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NOVEMBER 2007

Supplemental Evaluation of Mercury In Sediments Report Northwestern Lake Condit Hydroelectric Project FERC Project No. 2342

KLEINFELDER PROJECT NO. 53886 / 5

SUPPLEMENTAL EVALUATION FOR MERCURY IN SEDIMENTS REPORT NORTHWESTERN LAKE CONDIT HYDROELECTRIC PROJECT FERC PROJECT No. 2342 WHITE SALMON, WASHINGTON KLEINFELDER PROJECT NO. 53886 / 5

December 10, 2007

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December 10, 2007
Kleinfelder Project Number 53886 / 5

Mr. Tim Hemstreet, P.E.
PacifiCorp Hydro Resources
825 N.E. Multnomah, 1500 LCT
Portland, Oregon 97232

Subject: Supplemental Evaluation For Mercury In Sediments Report
Northwestern Lake – Condit Hydroelectric Project
FERC Project No. 2342
White Salmon, Washington

Dear Mr. Hemstreet:

We are pleased to present our Supplemental Evaluation for Mercury In Sediments Report for Northwestern Lake of the Condit Hydroelectric Project. We trust the information contained in this report will meet your needs at this time.

We appreciate this opportunity to provide our services to you. Should you require additional information or have any questions regarding this report, please contact us at (503) 644-9447.

Sincerely,

KLEINFELDER WEST, INC.

David Earl King, L.G.
Senior Professional Geologist

Lon R. Yandell, L.G.
Principal Geologist
Environmental Department Manager

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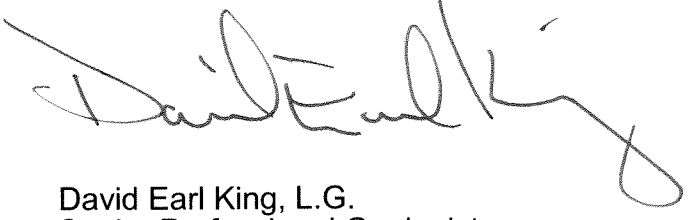

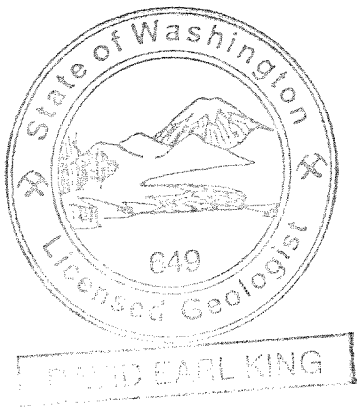

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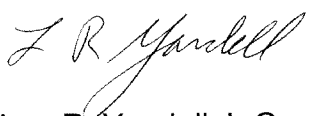

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1.0 INTRODUCTION

This document presents the results of the supplemental mercury evaluation of sediments collected from Northwestern Lake at the Condit Hydroelectric Project in June 2007. The evaluation of the supplemental samples collected in June 2007 is intented to provide a further understanding of mercury analytical results obtained from the sampling and analysis performed on Northwestern Lake sediment samples collected in December 2006. The results of the evaluation of sediment samples collected in December 2006, were reported by Kleinfelder in the *Sediment Sampling and Analysis Report Northwestern Lake Condit Hydrelectric Project; FERC Project No. 2342; White Salmon, Washington; Kleinfelder Project No. 53886 / 4; March 2007* (hereafter referred to as the *March 2007 Sediment Report*). The purpose of the Northwestern Lake sediment evaluation is to determine whether the sediment impounded behind Condit Dam meets established criteria for "open-water" release following the proposed removal of the dam. The Condit Hydroelectric Project is regulated by the Federal Energy Regulatory Commission (FERC) as FERC Project No. 2342.

The data presented in the *March 2007 Sediment Report* indicated that the average concentration of mercury in the fine silts impounded behind Condit Dam was 0.724 milligrams per kilogram (mg/Kg). According to the laboratory data provided in the *March 2007 Sediment Report*, the maximum detected concentration of mercury in the sediments was 2.030 mg/Kg, which was detected in a surface sediment sample collected from a location (boring B-1) near the dam.

The applicable current regulatory screening levels for mercury in freshwater sediments are presented in the *Northwest Regional Sediment Evaluation Framework* (*NWRSEF*) guidance document. The lower screening level (SL1) value is 0.28 mg/Kg and the upper screening level (SL2) is 0.75 mg/Kg. The *NWRSEF* states, "The lower screening level (SL1) corresponds to a concentration below which adverse effects to benthic organisms would not be expected, and the upper screening level (SL2) corresponds to a concentration at which minor adverse effects may be observed in the more sensitive groups of benthic organisms."

The Interim Final *NWRSEF* was presented in September 2006, by the Regional Sediment Evaluation Team (RSET) as a new framework for evaluating sediments and the suitability of disposing those sediments in the Pacific Northwest. The RSET is composed of the U.S. Army Corps of Engineer's (USACOE's) Seattle District,

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USACOE's Portland District, USACOE's Walla Walla District, USACOE's Northwestern Division; the U.S. Environmental Protection Agency (EPA) Region 10; Washington Department of Ecology (WDOE); Washington Department of Natural Resources (WDNR); Oregon Department of Environmental Quality (ODEQ); Idaho Department of Environmental Quality (IDEQ); National Marine Fisheries Service (NMFS); and the U.S. Fish and Wildlife Service (US F&WS).

Laboratory bioassays conducted on sediment collected in December 2006 and composited from the complete lower basin Dredged Material Management Unit (DMMU) indicated that the sediment did not have an adverse effect on the life cycles of the test species. However, because mercury concentrations were found in excess of the upper screening level (SL2) listed in the *NWRSEF*, the RSET requested that PacifiCorp:

1. Collect additional samples from Northwestern Lake to confirm the sediment mercury concentration found near sample location B1-72,
2. Conduct bio-assays on collected sediments found to have the highest mercury concentrations,
3. Establish the bio-availability of mercury found in the sediments through fish and invertebrate tissue analysis (bioaccumulation testing), and
4. Characterize background mercury concentrations in sediments in the local area to determine whether to establish whether Northwestern Lake sediment concentrations are consistent with background levels.

On June 22, 2007, WDOE requested that the bioaccumulation testing initially proposed for the work documented in this report be expanded to include the evaluation of the non-native species *Lumbriculus variegates* and *Corbicula fluminea*. The requested scope expansion by WDOE also included the evaluation of a reference sample with similar characteristics to the project test sediments (location B-1).

The data presented in this report is also intended to support the hypothesis presented in the *March 2007 Sediment Report*, which suggested that the elevated concentrations of mercury encountered in the fine-grained sediments impounded in Northwestern Lake behind Condit Dam are due to naturally occurring background concentrations of the native element. This hypothesis was developed based on the understanding that hydrothermal alteration associated with recent volcanic activity, such as that which has occurred with Mount St. Helens, is a known source of mercury.

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The information presented in this document is intended to satisfy the RSET and *NWRSEF* criteria. Included in this report are the data provided in the *March 2007 Sediment Report*, which have been reconfigured to conform with the format requested by the RSET (refer, Tables 1 through 4).

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2.0 PROJECT DESCRIPTION

The following sections describe the project location, background information, the site ranking, and proposed dredging and sampling parameters.

2.1 PROJECT DESCRIPTION

The Condit Hydroelectric Project is located on the White Salmon River on the border of Klickitat and Skamania Counties approximately 3.3 miles upstream of the confluence of the White Salmon and Columbia Rivers (refer, Figure 1). The U.S. Geological Survey (USGS) topographic coordinates for the Condit Hydroelectric Project are Sections 2 and 3, Township 3 North, Range 10 East, Willamette Meridian (Sec. 2 and 3/T3N/R10E W.M.). The Condit Hydroelectric Project includes a 125-foot high concrete dam across the White Salmon River that diverts water into a 1-mile long woodstave flowline. The woodstave flowline conveys water to a surge tank, where the water is diverted into two pipes (penstocks) for delivery to two turbine generators in the powerhouse downstream of the dam.

The Condit Hydroelectric Project is owned and operated by PacifiCorp and has been in operation since construction was completed in 1913. The name of the reservoir behind the dam is Northwestern Lake. Northwestern Lake is approximately 10,380 feet long with a surface area of approximately 92 acres (refer, Figure 2). The pool elevation listed on the USGS Northwestern Lake topographic map (1983 Edition) is 294 feet above mean sea level. At the time of its construction, the depth of water in the reservoir ranged from approximately 15 to 110 feet. Since the construction of the dam, the reservoir has been collecting sediments brought in by the White Salmon River. As of 1990, the depth of water in the reservoir reportedly ranged from approximately 3 to 85 feet.

Following the construction of the dam, a sawmill was established on a bay on the east shore of the reservoir, immediately upstream of the dam. This sawmill remained in operation for several decades. The exact start up and shut down dates of the sawmill operation are unknown, except that it closed sometime prior to 1960. As part of the development of the *Work Plan for Sediment Characterization* in 1994, a site reconnaissance was conducted of the upland areas around Northwestern Lake and upstream along the White Salmon River. No industrial activity was observed. Land use consisted primarily of residential usage, with some orchards located on the eastern bank of the reservoir. The reconnaissance findings were presented in a report prepared by

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Squier Associates in 1994, entitled the *Condit Hydroelectric Project (FERC Project No. 2342) Northwestern Lake Sediment Characterization Study; White Salmon, Washington* (the *1994 Condit Study*). Reconnaissance of the upstream area of the White Salmon River was also conducted on March 2, 2005, to confirm that no new sources of possible environmental contaminants had been developed since 1994. This reconnaissance identified a new rock quarry just east of Highway 141 (about 0.5 miles east of the northern end of the Lower Basin of Northwestern Lake). This new activity could be considered a new source for fine sediment, but not environmental contaminants. No new potential contaminant sources were discovered during the March 2, 2005, reconnaissance.

A bathymetric survey of the reservoir was conducted in 1990 by PacifiCorp. Based upon a comparison of preconstruction topography to current bathymetry, a channel profile, showing the existing water depths and sediment thicknesses, was developed by others. Based upon this document, the existing water depth within the reservoir appears to vary from approximately 3 to 85 feet, with an accumulated sediment thickness that varies from approximately 13 to 65 feet, with an average thickness of approximately 31 feet. Additional bathymetry work was conducted in 1997 and 2006. On the basis of the bathymetry work, the current volume of accumulated sediments has been estimated by others to be 2.3 million cubic yards.

2.2 1994 AND 1997 INVESTIGATIONS

In 1994, exploratory borings were drilled from a barge at 10 locations in Northwestern Lake. Eight of those locations were chosen using a random number selection process. The remaining two borings were located at the extreme upstream and downstream limits of barge access within the reservoir. As part of the *1994 Condit Study*, 45 geotechnical and 39 environmental samples were collected at various depths from the 10 sample points.

The *1994 Condit Study* sediment characterization testing program consisted of both geotechnical and environmental testing. The geotechnical testing included the following:

- soil classification,
- moisture content,
- grain-size analysis, and
- unit weight determination.

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The environmental testing included an analytical testing program for inorganic metals and organic compounds considered to be of concern by WDOE at that time. In 1994, the mercury concentrations ranged from less than 0.025 mg/Kg to 1.1 mg/Kg. The average mercury concentration in samples collected from the fine-grained sediments was 0.724 mg/Kg. The average mercury concentration in the coarse-grained sediments was 0.30 mg/Kg.

Additional investigation of the sediments was also conducted by Squier Associates in 1997. The results of that additional investigation were presented in a report entitled, *"Additional Geotechnical Exploration and Laboratory Testing at the Condit Hydroelectric Project (Contract No. P018780)"* and dated November 20, 1997. Analytical data from the 1994 and 1997 reports were provided in the *March 2007 Sediment Report*.

The 1994 and 1997 geotechnical testing results indicated that the reservoir sediments consist mainly of fine-grained materials in the downstream deep pool area (Lower Basin), and granular materials in the upstream area (Upper Reservoir). A transition area where the upstream granular sediments have overridden the deep pool fine-grained sediments is located in the middle of the reservoir.

Our review of the environmental testing results and pertinent geological literature indicated that the detected metal concentrations (particularly mercury) were within expected background levels. However, residual pesticides and herbicides were detected in the intermediate-aged sediments in the reservoir.

2.3 2006 SITE RANKING

The data presented in the *March 2007 Sediment Report* was generated based on the protocols and criteria presented in the *Dredged Material Evaluation Framework, Lower Columbia River Management Area, November 1998 (DMEF)* and a *Sampling and Analysis Plan* (SAP) approved by the USACOE on October 16, 2006. The *Sampling and Analysis Plan* submitted to the USACOE for the work described in the *March 2007 Sediment Report* was based on the Low Management Area Ranking for the lower basin DMMU of Northwestern Lake. The initial site ranking was based on *DMEF* criteria. Details on the site ranking process are included in the *March 2007 Sediment Report*.

The *DMEF* allowed for the creation of Dredged Material Management Units (DMMUs), which are subdivisions of a sediment-generating project site that represent sediments similar in nature. The Northwestern Lake sediments were segregated into two DMMUs:

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the lower basin sediments and the upper reservoir gravels. The segregation into two DMMUs provides for one Low Management Area Ranking of homogenous sediments (lower basin) and one area of Exclusionary Ranking (upper reservoir). The homogeneity of the sediments is supported by the 1994, 1997, and 2007 mechanical sieve data. PacifiCorp previously estimated that the sediment volume in Northwestern Lake was approximately 2.2 million cubic yards, based on measured accretion rates and the 1990 bathymetric survey. Using this information and the information presented in the *1994 Condit Study*, the lower basin was determined to include about 51percent of the sediments or 1.122 million cubic yards. The *DMEF* sampling requirement for a homogeneous Low Management Area Ranking DMMU is one sample per 100,000 cubic yards. Accordingly, 12 samples were proposed in the *August 2006 SAP* for the 1.122 million cubic yards of sediments.

2.4 MARCH 2007 SEDIMENT REPORT

The *March 2007 Sediment Report* presented the findings of the field work conducted between December 13 and 18, 2006, which consisted of advancing push probes at four locations using a direct-push drill rig mounted on a barge. The four sample locations (B-1 through B-4) were selected to represent the thickest sediment column in an area representing approximately one quarter of the area of the Lower Basin. Surface casing was used between the barge and the mudline for probes B-1 and B-4. Direct sampling (no surface casing) was used in probes B-2 and B-3. Water depth to the mudline (top of submerged sediments) at each probe location was measured directly with a steel tape. All probes were extended until refusal, which was assumed to indicate gravels or bedrock.

Three samples were obtained from each sample location. The sample depths were typically spaced at a minimum of 10-foot intervals. Multiple holes were required for sample locations B-2, B-3, and B-4 due to either poor recovery or the inability of the barge to properly anchor as a result of the strength of the current at that time. Three duplicate samples were also collected during the field activities for quality assurance and quality control (QA/QC) purposes.

Each sediment sample was analyzed for the physical and chemical parameters required by the *DMEF,* except the sediments were not tested for the presence of butyl tins (also referred to as organotins). The sediment testing methods conformed with the methods listed in the *DMEF.* The physical parameter testing indicated that the

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sediments in the Lower Basin are predominantly fine grained (less than 0.43 millimeters).

The mercury concentration in one sample (sample B1-72) was identified as exceeding the *DMEF* bioaccumulation screening level of 1.5 milligrams per kilogram (mg/Kg). Based on this finding, Tier III Biological Testing (bioassay) was conducted. Sample B1-72 was the sample collected nearest the dam, at the sediment surface, and in 72 feet of water. To satisfy the *DMEF* requirements, the freshwater bioassays were conducted with the amphipod *Hyallella azteca* and the midge *Chironomus tentans*. The freshwater bioassays were also conducted on a reference sample obtained at the mouth of the White Salmon River near the Columbia River, at the Underwood In-Lieu Fishing Access Site managed by the U.S. Department of Interior's Bureau of Indian Affairs (BIA). The bioassay testing indicated that the sediments would not adversely impact the biota of the Columbia River system.

Mercury was detected above the *DMEF* Screening Level of 0.41 mg/Kg in 11 of the 15 sediment samples. For reference purposes, the *NWRSEF* SL1 for mercury is 0.28 mg/Kg and the *NWRSEF* SL2 is 0.75 mg/Kg (these values were not included in the *March 2007 Sediment Report*). The range of mercury concentrations documented in the *March 2007 Sediment Report* is from 0.020 mg/Kg to 2.03 mg/Kg. In 1994, the mercury concentrations ranged from less than 0.025 mg/Kg to 1.1 mg/Kg. Mercury was not detected above the *DMEF* Maximum Level of 2.3 mg/Kg.

The chemical analysis of sediments presented in the *March 2007 Sediment Report* indicated that most contaminants of concern (CoCs) were not present in the sediments. Those CoCs that were detected were typically present at relatively low concentrations as compared to the *DMEF* Screening Levels. However, one sample (B1-72) did contain a mercury concentration (2.030 mg/Kg) above the *DMEF* Bioaccumulation Trigger Level (discussed above), which initiated the bioassay testing. The chemical analysis did not detect analytes above *DMEF* Maximum Levels.

Tables 1 through 4 present the *March 2007 Sediment Report* data and compare the data to the NWRSEF criteria. The data has also been reconfigured to conform to the format requested in the NWRSEF. The locations of the samples collected in December 2006 are presented in Figure 3.

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3.0 SITE EXPLORATION METHODOLOGY

The following sections discuss the methodologies and protocols used to complete the field portion of this project.

3.1 SUPPLEMENTAL SAMPLING AND ANALYSIS PLAN

Kleinfelder submitted a *Mercury Distribution and Background Evaluation Supplemental Sampling and Analysis Plan* (*SSAP*) to PacifiCorp on June 12, 2007 *(June 2007 SSAP).* A copy of the SSAP is included in Appendix A. After PacifiCorp's review and approval, the *June 2007 SSAP* was submitted to RSET for review and approval. At WDOE's request, an addendum letter was submitted on July 2, 2007 that included a description of additional bioaccumulation testing to be conducted. The objective of the *June 2007 SSAP* was to provide a systematic approach to collecting additional sediment characterization data that would supplement the existing data presented in the *1994 Condit Study* and *March 2007 Sediment Report*. The data collected during implementation of the *June 2007 SSAP* (and July 2007 Addendum Letter) are intended to satisfy the requirements of the RSET in accordance with the *NWRSEF*.

The USACOE, acting on behalf of the RSET, approved the *June 2007 SSAP* on July 10, 2007, in a transmittal to PacifiCorp (refer, Appendix B). The Washington Department of Fish and Wildlife provided a *Hydraulic Project Approval* on July 11, 2007, that authorized the sampling program to proceed in Northwestern Lake. A copy of the *Hydraulic Project Approval* is also included in Appendix B. A Wilderness Use Permit was also obtained from the U.S. Department of Agriculture's (USDA) Forest Service on July 17, 2007, to access the sampling locations within the Gifford Pinchot National Forest.

3.2 FIELD DOCUMENTATION

A team consisting of a Kleinfelder geologist and a Kleinfelder biologist conducted the field work to collect the sediment samples. The fish species collection effort was conducted by a PacifiCorp fish biologist and two representatives from the Washington Department of Fish and Wildlife.

Each sediment sampling location was documented by a member of the Kleinfelder field team in the field notes, which were maintained during sampling operations. Included in the field notes was the following information:

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- Names of the individuals onsite during sample collection
- Weather conditions
- Depth to top of sediments (mudline) at each sampling station
- Date and time of collection of each sample
- The sample identification number
- Physical sediment descriptions, including general soil classification and observations for the presence of vegetation, debris, evidence of biological activity, and other distinguishing characteristics or features
- Any deviation from the approved sampling plan

The sediment samples for chemical analysis and bioassay testing were immediately placed in properly labeled, laboratory-supplied, glass jars with teflon-lined lids, and placed on ice. Containers were filled as tightly as possible, eliminating obvious air pockets. With the cap liner's Teflon side down, the cap was carefully placed on the opening of the container, displacing any excess material. Bulk samples for use in the exposure process of the bioaccumulation testing were placed into clean 5-gallon plastic buckets with clean lids.

The sampling containers were labeled with: the project name, sample identification, date, and time; and referenced by entry into the field logs. New, disposable nitrile gloves were worn and replaced between each sample collected.

3.3 SAMPLE TRANSPORT AND CHAIN-OF-CUSTODY PROCEDURES

Following sample collection, the samples were packed on ice in coolers. A signed and dated chain-of-custody seal was placed on all coolers prior to removal from the site. The chain-of-custody records were maintained throughout all sampling activities and accompanied samples during shipment to the laboratory. Information tracked by the chain-of-custody records included: sample identification number, date and time of sample receipt, and analytical parameters requested.

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4.0 MERCURY DISTRIBUTION EVALUATION

The mercury concentrations presented in the *March 2007 Sediment Report* ranged from 0.020 mg/Kg to 2.03 mg/Kg. The *NWRSEF* SL1 for mercury is 0.28 mg/Kg and the *NWRSEF* SL2 is 0.75 mg/Kg. The *NWRSEF* SL1 and SL2 are the current applicable action levels. The highest mercury concentration detected (2.03 mg/Kg) was in the sediment sample collected nearest the dam (identified as sample B1-72). Sample B1-72 was collected when the sampling barge was anchored adjacent to the safety-buoy line that is intended to limit water craft from approaching the dam. The water depth at the location of sample B1-72 was about 72 feet at the time of sampling on December 18, 2006. The sample consisted of fine-grained material only.

One of the objectives of the *June 2007 SSAP* was to further characterize sediment mercury concentrations in the vicinity of sample B1-72. This was accomplished by collecting a set of seven supplemental sediment samples in the vicinity of sample B1-72.

4.1 SAMPLING LOCATIONS

On July 18, 2007, seven supplemental surface sediment samples were collected in the vicinity of sample B1-72. The seven sample points were identified as NW1-071807, NW2-071807, NW3-071807, NW4-071807, NW5-071807, MW6-071807, and NW7-071807. The locations of the sample points were determined with a Global Positioning System (GPS) unit with a minimum of three satellite points for reference (refer to Table 5 and Figure 4).

The sediment sampling was conducted from a 24-foot aluminum sled with twin outboard motors owned and operated by Mark Marine Services, Inc., of Camas, Washington (Mark Marine sled). The sediment samples were collected using a bottom dredge capable of securely recovering an approximate 235 cubic inch sample.

Adequate sample volume (approximately 360 cubic inches) was collected from each location for the proposed tests. In order to accomplish this, the sediment-filled bottom dredge was emptied into a clean, dedicated, 5-gallon bucket immediately after retrieval. When an adequate volume of sediment was obtained, the sediments were transferred to the appropriate containers. The sampling containers were referenced in the field

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logbook and labeled with the project name, sample identification, type of analysis to be performed, and the date and time.

4.2 DISCUSSSION OF CHEMICAL ANALYSES

The samples for chemical analyses were delivered to Columbia Analytical Services in Kelso, Washington (CAS-Kelso) for chemical analysis. All samples delivered to CAS-Kelso were transported under chain-of-custody protocols. The seven project samples collected in Northwestern Lake on July 18, 2007, were tested for the following:

- mercury concentrations by EPA Method 7471A,
- total solids by EPA Method 160.3M,
- total volatile solids (TVS) by EPA Method 160.4M,
- total organic carbon (TOC) by EPA Method American Society for Testing and Materials (ASTM) D 4129-98M,
- ammonia by EPA Method 350.1M, and
- sulfides by Standard Method 9030M.

The results of the chemical analyses are presented in Table 6. Copies of the analytical reports provided by CAS-Kelso are included in Appendix C. In summary, the following results were reported for the seven samples collected from the vicinity of sample point B1-72:

- Mercury concentrations ranged from 0.094 mg/Kg to 0.881 mg/Kg with an average of 0.6 mg/Kg. The mercury concentration in B1-72 was 2.030 mg/Kg and the average mercury concentration derived from the *March 2007 Sediment Report* is 0.7 mg/Kg.
- Total solids percentages ranged from 43.7 percent to 55.1 percent with an average of 50.4 percent. The total solids percentage in B1-72 was 48.0 percent and the average total solids percentage derived from the *March 2007 Sediment Report* is 61.0 percent.
- Total volatile solids percentages ranged from 3.67 percent to 5.84 percent with an average of 4.99 percent. The TVS percentage in B1-72 was 4.01 percent and the average TVS percentage derived from the *March 2007 Sediment Report* is 4.8 percent.
- TOC ranged from 0.86 percent (8,600 mg/Kg) to 1.64 percent (16,400 mg/Kg) with an average of 1.37 percent (13,700 mg/Kg). The TOC in B1-72 was 1.05

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percent (10,500 mg/Kg) and the average TOC derived from the *March 2007 Sediment Report* is 1.1 percent (11,000 mg/Kg).

- Ammonia concentrations ranged from 11.0 mg/Kg to 26.9 mg/Kg with an average of 18.9 mg/Kg. The ammonia concentration in B1-72 was 2.88 mg/Kg and the average ammonia concentration derived from the *March 2007 Sediment Report* is 78.4 mg/Kg.
- Sulfides ranged from non-detect (less than 0.5 mg/Kg) to 50.2 mg/Kg with an average of 19.5 mg/Kg. The sulfide concentration in B1-72 was also less than 0.5 mg/Kg and the average sulfide concentration derived from the *March 2007 Sediment Report* is 63.1 mg/Kg.

The mercury concentrations reported for the seven supplemental samples were all less than the mercury concentration detected in sample B1-72. The mercury concentrations in the supplemental sediment samples appear to be more consistent with the average mercury concentrations derived from the data presented in the *March 2007 Sediment Report*.

4.3 DISCUSSION OF PHYSICAL PARAMETER ANALYSES

Representative samples from the seven supplemental sediment sample points (NW-1 through NW-7) were also delivered to Northwest Testing, Inc. a division of Northwest Geotech, Inc., of Wilsonville, Oregon (Northwest Testing). The seven samples were analyzed for grain size determination using ASTM D422 and ASTM D2487 methods. The ASTM D422 analysis used the following sieve sizes: 5-inch; 2.5-inch; 1.25-inch; 0.63-inch; 0.31-inch; and numbers 5, 10, 18, 35, 60, 100, and 200. The fine-grained fraction (finer than No. 200 sieve) was classified using hydrometer analysis on the seven samples. Hydrogen peroxide was not used in the preparation for grain size analysis.

The results of the grain size analysis are provided in Appendix D and are summarized in Table 6. On the basis of the grain size analysis, Kleinfelder has classified the sediment in accordance with the Unified Soil Classification System, ASTM D 2487. The sediment classification is presented in Table 7.

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4.4 COMPARISON OF FINDINGS TO NWRSEF SCREENING LEVELS

The applicable current regulatory screening levels for mercury in freshwater sediments are found in the NWRSEF. These screening levels include a lower screening level (SL1) of 0.28 mg/Kg and an upper screening level (SL2) of 0.75 mg/Kg. Five of the seven samples collected to evaluate the distribution of mercury in the vicinity of the sample B1-72 exceeded the SL1 screening level of 0.28 mg/Kg. Four of those five samples also exceeded the SL2 screening level of 0.75 mg/Kg. The average mercury concentration for the seven samples (NW1-071807 through NW7-071807) also exceeded the SL1 screening level.

4.5 ELUTRIATION TESTING OF SEDIMENTS

The mercury that has been identified in the Northwestern Lake sediments has been sorbed onto fine-grained particles deposited by the river. Elutriation testing was also conducted on the sediments in order to evaluate the ability of that mercury to resuspend into the water column and become water-borne mercury. The elutriation process is a method of washing, straining, or decanting that separates the light and heavy particles.

The elutriation testing was conducted by CAS-Kelso. Two liters of sediment were provided by Kleinfelder for each sampling location. The sediment collected from sample location NW1-071807 was selected for the elutriation testing since this location had the highest concentration of mercury of the seven sets of sediment samples collected on July 18, 2007. CAS-Kelso conducted the elutriation preparation in general accordance with the guidance procedures provided by the EPA for water quality evaluations of water column effects. The CAS-Kelso elutriation preparation procedures differed from the EPA guidance for standard elutriate preparation in that they used laboratory grade deionized water instead of natural water from the receiving water body. This deviation in the methodology produces a concentration with a high bias with respect to released contaminants concentrations due to the principle of chemical equilibria, which provides for a greater desorption into a pure media than a media that already has a solute load. Both procedures aggressively mix the sediments with the aqueous media, allow for settling of the sediments over a prescribed time period, and then siphon off the supernate without disturbing the settled material. A supernate, or supernatant liquid, is the liquid that floats above non-soluble solids.

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The supernate was analyzed for mercury using EPA Method 1631. This EPA method is used to detect very low levels of mercury. The reporting limit for the EPA Method 1631 analysis is in nanograms per liter (ng/L or parts per trillion). The elutriate sample analysis resulted in a detected mercury concentration of 0.525 ug/L.

Various regulatory levels have been promulgated for mercury. These include the WDOE's Ambient Water Quality Criteria (AWQC) for chronic and acute exposures as defined in Washington Administrative Code (WAC) Chapter 173-201A (*Water Quality Standards for Surface Waters of the State of Washington*) and the National Recommended Water Quality Criteria (NWRQC) published by EPA's Office of Water and Office of Science and Technology in 2004. The NWRQC include the Criteria Maximum Concentration (CMC), which is "an estimate of the highest concentration of …" mercury… "in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect." The NWRQC also include the Criterion Continuous Concentration (CCC), which is "an estimate of the highest concentration of …" mercury … "in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect." Also presented, for reference, are the EPA's Maximum Contaminant Level (MCL) and EPA's Region IX Preliminary Remediation Goal (PRG) for mercury in tap (drinking) water.

These regulatory levels and reported sample concentration (0.525 ug/L) are presented in Table 8 in descending order. This method displays the relationship between of the values and the observed sample concentration. Based on this review, the elutriation test concentration only exceeds the WDOE AWQC concentration for chronic exposures (0.012 ug/L).

4.6 QUALITY ASSURANCE AND QUALITY CONTROL

CAS-Kelso has provided a Case Narrative for their package of laboratory results submitted for this set of analyses (refer, Appendix C). The Case Narrative notes that the Kleinfelder sampler neglected to sign the chain of custody prior to relinquishing the samples to the CAS-Kelso courier. This is also noted in Kleinfelder's Quality Assurance (QA) review of the data package (refer, Appendix C). The sampler did sign the chain of custody in the title block.

Our QA review of the data indicates that the data is valid and, therefore, is acceptable for use in accomplishing the project objectives. The one noted issue is that the sulfide

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detections may be biased high due to high relative percent differences (RPDs) between the project samples and a selected duplicate sample. It is noted in the Case Narrative that the high RPDs may be due to variability within the sediments. It appears that all samples for physical and chemical analysis were analyzed within the recommended holding times. Kleinfelder's QA/QC review included an evaluations of both the laboratory and field QA/QC procedures and results.

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5.0 BACKGROUND MERCURY EVALUATION

As stated earlier, the *March 2007 Sediment Report* documented that the mercury concentration in one sample (Sample B1-72) was reported as 2.030 mg/Kg. The *March 2007 Sediment Report* further presented that the average concentration of mercury in the fine silts impounded behind Condit Dam, based on the samples collected in December 2006, is 0.724 mg/Kg.

Mercury is a native element commonly found in rocks associated with Cascade Range volcanic activity. The White Salmon River receives direct runoff from nearby Mount Adams, a Cascades Range volcano. The objective of the background mercury evaluation was to determine whether mercury concentrations identified in Northwestern Lake are within background concentrations found in the local area.

5.1 LITERATURE REVIEW

According to U.S. Geological Services (USGS) Professional Paper 1270 (*Element Concentrations In Soils and Other Surficial Materials of the Conterminous United States*), background mercury concentrations are considered to be between 0.32 mg/Kg and 2.0 mg/Kg in the White Salmon River area. Mark A. Engle, PhD, a Research Geologist with the USGS, has stated in a personal communication that the USGS generally considers 0.100 mg/Kg as a "cutoff for soils" when considering whether a soil has an elevated mercury concentration. Mr. Engle was contacted based on a published abstract for a Poster Presentation entitled *Mercury Rising Out of Volcanoes and Geothermal Systems*.

Engle's abstract and a paper prepared by James J. Rytuba identify the Mount Saint Helens eruption as being a local source of mercury emissions. Mr. Rytuba's paper (*Geogenic and Mining Sources of Mercury to the Environment*) includes a discussion on the processes involved in the release of mercury from volcanic activity, which are depicted in Figure 5. Both authors indicate that the amount of mercury emitted by Cascade volcanoes is minor compared to the global loading of mercury, but that the process can be significant on a local scale. According to the researchers, mercury will also be concentrated in hydrothermally altered argillic (clayey) rocks. The argillic hydrothermal alteration zones are typically located on or near the volcanic summits. However, due to the argillic rocks inherent weakness and instability of active volcanic

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summits, the rocks are entrained in lahars and associated debris flows that can travel great distances from the volcano.

The role of lahars in distributing the weakened, hydrothermally altered argillic rocks is also discussed by James W. Vallance in *Postglacial Lahars and Potential Hazards in the White Salmon River System on the Southwest Flank of Mount Adams, Washington* (USGS Bulletin 2161). The Salt Creek Lahar was identified by Vallance and Rytuba (personal communication) as being a flow with abundant blocks of hydrothermally altered rocks.

According to the EPA, the most prevalent source of anthropogenic (man-made) mercury in the environment is from the burning of fossil fuels, particularly coal. Coal-burning power plants reportedly account for over 40 percent of the mercury emissions in the United States. The EPA further estimates that less than half of the mercury that is deposited in the U.S. comes from U.S. sources.

WDOE's publication, *Chemicals of Special Concern in Washington State* (1992), describes the following other anthropogenic sources of mercury:

> "Mercury is used as a cleaning agent in heavy metal soaps, and as a base for pesticides. It is used in chemical production, laboratories, auto repair shops, dentistry, preservation of some latex paints, and the plating and metal printing industries. Mercury is used in thermometers, switches, and batteries, in fluorescent light bulbs, and in pharmaceuticals. It is found at illegal drug laboratory hazardous waste sites, where amphetamines and barbiturates have been processed."

Rytuba (2005) also identified forest fires as a mechanism to redistribute mercury into upper soil layers. Rytuba cites a 2003 article by Hans Friedli for this assertion. Hans Friedli and Christine Wiedinmyer reasserted this action in a 2007 article, *Mercury Emissions Estimates From Fires: An Initial Inventory for the United States,* which was published in the October issue of the journal, *Environmental Science and Technology*. The mercury released by the forest fires is not generated by the forest fires. Instead, it is atmospheric mercury, typically anthropogenic mercury that has been accumulated by the forests, which is then released by the combustion.

In 2001 and 2002, WDOE staff collected 60 sediment samples from 20 waterbodies in the State of Washington. The results of the study were published in 2003 under

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the title "*Mercury in Edible Fish Tissue and Sediments from Selected Lakes and Rivers of Washington State*, June 2003, Publication No. 03-03-026." Mercury was detected in all the waterbodies, although two waterbodies (the Okanogan River and Banks Lake) produced sediment samples with no detectable mercury among the set of three samples collected from those water bodies. The waterbodies with the highest levels of mercury were located in the southwestern portion of Washington. Northwestern Lake is in the southwestern portion of Washington. The maximum mercury concentration for Washington lake sediments, as reported in the 2003 document, is 0.327 mg/Kg.

5.2 SAMPLING LOCATIONS

Ten sample locations were selected from the region around Northwestern Lake and the White Salmon River for the background mercury evaluation. The selection of 10 samples for the data set was based on WAC 173-340-709 *Methods For Defining Background Concentrations* under the *Model Toxics Cleanup Act* (MTCA). Ten samples is the minimum required sample set for determining natural background concentrations. Natural background is further defined as the concentration "consistently present in the environment that has not been influenced by localized human activities."

Each sample location, illustrated on Figures 6 through 15, was selected to represent sediment that was within the White Salmon River drainage basin or within the same physiographical region. Efforts were made to match fine-grained sediments in Northwestern Lake by focusing the sampling efforts in areas where fine-grained sediments might accumulate in the selected locations. The sampling activities were conducted between July 17 and July 19, 2007. The ten sample locations in the Northwestern Lake region are described as follows:

- Little Buck Creek - Sample LBC-071807 (LBC) was collected from the Mark Marine sled with a dredge sampler at the confluence of Little Buck Creek and Northwestern Lake (refer, Figures 6 and 7).

- Buck Creek - No sample was collected from this location (refer, Figures 2 and 6) at the confluence of Buck Creek and Northwestern Lake due to the predominant prevalency of gravel and lack of fine grained material.

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- Mill Creek - Sample MC-071807 (MC) was collected from the Mark Marine sled with a dredge sampler at the confluence of Mill Creek and Northwestern Lake (refer, Figures 6 and 8).

- Spring Creek - Sample BC-071807 (BC) was collected from the Mark Marine sled with a dredge sampler at the confluence of Spring Creek and Northwestern Lake (refer, Figures 6 and 7).

- Salt Creek - Sample SP1-01707 (SP1) was collected in the southeast corner of Salt Creek Meadows on the Salt Creek Lahar (refer, Figures 6 and 9).

- Trout Lake – Sample SP2-071707 (SP2) was collected in a marshy area near the main flow channel and the southwest end of Trout Lake (refer, Figures 6 and 10).

- Gilmer Creek - Sample SP3-071707 (SP3) was collected near the confluence of Gilmer Creek and the White Salmon River approximately 300 feet upstream on Gilmer Creek (refer, Figures 6 and 11).

- Rattlesnake Creek - Sample SP4-071707 (SP4) was collected at the confluence of Rattlesnake Creek and The White Salmon River (refer, Figures 6 and 12).

- White Salmon – Sample SP5-071707 (SP5) was collected in a bay just north of the confluence of the White Salmon and Columbia Rivers in the tribal Underwood In-Lieu Fishing Access Site (refer, Figures 6 and 13). The letter granting permission for sampling access from the Northwest Regional Office of the BIA is included in Appendix B.

- Little White Salmon – Sample LWS-071907 (LWS) was collected along a river bend just below the Little White Salmon Fish Hatchery, at the confluence of the Little White Salmon and Drano Lake (refer, Figures 6 and 14).

- Wind River - Sample WR-071907 (WR) was collected in the bay at the confluence of the Wind River and the Columbia River (refer, Figures 6 and 15).

Sample collection tools were decontaminated between each location. The locations of the sample points were determined with a GPS unit with a minimum of three satellite points for reference (refer to Table 6).

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5.3 DISCUSSION OF PHYSICAL PARAMETER ANALYSES

The ten samples collected for the mercury background evaluation were also evaluated for the physical parameters of the sediments. Specifically, particle size was evaluated by ASTM Methods C-136/C117 and D 422 by Northwest Testing. The particle size analysis was conducted using the following sieve sizes: 5-inch; 2.5-inch; 1.25-inch; 0.63-inch; 0.31-inch; and numbers 5, 10, 18, 35, 60, 120, and 230. The fine-grained fraction (finer than No. 230 sieve) was further classified using hydrometer analysis (ASTM D-422). Hydrogen peroxide was not used in the preparation for grain size analysis.

The report provided by Northwest Testing is provided in Appendix D. In addition, the percentages of sediment that passed each of the sieves are included in Table 9. Sediment classification designations were also made in accordance with USCS and ASTM D 2487. The sediment classification designations are included in Table 7.

A special request was made to Northwest Testing to retain the portion of each sediment sample that passed the Number 200 sieve. This portion was collected into clean 8-ounce or 4-ounce jars (depending on the available volume) provided by CAS-Kelso and returned to Kleinfelder for delivery to CAS-Kelso.

5.4 DISCUSSION OF CHEMICAL LABORATORY ANALYSES

Both sets of samples (unsieved and sieved) for mercury analysis were delivered to CAS-Kelso for chemical analysis using EPA Method 7471A. CAS-Kelso also provided a total solids value for each sample. The analytical report from CAS-Kelso is included in Appendix C and the data are summarized in Table 9.

The highest mercury concentration (0.72 mg/Kg) encountered in the unsieved samples was associated with the mouth of the White Salmon River (collected at the Underwood In-Lieu Fishing Access Site). This concentration is comparable to the average mercury concentration (0.724 mg/Kg) of the sediment samples collected from Northwestern Lake in the 2006 samples - also on the White Salmon River. The mercury concentrations of the other unsieved samples ranged from 0.007 mg/Kg (collected at Trout Lake) to 0.443 mg/Kg (collected at the mouth of Mill Creek).

The average mercury concentration for the ten sieved samples collected to assist in the understanding of background concentrations in the White Salmon River drainage is

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0.142 mg/Kg. This average is less than the average derived from samples collected in Northwestern Lake.

The portions of the seven samples collected from tributaries of the White Salmon River that passed the number 230 sieve during the grain size analysis were also submitted for analysis of mercury content. The results of the mercury analysis on the sieved samples are also included in Appendix C and summarized in Table 9.

The laboratory reports show that the mercury concentrations in the sieved samples were about an order of magnitude higher than concentrations found in the unsieved samples. The mercury concentrations in the sieved samples ranged from 0.08 mg/Kg to 1.2 mg/Kg. The highest mercury concentration (1.2 mg/Kg) was found in the sample collected in Mill Creek, where the highest mercury concentration (0.443 mg/Kg) was detected in the seven unsieved samples. The lowest mercury concentration in the sieved samples (0.08 mg/Kg) was reported for the sample from Gilmer Creek, which contained a mercury concentration of 0.021 mg/Kg in the unsieved sample. The lowest unsieved mercury concentration (0.007 mg/Kg) was found in the Trout Lake sample, which increased to 0.11 mg/Kg in the sieved sample.

5.5 DISCUSSION OF RELATIONSHIP BETWEEN SAMPLE LOCATION AND MERCURY

The samples collected from sample points in proximity to Northwestern Lake (Mill Creek, Spring Creek, and Little Buck Creek) tended to produce greater mercury concentrations than the samples collected from points upstream of the lake (Salt Creek, Trout Lake, Gilmer Creek, and Rattlesnake Creek). Specifically, the average mercury concentrations for the two separate sample point types were an order of magnitude apart (0.19 mg/Kg compared to 0.019 mg/Kg).

The two sample point types could also be differentiated according to direction of origin. The three samples collected from the confluences of creeks with Northwestern Lake (Mill Creek, Spring Creek, and Little Buck Creek) originated west of Northwestern Lake and the White Salmon River. The three samples collected at the confluences of creeks with the White Salmon River (Salt Creek, Gilmer Creek, and Rattlesnake Creek) originated east of the white Salmon River. The Big Lava Bed Geologic Area and the Indian Heaven Volcanic Field, which together include over 20 volcanic vents of Quaternary age, and Mount St. Helens are located west of the White Salmon River and Mount Adams is located northeast of the White Salmon River. Samples collected from

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points west of the White Salmon produced higher mercury concentrations than those samples collected from sample points east of the White Salmon River. More recent volcanism has occurred west of the White Salmon River.

5.6 COMPARISON OF FINDINGS TO NWRSEF SCREENING LEVELS

As stated earlier, the applicable regulatory screening levels for mercury in freshwater sediments include a lower screening level (SL1) of 0.28 mg/Kg and an upper screening level (SL2) of 0.75 mg/Kg. The sample collected from the White Salmon River (SP5-071707) at its confluence with the Columbia River exceeded the SL1 criteria but not the SL2 criteria, although it closely approached that criteria (0.72 mg/Kg compared to 0.75 mg/Kg). Mercury concentrations in two of the three sieved samples collected from tributaries that empty into the lower portion of Northwestern Lake (Little Buck Creek and Mill Creek) exceeded both (SL1 and SL2) screening levels. The mercury concentration in the third sieved sample (the Spring Creek's sample concentration of 0.73 mg/Kg) almost matched the upper screening level. The only unsieved sample where the mercury concentration exceeded the lower screening level was collected from Mill Creek (MC-071807). No unseived samples exceeded the SL2 criteria.

5.7 QUALITY ASSURANCE AND QUALITY CONTROL

The initial set of samples for mercury analysis used in the mercury background evaluation were included in the CAS-Kelso data package discussed in Section 4.6. As stated earlier, the Case Narrative notes that the Kleinfelder sampler neglected to sign the chain of custody prior to relinquishing the samples to the CAS-Kelso courier. This is also noted in Kleinfelder's QA review of the data package (refer, Appendix C). The sampler did sign the chain of custody in the title block.

The second set of samples for mercury analysis (the sieved samples) were reported in a separate CAS-Kelso document. No issues or discrepancies were noted in the second CAS-Kelso Case Narrative (refer, Appendix C). It appears that all samples for physical and chemical analysis were analyzed within the recommended holding times. Our QA review of the data indicates that the data is valid and, therefore, are acceptable for use in accomplishing the project objectives.

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6.0 FRESHWATER BIOASSAY EVALUATION

The work presented in the *March 2007 Sediment Report* was based on guidance provided by the *Dredged Material Evaluation Framework, Lower Columbia River Management Area (DMEF, 1998).* In the *March 2007 Sediment Report*, one sample (Sample B1-72) was identified as exceeding the *DMEF, 1998* bioaccumulation screening level of 1.5 mg/Kg. Based on this finding, DMEF Tier III Biological Testing (bioassay) was conducted with the amphipod *Hyallella azteca* and the midge *Chironomus tentans* on a composite sample represenative of the complete sediment unit. The freshwater bioassays were also conducted on a reference sample obtained at the mouth of the White Salmon River near the Columbia River, at the Underwood In-Lieu Fishing Access Site managed by the U.S. Department of Interior's Bureau of Indian Affairs.

The laboratory bioassays conducted on the composited sediment collected in December 2006 indicated that the sediment had no adverse effect on the life cycles of test species. However, because mercury concentrations were found in excess of the *NWRSEF* SL2, the RSET requested that PacifiCorp collect additional information to confirm the concentrations of mercury in sediments of Northwestern Lake, and conduct bioassays on the worst-case sediments (the sample with the highest mercury concentrations).

6.1 FRESHWATER BIOLOGICAL ASSAY (BIO-ASSAY) METHODOLOGY

The freshwater biological assay testing was conducted by Northwestern Aquatic Sciences of Newport, Oregon (NW Aquatic). NW Aquatic also conducted the initial bioassays reported in the *March 2007 Sediment Report*. The freshwater bioassays were conducted with the amphipod *Hyallella azteca* and the midge *Chironomus tentans*. The amphipods are small (about 0.25-inch) aquatic crustaceans. Midges are tiny (about 0.05-inch) 2-winged flying insects. The testing protocol for the *Hyallella azteca* and *Chironomous tentans* testing was based on EPA Methods 100.1 and 100.2, respectively, and ASTM Method E 1706-00 (for both).

Bioassays were conducted on the one sample selected based on the mercury concentration, as reported by CAS-Kelso and a reference sample, also selected based on mercury concentrations reported by CAS-Kelso. Specifically, sample NW1-071807, with a mercury concentration of 0.881 mg/Kg was selected as the worst-case sample

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and sample NW7-071807, with a mercury concentration of 0.094 mg/Kg was selected as the reference sample. The sediment samples for freshwater bioassay testing were developed by obtaining three discrete 32-ounce jars at each of the seven sampling locations accessed for the mercury distribution task (samples NW1-071807 through NW7-071807).

As stated earlier, physical parameter information and chemical reference information were obtained on the samples from Northwestern Lake and identified as NW1-071807 through NW7-071807. Samples NW1-071807 through NW7-01807 were collected from the same medium at the same relative time, and accordingly are considered seven replicates. The physical parameter analyses (grain size) were completed by Northwest Testing and the chemical reference analyses were completed by CAS-Kelso. The chemical reference analyses for the seven replicate samples included the following:

- total solids,
- TVS,
- total organic carbon,
- ammonia, and
- sulfides.

The analytical reports from CAS-Kelso were provided to NW Aquatic prior to initiating the bioassay testing. NW Aquatic personnel collected their own negative control sample from Beaver Creek, a location about 8 miles south of Newport, Oregon prior to initiating the bioassays.

The *Hyella* and *Chironomus* tests are both 10-day growth and survival tests. A known quantity of each species is introduced into each of the test sediments (project, reference, and control). After the 10-day period the population of each specie is evaluated for mortality rate. The *Chironomus* population is also burned and weighed for an “ash-free weight”. The “ash-free weights” are used to evaluate changes in biomass between the sediments. The results are then compared to “One Hit Criteria” and “Two Hit Criteria”. A more complete description of the bioassay method is included in Appendix E.

6.2 DISCUSSION OF BIOASSAY RESULTS

NW Aquatic’s report for the freshwater biological assay is included in Appendix E. In summary, the following statistical results were reported for the *Hyella* tests:

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- Project Sample (NW1-071807) = 6.3 percent mean mortality with a Standard Deviation (SD) of plus or minus (+/-) 7.4.
- Reference Sample (NW7-071807) = 0.0 percent mean mortality with an SD of +/- 0.0.
- Control Sample = 1.3 percent mean mortality with an SD of +/- 3.5.

The statistical results of the *Chironomous* tests are as follows:

- Project Sample (NW1-071807) = 3.8 percent mean mortality with an SD of +/- 5.2.
- Reference Sample (NW7-071807) = 5.0 percent mean mortality with an SD of +/- 5.3.
- Control Sample = 1.3 percent mean mortality with an SD of +/- 3.5.

The statistical results of the average individual ash-free weights of the *Chironomous* are as follows:

- Project Sample (NW1-071807) = 0.62 milligrams (mg) with an SD of +/- 0.05.
- Reference Sample (NW7-071807) = 0.76 mg with an SD of +/- 0.05.
- Control Sample = 0.74 mg with an SD of +/- 0.05.

Although the results of the project sample are considered "statistically significantly different from the reference" sample, the results did not fail under the one-hit rule, nor did the results fail under the two-hit rule. The one-hit and two-hit rules are levels of observed response for biological test interpretation. The one-hit rule is for when a single observed response indicates a test failure, such as a test species' mortality rate being greater than 15 percent of the mean reference mortality rate. The two-hit response is similar, but there are two observed indications of test failures. Accordingly, the project sediments, which are the sediments with the highest detected concentration of mercury of the seven samples collected in July 2007 in the vicinity of the highest reported mercury concentration for Northwestern Lake, passed the freshwater biological assay tests (refer, Appendix E).

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7.0 MERCURY BIOACCUMULATION EVALUATION

The State of Washington recognizes certain toxic substances in the environment as being bioaccumulative. Bioaccumulation is the process wherein a member of the biosphere takes in a substance quicker than it will excrete the same substance. This is a problem when the substance is toxic. The bioaccumulated toxic substance can also be passed along from one species (prey) to another species (predator). The larger the organism and the more active a carnivore an organism is, the greater the potential bioaccumulation. Mercury is a recognized bioaccumulative toxic substance.

To establish the possible bio-availability of mercury found in the sediments through fish and invertebrate tissue analysis, bioaccumulation testing was also conducted as part of this supplemental mercury evaluation.

7.1 DEVLOPMENT OF SCOPE OF WORK FOR MERCURY BIOACCUMULATION EVALUATION

On June 8, 2007, Kleinfelder submitted a *Supplemental Sediment Sampling and Analysis Plan* (*SSAP*) to further evaluate mercury distribution in the sediments and aquatic fauna of Northwestern Lake. One of the three tasks specified in the *SSAP* was a bioaccumulation study that was to focus on fish tissue, molluscan tissue, and crayfish (*Astacidae*) tissue. Based on the initial field findings, on June 22, 2007, WDOE requested that the bioaccumulation testing initially proposed for the work documented in this report be expanded to include the evaluation of the non-native species *Lumbriculus variegates* and *Corbicula fluminea*. The requested scope expansion by WDOE also included the evaluation of a reference sample with similar characteristics to the project test sediments (location B-1).

7.2 FIRST PHASE OF SPECIMEN COLLECTION FOR BIOACCUMULATION EVALUATION

On June 5, 2007, a PacifiCorp fish biologist, accompanied by two representatives of the Washington Department of Fish and Wildlife (WDFW) initiated the proposed field work for the bioaccumulation task of the *SSAP*. The bioaccumulation field team used two 250-foot long, monofilament gill nets with 3-inch stretch mesh and a 50-foot long, monofilament gill net with variable mesh that stretched from ¾-inch to 2-inch openings.

One of the 250-foot long nets was deployed near the boat barrier at the dam and the other 250-foot long net was deployed just upstream of Little Buck Creek on the west

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shoreline. At these sites, the nets spanned nearly half the width of the lake. The 50-foot long net was fished from the east shoreline across from the southern boat ramp. The three nets were set at the bottom of the lake and allowed to remain in place for four half-hour sets. The 50-foot net was also used just offshore of Northwestern Lake Park in an effort to increase the fish catch.

All captured fish were examined for evidence of hatchery origins. Two fish were returned to Northwestern Lake based on the determination that they were hatchery fish. Hatchery fish were excluded from the study based on the presumption that hatchery fish would not have as much exposure time to lake conditions to exhibit the strength of evidence of mercury bioaccumulation that would be provided by native fish.

A total of seven rainbow trout (*Oncorhynchus mykiss*) were collected during the June 5, 2007 field collection event. The collected fish were measured (fork length) and weighed with a spring scale. Each fish was filleted and one fillet from each fish was placed in one of three polyethylene bags. The sample bags contained the following:

- Sample Bag #1 = Fish collected from Little Buck Creek
  - Fish 1: fork length = 305 millimeters (mm) and weight of 0.75 pounds
  - Fish 4: fork length = 255 mm and weight of 0.30 pounds
  - Fish 5: fork length = 315 mm and weight of 0.75 pounds

- Sample Bag #2 = Fish collected near boat barrier
  - Fish 2: fork length = 309 mm and weight of 0.75 pounds
  - Fish 3: fork length = 331 mm and weight of 0.95 pounds

- Sample Bag #3 = Fish collected from near Northwestern Lake Park
  - Fish 6: fork length = 225 mm and weight of 0.25 pounds
  - Fish 7: fork length = 355 mm and weight of 1.00 pounds.

The remnant fish carcasses, along with canned tuna, were used to bait two crayfish traps. The two crayfish traps were set during the fish capture activities. One crayfish trap was set near the mouth of Little Buck Creek and the other crayfish trap was set near the mouth of Mill Creek. The traps were periodically checked and re-baited while being left in place during the day of sampling for the bioaccumulation task. No crayfish were found in the traps. Accordingly, no crayfish were available for further evaluation of the tissues for mercury concentrations.

During the same period that the fish were being collected and efforts were being made to obtain crayfish, a work crew from WDFW and the US Bureau of Land Management

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(BLM) were also actively conducting a survey for molluscs in Northwestern Lake by wading in shallow water and snorkeling into deeper water. Representative samples of molluscs were requested from the mollusc survey team by the Pacificorp representative at the end of the field day. However, the mollusc survey team did not observe molluscs in Northwestern Lake. Accordingly, no molluscan tissues were available for further evaluation of mercury concentrations.

7.3 SECOND PHASE OF SPECIMEN COLLECTION FOR BIOACCUMULATION EVALUATION

As stated above, during the field work conducted for the bioaccumulation task, the biologists were only able to recover representative fish. Based on this field result, the *SSAP* was amended to include the laboratory-controlled exposure of imported populations of the freshwater oligochate (worm) *Lumbriculus variegatus* and an imported population of the freshwater clam *Corbicula fluminea*.

The *Lumbriculus* population was obtained from Aquatic Foods, Inc. of Fresno, California. The *Corbicula* were obtained from Virgina Polytechnic Institute and State University in Blacksburg, Virgina. Their source of the clams was the Upper Clinch River in Virginia.

7.4 FIRST PHASE OF LABORATORY ACTIVITY FOR BIOACCUMULATION EVALUATION

Kleinfelder provided NW Aquatic Sciences of Newport, Oregon with 15 gallons of sediment obtained from the vicinity of sample B1-72. Kleinfelder also collected 15 gallons of sediment from the sampling location below the Little White Salmon Fish Hatchery, the location of sample LWS-071907, as a reference sample. The samples were collected on July 19, 2007, and placed into clean 5-gallon buckets dedicated to the bioaccumulation tests.

The vicinity of sample B1-72 was selected for the bioacumulation tests because the highest concentration of mercury was detected at this location as presented in the *March 2007 Sediment Report*. The reference sample location (LWS-071907) was selected because, based on field observations, this location most closely resembled the sediment collected from the vicinity of sample location B1-72. A negative control sediment sample was collected by NW Aquatic personnel on July 27, 2007, from Beaver Creek, located about 8 miles south of Newport, Oregon. The negative control sample was press sieved through a 1.0 millimeter screen.

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NW Aquatic conducted the exposure portion of the test, reference, and control sediments for a period of 28 days. The exposures were conducted according to protocols based on EPA Method 100.3, EPA document 600/R-99-024, EPA document EPA-B-98-004 (the Inland Testing Manual), and ASTM E-1688-97a. Five sets of each target species were developed to provide the appropriate controls and replicates. Specific details of the test procedures are presented in NW Aquatic's reports which are included in Appendix E.

7.5 SECOND PHASE OF LABORATORY ACTIVITY FOR BIOACCUMULATION EVALUATION

NW Aquatic provided the following sets of tissue samples to the Brooks Rand laboratory in Seattle, Washington:

- Five sets of *Corbicula* tissues and five sets of *Lumbriculus* tissue that were exposed to the Northwestern Lake test sediments.
- Five sets of *Corbicula* tissues and five sets of *Lumbriculus* tissue that were exposed to the reference sediments.
- Five sets of *Corbicula* tissues and five sets of *Lumbriculus* tissue that were exposed to the control sediments.
- Five sets of *Corbicula* tissues and five sets of *Lumbriculus* tissue that were not exposed to any sediments.

Brooks Rand personnel shucked the clam samples the day after receipt. The clam samples and the worm samples were then homogenized prior to mercury analysis. Homogenization blanks were also prepared at that time.

The samples were tested for mercury using an appendix to EPA Method 1631. Further information on the sample preparation is included in Brooks Rand's report, which is included in Appendix F. The results of Brooks Rand's mercury analysis is included in Appendix F and are summarized in Table 10.

7.6 DISCUSSION OF BIOACCUMULATION EVALUATION TEST RESULTS

Mercury was detected in all the tissue samples, but not the homogenization blanks. The highest level of mercury was detected in the worm tissues exposed to the Northwestern Lake sediments. The mercury concentrations in the worm tissues exposed to the Northwestern Lake sediments ranged from 0.340 mg/Kg to 0.357 mg/Kg, with an average mercury concentration of 0.347 mg/Kg. Mercury

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concentrations in the fish tissues were similar, although slightly lower, ranging from 0.185 mg/Kg to 0.308 mg/Kg, with an average of 0.263 mg/Kg.

Mercury concentrations in the clam tissue samples were negligible when compared to the control and pre-exposure samples. Specifically, the test and reference samples averaged about 0.04 mg/Kg and the control and pre-exposure samples averaged about 0.03 mg/Kg. In contrast, worm tissues exposed to Northwestern Lake sediments averaged 0.3 mg/Kg, the control worm tissues averaged 0.01 mg/Kg, the reference worm tissues averaged 0.005 mg/Kg, and the pre-exposed worm tissues averaged 0.004 mg/Kg.

The State of Washington currently has not published tissue criteria for acceptable levels that would not endanger the health of humans or other possible ecological receptors. Washington has been evaluating the mercury concentrations of fish in the state. An initial Washington study focused on bass in Whatcom County (*Mercury Concentrations in Edible Muscle of Lake Whatcom Fish*, March 2001). The Whatcom County study found a mean concentration of mercury in bass of 0.49 mg/Kg and noted a significant dependence on length and age. The Whatcom County study did include some cutthroat trout, which were found to have a mean mercury concentration of 0.07 mg/Kg.

In 2002, WDOE expanded their study to include 18 lakes and 2 rivers in 13 counties. Kitsap and Skamania Counties were not included in the selected counties. This study (*Mercury in Edible Fish Tissue and Sediments from Selected Lakes and Rivers of Washington State*, June 2003) found that over 50 percent of the fish tissue analyzed exceeded a draft criterion of 0.150 mg/Kg. The mean mercury concentration in fish tissue reported in the 2003 WDOE report was 0.217 mg/Kg. In review, the mean mercury concentration in fish tissue for Northwestern Lake was 0.263 mg/Kg. The relationship between age and increased mercury concentration in fish tissue was again supported by the study reported in the 2003 WDOE report.

A third WDOE study was documented in a 2007 report for fish samples collected in 2005. The 2007 report also found a strong correlation between increased fish age and increased mercury concentration in the fish tissues. The 2005 study also focused on bass but only tested six sites. Generally, the mercury concentrations were lower than the concentrations reported in the 2003 WDOE report.

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The Oregon Department of Environmental Quality (DEQ), a co-member of the RSET with WDOE and others, has published its *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment* (April 3, 2007). DEQ's guidance provides the following numerical criteria for mercury.

Acceptable Tissue Levels (ATLs):

• Humans	General / recreational:	0.40 mg/Kg
	Subsistence / Tribal:	0.049 mg/Kg
• Mammals	Individual:	0.12 mg/Kg
	Population:	0.20 mg/Kg
• Birds	Individual:	0.074 mg/Kg
	Eagle eggs:	0.18 mg/Kg
	Population:	0.15 mg/Kg
	Osprey eggs:	0.89 mg/Kg
Freshwater Critical Tissue Level (CTL):		0.088 mg/Kg

The Oregon ATLs for humans are the derived concentrations of mercury in fish tissue that will not result in an unacceptable risk to humans who consume the fish at a rate of 0.0175 kilograms per day (Kg/day) for recreational and general populations and 0.1424 Kg/day for Tribal and other subsistence fishers. The Oregon ATLs for humans are equivalent to the EPA's screening values for similar receptors. The Oregon ATLs for birds and mammals are based on a similar formula with the ingestion rate for birds (based on a Great Blue Heron) of 0.42 Kg/day and for minks of 0.137 Kg/day.

The concentrations of mercury reported for the three fish samples exceeded the Oregon ATL for tribal and subsistence fishers but not the general population Oregon ATL. The fish tissue concentrations also exceeded the Oregon ATLs for individual and populations of piscivorous birds and eagle eggs. The fish tissue concentrations also exceeded the individual and population of mammals, except for the fish collected near Northwestern Lake Park, located in the upstream end of Northwestern Lake, which only exceeded the individual Oregon ATL.

Worm tissues are not routinely ingested by humans, however, the nature of bioaccumulative chemicals results in the bioconcentration of the toxin as one organism ingests another organism that has retained the toxin. For example, as worms that have retained mercury are ingested by fish, the mercury is transferred to the fish in the worm tissues. The concentrations of mercury in the worms exceed the Tribal and

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Subsistence Fishers Oregon ATL, the individual and population Avian Oregon ATLs, the individual (eagle) egg Oregon ATL, and both mammal Oregon ATLs. The worm tissues from the reference sample, the control sample, and pre-exposed tissues did not exceed an Oregon ATL.

None of the clam tissues exceeded an Oregon ATL or Oregon mercury CTL. All mercury concentrations in the fish tissues and worm tissues of this study exceeded the Oregon mercury CTL.

The EPA has published a recommended fish tissue criterion of 0.3 mg/Kg. In review, the average mercury in fish tissue concentration for the three trout samples collected from Northwestern Lake was 0.26333 mg/Kg. The EPA has also published a National Toxics Rule human health criterion for mercury in edible fish of 0.825 mg/Kg. None of the tissue samples exceeded the National Toxics Rule human health criterion for mercury in edible fish. The U.S. Food and Drug Administration (FDA) has an action level of 1.000 mg/Kg, which is used to determine when fish must be removed from the marketplace. None of the tissue samples exceeded the FDA's action level for mercury in edible fish.

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8.0 SUMMARY AND CONCLUSIONS

Sediment sampling and analysis for environmental and physical characteristics of sediments has been conducted to provide supplemental information on the distribution and bioavailability of mercury in Northwestern Lake. Focused bioassays on two species and bioaccumulation studies on three species were completed to evaluate the sediments according to guidelines in the *NWRSEF*. The following conclusions are based on the information presented in this report:

- Chemical analysis of sediments in Northwestern Lake indicates that mercury is present. The mercury has consistently been detected in the sediments since the sediment evaluation began in 1994. Mercury concentrations detected during this supplemental investigation ranged from 0.020 mg/Kg to 1.1 mg/Kg. Elutriate testing and prior sampling investigations have demonstrated that the mercury is primarily associated with the fine grained silts and clays in the sediments.

- Mercury was detected above the NWRSEF lower screening level (SL1) in five of the seven sediment samples collected to evaluate the mercury distribution in the near-dam sediments. The mercury concentrations in four of those five sediment samples also exceeded the NWRSEF upper screening level (SL2) of 0.75 mg/Kg. The seven sediment samples were all found to consist of greater than 90 percent silt or finer grained material.

- Mercury was detected above the NWRSEF lower screening level (SL1) in two of the ten sediment or soil samples collected to estimate a background mercury concentration in the local area. None of those mercury concentrations exceeded the NWRSEF upper screening level (SL2). Supplemental mercury analyses was conducted on the portions of sediment that were not retained on the Number 200 sieve or greater. In seven of those ten samples, mercury concentrations were found to be at least one order of magnitude greater than the mercury concentrations detected in the unsieved samples. Specifically, four of the seven mercury concentrations for the sieved samples exceeded the NWRSEF lower screen level (SL1) and two of the four also exceeded the NWRSEF upper screening level (SL2) for mercury.

- The highest mercury concentration (1.2 mg/Kg) was detected in a sample collected outside of the near-dam, lower basin sample site (vicinity of sample B1-72). This

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concentration was found in the sieved portion of the sample collected at the mouth of Mill Creek. Mill Creek flows into Northwestern Lake from the west.

- Mercury is a native element commonly found in rocks associated with Cascade Range volcanic activity. Numerous geologic publications discuss the presence of mercury in hydrothermally altered rocks, specifically argillic or fine grained rocks. Hydrothermally altered rocks are related to volcanic activity. The White Salmon River receives direct runoff from nearby Mount Adams, a Cascades Range volcano and from the Big Lava Bed Geologic Area located west of the White Salmon River.

- According to USGS Professional Paper 1270, background mercury concentrations are considered to be between 0.32 mg/Kg and 2.0 mg/Kg in the White Salmon River area. The mercury concentrations encountered in the 2007 sediment samples ranged from 0.014 mg/Kg to 1.2 mg/Kg. In 2006, the mercury concentrations ranged from 0.020 mg/Kg to 2.030 mg/Kg, and in 1994, the mercury concentrations ranged from less than 0.025 mg/Kg to 1.1 mg/Kg. Based on the study reported herein, the estimated background mercury concentration for fine-grained sediments is about 0.5 mg/Kg. The average mercury concentration in the fine grained sediments of Northwestern Lake sampled in 2007 is 0.6 mg/Kg. This average increases to 0.7 mg/Kg when the 2006 sample results are included in the average.

- Bioassays were conducted on “worst-case” sediments, which were selected based on the highest reported mercury concentration for samples collected in the vicinity of the previously reported highest reported mercury concentration. The bioassay testing indicates that the sediments will not adversely impact the biota of the Columbia River system.

- Mercury is a known bioaccumulative toxin. A field collection effort for representative biota only provided trout for an evaluation of mercury bioaccumulation. The fish tissue samples prepared from the captured trout were found to contain levels of mercury that exceeded the numerical criteria adopted by the State of Oregon for subsistence fishers (typically tribal members). The mercury concentrations in the fish tissues did not exceed Oregon’s Acceptable Tissue Level (ATL) for the general public. Washington has not adopted numerical fish tissue criteria as of November 2007.

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- The mercury concentration in fish tissues also exceeded Oregon's Avian ATL's for eagles and ospreys, as well as eagle eggs. In addition, the mercury concentration in fish tissue exceeded the Individual Mammal ATL and two of the three concentrations exceeded the Mammal Population ATL.

- Representative test populations of an imported worm and non-native clams were obtained and exposed to the sediments in a controlled laboratory environment. Subsequent analysis of the worm tissues found similar, although slightly higher, results as the fish tissue mercury concentrations. Mercury concentrations in the clam tissues were not significantly different than the control and reference samples, indicating no bioaccumulation of mercury by the clams.

In summary, mercury is present in the fine-grained sediments impounded by Condit Dam. It is our opinion that the mercury is from natural sources in the uplands drained by the White Salmon River. The mercury can be ingested by some of the aquatic organisms and may accumulate in the food chain by bioconcentrating in the biotic elements of the food chain. The current concentrations represent a possible health risk for individuals or populations that ingest a diet consisting primarily of tissue obtained from Northwestern Lake.

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9.0 REFERENCES

Friedli, Hans and Christine Wiedinmyer, 2007. *Mercury Emission Estimates from Fires: An Initial Inventory for the United States, in Environmental Science and Technology*, October 17, 2007.

Kleinfelder, 2007. *Sediment Sampling and Analysis Report, Northwestern Lake, Condit Hydroelectric Project, FERC Project No. 2342, White Salmon, Washington, Kleinfelder Project No. 53886 / 4,* March 2007.

Olson, Todd (PacifiCorp), 2007. Personal Communication with Thomas O'Keefe, PhD (Pacific Northwest Stewardship Director, American Whitewater), June 5, 2007 forwarding Personal Communication with James Rytuba (USGS), May 9, 2007.

Oregon Department of Environmental Quality (ODEQ), 2007. *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment*, Updated April 3, 2007.

Rapp, Shawn R. (Kleinfelder), 2007. Personal Communication with Mark A. Engle, PhD, USGS, May 1, 2007.

Rytuba, James J., 2005. *Geogenic and Mining Sources of Mercury to the Environment,* Chapter 2 in *Mercury Sources, Measurements, Cycles, and Effects,* Mineralogical Association of Canada Short Course Series, Volume 34, Halifax, Nova Scotia, 2005.

Squier Associates, 1994. *Condit Hydroelectric Project (FERC Project No. 2342) Northwestern Lake Sediment Characterization Study, White Salmon, Washington*.

Squier Associates, 1997. *Additional Geotechnical Exploration and Laboratory Testing at the Condit Hydroelectric Project (Contract No. P018780).*

Squier | Kleinfelder, 2005. *Suitability Evaluation of Northwestern Lake Sediment Characterization Study, Squier Associates*, *April 1994*.

United States Army Corps of Engineers (USACOE), 1998. *Dredged Material Evaluation Framework, Lower Columbia River Management Area*, *November 1998*.

USACOE, 2006. *Draft Letter to PacifiCorp Hydro Licensing / Hydro Resources, April 12, 2006*.

Copyright 2007 Kleinfelder

USACOE et al., 2006. *Interim Final Sediment Evaluation Framework for The Pacific Northwest,* September 2006.

United States Environmental Protection Agency (USEPA) Office of Water and Office of Science and Technology, 2004. National Recommended Water Quality Criteria, 4304T.

USEPA, 2007. Mercury Basic Information, http://www.epa.gov/mercury/about.htm, August 7, 2007.

United States Geological Survey (USGS), 1982. *Element Concentrations In Soils and Other Surficial Materials of the Conterminous United States*, USGS Professional Paper 1270.

Vallance, James W., 1999. *Postglacial Lahars and Potential Hazards in the White Salmon River System on the Southwest Flank of Mount Adams, Washington*, USGS Bulletin 2161.

Washington Administrative Code (WAC) Chapter 173-201A, 2006. *Water Quality Standards for Surface Waters of the State of Washington,* November 20, 2006.

Washington State Department of Ecology (WDOE), 1992. *Chemicals of Special Concern in Washington State,* 92-66, July 1992.

WDOE, 2001. *Mercury Concentrations in Edible Muscle of Lake Whatcom Fish*, Publication No. 01-03-012, March 2001.

WDOE, 2003. *Mercury in Edible Fish Tissue and Sediments from Selected Lakes and Rivers of Washington State*, Publication No. 03-03-026, June 2003.

WDOE, 2005. *Model Toxics Control Act Chapter 70.105D RCW (Amended 2005) and Cleanup Regulation Chapter 173-340 WAC (Amended February 12, 2001), Publication No. 94-06,* October 2005.

WDOE, 2007. *Measuring Mercury Trends in Freshwater Fish in Washington State: 2005 Sampling Results*, Publication No. 07-03-007, February 2007

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10.0 LIMITATIONS

We have prepared this report for use by PacifiCorp, their authorized agents, and regulatory agencies for specific application to this site. If, during future site operations, conditions are encountered which vary appreciably from those described herein, Kleinfelder should be notified for review of the recommendations of this report, if necessary.

This report may be used only by PacifiCorp, their authorized agents, and regulatory agencies and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors may change over time and could materially affect our recommended sampling scheme. The *DMEF* provides for a period of seven years as the length of time that an analytical set may be considered to validly represent a Low Management Ranking Dredged Material Management Unit.

Therefore, this report should not be relied upon after seven years from its date of issue. Kleinfelder should be notified if use of the report is delayed by more than seven years from the date of this report so that a review of site conditions can be made, and recommendations revised, if appropriate.

Any party other than PacifiCorp, their authorized agents, and regulatory agencies who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the clients or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

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Important Information About Your Geoenvironmental Report

Geoenvironmental studies are commissioned to gain information about environmental conditions on and beneath the surface of a site. The more comprehensive the study, the more reliable the assessment is likely to be. But remember: Any such assessment is to a greater or lesser extent based on professional opinions about conditions that cannot be seen or tested. Accordingly, no matter how many data are developed, risks created by unanticipated conditions will always remain. *Have realistic expectations.* Work with your geoenvironmental consultant to manage known and unknown risks. Part of that process should already have been accomplished, through the risk allocation provisions you and your geoenvironmental professional discussed and included in your contract's general terms and conditions. This document is intended to explain some of the concepts that may be included in your agreement, and to pass along information and suggestions to help you manage your risk.

Beware of Change; Keep Your Geoenvironmental Professional Advised

The design of a geoenvironmental study considers a variety of factors that are subject to change. Changes can undermine the applicability of a report's findings, conclusions, and recommendations. *Advise your geoenvironmental professional about any changes you become aware of.* Geoenvironmental professionals cannot accept responsibility or liability for problems that occur because a report fails to consider conditions that did not exist when the study was designed. Ask your geoenvironmental professional about the types of changes you should be particularly alert to. Some of the most common include:

- modification of the proposed development or ownership group,
- sale or other property transfer,
- replacement of or additions to the financing entity,
- amendment of existing regulations or introduction of new ones, or
- changes in the use or condition of adjacent property.

Should you become aware of any change, *do not rely on a geoenvironmental report.* Advise your geoenvironmental professional immediately; follow the professional's advice.

Recognize the Impact of Time

A geoenvironmental professional's findings, recommendations, and conclusions cannot remain valid indefinitely. The more time that passes, the more likely it is that important latent changes will occur. *Do not rely on a geoenvironmental report if too much time has elapsed since it was completed.* Ask your environmental professional to define "too much time." In the case of Phase I Environmental Site Assessments (ESAs), for example, more than 180 days after submission is generally considered "too much."

Prepare To Deal with Unanticipated Conditions

The findings, recommendations, and conclusions of a Phase I ESA report typically are based on a review of historical information, interviews, a site "walkover," and other forms of noninvasive research. When site subsurface conditions are not sampled in any way, the risk of unanticipated conditions is higher than it would otherwise be.

While borings, installation of monitoring wells, and similar invasive test methods can help reduce the risk of unanticipated conditions, *do not overvalue the effectiveness of testing.* Testing provides information about actual conditions only at the precise locations where samples are taken, and only when they are taken. Your geoenvironmental professional has applied that specific information to develop a general opinion about environmental conditions. *Actual conditions in areas not sampled may differ (sometimes sharply) from those predicted in a report.* For example, a site may contain an unregistered underground storage tank that shows no surface trace of its existence. *Even conditions in areas that were tested can change,* sometimes suddenly, due to any number of events, not the least of which include occurrences at

adjacent sites. Recognize, too, that *even some conditions in tested areas may go undiscovered,* because the tests or analytical methods used were designed to detect only those conditions assumed to exist.

Manage your risks by retaining your geoenvironmental professional to work with you as the project proceeds. Establish a contingency fund or other means to enable your geoenvironmental professional to respond rapidly, in order to limit the impact of unforeseen conditions. And to help prevent any misunderstanding, identify those empowered to authorize changes and the administrative procedures that should be followed.

Do Not Permit Any Other Party To Rely on the Report

Geoenvironmental professionals design their studies and prepare their reports to meet the specific needs of the clients who retain them, in light of the risk management methods that the client and geoenvironmental professional agree to, and the statutory, regulatory, or other requirements that apply. The study designed for a developer may differ sharply from one designed for a lender, insurer, public agency...or even another developer. *Unless the report specifically states otherwise, it was developed for you and only you.* Do not unilaterally permit any other party to rely on it. The report and the study underlying it may not be adequate for another party's needs, and you could be held liable for shortcomings your geoenvironmental professional was powerless to prevent or anticipate. Inform your geoenvironmental professional when you know or expect that someone else—a third-party—will want to use or rely on the report. *Do not permit third-party use or reliance until you first confer with the geoenvironmental professional who prepared the report.* Additional testing, analysis, or study may be required and, in any event, appropriate terms and conditions should be agreed to so both you and your geoenvironmental professional are protected from third-party risks. *Any party who relies on a geoenvironmental report without the express written permission of the professional who prepared it and the client for whom it was prepared may be solely liable for any problems that arise.*

Avoid Misinterpretation of the Report

Design professionals and other parties may want to rely on the report in developing plans and specifications. They need to be advised, in writing, that their needs may not have been considered when the study's scope was developed, and, even if their needs were considered, they might misinterpret geoenvironmental findings, conclusions, and recommendations. *Commission your geoenvironmental professional to explain pertinent elements of the report to others who are permitted to rely on it, and to review any plans, specifications or other instruments of professional service that incorporate any of the report's findings, conclusions, or recommendations.* Your geoenvironmental professional has the best understanding of the issues involved, including the fundamental assumptions that underpinned the study's scope.

Give Contractors Access to the Report

Reduce the risk of delays, claims, and disputes by giving contractors access to the full report, *providing that it is accompanied by a letter of transmittal that can protect you* by making it unquestionably clear that: 1) the study was not conducted and the report was not prepared for purposes of bid development, and 2) the findings, conclusions, and recommendations included in the report are based on a variety of opinions, inferences, and assumptions and are subject to interpretation. Use the letter to also advise contractors to consult with your geoenvironmental professional to obtain clarifications, interpretations, and guidance (a fee may be required for this service), and that—in any event—they should conduct additional studies to obtain the specific type and extent of information each prefers for preparing a bid or cost estimate. Providing access to the full report, with the appropriate caveats, helps prevent formation of adversarial attitudes and claims of concealed or differing conditions. If a contractor elects to ignore the warnings and advice in the letter of transmittal, it would do so at its own risk. Your geoenvironmental professional should be able to help you prepare an effective letter.

Do Not Separate Documentation from the Report

Geoenvironmental reports often include supplemental documentation, such as maps and copies of regulatory files, permits, registrations, citations, and correspondence with regulatory agencies. If subsurface explorations were performed, the report may contain final boring logs and copies of laboratory data. If remediation activities occurred on site, the report may include: copies of daily field reports; waste manifests; and information about the disturbance of subsurface materials, the type and thickness of any fill placed on site, and fill placement practices, among other types of documentation. *Do not separate supplemental documentation from the report. Do not, and do not permit any other party to redraw or modify any of the supplemental documentation for incorporation into other professionals' instruments of service.*

Understand the Role of Standards

Unless they are incorporated into statutes or regulations, standard practices and standard guides developed by the American Society for Testing and Materials (ASTM) and other recognized standards-developing organizations (SDOs) are little more than aspirational methods agreed to by a consensus of a committee. The committees that develop standards may not comprise those best-qualified to establish methods and, no matter what, no standard method can possibly consider the infinite client- and project-specific variables that fly in the face of the theoretical "standard conditions" to which standard practices and standard guides apply. In fact, these variables can be so pronounced that geoenvironmental professionals who comply with every directive of an ASTM or other standard procedure could run afoul of local custom and practice, thus violating the standard of care.

Accordingly, when geoenvironmental professionals indicate in their reports that they have performed a service "in general compliance" with one standard or another, it means they have applied professional judgement in creating and implementing a scope of service designed for the specific client and project involved, and which follows some of the general precepts laid out in the referenced standard. To the extent that a report indicates "general compliance" with a standard, you may wish to speak with your geoenvironmental professional to learn more about what was and was not done. *Do not assume a given standard was followed to the letter.* Research indicates that that seldom is the case.

Realize that Recommendations May Not Be Final

The technical recommendations included in a geoenvironmental report are based on assumptions about actual conditions, and so are preliminary or tentative. Final recommendations can be prepared only by observing actual conditions as they are exposed. For that reason, you should retain the geoenvironmental professional of record to observe construction and/or remediation activities on site, to permit rapid response to unanticipated conditions. *The geoenvironmental professional who prepared the report cannot assume responsibility or liability for the report's recommendations if that professional is not retained to observe relevant site operations.*

Understand That Geotechnical Issues Have Not Been Addressed

Unless geotechnical engineering was specifically included in the scope of professional service, a report is not likely to relate any findings, conclusions, or recommendations about the suitability of subsurface materials for construction purposes, especially when site remediation has been accomplished through the removal, replacement, encapsulation, or chemical treatment of on-site soils. The equipment, techniques, and testing used by geotechnical engineers differ markedly from those used by geoenvironmental professionals; their education, training, and experience are also significantly different. If you plan to build on the subject site, but have not yet had a geotechnical engineering study conducted, your geoenvironmental professional should be able to provide guidance about the next steps you should take. The same firm may provide the services you need.

Read Responsibility Provisions Closely

Geoenvironmental studies cannot be exact; they are based on professional judgement and opinion. Nonetheless, some clients, contractors, and others assume geoenvironmental reports are or certainly should be unerringly precise. Such assumptions have created unrealistic expectations that have led to wholly unwarranted claims and disputes. To help prevent such problems, geoenvironmental professionals have developed a number of report provisions and contract terms that explain who is responsible for what, and how risks are to be allocated. Some people mistake these for "exculpatory clauses," that is, provisions whose purpose is to transfer one party's rightful responsibilities and liabilities to someone else. Read the responsibility provisions included in a report and in the contract you and your geoenvironmental professional agreed to. *Responsibility provisions are not "boilerplate."* They are important.

Rely on Your Geoenvironmental Professional for Additional Assistance

Membership in ASFE exposes geoenvironmental professionals to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a geoenvironmental project. Confer with your ASFE-member geoenvironmental professional for more information.

ASFE

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TABLE 1
PROBE B-1 ANALYTICAL RESULTS
NORTHWESTERN LAKE, WASHINGTON

	Boring	B-1				Average (B1) Project Samples Only	Average (B1 to B4) Project Samples Only	Dredged Material Evaluation Framework [1]			Sediment Quality Guidelines	
	Sample #	B1-72	B1-85	B1-106	Dup-3			Screening Levels	Bioaccum Trigger Levels	Maximum Levels	Interim SL1	Freshwater [2] SL2
	Depth Below Water Surface (feet)	72	85	106	85							
	Depth Below Sediment Surface (feet)	1	14	35	14							
	Date	18-Dec-06	18-Dec-06	18-Dec-06	18-Dec-06							
General	Total Solids	48.0	59.0	69.4	56.2	58.8	61.0	---	---	---	---	---
	Total Volatile Solids	4.01	9.34	7.33	6.32	6.9	4.8	---	---	---	---	---
	Total Organic Carbons	1.05	2.57	1.68	2.82	1.8	1.1	---	---	---	---	---
	Ammonia	2.88	244	154	181	133.6	78.4	---	---	---	---	---
	Sulfide	<0.5	22.5	103	95.8	62.8	63.1	---	---	---	---	---
Metals	Antimony	<0.04	<0.04	<0.04	<0.04	<0.04	0.1	150	150	200	---	---
	Arsenic	2.18	1.05	1.79	1.16	1.7	1.5	57	507.1	700	20	51
	Cadmium	0.112	0.169	0.139	0.114	0.1	0.1	5.1	---	14	1.1	1.5
	Chromium	7.59	10.4	10.6	8.78	9.5	9.2	---	---	---	95	100
	Copper	46.2	13.7	17.5	16.3	25.8	17.6	390	---	1,300	80	830
	Lead	3.03	6.42	5.37	4.17	4.9	4.4	450	---	1,200	340	430
	Mercury	**2.030**	**0.715**	**0.702**	**1.240**	**1.1**	**0.7**	**0.41**	**1.5**	2.3	**0.28**	**0.75**
	Nickel	10.0	8.59	11.5	10.2	10.0	10.4	140	370	370	60	70
	Silver	0.124	0.134	0.101	0.106	0.1	0.1	6.1	6.1	8.4	2.0	2.5
	Zinc	18.0	37.3	53.5	158	36.3	33.0	410	---	3,800	130	400
Organics	Total LPAHs	<0.011	0.0136	0.041	0.008	0.0273	0.0214	---	---	---	6.600	9.200
	Naphthalene	<0.011	0.0028	0.011	0.0026	0.0069	0.0059	2.1	---	2.4	0.500	1.300
	Acenaphthylene	<0.011	<0.01	0.0043	<0.01	0.0043	0.0043	0.56	---	1.3	0.470	0.640
	Acenanaphthene	<0.011	<0.01	0.0024	<0.01	0.0024	0.0024	0.5	---	2	1.100	1.300
	Fluorene	<0.011	<0.01	0.0035	<0.01	0.0035	0.0035	0.54	---	3.6	1.000	3.000
	Phenanthrene	<0.011	0.0087	0.011	0.0029	0.0099	0.0077	1.5	---	21	6.100	7.600
	Anthracene	<0.011	<0.01	0.005	<0.01	0.0050	0.0050	0.96	---	13	1.200	1.600
	2-Methylnaphthalene	<0.011	0.0021	0.0038	0.0025	0.0030	0.0028	0.67	---	1.9	0.470	0.560
	Total HPAHs	<0.011	0.0247	0.0421	<0.01	0.0334	0.0182	---	---	---	31.000	55.000
	Fluoranthene	<0.011	0.0085	0.010	<0.01	0.0093	0.00925	1.7	4.6	30	11.000	15.000
	Pyrene	<0.011	0.0070	0.012	<0.01	0.0095	0.0062	2.6	---	16	8.800	16.000
	Benz(a)anthracene	<0.011	0.0037	0.0045	<0.01	0.0041	0.0041	1.6	3.6	3.6	4.300	5.800
	Chrysene	<0.011	0.0055	0.0079	<0.01	0.0067	0.0067	1.4	---	21	5.900	6.400
	Benzofluoranthene	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	3.2	---	9.9	0.600	4.000
	Benzo(a)pyrene	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	1.6	3.6	3.6	3.300	4.800
	Indeno(1,2,3-cd)pyrene	<0.011	<0.01	0.0034	<0.01	0.0034	0.0034	0.6	---	16	4.100	5.300
	Dibenzo(a,h)anthracene	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	0.23	---	1.9	0.800	0.840
	Benzo(g,h,I)perylene	<0.011	<0.01	0.0043	<0.01	0.0043	0.0043	0.67	---	3.2	4.000	5.200
Chlorinated Hydrocarbons	1,4-Dichlorobenzene	<0.0040	<0.0033	<0.0028	<0.0034	<0.0028	<0.0024	0.11	0.12	0.12	---	---
	1,3-Dichlorobenzene	<0.0034	<0.0028	<0.0024	<0.0029	<0.0024	<0.0020	0.17	1.241	---	---	---
	1,2-Dichlorobenzene	<0.0028	<0.0023	<0.0019	<0.0024	<0.0019	<0.0017	0.035	0.037	0.11	---	---
	1,2,4-Trichlorobenzene	<0.0032	<0.0026	<0.0022	<0.0027	<0.0022	<0.0019	0.031	---	0.064	---	---
	Hexachlorobenzene	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	0.022	0.168	0.23	---	---
	Total Chlorinated Hydrocarbons	<0.0028	<0.0023	<0.0019	<0.0024	<0.0019	<0.0018	---	---	---	---	---
Phthalates	Dimethyl Phthalate	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	1.4	1.4	---	0.046	0.440
	Diethyl Phthalate	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	1.2	---	---	---	---
	Di-n-butyl Phthalate	<0.011	0.0071	0.0079	0.0076	0.0075	0.0066	5.1	10.22	---	---	---
	Butyl benzyl Phthalate	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	0.97	---	---	0.260	0.370
	Bis(2-ethylhexyl) Phthalate	<0.11	0.038	0.021	<0.1	0.0295	0.0391	8.3	13.87	---	0.220	0.320
	Di-n-octyl Phthalate	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	6.2	---	---	0.026	0.045
Phenols	Phenol	<0.0040	<0.0033	0.0058	<0.0034	0.0058	0.0099	0.42	0.876	1.2	---	---
	2-Methylphenol	<0.0071	<0.0058	<0.0049	<0.0061	<0.0049	<0.0042	0.063	---	0.077	---	---
	4-Methylphenol	<0.011	<0.01	0.047	<0.01	0.0470	0.0253	0.67	---	3.6	---	---
	2,4-Dimethylphenol	<0.012	<0.0094	<0.0080	<0.0098	<0.0080	<0.0069	0.029	---	0.21	---	---
	Pentachlorophenol	<0.018	<0.015	<0.013	<0.016	<0.013	<0.011	0.4	0.504	0.69	---	---
Miscellaneous Extractables	Benzyl Alcohol	<0.0078	<0.0063	<0.0054	<0.0066	<0.0054	<0.0046	0.057	---	0.87	---	---
	Benzoic Acid	<0.200	<0.170	0.210	<0.180	0.2100	0.1800	0.65	---	0.76	---	---
	Dibenzofuran	<0.011	<0.01	0.0022	<0.01	0.0022	0.0022	0.54	---	1.7	0.400	0.440
	Hexachloroethane	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	1.4	10.2	14	---	---
	Hexachlorobutadiene	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	0.029	0.212	0.27	---	---
	n-Nitrosodiphenylamine	<0.011	<0.01	<0.01	<0.01	<0.01	<0.0099	0.028	0.13	0.13	---	---
Pesticides	4,4'-DDD (p,p'-DDD)	<0.0010	0.0028	<0.00099	0.0022	0.0028	0.0039	0.0069	0.05	0.069	---	---
	4,4'-DDE (p,p'-DDE)	<0.0010	0.0065	0.0013	0.0055	0.0039	0.0042	0.0069	0.05	0.069	---	---
	4,4'-DDT (p,p'-DDT)	0.00084	0.0020	0.00012	0.0020	0.0010	0.0014	0.0069	0.05	0.069	---	---
	Aldrin	<0.0010	<0.0010	0.00037	<0.0010	0.0004	0.0004	0.01	0.037	---	---	---
	Chlordane	<0.0086	<0.0070	<0.0074	<0.011	<0.0070	<0.0051	0.01	0.037		---	---
	Dieldrin	<0.0010	<0.0010	0.00020	<0.0010	0.0002	0.0002	0.01	0.037	---	---	---
	Heptachlor	<0.0010	<0.0010	<0.00099	<0.0010	<0.0010	<0.0010	0.01	0.037	---	---	---
	Lindane	<0.0010	<0.0010	<0.00099	<0.0010	<0.0010	<0.0010	0.01	---	---	---	---
PCB	Polychlorinated Biphenyls	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.130	0.038	3.1	0.060	0.120

Concentrations in milligrams per kilogram (mg/kg)
[1] U.S. Army Corps of Engineers et al - Dredged Material Evaluation Framework - Lower Columbia River Management Area, November 1998
[2] U.S. Army Corps of Engineers et al - Northwest Regional Sediment Evaluation Framework, Interim Final September 2006 / Amended October 2006
-- = No value
Total LPAHs = total low molecular weight polynuclear aromatic hydrocarbons
Total HPAHs = total high molecular weight polynuclear aromatic hydrocarbons

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TABLE 2
PROBE B-2 ANALYTICAL RESULTS
NORTHWESTERN LAKE, WASHINGTON

	Boring	B-2				Average (B2) Project Samples Only	Average (B1 to B4) Project Samples Only	Dredged Material Evaluation Framework [1]			Sediment Quality Guidelines	
	Sample #	B-2-20	B-2-30	B-2-40	DUPE-2			Screening Levels	Bioaccum Trigger Levels	Maximum Levels	Interim Freshwater [2] SL1	Interim Freshwater [2] SL2
	Depth Below Water Surface (feet)	20	30	40	30							
	Depth Below Sediment Surface (feet)	0	10	20	10							
	Date	15-Dec-06	15-Dec-06	15-Dec-06	15-Dec-06							
General	Total Solids	63.5	54.7	77.2	55	65.1	61.0	---	---	---	---	---
	Total Volatile Solids	2.6	7.04	3.68	7.23	4.4	4.8	---	---	---	---	---
	Total Organic Carbons	0.58	2.06	0.17	2.14	0.9	1.1	---	---	---	---	---
	Ammonia	1.30	154	10.4	188	55.2	78.4	---	---	---	---	---
	Sulfide	<0.37	148	<0.37	92.3	148.0	63.1	---	---	---	---	---
Metals	Antimony	<0.05	<0.04	0.14	<0.04	0.1	0.1	150	150	200	---	---
	Arsenic	1.09	1.33	3.96	1.25	2.1	1.5	57	507.1	700	20	51
	Cadmium	0.048	0.133	0.075	0.132	0.1	0.1	5.1	---	14	1.1	1.5
	Chromium	5.43	9.85	15.3	10.0	10.2	9.2	---	---	---	95	100
	Copper	21.9	18.1	11.2	16.8	17.1	17.6	390	---	1,300	80	830
	Lead	1.23	4.84	9.80	5.38	5.3	4.4	450	---	1,200	340	430
	Mercury	**0.790**	**1.320**	0.020	**1.110**	**0.7**	**0.7**	**0.41**	1.5	2.3	**0.28**	**0.75**
	Nickel	9.45	12.6	9.26	11.8	10.4	10.4	140	370	370	60	70
	Silver	0.057	0.106	0.107	0.116	0.1	0.1	6.1	6.1	8.4	2.0	2.5
	Zinc	13.6	77.4	43.8	35.3	44.9	33.0	410	---	3,800	130	400
Organics	Total LPAHs	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0214	---	---	---	6.600	9.200
	Naphthalene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0059	2.1	---	2.4	0.500	1.300
	Acenaphthylene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0043	0.56	---	1.3	0.470	0.640
	Acenanaphthene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0024	0.5	---	2	1.100	1.300
	Fluorene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0035	0.54	---	3.6	1.000	3.000
	Phenanthrene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0077	1.5	---	21	6.100	7.600
	Anthracene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0050	0.96	---	13	1.200	1.600
	2-Methylnaphthalene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0028	0.67	---	1.9	0.470	0.560
	Total HPAHs	<0.01	<0.01	<0.01	0.0107	<0.01	0.0182	---	---	---	31.000	55.000
	Fluoranthene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0093	1.7	4.6	30	11.000	15.000
	Pyrene	<0.01	<0.01	<0.01	0.0038	<0.01	0.0062	2.6	---	16	8.800	16.000
	Benz(a)anthracene	<0.01	<0.01	<0.01	0.0029	<0.01	0.0041	1.6	3.6	3.6	4.300	5.800
	Chrysene	<0.01	<0.01	<0.01	0.0040	<0.01	0.0067	1.4	---	21	5.900	6.400
	Benzofluoranthene	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	3.2	---	9.9	0.600	4.000
	Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	1.6	3.6	3.6	3.300	4.800
	Indeno(1,2,3-cd)pyrene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0034	0.6	---	16	4.100	5.300
	Dibenzo(a,h)anthracene	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	0.23	---	1.9	0.800	0.840
	Benzo(g,h,I)perylene	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0043	0.67	---	3.2	4.000	5.200
Chlroinated Hydrocarbons	1,4-Dichlorobenzene	<0.0030	<0.0035	<0.0025	<0.0035	<0.0025	<0.0024	0.11	0.12	0.12	---	---
	1,3-Dichlorobenzene	<0.0026	<0.0030	<0.0021	<0.0030	<0.0021	<0.0020	0.17	1.241	---	---	---
	1,2-Dichlorobenzene	<0.021	<0.0024	<0.0017	<0.0024	<0.0017	<0.0017	0.035	0.037	0.11	---	---
	1,2,4-Trichlorobenzene	<0.0024	<0.0028	<0.0020	<0.0028	<0.0020	<0.0019	0.031	---	0.064	---	---
	Hexachlorobenzene	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	0.022	0.168	0.23	---	---
	Total Chlorinated Hydrocarbons	<0.0024	<0.0024	<0.0017	<0.0024	<0.0024	<0.0018	---	---	---	---	---
Phthalates	Dimethyl Phthalate	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	1.4	1.4	---	0.046	0.440
	Diethyl Phthalate	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	1.2	---	---	---	---
	Di-n-butyl Phthalate	<0.01	<0.01	0.0035	<0.0099	0.0035	0.0066	5.1	10.22	---	---	---
	Butyl benzyl Phthalate	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	0.97	---	---	0.260	0.370
	Bis(2-ethylhexyl) Phthalate	0.0048	0.035	0.027	0.021	0.0223	0.0391	8.3	13.87	---	0.220	0.320
	Di-n-octyl Phthalate	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	6.2	---	---	0.026	0.045
Phenols	Phenol	0.0044	0.0085	<0.0025	<0.0035	0.0065	0.0099	0.42	0.876	1.2	---	---
	2-Methylphenol	<0.0054	<0.0063	<0.0045	<0.0062	<0.0045	<0.0042	0.063	---	0.077	---	---
	4-Methylphenol	<0.01	0.038	<0.01	<0.010	0.0380	0.0253	0.67	---	3.6	---	---
	2,4-Dimethylphenol	<0.0087	<0.011	<0.0072	<0.010	<0.0072	<0.0069	0.029	---	0.21	---	---
	Pentachlorophenol	<0.014	<0.016	<0.012	<0.016	<0.012	<0.011	0.4	0.504	0.69	---	---
Miscellaneous Extractables	Benzyl Alcohol	<0.0059	<0.0068	<0.0048	<0.0068	<0.0048	<0.0046	0.057	---	0.87	---	---
	Benzoic Acid	<0.160	0.230	<0.130	0.200	0.230	0.1800	0.65	---	0.76	---	---
	Dibenzofuran	<0.01	<0.01	<0.01	<0.0099	<0.01	0.0022	0.54	---	1.7	0.400	0.440
	Hexachloroethane	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	1.4	10.2	14	---	---
	Hexachlorobutadiene	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	0.029	0.212	0.27	---	---
	n-Nitrosodiphenylamine	<0.01	<0.01	<0.01	<0.0099	<0.01	<0.0099	0.028	0.13	0.13	---	---
Pesticides	4,4'-DDD	<0.0010	0.0039	<0.0010	0.0038	0.0039	0.0039	0.0069	0.05	0.069	---	---
	4,4'-DDE	<0.0010	**0.011**	<0.0013	**0.011**	0.0110	0.0042	**0.0069**	0.05	0.069	---	---
	4,4'-DDT	<0.0010	0.0025	<0.0010	0.0021	0.0025	0.0014	0.0069	0.05	0.069	---	---
	Aldrin	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0004	0.01	0.037	---	---	---
	Chlordane	<0.0065	<0.0086	<0.0054	<0.014	<0.0054	<0.0051	0.01	0.037		---	---
	Dieldrin	<0.0010	<0.0010	<0.0010	0.00044	<0.0010	0.0002	0.01	0.037	---	---	---
	Heptachlor	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.01	0.037	---	---	---
	Lindane	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.01	---	---	---	---
PCB	Polychlorinated Biphenyls	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.130	0.038	3.1	0.060	0.120

Concentrations in milligrams per kilogram (mg/kg)
[1] U.S. Army Corps of Engineers et al -Dredged Material Evaluation Framework - Lower Columbia River Management Area, November 1998
[2] U.S. Army Corps of Engineers et al - Northwest Regional Sediment Evaluation Framework, Interim Final September 2006 / Amended October 2006
-- = No value
Total LPAHs = total low molecular weight polynuclear aromatic hydrocarbons
Total HPAHs = total high molecular weight polynuclear aromatic hydrocarbons

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TABLE 3
PROBE B-3 ANALYTICAL RESULTS
NORTHWESTERN LAKE, WASHINGTON

	Boring	B-3				Average (B3) Project Samples Only	Average (B1 to B4) Project Samples Only	Dredged Material Evaluation Framework [1]			Sediment Quality Guidelines	
	Sample #	B-3-16	B-3-27	B-3-35	DUPE-1			Screening Levels	Bioaccum Trigger Levels	Maximum Levels	Interim SL1	Freshwater [2] SL2
	Depth Below Water Surface (feet)	16	27	35	27							
	Depth Below Sediment Surface (feet)	0	11	19	11							
	Date	14-Dec-06	14-Dec-06	15-Dec-06	14-Dec-06							
General	Total Solids	66	58	73.1	56.9	65.7	61.0	---	---	---	---	---
	Total Volatile Solids	2.76	7.17	3.24	8.15	4.4	4.8	---	---	---	---	---
	Total Organic Carbons	0.70	2.34	0.19	2.59	1.1	1.1	---	---	---	---	---
	Ammonia	1.66	220	12.4	236	78.0	78.4	---	---	---	---	---
	Sulfide	<0.37	134	<0.37	68.8	134.0	63.1	---	---	---	---	---
Metals	Antimony	<0.04	<0.04	0.08	0.04	0.1	0.1	150	150	200	---	---
	Arsenic	0.96	1.68	2.10	1.72	1.6	1.5	57	507.1	700	20	51
	Cadmium	0.040	0.112	0.101	0.149	0.1	0.1	5.1	---	14	1.1	1.5
	Chromium	5.59	7.80	16.0	10.3	9.8	9.2	—	---	—	95	100
	Copper	17.6	18.0	12.2	17.0	15.9	17.6	390	---	1,300	80	830
	Lead	1.07	7.05	7.57	8.56	5.2	4.4	450	---	1,200	340	430
	Mercury	**0.738**	**1.280**	0.024	**0.915**	**0.7**	**0.7**	**0.41**	1.5	2.3	**0.28**	**0.75**
	Nickel	9.91	9.50	10.7	9.75	10.0	10.4	140	370	370	60	70
	Silver	0.034	0.099	0.137	0.113	0.1	0.1	6.1	6.1	8.4	2.0	2.5
	Zinc	13.4	26.1	36.5	53.0	25.3	33.0	410	---	3,800	130	400
Organics	Total LPAHs	<0.0099	0.0097	<0.01	0.0067	0.0097	0.0214	---	---	--	6.600	9.200
	Naphthalene	<0.0099	0.004	<0.01	0.0030	0.0040	0.0059	2.1	---	2.4	0.500	1.300
	Acenaphthylene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0043	0.56	---	1.3	0.470	0.640
	Acenanaphthene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0024	0.5	---	2	1.100	1.300
	Fluorene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0035	0.54	---	3.6	1.000	3.000
	Phenanthrene	<0.0099	0.0033	<0.01	0.0037	0.0033	0.0077	1.5	---	21	6.100	7.600
	Anthracene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0050	0.96	---	13	1.200	1.600
	2-Methylnaphthalene	<0.0099	0.0024	<0.01	<0.01	0.0024	0.0028	0.67	---	1.9	0.470	0.560
	Total HPAHs	<0.0099	0.0035	<0.01	0.0039	0.0035	0.0182	---	---	---	31.000	55.000
	Fluoranthene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0093	1.7	4.6	30	11.000	15.000
	Pyrene	<0.0099	0.0035	<0.01	0.0039	0.0035	0.0062	2.6	---	16	8.800	16.000
	Benz(a)anthracene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0041	1.6	3.6	3.6	4.300	5.800
	Chrysene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0067	1.4	---	21	5.900	6.400
	Benzofluoranthene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	3.2	---	9.9	0.600	4.000
	Benzo(a)pyrene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.6	3.6	3.6	3.300	4.800
	Indeno(1,2,3-cd)pyrene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0034	0.6	---	16	4.100	5.300
	Dibenzo(a,h)anthracene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.23	---	1.9	0.800	0.840
	Benzo(g,h,I)perylene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.0043	0.67	---	3.2	4.000	5.200
Chlorinated Hydrocarbons	1,4-Dichlorobenzene	<0.0029	<0.0033	<0.0026	<0.0034	<0.0026	<0.0024	0.11	0.12	0.12	---	---
	1,3-Dichlorobenzene	<0.0025	<0.0028	<0.0022	<0.0029	<0.0022	<0.0020	0.17	1.241	---	---	---
	1,2-Dichlorobenzene	<0.0020	<0.0023	<0.0018	<0.0023	<0.0018	<0.0017	0.035	0.037	0.11	---	---
	1,2,4-Trichlorobenzene	<0.0023	<0.0026	<0.0021	<0.0027	<0.0021	<0.0019	0.031	---	0.064	---	---
	Hexachlorobenzene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.022	0.168	0.23	---	---
	Total Chlorinated Hydrocarbons	<0.0099	<0.0099	<0.0018	<0.0023	<0.0099	<0.0018	---	---	---	---	---
Phthalates	Dimethyl Phthalate	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.4	1.4	---	0.046	0.440
	Diethyl Phthalate	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.2	---	---	---	---
	Di-n-butyl Phthalate	0.0089	0.0061	<0.01	0.0049	0.0075	0.0066	5.1	10.22	---	---	---
	Butyl benzyl Phthalate	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.97	---	---	0.260	0.370
	Bis(2-ethylhexyl) Phthalate	0.010	0.015	0.027	0.021	0.0173	0.0391	8.3	13.87	---	0.220	0.320
	Di-n-octyl Phthalate	>0.0099	>0.0099	<0.01	<0.01	<0.0099	<0.0099	6.2	---	---	0.026	0.045
Phenols	Phenol	0.0095	0.016	<0.0026	0.037	0.0128	0.0099	0.42	0.876	1.2	---	---
	2-Methylphenol	<0.0052	<0.0059	<0.0047	<0.0060	<0.0047	<0.0042	0.063	---	0.077	---	---
	4-Methylphenol	<0.0099	0.022	<0.01	0.069	0.0220	0.0253	0.67	---	3.6	---	---
	2,4-Dimethylphenol	<0.0084	<0.0095	<0.0076	<0.0097	<0.0076	<0.0069	0.029	---	0.21	---	---
	Pentachlorophenol	<0.013	<0.015	<0.012	<0.015	<0.012	<0.011	0.4	0.504	0.69	---	---
	Benzyl Alcohol	<0.0057	<0.0064	<0.0051	<0.0066	<0.0051	<0.0046	0.057	---	0.87	---	---
	Benzoic Acid	0.150	0.210	<0.01	0.380	0.180	0.180	0.65	---	0.76	---	---
	Dibenzofuran	<0.0099	<0.0099	<0.01	<0.01	<0.0099	0.002	0.54	---	1.7	0.400	0.440
	Hexachloroethane	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.4	10.2	14	---	---
	Hexachlorobutadiene	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.029	0.212	0.27	---	---
	n-Nitrosodiphenylamine	<0.0099	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.028	0.13	0.13	---	---
Pesticides	4,4'-DDD	<0.0010	**0.0090**	<0.0010	**0.019**	0.0090	0.0039	**0.0069**	0.05	0.069	---	---
	4,4'-DDE	<0.0010	0.0035	<0.0010	**0.010**	0.0035	0.0042	**0.0069**	0.05	0.069	---	---
	4,4'-DDT	<0.0010	0.0014	<0.0010	0.0023	0.0014	0.0014	0.0069	0.05	0.069	---	---
	Aldrin	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0004	0.01	0.037	---	---	---
	Chlordane	<0.0063	<0.012	<0.0057	<0.0081	<0.0057	<0.0051	0.01	0.037		---	---
	Dieldrin	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0002	0.01	0.037	---	---	---
	Heptachlor	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.01	0.037	---	---	---
	Lindane	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.01	—	—	---	---
PCB	Polychlorinated Biphenyls	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.130	0.038	3.1	0.060	0.120

Concentrations in milligrams per kilogram (mg/kg)
[1] U.S. Army Corps of Engineers et al - Dredged Material Evaluation Framework - Lower Columbia River Management Area, November 1998
[2] U.S. Army Corps of Engineers et al - Northwest Regional Sediment Evaluation Framework, Interim Final September 2006 / Amended October 2006
-- = No value
Total LPAHs = total low molecular weight polynuclear aromatic hydrocarbons
Total HPAHs = total high molecular weight polynuclear aromatic hydrocarbons

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TABLE 4
PROBE B-4 ANALYTICAL RESULTS
NORTHWESTERN LAKE, WASHINGTON

	Boring	B-4			Average (B4) Project Samples Only	Average (B1 to B4) Project Samples Only	Dredged Material Evaluation Framework [1]			Sediment Quality Guidelines	
	Sample #	B-4-15	B-4-24	B-4-35			Screening Levels	Bioaccum Trigger Levels	Maximum Levels	Interim Freshwater [2] SL1	SL2
	Depth Below Water Surface (feet)	15	24	35							
	Depth Below Sediment Surface (feet)	3	12	23							
	Date	14-Dec-06	14-Dec-06	14-Dec-06							
General	Total Solids	7	80.8	75.2	54.3	61.0	---	---	---	---	---
	Total Volatile Solids	2.94	4.37	3.24	3.5	4.8	---	---	---	---	---
	Total Organic Carbons	0.66	0.63	0.47	0.6	1.1	---	---	---	---	---
	Ammonia	57.9	52.9	29.9	46.9	78.4	---	---	---	---	---
	Sulfide	9.2	7.0	18.3	11.5	63.1	---	---	---	---	---
Metals	Antimony	<0.05	<0.05	<0.04	<0.04	0.1	150	150	200	---	---
	Arsenic	0.87	0.78	0.78	0.8	1.5	57	507.1	700	20	51
	Cadmium	0.050	0.071	0.052	0.1	0.1	5.1	---	14	1.1	1.5
	Chromium	8.04	7.38	6.31	7.2	9.2	---	---	---	95	100
	Copper	14.1	11.0	9.85	11.7	17.6	390	---	1,300	80	830
	Lead	1.80	2.59	2.07	2.2	4.4	450	---	1,200	340	430
	Mercury	**0.449**	0.238	0.378	0.4	**0.7**	**0.41**	1.5	2.3	**0.28**	0.75
	Nickel	12.2	10.6	10.6	11.1	10.4	140	370	370	60	70
	Silver	0.056	0.038	0.043	0.0	0.1	6.1	6.1	8.4	2.0	2.5
	Zinc	25.1	26.2	24.5	25.3	33.0	410	---	3,800	130	400
Organics	Total LPAHs	<0.0099	<0.01	<0.01	<0.0099	0.0214				6.600	9.200
	Naphthalene	<0.0099	<0.01	<0.01	<0.0099	0.0059	2.1	---	2.4	0.500	1.300
	Acenaphthylene	<0.0099	<0.01	<0.01	<0.0099	0.0043	0.56	---	1.3	0.470	0.640
	Acenanaphthene	<0.0099	<0.01	<0.01	<0.0099	0.0024	0.5	---	2	1.100	1.300
	Fluorene	<0.0099	<0.01	<0.01	<0.0099	0.0035	0.54	---	3.6	1.000	3.000
	Phenanthrene	<0.0099	<0.01	<0.01	<0.0099	0.0077	1.5	---	21	6.100	7.600
	Anthracene	<0.0099	<0.01	<0.01	<0.0099	0.0050	0.96	---	13	1.200	1.600
	2-Methylnaphthalene	<0.0099	<0.01	<0.01	<0.0099	0.0028	0.67	---	1.9	0.470	0.560
	Total HPAHs	<0.0099	<0.01	0.0023	0.0023	0.0182				31.000	55.000
	Fluoranthene	<0.0099	<0.01	<0.01	<0.0099	0.0093	1.7	4.6	30	11.000	15.000
	Pyrene	<0.0099	<0.01	0.0023	0.0023	0.0062	2.6	---	16	8.800	16.000
	Benz(a)anthracene	<0.0099	<0.01	<0.01	<0.0099	0.0041	1.6	3.6	3.6	4.300	5.800
	Chrysene	<0.0099	<0.01	<0.01	<0.0099	0.0067	1.4	---	21	5.900	6.400
	Benzofluoranthene	<0.0099	<0.01	<0.01	<0.0099	<0.0099	3.2	---	9.9	0.600	4.000
	Benzo(a)pyrene	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.6	3.6	3.6	3.300	4.800
	Indeno(1,2,3-cd)pyrene	<0.0099	<0.01	<0.01	<0.0099	0.0034	0.6	---	16	4.100	5.300
	Dibenzo(a,h)anthracene	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.23	---	1.9	0.800	0.840
	Benzo(g,h,I)perylene	<0.0099	<0.01	<0.01	<0.0099	0.0043	0.67	---	3.2	4.000	5.200
Chlroinated Hydrocarbons	1,4-Dichlorobenzene	<0.0028	<0.0024	<0.0018	<0.0024	<0.0024	0.11	0.12	0.12	---	---
	1,3-Dichlorobenzene	<0.0023	<0.0020	<0.0026	<0.0020	<0.0020	0.17	1.241	---	---	---
	1,2-Dichlorobenzene	<0.0019	<0.0017	<0.01	<0.0017	<0.0017	0.035	0.037	0.11	---	---
	1,2,4-Trichlorobenzene	<0.0022	<0.0019	<0.002	<0.0019	<0.0019	0.031	---	0.064	---	---
	Hexachlorobenzene	<0.0099	<0.01	<0.0022	<0.0099	<0.0099	0.022	0.168	0.23	---	---
	Total Chlorinated Hydrocarbons	<0.099	<0.0017	<0.0018	<0.0018	<0.0018				---	---
Phthalates	Dimethyl Phthalate	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.4	1.4	---	0.046	0.440
	Diethyl Phthalate	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.2	---	---	---	---
	Di-n-butyl Phthalate	0.0060	0.0065	0.0064	0.0063	0.0066	5.1	10.22	---	---	---
	Butyl benzyl Phthalate	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.97	---	---	0.260	0.370
	Bis(2-ethylhexyl) Phthalate	0.071	0.120	0.061	0.0840	0.0391	8.3	13.87	---	0.220	0.320
	Di-n-octyl Phthalate	<0.0099	<0.01	<0.01	<0.0099	<0.0099	6.2	---	---	0.026	0.045
Phenols	Phenol	0.010	0.015	0.0099	0.0116	0.0099	0.42	0.876	1.2	---	---
	2-Methylphenol	<0.0049	<0.0043	<0.0046	<0.0043	<0.0042	0.063	---	0.077	---	---
	4-Methylphenol	0.025	0.010	0.01	0.0150	0.0253	0.67	---	3.6	---	---
	2,4-Dimethylphenol	<0.0079	<0.0069	<0.0074	<0.0069	<0.0069	0.029	---	0.21	---	---
	Pentachlorophenol	<0.013	<0.011	<0.012	<0.011	<0.011	0.4	0.504	0.69	---	---
Miscellaneous extractables	Benzyl Alcohol	<0.0053	<0.0046	<0.0050	<0.0046	<0.0046	0.057	---	0.87	---	---
	Benzoic Acid	0.150	0.140	0.170	0.1533	0.1800	0.65	---	0.76	---	---
	Dibenzofuran	<0.0099	<0.01	<0.01	<0.0099	0.0022	0.54	---	1.7	0.400	0.440
	Hexachloroethane	<0.0099	<0.01	<0.01	<0.0099	<0.0099	1.4	10.2	14	---	---
	Hexachlorobutadiene	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.029	0.212	0.27	---	---
	n-Nitrosodiphenylamine	<0.0099	<0.01	<0.01	<0.0099	<0.0099	0.028	0.13	0.13	---	---
Pesticides	4,4'-DDD	0.0014	0.0034	0.0030	0.0026	0.0039	0.0069	0.05	0.069	---	---
	4,4'-DDE	0.0028	0.0017	0.0028	0.0024	0.0042	0.0069	0.05	0.069	---	---
	4,4'-DDT	0.0020	0.00094	<0.0010	0.0015	0.0014	0.0069	0.05	0.069	---	---
	Aldrin	<0.0010	<0.0010	<0.0010	<0.0010	0.0004	0.01	0.037	---	---	---
	Chlordane	<0.0087	<0.0051	<0.0055	<0.0051	<0.0051	0.01	0.037		---	---
	Dieldrin	<0.0010	<0.0010	<0.0010	<0.0010	0.0002	0.01	0.037	---	---	---
	Heptachlor	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.01	0.037	---	---	---
	Lindane	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.01	---	---	---	---
PCB	Polychlorinated Biphenyls	<0.01	<0.01	<0.01	<0.01	<0.01	0.130	0.038	3.1	0.060	0.120

Concentrations in milligrams per kilogram (mg/kg)
[1] U.S. Army Corps of Engineers et al - Dredged Material Evaluation Framework - Lower Columbia River Management Area, November 1998
[1] U.S. Army Corps of Engineers et al - Dredged Material Evaluation Framework - Lower Columbia River Management Area, November 1998
[2] U.S. Army Corps of Engineers et al - Northwest Regional Sediment Evaluation Framework, Interim Final September 2006 / Amended October 2006
-- = No value
Total LPAHs = total low molecular weight polynuclear aromatic hydrocarbons
Total HPAHs = total high molecular weight polynuclear aromatic hydrocarbons

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TABLE 5
SAMPLE POINT LOCATIONS WITH COORDINATES
NORTHWESTERN LAKE, WASHINGTON

Sample Point Description	Sample Name	latitude	longitude	northing	Easting	feet below sediment surface	comments
Northwestern Lake	NW1-071707	45.76830	121.53825	160362.593	1375455.849	1	vicinity of B-1 (N45.76825 / W121.53781)
Northwestern Lake	NW2-071707	45.76818	121.53799	160317.964	1375521.621	1	vicinity of B-1 (N45.76825 / W121.53781)
Northwestern Lake	NW3-071707	45.76842	121.53788	160405.106	1375550.843	1	vicinity of B-1 (N45.76825 / W121.53781)
Northwestern Lake	NW4-071807	45.76847	121.53829	160424.714	1375446.457	1	vicinity of B-1 (N45.76825 / W121.53781)
Northwestern Lake	NW5-071807	45.76866	121.53852	160494.766	1375388.677	1	vicinity of B-1 (N45.76825 / W121.53781)
Northwestern Lake	NW6-071807	45.76865	121.53779	160488.668	1375574.913	1	vicinity of B-1 (N45.76825 / W121.53781)
Northwestern Lake	NW7-071807	45.76833	121.53788	160372.289	1375550.411	1	vicinity of B-1 (N45.76825 / W121.53781)
Buck Creek	no sample						cobble to gravel sediment, no fines available
Little Buck Creek	LBC-071807	45.77117	121.53925	161412.436	1375214.453	0.5	at confluence with Northwestern Lake
Mill Creek	MC-071807	45.77547	121.53169	163687.211	1326134.593	0.5	at confluence with Northwestern Lake
Spring Creek	BC-071807	45.77028	121.53951	161088.791	1375143.831	0.5	at confluence with Northwestern Lake
Salt Creek	SP1-071707	46.1256	121.58598	290806.368	1365069.744	0.5	southwest of Mount Adams, lahar material
Trout Lake	SP2-071707	46.00735	121.55015	247566.488	1373579.702	1	in marshy area
Gilmer Creek	SP3-071707	45.85725	121.50428	192684.111	1384537.475	0.5	at confluence with White Salmon River
Rattlesnake Creek	SP4-071707	45.79726	121.48.551	170749.64	1389046.291	0.5	
White Salmon River	SP5-071707	45.72936	121.52377	146115.618	1378966.628	0.5	at boat dock, near confluence with Columbia River
Little White Salmon River	LWS-071907	45.71852	121.64498	142588.662	1347956.739	0.5	below fish hatchery, near Columbia River
Wind River	WR-071907	45.71708	121.79044	142637.214	1310796.723	0.5	near boat ramp, near Columbia River

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TABLE 6
ANALYTICAL DATA FOR MERCURY DISTRIBUTION ANALYSIS
NORTHWESTERN LAKE, WASHINGTON

Location	B-1	NW-1	NW-2	NW-3	NW-4	NW-5	NW-6	NW-7		
Sample #	B1-72	NW1-071807	NW2-071807	NW3-071807	NW4-071807	NW5-071807	NW6-071807	NW7-071807	average	average
Depth Below Water Surface (feet)	72	72	71	72	25	70	70	69	7	
Depth Below Sediment Surface (feet)	1	1	1	1	1	1	1	1	Supplemental	8 Samples
Sample Collection Date	18-Dec-06	18-Jul-07	18-Jul-07	18-Jul-07	18-Jul-07	18-Jul-07	18-Jul-07	18-Jul-07	Samples	
Total Solids (percent)	48.0	43.7	49.5	52.6	52	55.1	48.4	51.6	50.4	50.1
Total Volatile Solids (percent)	4.01	5.74	5.85	5.18	4.33	3.67	5.47	4.71	4.99	4.87
Total Organic Carbons (percent)	1.05	1.55	1.56	1.64	1.10	0.86	1.56	1.35	1.37	1.33
Ammonia (mg/Kg)	2.88	26.9	21.3	18.7	18.4	11.0	19.7	16.1	18.9	16.9
Sulfide (mg/Kg)	<0.5	<0.5	2.2	50.2	10.1	7.3	44.5	2.4	19.5	19.5
Mercury (mg/Kg)	**2.03**	**0.881**	**0.774**	**0.647**	**0.832**	**0.856**	0.105	0.094	**0.60**	**0.78**
NWRSEF Mercury SL1	***0.28***	***0.28***	***0.28***	***0.28***	***0.28***	***0.28***	*0.28*	*0.28*	***0.28***	***0.28***
NWRSEF Mercury SL2	***0.75***	***0.75***	***0.75***	*0.75*	***0.75***	***0.75***	*0.75*	*0.75*	*0.75*	***0.75***
percent passing 3/4-inch sieve	100	100	100	100	100	100	100	100	100.00	100.0
percent passing 1/2-inch sieve	100	100	100	100	100	100	100	100	100.00	100.0
percent passing 3/8-inch sieve	100	100	100	100	100	100	100	100	100.00	100.0
percent passing 1/4-inch sieve	100	100	100	100	100	100	100	99	99.86	99.9
percent passing #4 sieve	100	100	100	100	100	100	100	99	99.86	99.9
percent passing #8 sieve	100	100	100	100	100	100	100	99	99.86	99.9
percent passing #10 sieve	100	100	99	100	100	100	100	99	99.71	99.8
percent passing #16 sieve	100	100	99	100	100	100	100	99	99.71	99.8
percent passing #30 sieve	100	99	99	100	100	99	99	99	99.29	99.4
percent passing #40 sieve	100	99	99	99	99	99	99	99	99.00	99.1
percent passing #50 sieve	100	99	98	99	99	99	99	99	98.86	99.0
percent passing #100 sieve	100	98	98	99	98	99	98	98	98.29	98.5
percent passing #120 sieve	100									
percent passing #200 sieve	100	95	94	96	92	97	93	93	94.29	95.0
percent passing #230 sieve	100									
percent passing 2 micron	9	9	11	5	6	6	4	5	6.57	6.9

mg/Kg = milligrams per kilogram
NWRSEF Mercury SL1 = Northwest Regional Sediment Evaluation Framework Lower Screening Level
NWRSEF Mercury SL2 = Northwest Regional Sediment Evaluation Framework Upper Screening Level

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TABLE 7
SOIL CLASSIFICATION OF SEDIMENT SAMPLES
NORTHWESTERN LAKE, WASHINGTON

Sample Location	Percent retained				USCS	ASTM
	gravel	sand	silt	clay		
B1-72	0%	0%	91%	9%	ML	silt with some clay
NW-1	0%	5%	86%	9%	ML	silt with some clay
NW-2	0%	6%	83%	11%	ML	silt with some clay and trace sand
NW-3	0%	4%	91%	5%	ML	silt with trace clay and trace sand
NW-4	0%	8%	86%	6%	ML	silt with trace clay and trace sand
NW-5	0%	3%	91%	6%	ML	silt with trace clay and trace sand
NW-6	0%	7%	89%	4%	ML	silt with trace clay and trace sand
NW-7	0%	7%	88%	5%	ML	silt with trace clay and trace sand
LBC	1%	47%	52%	-	SM	sandy silt with trace gravel
MC	0%	11%	89%	-	MH	silt with some sand
BC	0%	54%	46%	-	SM	silty sand
SP-1	0%	80%	20%	-	SM	silty sand
SP-2	0%	41%	59%	-	SM	sandy silt
SP-3	0%	77%	23%	-	SM	silty sand
SP-4	45%	52%	3%	-	SP	gravelly sand with trace silt
SP-5	0%	5%	95%	-	ML	silt with trace sand
LWS	2%	70%	28%	-	SM	silty sand with trace gravel
WR	0%	32%	68%	-	SM	sandy silt

USCS = Unified Soil Classification System designation
ASTM = classification according to American Society for Testing and Materials D 2488

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TABLE 8
ELUTRIATION TEST RESULT AND COMPARISON TO WATER QUALITY CRITERIA
NORTHWESTERN LAKE, WASHINGTON

<---- Descending concentrations			
	11	ug/L	U.S. Environmental Protection Agency (EPA) Region IX Preliminary Remediation Goal (PRG) for Tapwater - 2004
	2.1	ug/L	Washington Department of Ecology (WDOE) Ambient Water Quality Criteria (AWQC) for Acute Exposures - 2006
	2	ug/L	EPA Maximum Contaminant Level for Drinking Water (MCL) - 2007
	1.4	ug/L	EPA Freshwater Criteria Maximum Concentration (CMC) - 2004
	0.77	ug/L	EPA Freshwater Criterion Continuous Concentration (CCC) - 2004
	0.525	**ug/L**	**Sample NW1-071807 Elutriate**
	0.012	ug/L	WDOE AWQC for Chronic Exposures

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TABLE 9
ANALYTICAL DATA FOR MERCURY BACKGROUND EVALUATION
NORTHWESTERN LAKE, WASHINGTON

Location	Little Buck Creek	Mill Creek	Spring Creek	Salt Creek	Trout Lake	Gilmer Creek	Rattlesnake Creek	White Salmon River	Little White Salmon River	Wind River	average
Sample #	LBC-071807	MC-071807	BC-071807	SP1-071707	SP2-071707	SP3-071707	SP4-071707	SP5-071707	LWS-071907	WR-071907	
Depth Below Water Surface (feet)	0.5	1	0.5	0.5	1	1	0	2	0	0	0.7
Depth Below Sediment Surface (feet)	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	0.5	0.5	0.6
Date	18-Jul-07	18-Jul-07	18-Jul-07	17-Jul-07	17-Jul-07	17-Jul-07	17-Jul-07	17-Jul-07	17-Jul-07	17-Jul-07	17-Jul-07
Mercury (mg/Kg)	0.067	**0.443**	0.051	0.031	0.007	0.021	0.016	**0.72**	0.014	0.054	0.142
Mercury (mg/Kg) in samples< 200 sieve	**0.85**	**1.2**	**0.73**	**0.29**	0.11	0.08	0.10				**0.48**
NWRSEF Mercury SL1	***0.28***	***0.28***	***0.28***	***0.28***	*0.28*	*0.28*	*0.28*	***0.28***	*0.28*	*0.28*	***0.28***
NWRSEF Mercury SL2	***0.75***	***0.75***	*0.75*	*0.75*	*0.75*	*0.75*	*0.75*	*0.75*	*0.75*	*0.75*	*0.75*
Total Solids (percent)	51.4	33	19.1	73.2	27.1	58	75.3	56.3	63.9	49.3	50.7
percent passing 3/4-inch sieve	100	100	100	100	100	100	100	100	100	100	100
percent passing 1/2-inch sieve	100	100	100	100	100	100	71	100	100	100	97
percent passing 3/8-inch sieve	100	100	100	100	100	100	61	100	100	100	96
percent passing 1/4-inch sieve	100	100	100	100	100	100	55	100	98	100	95
percent passing #4 sieve	99	100	99	100	100	100	49	100	94	100	94
percent passing #8 sieve	99	99	98	100	98	100	42	99	86	100	92
percent passing #10 sieve	99	99	97	100	97	100	40	99	84	100	92
percent passing #16 sieve	98	98	94	98	93	98	37	98	81	99	89
percent passing #30 sieve	95	97	89	95	88	94	27	98	78	98	86
percent passing #40 sieve	91	97	87	94	85	78	18	98	75	98	82
percent passing #50 sieve	82	97	82	90	82	61	12	97	71	97	77
percent passing #100 sieve	65	94	60	65	74	40	6	97	52	91	64
percent passing #120 sieve	61	93	59	56	65	35	5				53
percent passing #200 sieve	53	89.2	45.7	20.4	59.2	23.3	3	95	30	68	49
percent passing #230 sieve	49.7	89.4	43.9	14.7	52.7	20.7	2.5				39
percent passing 2 micron								5	2	7	5

mg/Kg = milligrams per kilogram
NWRSEF Mercury SL1 = Northwest Regional Sediment Evaluation Framework Lower Screening Level
NWRSEF Mercury SL2 = Northwest Regional Sediment Evaluation Framework Upper Screening Level

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TABLE 10
COMPARISON OF BIOACCUMULATION ANALYTICAL RESULTS TO OREGON GUIDELINES
NORTHWESTERN LAKE, WASHINGTON

sample type	sample number	laboratory identification	sample location and / or identifier	ng/g	mg/Kg	Human ATL		Avian ATL				Mammals		Freshwater
						general	tribal	Individual		Population		Individual	Population	CTL
fish	Fish #1	07BR0799-01	Northwestern Lake	297.000	**0.29700**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	**0.20**	**0.088**
fish	Fish #2	07BR0799-02	Northwestern Lake	308.000	**0.30800**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	**0.20**	**0.088**
fish	Fish #3	07BR0799-03	Northwestern Lake	185.000	**0.18500**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	0.20	**0.088**
clams	1139G-01	07BR1309-06	pre-exposure sample	29.900	0.02990	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clams	1139G-02	07BR1309-07	pre-exposure sample	30.900	0.03090	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clams	1139G-03	07BR1309-08	pre-exposure sample	31.000	0.03100	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clams	1139G-04	07BR1309-09	pre-exposure sample	27.900	0.02790	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clams	1139G-05	07BR1309-10	pre-exposure sample	29.200	0.02920	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clams	1175G-01	07BR1309-26	control sample	32.200	0.03220	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1175G-02	07BR1309-27	control sample	35.100	0.03510	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1175G-03	07BR1309-28	control sample	34.000	0.03400	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1175G-04	07BR1309-29	control sample	35.000	0.03500	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1175G-05	07BR1309-30	control sample	34.800	0.03480	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1176G-01	07BR1309-31	Northwestern Lake	38.400	0.03840	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1176G-02	07BR1309-32	Northwestern Lake	40.900	0.04090	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1176G-03	07BR1309-33	Northwestern Lake	37.100	0.03710	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1176G-04	07BR1309-34	Northwestern Lake	40.400	0.04040	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1176G-05	07BR1309-35	Northwestern Lake	41.800	0.04180	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1177G-01	07BR1309-36	Little White Salmon River	35.900	0.03590	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1177G-02	07BR1309-37	Little White Salmon River	35.700	0.03570	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1177G-03	07BR1309-38	Little White Salmon River	36.900	0.03690	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1177G-04	07BR1309-39	Little White Salmon River	34.000	0.03400	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
clam	1177G-05	07BR1309-40	Little White Salmon River	38.000	0.03800	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1138G-01	07BR1309-01	pre-exposure sample	4.390	0.00439	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1138G-02	07BR1309-02	pre-exposure sample	4.160	0.00416	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1138G-03	07BR1309-03	pre-exposure sample	4.240	0.00424	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1138G-04	07BR1309-04	pre-exposure sample	4.340	0.00434	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1138G-05	07BR1309-05	pre-exposure sample	3.970	0.00397	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1172G-01	07BR1309-11	control sample	13.400	0.01340	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1172G-02	07BR1309-12	control sample	13.500	0.01350	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1172G-03	07BR1309-13	control sample	13.300	0.01330	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1172G-04	07BR1309-14	control sample	13.100	0.01310	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1172G-05	07BR1309-15	control sample	12.300	0.01230	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1173G-01	07BR1309-16	Northwestern Lake	340.000	**0.34000**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	**0.20**	**0.088**
worms	1173G-02	07BR1309-17	Northwestern Lake	346.000	**0.34600**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	**0.20**	**0.088**
worms	1173G-03	07BR1309-18	Northwestern Lake	354.000	**0.35400**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	**0.20**	**0.088**
worms	1173G-04	07BR1309-19	Northwestern Lake	340.000	**0.34000**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	**0.20**	**0.088**
worms	1173G-05	07BR1309-20	Northwestern Lake	357.000	**0.35700**	0.40	**0.049**	**0.074**	**0.18**	**0.15**	0.89	**0.12**	**0.20**	**0.088**
worms	1174G-01	07BR1309-21	Little White Salmon River	4.980	0.00498	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1174G-02	07BR1309-22	Little White Salmon River	4.740	0.00474	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1174G-03	07BR1309-23	Little White Salmon River	4.460	0.00446	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1174G-04	07BR1309-24	Little White Salmon River	4.910	0.00491	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
worms	1174G-05	07BR1309-25	Little White Salmon River	4.980	0.00498	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
blank	HB-07-0606-Hg	07BR0799-04	homogenizing blank	0.070	0.00007	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
blank	HB-Hg-07-1022	07BR1309-41	homogenizing blank	0.650	0.00065	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088
blank	HB-Hg-07-0992	07BR1309-42	homogenizing blank	0.650	0.00065	0.40	0.049	0.074	0.18	0.15	0.89	0.12	0.20	0.088

ng/g = nanograms per gram
mg/Kg = milligrams per kilogram
ATL = acceptable tissue level
CTL = critical tissue level

H:\Environmental\53886 - Condit\Task 5 - Report Pieces\bioaccum tablespecies
11/26/2007 4:34 PM
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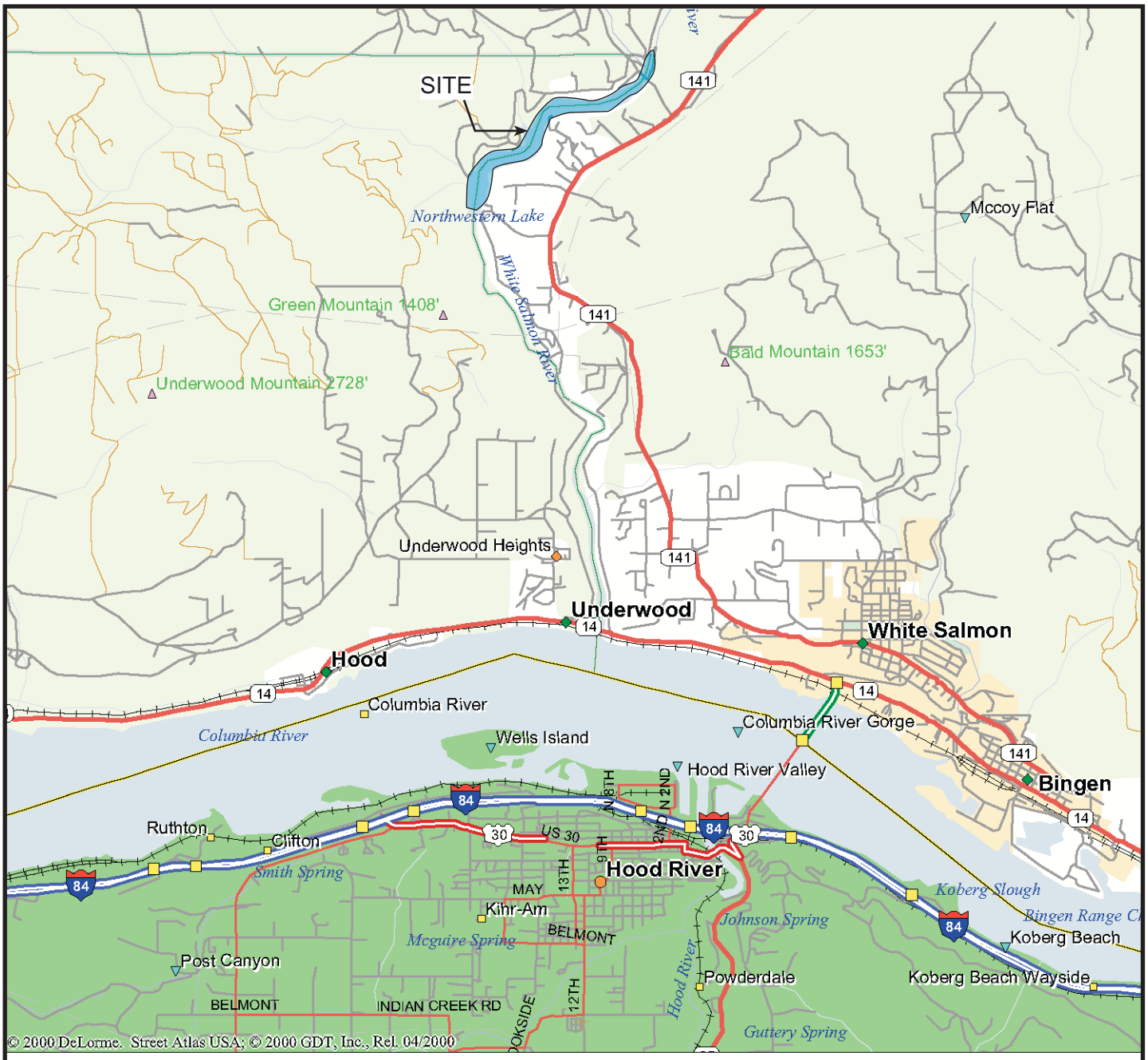


Mag 13.00
Tue Jun 27 08:54 2006
Scale 1:62,500 (at center)

1 Miles

2 KM

- Local Road
- Major Connector
- State Route
- Trail
- Interstate/Limited Access
- Toll Highway
- US Highway
- Exit
- Utility/Pipe
- Railroad
- Point of Interest
- County Seat
- Small Town
- Summit
- Geographic Feature
- Locale
- Private Airport
- Cemetery
- County Boundary
- State Boundary
- Population Center
- Land
- Water
- National Park

N W E S

KLEINFELDER

PROJECT NO. 53886

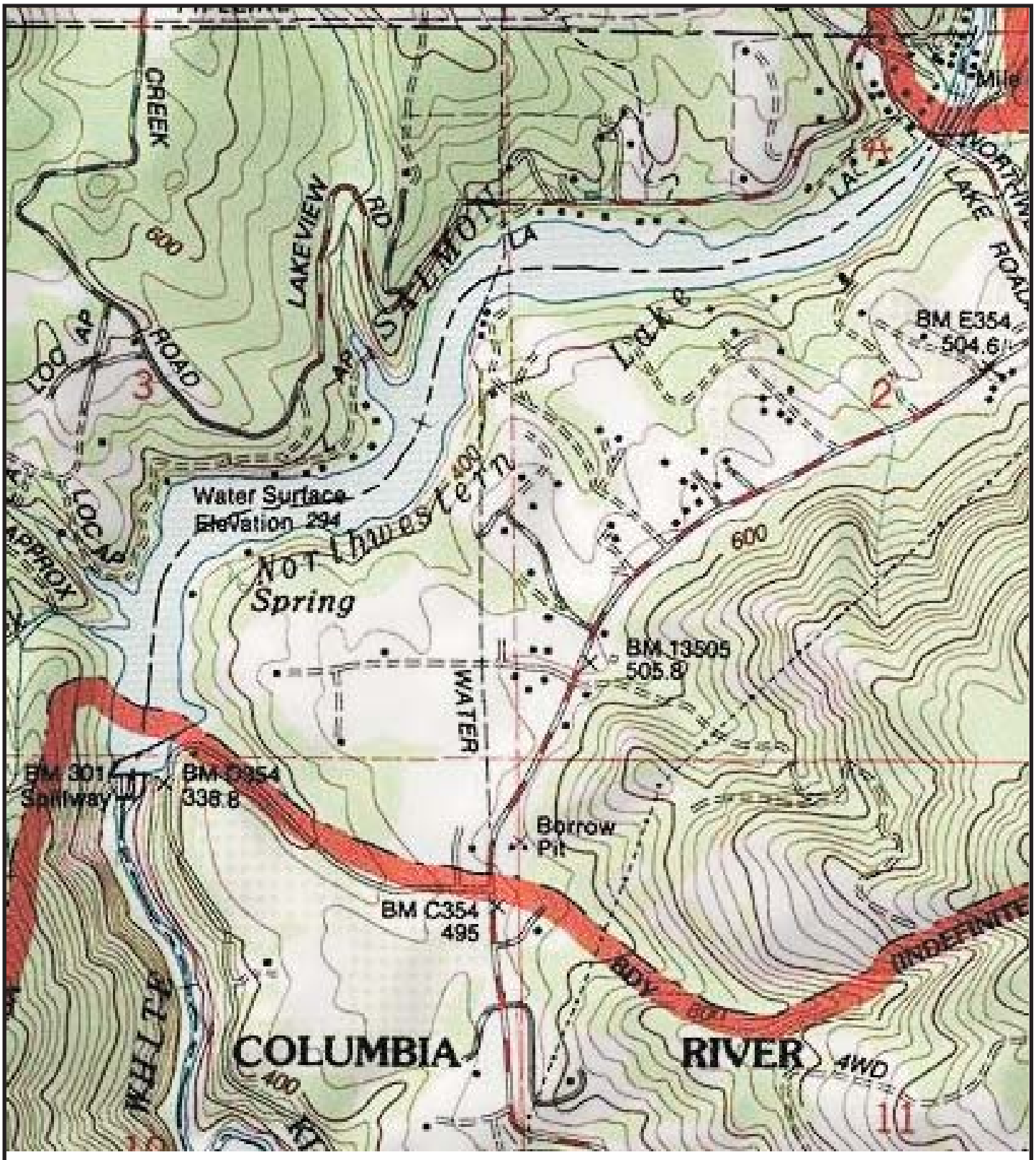
DRAWN BY: TLK

CHECKED BY: DEK

SITE LOCATION MAP
NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE: 1



SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO.
53886

DRAWN BY:
TLK

CHECKED BY:
DEK

NORTHWESTERN LAKE SITE MAP

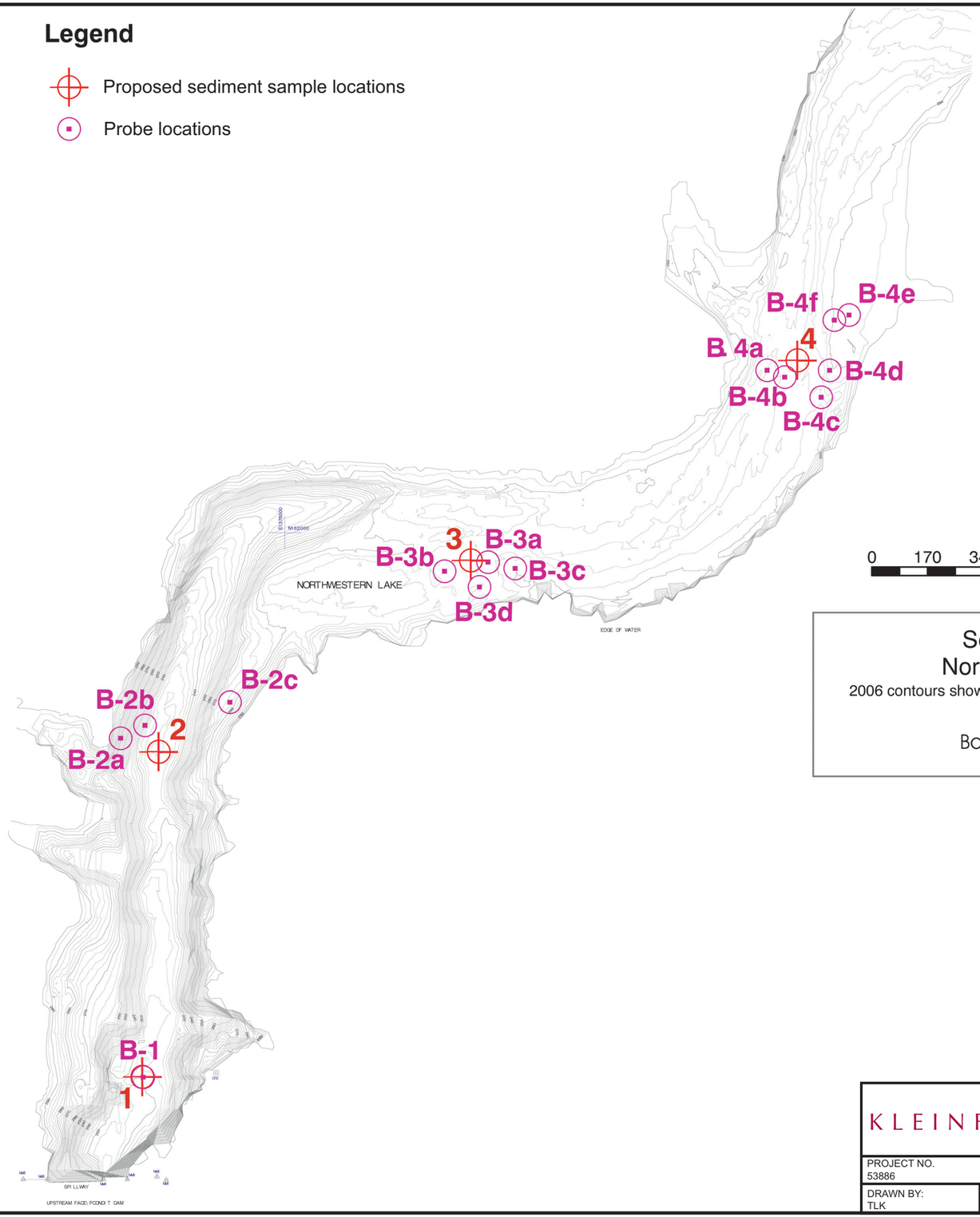
NORTHWESTERN LAKE, WASHINGTON

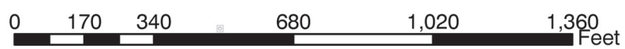
DATE:
11/07

FIGURE:
2

Legend

- Proposed sediment sample locations
- Probe locations



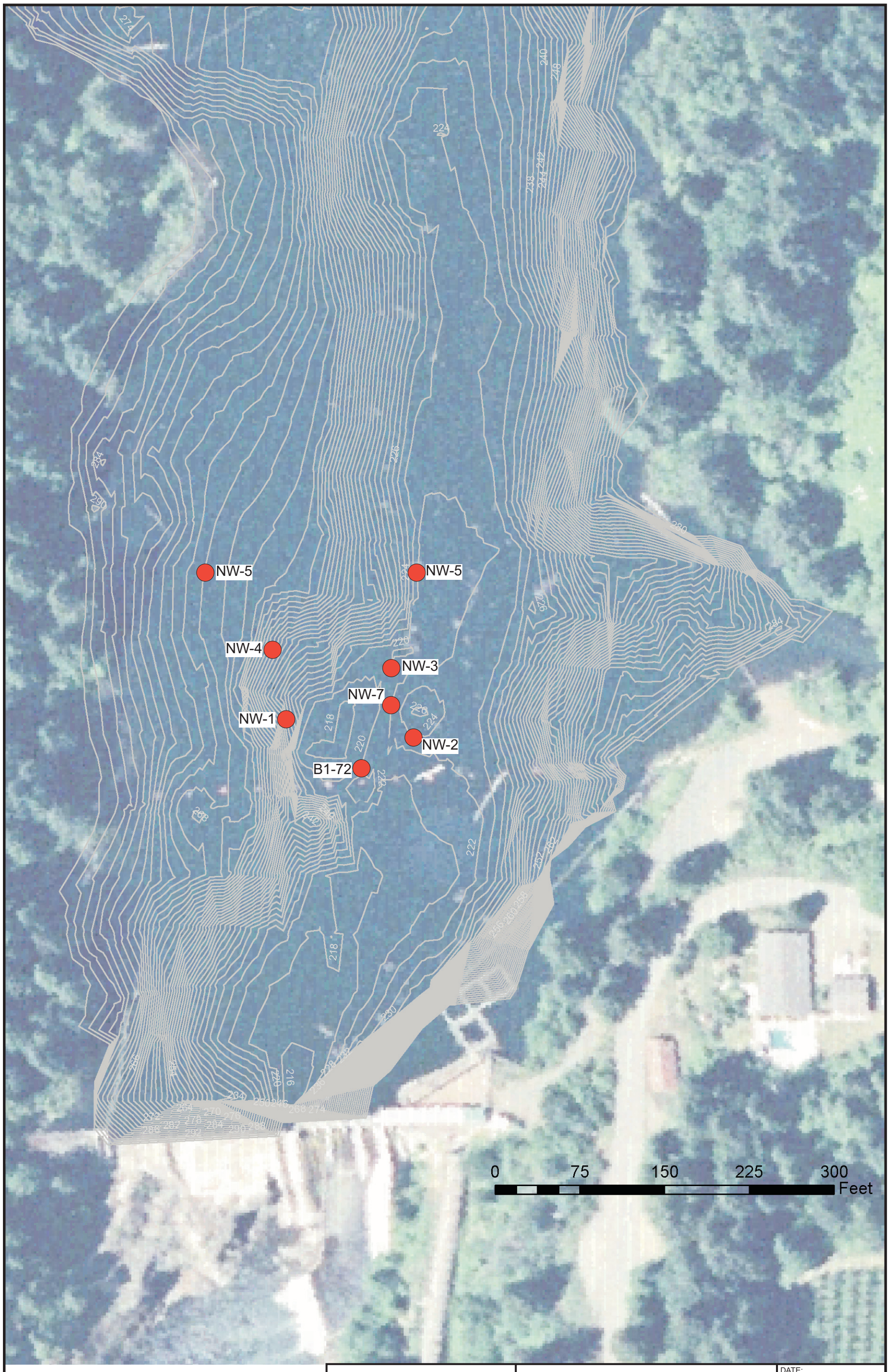


Sediment Sample Locations
Northwestern Lake, Condit Dam

2006 contours shown. Lake surface elevation = 293.3 ft in Condit datum.

Base map courtesy of PacifiCorp

KLEINFELDER		**DECEMBER 2006 SEDIMENT SAMPLING LOCATIONS** NORTHWESTERN LAKE, WASHINGTON	DATE: 11/07
PROJECT NO. 53886			
DRAWN BY: TLK	CHECKED BY: DEK		FIGURE: 3



LEGEND

SAMPLE LOCATION

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KLEINFELDER

PROJECT NO.
53886

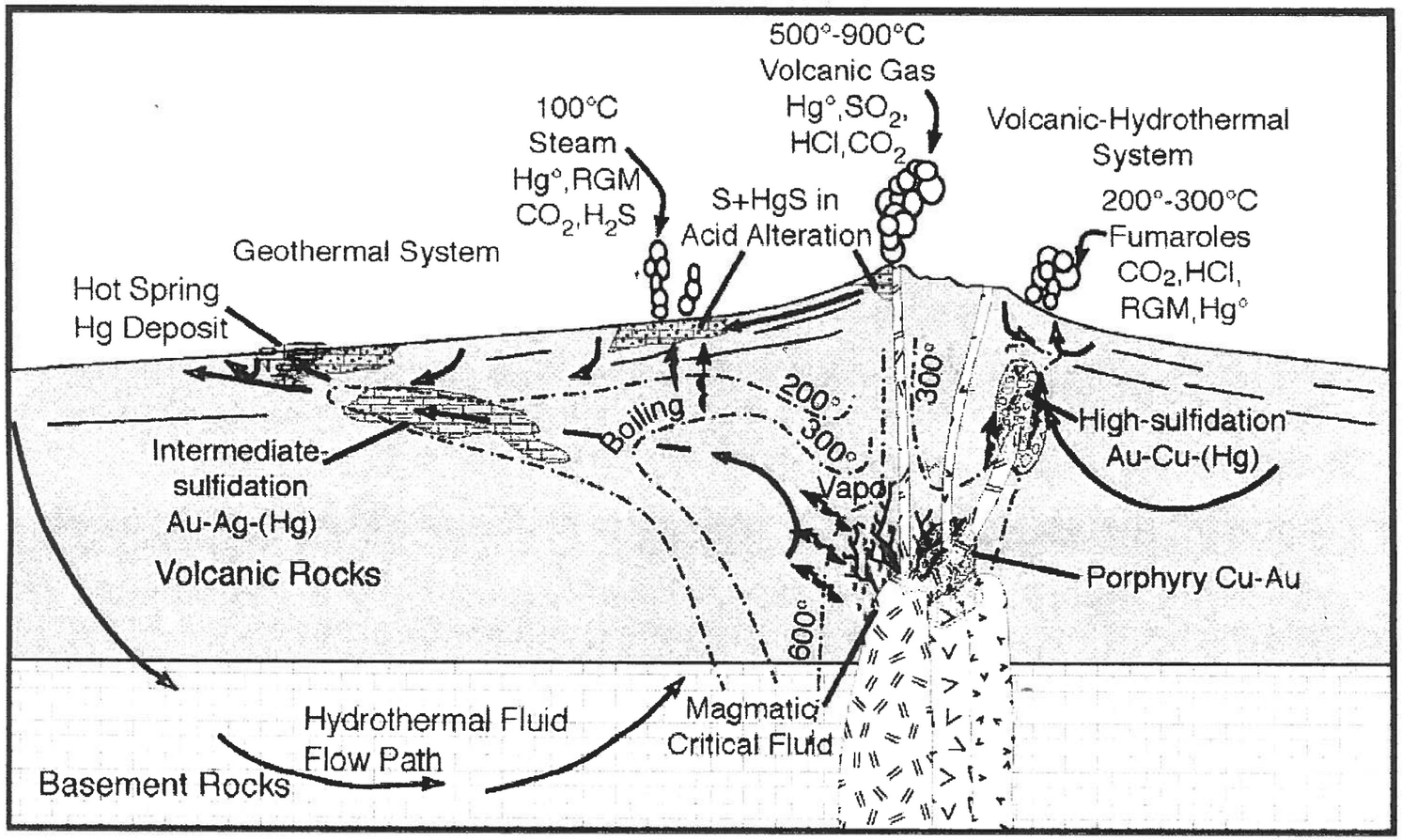
DRAWN BY:
TLK

CHECKED BY:
DEK

MERCURY DISTRIBUTION IN SEDIMENT SAMPLE LOCATIONS
NORTHWESTERN LAKE, WASHINGTON

DATE:
11/07

FIGURE:
4



LEGEND

Hg = Mercury
Hg° = Gaseous Mercury
RGM = Reactive Gaseous Mercury
$C0_2$ = Carbon Dioxide
H_2S = Hydrogen Sulfide
$S0_2$ = Sulfur Dioxide
HCl = Hydrochloric acid
Au = Gold
Cu = Copper
Ag = Silver

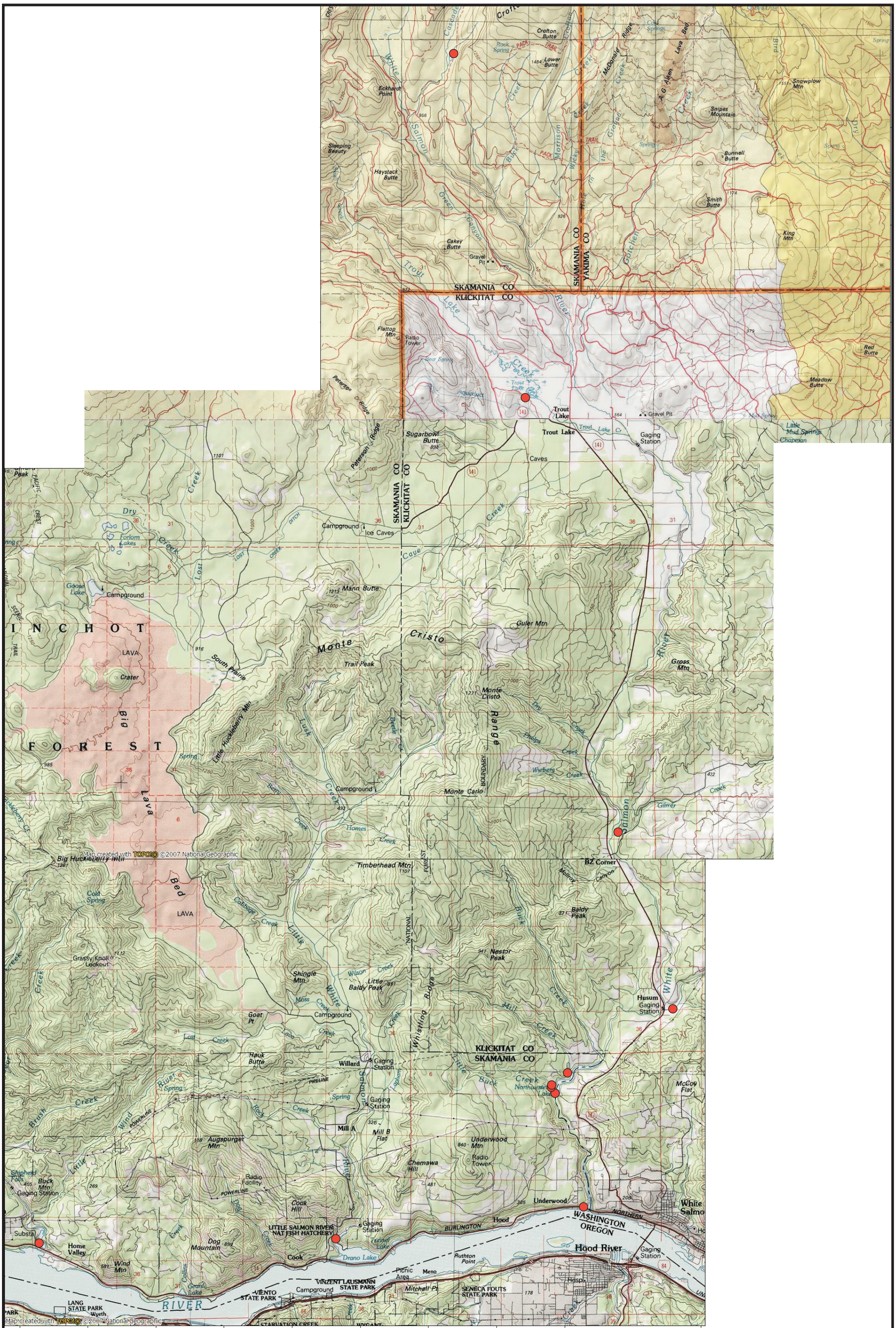
Source

Mercury Sources, Measurements, Cycles, and Effects

Chapter 2: Geogenic and Mining Sources of Mercury to Environment
Mineralogical Association of Canada
Short Course 34, Halifax, Nova Scotia, P 1-17

James J. Rytuba, USGS

KLEINFELDER	**MERCURY EMISSION ASSOCIATED WITH VOLCANOES** NORTHWESTERN LAKE, WASHINGTON	DATE: 11/07
PROJECT NO. 53886		FIGURE: 5
DRAWN BY: TLK / CHECKED BY: DEK		



LEGEND

- SAMPLE LOCATION

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KLEINFELDER

PROJECT NO.
53886

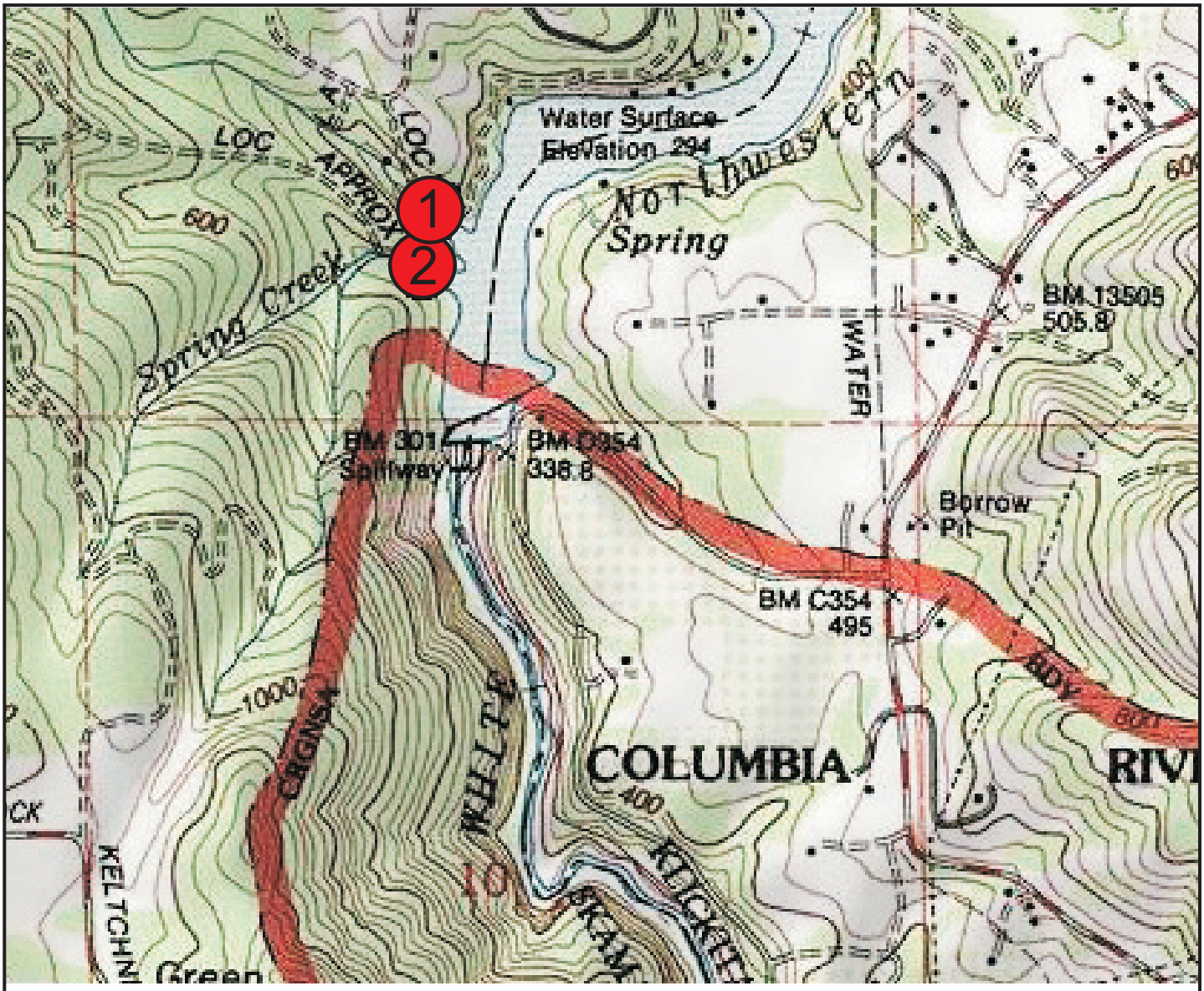
DRAWN BY:
TLK

CHECKED BY:
DEK

MERCURY BACKGROUND SAMPLE LOCATIONS
NORTHWESTERN LAKE, WASHINGTON

DATE:
11/07

FIGURE:
6



LEGEND

1. LITTLE BUCK CREEK SAMPLE LOCATION
2. SPRING CREEK SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO. 53886

DRAWN BY: TLK

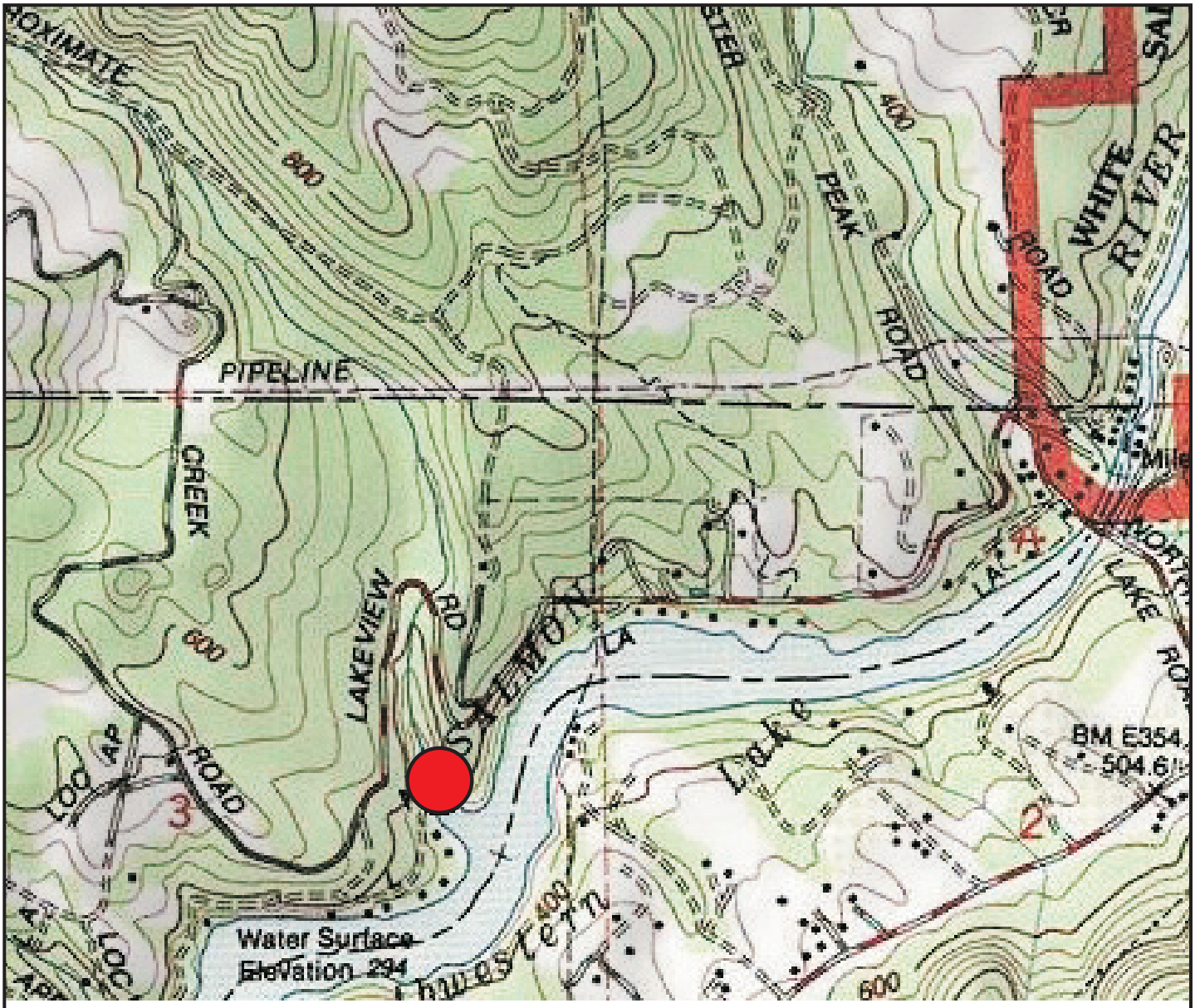
CHECKED BY: DEK

SPRING AND LITTLE BUCK CREEK SAMPLE LOCATIONS

NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE: 7



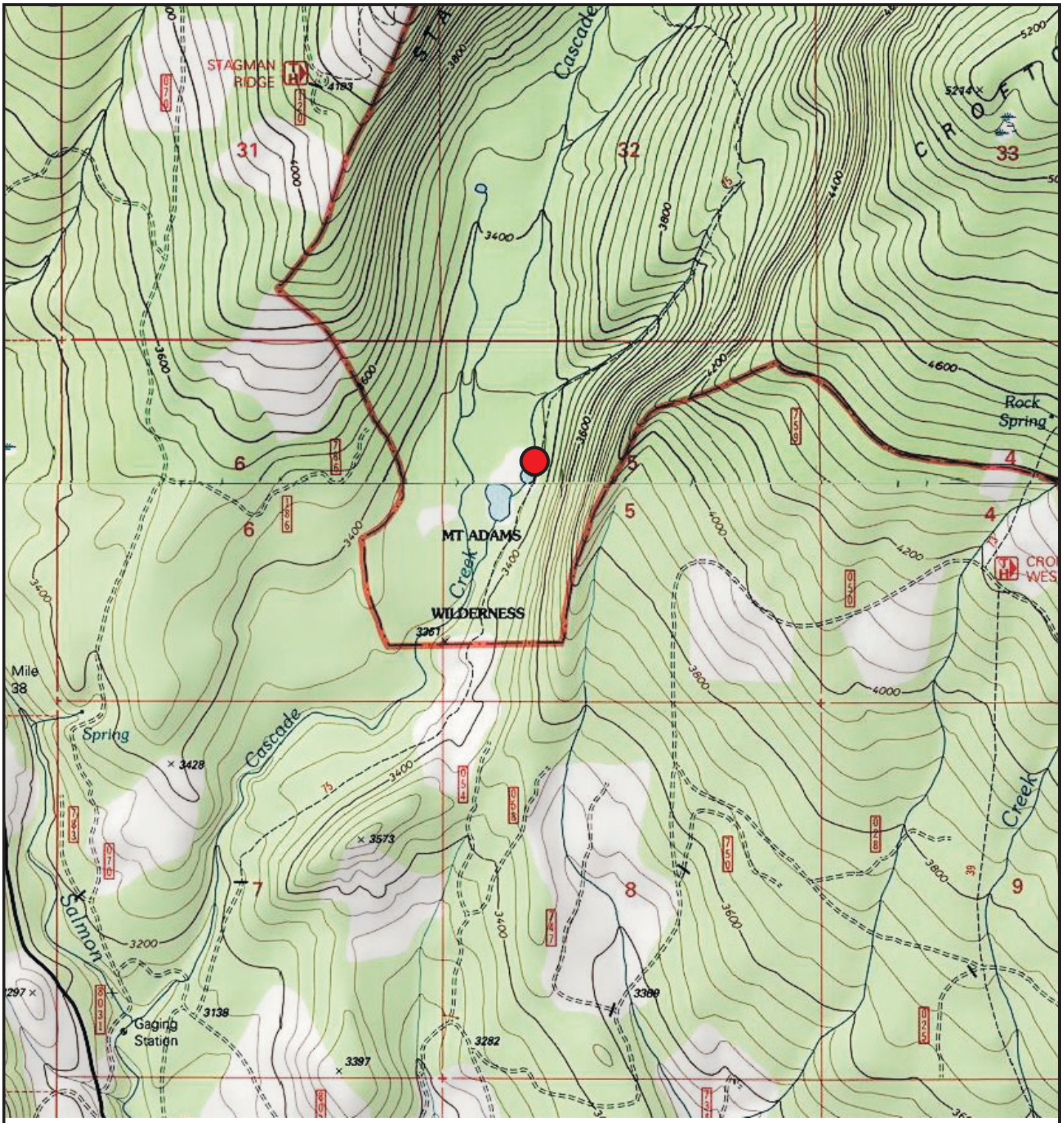
LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

KLEINFELDER		**MILL CREEK** **SAMPLE LOCATION** NORTHWESTERN LAKE, WASHINGTON	DATE: 11/07
PROJECT NO. 53886			FIGURE: 8
DRAWN BY: TLK	CHECKED BY: DEK		



LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 2000 4000

N

W E

S

KLEINFELDER

PROJECT NO. 53886

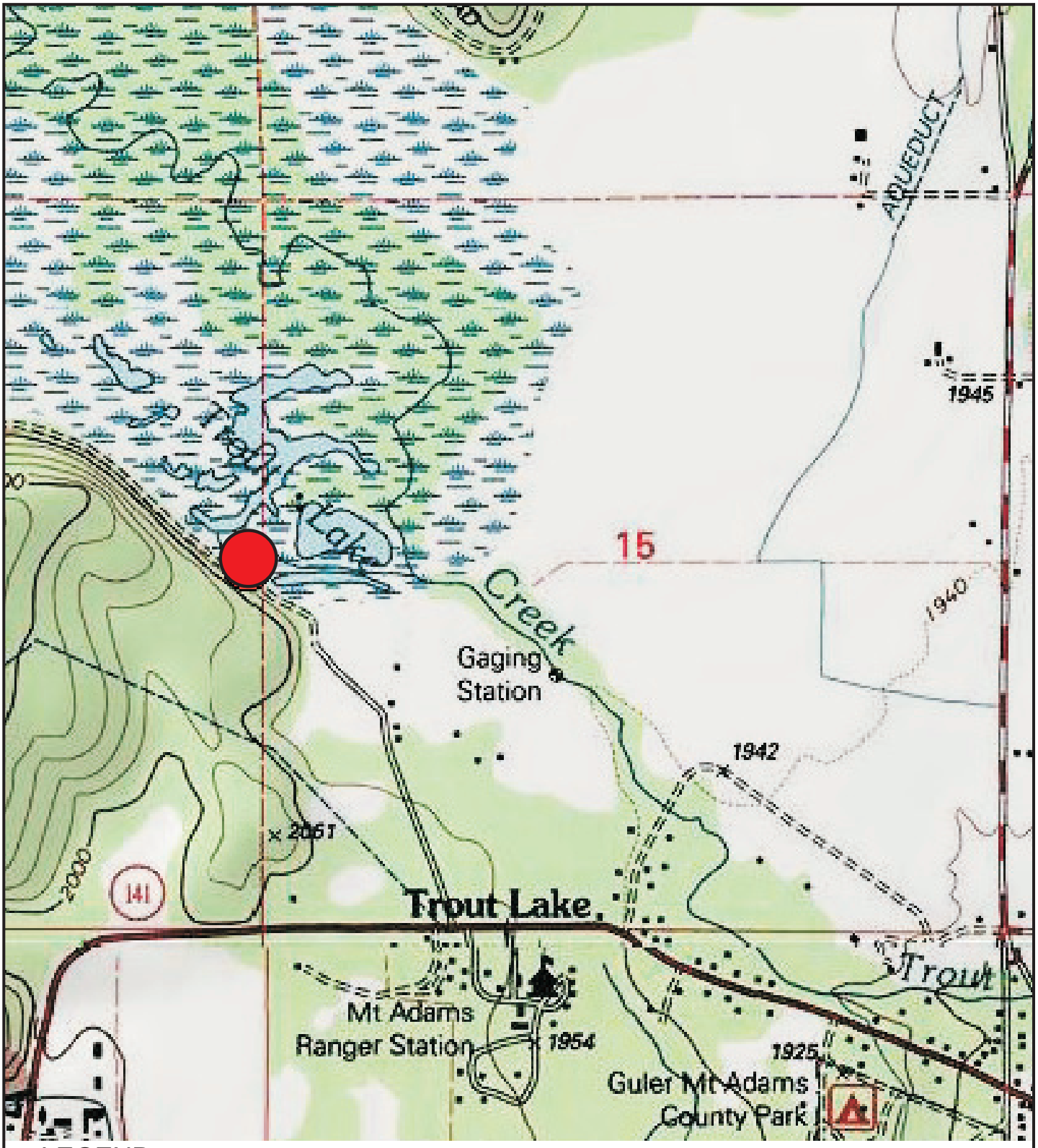
DRAWN BY: TLK

CHECKED BY: DEK

SALT CREEK LAHAR
SAMPLE LOCATION
NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE: 9



LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO. 53886

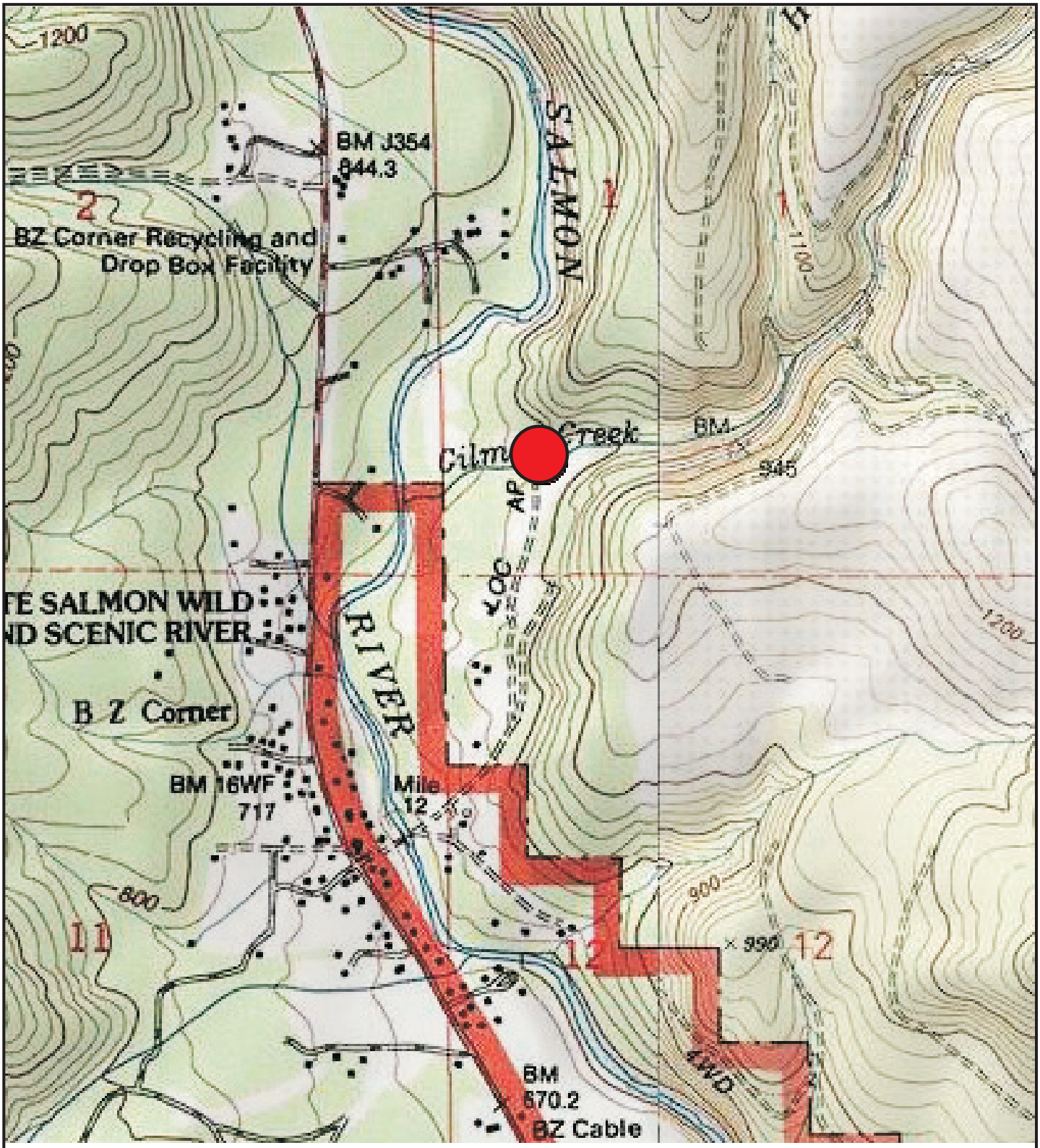
DRAWN BY: TLK

CHECKED BY: DEK

TROUT LAKE
SAMPLE LOCATION
NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE: 10



LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO. 53886

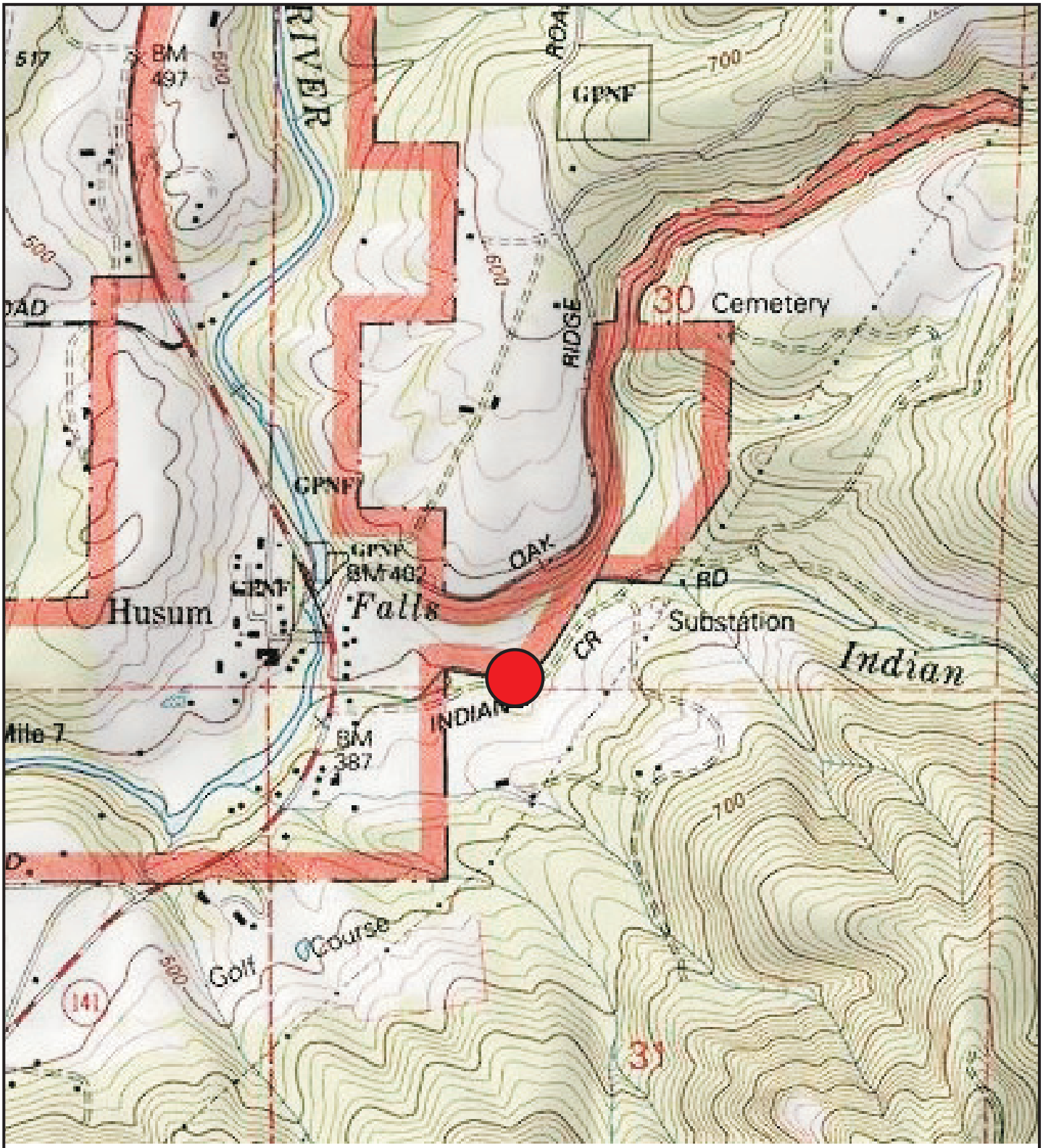
DRAWN BY: TLK

CHECKED BY: DEK

GILMER CREEK
SAMPLE LOCATION
NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE: 11



LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO. 53886

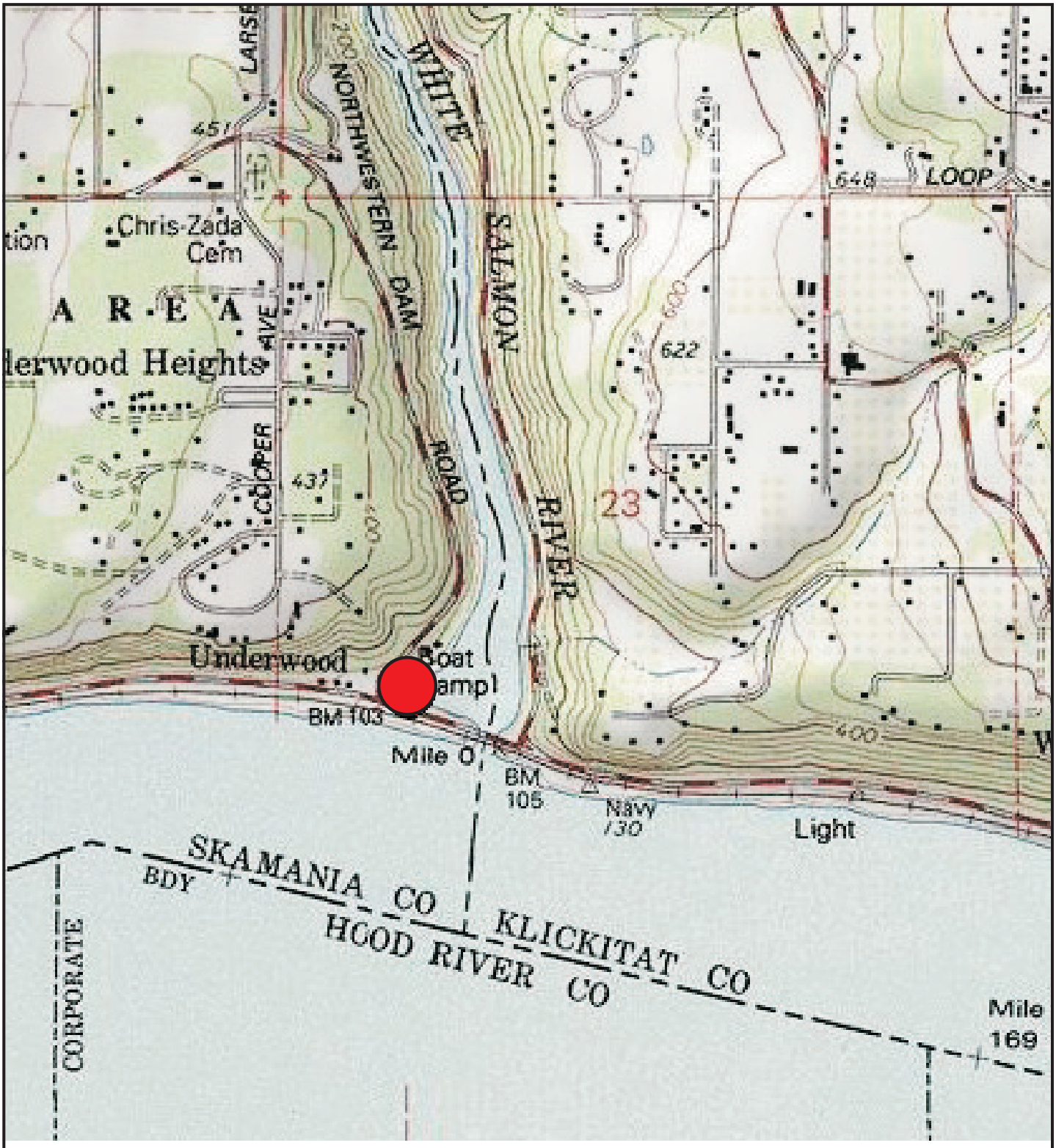
DRAWN BY: TLK

CHECKED BY: DEK

RATTLESNAKE CREEK
SAMPLE LOCATION
NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE: 12



LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO. 53886

DRAWN BY: TLK

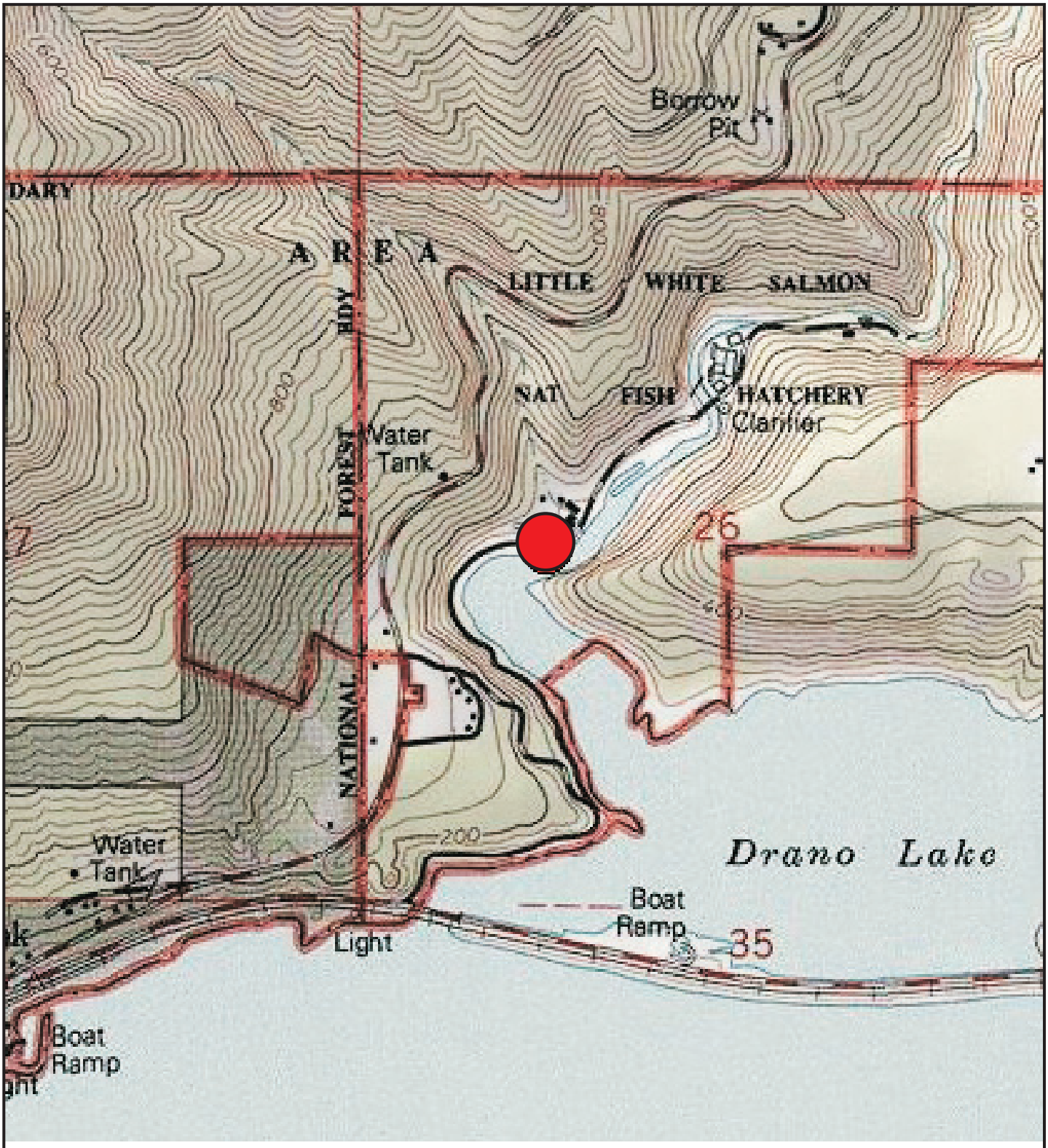
CHECKED BY: DEK

WHITE SALMON RIVER (IN-LIEU FISHING SITE) SAMPLE LOCATION

NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE: 13



LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO. 53886

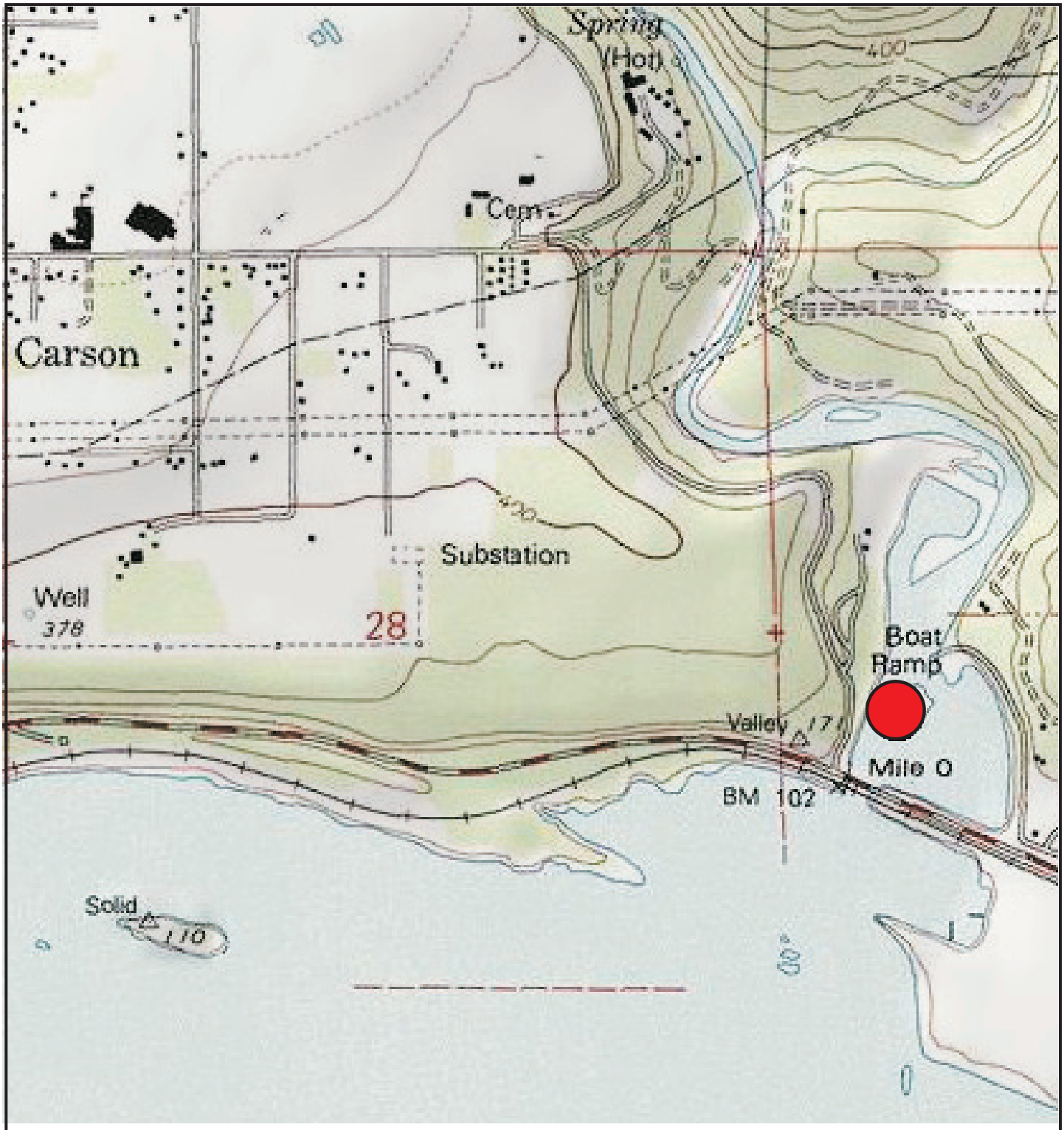
DRAWN BY: TLK

CHECKED BY: DEK

LITTLE WHITE SALMON RIVER
SAMPLE LOCATION
NORTHWESTERN LAKE, WASHINGTON

DATE: 11/07

FIGURE 14



LEGEND

SAMPLE LOCATION

SCALE IN FEET

0 1000 2000

N W E S

KLEINFELDER

PROJECT NO.
53886

DRAWN BY:
TLK

CHECKED BY:
DEK

WIND RIVER
SAMPLE LOCATION
NORTHWESTERN LAKE, WASHINGTON

DATE:
11/07

FIGURE
15

APPENDIX A

MERCURY DISTRIBUTION AND BACKGROUND EVALUATION SUPPLEMENTAL SEDIMENT SAMPLING AND ANALYSIS PLAN NORTHWESTERN LAKE CONDIT DAM REMOVAL PROJECT FERC PROJECT No. 2342 WHITE SALMON, WASHINGTON KLEINFELDER PROJECT NO. 53886 / 5

June 12, 2007

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June 12, 2007
Kleinfelder Project Number 53886 / 5

Mr. Tim Hemstreet, P.E.
PacifiCorp Hydro Resources
825 N.E. Multnomah, 1500 LCT
Portland, Oregon 97232

Subject: **Supplemental Sediment Sampling and Analysis Plan**
Northwestern Lake – Condit Dam Removal Project
FERC Project No. 2342
White Salmon, Washington

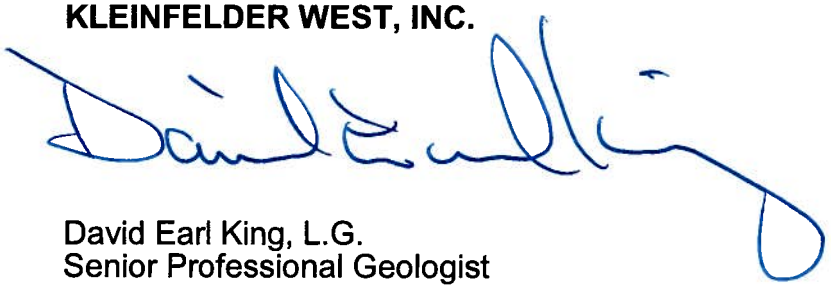
Dear Mr. Hemstreet:

We are pleased to present our Supplemental Sampling and Analysis Plan for the above referenced project. We trust the information contained in this Supplemental Sampling and Analysis Plan will meet your needs at this time.

We appreciate this opportunity to provide our services to you. Should you require additional information or have any questions regarding this report, please contact us at (503) 644-9447.

Sincerely,

KLEINFELDER WEST, INC.



David Earl King, L.G.
Senior Professional Geologist

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FIGURES

1. Vicinity Map
2. Sediment Sample Location Map – Northwestern Lake
3. Sample Location Map – White Salmon River

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1.0 INTRODUCTION

In December 2006, Kleinfelder, under contract to PacifiCorp, collected sediment characterization samples from Northwestern Lake and reported the results in a *Sediment Sampling and Analysis Report* (March 2007). This investigation determined that the average concentration of mercury in the fine silts impounded behind Condit Dam is about 0.7 milligrams per kilogram (mg/Kg). During this work, the maximum detected concentration of mercury in the sediments was found to be 2.03 mg/Kg in the surface sediment at a location (boring B-1) near the dam. Laboratory bio-assays conducted on the sediment collected during this field work indicated that the sediment had no adverse effect on the life cycles of test species.

The applicable current regulatory screening levels for mercury in fresh water sediments are found in the *Northwest Regional Sediment Evaluation Framework* (NWRSEF) and are 0.28 mg/Kg (lower screening level, SL1) and 0.75 mg/Kg (upper screening level, SL2). The NWRSEF states, "The lower screening level (SL1) corresponds to a concentration below which adverse effects to benthic organisms would not be expected, and the upper screening level (SL2) corresponds to a concentration at which minor adverse effects may be observed in the more sensitive groups of benthic organisms.

Because mercury concentrations were found in excess of the upper screening level (SL2), the Regional Sediment Evaluation Team (RSET), composed of representatives of various state and Federal regulatory agencies, requested that PacifiCorp collect additional information to confirm sediment concentrations in Northwestern Lake, establish the bio-availability of mercury found in the sediments through fish tissue analysis, and ascertain background mercury sediment concentrations in the local area.

This document presents a Supplemental Sampling and Analysis Plan that will support these data needs.

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2.0 PROJECT DESCRIPTION

The following sections describe the project location and description, the site ranking criteria, and proposed dredging and sampling parameters.

2.1 PROPOSED ACTION

Northwestern Lake sediments are proposed to be released in an "open-water" fashion during the decommissioning of the Condit Dam. Since the construction of the dam and formation of the lake, the natural transport of sediments by the White Salmon River has been disrupted and the sediments previously transported to the Columbia River are now deposited in the slack water of Northwestern Lake. The current estimate of impounded sediment volume is 2.3 million cubic yards.

The removal of Condit Dam would initiate the discharge of a portion of the impounded sediment into the lower White Salmon River, a tributary of the Columbia River. As the U.S. Army Corps of Engineers (USACOE), Portland District stated in a letter dated December 15, 2004, "Because the sediment will settle out within the river systems, the project would result in unconfined aquatic disposal of sediments into the Lower Columbia River system". Unconfined aquatic disposal of sediments is regulated by the USACOE. The Regional Sediment Evaluation Team (RSET), composed of the USACOE's Seattle District, Portland District, Walla Walla District, and Northwestern Division, in collaboration with the U.S. Environmental Protection Agency (EPA) Region 10, Washington Department of Ecology (WDOE), Washington Department of Natural Resources (WDNR), Oregon Department of Environmental Quality (ODEQ), Idaho Department of Environmental Quality (IDEQ), National Marines Fisheries Service (NMFS), and the U.S. Fish and Wildlife Service (US F&WS), has developed a framework for evaluating sediments and the suitability of disposing those sediments in the Pacific Northwest. This framework is presented in the *Northwest Regional Sediment Evaluation Framework* (NWRSEF), *Interim Final, September 2006*.

The sediments were physically and chemically characterized in 1994 and again in 2006. To assist with the continued evaluation of the accumulated sediment in Northwestern Lake, Kleinfelder has prepared this Supplemental Sampling and Analysis Plan (SSAP). The objective of this SSAP is to provide a systematic approach to collecting sediment characterization data that will supplement the existing data presented in the Condit Hydroelectric Project (FERC Project No. 2342) Northwestern Lake Sediment

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Characterization Study, White Salmon, Washington, conducted in 1994 (the 1994 Condit Study).

2.2 PROJECT DESCRIPTION

The Condit Hydroelectric Project is located along the White Salmon River above Washington State Highway 14 on the border between Klickitat and Skamania Counties, approximately 3.3 miles upstream of the confluence of the White Salmon and Columbia Rivers (refer, Figure 1). The U.S. Geological Survey (USGS) topographic coordinates for the reservoir are Sections 2 and 3, Township 3 North, Range 10 East, Willamette Meridian (Sec. 2 and 3/T3N/R10E W.M.). The Condit Project includes a 125-foot high concrete dam across the White Salmon River that diverts water into a one-mile long woodstave flowline. The woodstave flowline conveys water to a headhouse, where the water is diverted into two pipes (penstocks) for delivery through two turbine generators in the powerhouse downstream of the dam.

The Condit Project is owned and operated by PacifiCorp. It has been in operation since its construction in 1913. The name of the reservoir behind the dam is Northwestern Lake. Northwestern Lake is approximately 10,380 feet long with a surface area of approximately 92 acres. The pool elevation listed on the USGS Northwestern Lake topographic map (1983 Edition) is 294 feet mean sea level (msl). At the time of its construction, the depth of water in the reservoir ranged from approximately 15 to 110 feet. Since the construction of the dam, the reservoir has been collecting sediments brought in by the White Salmon River. As of 1990, the depth of water in the reservoir reportedly ranged from approximately 3 to 85 feet.

Following the construction of the dam, a sawmill was established on a bay on the south shore of the reservoir, immediately upstream of the dam. This sawmill remained in operation for several decades. The exact start up and shut down dates of the sawmill operation are unknown, except that it closed sometime prior to 1960. As part of the development of the Work Plan for Sediment Characterization prepared in 1994, a site reconnaissance was conducted of the upland areas around Northwestern Lake and upstream along the White Salmon River. No industrial activity was observed. Land use consisted primarily of residential usage, with some orchards located on the eastern bank of the reservoir. A site reconnaissance of the upstream area of the White Salmon River was also conducted on March 2, 2005, to confirm that no new sources of possible environmental contaminants had been developed since 1994. This site reconnaissance

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identified a new rock quarry located just east of Highway 141 (about 0.5 miles east of the northern end of the Lower Basin of Northwestern Lake). The rock quarry could be considered a new source for fine sediment, but not environmental contaminants. No new sources that would introduce contaminants not identified in the *1994 Condit Study* were discovered during the March 2, 2005 reconnaissance.

2.3 PREVIOUS INVESTIGATIONS

Bathymetric surveys of the reservoir have been conducted by PacifiCorp in 1990, 1997, and 2006. Based upon a comparison of preconstruction and bathymetric topography, a channel profile, showing the existing water depths and sediment thicknesses, has been developed by others. Based upon this document, the existing water depth within the reservoir appears to vary from approximately 3 to 85 feet, with an accumulated sediment thickness that varies from approximately 13 to 65 feet and an average thickness of approximately 31 feet. The current volume of these sediments has been estimated by others to be 2.3 million cubic yards.

The sediments in Northwestern Lake, located behind Condit Dam, were investigated by advancing ten borings for the collection of sediment and bedrock samples in 1994. The results of the 1994 investigation were presented in a report prepared by Squier Associates, entitled *"Condit Hydroelectric Project (FERC Project No. 2342), Northwestern Lake Sediment Characterization Study, White Salmon, Washington,"* and dated April 29, 1994. The 1994 investigation was developed in general accordance with the protocols of the Puget Sound Dredge Disposal Analysis (PSDDA) program.

The 1994 investigation consisted of exploratory borings, which were drilled with a JKS Winkie Drill equipped with a 2.97-inch diamond bit positioned on a barge that moved to 10 locations on Northwestern Lake. Eight of those locations were chosen using a random number selection process. The remaining two borings were located at the extreme upstream and downstream limits of barge access within the reservoir. As part of the *1994 Condit Study*, 45 geotechnical and 39 environmental samples were collected at various depths from the 10 boring locations.

The 1994 sediment characterization testing program consisted of both geotechnical and environmental testing. The geotechnical testing parameters included the following:

- soil classification,
- moisture content,

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- grain-size analysis, and
- unit weight determination.

The environmental testing included a chemical analytical testing program for inorganic metals and organic compounds considered to be of concern by the Washington Department of Ecology at that time.

The geotechnical testing disclosed that the reservoir sediments consist mainly of fine-grained materials in the downstream deep pool area, and granular materials in the upstream area. Located in the middle of the reservoir is a transition area where the upstream granular sediments have overridden the deep pool fine-grained sediments.

The interpretation of the 1994 environmental testing results indicated that the metal concentrations were within expected background levels. However, remnant pesticides and herbicides were detected in the intermediate age sediments in the reservoir.

A second investigation of the sediments was conducted by Squier Associates in 1997. The results of that second investigation are presented in a report entitled, *"Additional Geotechnical Exploration and Laboratory Testing at the Condit Hydroelectric Project (Contract No. P018780)"* and dated November 20, 1997.

In 1998, the cooperative interagency/intergovernmental team consisting of the USACOE, EPA Region 10, WDOE, WDNR, and ODEQ produced the Dredged Material Evaluation Framework, Lower Columbia River Management Area (DMEF). The DMEF established a tiered system for ranking of proposed dredging sites. The *DMEF* Tier I used existing information to conclude whether or not there is "enough information to determine if project meets exclusion ranking". Exclusionary Ranking was a Management Area Ranking that provided the least stringent characterization requirements. Projects from specific areas listed in the *DMEF* were awarded the Exclusionary Ranking. Northwestern Lake currently was not one of the listed zones for Exclusionary Ranking. The Exclusionary Criteria also included sediments that were to be used for beach enhancement and sediments whose final placement will be the same substrate as their origin. It is our understanding that the Northwestern Lake sediments did not meet either criterion.

Exclusionary Ranking was also awarded to locations whose sediments had at least 80% sand retained on a number (No.) 230 sieve (i.e., less than 20% fines) and a Total Volatile Solids (TVS) content of less than 5.0%. Mechanical sieve analysis of the

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sediments collected from the upstream portion of Northwestern Lake demonstrated that those sediments met the criterion of having less than 20% fines.

However, in order to determine if the 1994 data was suitable, the data was first compared to the framework of Tiers II and IIB. Consequently, it was concluded that the sediments from Northwestern Lake (as one discrete unit) did not meet the criteria for Exclusionary Ranking. It was further concluded that the Low Management Area Ranking was appropriate. The Northwestern Lake sediment source location met the following criteria for Low Management Area Ranking:

- Low concentrations of chemicals of concern (COC),
- Some locations of higher percentages of fines, and
- Few sources of potential contamination

The *DMEF* allowed for the creation of Dredged Material Management Units (DMMUs), which are subdivisions of a sediment-generating project site that represent sediments similar in nature. Based on this understanding, the Northwestern Lake sediments were segregated into two DMMUs: the lower basin sediments and the upstream gravels. The segregation into two DMMUs provided for one Low Management Area Ranking of homogenous sediments (Lower Basin) and one area of Exclusionary Ranking (Upper Reservoir). The homogeneity of the sediments was supported by the 1994 mechanical sieve data. Based on the information presented in the *1994 Condit Study*, the lower basin included about 51% of the sediments (approximately 1,122,000 cubic yards).

The DMEF requirement for a homogeneous Low Management Area Ranking DMMU was 1 sample per 100,000 cubic yards. Accordingly, 12 samples were proposed for the 1,122,000 cubic yards of sediments.

In December 2006, Kleinfelder (formerly Squier | Kleinfelder) conducted additional sediment sampling in the lower basin of Northwestern Lake in order to obtain current data on the chemical characterization of the fine-grained sediments in the lower basin. A total of 15 probes were advanced into the fine-grained sediments for the collection of 12 project and 3 quality control samples. The analytical results were compared to the screening levels provided in the USACOE's *Dredged Material Evaluation Framework, Lower Columbia River Management Area,* November 1998 (DMEF). The Sampling and Analysis Plan (SAP) developed for the 2006 phase of sediment sampling was approved by the USACOE in August 2006.

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The data that was collected by the implementation of the 2006 SAP was intended to satisfy the requirements of the USACOE in accordance with the applicable Tier IIB and Tier III testing guidelines as presented in the DMEF. However, RSET introduced the Interim Final of the NWRSEF in September 2006. The NWRSEF provides more stringent fresh water screening criteria, compared to marine screening criteria, and for those screening criterion to be divided into two discrete levels (SL1 and SL2). The mercury concentrations reported for 4 of the 12 project sediment samples and the three duplicate samples collected in December 2006 exceeded the SL2 criterion (0.75 mg/Kg). Therefore, the preparation of this SSAP to confirm sediment mercury concentrations, establish mercury background levels, and assess bioaccumulation was requested by members of the RSET.

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3.0 SAMPLING AND ANALYSIS TASKS

The following section discusses the three primary tasks that will be performed during the Supplemental Sediment Sampling for Northwestern Lake.

3.1 NORTHWESTERN LAKE SEDIMENT RESAMPLING

Seven surface sediment samples will be collected in the vicinity of the location previously identified as B-1 in the *Sediment Sampling and Analysis Report, Northwestern Lake Condit Hydroelectric Project, FERC Project No. 2342, White Salmon, Washington, Kleinfelder Project No. 53886/4, March 2007* (refer, Figure 2). In addition, one duplicate sample will also be collected at that time. The sediment samples will be collected using a bottom dredge capable of securely recovering an approximate 235 cubic inch sample.

Adequate sample volume will be collected from each location to provide for the proposed tests. In order to accomplish this, the sediment-filled bottom dredge will be emptied into a either a 2-gallon, clean, stainless steel bowl or clean, dedicated, 5-gallon bucket immediately after retrieval. When an adequate volume of sediment has been obtained (approximately 360 cubic inches), the sediments will be transferred to the appropriate containers. The sampling containers will be clearly labeled with: the project name, sample identification, type of analysis to be performed, and date and time; and referenced by entry into the logbook.

3.1.1 First Phase of Laboratory Analysis

All seven project samples and the one duplicate sample will be tested for the following:

- Mercury concentrations using EPA Method 7471A,
- Grain size determination using ASTM D422 and ASTM D2487,
- total solids using EPA Method 160.3M,
- total volatile solids (TVS) using EPA Method 160.4M,
- total organic carbon (TOC) using EPA Method ASTM D 4129-98M,
- ammonia using EPA Method 350.1M, and
- sulfides using Standard Method 9030M.

Grain size will be evaluated using the following sieve sizes: 5-inch; 2.5-inch; 1.25-inch; 0.63-inch; 0.31-inch; and numbers 5, 10, 18, 35, 60, 120, and 230. The fine-grained fraction (finer than No. 230 sieve) will be classified using hydrometer analysis.

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Hydrogen peroxide will not be used in preparation for grain-size analysis. Sediment classification designation will be made in accordance with Unified Soil Classification System, ASTM D 2487. Water content will be evaluated in accordance with ASTM D 2216.

3.1.2 Second Phase of Laboratory Analysis

The sample with the highest mercury concentration will be further analyzed for the following tests:

- Elutriation testing preparation for analysis of mercury in the water column, and
- Bioassay Testing (*Hyallella azteca and Chironomous tentans*) using ASTM 1706 and the accompanying replicate samples using the appropriate methodology.

3.2 BACKGROUND MERCURY DETERMINATION

3.2.1 Sample Locations

Samples will be collected from a variety of locations in the region of Northwestern Lake and submitted for mercury analysis. The State of Washington's Model Toxics Control Act (MTCA) provides the acceptable methods for defining the background concentrations of native elements. MTCA requires 10 samples for areas that have not been influenced by human activity. The ten sample locations include the following:

- The confluences of three minor tributaries (Little Buck Creek, Buck Creek, and Mill Creek) with Northwestern Lake (refer, Figure 2). This effort will be completed concurrently with Task 3.1 (refer, above).
- The confluences of Rattlesnake and Gilmer Creeks with the White Salmon River.
- The confluences of the White Salmon, Little White Salmon, and Wind Rivers with the Columbia River (refer, Figure 3).
- A marshy area associated with Trout Lake, on the White Salmon River (refer, Figure 3).
- Mud deposits associated with the Salt Creek lahar on the southwest side of Mount Adams (refer, Figure 3).

It is possible that one or more of these selected sample locations will not allow sample collection. If this occurs, alternate sites will be selected.

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3.2.2 Sample Analyses

Since the mercury was detected in the fine-grained sediments impounded by Condit Dam, the evaluation will focus on evaluating the fine-grained fractions of the samples. In order to accomplish this, two grab samples will be collected from each location. The first grab sample will be submitted without pre-analysis preparation. The second grab sample (which will be of larger volume) will be mechanically sieved according to ASTM D422. Only the portion of the second grab sample passing the Number 230 sieve will be analyzed for mercury using EPA Method 7471A.

3.3 FISH TISSUE BIOACCUMULATION STUDY

3.3.1 Target Species

The bioaccumulation study will focus on three phyla: Chordata (fish), Mollusca (clams or mussels), and Arthropoda (crayfish). To accomplish this, the following field tasks will be performed:

- The mercury bioaccumulation study will require sacrificing fish since representative fish species will be collected and their tissues evaluated for mercury content. WDOE recommends collecting three composite samples containing five specimens of each available species. Most of the game fish that exist in Northwestern Lake are stocked annually and are not likely to exhibit mercury accumulation so hatchery stocked fish will be excluded. For the purposes of ease and efficiency, gill nets will be used for fish sampling. The gill net sampling will occur in approximately the same area where the lower reservoir sediment samples were collected in December 2006 and will be collected again as part of this scope of work. PacifiCorp Energy staff will place four 250-foot gill nets (3-inch stretch mesh) in the general vicinity of B-1. The nets will be set for 30-minute intervals, or until sufficient fish have been collected. Specimens will be kept in a cooler under ice and will be transported to a selected laboratory. PacifiCorp currently has a sampling permit issued by the State of Washington that covers the proposed fish collection effort.

- If an adequate molluscan community is present in the lake, the mercury bioaccumulation study will also include the evaluation of molluscan tissues for mercury content.

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- In addition, the mercury bioaccumulation study will also evaluate the bioaccumulation of mercury in the tissues of crayfish, if they are present. Representatives from PacifiCorp will capture the crayfish using commercially available traps designed for the collection of crayfish.

3.3.2 Laboratory Analysis

The collected specimens will be transferred to a WDOE-recommended laboratory for analysis of mercury content in the soft tissues of the specimens. The processing of the specimens for analysis will be accomplished by the selected laboratory. The analysis for mercury will be conducted in accordance with EPA Method 1631 Appendix – Total Mercury in Tissue. The laboratory's report will include a detailed narrative, raw / instrument data, preparation sheets, and Quality Assurance (QA) review information.

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4.0 SAMPLING SCHEDULE AND OTHER PROCEDURES

The following section describes the field activities and procedures during and after sediment sampling.

4.1 FIELD SAMPLING SCHEDULE

The sampling schedule is not currently set, but is anticipated to take place immediately after receiving approval from the RSET review panel. An updated sampling schedule will be set after approval of this SSAP. Sediment samples will be prepared in the field and delivered to the environmental testing laboratory.

4.2 FIELD NOTES

Field notes will be maintained during sampling operations. Included in the field notes will be the following information:

- Names of the sample equipment operator and person(s) collecting and logging the sediment samples
- Weather conditions
- Reservoir height (for samples collected in Northwestern Lake)
- Date and time of collection of each sample
- The sample station number
- Descriptions of sample
- Any deviation from the approved sampling plan

For each sample, the following data will be recorded on the field log:

- Depth interval of each sample point as measured from mudline
- Percent sample recovery
- Physical sediment description in accordance with the U.S. Soil Classification System, ASTM D 2487 (includes sediment type, density/consistency of sediment, color)
- Odor
- Visual stratifications and lenses
- Vegetation
- Debris
- Biological Activity (e.g., detritus, shells, tubes, bioturbation, live or dead organisms)
- Presence of oil sheen

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- Any other distinguishing characteristics or features

4.3 SAMPLE STATION POSITIONING

The location of each sample point will be measured using a portable global positioning system (GPS). The locations of each sample point will be shown on the site plan. If the sample point is over water, water depths to the mudline at the sample locations will be measured directly by a weighted cloth or steel tape.

4.4 DECONTAMINATION

Following sample collection, sample collection devices will be thoroughly cleaned according to the following procedure:

- Wash with brush and trisodium phosphate or non-phosphate detergent
- Tap water rinse
- Rinse with distilled water

4.5 SAMPLE TRANSPORT AND CHAIN-OF-CUSTODY PROCEDURES

After sample containers have been filled, they will be packed on ice in coolers, as previously discussed. The coolers will be delivered to a qualified laboratory. Chain-of-custody procedures will commence in the field and will track delivery of the samples to the laboratory. Specific procedures are as follows:

- Individual sample containers will be packed to prevent breakage.
- The coolers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the cooler, and Kleinfelder's office name and address) to enable positive identification.
- A sealed envelope containing chain-of-custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- Signed and dated chain-of-custody seals will be placed on all coolers prior to removal from the site.
- Upon transfer of sample possession to the testing laboratory, the persons transferring custody of the coolers will sign the chain-of-custody form. Upon receipt of samples at the laboratory, the shipping container seal will be broken, and the receiver will record the condition of the samples.

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5.0 LABORATORY PHYSICAL AND CHEMICAL ANALYSIS

The Northwestern Lake sediment samples will only be analyzed for the parameters listed in Section 3.

5.1 LABORATORY ANALYSIS PROTOCOLS

Laboratory testing procedures will be conducted in general accordance with the RSET's Recommended Analytical Methods (*Northwest Regional Sediment Evaluation Framework, Interim Final*, September 2006, Table 7-2).

5.1.1 Chain-of-Custody

A chain-of-custody record for each set of samples will be maintained throughout all sampling activities and will accompany samples during shipment to the laboratory. Information tracked by the chain-of-custody records in the laboratory includes: sample identification number, date and time of sample receipt, analytical parameters required, and final disposition of the sample.

5.1.2 Limits of Detection

Northwest Regional Sediment Evaluation Framework, Interim Final, September 2006, Table 7-2 includes the recommended Sample Quantification Limits (SQLs) for each analyte. For those tests where the laboratory's SQL's exceed the RSET-recommended SQLs, the laboratory Method Detection Limits (MDLs) will be used. For purposes of comparison with the chemical parameters shown in Table 7-2, laboratory SQLs / MDLs of all tested chemicals will be below the stated RSET Sediment Quality Guidelines. Failure to achieve this may result in a requirement to reanalyze. The testing laboratory will be specifically cautioned to comply with the detection limit requirements.

5.1.3 Analysis Method Protocols

Sediment analysis protocols will follow the recommendations presented in RSET's Table 7-2.

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5.2 LABORATORY WRITTEN REPORT

A written report will be prepared by the analytical laboratory documenting the activities associated with sample analyses. At a minimum, the following will be included in the report:

- Results of the laboratory analyses and Quality Control (QC) parameters
- Protocols used during analyses
- Chain-of-custody procedures, including explanation of any deviation from those identified herein
- Location and availability of the data
- As appropriate, this SSAP may be referenced in describing protocols

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6.0 REPORTING

Reporting the results of the sediment sampling and analysis will be completed as described in the following sections.

6.1 QUALITY ASSURANCE (QA) REPORT

The project quality assurance representative will prepare a quality assurance report based upon activities involved with the field sampling and review of the laboratory analytical data. The QA/QC report will be incorporated into the Final Report.

6.2 FINAL REPORT

A written report will be prepared by Kleinfelder, documenting the activities associated with collection, transportation of samples, and chemical and physical analyses of the samples. The chemical and physical analysis laboratory reports will be included as appendices. The laboratory QC reports will be incorporated by reference. At a minimum, the following will be included in the final report:

- Type of sampling equipment used
- Protocols used during sampling and testing and an explanation of any deviations from the sampling plan protocols
- Descriptions of each sample
- Locations where the sediment samples were collected
- A plan view of the project showing the actual sampling locations
- Chain of-custody procedures used and explanation of any deviations from the sampling plan procedures
- Description of sampling procedures
- Final QA report
- Chemical and physical testing data and a comparison to the Sediment Qualty Guidelines shown in Table 7-1 of the Northwest Regional Sediment Evaluation Framework, Interim Final, September 2006.
- Fish tissue sampling results

In addition, the 2006 data will be reformatted to conform to the RSET requirements and presented in the supplemental report. Included in the reformatted table will be the RSET SQLs, the laboratories MDLs, and Method Reporting Limits (MRLs).

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7.0 REFERENCES

Kleinfelder,2007. *Sediment Sampling and Analysis Report, Northwestern Lake, Condit Hydroelectric Project. FERC Project 2342, White Salmon, Washington.*

Squier Associates, 1994. *Condit Hydroelectric Project (FERC Project No. 2342) Northwestern Lake Sediment Characterization Study, White Salmon, Washington.*

Squier | Kleinfelder, 2005. *Suitability Evaluation of Northwestern Lake Sediment Characterization Study, Squier Associates, April 1994.*

United States Army Corps of Engineers (USACOE) et al., 1998. *Dredged Material Evaluation Framework, Lower Columbia River Management Area*, November 1998.

USACOE et al., 2006. *Interim Final Sediment Evaluation Framework For The Pacific Northwest*, September 2006.

USACOE, 2006. *April 12, 2006, Draft Letter to PacifiCorp Hydro Licensing / Hydro Resources.*

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8.0 LIMITATIONS

We have prepared this plan for use by PacifiCorp, their authorized agents, and regulatory agencies for specific application to this site. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, Kleinfelder should be notified for review of the recommendations of this plan, and revision of such, if necessary.

This plan may be used only by PacifiCorp, their authorized agents, and regulatory agencies and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors may change over time and could materially affect our recommended sampling scheme. Therefore, this plan should not be relied upon after 24 months from its date of issue. Kleinfelder should be notified if use of the plan is delayed by more than 24 months from the date of this plan so that a review of site conditions can be made, and recommendations revised, if appropriate.

Any party other than PacifiCorp, their authorized agents, and regulatory agencies who wishes to use this plan shall notify Kleinfelder of such intended use. Based on the intended use of the plan, Kleinfelder may require that additional work be performed and that an updated plan be issued. Non-compliance with any of these requirements by the clients or anyone else will release Kleinfelder from any liability resulting from the use of this plan by any unauthorized party.

No warranty, expressed or implied, is made.

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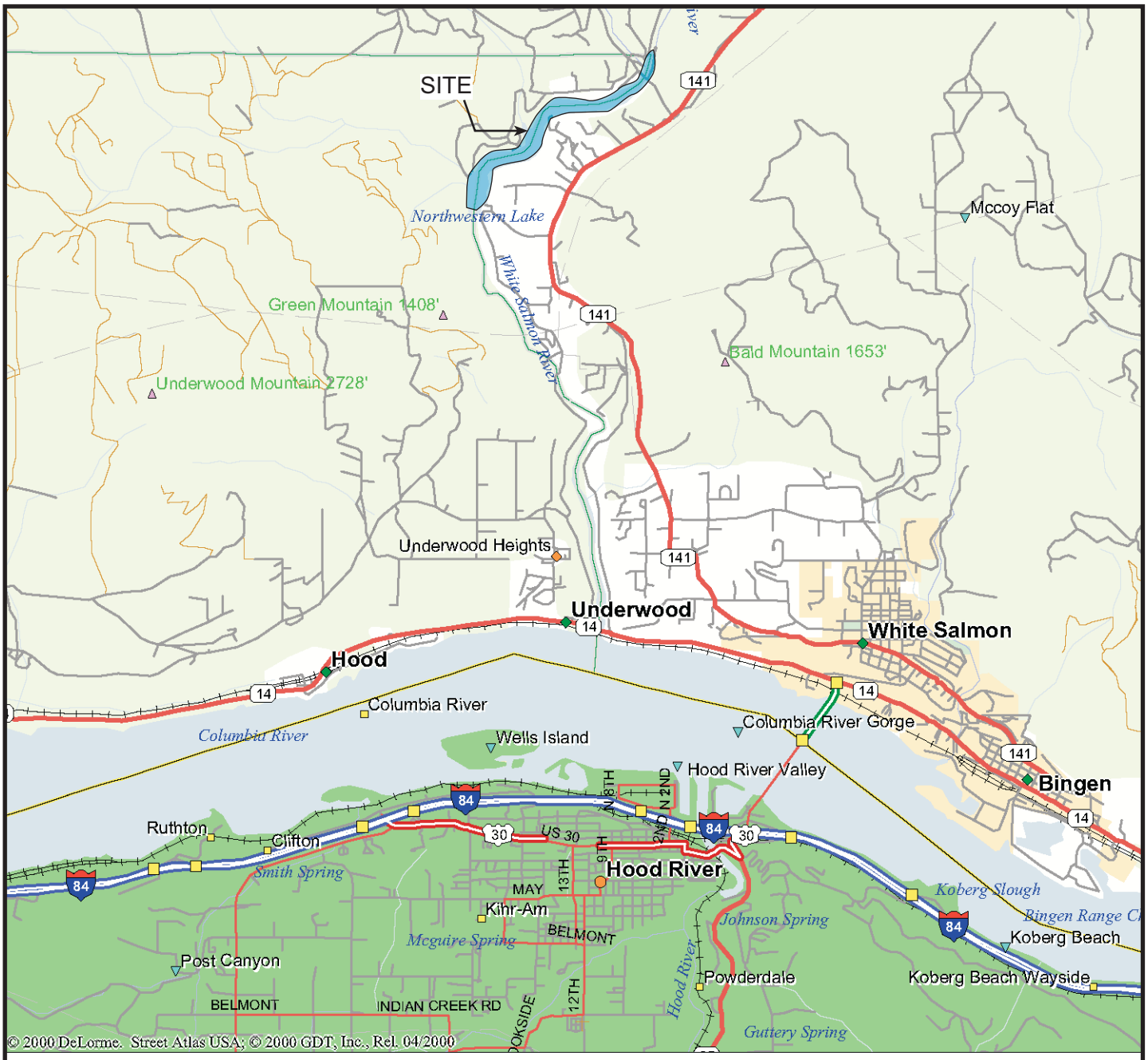

Mag 13.00
Tue Jun 27 08:54 2006
Scale 1:62,500 (at center)

1 Miles

2 KM

N
W
E
S

- Local Road
- Major Connector
- State Route
- Trail
- Interstate/Limited Access
- Toll Highway
- US Highway
- Exit
- Utility/Pipe
- Railroad
- Point of Interest
- County Seat
- Small Town
- Summit
- Geographic Feature
- Locale
- Private Airport
- Cemetery
- County Boundary
- State Boundary
- Population Center
- Land
- Water
- National Park

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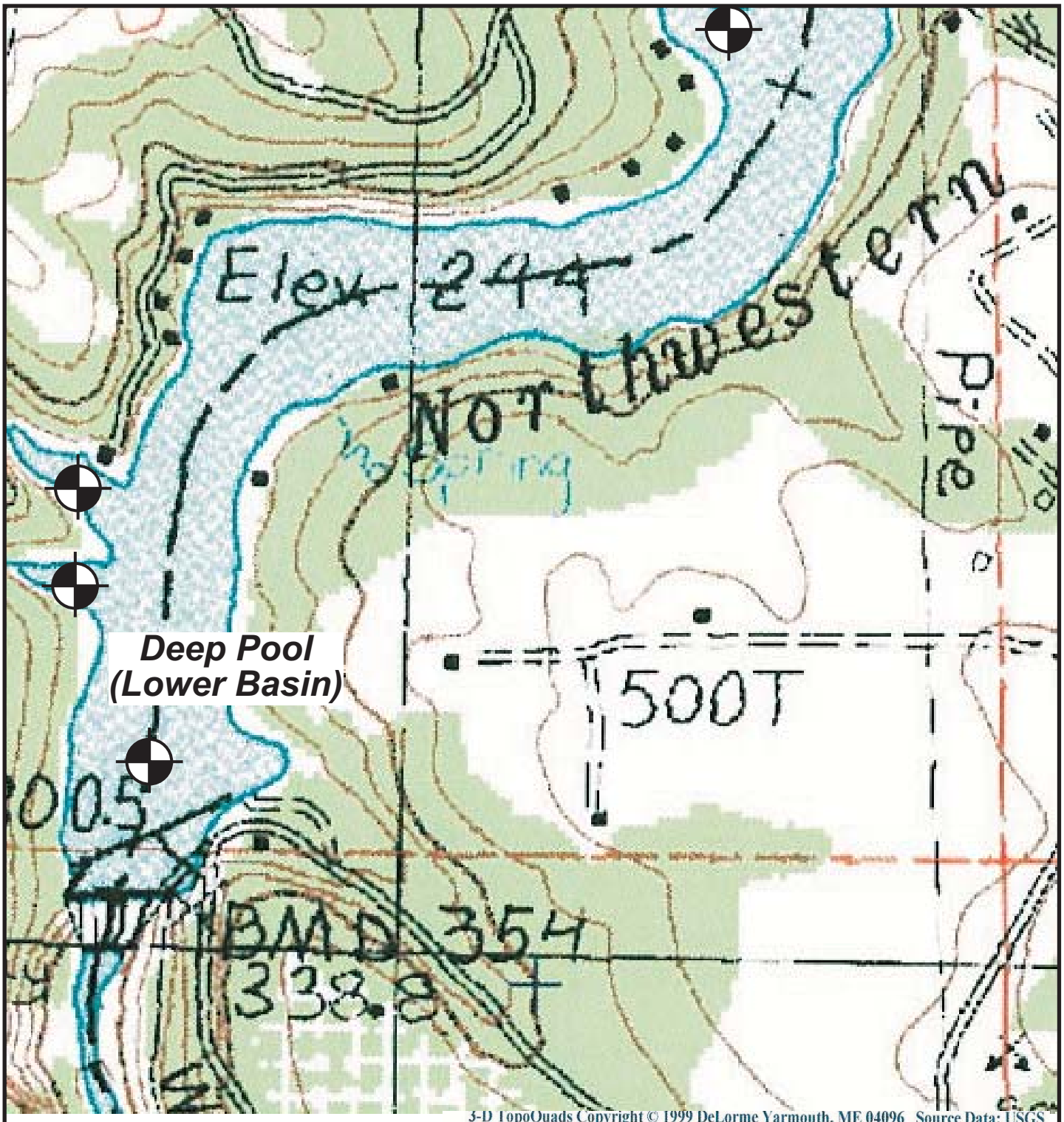
SITE LOCATION MAP
NORTHWESTERN LAKE
CONDIT DAM SAMPLING AND ANALYSIS
WHITE SALMON, WASHINGTON

PROJECT # 53886

FIGURE 1



N
W E
S

Scale
650 ft.

LEGEND

Proposed sampling location

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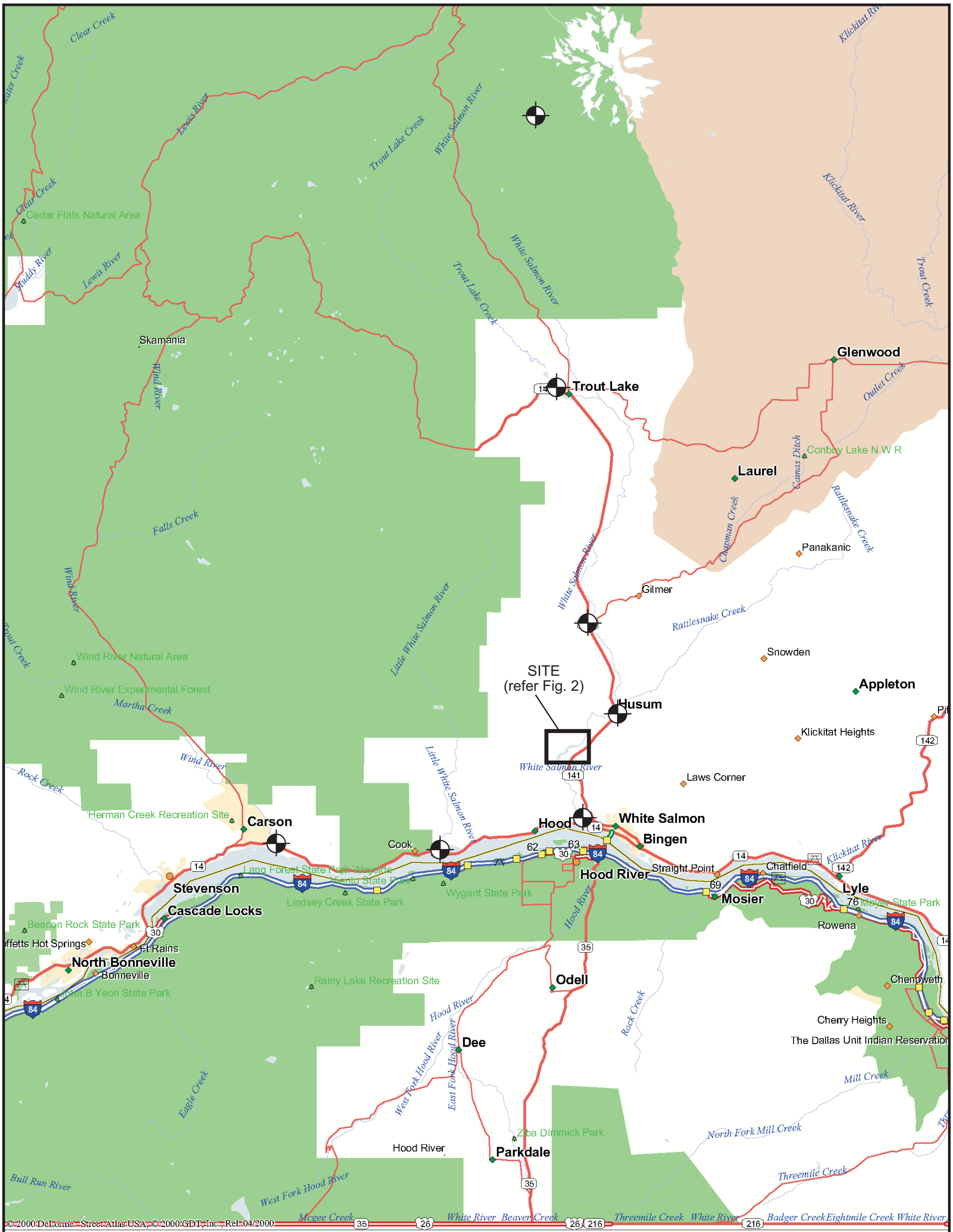
L:\Projects\2007\53886 06/07 TLK

SAMPLING LOCATION MAP
NORTHWESTERN LAKE
CONDIT DAM SAMPLING AND ANALYSIS
WHITE SALMON, WASHINGTON

PROJECT # 53886

FIGURE 2



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L:\Projects\2007\53886 06/07 TLK

SAMPLING LOCATION MAP
WHITE SALMON RIVER
CONDIT DAM SAMPLING AND ANALYSIS
WHITE SALMON, WASHINGTON

PROJECT # 53886

FIGURE 3

KLEINFELDER
An employee owned company

July 2, 2007
Project No. 53866 / 5

Washington Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Attn: Laura Inouye, Environmental Specialist (Sediment)

Subject: Supplemental Bioaccumulation Testing
Supplemental Sampling and Analysis Plan
Northwestern Lake - Condit Dam Removal Project

Dear Ms. Inouye:

On June 8, 2007, Kleinfelder submitted a *Supplemental Sediment Sampling and Analysis Plan* (*SSAP*) to further evaluate mercury distribution in the sediments and aquatic fauna of Northwestern Lake. One of the three tasks specified in the *SSAP* was a Bioaccumulation Study that was to focus on fish tissue, molluscan tissue, and crayfish tissue. During the field work conducted for this task, the biologists were only able to recover representative fish. Traps set in Northwestern Lake did not recover any crayfish and mollusks were not observed by biologists while snorkeling and wading. Based on this field result, we wish to amend our *SSAP* to provide for bioaccumulation testing of collected Northwestern Lake and background sediments through exposure of *Lumbriculus* and *Corbicula*. Specifically, the SSAP shall include the following:

1. An adequate volume of sediment will be collected from the vicinity of probe location B1 (the sample location that produced the highest mercury concentration as per the Kleinfelder report: *Sediment Sampling and Analysis Report, Northwestern Lake Condit Hydroelectric Project, FERC Project No. 2342, White Salmon, Washington, Kleinfelder Project No. 53886/4, March 2007)* to allow for the exposure portion of the bioaccumulation testing.
2. Adequate sample volume for bioaccumulation testing will also be collected at each of the 10 background sample locations. The background sample that has the most similar grain size characteristics as the Northwestern Lake B1 vicinity sediment will be submitted for bioaccumulation testing.
3. Northwestern Aquatic Sciences of Newport, Oregon will conduct the exposure portion of the probe B1 vicinity sediments and selected background sampling location sediments. The exposure portion of bioaccumulation will be conducted on an imported population of the worm

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KLEINFELDER 15050 S.W. Koll Parkway, Suite L, Beaverton, OR 97006-6028 (503) 644-9447 (503) 643-1905 fax

Lumbriculus and an imported population of the clam *Corbicula*. Five sets of each target species will provide the appropriate controls and replicates. The exposure portion of the bioaccumulation test will last for 28 days. The exposures will be conducted according to EPA Method 100.3 and the protocols described in U.S. Environmental Protection Agency (EPA) document EPA 600/R-99-064.

4. A total of ten sets of *Corbicula* tissues and ten sets of *Lumbriculus* tissue will be submitted under proper shipment guidelines and other protocols to an analytical laboratory for analysis of mercury content.

Should you have questions concerning this request, please do not hesitate to contact us.

Sincerely,

KLEINFELDER WEST, INC.

David Earl King, RG
Senior Professional Geologist

cc: Tim Hemstreet, P.E., PacifiCorp
Mark Siipola, U.S.A.C.O.E.
Stephanie Stirling, U.S.A.C.O.E.

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APPENDIX B

CENWD-PDS
Memorandum for File

10 July 2007

SUBJECT: RSET REVIEW OF SUPPLEMENTAL SAMPLING PLAN PROPOSED FOR CONDIT DAM

The RSET agencies have reviewed the Supplemental Sampling and Analysis Plan for Condit Dam, submitted on 8 June 2007, and the letter from David King, Kleinfelder, dated 2 July 2007.

After reviewing the sampling plan, and the follow-up letter, the agencies agree that the supplemental sampling plan is approved.

Stephanie Stirling

Washington Department of FISH and WILDLIFE

HYDRAULIC PROJECT APPROVAL

RCW 77.55.021 - Appeal pursuant to Chapter 34.05 RCW

Southwest
2108 Grand Boulevard
Vancouver, WA 98661
(360) 696-6211

Issue Date: July 11, 2007
Project Expiration Date: August 31, 2007

Control Number: 107362-3
FPA/Public Notice #: N/A

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
Pacificorp	PacifiCorp
ATTENTION: Tim Hemstreet	ATTENTION: Briana Weatherly
825 NE Multnomah Suite 1500	825 NE Multnomah Suite 1500
Portland, OR 97232	Portland, OR 97232
503-813-6170	503-813-7039
Fax: 503-813-6659	Fax: 503-813-6659

Project Name: Northwestern Lake Sediment Sampling

Project Description: Approximately three sediment samples will be taken at each of four locations in the lake.

PROVISIONS

1. Work shall be accomplished per plans and specifications approved by the Washington Department of Fish and Wildlife as detailed on the JARPA, except as modified by this Hydraulic Project Approval. A copy of these plans shall be available on site during construction.

2. Work below the ordinary high water line shall only occur between July 12, 2007 and August 31, 2007.

3. Drilling equipment shall be well-maintained and in good repair to prevent the loss of lubricants, grease, and any other deleterious materials from entering the lake.

4. Drill spoils and cutting brought up to the barge shall not be released to the lake.

5. Drill cuttings shall be deposited in a location where they will not re-enter the lake either directly or due to erosion.

6. The drill string shall operate within a temporary pipe casing.

7. All containers storing fuel or other deleterious substances on the barge shall be secured during drilling operations to prevent incidental spills.

8. Extreme care shall be exercised to minimize the loss of fine sediment into the lake during drilling and soil sampling efforts.

9. A non-petroleum organic drilling lubricant shall be used during this project to protect water quality and fish resources.

10. Wastewater from the drilling process shall not be allowed to directly enter or leach into the lake.

11. If at any time, as a result of project activities, fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), immediate notification shall be made to the Washington Department of Ecology at 1-800-258-5990, and to the Area Habitat Biologist listed below.

12. Every effort shall be taken during all phases of this project to ensure that sediment-laden water is not allowed to enter the lake.

13. Extreme care shall be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into the lake.

PROJECT LOCATIONS

Location #1 Site One

WORK START: July 12, 2007					WORK END: July 31, 2007	
WRIA:	Waterbody:			Tributary to:		
29.0160	White Salmon River			Columbia River		
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
SE 1/4	03	03 N	10 E	N 45.76831	W 121.53805	Klickitat
Location #1 Driving Directions						

Location #2 Site Two

WORK START: July 12, 2007					WORK END: July 31, 2007	
WRIA:	Waterbody:			Tributary to:		
29.0160	White Salmon River			Columbia River		
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
SE 1/4	03	03 N	10 E	N 45.7711	W 121.53784	Klickitat
Location #2 Driving Directions						

Location #3 Site Three

WORK START: July 12, 2007					WORK END: July 31, 2007	
WRIA:	Waterbody:			Tributary to:		
29.0160	White Salmon River			Columbia River		
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
SE 1/4	03	03 N	10 E	N 45.77267	W 121.53405	Klickitat
Location #3 Driving Directions						

Issue Date: July 11, 2007
Project Expiration Date: August 31, 2007

Control Number: 107362-3
FPA/Public Notice #: N/A

Location #4 Site Four

WORK START: July 12, 2007					WORK END: July 31, 2007	
WRIA:	Waterbody:				Tributary to:	
29.0160	White Salmon River				Columbia River	
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
SE 1/4	03	03 N	10 E	N 45.77441	W 121.5303	Klickitat
Location #4 Driving Directions						

APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW (formerly RCW 77.20). Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in a civil penalty of up to one hundred dollars per day and/or a gross misdemeanor charge, possibly punishable by fine and/or imprisonment.

All Hydraulic Project Approvals issued pursuant to RCW 77.55.021 (EXCEPT agricultural irrigation, stock watering or bank stabilization projects) or 77.55.141 are subject to additional restrictions, conditions or revocation if the Department of Fish and Wildlife determines that new biological or physical information indicates the need for such action. The person(s) to whom this Hydraulic Project Approval is issued has the right pursuant to Chapter 34.04 RCW to appeal such decisions. All agricultural irrigation, stock watering or bank stabilization Hydraulic Project Approvals issued pursuant to RCW 77.55.021 may be modified by the Department of Fish and Wildlife due to changed conditions after consultation with the person(s) to whom this Hydraulic Project Approval is issued: PROVIDED HOWEVER, that such modifications shall be subject to appeal to the Hydraulic Appeals Board established in RCW 77.55.301.

APPEALS INFORMATION

If you wish to appeal the issuance or denial of, or conditions provided in a Hydraulic Project Approval, there are informal and formal appeal processes available.

Issue Date: July 11, 2007
Project Expiration Date: August 31, 2007

Control Number: 107362-3
FPA/Public Notice #: N/A

A. INFORMAL APPEALS (WAC 220-110-340) OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.021, 77.55.141, 77.55.181, and 77.55.291: A person who is aggrieved or adversely affected by the following Department actions may request an informal review of:

(A) The denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval; or

(B) An order imposing civil penalties. A request for an INFORMAL REVIEW shall be in WRITING to the Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091 and shall be RECEIVED by the Department within 30 days of the denial or issuance of a Hydraulic Project Approval or receipt of an order imposing civil penalties. If agreed to by the aggrieved party, and the aggrieved party is the Hydraulic Project Approval applicant, resolution of the concerns will be facilitated through discussions with the Area Habitat Biologist and his/her supervisor. If resolution is not reached, or the aggrieved party is not the Hydraulic Project Approval applicant, the Habitat Technical Services Division Manager or his/her designee shall conduct a review and recommend a decision to the Director or his/her designee. If you are not satisfied with the results of this informal appeal, a formal appeal may be filed.

B. FORMAL APPEALS (WAC 220-110-350) OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.021 (EXCEPT agricultural irrigation, stock watering or bank stabilization projects) or 77.55.291:
A person who is aggrieved or adversely affected by the following Department actions may request a formal review of:

(A) The denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval;

(B) An order imposing civil penalties; or

(C) Any other 'agency action' for which an adjudicative proceeding is required under the Administrative Procedure Act, Chapter 34.05 RCW.

A request for a FORMAL APPEAL shall be in WRITING to the Department of Fish and Wildlife HPA Appeals Coordinator, shall be plainly labeled as 'REQUEST FOR FORMAL APPEAL' and shall be RECEIVED DURING OFFICE HOURS by the Department at 600 Capitol Way North, Olympia, Washington 98501-1091, within 30-days of the Department action that is being challenged. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, the deadline for requesting a formal appeal shall be within 30-days of the date of the Department's written decision in response to the informal appeal.

C. FORMAL APPEALS OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.021 (agricultural irrigation, stock watering or bank stabilization only), 77.55.141, 77.55.181, or 77.55.241: A person who is aggrieved or adversely affected by the denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval may request a formal appeal. The request for FORMAL APPEAL shall be in WRITING to the Hydraulic Appeals Board per WAC 259-04 at Environmental Hearings Office, 4224 Sixth Avenue SE, Building Two - Rowe Six, Lacey, Washington 98504; telephone 360/459-6327.

D. FORMAL APPEALS OF DEPARTMENT ACTIONS TAKEN PURSUANT TO CHAPTER 43.21L RCW: A person who is aggrieved or adversely affected by the denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval may request a formal appeal. The FORMAL APPEAL shall be in accordance with the provisions of Chapter 43.21L RCW and Chapter 199-08 WAC. The request for FORMAL APPEAL shall be in WRITING to the Environmental and Land Use Hearings Board at Environmental Hearings Office, Environmental and Land Use Hearings Board, 4224 Sixth Avenue SE, Building Two - Rowe Six, P.O. Box 40903, Lacey, Washington 98504; telephone 360/459-6327.

E. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS results in forfeiture of all appeal rights. If there is no timely request for an appeal, the department action shall be final and unappealable.

Issue Date: July 11, 2007
Project Expiration Date: August 31, 2007

Control Number: 107362-3
FPA/Public Notice #: N/A

ENFORCEMENT: Sergeant Webb (38) P3

Habitat Biologist Tim Rymer	360-906-6729	Tim R. Rymer	for Director WDFW

CC:

IN REPLY REFER TO:

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Northwest Regional Office
911 N.E. 11th Avenue
Portland, Oregon 97232-4169

TAKE PRIDE IN AMERICA

JUL 13 2007

Mr. Tim Hemstreet
PacifiCorp
Suite 1500
825 NE Multnomah
Portland, Oregon 97232

Dear Mr. Hemstreet:

This letter is in regards to your letter of July 13, 2007, requesting access to the Underwood In Lieu Fishing Access Site. This access will involve accessing and sampling sediments at the mouth of the White Salmon River as part of the Condit Dam removal project. The sampling will entail short use of the parking lot and the shoreline area in the vicinity of the boat launching of the Underwood site during the week of July 16, 2007.

The Bureau of Indian Affairs does sanction site access to researchers when it finds that their presence is necessary and beneficial to the management of Columbia River fishery resources. As you are aware, these sites are managed for the exclusive use of treaty fishers under CFR 25 § 247 and §248, so that these fishers may access their usual and accustomed fishing areas.

I would remind you that this access is subject to the following conditions:

- That while tribal identification will not be required for project employees, any vehicles parked will be identified as to their connection to this project. All Kleinfelder Contractor staff will possess some form of government issued identification.
- That crew will yield to the treaty fishers at all times.
- You agree to hold harmless the Bureau in the event of any loss, accident, injury or death.
- That this authorization is not transferable. Separate application for access will be necessary for other project or sampling. This privilege may be revoked at will.

I hope your contractor has a safe and productive sampling season. If you have any questions, or need more information please contact Keith Hatch, Fishery Biologist at (503) 872-2876.

Sincerely,

ACTING

Northwest Regional Director

APPENDIX C

1317 South 13th Avenue P.O. Box 479 Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

August 10, 2007 Analytical Report for Service Request No: K0706398

David King
Kleinfelder
15050 SW Koll Parkway
Suite L
Beaverton, OR 97006

RE: Condit Dam/53886

Dear David:

Enclosed are the results of the samples submitted to our laboratory on July 20, 2007. For your reference, these analyses have been assigned our service request number K0706398.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260. You may also contact me via Email at HJacky@kelso.caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Harvey Jacky
Project Chemist

HJ/LL

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

Case Narrative

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Kleinfelder	**Service Request No.:**	K0706398
Project:	Condit Dam / 53886	**Date Received:**	7/20/07
Sample Matrix:	Sediment		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms and all of the associated raw data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Seventeen sediment samples were received for analysis at Columbia Analytical Services on 7/20/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Sulfide, Total by 9030M
The Relative Percent Difference (RPD) for the replicate analysis of Total Sulfide in the Batch QC sample was outside the normal CAS control limits. The variability in the results is attributed to the heterogeneous character of the sample.. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample. The result is flagged to indicate the problem.

The matrix spike recovery of Total Sulfide for the Batch QC sample was outside control criteria because of suspected matrix interference. A matrix spike duplicate was performed which was within control criteria. As a result of the interference, the results for this analyte might contain a high bias. The results are flagged to indicate the problem. No further corrective action was taken.

Total Metals

Notes of Discussion:
The DI Water Leach Mercury analysis was performed by EPA 1631. Mercury is reported in parts per trillion (ng/L).

Approved by _____ **Date** 9/19/07

Chain of Custody Documentation

Columbia Analytical Services, Inc.
An Employee - Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222x07 • FAX (360) 636-1068

SR#: K0706398

PAGE 1 OF 2 COC #

PROJECT NAME	Condit Dam
PROJECT NUMBER	53886
PROJECT MANAGER	Dave King
COMPANY/ADDRESS	15050 SW koll Pkwy Beaverton, OR 97050
CITY/STATE/ZIP	Beaverton OR 97050
E-MAIL ADDRESS	dking@kleinfelder.com
PHONE #	503-644-9447
FAX#	
SAMPLER'S SIGNATURE	Scott Thomas

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☐ 8270LL☐	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ ☐Fuel Fingerprint (FIQ) ☐NW-HCID Screen	Oil & Grease/TRPH 1664 HEM☐ 1664 SGT☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	Metals, Total or Dissolved (See list below)	Cyanide☐	Hex-Chrom☐	pH, Cond., Cl, SO_4, PO_4, F, NO_2, NO_3, BOD, TSS, TDS (circle) NH_3-N, COD, Total-P, TKN, TOC, DOC (circle) NO_2+NO_3	TOX 9020☐ AOX 1650☐ 506☐	Sulfides 9030M	Ammonia 350.1M TOC ASTM D4129-98M	TDS 160.1M Total Solids 160.3M Mercury 7471A	REMARKS
MC-071807	7/18/07	1525	1	Sediment	1																		X	
BC-071807		1645	2		1																		X	
LBC-071807		1600	3		1																		X	
NW1-071807		1000	4		5															X	X	X	X	
NW2-071807		1120	5		5															X	X	X	X	
NW3-071807		1230	6		5															X	X	X	X	
NW4-071807		1300	7		5															X	X	X	X	
NW5-071807		1340	8		5															X	X	X	X	
NW6-071807		1420	9		5															X	X	X	X	
NW7-071807	↓	1500	10	↓	5															X	X	X	X	

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required

___ II. Report Dup., MS, MSD as required

___ III. Data Validation Report (includes all raw data)

___ IV. CLP Deliverable Report

___ V. EDD

INVOICE INFORMATION

P.O. #

Bill To:

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.

___ 5 Day

✓ Standard (10-15 working days)

___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER: (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

Attn: Tammy Terry

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature	Scott 7/20/07 1045	Scott 7/20/07 2:00	[illegible] 7/20/07 1445
Date/Time			
Printed Name	Scott	Scott	[illegible]
Firm	GHS	GHS	CAS

BCOC #1 06/03

Columbia Analytical Services INC.
An Employee - Owned Company

CHAIN OF CUSTODY

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SR#: KO 706397

PAGE 2 OF 2 COC #

PROJECT NAME: Condit Dam
PROJECT NUMBER: 53886
PROJECT MANAGER: Dave King
COMPANY/ADDRESS: 15050 SW Koll Pkwy
CITY/STATE/ZIP: Beaverton, OR 97050
E-MAIL ADDRESS: dking@kleinfelder.com
PHONE #: 503-644-9447 FAX#:
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625 ☐ 8270 ☐ 8270LL ☐	Volatile Organics 624 ☐ 8260 ☐ 8021 ☐ BTEX ☐	Hydrocarbons (*see below) Gas ☐ Diesel ☐ Oil ☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 1664 HEM ☐ 1664 SGT ☐	PCB's Aroclors ☐ Congeners ☐	Pesticides/Herbicides 608 ☐ 8081A ☐ 8141A ☐ 8151A ☐	Chlorophenolics - 8151M Tri ☐ Tetra ☐ PCP ☐	PAHS 8310 ☐ SIM ☐	Metals, Total or Dissolved (See list below)	Cyanide ☐ Hex-Chrom ☐	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle) NO2+NO3	TOX 9020 ☐ AOX 1650 ☐ 506 ☐	Mercury 7471A				REMARKS
SP1-071707	7/17/07	1345	11	Sediment	1																X				
SP2-071707	↓	1540	12	↓	1																X				
SP3-071707	↓	1700	13	↓	1																X				
SP4-071707	↓	1800	14	↓	1																X				
SP5-071707	↓	1830	15	↓	1																X				
WR-071907	7/19/07	1300	16	↓	1																X				
LWS-071907	↓	1400	17	↓	1																X				
				↓																					

REPORT REQUIREMENTS

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. # _____
Bill To: _____

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
✓ Standard (10-15 working days)
___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORTHWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:

Attn: [signature]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature: [signature] Date/Time: 7-20-07 1045	Signature: [signature] Date/Time: 7-20-07 2:00	Signature: Date/Time:
Printed Name:	Printed Name: [signature] Firm: CAS	Printed Name: [signature] Firm: CAS	Printed Name: Firm:

RCOC #1 06/03

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC HJ

Client / Project: KLEINFELDER Service Request K07 0706397

Received: 7/20/07 Opened: 7/20/07 By: SB

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* (Courier) *Hand Delivered*
2. Samples were received in: (circle) (Cooler) *Box* *Envelope* *Other* _____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 1 FR
   If present, were custody seals intact? (Y) N If present, were they signed and dated? Y (N)
4. Is shipper's air-bill filed? If not, record air-bill number: _____ (NA) Y N

5. **Temperature of cooler(s) upon receipt (°C):** 9.8
   Temperature Blank (°C): 8.7
6. If applicable, list Chain of Custody Numbers:
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Packing material used. *Inserts* *Bubble Wrap* (Gel Packs) *Wet Ice* *Sleeves* *Other* _____
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* (Y) N
12. **Were the correct types of bottles used for the tests indicated?** NA (Y) N
13. Were all of the preserved bottles received at the lab with the appropriate pH? *Indicate in the table below.* (NA) Y N
14. Were VOA vials and 1631 Mercury bottles checked for absence of air bubbles? *Indicate in the table below.* (NA) Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** (NA) Y N
16. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials
✓			✓							SB

Additional Notes, Discrepancies, & Resolutions: COC not Signed

Total Solids

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Kleinfelder	**Service Request:**	K0706398
Project:	Condit Dam/53886	**Date Collected:**	7/18/2007
Sample Matrix:	Sediment	**Date Received:**	7/20/2007

Total Volatile Solids

Prep Method:	NONE	Units:	PERCENT
Analysis Method:	160.4M	Basis:	DRY
Test Notes:			

Sample Name	Lab Code	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
NW1-071807	K0706398-004	0.01	1	NA	7/24/2007	5.74	
NW2-071807	K0706398-005	0.01	1	NA	7/24/2007	5.85	
NW3-071807	K0706398-006	0.01	1	NA	7/24/2007	5.18	
NW4-071807	K0706398-007	0.01	1	NA	7/24/2007	4.33	
NW5-071807	K0706398-008	0.01	1	NA	7/24/2007	3.67	
NW6-071807	K0706398-009	0.01	1	NA	7/24/2007	5.47	
NW7-071807	K0706398-010	0.01	1	NA	7/24/2007	4.71	
Method Blank	K0706398-MB	0.01	1	NA	7/24/2007	ND	

M Modified for analysis of soil.

Approved By: _____ Date: 7/27/07

1A/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Kleinfelder
Project: Condit Dam/53886
Sample Matrix: Sediment

Service Request: K0706398
Date Collected: 7/18/2007
Date Received: 7/20/2007
Date Extracted: NA
Date Analyzed: 7/24/2007

Duplicate Summary
Inorganic Parameters

Sample Name: NW1-071807
Lab Code: K0706398-004DUP
Test Notes:

Units: PERCENT
Basis: DRY

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Total Volatile Solids	NONE	160.4M	0.01	5.74	5.73	5.74	< 1	

M Modified for soil analysis.

Approved By: _____ Date: 7/27/07

DUP/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Kleinfelder
Project: Condit Dam/53886
Sample Matrix: Sediment

Service Request: K0706398

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
MC-071807	K0706398-001	07/18/2007	07/20/2007	07/24/2007	33.0	
BC-071807	K0706398-002	07/18/2007	07/20/2007	07/24/2007	19.1	
LBC-071807	K0706398-003	07/18/2007	07/20/2007	07/24/2007	51.4	
NW1-071807	K0706398-004	07/18/2007	07/20/2007	07/24/2007	43.7	
NW2-071807	K0706398-005	07/18/2007	07/20/2007	07/24/2007	49.5	
NW3-071807	K0706398-006	07/18/2007	07/20/2007	07/24/2007	52.6	
NW4-071807	K0706398-007	07/18/2007	07/20/2007	07/24/2007	52.0	
NW5-071807	K0706398-008	07/18/2007	07/20/2007	07/24/2007	55.1	
NW6-071807	K0706398-009	07/18/2007	07/20/2007	07/24/2007	48.4	
NW7-071807	K0706398-010	07/18/2007	07/20/2007	07/24/2007	51.6	
SP1-071707	K0706398-011	07/17/2007	07/20/2007	07/24/2007	73.2	
SP2-071707	K0706398-012	07/17/2007	07/20/2007	07/24/2007	27.1	
SP3-071707	K0706398-013	07/17/2007	07/20/2007	07/24/2007	58.0	
SP4-071707	K0706398-014	07/17/2007	07/20/2007	07/24/2007	75.3	
SP5-071707	K0706398-015	07/17/2007	07/20/2007	07/24/2007	56.3	
WR-071907	K0706398-016	07/19/2007	07/20/2007	07/24/2007	49.3	
LWS-071907	K0706398-017	07/19/2007	07/20/2007	07/24/2007	63.9	

Client:	Kleinfelder	**Service Request:**	K0706398
Project:	Condit Dam/53886	**Date Collected:**	07/18/2007
Sample Matrix:	Sediment	**Date Received:**	07/20/2007
		Date Analyzed:	07/24/2007

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
MC-071807	K0706398-001	33.0	33.2	33.1	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Kleinfelder	**Service Request:**	K0706398
Project:	Condit Dam/53886	**Date Collected:**	07/17/2007
Sample Matrix:	Sediment	**Date Received:**	07/20/2007
		Date Analyzed:	07/24/2007

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

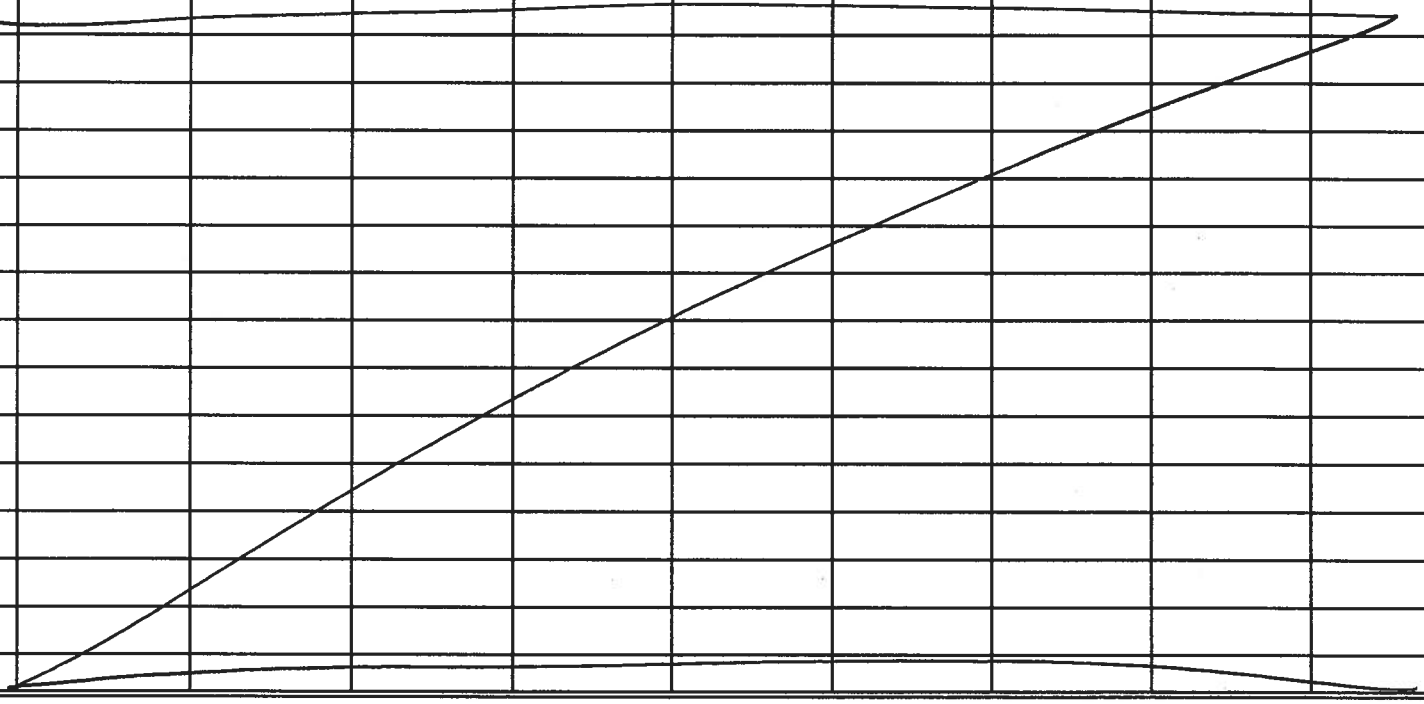
Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
SP1-071707	K0706398-011	73.2	72.5	72.9	<1	

COLUMBIA ANALYTICAL SERVICES, INC.

Service Request K0706398 EPA 160.4 M

Analysis For: Total Volatile Solids

Pan ID	Lab Code	Wet Weight	Tare Weight (g)	Tare + Dry Weight	Tare + Ash Weight (g)	Dry Weight (g)	Ash Weight (g)	% Total Solids	% Volatile Solids
P4	MB	10.9435	32.5834	32.5831	32.5830	-0.0003	-0.0004	<0.01	<0.01
E3	6398-4	15.9081	34.9583	41.7704	41.3791	6.8121	6.4208	42.8	5.74%
P7	6398-4D	16.2884	27.6202	34.6595	34.2563	7.0393	6.6361	43.2	5.73%
Q2	6398-5	17.6775	30.5239	38.9683	38.4741	8.4444	7.9502	47.8	5.85%
T4	6398-6	20.1908	31.4918	42.0397	41.4935	10.5479	10.0017	52.2	5.18%
J2	6398-7	17.7661	36.4593	45.5867	45.1912	9.1274	8.7319	51.4	4.33%
T3	6398-8	20.2012	29.7301	40.7224	40.3193	10.9923	10.5892	54.4	3.67%
C19	6398-9	17.5388	37.2516	45.7233	45.2601	8.4717	8.0085	48.3	5.47%
J19	6398-10	19.5783	32.2691	42.3199	41.8469	10.0508	9.5778	51.3	4.71%



Oven Temp IN/OUT : 102 C / 102 C Time IN/OUT : 11:05 07/24/07 / 09:00 07/25/07

Comments:

Total Solids	x = 43.0	RPD = <1
Total Volatile Solids	x = 5.74	RPD = <1

Analyst: C. Leaf Date: 7/24/2007

Reviewed By: Date: 7/27/07

COLUMBIA ANALYTICAL SERVICES, INC.

Service Request #: K0706398 Method: EPA METHOD 160.3 M / 160.4 M

Analysis For: Total Volatile Solids

Pan ID	Lab Code	Wet Weight	Tare Weight (g)	Tare + Dry Weight	Tare + Ash Weight (g)	Dry Weight (g)	Ash Weight (g)	% Total Solids	% Volatile Solids
P4	MB	10.9435	32.5834	32.5831	32.5830				
E3	6398-4	15.9081	34.9583	41.7704	41.3791				
P7	-4d	16.2884	27.6202	34.6595	34.2563				
Q2	-5	17.6775	30.5239	38.9683	38.4741				
T4	-6	20.1908	31.4918	42.0397	41.4935				
J2	-7	17.7661	36.4543	45.5867	45.1912				
T3	-8	20.2012	29.7301	40.7224	40.3193				
C19	-9	17.5388	37.2516	45.7233	45.2601				
O19	-10	19.5783	32.2691	42.3199	41.8469				

% Total Solids = (Dry Weight//Wet Weight) x 100 **% Total Volatile Solids** = (1 - (Ash Weight /Dry Weight)) x 100

Time/Date In : 11:05 7/24 Oven Temp : 102°C Time/Date Out : 09:00 7/25/07 Oven Temp : 102°C

Comments:

Ignite @ 550°C

TS-Met: $\bar{x}$ = RPD =

TVS-Met: $\bar{x}$ = RPD =

Run # 89967

Analyst: CL Date: 7/24/07

Reviewed By: [signature] Date: 7/27/07

TVSSOIL1.XLS

Group ID:	KWG0708009		
Analyst:	CLeaf	**Reviewed By:**	
Date Acquired:	07/24/2007 14:25	**Oven TempStart:**	103 DEG C
Date Completed:	07/25/2007 10:07	**Oven TempEnd:**	102 DEG C
		Date Reviewed:	7/25/07

#	Lab Code	Client ID	Matrix	Tare	Tare+Wet	Tare+Dry	% Solids	QC Ref Sample	Comments
19	K0706366-009	S-9	SLUDGE, SOLID	1.30g	17.13g	3.03g	10.9		Strong odor of hydrocarbons present.
20	K0706366-010	S-10	SLUDGE, SOLID	1.27g	14.46g	2.82g	11.8		Strong odor of hydrocarbons present.
21	K0706366-011	Duplicate	SLUDGE, SOLID	1.27g	13.93g	1.86g	4.66		Strong odor of hydrocarbons present.
22	K0706397-001	OCSG070719-000	MISC. SOLID	1.27g	15.23g	14.18g	92.5		
23	K0706397-002	ODSG070719-000	MISC. SOLID	1.26g	18.12g	16.50g	90.4		
24	K0706398-001	MC-071807	SEDIMENT	1.25g	14.54g	5.63g	33.0		
25	K0706398-002	BC-071807	SEDIMENT	1.26g	12.41g	3.39g	19.1		
26	K0706398-003	LBC-071807	SEDIMENT	1.27g	14.70g	8.17g	51.4		
27	K0706398-004	NW1-071807	SEDIMENT	1.26g	12.21g	6.04g	43.7		
28	K0706398-005	NW2-071807	SEDIMENT	1.25g	14.38g	7.75g	49.5		
29	K0706398-006	NW3-071807	SEDIMENT	1.26g	15.31g	8.65g	52.6		
30	K0706398-007	NW4-071807	SEDIMENT	1.25g	15.77g	8.80g	52.0		
31	K0706398-008	NW5-071807	SEDIMENT	1.26g	16.32g	9.56g	55.1		
32	K0706398-009	NW6-071807	SEDIMENT	1.27g	12.88g	6.89g	48.4		
33	K0706398-010	NW7-071807	SEDIMENT	1.27g	16.24g	8.99g	51.6		
34	K0706398-011	SP1-071707	SEDIMENT	1.26g	21.71g	16.22g	73.2		
35	K0706398-012	SP2-071707	SEDIMENT	1.27g	15.63g	5.16g	27.1		
36	K0706398-013	SP3-071707	SEDIMENT	1.25g	19.97g	12.10g	58.0		
37	K0706398-014	SP4-071707	SEDIMENT	1.27g	20.42g	15.69g	75.3		
38	K0706398-015	SP5-071707	SEDIMENT	1.26g	20.00g	11.81g	56.3		
39	K0706398-016	WR-071907	SEDIMENT	1.27g	16.02g	8.54g	49.3		
40	K0706398-017	LWS-071907	SEDIMENT	1.27g	24.25g	15.96g	63.9		
41	K0706399-001	07TAN-BDA10-SO	SOIL	1.26g	12.10g	10.69g	87.0		
42	K0706399-002	07TAN-BDA11-SO	SOIL	1.25g	12.12g	11.48g	94.1		
43	K0706399-003	07TAN-MCA22-SO	SOIL	1.25g	22.17g	15.11g	66.3		
44	K0706399-004	07TAN-BDA12-SO	SOIL	1.25g	20.10g	14.94g	72.6		
45	K0706399-005	07TAN-PHA25-SO	SOIL	1.25g	18.63g	5.82g	26.3		
46	K0706399-006	07TAN-BDA13-SO	SOIL	1.26g	17.83g	14.27g	78.5		

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Group ID:	KWG0708009		
Analyst:	CLeaf	**Reviewed By:**	G
Date Acquired:	07/24/2007 14:25	**Oven TempStart:**	103 DEG C
Date Completed:	07/25/2007 10:07	**Oven TempEnd:**	102 DEG C
		Date Reviewed:	7/25/07

#	Lab Code	Client ID	Matrix	Tare	Tare+Wet	Tare+Dry	% Solids	QC Ref Sample	Comments
47	K0706399-007	07TAN-PHA26-SO	SOIL	1.24g	18.18g	5.12g	22.9		
48	K0706399-008	07TAN-BDA14SO	SOIL	1.25g	15.05g	14.31g	94.6		
49	K0706399-009	07TAN-PHA27-SO	SOIL	1.27g	14.74g	6.06g	35.6		
50	K0706399-010	07TAN-MCA29-SO	SOIL	1.26g	18.51g	14.78g	78.4		
51	K0706399-011	07TAN-MCA16-SO	SOIL	1.27g	16.67g	15.36g	91.5		
52	K0706399-012	07TAN-MCA31-SO	SOIL	1.27g	14.20g	7.87g	51.0		
53	K0706399-013	07TAN-PHA33-SO	SOIL	1.27g	15.59g	13.64g	86.4		
54	K0706399-014	07TAN-MCA18-SO	SOIL	1.26g	14.81g	12.31g	81.5		
55	K0706399-015	07TAN-MCA19-SO	SOIL	1.26g	12.30g	10.27g	81.6		
56	K0706399-016	07TAN-BDA34-SO	SOIL	1.26g	14.31g	13.31g	92.3		
57	K0706422-012	07TAN-BDA34-SO	SOIL	1.25g	12.29g	11.41g	92.0		
58	K0706422-013	07TAN-MCA35-SO	SOIL	1.26g	17.76g	16.70g	93.6		
59	K0706422-014	07TAN-SEA36-SO	SOIL	1.26g	14.42g	13.28g	91.3		
60	K0706422-015	07TAN-BDA37-SO	SOIL	1.26g	16.60g	14.75g	87.9		
61	K0706427-001	P2F Tank	MISC. SOLID	1.26g	6.14g	6.20g	101		
62	K0706427-002	P2F Candles	MISC. SOLID	1.26g	4.47g	4.66g	106		
63	K0706428-001	0707235361SL301	SOIL	1.25g	10.75g	6.79g	58.3		
64	K0706428-002	0707236353SL301	SOIL	1.24g	12.82g	9.25g	69.2		
65	K0706428-003	0707335242SL301	SOIL	1.26g	13.72g	10.14g	71.3		
66	KWG0708009-1	Duplicate Client Sample	SOIL	1.27g	9.34g	5.55g	53.0	K0706428-001	
67	KWG0708009-10	Duplicate Client Sample	SOIL	1.25g	15.76g	3.32g	14.3	K0706366-001	
68	KWG0708009-11	Duplicate Client Sample	SLUDGE	1.28g	15.26g	1.96g	4.86	K0706366-011	
69	KWG0708009-12	Duplicate Client Sample	SOLID FUEL	32.9079g	33.9150g	33.9223g	101	K0705291-001	
70	KWG0708009-2	Duplicate Client Sample	MISC. SOLID	1.26g	4.98g	5.05g	102	K0706427-001	
71	KWG0708009-3	Duplicate Client Sample	SOIL	1.25g	13.56g	12.60g	92.2	K0706422-012	
72	KWG0708009-4	Duplicate Client Sample	SOIL	1.25g	20.55g	15.07g	71.6	K0706399-004	
73	KWG0708009-5	Duplicate Client Sample	SOIL	1.25g	20.45g	16.46g	79.2	K0706399-006	
74	KWG0708009-6	Duplicate Client Sample	SOIL	1.27g	14.23g	12.34g	85.4	K0706399-013	
75	KWG0708009-7	Duplicate Client Sample	SEDIMENT	1.25g	12.81g	5.09g	33.2	K0706398-001	

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Group ID:	KWG0708009				
Analyst:	CLeaf			**Reviewed By:**	CR
Date Acquired:	07/24/2007 14:25	**Oven TempStart:**	103 DEG C	**Date Reviewed:**	7/25/07
Date Completed:	07/25/2007 10:07	**Oven TempEnd:**	102 DEG C		

#	Lab Code	Client ID	Matrix	Tare	Tare+Wet	Tare+Dry	% Solids	QC Ref Sample	Comments
76	KWG0708009-8	Duplicate Client Sample	SEDIMENT	1.27g	17.62g	13.13g	72.5	K0706398-011	
77	KWG0708009-9	Duplicate Client Sample	MISC. SOLID	1.27g	13.55g	12.55g	91.9	K0706397-001	

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COLUMBIA ANALYTICAL SERVICES, INC.

EPA Method 160.3 - Total Solids

Group ID:	KWG0708009				
Analyst:	CLeaf			**Reviewed By:**	
Date Acquired:	07/24/2007 14:25	**Oven TempStart:**	103 DEG C	**Date Reviewed:**	7/25/07
Date Completed:	07/25/2007 10:07	**Oven TempEnd:**	102 DEG C		

#	Lab Code	Client ID	Matrix	Tare	Tare+Wet	Tare+Dry	% Solids	QC Ref Sample	Comments
1	K0705291-001	OCC Rejects 31	SOLID FUEL	34.2752g	35.2785g	35.2733g	99.5		Air dried and grd in JAX.
2	K0705291-002	OCC Rejects 32	SOLID FUEL	35.0485g	36.0532g	36.0387g	98.6		Air dried and grd in JAX.
3	K0705291-003	OCC Rejects 33	SOLID FUEL	26.0932g	27.0967g	27.0862g	99.0		Air dried and grd in JAX.
4	K0705291-004	OCC Rejects 34	SOLID FUEL	37.0718g	38.0734g	38.0810g	101		Air dried and grd in JAX.
5	K0705291-005	OCC Rejects 35	SOLID FUEL	34.1636g	35.1878g	35.1981g	101		Air dried and grd in JAX.
6	K0705291-006	OCC Rejects 36	SOLID FUEL	36.1952g	37.2025g	37.0511g	85.0		Air dried and grd in JAX.
7	K0706311-001	Composite Sample-07/05/2007	COAL	1.25g	12.61g	12.54g	99.4		Air dried and grd.
8	K0706311-002	Composite Sample-07/09/2007	COAL	1.27g	9.39g	9.35g	99.5		Air dried and grd.
9	K0706311-003	Composite Sample-07/11/2007	COAL	1.27g	11.91g	11.84g	99.3		Air dried and grd.
10	K0706311-004	Composite Sample-07/13/2007	COAL	1.26g	11.62g	11.53g	99.1		Air dried and grd.
11	K0706366-001	S-1	SOIL	1.25g	13.03g	2.82g	13.3		Strong odor of hydrocarbons present.
12	K0706366-002	S-2	SLUDGE, SOLID	1.25g	15.56g	2.25g	6.99		Strong odor of hydrocarbons present.
13	K0706366-003	S-3	SLUDGE, SOLID	1.26g	17.39g	1.87g	3.78		Strong odor of hydrocarbons present.
14	K0706366-004	S-4	SLUDGE, SOLID	1.26g	16.19g	2.20g	6.30		Strong odor of hydrocarbons present.
15	K0706366-005	S-5	SLUDGE, SOLID	1.26g	15.17g	2.38g	8.05		Strong odor of hydrocarbons present.
16	K0706366-006	S-6	SLUDGE, SOLID	1.25g	13.81g	1.86g	4.86		Strong odor of hydrocarbons present.
17	K0706366-007	S-7	SLUDGE, SOLID	1.27g	13.24g	2.17g	7.52		Strong odor of hydrocarbons present.
18	K0706366-008	S-8	SLUDGE, SOLID	1.26g	12.87g	2.02g	6.55		Strong odor of hydrocarbons present.

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General Chemistry Parameters

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 07/17-19/07
Date Received : 07/20/07

Density

Analysis Method : ASTM D2937
Test Notes :

Units : g/cc
Basis : As Received

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Analyzed	Result	Result Notes
MC-071807	K0706398-001	-	-	1	09/01/07	1.07	
BC-071807	K0706398-002	-	-	1	09/01/07	1.21	
LBC-071807	K0706398-003	-	-	1	09/01/07	1.34	
NW1-071807	K0706398-004	-	-	1	09/01/07	1.39	
NW2-071807	K0706398-005	-	-	1	09/01/07	1.26	
NW3-071807	K0706398-006	-	-	1	09/01/07	1.34	
NW4-071807	K0706398-007	-	-	1	09/01/07	1.42	
NW5-071807	K0706398-008	-	-	1	09/01/07	1.36	
NW6-071807	K0706398-009	-	-	1	09/01/07	1.32	
NW7-071807	K0706398-010	-	-	1	09/01/07	1.38	
SP1-071707	K0706398-011	-	-	1	09/01/07	1.72	
SP2-071707	K0706398-012	-	-	1	09/01/07	1.19	
SP3-071707	K0706398-013	-	-	1	09/01/07	1.45	
SP4-071707	K0706398-014	-	-	1	09/01/07	1.80	
SP5-071707	K0706398-015	-	-	1	09/01/07	1.51	
WR-071907	K0706398-016	-	-	1	09/01/07	1.30	
LWS-071907	K0706398-017	-	-	1	09/01/07	1.55	

Columbia Analytical Services Inc.

Service Request #: K6398 Method: ASTM E1109-86

Analysis For: Bulk Density

Sample	Weight of Sample (g)	Bulk Density (g/cm^3)	Reported Bulk Density(g/cm3) as-received or drained weight*
K6398-1	21.2805	1.07	
K6398-1	21.3163	1.07	1.073438
K6398-2	23.9447	1.21	
K6398-2d	23.8956	1.20	1.205574
K6398-3	26.5856	1.34	
K6398-3d	26.4321	1.33	1.336044
K6398-4	27.6208	1.39	
K6398-4d	27.6723	1.39	1.393384
6398-5	24.9676	1.26	
6398-5d	25.2100	1.27	1.264474
6398-6	26.0024	1.31	
6398-6d	27.0003	1.36	1.335666
6398-7	28.2416	1.42	
6398-7d	28.2510	1.42	1.423611
6398-8	26.9792	1.36	
6398-8d	27.0101	1.36	1.360528
6398-9	26.2168	1.32	
6398-9d	26.1170	1.32	1.31881
6398-10	27.4506	1.38	
6398-10d	27.4752	1.38	1.384128
6398-11	34.1396	1.72	
6398-11d	34.2012	1.72	1.722186

* circle one

Commen **Weight of 20mL DIW (g) = 19.8413**

Analyzed By:		Date:	9/1/2007
Reviewed By:		Date:	9/7/07

Columbia Analytical Services Inc.

Service Request #: _____ Method: ASTM E1109-86

Analysis For: Bulk Density

Sample	Weight of Sample (g)	Bulk Density (g/cm^3)	Reported Bulk Density(g/cm3) as-received or drained weight*
K6398-12	23.5175	1.19	
6398-12d	23.5281	1.19	1.185547
6398-13	28.7868	1.45	
6398-13d	28.7872	1.45	1.450863
6398-14	35.8239	1.81	
6398-14d	35.8278	1.81	1.80562
6398-15	29.9182	1.51	
6398-15d	29.9312	1.51	1.508203
6398-16	25.7151	1.30	
6398-16d	25.6987	1.30	1.295626
6398-17	30.7267	1.55	
6398-17d	30.6997	1.55	1.547943

* circle one

Comments: **19.8413**

Analyzed By:	DLambe	Date:	9/1/2007
Reviewed By:		Date:	9/7/07

Columbia Analytical Services Inc.

93330

Service Request #:

Analysis For: Specific Gravity / Bulk Density

Method: SM2710 F

Sample	Weight of 10ml Sample	Specific Gravity
K63956-1	21.2605	
1d	21.3163	
2	23.9447	
2d	23.8956	
3	26.5856	
3d	26.4321	
4	27.6206	
4d	27.6723	
5	24.9676	
5d	25.2100	
6	26.0024	
6d	27.0003	
7	28.2416	
7d	28.2510	
8	26.9792	
8d	27.0101	
9	26.2168	
9d	26.1170	
10	27.4506	
10d	27.4752	
11	34.1396	
11d	34.2012	
12	23.5175	
12d	23.5281	
13	28.7868	

Comments: **Weight of 20 ml DI water =** 19.8413

Analyzed By:	Deeke	Date: 9/1/07	12:00
Reviewed By:		Date: 9/7/07	

SPECGRAV.XLS

Columbia Analytical Services Inc.

Service Request #: _____ Method: SM2710 F

Analysis For: Specific Gravity / Bulk Density

Sample	Weight of 10ml Sample	Specific Gravity
k6398-13d	28.7872	
14	35.8239	
14d	35.8278	
15	29.9182	
15d	29.9312	
16	25.7151	
16d	25.6987	
17	30.7267	
17d	30.6997	

Comments: **Weight of ~~10~~ 20 ml DI water =** 19.8413

Analyzed By:	Dleeke	Date:	9/1/07 12:00
Reviewed By:		Date:	9/7/07

SPECGRAV.XLS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007

Inorganic Parameters

Sample Name : NW1-071807
Lab Code : K0706398-004
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	26.9	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	1.55	
Sulfide, Total	mg/Kg	9030M	1.2	0.5	1	07/19/07	07/19/07	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007

Inorganic Parameters

Sample Name : NW2-071807
Lab Code : K0706398-005
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	21.3	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	1.56	
Sulfide, Total	mg/Kg	9030M	1.2	0.5	1	07/19/07	07/19/07	2.2	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007

Inorganic Parameters

Sample Name : NW3-071807
Lab Code : K0706398-006
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	18.7	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	1.64	
Sulfide, Total	mg/Kg	9030M	12	5.0	10	07/19/07	07/19/07	50.2	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007

Inorganic Parameters

Sample Name : NW4-071807
Lab Code : K0706398-007
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	18.4	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	1.10	
Sulfide, Total	mg/Kg	9030M	1.2	0.5	1	07/19/07	07/19/07	10.1	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007

Inorganic Parameters

Sample Name : NW5-071807
Lab Code : K0706398-008
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	11.0	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	0.86	
Sulfide, Total	mg/Kg	9030M	1.2	0.5	1	07/19/07	07/19/07	7.3	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007

Inorganic Parameters

Sample Name : NW6-071807
Lab Code : K0706398-009
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	19.7	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	1.56	
Sulfide, Total	mg/Kg	9030M	12	5.0	10	07/19/07	07/19/07	44.5	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007

Inorganic Parameters

Sample Name : NW7-071807
Lab Code : K0706398-010
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	16.1	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	1.35	
Sulfide, Total	mg/Kg	9030M	1.2	0.5	1	07/19/07	07/19/07	2.4	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : NA
Date Received : NA

Inorganic Parameters

Sample Name : Method Blank
Lab Code : K0706398-MB
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Analyzed	Date Prepared	Result	Result Notes
Ammonia as Nitrogen	mg/Kg	350.1M	0.58	0.07	1	08/03/07	07/24/07	ND	
Carbon, Total Organic	Percent	ASTM D4129-82M	0.05	0.02	1	08/07/07	07/31/07	ND	
Sulfide, Total	mg/Kg	9030M	1.2	0.5	1	07/19/07	07/19/07	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007
Date Prepared : 07/31/07
Date Analyzed : 07/19-08/07/07

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name : Laboratory Control Sample
Lab Code : K0706398-LCS
Test Notes :

Basis : Dry

Analyte	Units	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	Percent	ASTM D4129-82M	0.89	0.82	92	85-115	
Sulfide, Total	mg/Kg	9030M	6.2	6.7	108	60-130	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : WATER

Service Request : K0706398
Date Collected : NA
Date Received : NA
Date Prepared : NA
Date Analyzed : 07/19-08/07/07

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name : Lab Control Sample
Lab Code : K0706398-LCS
Test Notes :

Basis : NA

Analyte	Units	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Ammonia as Nitrogen	mg/L	350.1M	2.45	2.46	100	90-110	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : NA
Date Received : NA
Date Prepared : 07/19/07
Date Analyzed : 07/19/07

Matrix Spike/Duplicate Matrix Spike Summary

Sample Name : Batch QC
Lab Code : K0706314-008MS K0706314-008DMS
Test Notes :

Units : mg/Kg
Basis : Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Spike Recovery MS	Spike Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Sulfide, Total	EPA 9030B Modified	9030M	240	477	484	37.2	688	657	136	128	60-130	5	*

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007
Date Prepared : 07/31/07
Date Analyzed : 08/07/07

Duplicate Summary
Inorganic Parameters

Sample Name : NW1-071807
Lab Code : K0706398-004DUP
Test Notes :

Units : Percent
Basis : Dry

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Carbon, Total Organic	Method	ASTM D4129-82M	0.05	1.55	1.50	1.52	3	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007
Date Prepared : 07/31/07
Date Analyzed : 08/07/07

Matrix Spike Summary
Inorganic Parameters

Sample Name : NW1-071807
Lab Code : K0706398-004MS
Test Notes :

Units : Percent
Basis : Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	Method	ASTM D4129-82M	0.05	9.08	1.55	10.4	97	80-120	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007
Date Prepared : 07/24/07
Date Analyzed : 08/03/07

Duplicate Summary
Inorganic Parameters

Sample Name : NW7-071807
Lab Code : K0706398-010DUP
Test Notes :

Basis : Dry

Analyte	Prep Method	Units	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Ammonia as Nitrogen	SOP	mg/Kg	350.1M	0.58	16.1	15.7	15.9	3	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project Number : 53886
Sample Matrix : SEDIMENT

Service Request : K0706398
Date Collected : 7/18/2007
Date Received : 7/20/2007
Date Prepared : 07/24/07
Date Analyzed : 08/03/07

Matrix Spike Summary
Inorganic Parameters

Sample Name : NW7-071807
Lab Code : K0706398-010MS
Test Notes :

Basis : Dry

Analyte	Prep Method	Units	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Ammonia as Nitrogen	SOP	mg/Kg	350.1M	29	950	16.1	1010	105	75-125	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project : Condit Dam

Service Request : K0706398
Date Collected : NA
Date Received : NA

Ammonia as Nitrogen
350.1M
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	8/3/2007	2.00	2.07	104
CCV2 Result	8/3/2007	2.00	2.07	104
CCV3 Result	8/3/2007	2.00	2.05	103
CCV4 Result	8/3/2007	2.00	2.07	104
CCV5 Result	8/3/2007	2.00	2.07	104
CCV6 Result	8/3/2007	2.00	2.08	104

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project : Condit Dam

Service Request : K0706398
Date Collected : NA
Date Received : NA

Ammonia as Nitrogen
350.1M
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	8/3/2007	0.05	ND
CCB2 Result	8/3/2007	0.05	ND
CCB3 Result	8/3/2007	0.05	ND
CCB4 Result	8/3/2007	0.05	ND
CCB5 Result	8/3/2007	0.05	ND
CCB6 Result	8/3/2007	0.05	ND

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project : Condit Dam

Service Request : K0706398
Date Collected : NA
Date Received : NA

Carbon, Total Organic
ASTM D4129-82M
Units: Percent

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	8/7/2007	20.0	18.9	95
CCV2 Result	8/7/2007	20.0	19.5	98
CCV3 Result	8/7/2007	20.0	19.3	97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project : Condit Dam

Service Request : K0706398
Date Collected : NA
Date Received : NA

Carbon, Total Organic
ASTM D4129-82M
Units: Percent

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	8/7/2007	0.05	ND
CCB2 Result	8/7/2007	0.05	ND
CCB3 Result	8/7/2007	0.05	ND

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project : Condit Dam

Service Request : K0706398
Date Collected : NA
Date Received : NA

Sulfide, Total
9030M
Units: mg/L

CONTINUING CALIBRATION VERIFICATION (CCV)

	Date Analyzed	True Value	Measured Value	Percent Recovery
CCV1 Result	7/19/2007	1.58	1.57	99
CCV2 Result	7/19/2007	1.58	1.58	100
CCV3 Result	7/19/2007	1.58	1.57	99
CCV4 Result	7/19/2007	1.58	1.56	99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project : Condit Dam

Service Request : K0706398
Date Collected : NA
Date Received : NA

Sulfide, Total
9030M
Units: mg/L

CONTINUING CALIBRATION BLANK (CCB)

	Date Analyzed	MRL	Blank Value
CCB1 Result	7/19/2007	0.05	ND
CCB2 Result	7/19/2007	0.05	ND
CCB3 Result	7/19/2007	0.05	ND
CCB4 Result	7/19/2007	0.05	ND

Work Request # Original (K62398) Run # 91096

Tier: 3

Date Analyzed: 8/7/07

Analyst: RPP

Analysis: TOC

DATA QUALITY REPORT
INORGANICS

Explain any "no" responses to questions below, and any corrective actions in the comments section below.

1.		Is the method name and number correct and appropriate?	(yes)/no/NA
2.		Holding times met for all analyses and for all samples?	(yes)/no/NA
3.		Are calculations correct?	(yes)/no/NA
4.		Is the reporting basis correct? (Dry Weight)	(yes)/no/NA
5.		All quality control criteria met?	(yes)/no/NA
	a.	Is the calibration curve correlation coefficient ≥ 0.995?	yes/no/(NA)
	b.	MBs, CCVs, CCBs, LCSs, Dups, and Spikes, analyzed at proper frequency?	(yes)/no/NA
	c.	Are ICVs, CCVs, and CCBs all within acceptance limits?	(yes)/no/NA
	d.	Are results for methods blanks all ND?	(yes)/no/NA
	e.	Are all QC samples within acceptance criteria? (LCS % rec, MS/DMS % rec, DUP or MS/DMS RPDs, etc.)	(yes)/no/NA
	f.	Are all exceptions explained?	yes/no/(NA)
6.		Are all service requests that apply attached?	yes/(no)/NA
7.		Are all samples labelled correctly?	(yes)/no/NA
8.		Have all instructions on the service request been followed? (e.g. Special MRLs, QC on a specific sample)	(yes)/no/NA
9.		Are detection limits and units reported correctly?	(yes)/no/NA
10.		Are proper Analysis/Extraction stickers included on report?	yes/no/(NA)
11.		Is the unused space on the benchsheet crossed out?	(yes)/no/NA
12.		Was analysis turned in by the due date? (n-2) (If not record SR#)	(yes)/no/NA

COMMENTS:

Final Approved by: _____ Date: 8/7/07

DQREPORT

Columbia Analytical Services, Inc.

91096

Service Request #: K6398

Analysis For: Total Organic Carbon (TOC)

Method: 9060s / PSEP (Combustion/Coulometric)

Matrix: Soil / Dry Weight Basis

Sample Number	mg Sample Injected	Sample Reading, ug C	Baseline Reading, ug C	Net µg C	% Carbon
CCV-1	11.5	2198.5	24.6	2173.9	18.9
CCB-1	50.0	8.6	24.6	-16.0	< 0.05
LCS	48.3	420.9	24.6	396.3	0.82
MB	50.0	5.5	24.6	-19.1	< 0.05
K6398-4	31.7	515.3	24.6	490.7	1.55
K6398-4d	40.3	627.5	24.6	602.9	1.50
K6398-4ms	19.6	2068.1	24.6	2043.5	10.4
K6398-5	41.6	674.2	24.6	649.6	1.56
K6398-6	41.0	696.4	24.6	671.8	1.64
K6398-7	55.2	630.4	24.6	605.8	1.10
K6398-8	54.7	496.2	24.6	471.6	0.86
K6398-9	56.8	911.6	24.6	887.0	1.56
CCV-2	13.0	2554.7	24.6	2530.1	19.5
CCB-2	50.0	24.2	24.6	-0.4	< 0.05
K6398-10	42.0	592.9	24.6	568.3	1.35
CCV-3	12.3	2402.9	24.6	2378.3	19.3
CCB-3	50.0	22.9	24.6	-1.7	< 0.05

Acid Purge Time: 1 minute **Reading Time:** 5 minutes **TOC % =** (Net Reading)(µg 0.1) / mg Sample Injected

CCV : Urea Baker (lot #A17584) ID#: TOCS/1-10-J TV = 20.0%C

CCV1 = 95 CCV2 = 97 CCV3= 97

LCS: ERA Cat#: 542 Lot#: D047542 ID#: TOCS/1-10-R TV = 0.89%C %REC= 92

Comments : K6398-4

Mean Values 1.5

~~K6398-4~~

K6112-3 Spike:

mg added	spike concentration	% REC
8.9	9.1	98

Analyzed By: [illegible] Date: 8/7/07 Time: 1130

Reveiwed By: [illegible] Date: 8/7/07

OKP 8/7/07

TOC Soil Benchsheet

Sample #	mg Sample	Reading	Date Baked
CCV-1	11.5	2198.5	
CCB-1	50.0	8.6	
LCS	48.3	420.9	
MB	50.0	5.5	
K6398-4	31.7	515.3	70° 7/31/07 1420
K6398-4d	40.3	627.5	70° 7/31/07 1420
K6398-4ms	19.6	2068.1	70° 7/31/07 1420
K6398-5	41.6	674.2	70° 7/31/07 1420
K6398-6	41.0	696.4	70° 7/31/07 1420
K6398-7	55.2	630.4	70° 7/31/07 1420
K6398-8	54.7	496.2	70° 7/31/07 1420
K6398-9	56.8	911.6	70° 7/31/07 1420
CCV-2	13.0	2554.7	
CCB-2	50.0	24.2	
K6398-10	42.0	592.9	70° 7/31/07 1420
CCV-3	12.3	2402.9	
CCB-3	50.0	22.9	
CCV-4			
CCB-4			
CCV-5			
CCB-5			
CCV-6			
CCB-6			
CCV-7			
CCB-7			
CCV-8			
CCB-8			

Baseline
26.9
20.8
26.2
Avg
24.6

KP 8/7/07 1130

TOC Soil Benchsheet

Sample #	mg Sample	Reading	Date Baked	Baseline
CCV-1	11.5	2198.5		26.9
CCB-2	50.0	8.6		2.8
LCS	48.3	420.9		26.2
MB	50.0	5.5		Avg
K6398-4	31.7	515.3	70° 7/31/07 1420	24.6
-4d	40.3	627.5		
-4ms	19.6	2068.1		
-5	41.6	679.2		
-6	41.0	696.4		
-7	55.2	630.4		
-8	54.7	496.2		
-9	56.8	911.6		
CCV-2	13.0	2554.7		
CCB-2	50.0	24.2		
K6398-10	42.0	592.9	v	
CCV-3	12.3	2402.9		
CCB-3	50.0	22.9		
CCV-4				
CCB-4				
CCV-5				
CCB-5				

K6398 : mean value = 1.5
MS: 8.9 mg added
concentration = 9.1
% rec = 98

CCV-1 = 95
CCB-1 : <0.05
CCV-2 : 97
CCB-2 : <0.05
CCV-3 : 97
CCB-3.

LCS : 92% rec
MB. <0.05

8/8/07

CP 8/7/07

11:30 start time

Work Request # (Original) K6094 K6398 K6752 K6634-1

Tier: II III I I

Date Analyzed: 8/3/07

Analyst: LV

Analysis: Soil MM3 Meth, 350.1

DATA QUALITY REPORT
INORGANICS

Explain any "no" responses to questions below, and any corrective actions in the comments section below.

1.		Is the method name and number correct and appropriate?	(yes)/no/NA
2.		Holding times met for all analyses and for all samples?	(yes)/no/NA
3.		Are calculations correct?	(yes)/no/NA
4.		Is the reporting basis correct? (Dry Weight)	(yes)/no/NA
5.		All quality control criteria met?	yes/no/NA
	a.	Is the calibration curve correlation coefficient ≥ 0.995?	yes/no/NA
	b.	MBs, CCVs, CCBs, LCSs, Dups, and Spikes, analyzed at proper frequency?	yes/no/NA
	c.	Are ICVs, CCVs, and CCBs all within acceptance limits?	yes/no/NA
	d.	Are results for methods blanks all ND?	yes/no/NA
	e.	Are all QC samples within acceptance criteria? (LCS % rec, MS/DMS % rec, DUP or MS/DMS RPDs, etc.)	yes/no/NA
	f.	Are all exceptions explained?	yes/no/NA
6.		Are all service requests that apply attached?	(yes)/no/NA
7.		Are all samples labelled correctly?	(yes)/no/NA
8.		Have all instructions on the service request been followed? (e.g. Special MRLs, QC on a specific sample)	(yes)/no/NA
9.		Are detection limits and units reported correctly?	(yes)/no/NA
10.		Are proper Analysis/Extraction stickers included on report?	(yes)/no/NA
11.		Is the unused space on the benchsheet crossed out?	(yes)/no/NA
12.		Was analysis turned in by the due date? (n-2) (If not record SR#)	(yes)/no/NA

COMMENTS:

K6752 is a Rush.

Final Approved by: _____ Date: 8/6/07

DQREPORT

COLUMBIA ANALYTICAL SERVICES, INC.

Work Order #.: K6094-

Analysis: (NH_3) NO_2 / NO_3

EPA 350.1 M / EPA 353.2 M

Date Prepared	Sample Name Lab Code	Dil.	Initial Wt./Vol. (g)	Final Vol. (ml)	mg/L (in solution)	mg/L - mg/kg As Rec'd	% Solids	mg/kg Dry Wt.
8/2/2007	mb	1	~~50~~	50	-0.0233	<0.05		
8/2/2007	k6094-4	1	20.3578	50	0.6515	1.6001	66.5	2.41
8/2/2007	k6094-4d	1	20.0389	50	0.7216	1.8005	66.5	2.71
8/2/2007	k6094-4s	1	20.0546	50	1.0544	2.6288	66.5	3.95
8/2/2007	k6094-4sd	1	20.2570	50	1.4398	3.5538	66.5	5.34
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50				
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		#DIV/0!		
		1		50		~~#DIV/0!~~		
		1		50		#DIV/0!		

NH_3 Spike Sol. (10,000 ppm) ID#:B+L NH3/1-1- NO_3 Spike Sol. (10,000 ppm) ID#:

NH_3/NO_3 Spike=	0.5 mL x 10 ,000 ppm /	
$\bar{x}$ =	RPD=	SPK % REC =

NH_3/NO_3 Spike =	0.5 mL x 10 ,000 ppm /	
$\bar{x}$ =	RPD =	SPK % REC =

NH_3/NO_3 Spike =	0.5 mL x 10 ,000 ppm /	
$\bar{x}$ =	RPD =	SPK % REC=

NH_3/NO_3 Sipike =	0.5 mL x 10 ,000 ppm /	
$\bar{x}$ =	RPD =	SPK % REC =

Comments:

Spike k6094-4s= 1.0 mlx 1.000ppm/20.0546 g x 0.665=75

X = 2.56 RPD= 12 % SPK % REC = 21

Spike k 6094-4sd= 2.0 ml x 1.000 ppm / 20.2570g x 0.665=148

SPK % REC = 21

Prepared By:	Date:
Analyzed By: CV	Date: 08/03/07
Reviewed By:	Date: 8/16/07

COLUMBIA ANALYTICAL SERVICES, INC.

Work Order #.: K6094 Method: SM 4500-NH3 E Mod. ISE

Analysis: NH3

Date Prepared	Sample Name / Lab Code	Initial Wt./Vol. (g) or (ml)	Final Volume (ml)	mg/L (in solution)	mg/L - mg/kg As Rec'd	% Solids	mg/kg Dry Wt.
8-2-07	MB	50 ml	50 ml				
	LCS	↓					
	K6094-4	20.3578g.				66-5	
	-4d	20.0389				↓	
	-4ms	20.0546					
↓	-4msd	20.2570	↓				

MS= K6094-4ms = 1.0 ml x 1,000 ppm / 20.0546 g. = 49.9 / .665 = 75

MSD= X= RPD= %REC=

K6094-4msd = 2.0 ml x 1,000 ppm / 20.2570 g. = 98.7 / .665 = 148

X= %REC=

RPD=

STD ID # = LCS APG# 4022 Lot # 47001 NH3/3.55-F TV = 2.45 mg/L %REC=

Comments:

Prepared By: A Chatman	Date Prepared: 8-2-07 1300
Analyzed By: CV	Date Analyzed: 8/03/07
Reviewed By:	Date Reviewed: 8/6/07

III

COLUMBIA ANALYTICAL SERVICES, INC.

Run # 90908

Work Order #.: K6398 K6752 K6634

EPA 350.1 M / EPA 353.2 M

Analysis: NH_3 NO_2 / NO_3

Date Prepared	Sample Name Lab Code	Dil.	Initial Wt./Vol. (g)	Final Vol. (ml)	mg/L (in solution)	mg/L - mg/kg As Rec'd	% Solids	mg/kg Dry Wt.
7/24/2007	mb-1	1	~~50~~	50	-0.0546	<0.05		
7/24/2007	k6398-4	1	10.36	50	2.4390	11.771	43.7	26.9
7/24/2007	k6398-5	1	10.06	50	2.1210	10.542	49.5	21.3
7/24/2007	k6398-6	1	10.07	50	1.9792	9.8272	52.6	18.7
7/24/2007	k6398-7	1	10.03	50	1.9229	9.5857	52.0	18.4
7/24/2007	k6398-8	1	10.24	50	1.2385	6.0474	55.1	11.0
7/24/2007	k6398-9	1	10.06	50	1.9140	9.5129	48.4	19.7
7/24/2007	k6398-10	1	10.11	50	1.6850	8.3333	51.6	16.1
7/24/2007	k6398-10d	1	10.11	50	1.6377	8.0994	51.6	15.7
7/24/2007	k6398-10s	50	10.20	50	2.1183	519.19	51.6	1010
7/24/2007	k6398-10sd	50	10.04	50	2.1679	539.82	51.6	1050
8/2/2007	mb-1	1	50	50	-0.0117	<0.05		
8/2/2007	k6752-1	50	10.18	50	1.3207	324.34	1.91	17000
8/2/2007	k6752-1d	50	10.19	50	1.2778	313.49	1.91	16400
8/2/2007	k6752-1s	250	10.16	50	0.6031	742.00	1.91	38800
8/2/2007	k6752-1sd	250	10.18	50	0.6078	746.32	1.91	39100
8/2/2007	k6634-1	20	10.16	50	3.2459	319.48	18.5	1730
8/2/2007	k6634-1d	20	10.13	50	3.2588	321.70	18.5	1740
8/2/2007	k6634-1s	50	10.18	50	3.3791	829.84	18.5	4490
8/2/2007	k6634-1sd	50	10.21	50	3.3964	831.64	18.5	4500
		1		50		#DIV/0!		

NH_3 Spike Sol. (10,000 ppm) ID#:B+L NH3/1-1-J NO_3 Spike Sol. (10,000 ppm) ID#:

NH_3/NO_3 Spike K6398-10S=	0.5 mL x 10 ,000 ppm / 10.20 x 0.516=950	
$\bar{x}$ = 15.9	RPD= 3 %	SPK % REC =105 %
NH_3/NO_3 Spike k6398-10sd=	0.5 mL x 10 ,000 ppm / 10.04 x 0.516=965	
$\bar{x}$ =	RPD =	SPK % REC =107 %
NH_3/NO_3 Spike k6752-1s=	0.5 mL x 10 ,000 ppm / 10.16 x 0.0191=25800	
$\bar{x}$ = 16700	RPD = 4 %	SPK % REC= 84 %
NH_3/NO_3 Spike k6752-1sd=	0.5 mL x 10 ,000 ppm / 10.18 x 0.0191=25700	
$\bar{x}$ =	RPD =	SPK % REC =86 %

Comments:

Spike k6634-1s= 0.5ml x 10,000ppm/ 10.18 x 0.185=2650

X K6634-1/1d =1740 RPD=1 % SPK % REC =104 %

Spike k6634-1sd= 0.5 ml x 10,000 ppm / 10.21 x 0 185=2650

SPK % REC = 105 %

Prepared By:	LO	Date:	07/29/07 08/02/07
Analyzed By:	LO	Date:	08/03/07
Reviewed By:		Date:	8/6/07

NH3EXT1form blank

Work Order #.: K6305 K6363 K6428 K6398 Method:

Analysis: PbNH3 / NH3 / NO2 / NO2 / NO3

Date Prepared	Sample Name / Lab Code	Initial Wt./Vol. (g) or (ml)	Final Volume (ml)	mg/L (in solution)	mg/L - mg/kg As Rec'd	% Solids	mg/kg Dry Wt.
7/24/07	MB-1	100	100			—	
	K6305-5	20.03				55.8	
	-5d	20.14				55.8	
	-5S	20.03				55.8	
	-5Sd	20.24				55.8	
	MB-2	50	50			—	
	K6363-1	10.63				39.7	
	-1d	10.18				39.7	
	-1S	10.28				39.7	
	-1Sd	10.37				39.7	
	-5	10.05				45.8	
	K6428-1	10.21				58.3	
	-2	10.10				69.2	
	-3	10.09				71.3	
	-3d	10.36				71.3	
	-3S	10.08				71.3	
	-3Sd	10.40				71.3	
	K6398-4	10.36				43.7	
	-5	10.06				49.5	
	-6	10.07				52.6	
	-7	10.03				52.0	
	-8	10.24				55.1	
	-9	10.06				48.4	
	-10	10.11				51.6	
	-10d	10.11				51.6	
	-10S	10.20				51.6	
	-10Sd	10.04				51.6	

Spike for NH3:

MS= 1 ml of 10.000 ppm B+L NH3 / 1-1-7 for K6305-5

MSD= 0.5 ml of 10.000 ppm B+L NH3 / 1-1-7 for K6363-1

X= 0.5 ml of 10.000 ppm B+L NH3 / 1-1-7 for K6428-3

RPD= Spike for NO3: 0.5 ml of 10.000 ppm B+L NH3 / 1-1-7 for K6398-10

0.5 ml of 10.000 ppm AH / 1-59-5 for K6363-1

STD ID # =

Comments:

K6428-2 contents rocks, K6428-3 contents woods

K6398-5,8 contents woods

Prepared By: LV		Date Prepared: 7/24/07	Time: 7:40
Analyzed By: LV		Date Analyzed: 08/03/07	
Reviewed By:		Date Reviewed:	8/10/07

COLUMBIA ANALYTICAL SERVICES, INC.

Work Order #.: K6752 K6634 Method:

Analysis: NO_2 NO_2/NO_3 NH_3

Date Prepared	Sample Name / Lab Code	Initial Wt./Vol. (g) or (ml)	Final Volume (ml)	mg/L (in solution)	mg/L - mg/kg As Rec'd	% Solids	mg/kg Dry Wt.
8/02/07	MB-1	50	50			—	
	K6752-1	10.18				1.91	
	-1d	10.19				1.91	
	-1S	10.16				1.91	
	-1Sd	10.18				1.91	
	K6634-1	10.16				18.5	
	-1d	10.13				18.5	
	-1S	10.18				18.5	
	-1Sd	10.21				18.5	

Spike for NH_3:

MS= 0.5 ml of 10,000 ppm Stl NH_3/11-1-J for K6752-1

MSD= 0.5 ml of 10,000 ppm Stl NH_3/11-1-J for K6634-1

X=

RPD= Spike for NO_3:

STD ID # = 0.5 ml of 10,000 ppm AA11-59-5 for K6752-1

Comments: 0.5 ml of 10,000 ppm AA11-59-5 for K6634-1

K6752 is a liquid / sludge

K6752-1 10 ml = 9.46 g K6752-1S 10 ml = 9.47 g

K6752-1d 10 ml = 9.47 g K6752-1Sd 10 ml = 9.50 g

Prepared By: LV		Date Prepared: 08/02/07	TIME: 12:00
Analyzed By: LV		Date Analyzed: 08/03/07	
Reviewed By:		Date Reviewed: 8/16/07	

Columbia Analytical Services

Post-run report

Name of Run : 070803G
Date of Report : 08/03/2007
Date of Run : 08/03/2007
Operator :
Comment :EPA 350.1

Name of Analysis :Ammonia.ANL
System No. :1
Type of System :AA3
Start/Stop time :16:31 - 18:06

LV 8/3/07

CCV: TV = 2.00 mg/L BT-NH3/1-28-0
LCS; TV = 2.45 mg/L APG #402-2
Lot #47001
NH3/3-55-F

Channel	2
Method	Ammonia
Unit	mg/L
Calibr. Fit	Linear
Corr. Coeff.	0.9995
Base	-16891
Gain	25
Sensitivity	0.3529
Sample Limit 1	
Sample Limit 2	

Pk	Cup		Sample Id	Value	
0	0	B	Baseline	-0.0346	
1	1	P	Primer	3.9516	
2	1	D	Drift	3.9543	
3	1	C	CS 4.00ppm	3.9538	
4	2	C	CS 2.00ppm	2.0897	
5	3	C	CS 0.50ppm	0.4906	
6	4	C	CS 0.05ppm	0.0326	
7	5	C	CB 0.00ppm	-0.0167	
8	0	B	Baseline	-0.0346	
9	1	H1	High	3.9720	
10	0	L1	Low	-0.0373	
11	0	L1	Low	-0.0373	
12	5	QC2	CCB-1	-0.0245	< 0.05 (< 0.006)
13	2	QC1	CCV-1	2.0706	2.07 104%
14	10	QC3	LCS-1	2.4617	2.46 100%
15	11	S	MB-MS	2.0023	2.00 100%
16	0	N	Null	-0.0317N	
17	12	S	mb- extr 08/02/07	-0.0233	< 0.05 (< 0.006)
18	13	S	k6094-4	0.6515	0.6 (1)
19	14	S	k6094-4d	0.7216	
20	15	S	rinse	-0.0195	
21	16	S	k6094-4s 0.25/5 ≥20	0.0355	NR
22	0	B	Baseline	-0.0346	
23	5	QC2	CCB-2	-0.0221	< 0.05 (< 0.006)
24	2	QC1	CCV-2	2.0736	2.07 104%
25	17	S	k6094-4sd 0.25/5 ≥20	0.0582	NR
26	18	S	k6634-1	60.9871*	NR
27	19	S	k6634-1d	60.8397*	NR
28	20	S	rinse	0.0770	
29	21	S	k6634-1s 0.1/5 ≥50	3.3791	
30	22	S	k6634-1sd 0.1/5 ≥50	3.3964	
31	23	S	mb-1extr 08/02/07	-0.0117	< 0.05 (< 0.006)
32	24	S	k6752-10.1/5 ≥50	1.3207	
33	25	S	k6752-1d 0.1/5 ≥50	1.2778	
34	0	B	Baseline	-0.0346	

(1) LV 8/3/07

35	5	QC2	CCB-3	-0.0334
36	2	QC1	CCV-3	2.0544
37	26	S	k6752-1s .1/5+1/5 =250	0.6031
38	27	S	k6752-1sd .1/5+1/5=250	0.6078
39	28	S	mb-1 extr 7/24/07	-0.0546
40	29	S	k6398-4	2.4390
41	30	S	k6398-5	2.1210
42	31	S	k6398-6	1.9792
43	32	S	k6398-7	1.9229
44	33	S	k6398-8	1.2385
45	34	S	k6398-9	1.9140
46	0	B	Baseline	-0.0346
47	5	QC2	CCB-4	-0.0258
48	2	QC1	CCV-4	2.0650
49	35	S	k6398-10	1.6850
50	36	S	k6398-10d	1.6377
51	37	S	k6398-10s 0.1/5 =50	2.1183
52	38	S	k6398-10sd 0.1/5 =50	2.1679
53	39	S	k6094-4s 0.5/5 =10	0.1187
54	40	S	k6094-4sd 0.5/5 =10	0.1560
55	0	B	Baseline	-0.0346
56	5	QC2	ccb-5	-0.0238
57	2	QC1	ccv-5	2.0720
58	41	S	k6094-4s 2.5/5 = 2	0.5134
59	42	S	k6094-4sd 2.5/5 =2	0.7400
60	43	S	k6634-1 0.1/5 =50	1.2532
61	44	S	k6634-1d 0.1/5 =50	1.2463
62	45	S	k6634-1 0.25/5 =20	3.2459
63	46	S	k6634-1d 0.25/5 =20	3.2588
64	47	S	rinse	-0.0023
65	48	S	k6094-4s	1.0544
66	49	S	k6094-4sd	1.4398
67	0	B	Baseline	-0.0346
68	5	QC2	ccb-6	-0.0231
69	2	QC1	ccv-6	2.0755
70	1	D	Drift	3.9543
71	0	B	Baseline	-0.0346
72	0	B	FinalBase	-0.0346

CORRECTIONS

Channel	:	2
Baseline	:	Yes
Drift	:	Yes
Carry over	:	Yes
%:		0.2

CV 8/3/07

* ... Sample offscale
\+ ... Result higher than sample limit
\- ... Result lower than sample limit
P ... Standard passed
F ... Standard failed
N ... Value not calculated or not used
R ... Resample after offscale
M ... Peak marker moved manually
D ... Diluted sample

** <END OF REPORT> **

Conclusion

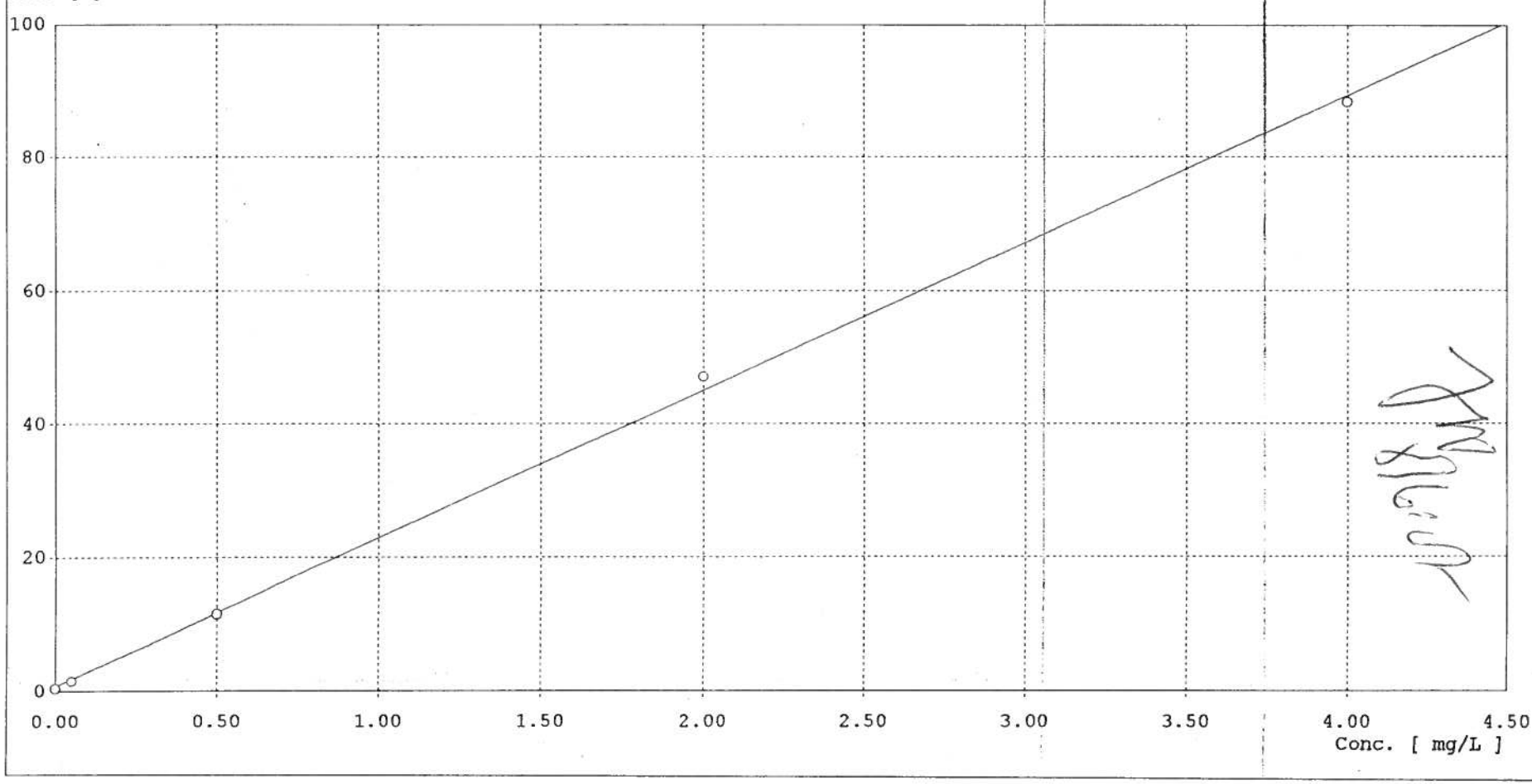
Columbia Analytical Services

Calibration Curve

Name of run :070803G.RUN
Comment :EPA 350.1

Name of analysis :Ammonia.ANL

Channel :2
Method :Ammonia
Curve fit :linear a=-2.3881E-001 b=6.8933E-005
Corr. coeff. :0.9995



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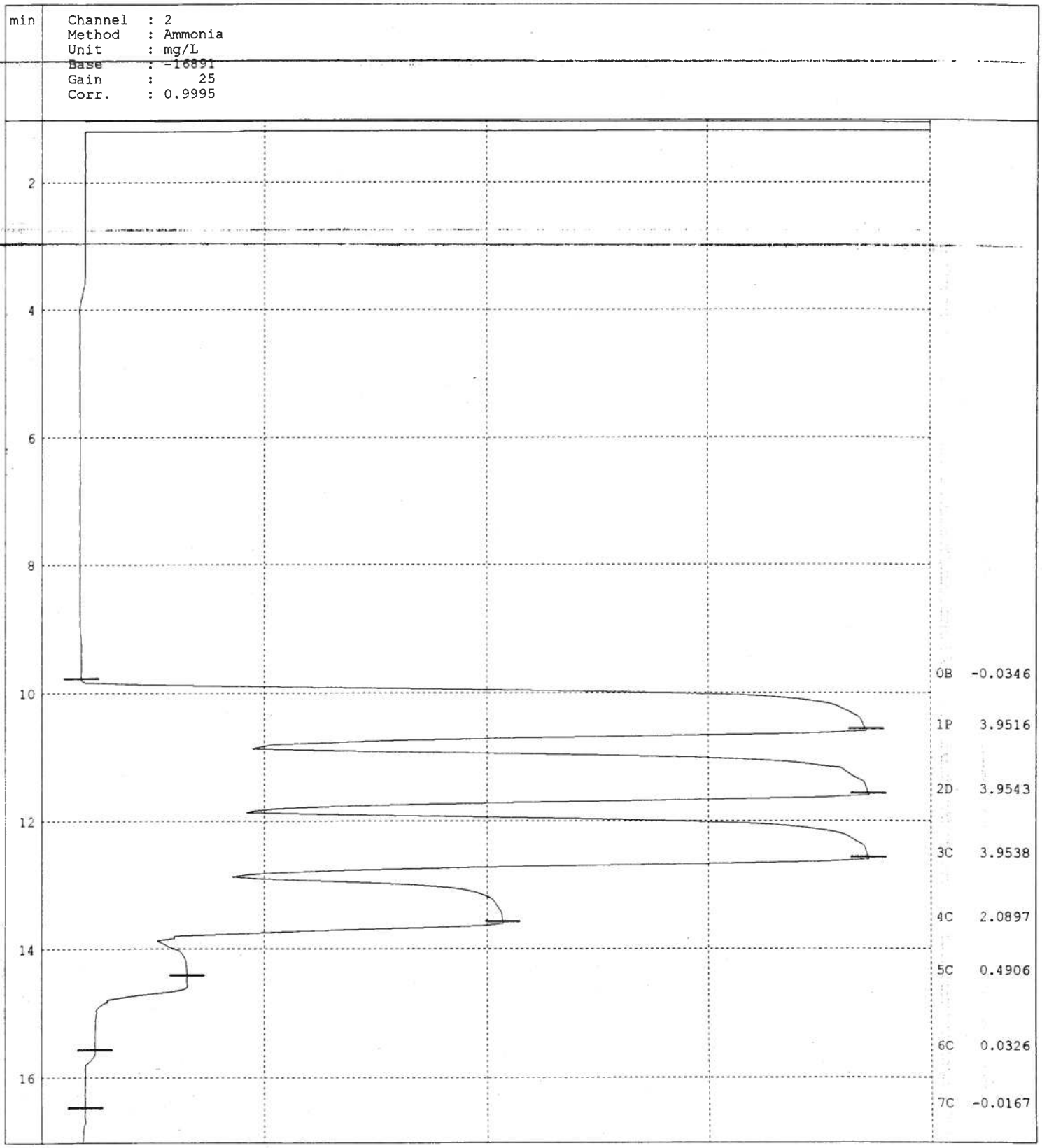
CV 8/3/04

Columbia Analytical Services

Post-run chart

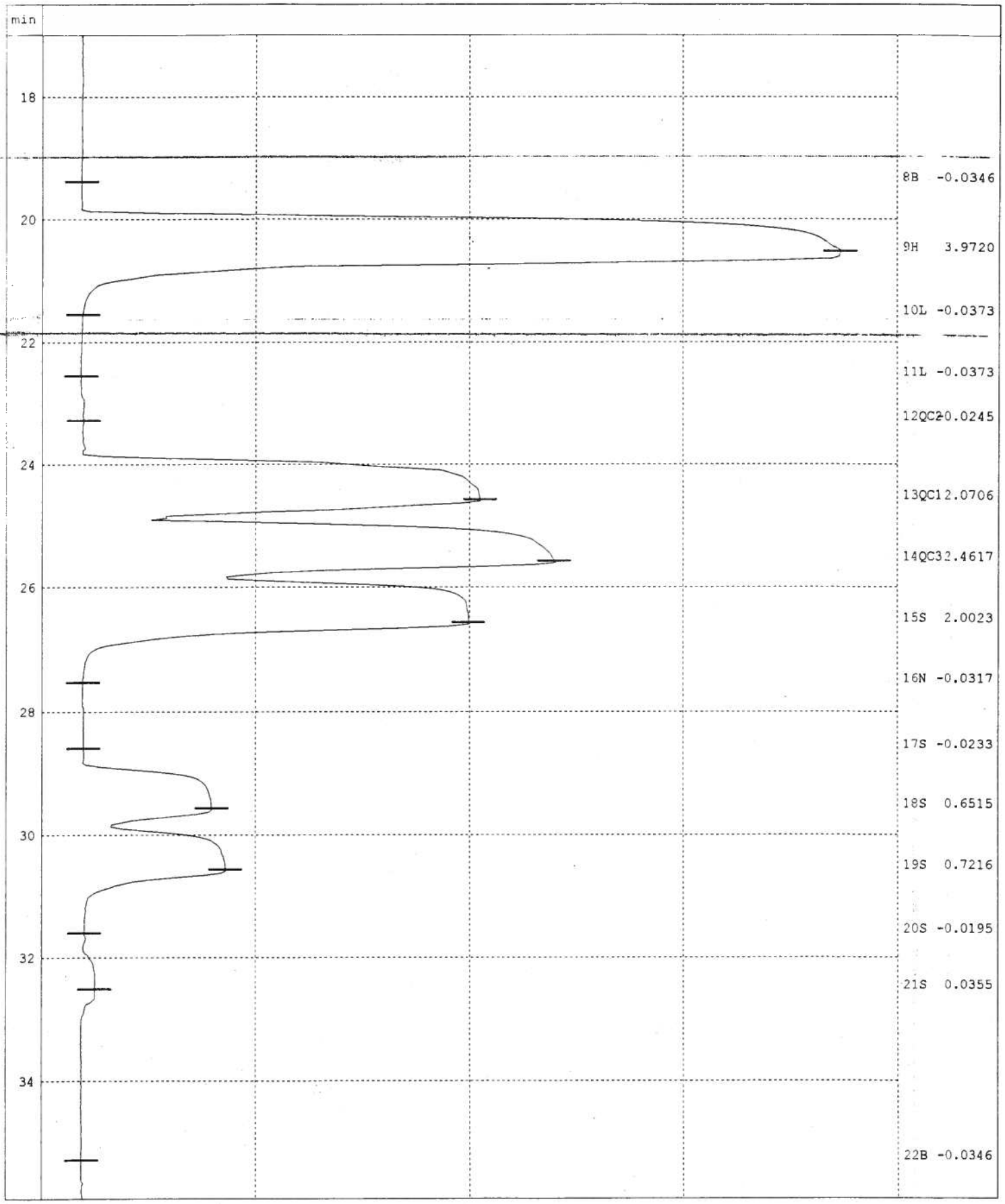
Name of run :070803G.RUN
Comment :EPA 350.1

Name of analysis :Ammonia.ANL

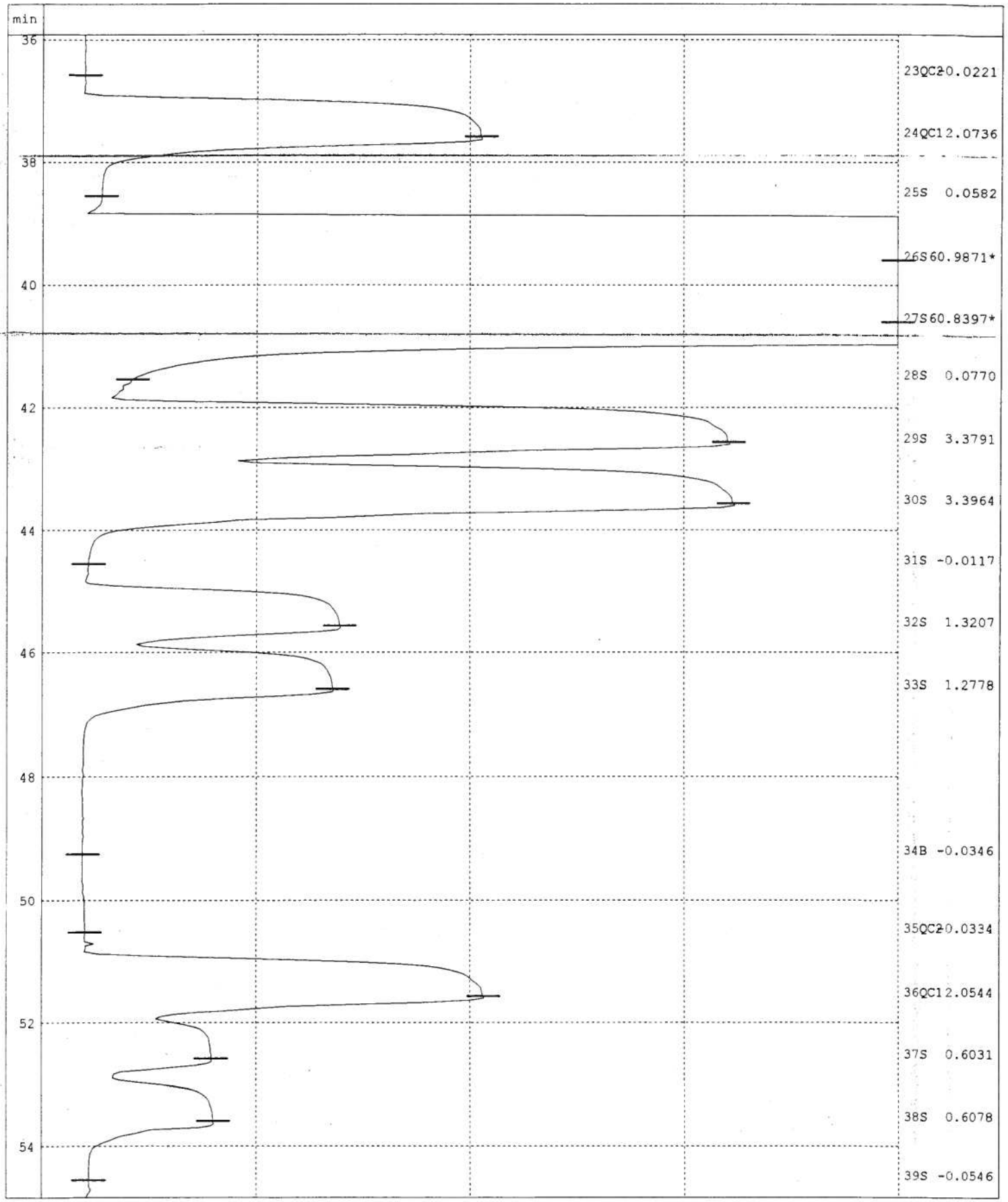


Name of run :070803G.RUN
Comment :EPA 350.1

Name of analysis :Ammonia.ANL



Name of run :070803G.RUN Name of analysis :Ammonia.ANL
Comment :EPA 350.1



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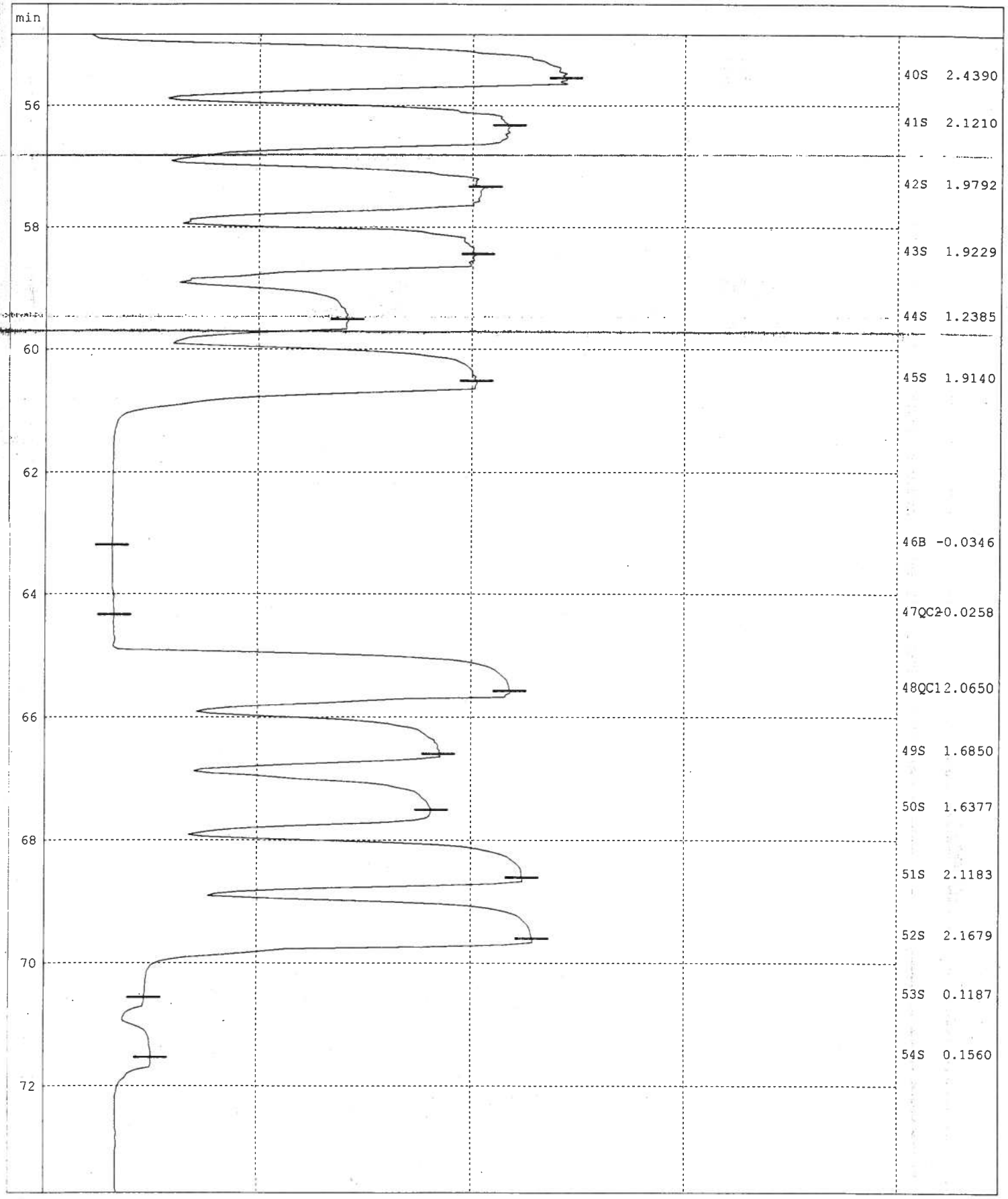
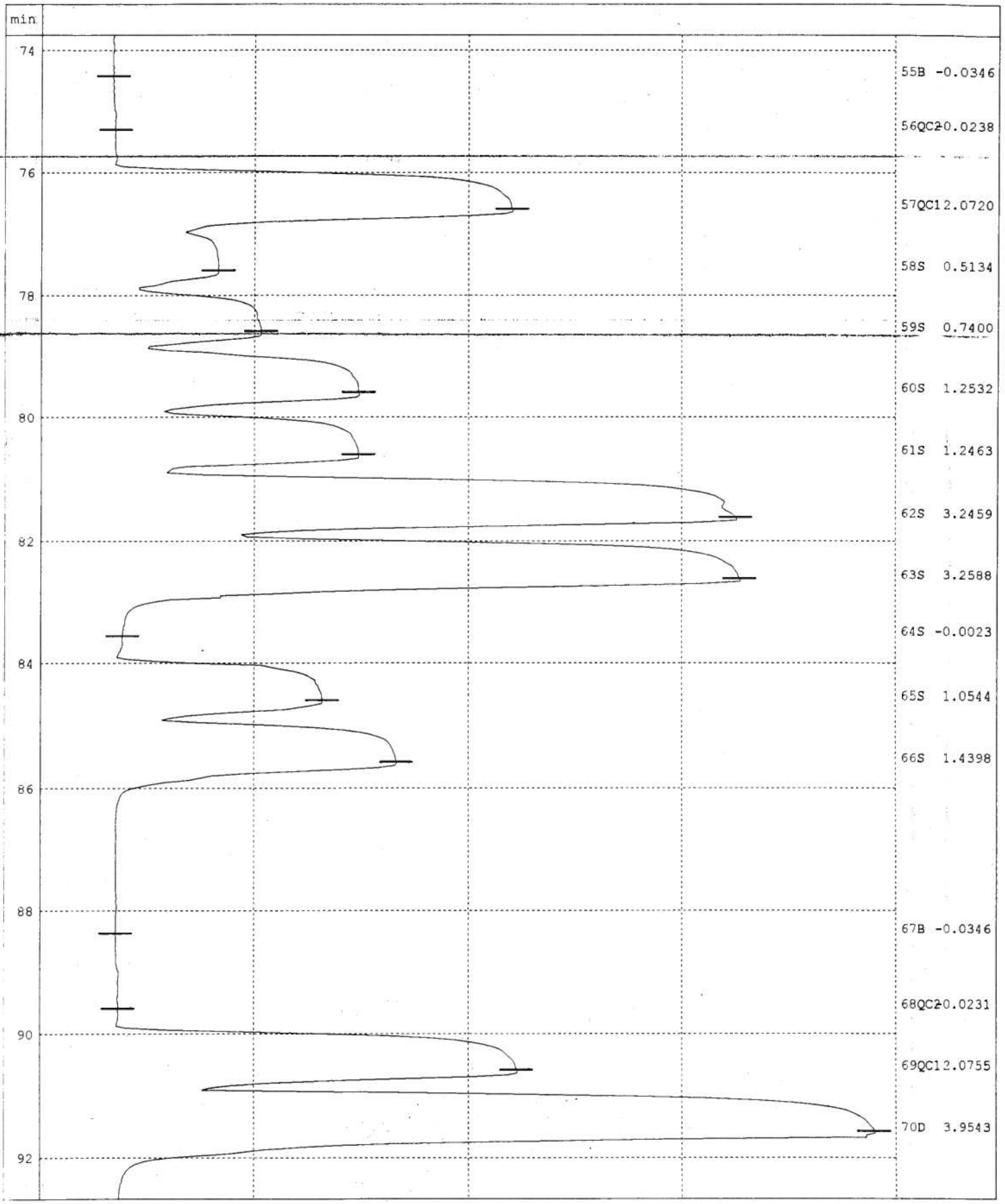
Comment :EPA 350.1

Name of analysis :Ammonia.ANL



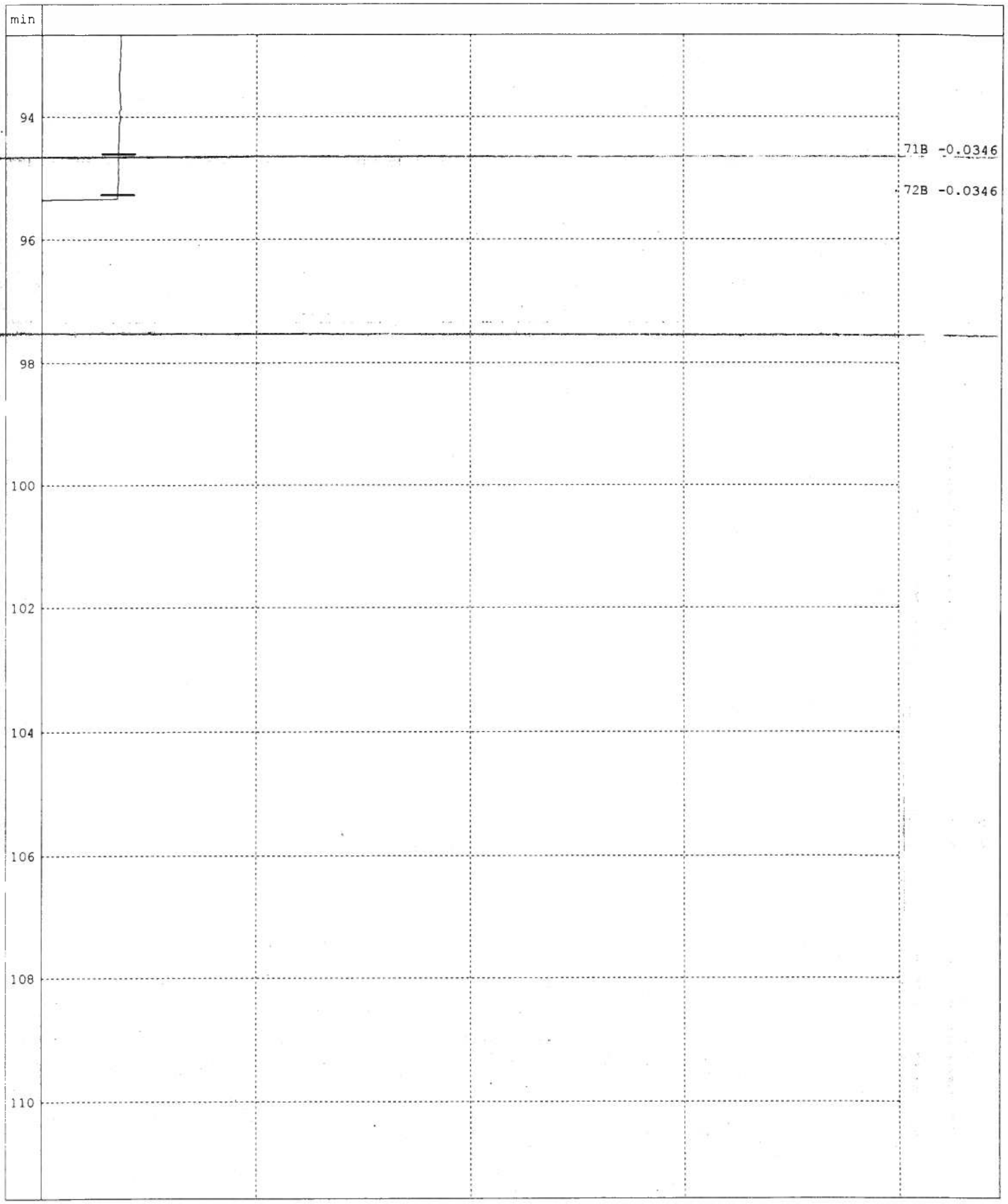
Name of run :070803G.RUN
Comment :EPA 350.1

Name of analysis :Ammonia.ANL



Name of run :070803G.RUN
Comment :EPA 350.1

Name of analysis :Ammonia.ANL



90251

Work Request # (~~K6314~~ Original K6314) ① K6398

Tier: III III

Date Analyzed: 7/25/07

Analyst: EM / BL

Analysis: Sulfide 9030M

DATA QUALITY REPORT
INORGANICS

Explain any "no" responses to questions below, and any corrective actions in the comments section below.

1.	Is the method name and number correct and appropriate?		yes/no/NA
2.	Holding times met for all analyses and for all samples?		yes/no/NA
3.	Are calculations correct?		yes/no/NA
4.	Is the reporting basis correct? (Dry Weight)		yes/no/NA
5.	All quality control criteria met?		yes/no/NA
	a.	Is the calibration curve correlation coefficient ≥ 0.995?	yes/no/NA
	b.	MBs, CCVs, CCBs, LCSs, Dups, and Spikes, analyzed at proper frequency?	yes/no/NA
	c.	Are ICVs, CCVs, and CCBs all within acceptance limits?	yes/no/NA
	d.	Are results for methods blanks all ND?	yes/no/NA
	e.	Are all QC samples within acceptance criteria? (LCS % rec, MS/DMS % rec, DUP or MS/DMS RPDs, etc.)	yes/no/NA
	f.	Are all exceptions explained?	yes/no/NA
6.	Are all service requests that apply attached?		yes/no/NA
7.	Are all samples labelled correctly?		yes/no/NA
8.	Have all instructions on the service request been followed? (e.g. Special MRLs, QC on a specific sample)		yes/no/NA
9.	Are detection limits and units reported correctly?		yes/no/NA
10.	Are proper Analysis/Extraction stickers included on report?		yes/no/NA
11.	Is the unused space on the benchsheet crossed out?		yes/no/NA
12.	Was analysis turned in by the due date? (n-2) (If not record SR#)		yes/no/NA

COMMENTS:

High RSD (84%) Rerun ~~83~~ EM 7/27/07 K6314-8 for confirmation as per PC. OK to batch K6398 w/ K6314.

Final Approved by: [signature] Date: 7/31/07

DQREPORT

① EM 7/27/07

COLUMBIA ANALYTICAL SERVICES, INC.

Work Order #. K6167 Method: 9030M

Analysis: Analysis for Total Sulfide

	STD1	STD 2	STD 3	STD 4	STD 5	STD 6	STD 7					
Conc. (mg/L)	0.000	0.039	0.394	0.788	1.181	1.575	1.969				(R) =	0.9994
Absorbance	0.000	0.029	0.243	0.460	0.699	0.910	1.101				Slope =	0.5640
											Y Int. =	0.0127

Date Prep'd	Sample #	Dil. Factor	Absorb. @ 670 nm	Conc. from Curve (mg/L)	Actual Conc. (mg/L)	Initial Wt./Vol. (g) / (ml)	Final Vol. (ml)	A Tower mg/L (solution)	B Tower mg/L (solution)	A & B mg/L - mg/kg as rec'd	% Solid	mg/kg Dry Wt.
7/16/2007	ICV	1	0.981	1.7170	1.7170	40	40	1.72		1.72		
7/16/2007	ICB	1	0.002	-0.0189	<0.05	40	40	<0.02		<0.02		
7/16/2007	CCV1	1	0.898	1.5698	1.5698	40	40	1.57		1.57		
7/16/2007	CCB1	1	0.002	-0.0189	<0.05	40	40	<0.02		<0.02		
7/16/2007	MB1	1	0.009	-0.0065	<0.05	10.020	40	<0.2	-0.07	<0.2		
7/16/2007	LCS1	1	0.948	1.6585	1.6585	10.137	40	6.54	0.11	6.7		
7/25/2007	K6314-8	20	0.188	0.3109	6.2181	10.470	40	23.76	-0.07	23.76	63.9	37.2
7/25/2007	K6314-8D	20	0.309	0.5255	10.5090	10.655	40	39.45	0.04	39.45	63.9	61.7
7/25/2007	K6314-8T	50	0.352	0.6017	30.0848	10.056	40	119.67	0.01	119.67	63.9	187
7/25/2007	K6314-8MS	200	0.333	0.5680	113.6014	10.344	40	439.29	0.09	439.39	63.9	688
7/25/2007	K6314-8MSD	200	0.314	0.5343	106.8635	10.179	40	419.94	0.05	419.99	63.9	657
7/25/2007	K6314-9	1	0.287	0.4864	0.4864	11.100	40	1.75	0.07	1.83	74.7	2.4
7/25/2007	K6314-10	50	0.525	0.9084	45.4224	11.701	40	155.28	-0.03	155.28	45.8	339
7/25/2007	K6398-4	1	0.040	0.0485	<0.05	11.727	40	<0.05	-0.05	<0.05	43.7	<0.5 ~~0.38~~ 0.871
7/25/2007	CCV2	1	0.903	1.5787	1.5787	40	40	1.58		1.58		
7/25/2007	CCB2	1	0.003	-0.0171	<0.05	40.000	40	<0.02		<0.02		
7/25/2007	K6398-5	1	0.169	0.2772	0.2772	10.132	40	1.09	-0.06	1.09	49.5	2.2
7/25/2007	K6398-6	10	0.399	0.6850	6.8503	10.374	40	26.41	-0.04	26.41	52.6	50.2
7/25/2007	K6398-7	1	0.755	1.3163	1.3163	10.044	40	5.24	0.02	5.24	52.0	10.1
7/25/2007	K6398-8	1	0.652	1.1336	1.1336	11.204	40	4.05	-0.01	4.05	55.1	7.3
7/25/2007	K6398-9	10	0.334	0.5698	5.6978	10.590	40	21.52	-0.02	21.52	48.4	44.5
7/25/2007	K6398-10	1	0.188	0.3109	0.3109	10.240	40	1.21	-0.05	1.21	51.6	2.4
7/25/2007	CCV3	1	0.896	1.5663	1.5663	40.000	40	1.57		1.57		
7/25/2007	CCB3	1	0.002	-0.0189	<0.05	40.000	40	<0.02		<0.02		
7/25/2007	CCV4	1	0.890	1.5556	1.5556	40	40	1.56		1.56		

CCV =2ml*31.5mg/l/40ml=1.58mg/l %REC = 99, 100, 99, 99, 99

LCS =2ml*31.5mg/l/10.137g = 6.2mg/kg %REC = 108

ICV = 2.25ml*31.5mg/L/40ml = 1.77mg/L %REC = 97 s d +

MS = 1ml*3150mg/L/10.344g/0.639g = 477mg/kg %REC = 136 131 105 K6314-1/1D/1T X=95.3mg/Kg RSD = 84

MSD = 1ml*3150mg/L/10.179g/0.639g = 484mg/kg %REC = 128 123 97

STD ID# s2/2-1-H CONC. = 3230mg/L

Distilled by: EL	Date Distilled:07/19/07 9:00
Analyzed By: EM	Date Analyzed:07/19/07
Reviewed By:	Date Reviewed: 7/31/07

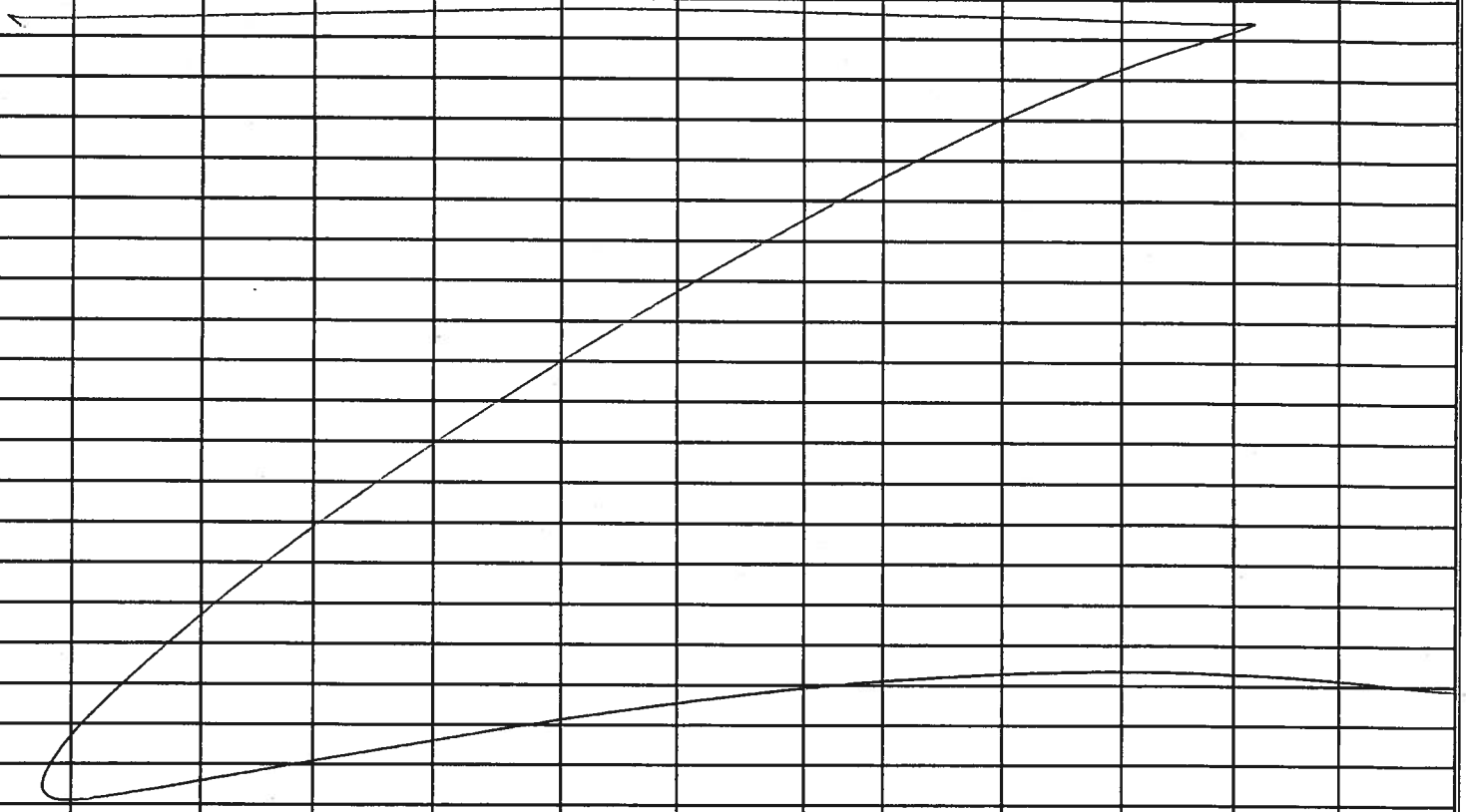
COLUMBIA ANALYTICAL SERVICES, INC.

Work Order #.: K6167 Method: 9030M

Analysis: Analysis for Total Sulfide

	STD1	STD 2	STD 3	STD 4	STD 5	STD 6	STD 7				(R) =	0.9994
Conc. (mg/L)	0.000	0.039	0.394	0.788	1.181	1.575	1.969				Slope =	0.5640
Absorbance	0.000	0.029	0.243	0.460	0.699	0.910	1.101				Y Int. =	0.0127

Date Prep'd	Sample #	Dil. Factor	Absorb. @ 670 nm	Conc. from Curve (mg/L)	Actual Conc. (mg/L)	Initial Wt./Vol. (g) / (ml)	Final Vol. (ml)	A Tower mg/L (solution)	B Tower mg/L (solution)	A & B mg/L - mg/kg as rec'd	% Solid	mg/kg Dry Wt.
7/25/2007	CCB4	1	0.003	-0.0171	<0.05	40	40	0.02		0.02		
7/25/2007	CCV5	1	0.890	1.5556	1.5556	40	40	1.56		1.56		
7/25/2007	CCB5	1	0.003	-0.0171	<0.05	40	40	0.02		<0.02		



Distilled by: EL		Date Distilled:07/19/07
Analyzed By: EM		Date Analyzed:07/19/07
Reviewed By:		Date Reviewed: 7/31/07

Work Order #.: K6314, K6398 Method: 9030M

Analysis: Analysis for Total Sulfide

Prep Date : 7/25/2007

	STD1	STD 2	STD 3	STD 4	STD 5	STD 6	STD 7					
Conc. (mg/L)	0.000	0.039	0.394	0.788	1.181	1.575	1.969					
Absorbance	0.000	0.029	0.243	0.460	0.699	0.910	1.101					

Sample Name Lab Code	Initial Wt./Vol. (g) or (ml)	Dilution Factor	Abs of A tower @ 670 nm	Abs of B tower @ 670 nm	% Solids
ICV	40	1	0.981		
ICB	40	1	0.002		
CCV1	40	1	0.898		
CCB1	40	1	0.002		
MB1	10.020	1	0.009	0.003	
LCS1	10.137	1	0.948	0.028	
K6314-8	10.47	20	0.188	0.003	63.9
K6314-8D	10.655	20	0.309	0.019	63.9
K6314-8T	10.056	50	0.352	0.014	63.9
K6314-8MS	10.344	200	0.333	0.026	63.9
K6314-8MSD	10.179	200	0.314	0.020	63.9
K6314-9	11.1	1	0.287	0.024	74.7
K6314-10	11.701	50	0.525	0.007	45.8
K6398-4	11.727	1	0.040	0.005	43.7
CCV2	40	1	0.903		
CCB2	40	1	0.003		
K6398-5	10.132	1	0.169	0.004	49.5
K6398-6	10.374	10	0.399	0.007	52.6
K6398-7	10.044	1	0.755	0.016	52.0
K6398-8	11.204	1	0.652	0.011	55.1
K6398-9	10.59	10	0.334	0.010	48.4
K6398-10	10.24	1	0.188	0.005	51.6
CCV3	40	1	0.896		
CCB3	40	1	0.002		
CCV4	40	1	0.890		
CCB4	40	1	0.003		
CCV5	40	1	0.890		
CCB5	40	1	0.003		
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			

Sample Name Lab Code	Initial Wt./Vol. (g) or (ml)	Dilution Factor	Abs of A tower @ 670 nm	Abs of B tower @ 670 nm	% Solids
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
		1			
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		1			
		1			
		1			
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DM 7/27/07

7/31/07

DM 7/25/07

S/N: 0112U2001732 1.03
L-07 20:59:06 SCA Group 7119
ength: 670.0 nm
la: A=a+bC a: 0.0127 b: 0.5640

e	Net A	Dil X	mg/L	
	0.981	1.0000	1.72	ICV
	0.002	1.0000	-0.02	ICB
	0.898	1.0000	1.57	CCV1
	0.002	1.0000	-0.02	CCB1
	0.009	1.0000	-0.01	MB
	0.948	1.0000	1.66	LCS
	0.188	1.0000	0.31	K6314-8 (1/20)
	0.309	1.0000	0.53	-8d (1/20)
	0.352	1.0000	0.60	-8t (0.4/20)
	0.333	1.0000	0.57	-8ms (0.1/20)
	0.314	1.0000	0.53	-8msd (0.1/20)
	0.287	1.0000	0.49	-9
	0.525	1.0000	0.91	-10 (0.4/20)
	0.040	1.0000	0.05	K6398-4
	0.903	1.0000	1.58	CCV2
	0.003	1.0000	-0.02	CCB2
	0.169	1.0000	0.28	K6398-5
	0.399	1.0000	0.68	-6 (2/20)
	0.755	1.0000	1.32	-7
	0.652	1.0000	1.13	-8
	0.334	1.0000	0.57	-9 (2/20)
	0.188	1.0000	0.31	-10
	0.003	1.0000	-0.02	MB
	0.028	1.0000	0.03	LCS
	0.003	1.0000	-0.02	K6314-8
	0.019	1.0000	0.01	-8d
	0.896	1.0000	1.57	CCV3
	0.002	1.0000	-0.02	CCB3
	0.014	1.0000	0.00	K6314-8t
	0.026	1.0000	0.02	-8ms
	0.020	1.0000	0.01	-8msd
	0.024	1.0000	0.02	-9
	0.007	1.0000	-0.01	-10
	0.005	1.0000	-0.01	K6398-4
	0.004	1.0000	-0.02	-5
	0.007	1.0000	-0.01	-6
	0.016	1.0000	0.01	-7
	0.011	1.0000	-0.00	-8
	0.890	1.0000	1.56	CCV4
	0.003	1.0000	-0.02	~~CCB4~~ CCB4
	0.010	1.0000	-0.01	K6398-9
	0.005	1.0000	-0.01	-10
	0.890	1.0000	1.56	CCV5
	0.003	1.0000	-0.02	CCB5

DEM 7/24/07

DM 7/25/07

S/N: 0112U2001732 1.03
L-07 20:56:20 SCA
ength: 670.0 nm
la: A=a+bC a: 0.0127 b: 0.5640

Net A r2=0.999 Var=0.0003

0.0000	0.000
0.0390	0.029
0.3910	0.243
0.7880	0.460
1.1810	0.699
1.5750	0.910
1.9690	1.101

COLUMBIA ANALYTICAL SERVICES, INC.

Work Order #

Method: 9030M / AVS

Analysis: Analysis for Total Sulfide/AVS/Dissolved Sulfide

Date Prep'd	Sample #	Initial Wt./Vol. (g) or (ml)	Final Vol. (ml)	Actual Conc. (mg/L)	mg/L - mg/kg as rec'd	% Solid	mg/kg Dry Wt.
7/25/07	MB	10.020	40				
	LCS	10.137					
	6314-8	10.470					
	8d	10.655					
	8t	10.056					
	8ws	10.344					
	8wsd	10.179					
	9	11.100					
	10	11.701					
	6398-4	11.727					
	5	10.132					
	6	10.374					
	7	10.044					
	8	11.204					
	9	10.590					
	10	10.240					

LCS= %REC =

SPIKE= %REC =

SPIKE DUP.= %REC =

X = RPD =

STD ID# = CONC. =

Distilled by:	Date Distilled: 7/25/07
Analyzed By:	Date Analyzed: 7/25/07
Reviewed By:	Date Reviewed: 7/31/07

Metals

METALS

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client: Kleinfelder

Project No.: 53886

Project Name: Condit Dam

Service Request: K0706398

Sample No.	Lab Sample ID.
MC-071807	K0706398-001
MC-071807D	K0706398-001D
MC-071807S	K0706398-001S
BC-071807	K0706398-002
LBC-071807	K0706398-003
NW1-071807	K0706398-004
NW2-071807	K0706398-005
NW3-071807	K0706398-006
NW4-071807	K0706398-007
NW5-071807	K0706398-008
NW6-071807	K0706398-009
NW7-071807	K0706398-010
SP1-071707	K0706398-011
SP2-071707	K0706398-012
SP3-071707	K0706398-013
SP4-071707	K0706398-014
SP5-071707	K0706398-015
WR-071907	K0706398-016
LWS-071907	K0706398-017
Method Blank	K0706398-MB

Were ICP interelement corrections applied? Yes/No YES

Were ICP background corrections applied? Yes/No YES

If yes-were raw data generated before application of background corrections? Yes/No NO

Comments:

Signature: _____ Date: 2/9/07

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: MC-071807 Lab Code: K0706398-001

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.443		

% Solids: 33.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: BC-071807 Lab Code: K0706398-002

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.051		

% Solids: 19.1

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: LBC-071807 Lab Code: K0706398-003

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.067		

% Solids: 51.4

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: NW1-071807 Lab Code: K0706398-004

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.019	0.006	1	8/6/07	8/8/07	0.881		

% Solids: 43.7

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: NW2-071807 Lab Code: K0706398-005

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.019	0.006	1	8/6/07	8/8/07	0.774		

% Solids: 49.5

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: NW3-071807 Lab Code: K0706398-006

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.018	0.006	1	8/6/07	8/8/07	0.647		

% Solids: 52.6

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: NW4-071807 Lab Code: K0706398-007

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.019	0.006	1	8/6/07	8/8/07	0.832		

% Solids: 52.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: NW5-071807 Lab Code: K0706398-008

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.019	0.006	1	8/6/07	8/8/07	0.856		

% Solids: 55.1

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: NW6-071807 Lab Code: K0706398-009

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.019	0.006	1	8/6/07	8/8/07	0.105		

% Solids: 48.4

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/18/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: NW7-071807 Lab Code: K0706398-010

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.094		

% Solids: 51.6

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/17/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SP1-071707 Lab Code: K0706398-011

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.031		

% Solids: 73.2

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/17/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SP2-071707 Lab Code: K0706398-012

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.007	B	

% Solids: 27.1

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/17/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SP3-071707 Lab Code: K0706398-013

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.021		

% Solids: 58.0

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/17/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SP4-071707 Lab Code: K0706398-014

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.019	0.006	1	8/6/07	8/8/07	0.016	B	

% Solids: 75.3

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/17/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: SP5-071707 Lab Code: K0706398-015

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.019	0.006	1	8/6/07	8/8/07	0.720		

% Solids: 56.3

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/19/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: WR-071907 Lab Code: K0706398-016

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.054		

% Solids: 49.3

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	07/19/07
Project Name:	Condit Dam	Date Received:	07/20/07
Matrix:	SEDIMENT	Units:	MG/KG
		Basis:	Dry

Sample Name: LWS-071907 Lab Code: K0706398-017

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.014	B	

% Solids: 63.9

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Date Collected:	
Project Name:	Condit Dam	Date Received:	
Matrix:	SOIL	Units:	MG/KG
		Basis:	Dry

Sample Name: Method Blank Lab Code: K0706398-MB

Analyte	Analysis Method	MRL	MDL	Dil.	Date Extracted	Date Analyzed	Result	C	Q
Mercury	7471A	0.020	0.006	1	8/6/07	8/8/07	0.010	B	

% Solids: 100.0

Comments:

METALS
- 2a -
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

ICV Source: Inorganic Ventures

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Mercury	5.0	5.14	103	5.0	5.13	103	5.05	101	7471A

METALS
- 2a -
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Mercury				5.0	5.25	105	5.38	108	7471A

METALS
- 2a -
INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

ICV Source:

CCV Source: Various

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					Method
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Mercury				5.0	5.22	104			7471A

METALS

- 2b -

CRDL STANDARD FOR AA AND ICP

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
				Initial			Final	
	True	Found	%R	True	Found	%R	Found	%R
Mercury	0.20	0.190	95					

METALS
- 3 -
BLANKS

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C		Preparation Blank	C		Method
Mercury	0.060	U	0.060	U	0.06	U	0.060	U					7471A

METALS
- 3 -
BLANKS

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L) 1	C	2	C	3	C	Preparation Blank	C	Method
Mercury			0.060	U	0.06	U					7471A

METALS

- 5a -

SPIKE SAMPLE RECOVERY

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Units:	mg/kg
Project Name:	Condit Dam	Basis:	Dry
Matrix:	SEDIMENT	% Solids:	33.0

Sample Name: MC-071807S Lab Code: K0706398-001S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Mercury	60 - 123	0.897		0.443		0.502	91		7471A

An empty field in the Control Limit column indicates the control limit is not applicabl

METALS

- 6 -

DUPLICATES

Client:	Kleinfelder	Service Request:	K0706398
Project No.:	53886	Units:	mg/kg
Project Name:	Condit Dam	Basis:	Dry
Matrix:	SEDIMENT	% Solids:	33.0

Sample Name: MC-071807D Lab Code: K0706398-001D

Analyte	Control Limit(%)	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Mercury	30	0.443		0.459		4		7471A

An empty field in the Control Limit column indicates the control limit is not applicabl

METALS

- 7 -

LABORATORY CONTROL SAMPLE

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

Aqueous LCS Source: Inorganic Ventures

Solid LCS Source: ERA Lot #D045540

Analyte	Aqueous mg/L			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits (%)	%R
Mercury				1.77	1.58		75.0 118	89

METALS
- 9 -
ICP SERIAL DILUTIONS

Client: Kleinfelder
Project No.: 53886
Project Name: Condit Dam

Service Request: K0706398
Units: ug/L

Sample Name: MC-071807L
Lab Code: K0706398-001L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Difference	Q	Method
Mercury	4.41		4.80		9		7471A

METALS

-10-

METHOD DETECTION LIMITS

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

ICP/ICP-MS ID #:

GFAA ID #:

AA ID #: CETAC-1

Analyte	Wave-length	Back-ground	MRL (ug/L)	MDL (ug/L)	Method
Mercury	253.70	BD	0.200	0.060	7471A

Comments:

METALS
- 13 -
PREPARATION LOG

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

Method: CV

Lab Code	Preparation Date	Preparation Method	Initial (mL or grams)	Final Volume (mL)
K0706398-002	8/6/07	METHOD	5.24	100
K0706398-003	8/6/07	METHOD	1.99	100
LCSS	8/6/07	METHOD	0.501	100
K0706398-017	8/6/07	METHOD	1.59	100
K0706398-001	8/6/07	METHOD	3.02	100
K0706398-001D	8/6/07	METHOD	3.02	100
K0706398-001S	8/6/07	METHOD	3.02	100
K0706398-MB	8/6/07	METHOD	1.00	100
K0706398-004	8/6/07	METHOD	2.41	100
K0706398-005	8/6/07	METHOD	2.14	100
K0706398-006	8/6/07	METHOD	2.07	100
K0706398-007	8/6/07	METHOD	1.99	100
K0706398-008	8/6/07	METHOD	1.87	100
K0706398-009	8/6/07	METHOD	2.17	100
K0706398-010	8/6/07	METHOD	1.95	100
K0706398-011	8/6/07	METHOD	1.40	100
K0706398-012	8/6/07	METHOD	3.71	100
K0706398-013	8/6/07	METHOD	1.73	100
K0706398-014	8/6/07	METHOD	1.42	100
K0706398-015	8/6/07	METHOD	1.87	100
K0706398-016	8/6/07	METHOD	2.07	100

METALS
- 14 -
ANALYSIS RUN LOG

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

Instrument ID Number: CETAC-1

Method: CV

Start Date: 8/8/07

End Date: 8/8/07

Sample ID.	D/F	Time	% R	Analytes																										
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
CALIBRATION ZERO	1.00	10:40																X									
STANDARD #1	1.00	10:42																X									
STANDARD #2	1.00	10:44																X									
STANDARD #3	1.00	10:46																X									
STANDARD #4	1.00	10:47																X									
STANDARD #5	1.00	10:49																X									
ICV	1.00	10:51																X									
ICB	1.00	10:53																X									
CCV1	1.00	10:55																X									
CCB1	1.00	10:56																X									
CRA	1.00	10:58																X									
ZZZZZZ	1.00	11:00																									
ZZZZZZ	1.00	11:02																									
ZZZZZZ	1.00	11:04																									
ZZZZZZ	1.00	11:06																									
ZZZZZZ	1.00	11:08																									
ZZZZZZ	1.00	11:10																									
ZZZZZZ	1.00	11:11																									
ZZZZZZ	1.00	11:13																									
ZZZZZZ	1.00	11:15																									
CCV2	1.00	11:17																X									
CCB2	1.00	11:19																X									
ZZZZZZ	1.00	11:27																									
ZZZZZZ	1.00	11:29																									
ZZZZZZ	1.00	11:30																									
ZZZZZZ	5.00	11:33																									
K0706398-MB	1.00	11:44																X									
LCSS	1.00	11:46																X									
K0706398-001	1.00	11:48																X									
K0706398-001D	1.00	11:50																X									

* - Denotes additional elements (other than the standard elements) are represented on another Form 14

METALS
- 14 -
ANALYSIS RUN LOG

Client: Kleinfelder

Service Request: K0706398

Project No.: 53886

Project Name: Condit Dam

Instrument ID Number: CETAC-1

Method: CV

Start Date: 8/8/07

End Date: 8/8/07

Sample ID.	D/F	Time	% R	Analytes																										
				AL	SB	AS	BA	BE	CD	CA	CR	CO	CU	FE	PB	MG	MN	HG	NI	K	SE	AG	NA	TL	V	ZN	CN
K0706398-001S	1.00	11:51																X									
K0706398-001L	5.00	11:56																X									
CCV3	1.00	11:58																X									
CCB3	1.00	12:00																X									
K0706398-002	1.00	12:02																X									
K0706398-003	1.00	12:04																X									
K0706398-004	1.00	12:05																X									
K0706398-005	1.00	12:08																X									
K0706398-006	1.00	12:11																X									
K0706398-007	1.00	12:12																X									
K0706398-008	1.00	12:15																X									
K0706398-009	1.00	12:18																X									
K0706398-010	1.00	12:19																X									
K0706398-011	1.00	12:21																X									
CCV4	1.00	12:23																X									
CCB4	1.00	12:25																X									
K0706398-012	1.00	12:27																X									
K0706398-013	1.00	12:28																X									
K0706398-014	1.00	12:30																X									
K0706398-015	1.00	12:32																X									
K0706398-016	1.00	12:34																X									
K0706398-017	1.00	12:36																X									
CCV5	1.00	12:51																X									
CCB5	1.00	12:53																X									

* - Denotes additional elements (other than the standard elements) are represented on another Form 14

Atomic Absorption Data Review Form

Element: Hg

Analysis Lot #: 91107

Cal. STD/CCV Source: HGI-61-J

Service Request Numbers:

K6438 K6397 K6398

	Yes	No	NA
1) Appropriate standardization completed	✓		
2) ICV within 10% of true value	✓		
3) CCVs in control	✓		
4) CCBs and or ICBs below MRL	✓		
5) All reported samples within calibration range	✓		
6) Calculations correct	✓		

Comments:

Rush

Primary Reviewed By: SPatterson Date: 8-8-07

Secondary Reviewed By: Emm Date: 8/8/07

COLUMBIA ANALYTICAL SERVICES, INC. PRINTOUT WITH:_____
ANALYTICAL WORKSHEET

Method: (Circle One) 7470A (7471A) 245.1	Service Request # :
Analysis For: Hg	

DATA

Pos.	SAMPLE NUMBER	Initial Sample (g) or (mL)	Initial Dilution (mL)	Dilution Factor	(µg/L) Measured	Sample Actual (mg/kg)	Sample Actual (µg/L)	
1	ICV	—	—	—	5.14		103%	
2	ICB	—	—	—	-0.01		<0.2	
3	CCV1	—	—	—	5.13		103%	
4	CCB1	—	—	—	-0.00		<0.2	
5	CRA	—	—	—	0.19		0.19	95%
6	PBS (53020)	—	100ml	—	0.01		<0.2	
7	LCSS ↓	0.515	↓	—	8.58	1.67		94%
8	K0706438-001	1.020		—	-0.00 (0.00)	<0.02		X̄=NC
9	-001d	1.019		—	-0.01 (-0.02)	<0.02		RPD=
10	↓ -001s	1.070		—	2.13 (3.61)	0.34		72%
11	K0706397-001	1.061		—	0.40	0.04		X̄=0.04
12	-001d	1.036		—	0.47	0.05		RPD=20
13	-001s	1.323		—	4.85	0.37		89%
14	↓ -002	1.040	↓	—	1.85	0.18		
15	CCV2	—	—	—	5.05		101%	
16	CCB2	—	—	—	-0.00		<0.2	
17	K0706438-001A	—	100ml	—	1.01	51%		
18	-001dA	—	↓	—	1.17	59%		
19	↓ -001SA	—		—	3.30	59%		
20	K0706397-002L	—		1/5	0.39	(5%)		
21	PBS (53019)	—		—	0.10		<0.2	
22	LCSS ↓	0.501		—	7.91	1.58		89%
23	K0706398-001	0.997		—	4.41	0.44		X̄=0.45
24	-001d	0.997		—	4.57	0.46		RPD=4%
25	↓ -001s	0.997	↓	—	8.94	0.90		92%

Comments: Reporting Levels:

Waters - 0.2 µg/L	TIME STARTED:
Soil - 0.02 mg/kg	8-8-07
TCLP - 1 µg/L	K6438-001S @ ~~0.48~~ 0.47 mg/kg
Water Spike Level : 1.0 µg/L	K6397-001S @ 0.38 mg/kg
Soil Spike Level : 5.0 µg/L =	mg/kg
TCLP Spike Level : 5.0 µg/L	K6398-001S @ 0.50 mg/kg

Analyst:	Date:	Page Number:
J Patterson	8-8-07	1 of 2

[HGFORM] HG1.XLS

COLUMBIA ANALYTICAL SERVICES, INC.
ANALYTICAL WORKSHEET

PRINTOUT WITH: _____

Method: (Circle One) 7470A (7471A) 245.1	Service Request # :
Analysis For: Hg	

DATA

Pos.	SAMPLE NUMBER	Initial Sample (g) or (mL)	Initial Dilution (mL)	Dilution Factor	(µg/L) Measured	Sample Actual (mg/kg)	Sample Actual (µg/L)
26	K0706398-001L	—	100ml	1/5	0.96	(96)	
27	CCV3	—	—	—	5.25		105%
28	CCB3	—	—	—	-0.01		<0.2
29	K0706398-002	1.001	100ml	—	0.51	0.05	
30	-003	1.023		—	0.68	0.07	
31	-004	1.053		—	9.28	0.88	
32	-005	1.059		—	8.20	0.77	
33	-006	1.089		—	7.05	0.65	
34	-007	1.035		—	8.61	0.83	
35	-008	1.030		—	8.82	0.86	
36	-009	1.050		—	1.10	0.10	
37	-010	1.006		—	0.95	0.09	
38	-011	1.032		—	0.32	0.03	
39	CCV4	—	—	—	5.38		108%
40	CCB4	—	—	—	0.00		<0.2
41	K0706398-012	1.005	100ml	—	0.07	<0.02	
42	-013	1.003		—	0.21	0.02	
43	-014	1.069		—	0.17	<0.02	
44	-015	1.053		—	7.58	0.72	
45	-016	1.021		—	0.55	0.05	
46	-017	1.016		—	0.14	<0.02	
47	CCV5	—	—	—	5.22		104%
48	CCB5	—	—	—	-0.02		<0.2
49							
50							

988807

Comments: Reporting Levels:

Waters - 0.2 µg/L
Soil - 0.02 mg/kg
TCLP - 1 µg/L

Water Spike Level : 1.0 µg/L
Soil Spike Level : 5.0 µg/L = mg/kg
TCLP Spike Level : 5.0 µg/L

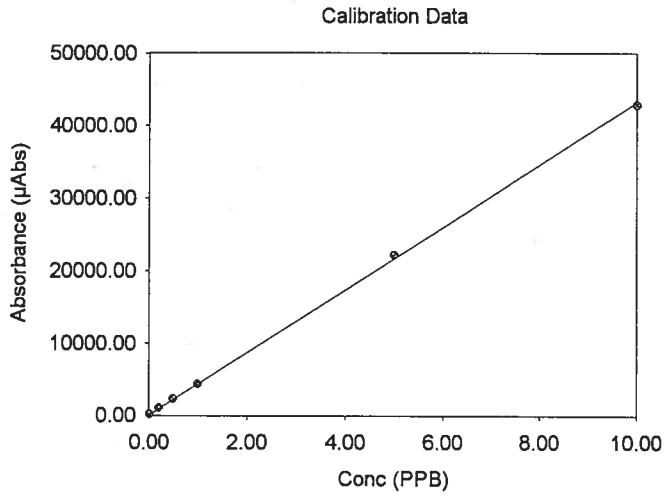
Analyst:	Date:	Page Number:
LPatterson	8-8-07	2 of 2

[HGFORM] HG2.XLS

CETAC Hg Analysis Report - 07080800.DB - Wednesday, August 08, 2007, 1:10:18 PM

Analyst S. Patterson
Date Started Wednesday, August 08, 2007, 10:40:52
Worksheet Hg 08/08/07 Run 1
Comment 91107

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
Calibration Zero	08-Aug-2007, 10:40	0.00	7.35	212.00	223	228	202	196	
Standard #1	08-Aug-2007, 10:42	0.20	1.93	1120.00	1089	1120	1137	1132	
Standard #2	08-Aug-2007, 10:44	0.50	1.52	2370.00	2392	2376	2321	2402	
Standard #3	08-Aug-2007, 10:46	1.00	0.80	4380.00	4349	4361	4383	4428	
Standard #4	08-Aug-2007, 10:47	5.00	1.44	22200.00	22582	22301	22104	21823	
Standard #5	08-Aug-2007, 10:49	10.00	0.22	43000.00	42875	42893	43023	43062	



Int.	0.000
Slope	4326.849
Correlation	0.99981

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
ICV	08-Aug-2007, 10:51	5.14	0.21	22300.00	22184	22279	22287	22260	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
ICB	08-Aug-2007, 10:53	-0.01	22.40	-45.80	-56	-38	-36	-54	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCV1	08-Aug-2007, 10:55	5.13	2.23	22200.00	21534	22081	22496	22636	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCB1	08-Aug-2007, 10:56	-0.00	293.00	-10.20	-7	-53	8	12	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CRA	08-Aug-2007, 10:58	0.19	1.99	841.00	819	842	844	860	
PBS (53020)	08-Aug-2007, 11:00	0.01	17.60	29.10	24	33	34	26	
LCSS (53020)	08-Aug-2007, 11:02	8.58	1.09	37100.00	37374	37427	37171	36543	
K0706438-001	08-Aug-2007, 11:04	-0.00	88.30	-12.40	-16	-19	-19	4	
K0706438-001D	08-Aug-2007, 11:06	-0.01	17.90	-48.10	-54	-49	-53	-36	
K0706438-001S	08-Aug-2007, 11:08	2.13	3.56	9240.00	8748	9376	9364	9460	
K0706397-001	08-Aug-2007, 11:10	0.40	2.55	1720.00	1669	1727	1694	1771	
K0706397-001D	08-Aug-2007, 11:11	0.47	1.01	2020.00	1997	2002	2019	2042	
K0706397-001S	08-Aug-2007, 11:13	4.85	0.46	21000.00	20842	20960	21038	21052	
K0706397-002	08-Aug-2007, 11:15	1.85	0.68	8020.00	7960	8001	8079	8058	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCV2	08-Aug-2007, 11:17	5.05	0.52	21800.00	21675	21867	21910	21914	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCB2	08-Aug-2007, 11:19	-0.00	95.40	-17.50	-30	-21	7	-26	

CETAC Hg Analysis Report - 07080800.DB - Wednesday, August 08, 2007, 1:10:19 PM

Analyst S. Patterson
Date Started Wednesday, August 08, 2007, 11:27:15
Worksheet Hg 08/08/07 Run 1
Comment 91107

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
K0706438-001A	08-Aug-2007, 11:27	1.01	1.00	4360.00	4311	4395	4395	4330	
K0706438-001DA	08-Aug-2007, 11:29	1.17	1.90	5040.00	4904	5057	5086	5121	
K0706438-001SA	08-Aug-2007, 11:30	3.30	7.78	14300.00	13163	14557	15680	13641	
K0706397-002L	08-Aug-2007, 11:33	0.39	0.95	1680.00	1660	1697	1691	1683	
PBS (53019)	08-Aug-2007, 11:44	0.10	1.62	418.00	415	410	423	423	
LCSS (53019)	08-Aug-2007, 11:46	7.91	1.05	34200.00	33712	34169	34441	34499	
K0706398-001	08-Aug-2007, 11:48	4.41	0.56	19100.00	18944	19128	19195	19125	
K0706398-001D	08-Aug-2007, 11:50	4.57	0.51	19800.00	19648	19819	19889	19805	
K0706398-001S	08-Aug-2007, 11:51	8.94	0.50	38700.00	38404	38789	38819	38740	
K0706398-001L	08-Aug-2007, 11:56	0.96	1.29	4160.00	4094	4187	4217	4144	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCV3	08-Aug-2007, 11:58	5.25	1.25	22700.00	22423	22546	22795	23067	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCB3	08-Aug-2007, 12:00	-0.01	54.00	-23.10	-33	-33	-18	-8	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
K0706398-002	08-Aug-2007, 12:02	0.51	6.62	2220.00	2187	2427	2156	2091	
K0706398-003	08-Aug-2007, 12:04	0.68	0.94	2940.00	2902	2928	2964	2953	
K0706398-004	08-Aug-2007, 12:05	9.28	0.41	40200.00	39925	40135	40301	40246	
K0706398-005	08-Aug-2007, 12:08	8.20	0.64	35500.00	35265	35321	35569	35752	
K0706398-006	08-Aug-2007, 12:11	7.05	1.61	30500.00	29822	30444	30720	30959	
K0706398-007	08-Aug-2007, 12:12	8.61	0.85	37200.00	36857	37109	37424	37558	
K0706398-008	08-Aug-2007, 12:15	8.82	0.92	38200.00	37717	38050	38543	38291	
K0706398-009	08-Aug-2007, 12:18	1.10	1.85	4760.00	4890	4729	4692	4732	
K0706398-010	08-Aug-2007, 12:19	0.95	1.13	4100.00	4116	4140	4097	4032	
K0706398-011	08-Aug-2007, 12:21	0.32	0.88	1390.00	1392	1395	1375	1404	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCV4	08-Aug-2007, 12:23	5.38	0.71	23300.00	23017	23340	23379	23315	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCB4	08-Aug-2007, 12:25	0.00	110.00	20.80	-0	52	24	8	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
K0706398-012	08-Aug-2007, 12:27	0.07	2.64	288.00	294	278	287	294	
K0706398-013	08-Aug-2007, 12:28	0.21	8.70	892.00	785	906	971	907	
K0706398-014	08-Aug-2007, 12:30	0.17	2.38	739.00	713	747	752	743	
K0706398-015	08-Aug-2007, 12:32	7.58	0.41	32800.00	32851	32617	32867	32922	
K0706398-016	08-Aug-2007, 12:34	0.55	0.74	2360.00	2337	2357	2368	2378	
K0706398-017	08-Aug-2007, 12:36	0.14	4.83	599.00	620	626	587	564	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCV5	08-Aug-2007, 12:51	5.22	0.88	22600.00	22317	22608	22753	22728	

Sample ID	Analysis Time	Conc (PPB)	%RSD	Avg. µAbs	Readings				Flags
CCB5	08-Aug-2007, 12:53	-0.02	12.60	-98.10	-87	-89	-102	-114	

Columbia Analytical Services

EPA METHOD 7471A

Prep Run: 53019

Service Request Number(s): K0398

Sample	Wet Weight (g)	% Solids	Dry Weight (g)	Final Volume (mL)
PBS	—	—	1.004	100ml
LCSS	—	—	0.501	
K0706398-001	3.02	33.0	0.997	
-001d	3.02		0.997	
-001s	3.02		0.997	
-002	5.24	19.1	1.001	
-003	1.99	51.4	1.023	
-004	2.41	43.7	1.053	
-005	2.14	49.5	1.059	
-006	2.07	52.6	1.089	
-007	1.99	52.0	1.035	
-008	1.87	55.1	1.030	
-009	2.17	48.4	1.050	
-010	1.95	51.6	1.006	
-011	1.40	73.7	1.032	
-012	3.71	27.1	1.005	
-013	1.73	58.0	1.003	
-014	1.42	75.3	1.069	
-015	1.87	56.3	1.053	
-016	2.07	49.3	1.021	
-017	1.59	63.9	1.016	
				SP 8-6-07
Std. 0.2	0.2 * mL			100
Std. 0.5	0.5 * mL			100
Std. 1.0	1.0 * mL			100
Std. 5.0	5.0 * mL			100
Std. 10.0	10.0 * mL			100
ICV	0.5 ** mL			100

Lot # of Reagents Used:

HNO3: E01042 **K2S2O8: T44H13** **NaCl : C51581**

H2SO4: 46137 **KMnO4: C23603** **NH2OH-HCL: C50638**

HCL: 47050 **SnCl2: C46596**

LCSS = **ERA CLP Soil Lot # D045540** **Water Bath Temp.:** 95°C

LCSW= **ICV Intermediate stock solution.**

*** Source Standard:** HG1-61-J **100 ppb** **Time Started:** 2:30pm **Time Finished:** 4:05pm

**** Source Standard: ICV** HG1-60-T **1000 ppb**

Comments: 0.5ml ml 1000ppb std to spikes (HG1-60-U)

Analyst: Patterson **Date:** 8-6-07

[HGFORM] 7471

Columbia Analytical Services

EPA METHOD 7471A

Prep Run: 53020

Service Request Number(s): K6438, K6397

Sample	Wet Weight (g)	% Solids	Dry Weight (g)	Final Volume (mL)
PBS	—	—	1.176	100ml
LCSS	—	—	0.515	↓
K0706438-001	2.890	35.3	1.020	↓
-001d	2.886	↓	1.019	↓
-001s	3.030	↓	1.070	↓
K0706397-001	1.147	92.5	1.061	↓
-001d	1.120	↓	1.036	↓
-001s	1.430	↓	1.323	↓
↓ -002	1.150	90.4	1.040	↓
				5 8-6-07
Std. 0.2	0.2 * mL			100
Std. 0.5	0.5 * mL			100
Std. 1.0	1.0 * mL			100
Std. 5.0	5.0 * mL			100
Std. 10.0	10.0 * mL			100
ICV	0.5 ** mL			100

Lot # of Reagents Used:

HNO3: E01042 **K2S2O8: T44H13** **NaCl : C51581**

H2SO4: 46137 **KMnO4: C23603** **NH2OH-HCL: C50638**

HCL: 47050 **SnCl2: C46596**

LCSS = **ERA CLP Soil Lot # D045540** **Water Bath Temp.:** 95°C

LCSW= **ICV Intermediate stock solution.**

*** Source Standard:** HG1-61-J **100 ppb** **Time Started:** 2:30pm **Time Finished:** 4:05pm

**** Source Standard: ICV** HG1-60-T **1000 ppb**

Comments: 0.5ml 1000ppb HG1-60-U to spikes

Analyst: Patterson **Date:** 8-6-07

[HGFORM] 7471

DI Water Leach Metals

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Kleinfelder
Project: Condit Dam/53886
Sample Matrix: Sediment

Service Request: K0706398
Date Collected: 07/18/07
Date Received: 07/20/07

Mercury, DI Extractable

Prep Method: METHOD
Analysis Method: 1631E
Test Notes:

Units: ng/L
Basis: NA

Sample Name	Lab Code	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
NW1-071807	K0706398-004	5.0	0.25	5	08/29/07	08/31/07	525	
Extraction Blank	K0706398-EB	1.0	0.05	1	08/29/07	08/31/07	0.3	B
Method Blank 1	K0706398-MB1	1.0	0.05	1	08/20/07	08/31/07	0.2	B
Method Blank 2	K0706398-MB2	1.0	0.05	1	08/27/07	08/31/07	ND	
Method Blank 3	K0706398-MB3	1.0	0.05	1	08/27/07	08/31/07	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Kleinfelder	**Service Request:**	K0706398
Project:	Condit Dam/53886	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	08/24/07
		Date Analyzed:	08/31/07

Matrix Spike/Duplicate Matrix Spike Summary
Mercury, DI Extractable

Sample Name:	Batch QC	Units:	ng/L
Lab Code:	K0707374-004S, K0707374-004SD	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Mercury	METHOD	1631E	1.0	25	25	0.3	19.7	21.4	78	84	71-125	8	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Kleinfelder	**Service Request:**	K0706398
Project:	Condit Dam/53886	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	08/29/07
		Date Analyzed:	08/31/07

Ongoing Precision and Recovery (OPR) Sample Summary

Mercury, DI Extractable

Sample Name: Ongoing Precision and Recovery (Initial)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	5.55	111	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Kleinfelder	**Service Request:**	K0706398
Project:	Condit Dam/53886	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	08/29/07
		Date Analyzed:	08/31/07

Ongoing Precision and Recovery (OPR) Sample Summary

Mercury, DI Extractable

Sample Name: Ongoing Precision and Recovery (Final)

Units: ng/L

Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.28	86	77-123	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Kleinfelder	**Service Request:**	K0706398
Project:	Condit Dam/53886	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	08/29/07
		Date Analyzed:	08/31/07

Quality Control Sample (QCS) Summary
Mercury, DI Extractable

Sample Name: Quality Control Sample

Units: ng/L
Basis: NA

Test Notes:

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	1631E	5.00	4.34	87	77-123	

Service Request # K7374, K6398, K7504, K7622, K7685, K7566, K7584, K7535

MS/MSD with # K7374, K7685

StarLims Run # 93224

1631 Data Review Form

	Yes	No	NA
1. 20 samples (or less) in batch	X		
2. MS/MSD every 10 samples	X		
3. Current Calibration factor used	X		
4. Calibration data included	X		
5. Method blank below MRL	X		
6. 3 Bubbler Blanks ran	X		
7. Mean of Bubbler Blanks less than 25 pg	X		
8. OPR, QCS in control (77-123%)	X		
9. MS/MSD recovery 71-125%	X		
10. Spike RPD within 24%	X		
11. All samples within the linear range	X		
12. All corresponding charts included	X		
13. Dilution factors calculated	X		
14. Bench sheet signed	X		
15. Reagent Blank below 20 pg	X		

Comments

Primary Reviewed by _____ Date 8/31/07

Secondary Reviewed by JDB Date 8/31/07

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Run Duration:	2.25	Integration Mode:	Total Hg
Heating Time:	1.75	Integration Type:	Peak Area
Retention Start Time:	1.0	Result Units:	ng/L
Retention Stop Time:	1.75		
Calibration File:	Curve 6-12-07.brd		

#8/31/07

Extr/Prep Batch
KP0613639

Reagents

Name	Lot Number
BrCl	RE2-9-F
SnCl+HCl	RE2-8-O

Standards

Name	Concentration	Lot Number
OPR STD	10000ppb	AF1-29-B
QCS STD	10000ppb	AF1-29-C

Comments

PMT: 592
OFFSET: 5,103
NOISE: 417

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Run	Run Type	Name/ID	Method Blank	Peak	Peak Area	Analyzed Result (pg)	Final Result (ng/L)	QA Results	Criteria	Notes
1	MBD	WB-1		1	105,712	11.2	0.112	0.112	< .5	accept
2	MBA	MB-1	MBD	1	330,361	30.2	0.190	0.190	< 1.0	accept
3	MBA	MB-2	MBD	1	149,870	11.1	-0.000565	-0.000565	< 1.0	accept
4	OPR	OPR-1	MBD	1	5,407,597	566	5.55	111	77-123	accept
5	QCS	QCS-1	MBD	1	4,256,806	445	4.34	86.7	77-123	accept
6	S	K0707374-004		1	338,141	31.0	0.310		< HS	accept
7	MS	K0707374-004		1	18,748,517	1,970	19.7	77.8	71-125	accept
~~8~~	~~MSD~~	~~K0707374-004~~		~~1~~	~~17,061,561~~	~~1,800~~	~~18.0~~	~~70.6~~	~~71-125~~	~~reject~~
9	S	K0707374-005		1	723,562	71.7	0.717		< HS	accept
10	S	K0707374-006		1	82,098	3.95	0.0395		< HS	accept
~~11~~	~~S~~	~~K0706398-004~~		~~2~~	~~>278,812,760~~	~~29,400~~	~~294~~		~~< HS~~	~~reject~~
12	S	K0706398-4EB		3	309,321	27.9	0.279		< HS	accept
13	CB	BB (OPR-1)		1	21,667	2.29		2.29	< 50	accept
14	CB	BB (QCS)		1	33,002	3.48		3.48	< 50	accept
15	S	K0707504-001		1	12,322,840	1,300	13.0		< HS	accept
16	S	K0707622-001		1	2,034,812	210	2.10		< HS	accept
17	S	K0707622-002		1	14,393,051	1,520	15.2		< HS	accept
18	S	K0707622-003		1	1,483,613	152	1.52		< HS	accept
19	S	K0707685-001		1	3,833,570	400	4.00		< HS	accept
20	S	K0707685-002		1	3,848,953	402	4.02		< HS	accept
21	MS	K0707685-002		1	25,191,854	2,660	26.6	90.1	71-125	accept
22	MSD	K0707685-002		1	25,059,746	2,640	26.4	89.6	71-125	accept
23	S	K0707584-001		1	2,691,120	279	2.79		< HS	accept
24	S	K0707584-002		1	495,175	47.6	0.476		< HS	accept
25	S	K0707584-003		1	809,677	80.8	0.808		< HS	accept
26	S	K0707584-004		1	710,745	70.3	0.703		< HS	accept
27	S	K0707584-007		1	798,087	79.6	0.796		< HS	accept
28	S	K0707584-009		1	190,266	15.4	0.154		< HS	accept
29	S	K0707535-003		1	165,359	12.7	0.127		< HS	accept
30	MSD	K0707374-004		1	20,266,874	2,140	21.4	84.2	71-125	accept
31	S	K0706398-004		1	99,418,338	10,500	525		< HS	accept
~~32~~	~~S~~	~~K0704566-001~~		~~1~~	~~>318,142,968~~	~~33,600~~	~~67,200~~		~~< HS~~	~~reject~~
~~33~~	~~S~~	~~K0704566-001~~		~~1~~	~~82,610,833~~	~~8,720~~	~~872,000~~		~~< HS~~	~~reject~~
34	S	K0704566-001		1	92,608,038	9,770	977,000		< HS	accept

8/31/07

8/31/07

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Run	Run Type	Name/ID	Method Blank	Peak	Peak Area	Analyzed Result (pg)	Final Result (ng/L)	QA Results	Criteria	Notes
~~35~~	~~MBA~~	~~MB-3~~	MBD	1	~~22,049,714~~	~~2,320~~	~~23.1~~	~~23.1~~	~~< 1.0~~	reject
36	MBA	MB-3	MBD	1	177,706	14.0	0.0288	0.0288	< 1.0	accept
37	OPR	OPR-2	MBD	1	4,201,069	439	4.28	85.5	77-123	accept
38	CB	BB (OPR)		2	79,411	8.38		8.38	< 50	accept

5/31/07

Comments

PMT: 592
OFFSET: 5,103
NOISE: 417

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Bias and Precision

Run Type	Name/ID	Final Result	Units	Spike Level	Source Result	% REC	% REC Limit	RPD	RPD Limit	Notes
MS	K0707374-004	19.7	ng/L	25	0.310	77.8	71-125			accept
	K0707685-002	26.6	ng/L	25	4.02	90.1	71-125			accept
MSD # 8/31/07	~~K0707374-004~~	~~18.0~~	~~ng/L~~	~~25~~	~~0.310~~	~~70.6~~	~~71-125~~	~~7.80~~	~~< 24~~	~~reject~~
	K0707685-002	26.4	ng/L	25	4.02	89.6	71-125	0.527	< 24	accept
	K0707374-004	21.4	ng/L	25	0.310	84.2	71-125	7.80	< 24	accept
OPR	OPR-1	5.55	ng/L	5		111	77-123			accept
	OPR-2	4.28	ng/L	5		85.5	77-123			accept
QCS	QCS-1	4.34	ng/L	5		86.7	77-123			accept

Calibration

QA Sample Type	Name/ID	Analyzed Result	Units	Spike Level	% REC	% REC Limit	RSD	RSD Limit	Notes
Calibration	500	498	pg	500	99.6	75-125			accept
	2000	1,920	pg	2000	96.0	75-125			accept
	5000	4,710	pg	5000	94.2	75-125			accept
	20000	20,100	pg	20000	100	75-125			accept
	10	9.48	pg	10	94.8	75-125			accept
	20	21.4	pg	20	107	75-125			accept
	200	233	pg	200	116	75-125			accept
	50	47.8	pg	50	95.6	75-125			accept
Calibration Factor		0.000106	pg/PA				7.05	< 15	accept
Calibration Date		6/12/07							

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Blank Summary

QA Sample Type	Name/ID	Analyzed Result	Units	Criteria	StDev	StDev Limit	Notes
CB	BB (OPR-1)	2.29	pg	< 50			accept
	BB (QCS)	3.48	pg	< 50			accept
	BB (OPR)	8.38	pg	< 50			accept
Average		4.72	pg	< 25	3.23	< 10	accept
MBA	MB-1	0.190	ng/L	< 1.0			accept
	MB-2	-0.000565	ng/L	< 1.0			accept
	~~MB-3~~	~~23.1~~	~~ng/L~~	~~< 1.0~~			~~reject~~
	MB-3	0.0288	ng/L	< 1.0			accept
Average		5.83	ng/L		11.5		
MBD	WB-1	0.112	ng/L	< .5			accept

4 8/31/07

Comments

PMT: 592
OFFSET: 5,103
NOISE: 417

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Run	Name/ID	Final Result (ng/L)	Notes
~~32~~	~~K0704566-001~~	~~67,200~~	~~rejected~~
~~33~~	~~K0704566-001~~	~~872,000~~	~~rejected~~
34	K0704566-001	977,000	accepted
31	K0706398-004	525	accepted
~~11~~	~~K0706398-004~~	~~294~~	~~rejected~~
12	K0706398-4EB	0.279	accepted
6	K0707374-004	0.310	accepted
9	K0707374-005	0.717	accepted
10	K0707374-006	0.0395	accepted
15	K0707504-001	13.0	accepted
29	K0707535-003	0.127	accepted
23	K0707584-001	2.79	accepted
24	K0707584-002	0.476	accepted
25	K0707584-003	0.808	accepted
26	K0707584-004	0.703	accepted
27	K0707584-007	0.796	accepted
28	K0707584-009	0.154	accepted
16	K0707622-001	2.10	accepted
17	K0707622-002	15.2	accepted
18	K0707622-003	1.52	accepted
19	K0707685-001	4.00	accepted
20	K0707685-002	4.02	accepted

8/31/07

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Run	Run Type	Name/ID	Method Blank	Sample Vol/Wt	Dilution Vol (ml)	Analyzed Vol (ml)	Expected Value	Notes
1	MBD	WB-1		100	100	100		
2	MBA	MB-1	MBD	100	100	100		
3	MBA	MB-2	MBD	100	100	100		
4	OPR	OPR-1	MBD	100	100	100	5	
5	QCS	QCS-1	MBD	100	100	100	5	
6	S	K0707374-004		100	100	100		
7	MS	K0707374-004		100	100	100	25	
~~8~~	~~MSD~~	~~K0707374-004~~		~~100~~	~~100~~	~~100~~	~~25~~	
9	S	K0707374-005		100	100	100		# 8/31/07
10	S	K0707374-006		100	100	100		
~~11~~	~~S~~	~~K0706398-004~~		~~100~~	~~100~~	~~100~~		
12	S	K0706398-4EB		100	100	100		
13	CB	BB (OPR-1)		100	100	100		
14	CB	BB (QCS)		100	100	100		
15	S	K0707504-001		100	100	100		
16	S	K0707622-001		100	100	100		
17	S	K0707622-002		100	100	100		
18	S	K0707622-003		100	100	100		
19	S	K0707685-001		100	100	100		
20	S	K0707685-002		100	100	100		
21	MS	K0707685-002		100	100	100	25	
22	MSD	K0707685-002		100	100	100	25	
23	S	K0707584-001		100	100	100		
24	S	K0707584-002		100	100	100		
25	S	K0707584-003		100	100	100		
26	S	K0707584-004		100	100	100		
27	S	K0707584-007		100	100	100		
28	S	K0707584-009		100	100	100		
29	S	K0707535-003		100	100	100		
30	MSD	K0707374-004		100	100	100	25	
31	S	K0706398-004		20	100	100		
~~32~~	~~S~~	~~K0704566-001~~		~~0.5~~	~~100~~	~~100~~		# 8/31/07
~~33~~	~~S~~	~~K0704566-001~~		~~0.01~~	~~100~~	~~100~~		
34	S	K0704566-001		0.01	100	100		

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

Run	Run Type	Name/ID	Method Blank	Sample Vol/Wt	Dilution Vol (ml)	Analyzed Vol (ml)	Expected Value	Notes
~~35~~	~~MBA~~	~~MB-3~~	~~MBD~~	~~100~~	~~100~~	~~100~~	8/31/07	
36	MBA	MB-3	MBD	100	100	100		
37	OPR	OPR-2	MBD	100	100	100	5	
38	CB	BB (OPR)		100	100	100		

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Columbia Analytical Services
Metals Digestion Sheet

Service Requests:

Method : **1631E** Analysis for : **CVAFS**

Sample	StarLims #	Date Prepped	> BrCl	Oxidized Vol. (ml)	Analyzed Vol. (ml)	Analyzed Dil. Vol. (ml)	Matrix
Method Blank		8/20/2007	X	500	100	100	0.5% BrCl
Method Blank		8/27/2007	X	500	100	100	0.5% BrCl
OPR 1			X	500	100	100	0.5% BrCl
QCS			X	500	100	100	0.5% BrCl
K7374-04	54014	8/24/2007	X	500	100	100	0.5% BrCl
K7374-04MS	54014	8/24/2007	X	500	100	100	0.5% BrCl
K7374-04DMS	54014	8/24/2007	X	500	100	100	0.5% BrCl
K7374-05	54014	8/24/2007	X	500	100	100	0.5% BrCl
K7374-06	54014	8/24/2007	X	500	100	100	0.5% BrCl
K6398-04	54215	8/29/2007	X	500	20	100	0.5% BrCl
K6398-04EB	54215	8/29/2007	X	500	100	100	0.5% BrCl
K7504-01	54014	8/24/2007	X	500	100	100	0.5% BrCl
K7622-01	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7622-02	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7622-03	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7685-01	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7685-02	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7685-02MS	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7685-02DMS	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7566-01	54014	8/24/2007	X	500	0.01	100	0.5% BrCl
K7584-01	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7584-02	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7584-03	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7584-04	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7584-07	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7584-09	54088	8/27/2007	X	500	100	100	0.5% BrCl
K7535-03	54014	8/24/2007	X	500	100	100	0.5% BrCl
Method Blank		8/27/2007	X	500	100	100	0.5% BrCl
OPR-2			X	500	100	100	0.5% BrCl

RE2 - 4 - **BrCl**

AF1 - 24 - I *(10 ng/mL)* **QCS:** 50uL

AF1 - 24 - H *(10 ng/mL)* **OPR:** 50uL

1st MS / DMS: 0.25ml

2nd MS / DMS: 0.25ml

Comments: Samlpes diluted due to particulate and organic matter.

Time Digestion Started: _____

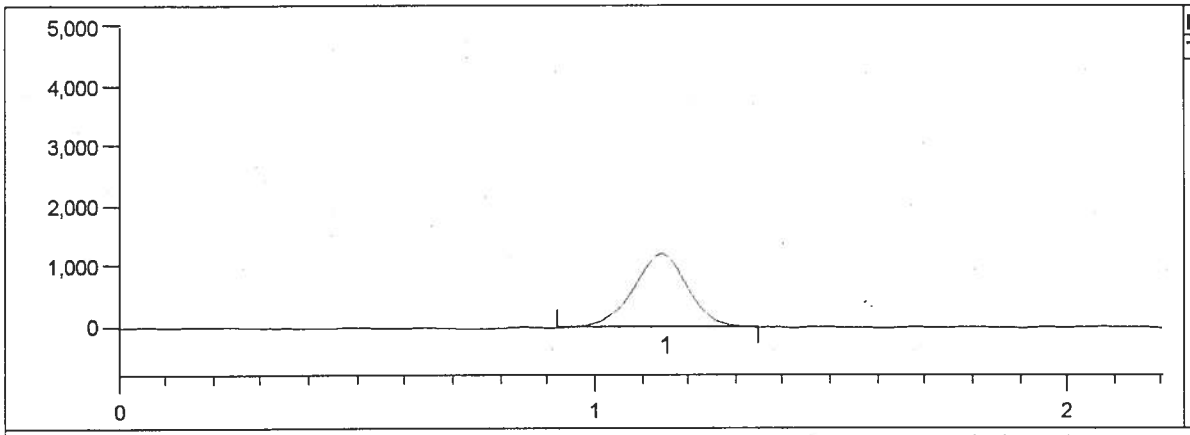
Analyst _____

1631Dig.XLS
3/1/2006

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

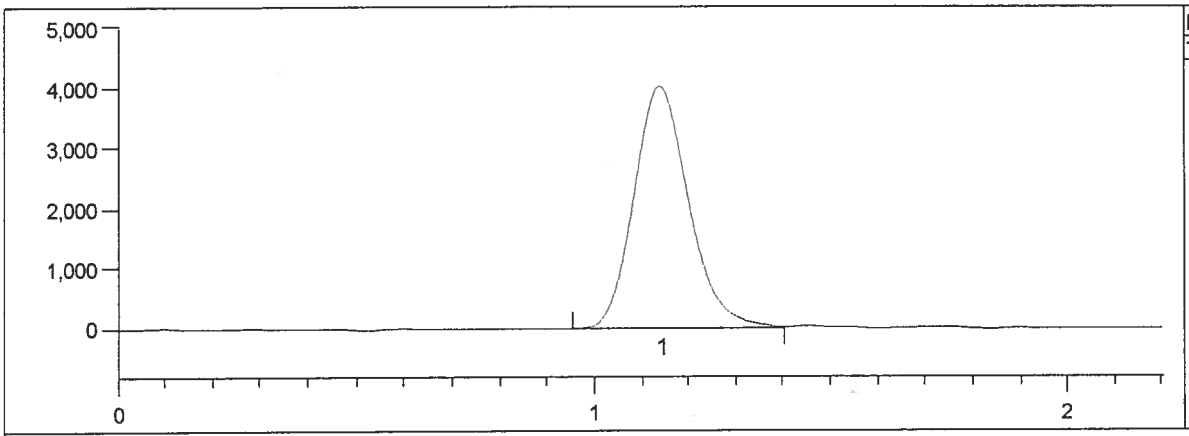


Date: 8/31/07
Time: 9:17 AM

Peak	rt	Area
1	1.16	105,712

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
1	MBD	WB-1		1	105,712	11.2	0.112	0.112	< .5	accept

Notes:

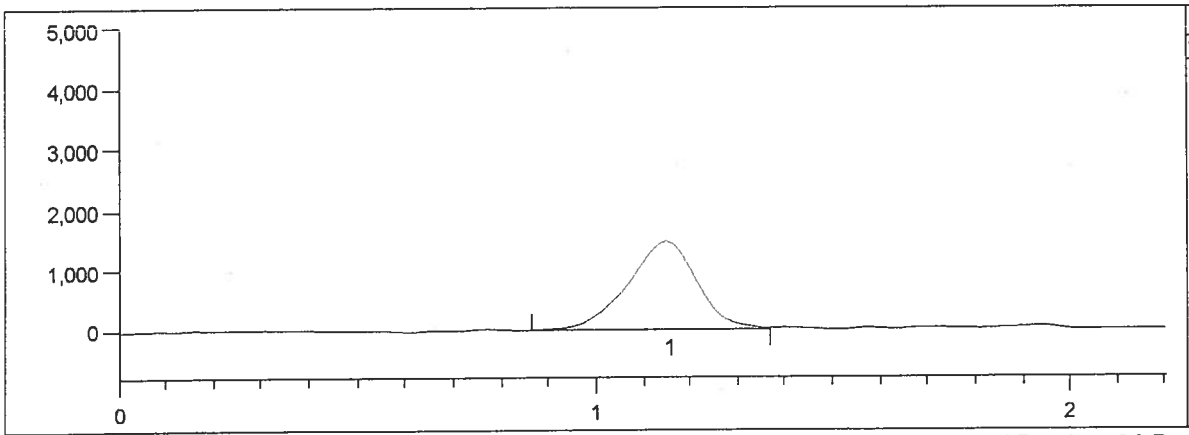


Date: 8/31/07
Time: 9:21 AM

Peak	rt	Area
1	1.16	330,361

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
2	MBA	MB-1	MBD	1	330,361	30.2	0.190	0.190	< 1.0	accept

Notes:



Date: 8/31/07
Time: 9:23 AM

Peak	rt	Area
1	1.17	149,870

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
3	MBA	MB-2	MBD	1	149,870	11.1	-0.000565	-0.000565	< 1.0	accept

Notes:

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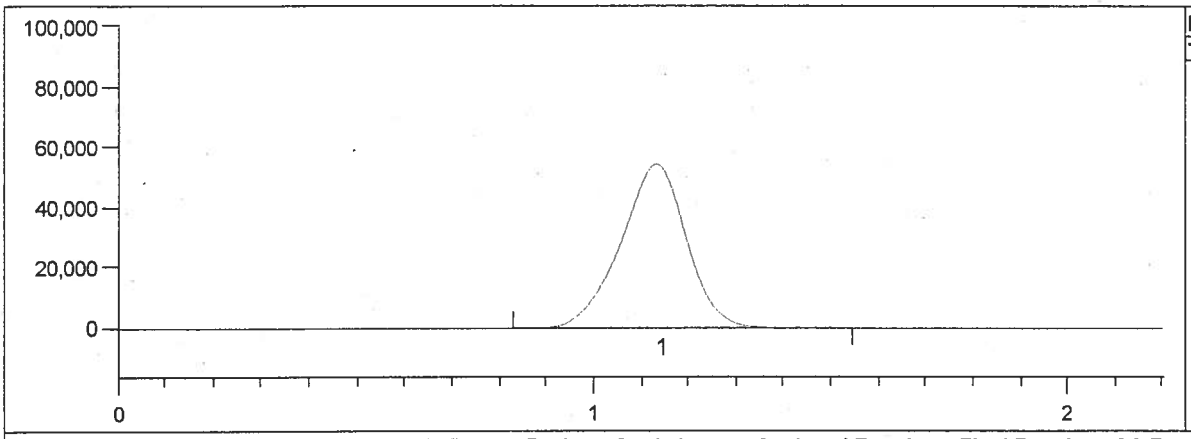
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

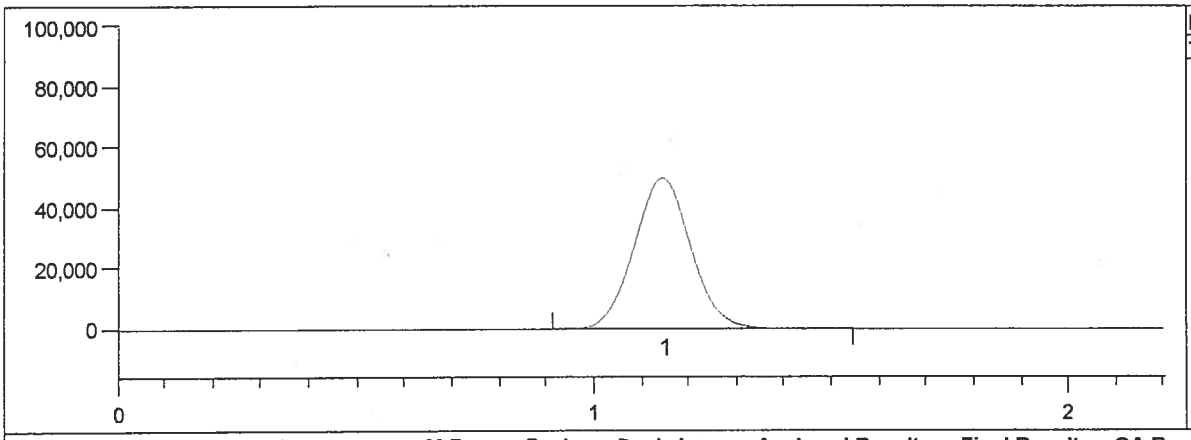


Date: 8/31/07
Time: 9:26 AM

Peak	rt	Area
1	1.16	5,407,597

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
4	OPR	OPR-1	MBD	1	5,407,597	566	5.55	111	77-123	accept

Notes:

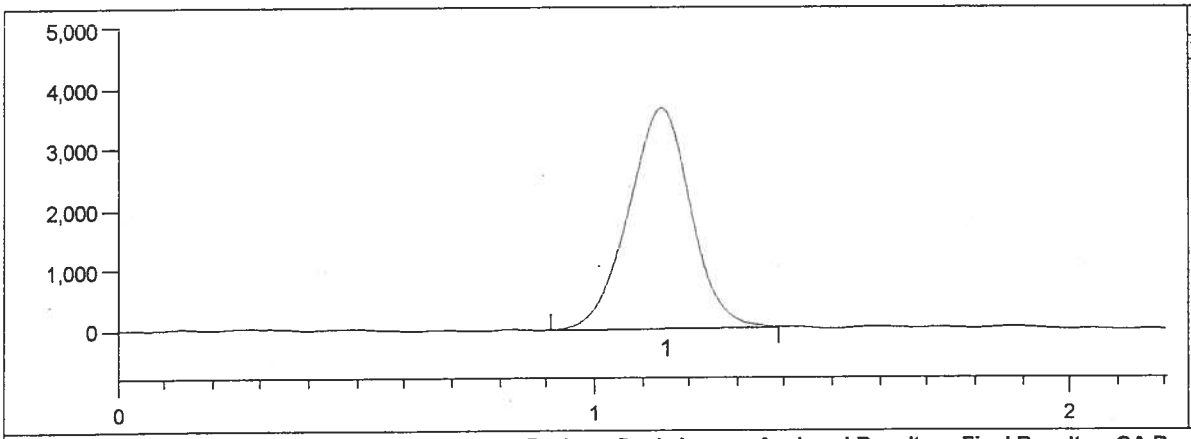


Date: 8/31/07
Time: 9:29 AM

Peak	rt	Area
1	1.16	4,256,806

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
5	QCS	QCS-1	MBD	1	4,256,806	445	4.34	86.7	77-123	accept

Notes:



Date: 8/31/07
Time: 9:32 AM

Peak	rt	Area
1	1.16	338,141

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
6	S	K0707374-004		1	338,141	31.0	0.310		< HS	accept

Notes:

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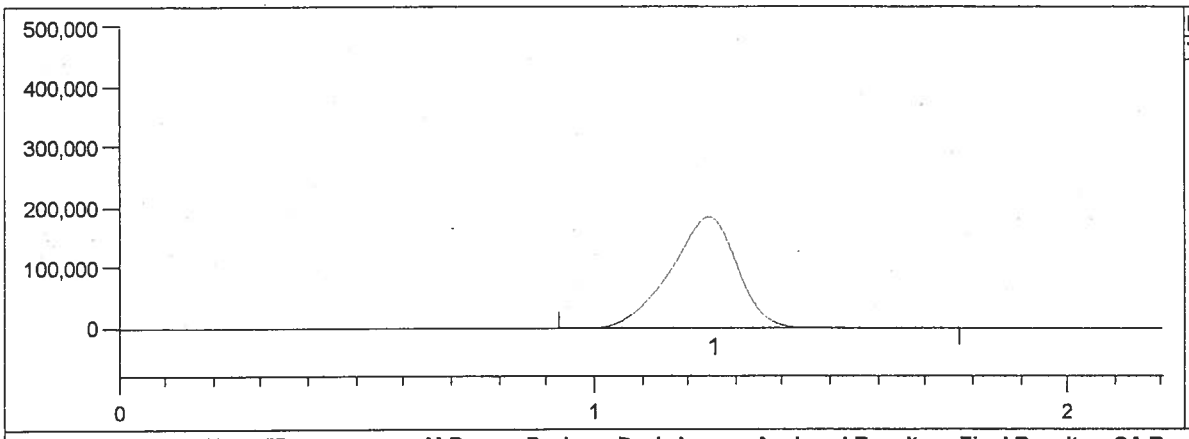
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

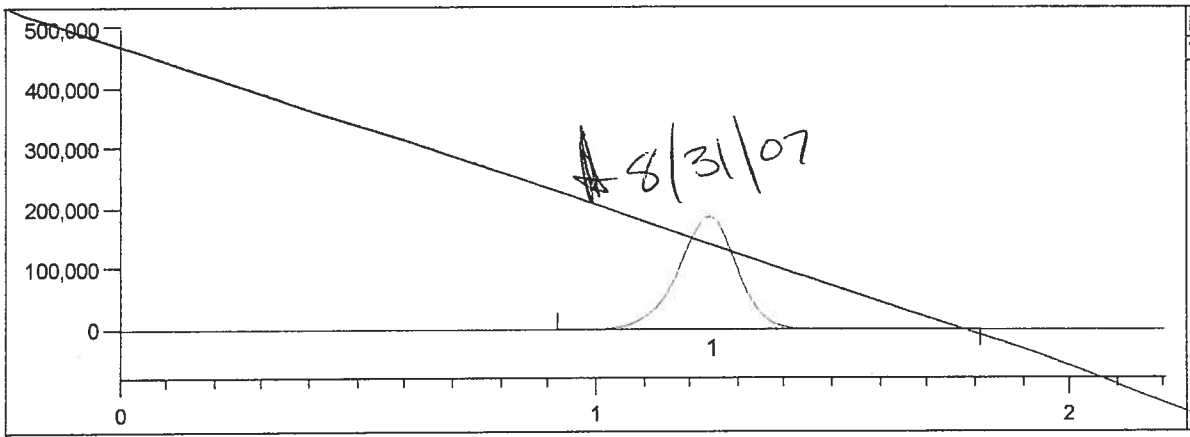


Date: 8/31/07
Time: 9:36 AM

Peak	rt	Area
1	1.26	18,748,517

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
7	MS	K0707374-004		1	18,748,517	1,970	19.7	77.8	71-125	accept

Notes:

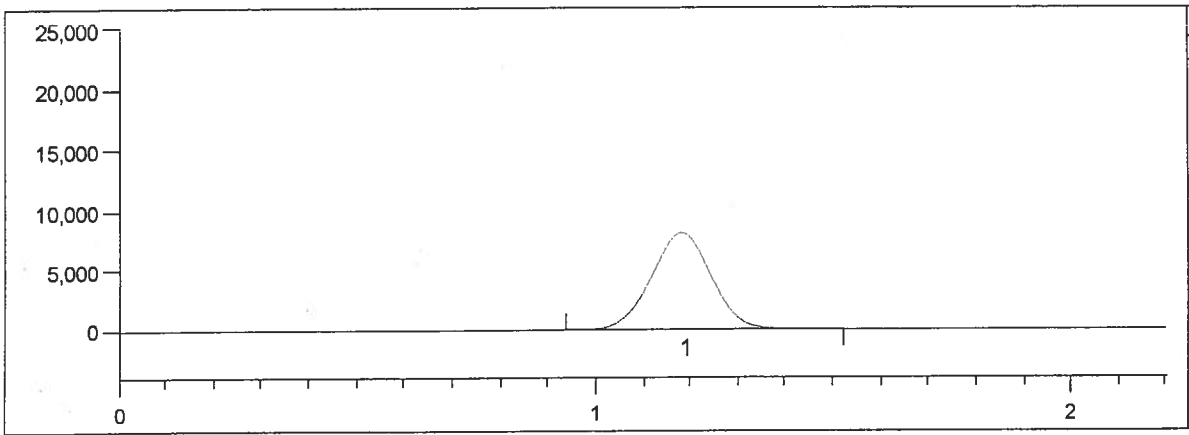


Date: 8/31/07
Time: 9:40 AM

Peak	rt	Area
1	1.26	17,061,561

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
8	MSD	K0707374-004		1	17,061,561	1,800	18.0	70.6	71-125	reject

Notes:



Date: 8/31/07
Time: 9:42 AM

Peak	rt	Area
1	1.20	723,562

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
9	S	K0707374-005		1	723,562	71.7	0.717		< HS	accept

Notes:

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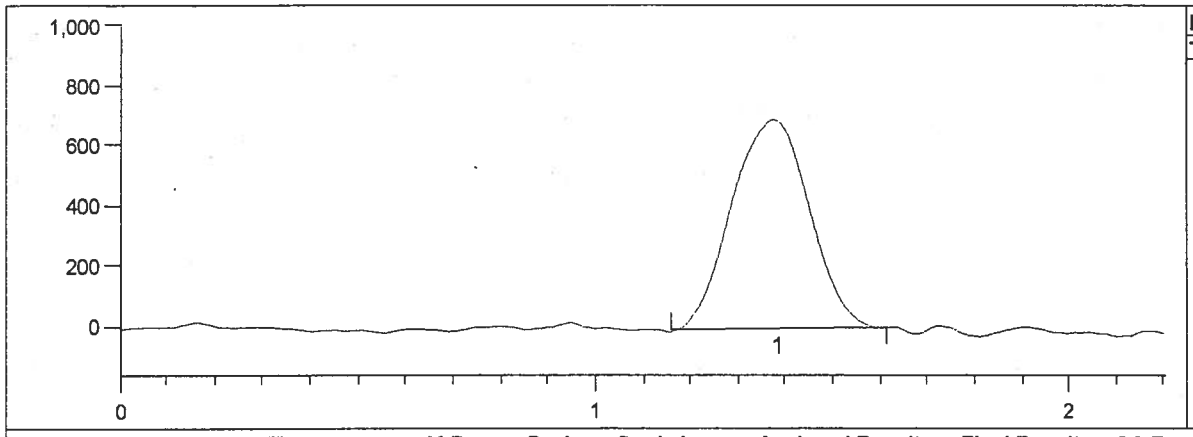
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

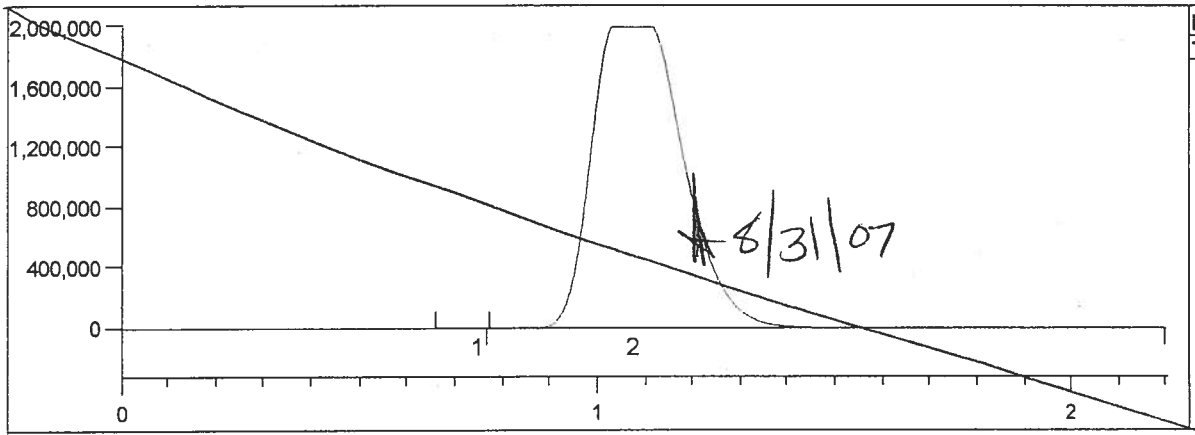


Date: 8/31/07
Time: 10:00 AM

Peak	rt	Area
1	1.40	82,098

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
10	S	K0707374-006		1	82,098	3.95	0.0395		< HS	accept

Notes:

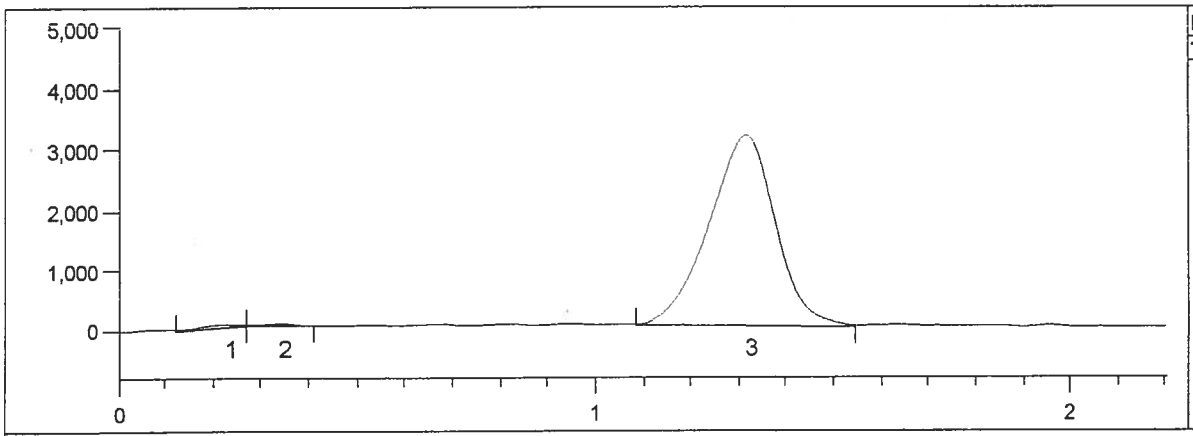


Date: 8/31/07
Time: 10:24 AM

Peak	rt	Area
1	0.75	4,033
2	1.09	>278,812,760

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
11	S	K0706398-004		2	>278,812,760	29,400	294		< HS	reject

Notes:



Date: 8/31/07
Time: 10:28 AM

Peak	rt	Area
1	0.23	3,984
2	0.34	3,590
3	1.34	309,321

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
12	S	K0706398-4EB		3	309,321	27.9	0.279		< HS	accept

Notes:

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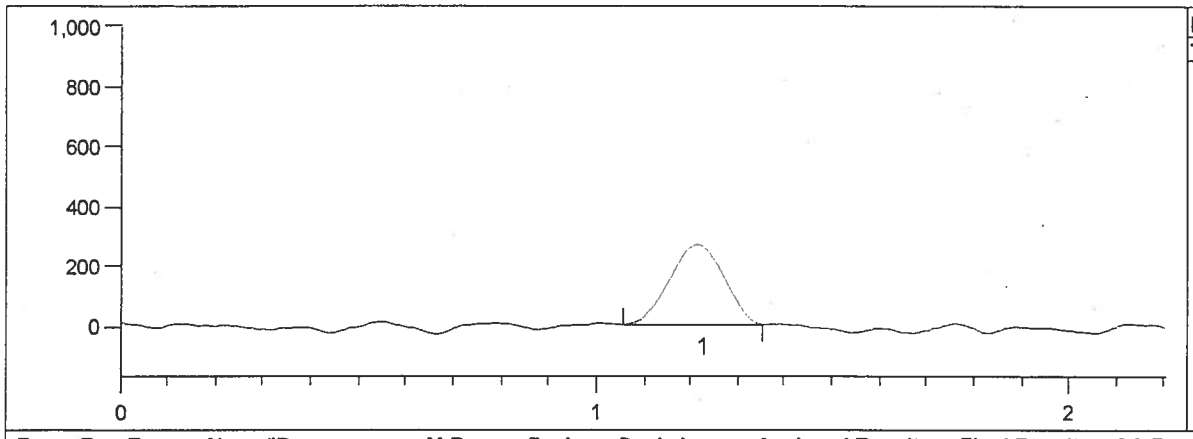
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

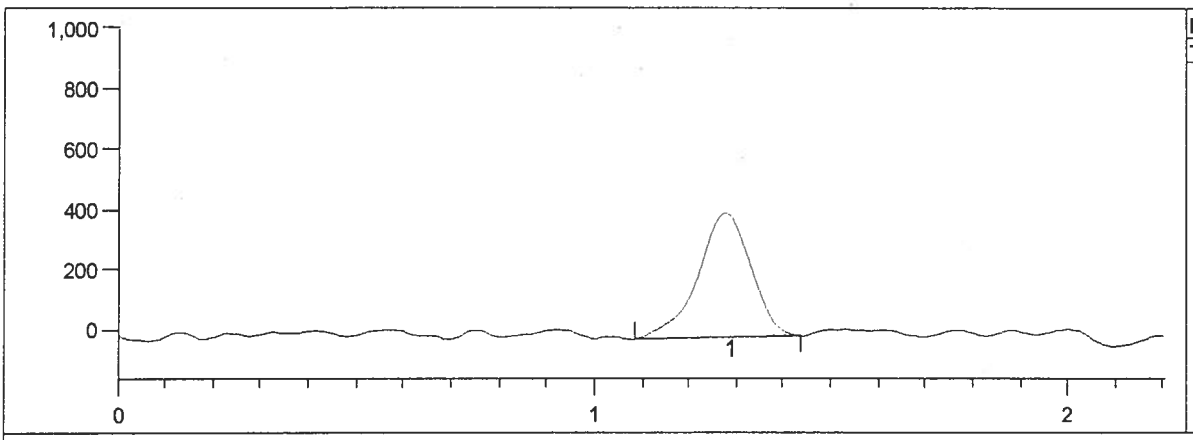


Date: 8/31/07
Time: 10:31 AM

Peak	rt	Area
1	1.24	21,667

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
13	CB	BB (OPR-1)		1	21,667	2.29		2.29	< 50	accept

Notes:

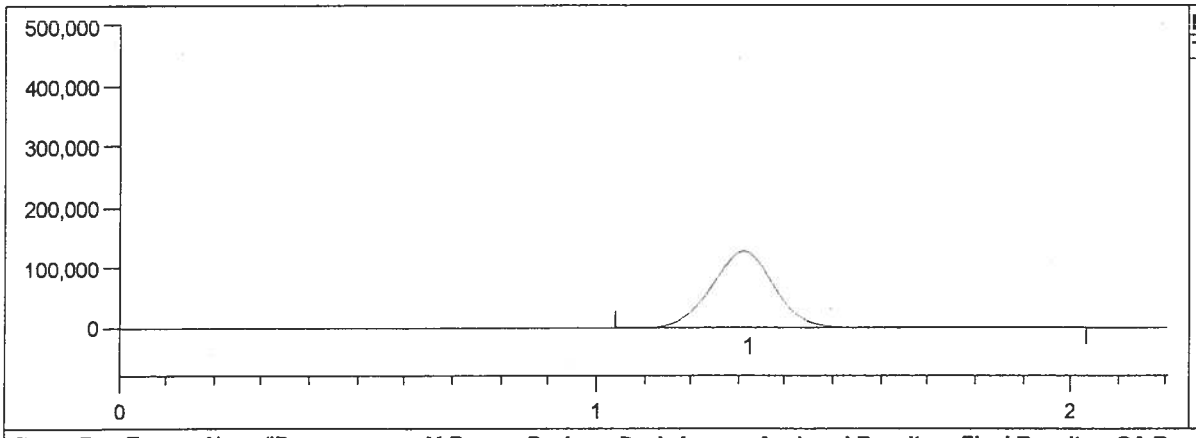


Date: 8/31/07
Time: 10:34 AM

Peak	rt	Area
1	1.30	33,002

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
14	CB	BB (QCS)		1	33,002	3.48		3.48	< 50	accept

Notes:



Date: 8/31/07
Time: 10:40 AM

Peak	rt	Area
1	1.34	12,322,840

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
15	S	K0707504-001		1	12,322,840	1,300	13.0		< HS	accept

Notes:

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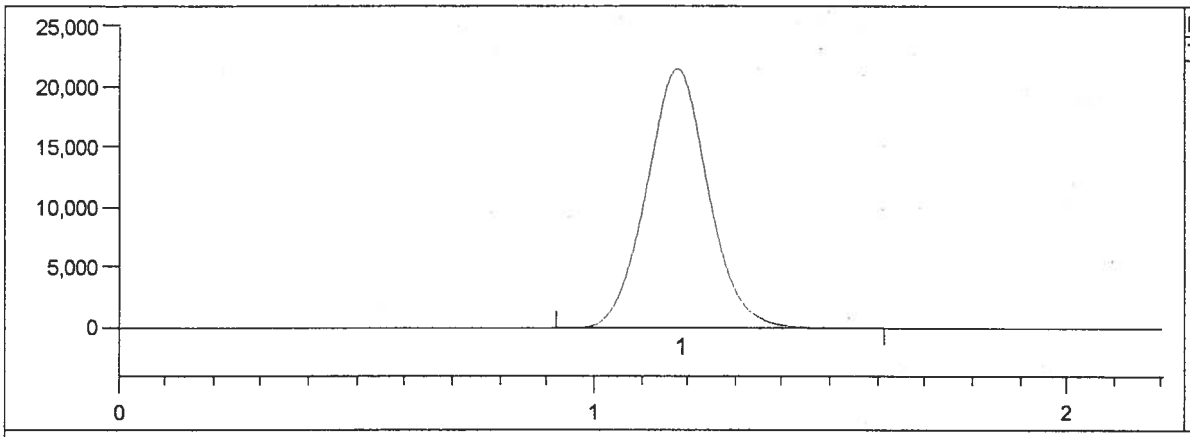
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

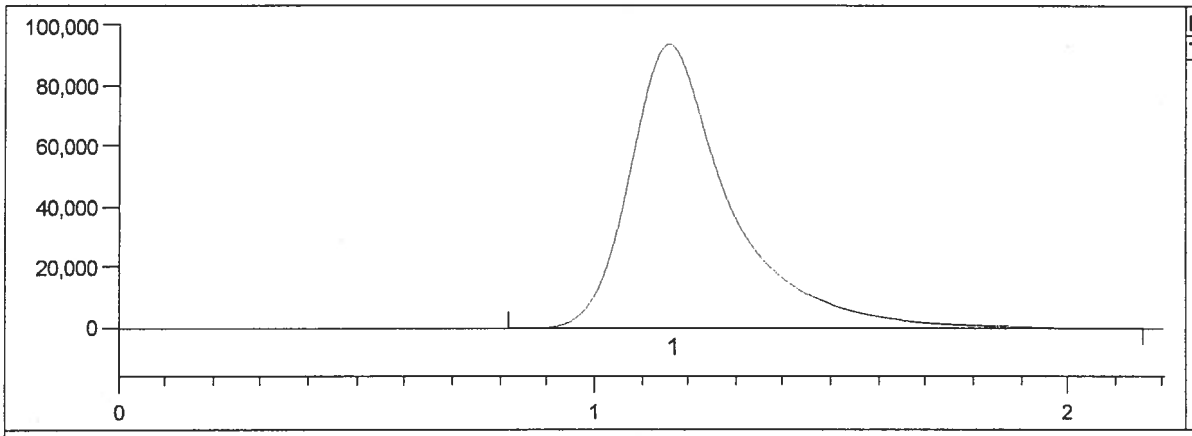


Date: 8/31/07
Time: 10:43 AM

Peak	rt	Area
1	1.20	2,034,812

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
16	S	K0707622-001		1	2,034,812	210	2.10		< HS	accept

Notes:

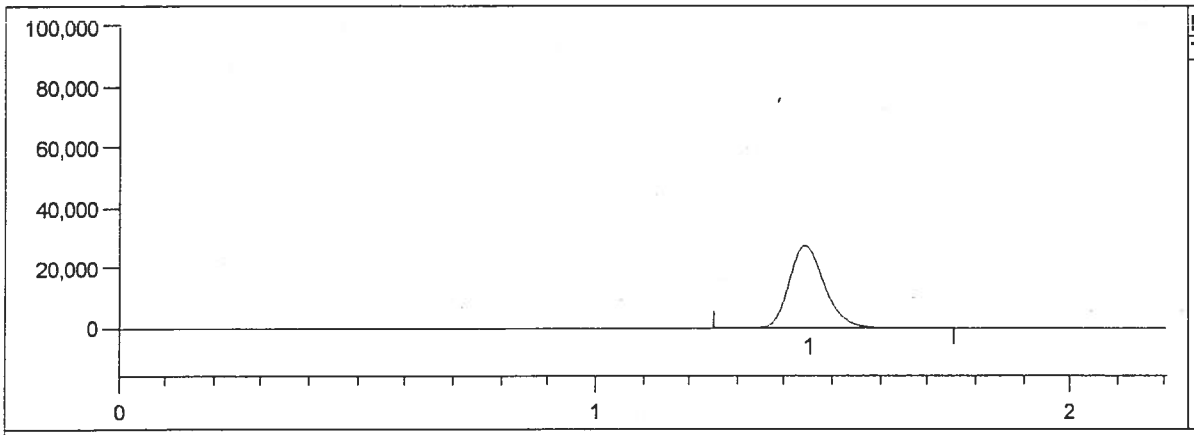


Date: 8/31/07
Time: 10:46 AM

Peak	rt	Area
1	1.18	14,393,051

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
17	S	K0707622-002		1	14,393,051	1,520	15.2		< HS	accept

Notes:



Date: 8/31/07
Time: 10:49 AM

Peak	rt	Area
1	1.47	1,483,613

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
18	S	K0707622-003		1	1,483,613	152	1.52		< HS	accept

Notes:

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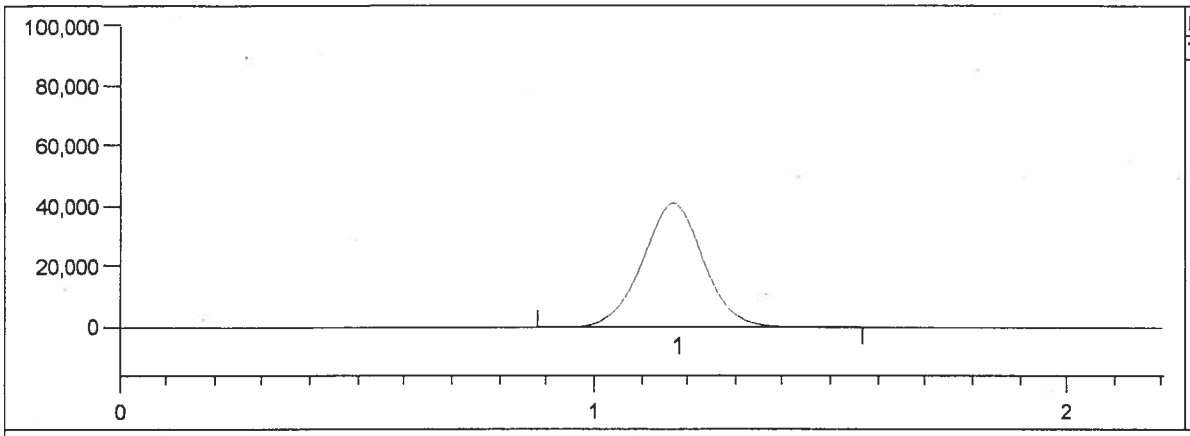
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

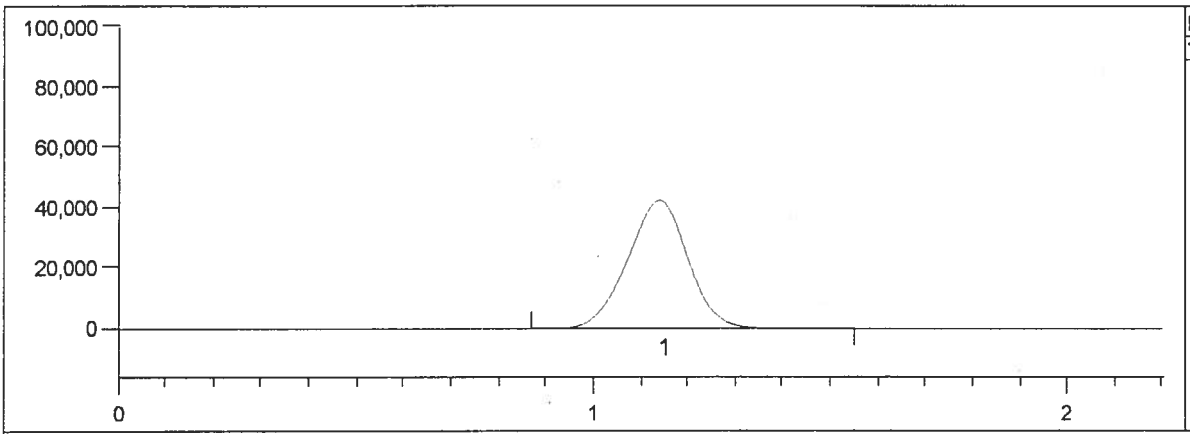


Date: 8/31/07
Time: 11:08 AM

Peak	rt	Area
1	1.19	3,833,570

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
19	S	K0707685-001		1	3,833,570	400	4.00		< HS	accept

Notes:

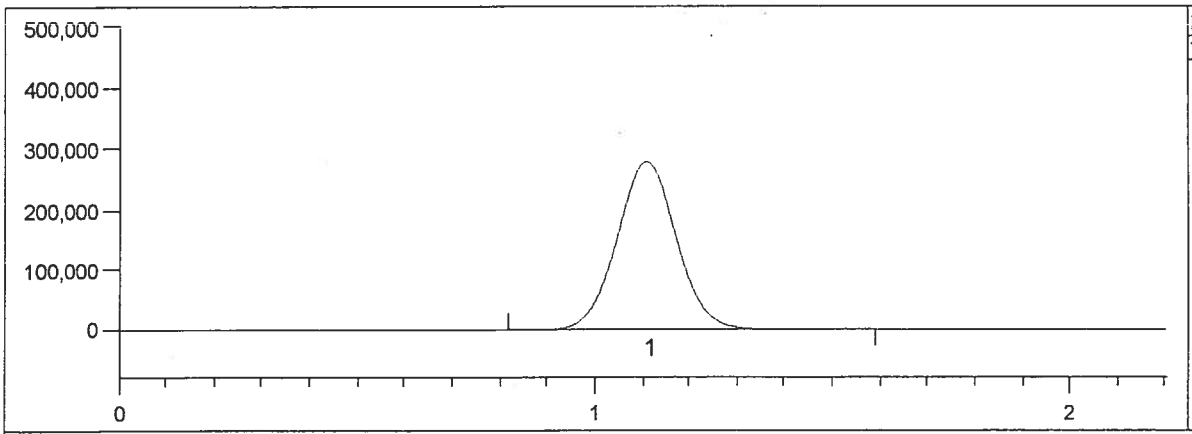


Date: 8/31/07
Time: 11:10 AM

Peak	rt	Area
1	1.16	3,848,953

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
20	S	K0707685-002		1	3,848,953	402	4.02		< HS	accept

Notes:



Date: 8/31/07
Time: 11:13 AM

Peak	rt	Area
1	1.13	25,191,854

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
21	MS	K0707685-002		1	25,191,854	2,660	26.6	90.1	71-125	accept

Notes:

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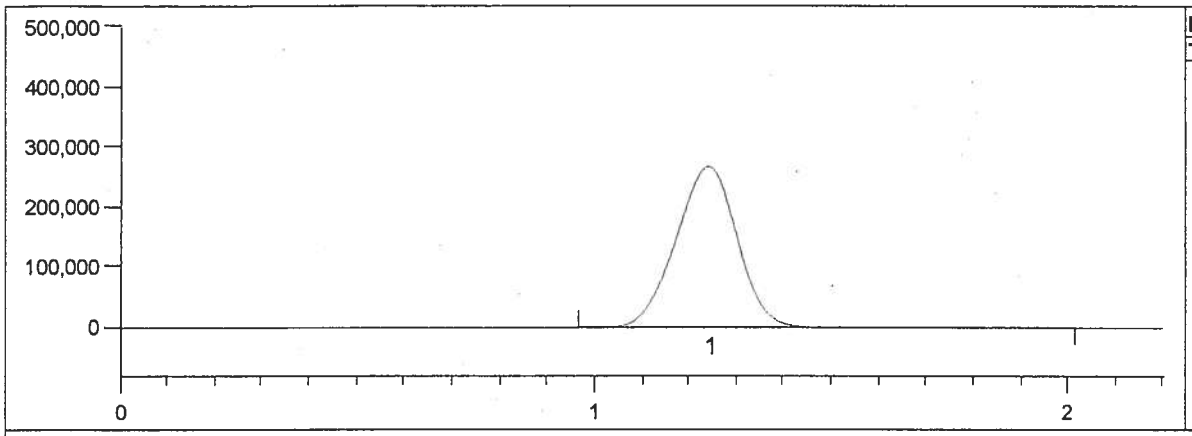
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

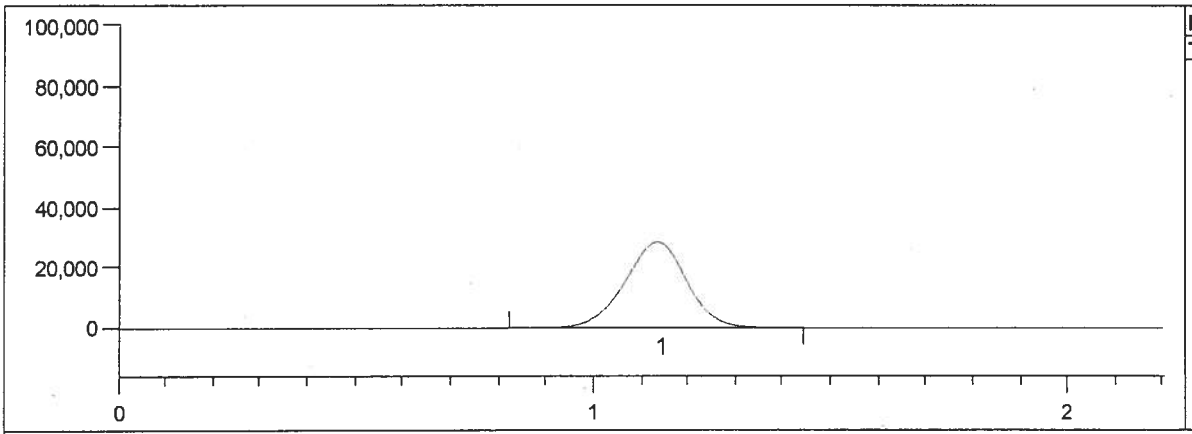


Date: 8/31/07
Time: 11:15 AM

Peak	rt	Area
1	1.26	25,059,746

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
22	MSD	K0707685-002		1	25,059,746	2,640	26.4	89.6	71-125	accept

Notes:

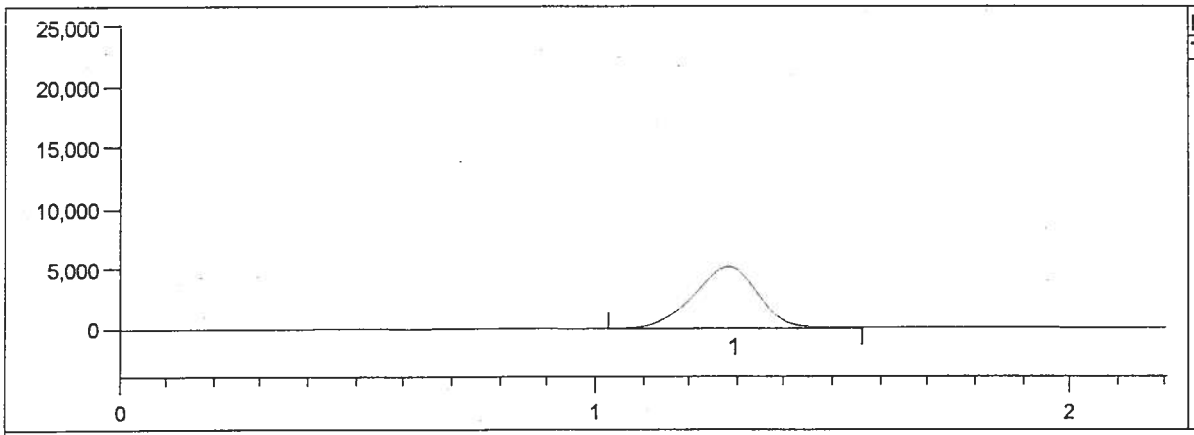


Date: 8/31/07
Time: 12:28 PM

Peak	rt	Area
1	1.16	2,691,120

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
23	S	K0707584-001		1	2,691,120	279	2.79		< HS	accept

Notes:



Date: 8/31/07
Time: 12:31 PM

Peak	rt	Area
1	1.30	495,175

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
24	S	K0707584-002		1	495,175	47.6	0.476		< HS	accept

Notes:

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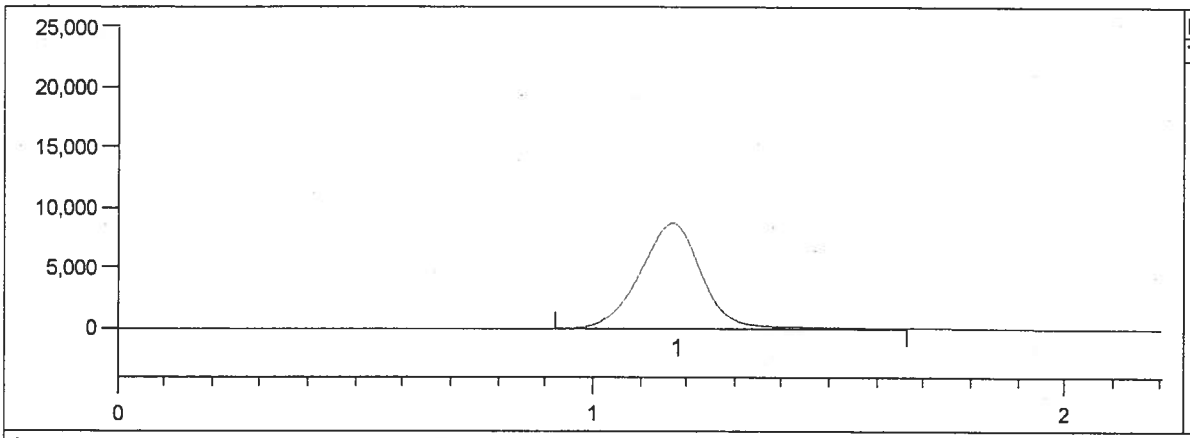
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

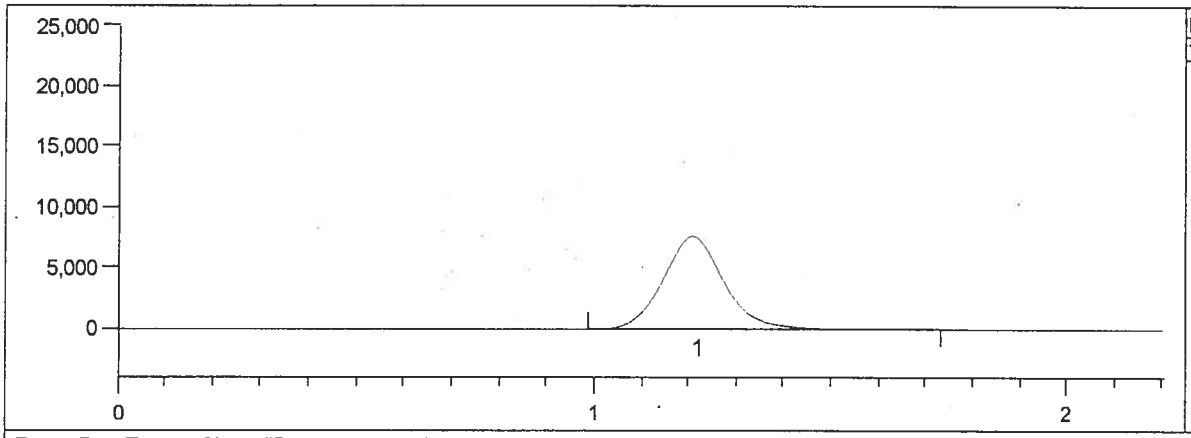


Date: 8/31/07
Time: 12:35 PM

Peak	rt	Area
1	1.19	809,677

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
25	S	K0707584-003		1	809,677	80.8	0.808		< HS	accept

Notes:

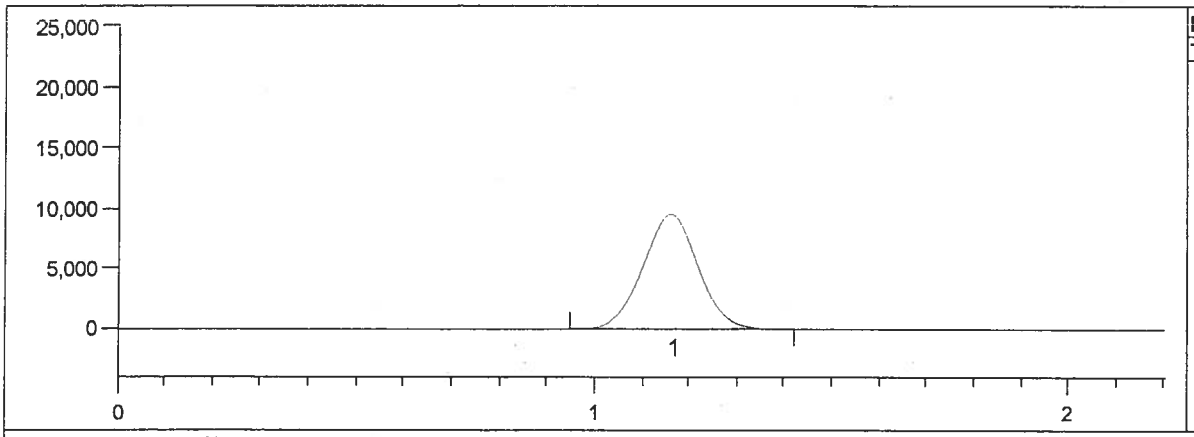


Date: 8/31/07
Time: 12:38 PM

Peak	rt	Area
1	1.23	710,745

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
26	S	K0707584-004		1	710,745	70.3	0.703		< HS	accept

Notes:



Date: 8/31/07
Time: 12:41 PM

Peak	rt	Area
1	1.18	798,087

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
27	S	K0707584-007		1	798,087	79.6	0.796		< HS	accept

Notes:

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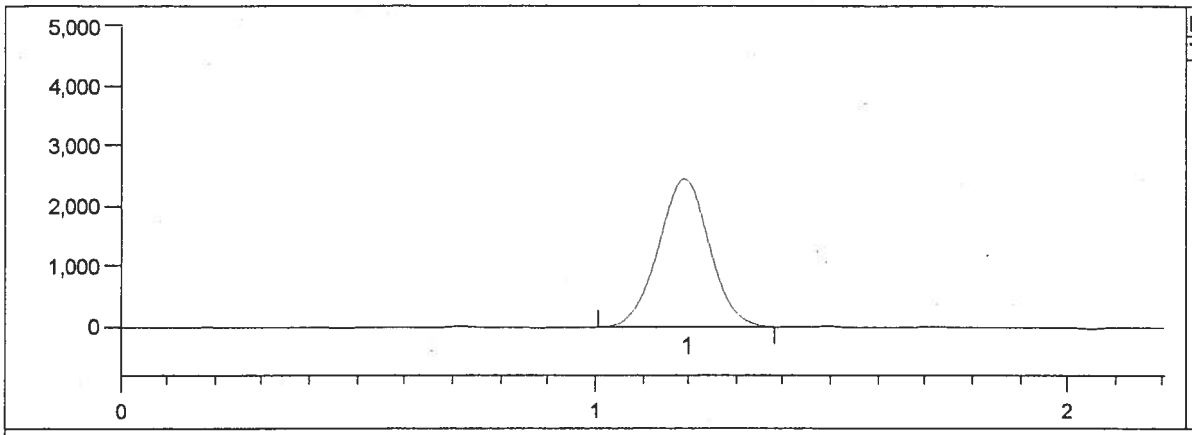
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

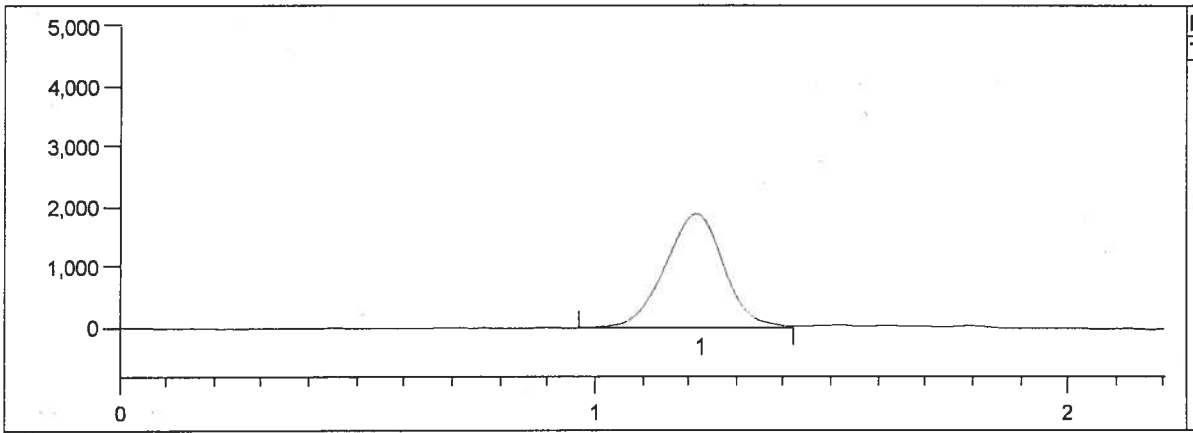


Date: 8/31/07
Time: 12:44 PM

Peak	rt	Area
1	1.21	190,266

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
28	S	K0707584-009		1	190,266	15.4	0.154		< HS	accept

Notes:

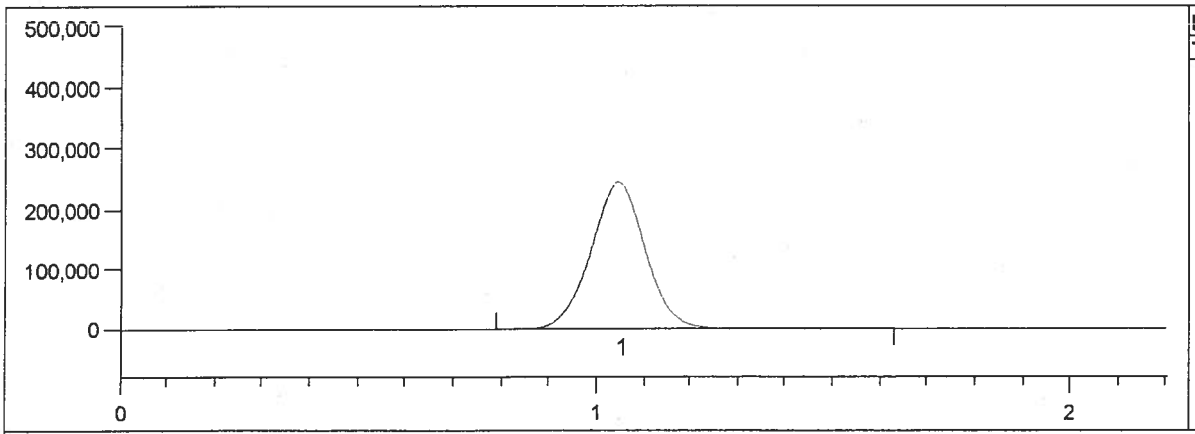


Date: 8/31/07
Time: 12:47 PM

Peak	rt	Area
1	1.24	165,359

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
29	S	K0707535-003		1	165,359	12.7	0.127		< HS	accept

Notes:



Date: 8/31/07
Time: 12:54 PM

Peak	rt	Area
1	1.06	20,266,874

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
30	MSD	K0707374-004		1	20,266,874	2,140	21.4	84.2	71-125	accept

Notes:

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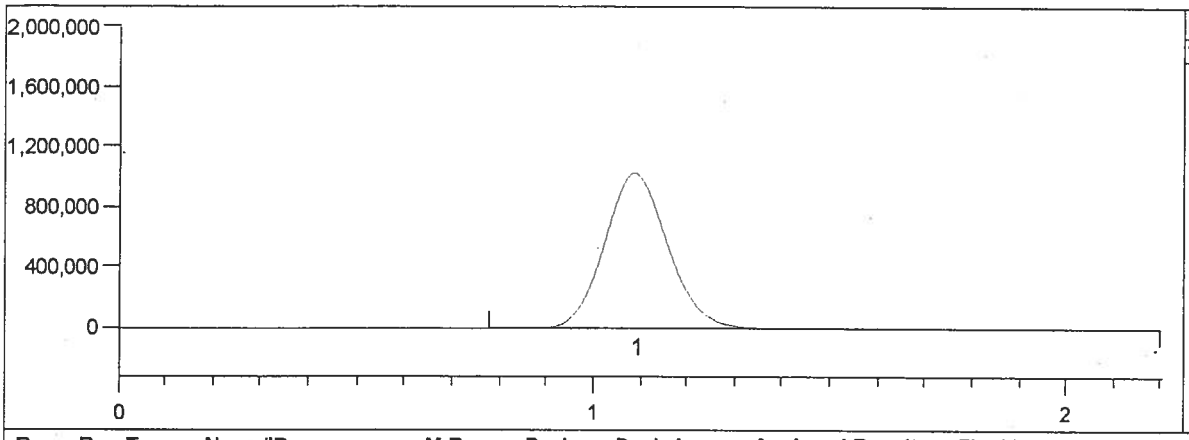
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

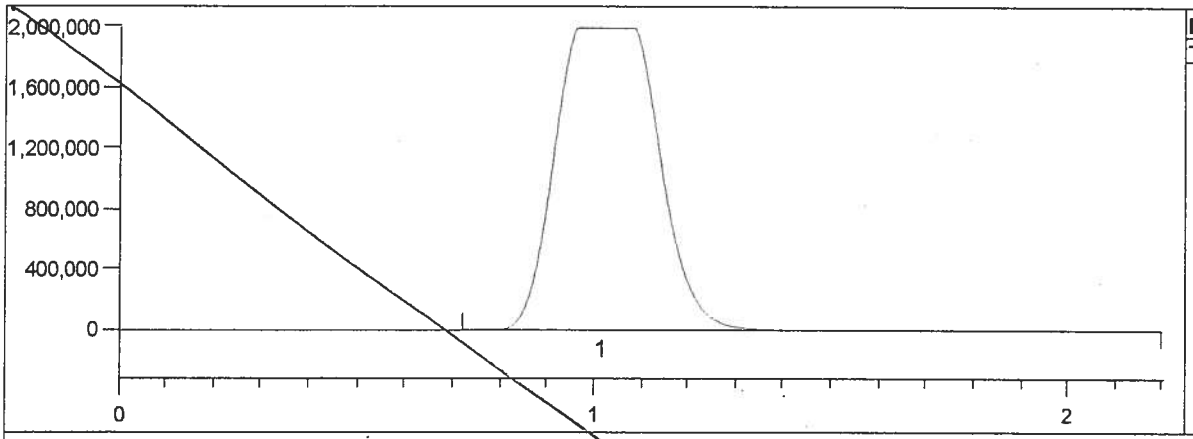


Date: 8/31/07
Time: 12:58 PM

Peak	rt	Area
1	1.11	99,418,338

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
31	S	K0706398-004		1	99,418,338	10,500	525		< HS	accept

Notes:



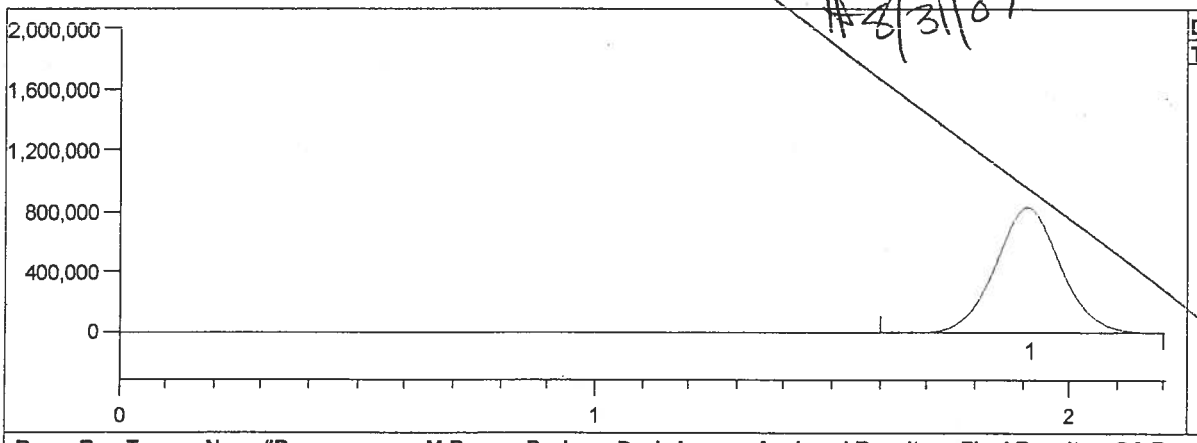
Date: 8/31/07
Time: 1:26 PM

Peak	rt	Area
1	1.02	>318,142,968

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
32	S	K0704566-001		1	>318,142,968	33,600	67,200		< HS	reject

Notes:

#8/31/07



Date: 8/31/07
Time: 1:46 PM

Peak	rt	Area
1	1.95	82,610,833

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
33	S	K0704566-001		1	82,610,833	8,720	872,000		< HS	reject

Notes:

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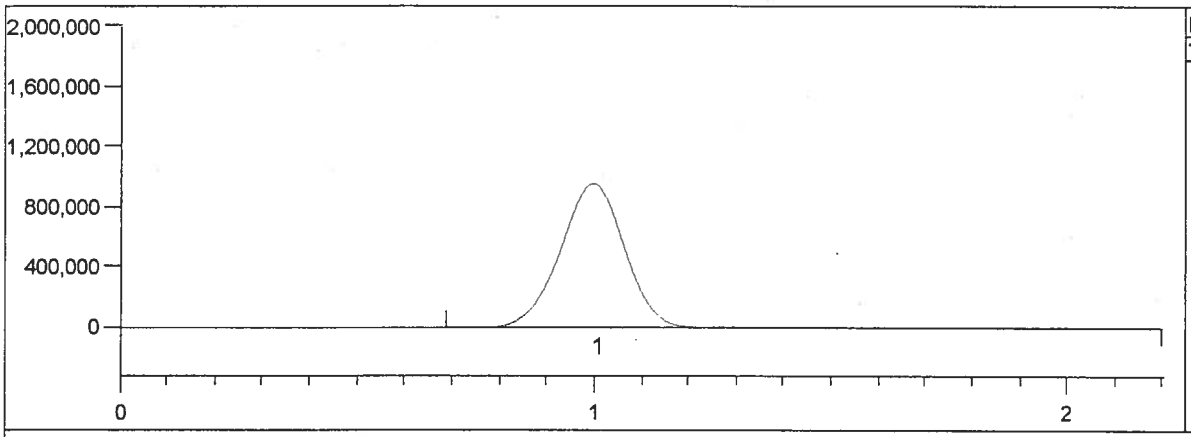
Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

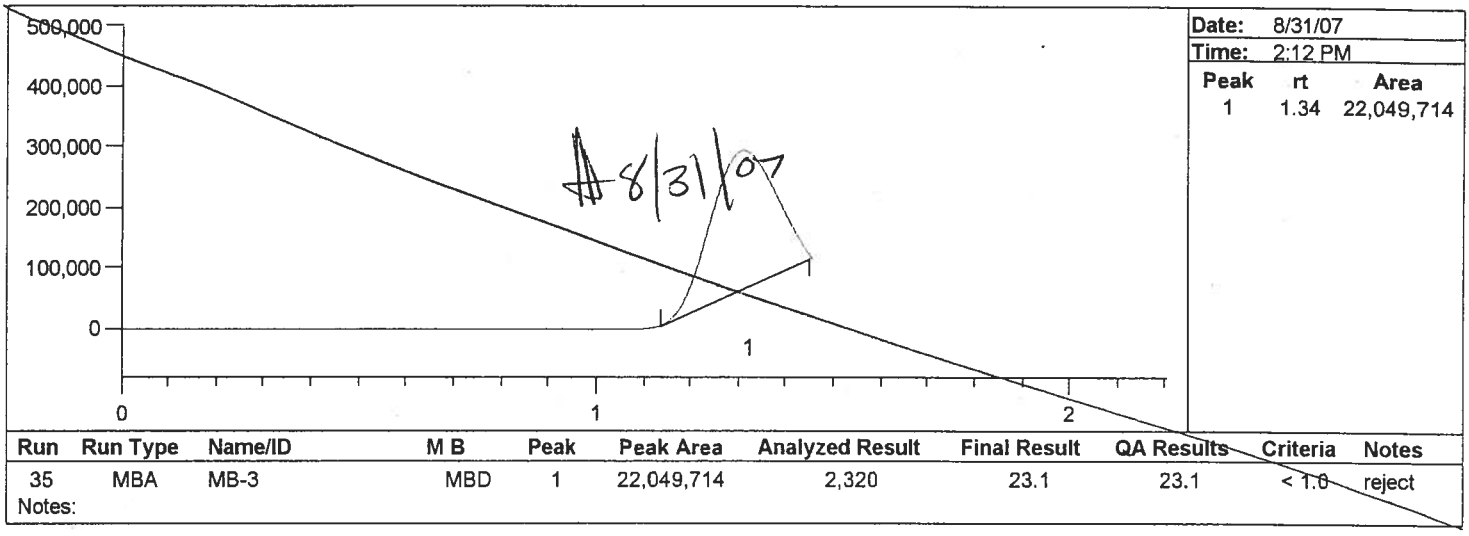


Date: 8/31/07
Time: 2:09 PM

Peak	rt	Area
1	1.02	92,608,038

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
34	S	K0704566-001		1	92,608,038	9,770	977,000		< HS	accept

Notes:

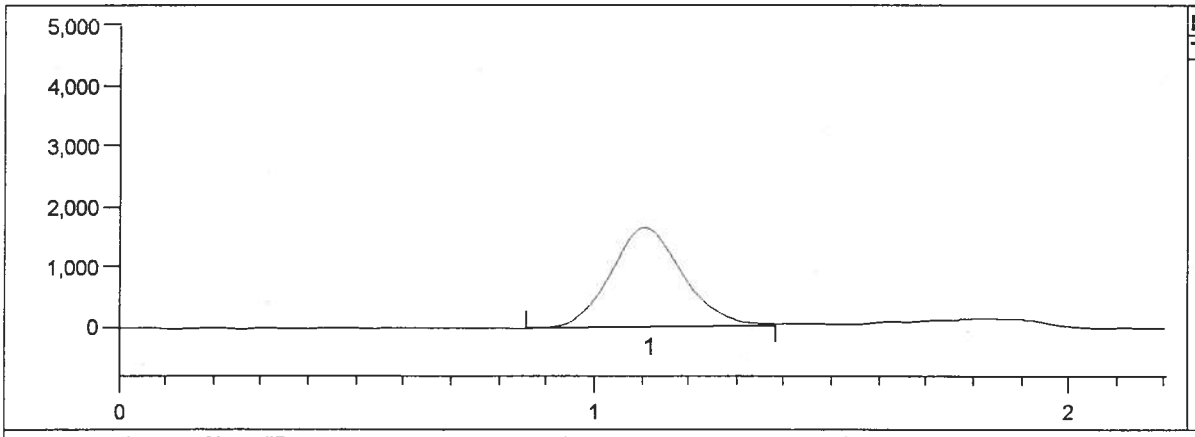


Date: 8/31/07
Time: 2:12 PM

Peak	rt	Area
1	1.34	22,049,714

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
35	MBA	MB-3	MBD	1	22,049,714	2,320	23.1	23.1	< 1.0	reject

Notes:



Date: 8/31/07
Time: 2:27 PM

Peak	rt	Area
1	1.12	177,706

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
36	MBA	MB-3	MBD	1	177,706	14.0	0.0288	0.0288	< 1.0	accept

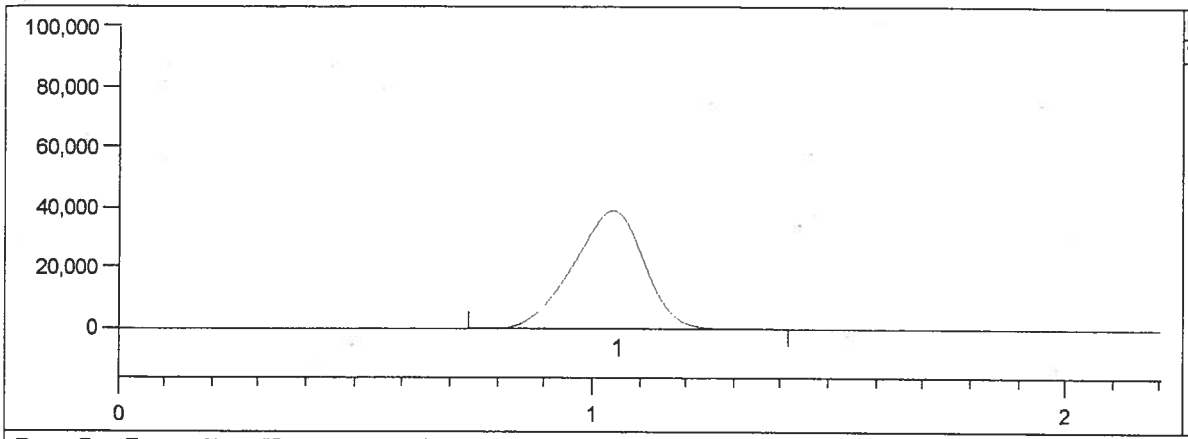
Notes:

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Batch Number: KP0613639
Method Number: EPA 1631E.001

Project Number(s): WATERS
Instrument ID: K-AFS-01

Date Analyzed: 8/31/07
Analyst Name: Dena

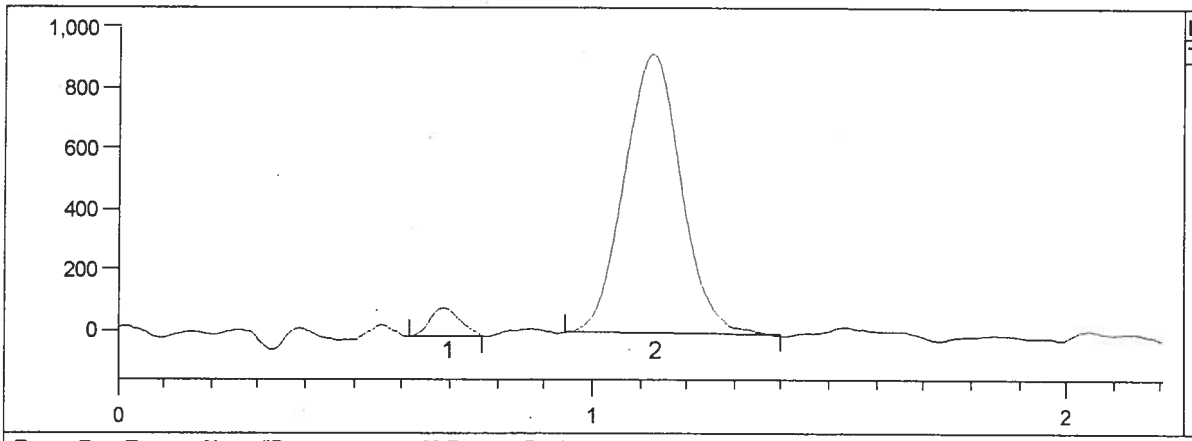


Date: 8/31/07
Time: 2:30 PM

Peak	rt	Area
1	1.06	4,201,069

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
37	OPR	OPR-2	MBD	1	4,201,069	439	4.28	85.5	77-123	accept

Notes:



Date: 8/31/07
Time: 2:32 PM

Peak	rt	Area
1	0.70	4,531
2	1.15	79,411

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
38	CB	BB (OPR)		2	79,411	8.38		8.38	< 50	accept

Notes:

HgGuru ver 3.0 (c) 2003 Brooks Rand LLC

Summary: DATA VALID ? YES NO

Analytical Laboratory Data Validation Check Sheet

Job Name: CONDIT Job Number: 53886 / 5

Date of Review: 12/oct/07 Lab Name: CAS Lab Batch Id #: K0706388

Chain of Custody

1.) Correct containers used ? yes no

2.) Correct preservative (if any) used ? yes no

3.) Signature blocks complete and ending with lab ? Missing Sig Pg yes no

4.) Analyses requested matches analyses reported ? Klein Added yes no

5.) Sample identification number matches with lab report ? yes no

6.) Trip Blank Submitted ? yes no

7.) Field Blank Submitted ? yes no

Timing

8.) Samples extracted within holding time ? yes no

9.) Analysis performed within holding time ? yes no

Quality Assurance/Quality Control

10.) Lab Blank Completed ? yes no

11.) Lab, Field, or Trip Blank(s) reports contaminants ? yes no

If yes, indicate blank type, chemical(s) and concentration(s): Insignificant Mercury

12.) Are Reporting Limits raised ? (If yes, explain @ "Comments") yes no

Accuracy

13.) Surrogate Recovery within limits (Default 70-130 %)? Not applicable yes no

14.) Matrix Spike (MS) Recovery within limits (Default 70-130 %)? 1 yes no

15.) Matrix Spike Duplicate (MSD) Recovery within limits (Default 70-130 %)? yes no

If no, list exceptions: _____

Precision

16.) Rel. % Diff. (RPD) within limits (Default 25%) ? yes no

17.) RPD calculation for Field Duplicates within limits (Default 25%) ? NA yes no

Comments:

1) Sulfide may be high biased high RPD w/ Sulfide - high variability

Initial Review By: DK **Final** Review By: _____

1317 South 13th Avenue P.O. Box 479 Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

October 1, 2007 Analytical Report for Service Request No: K0707329

David King
Kleinfelder
15050 SW Koll Parkway
Suite L
Beaverton, OR 97006

RE: Condit Dam/83616

Dear David:

Enclosed are the results of the sample(s) submitted to our laboratory on August 16, 2007. For your reference, these analyses have been assigned our service request number K0707329.

All analyses were performed according to our laboratory's quality assurance program. Where applicable, the methods cited conform to the Methods Update Rule (effective 4/11/2007), which relates to the use of analytical methods for the drinking water and waste water programs. The test results meet requirements of the NELAC standards. Exceptions are noted in the case narrative report where applicable. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3260. You may also contact me via Email at HJacky@kelso.caslab.com.

Respectfully submitted,

Columbia Analytical Services, Inc.

Harvey Jacky
Project Chemist

HJ/ds

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc.
Kelso, WA
State Certifications, Accreditations, and Licenses

Program	Number
Alaska DEC UST	UST-040
Arizona DHS	AZ0339
Arkansas - DEQ	88-0637
California DHS	2286
Colorado DPHE	-
Florida DOH	E87412
Hawaii DOH	-
Idaho DHW	-
Indiana DOH	C-WA-01
Louisiana DEQ	3016
Louisiana DHH	LA050010
Maine DHS	WA0035
Michigan DEQ	9949
Minnesota DOH	053-999-368
Montana DPHHS	CERT0047
Nevada DEP	WA35
New Jersey DEP	WA005
New Mexico ED	-
North Carolina DWQ	605
Oklahoma DEQ	9801
Oregon - DHS	WA200001
South Carolina DHEC	61002
Utah DOH	COLU
Washington DOE	C1203
Wisconsin DNR	998386840
Wyoming (EPA Region 8)	-

Case Narrative

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Kleinfelder	**Service Request No.:**	k0707329
Project:	Condit Dam / 83616	**Date Received:**	09/17/07
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Seven soil samples were received for analysis at Columbia Analytical Services on 09/17/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Approved by _____ **Date** 10/1/07

Chain of Custody Documentation

SQUIER ASSOCIATES
4260 Galewood
Post Office Box 1317
Lake Oswego, Oregon
97035
(503) 635-4419
Fax 635-1430

Chain of Custody

LABORATORY NUMBER: K0707329
LABORATORY NAME: _____

0008

Project Manager: David E King
Project Name: Cardlet Dam
Project Number: 03616
Site Location: Washington
Sampled By: SS, CW

TURN AROUND TIME

☐ 24 hr. ☐ 48 hr. ☐ 5 day ☑ 10 day

LAB ID	SAMPLE ID	DATE	TIME	MATRIX	NUMBER OF CONTAINERS
	SP1-071707	7/17/07	1345	soil	1
	SP2-071707		1540		1
	SP3-071707		1700		1
	SP4-071707		1800		1
	MC-071807	7/18/07	1525		2
	BC-071807		1615		1
	LBC-071807		1600		2
	Total Number of Containers:				9

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS											ORGANICS							INORG.			TCLP			OTHER						
TPH-HCID State: OR/WA	TPH-G State: OR/WA	TPH-D State: OR/WA	418.1M State: OR/WA	EPA 418.1	8270 SIM	8020M-BETX only	8310 HPLC PAHs	7421 Lead	TCLP Cr, Cd, Pb	8010 Halogenated VOCs	8020 Aromatic VOCs	8040 Phenols	8240 GCMS Volatiles	8270 GCMS Semivolatiles	8080 OC Pesticides/PCBs	8080M PCBs only	Drinking Water (8)	Priority Pol. Metals (13)	ICP Metal Scan (22)	TCLP Metals (8)	TCLP Vol. 8240 ZH-EXT	TCLP Semivolatiles 8270	Mercury (Hg) 7471A						
																							X						
																							X						
																							X						
																							X						
																							X						
																							X						
																							X						

Special Instructions:

RELINQUISHED BY: 1.
Signature: _____ Time: 12:10
Company: KLEINFELDER Date: 8/16/07

RECEIVED BY: 1.
Signature: _____ Time: 8/16/07
Company: _____ Date: 12.10
Container: CAS
Sealed: Y N Iced: Y N

RELINQUISHED BY: 2.
Signature: _____ Time: 3:00
Company: CAS Date: 8-16-07

RECEIVED BY: 2.
Signature: Amanda Juff Time: 1500
Company: CAS Date: 8/16
Container:
Sealed: Y N Iced: Y N

RELINQUISHED BY: 3.
Signature: Time:
Company: Date:

RECEIVED BY: 3.
Signature: Time:
Company: Date:
Container:
Sealed: Y N Iced: Y N

DISTRIBUTION: White, Canary = Analytical Laboratory; Pink = Squier Files

Columbia Analytical Services, Inc.
Cooler Receipt and Preservation Form

PC 47

Client / Project: Kleinfelder Service Request K07 07329

Received: 8/6/07 Opened: 8/6/07 By: DW

1. Samples were received via? *US Mail* *Fed Ex* *UPS* *DHL* *GH* *GS* *PDX* (*Courier*) *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* (*Other*) *NA*
3. Were custody seals on coolers? (NA) Y N If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N
4. Is shipper's air-bill filed? If not, record air-bill number: _____ (NA) Y N
5. **Temperature of cooler(s) upon receipt (°C):** _____
   Temperature Blank (°C): _____
6. If applicable, list Chain of Custody Numbers: _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Packing material used. *Inserts* *Bubble Wrap* *Gel Packs* *Wet Ice* *Sleeves* *Other* _____
9. **Did all bottles arrive in good condition (unbroken)?** *Indicate in the table below.* NA (Y) N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? (Y) N
11. Did all sample labels and tags agree with custody papers? *Indicate in the table below* (Y) N
12. **Were the correct types of bottles used for the tests indicated?** NA (Y) N
13. Were all of the preserved bottles received at the lab with the appropriate pH? *Indicate in the table below* (NA) Y N
14. Were VOA vials and 1631 Mercury bottles checked for absence of air bubbles? *Indicate in the table below.* (NA) Y N
15. **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** (NA) Y N
16. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broken	pH	Reagent	Volume added	Reagent Lot Number	Initials

Additional Notes, Discrepancies, & Resolutions: _____

0009

Total Solids

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Kleinfelder
Project: Condit Dam/83616
Sample Matrix: Soil

Service Request: K0707329

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
SP1-071707	K0707329-001	07/17/2007	08/16/2007	08/17/2007	99.6	
SP2-071707	K0707329-002	07/17/2007	08/16/2007	08/17/2007	92.1	
SP3-071707	K0707329-003	07/17/2007	08/16/2007	08/17/2007	98.4	
SP4-071707	K0707329-004	07/17/2007	08/16/2007	08/17/2007	99.4	
MC-071807	K0707329-005	07/18/2007	08/16/2007	08/17/2007	99.6	
BC-071807	K0707329-006	07/18/2007	08/16/2007	08/17/2007	99.1	
LBC-071807	K0707329-007	07/18/2007	08/16/2007	08/17/2007	99.2	

0011

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Kleinfelder	**Service Request:**	K0707329
Project:	Condit Dam/83616	**Date Collected:**	07/18/2007
Sample Matrix:	Sediment	**Date Received:**	08/16/2007
		Date Analyzed:	08/17/2007

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
LBC-071807	K0707329-007	99.2	99.6	99.4	<1	

0012

Metals

COLUMBIA ANALYTICAL SERVICES, INC.

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client : Kleinfelder
Project Name : Condit Dam
Project No. : 83616

Service Request : K0707329

Sample Name :	Lab Code :
SP1-071707	K0707329-001
SP2-071707	K0707329-002
SP3-071707	K0707329-003
SP4-071707	K0707329-004
MC-071807	K0707329-005
BC-071807	K0707329-006
LBC-071807	K0707329-007
Method Blank	K0707329-MB
Batch QC	K0707606-001
Batch QC	K0707606-001D
Batch QC	K0707606-001S

Comments:

Approved By: _____ Date: 10/1/07

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	07/17/07
Project No. :	83616	**Date Received :**	08/16/07
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	SP1-071707	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-001	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.02	09/18/07	0.29	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	07/17/07
Project No. :	83616	**Date Received :**	08/16/07
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	SP2-071707	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-002	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.02	09/18/07	0.11	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	07/17/07
Project No. :	83616	**Date Received :**	08/16/07
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	SP3-071707	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-003	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.02	09/18/07	0.08	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	07/17/07
Project No. :	83616	**Date Received :**	08/16/07
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	SP4-071707	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-004	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.02	09/18/07	0.10	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	07/18/07
Project No. :	83616	**Date Received :**	08/16/07
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	MC-071807	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-005	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.2	09/18/07	1.2	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	07/18/07
Project No. :	83616	**Date Received :**	08/16/07
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	BC-071807	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-006	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.02	09/18/07	0.73	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	07/18/07
Project No. :	83616	**Date Received :**	08/16/07
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	LBC-071807	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-007	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.03	09/18/07	0.85	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	NA
Project No. :	83616	**Date Received :**	NA
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	Method Blank	**Units :**	mg/Kg (ppm)
Lab Code :	K0707329-MB	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.01	09/18/07	ND	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	NA
Project No. :	83616	**Date Received :**	NA
Matrix :	Soil	**Date Extracted :**	09/17/07

Total Metals

Sample Name :	Batch QC	**Units :**	mg/Kg (ppm)
Lab Code :	K0707606-001	**Basis :**	Dry

Analyte	Analysis Method	MRL	Date Analyzed	Sample Result	Result Notes
Mercury	7471A	0.02	09/18/07	0.03	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Kleinfelder
Project Name : Condit Dam
Project No. : 83616
Matrix : Soil

Service Request : K0707329
Date Collected : NA
Date Received : NA
Date Extracted : 09/17/07
Date Analyzed : 09/18/07

Duplicate Summary
Total Metals

Sample Name : Batch QC
Lab Code : K0707606-001D

Units : mg/Kg (ppm)
Basis : Dry

Analyte	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Mercury	7471A	0.02	0.03	0.02	0.02	40	

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Kleinfelder	**Service Request :**	K0707329
Project Name :	Condit Dam	**Date Collected :**	NA
Project No. :	83616	**Date Received :**	NA
Matrix :	Soil	**Date Extracted :**	09/17/07
		Date Analyzed :	09/18/07

Matrix Spike Summary
Total Metals

Sample Name :	Batch QC	**Units :**	mg/Kg (ppm)
Lab Code :	K0707606-001S	**Basis :**	Dry

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	0.02	0.4	0.03	0.46	98	60-123	

Comments:

Summary: DATA VALID ? YES NO

Analytical Laboratory Data Validation Check Sheet

Job Name: CONDIT Job Number: 53886/5

Date of Review: 01/NOV/07 Lab Name: COLUMBIA Lab Batch Id #: K0707329

Chain of Custody

1.) Correct containers used ? yes no

2.) Correct preservative (if any) used ? NA yes no

3.) Signature blocks complete and ending with lab ? yes no

4.) Analyses requested matches analyses reported ? yes no

5.) Sample identification number matches with lab report ? yes no

6.) Trip Blank Submitted ? yes no

7.) Field Blank Submitted ? yes no

Timing

8.) Samples extracted within holding time ? yes no

9.) Analysis performed within holding time ? yes no

Quality Assurance/Quality Control

10.) Lab Blank Completed ? yes no

11.) Lab, Field, or Trip Blank(s) reports contaminants ? yes no

If yes, indicate blank type, chemical(s) and concentration(s):

12.) Are Reporting Limits raised ? (If yes, explain @ "Comments") yes no

Accuracy

13.) Surrogate Recovery within limits (Default 70-130 %)? NA yes no

14.) Matrix Spike (MS) Recovery within limits (Default 70-130 %)? 98% yes no

15.) Matrix Spike Duplicate (MSD) Recovery within limits (Default 70-130 %)? yes no NA

If no, list exceptions:

Precision

16.) Rel. % Diff. (RPD) within limits (Default 25%) ? 40 - 0.02 RS 0.03 yes no OK

17.) RPD calculation for Field Duplicates within limits (Default 25%) ? NA yes no

Comments:

Initial Review By: DAL **Final** Review By:

APPENDIX D

Northwest Testing, Inc.
A Division of Northwest Geotech, Inc
9120 SW Pioneer Court, Suite B • Wilsonville, Oregon 97070 503/682-1880 FAX: 503/682-2753

TECHNICAL REPORT

Report To:	Mr. David E. King, RG, LHG, REA Kleinfelder 15050 SW Knoll Parkway Suite L Beverton, Oregon 97006	**Date:** **Lab No:**	8/8/07 07-266
Project:	Laboratory Testing – 53886/5	**Project No.:**	1643.1.1

Report of: Sieve analysis and hydrometer analysis of soil test results

Sample Identification

NTI determined the sieve analysis and hydrometer analysis on soil samples delivered to our laboratory on July 20, 2007. Testing was performed in accordance with the standards indicated. Our laboratory test results are summarized on the following tables and attached pages.

Laboratory Testing

Sample Id: MC

Sieve Analysis of Aggregate (ASTM C136/ C117)	
Sieve Size	**Percent Passing**
¼"	100
#4	100
#8	99
#10	99
#16	98
#30	97
#40	97
#50	97
#100	94
#120	93
#200	89.2
#230	89.4

Copies: Addressee

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Northwest Testing, Inc.
A Division of Northwest Geotech, Inc.
9120 SW Pioneer Court, Suite B • Wilsonville, Oregon 97070 503/682-1880 FAX: 503/682-2753

TECHNICAL REPORT

Report To:	Mr. David E. King, RG, LHG, REA Kleinfelder 15050 SW Knoll Parkway Suite L Beverton, Oregon 97006	**Date:** **Lab No:**	8/8/07 07-266
Project:	Laboratory Testing – 53886/5	**Project No.:**	1643.1.1

Laboratory Testing

Sample Id: BC

Sieve Analysis of Aggregate (ASTM C136/ C117)	
Sieve Size	**Percent Passing**
¼"	100
#4	99
#8	98
#10	97
#16	94
#30	89
#40	87
#50	82
#100	60
#120	59
#200	45.7
#230	43.9

Sample Id: LBC

Sieve Analysis of Aggregate (ASTM C136/ C117)	
Sieve Size	**Percent Passing**
¼"	100
#4	99
#8	99
#10	99
#16	98
#30	95
#40	91
#50	82
#100	65
#120	61
#200	53.0
#230	49.7

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Northwest Testing, Inc.
A Division of Northwest Geotech, Inc
9120 SW Pioneer Court, Suite B • Wilsonville, Oregon 97070 503/682-1880 FAX: 503/682 2753

TECHNICAL REPORT

Report To:	Mr. David E. King, RG, LHG, REA Kleinfelder 15050 SW Knoll Parkway Suite L Beverton, Oregon 97006	**Date:** **Lab No:**	8/8/07 07-266
Project:	Laboratory Testing – 53886/5	**Project No.:**	1643.1.1

Laboratory Testing

Sample Id: SP1

Sieve Analysis of Aggregate (ASTM C136/ C117)	
Sieve Size	**Percent Passing**
¼"	100
#4	100
#8	100
#10	100
#16	98
#30	95
#40	94
#50	90
#100	65
#120	56
#200	20.4
#230	14.7

Sample Id: SP2

Sieve Analysis of Aggregate (ASTM C136/ C117)	
Sieve Size	**Percent Passing**
¼"	100
#4	100
#8	98
#10	97
#16	93
#30	88
#40	85
#50	82
#100	74
#120	65
#200	59.2
#230	52.7

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Northwest Testing, Inc.
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9120 SW Pioneer Court, Suite B • Wilsonville, Oregon 97070 503/682-1880 FAX: 503/682-2753

TECHNICAL REPORT

Report To:	Mr. David E. King, RG, LHG, REA Kleinfelder 15050 SW Knoll Parkway Suite L Beverton, Oregon 97006	**Date:**	8/8/07
		Lab No:	07-266
Project:	Laboratory Testing – 53886/5	**Project No.:**	1643.1.1

Laboratory Testing

Sample Id: SP3

Sieve Analysis of Aggregate (ASTM C136/ C117)	
Sieve Size	**Percent Passing**
¼"	100
#4	100
#8	100
#10	100
#16	98
#30	94
#40	78
#50	61
#100	40
#120	35
#200	23.3
#230	20.7

Sample Id: SP4

Sieve Analysis of Aggregate (ASTM C136/ C117)	
Sieve Size	**Percent Passing**
¾"	100
½"	71
⅜"	61
¼"	55
#4	49
#8	42
#10	40
#16	37
#30	27
#40	18
#50	12
#100	6
#120	5
#200	3.0
#230	2.5

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Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	SP5		

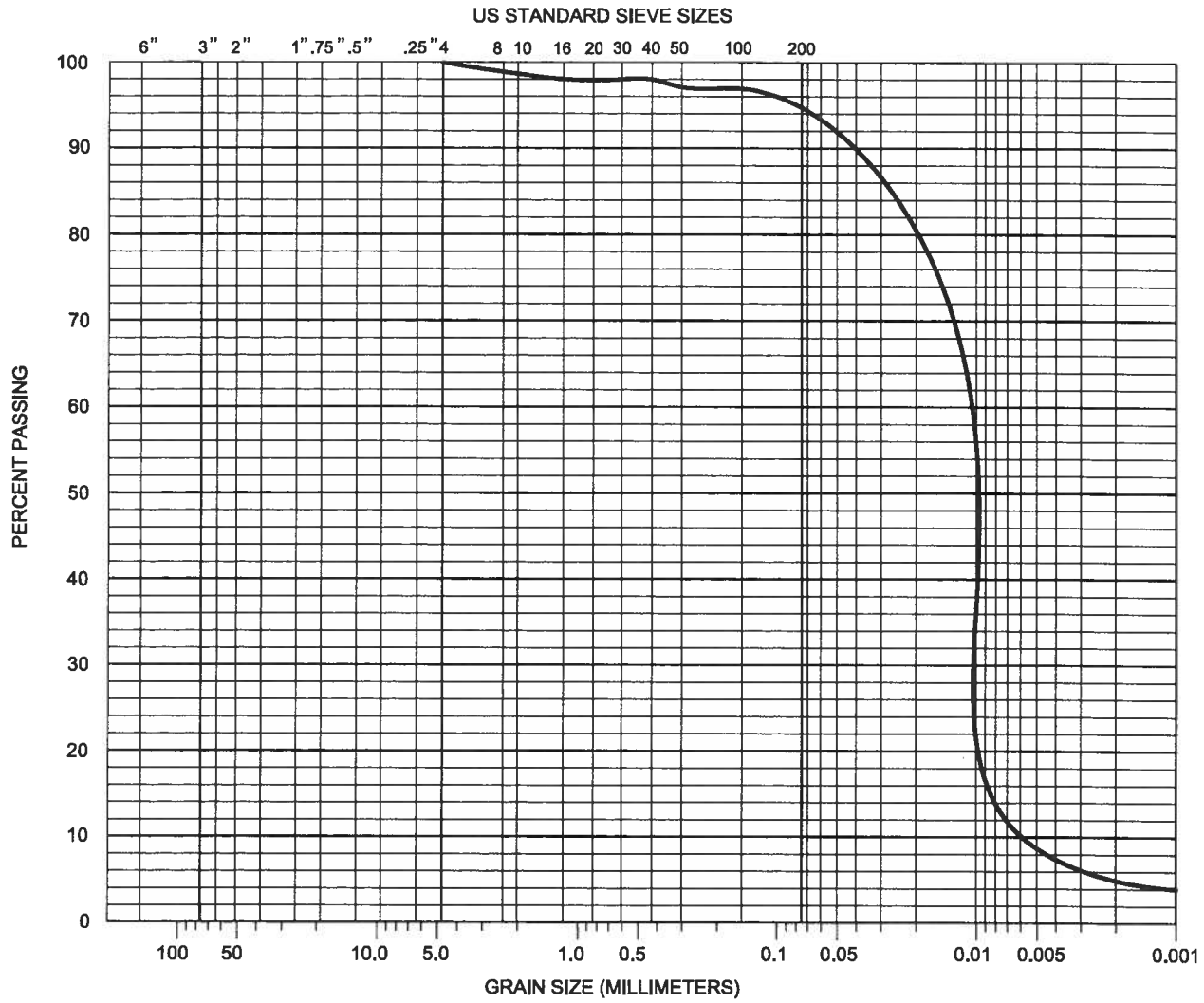
Weight Retained on the #10	1.88	1.20	Tare	13.57	g
Weight Passing the #10	157.48	98.80	Wet Weight + Tare	50.23	g
Total Wet Sample Weight	159.36		Dry Weight + Tare	49.51	g
Total Dry Sample Weight	156.23		Moisture Content	2.00	%

Hydrometer					
Air Dry Weight of Sample Used	66.45		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	65.14	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	65.94	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	61	6	55	72	22	7.3	0.01337	0.025500	84.2
5	50	6	44	72	22	9.1	0.01337	0.018016	67.4
15	33	6	27	72	22	11.9	0.01337	0.011892	41.4
30	24	6	18	72	22	13.3	0.01337	0.008917	27.6
60	13	6	7	72	22	15.1	0.01337	0.006718	10.7
275	12	6	6	72	22	15.3	0.01337	0.003155	9.2
1440	9	6	3	72	22	15.8	0.01337	0.001401	4.6

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0	0.00	100
#4	4.75	0.05	0.03	100
#8	2.36	1.51	0.97	99
#10	2.00	1.88	1.20	99
#16	1.18	0.30	0.45	98
#30	0.60	0.48	0.73	98
#40	0.43	0.63	0.96	98
#50	0.30	0.90	1.36	97
#100	0.15	1.40	2.12	97
#200	0.075	2.45	3.72	95
pan		2.64	4.00	95



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	SP5	–	95.0	5	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	LWS		

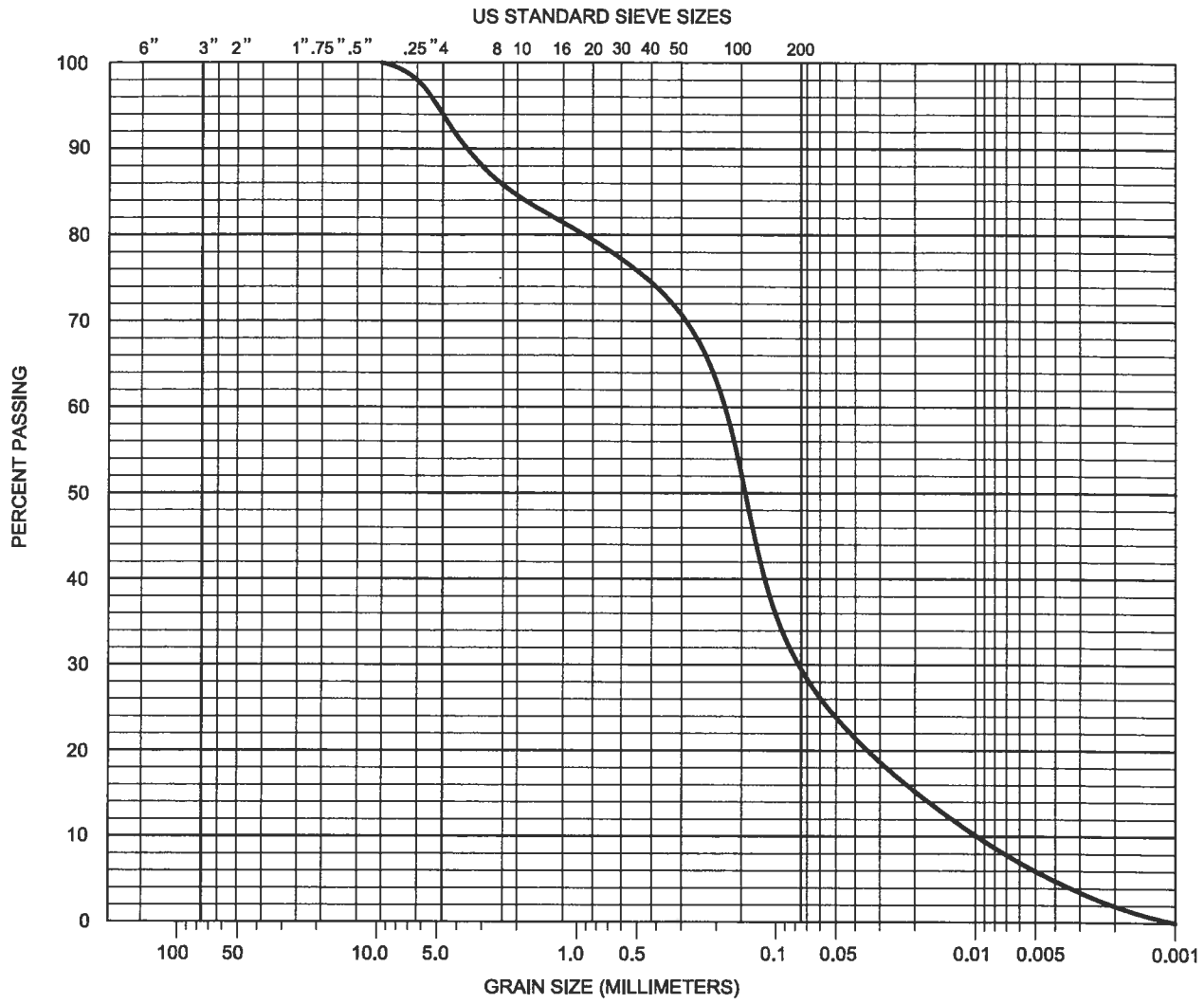
Weight Retained on the #10	34.74	15.58	Tare	14.74	g
Weight Passing the #10	198.74	84.42	Wet Weight + Tare	63.38	g
Total Wet Sample Weight	233.48		Dry Weight + Tare	61.18	g
Total Dry Sample Weight	222.92		Moisture Content	4.74	%

Hydrometer					
Air Dry Weight of Sample Used	64.97		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	62.03	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	73.48	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	20	6	14	72	22	14.0	0.01337	0.035372	19.2
5	18	6	12	72	22	14.3	0.01337	0.022632	16.5
15	14	6	8	72	22	15.0	0.01337	0.013362	11.0
30	12	6	6	72	22	15.3	0.01337	0.009552	8.2
60	11	6	5	72	22	15.5	0.01337	0.006790	6.9
275	9	6	3	72	22	15.8	0.01337	0.003205	4.1
1440	7	6	1	72	22	16.1	0.01337	0.001415	1.4

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	5.48	2.46	98
#4	4.75	12.75	5.72	94
#8	2.36	31.03	13.92	86
#10	2.00	34.74	15.58	84
#16	1.18	2.70	3.67	81
#30	0.60	5.06	6.89	78
#40	0.43	6.72	9.14	75
#50	0.30	9.93	13.51	71
#100	0.15	24.11	32.81	52
#200	0.075	39.70	54.03	30
pan		41.56	56.56	28



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	LWS	–	30.0	2	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	WR		

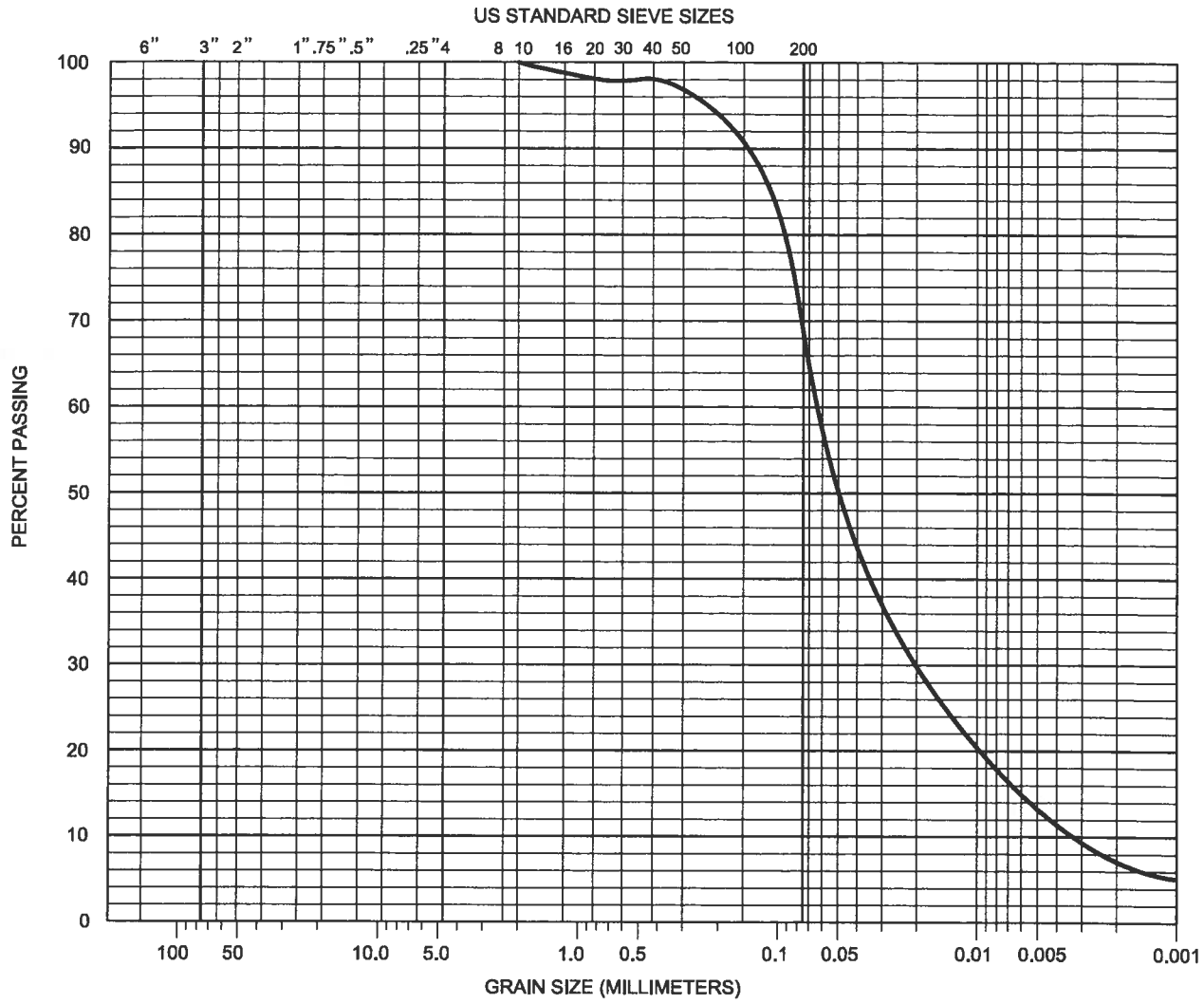
Weight Retained on the #10	0.15	0.10	Tare	13.57	g
Weight Passing the #10	151.98	99.90	Wet Weight + Tare	43.11	g
Total Wet Sample Weight	152.13		Dry Weight + Tare	41.59	g
Total Dry Sample Weight	144.30		Moisture Content	5.42	%

Hydrometer					
Air Dry Weight of Sample Used	57.16		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	54.22	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	54.28	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	27	6	21	72	22	12.9	0.01337	0.033891	39.1
5	20	6	14	72	22	14.0	0.01337	0.022371	26.1
15	17	6	11	72	22	14.5	0.01337	0.013141	20.5
30	15	6	9	72	22	14.8	0.01337	0.009397	16.7
60	14	6	8	72	22	15.0	0.01337	0.006681	14.9
275	11	6	5	72	22	15.5	0.01337	0.003172	9.3
1440	9	6	3	72	22	15.8	0.01337	0.001401	5.6

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0	0.00	100
#4	4.75	0	0.00	100
#8	2.36	0.03	0.02	100
#10	2.00	0.15	0.10	100
#16	1.18	0.22	0.41	99
#30	0.60	0.77	1.42	98
#40	0.43	1.28	2.36	98
#50	0.30	1.81	3.33	97
#100	0.15	4.60	8.48	91
#200	0.075	17.39	32.04	68
pan		21.41	39.45	60



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	WR	–	68.0	7	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	NW1		

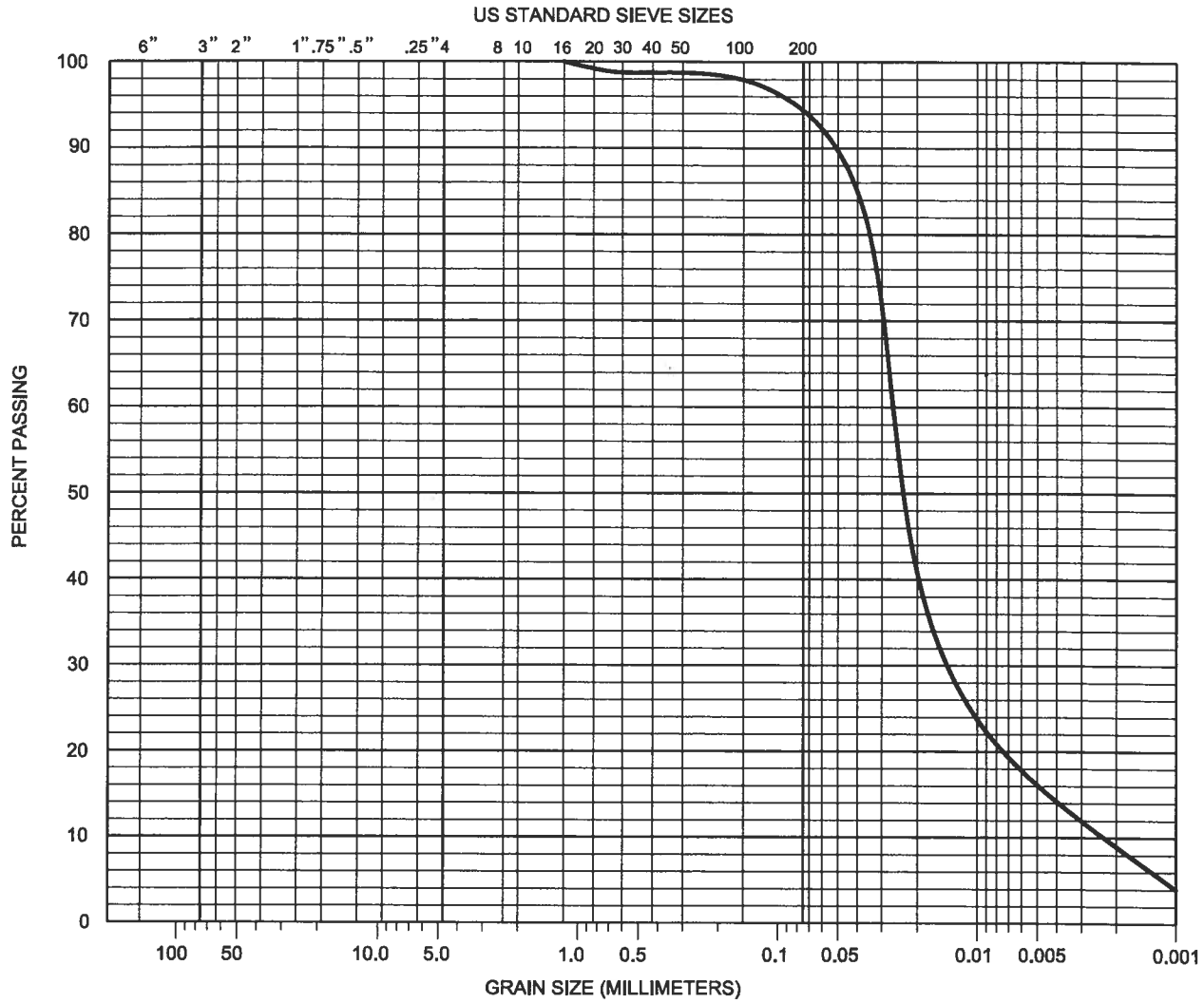
Weight Retained on the #10	0.21	0.15	Tare	13.41	g
Weight Passing the #10	141.97	99.85	Wet Weight + Tare	50.84	g
Total Wet Sample Weight	142.18		Dry Weight + Tare	49.76	g
Total Dry Sample Weight	138.08		Moisture Content	2.97	%

Hydrometer					
Air Dry Weight of Sample Used	65.03		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	63.15	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	63.25	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature ?F	Temperature ?C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	50	6	44	72	22	9.1	0.01337	0.028486	70.3
5	36	6	30	72	22	11.4	0.01337	0.020166	47.9
15	26	6	20	72	22	13.0	0.01337	0.012454	31.9
30	20	6	14	72	22	14.0	0.01337	0.009133	22.4
60	17	6	11	72	22	14.5	0.01337	0.006571	17.6
275	14	6	8	72	22	15.0	0.01337	0.003121	12.8
1440	9	6	3	72	22	15.8	0.01337	0.001401	4.8

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0	0.00	100
#4	4.75	0	0.00	100
#8	2.36	0.02	0.01	100
#10	2.00	0.21	0.15	100
#16	1.18	0.11	0.17	100
#30	0.60	0.46	0.73	99
#40	0.43	0.67	1.06	99
#50	0.30	0.80	1.26	99
#100	0.15	1.10	1.74	98
#200	0.075	3.22	5.09	95
pan		4.32	6.83	93



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	NW1	–	95.0	9	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	NW2		

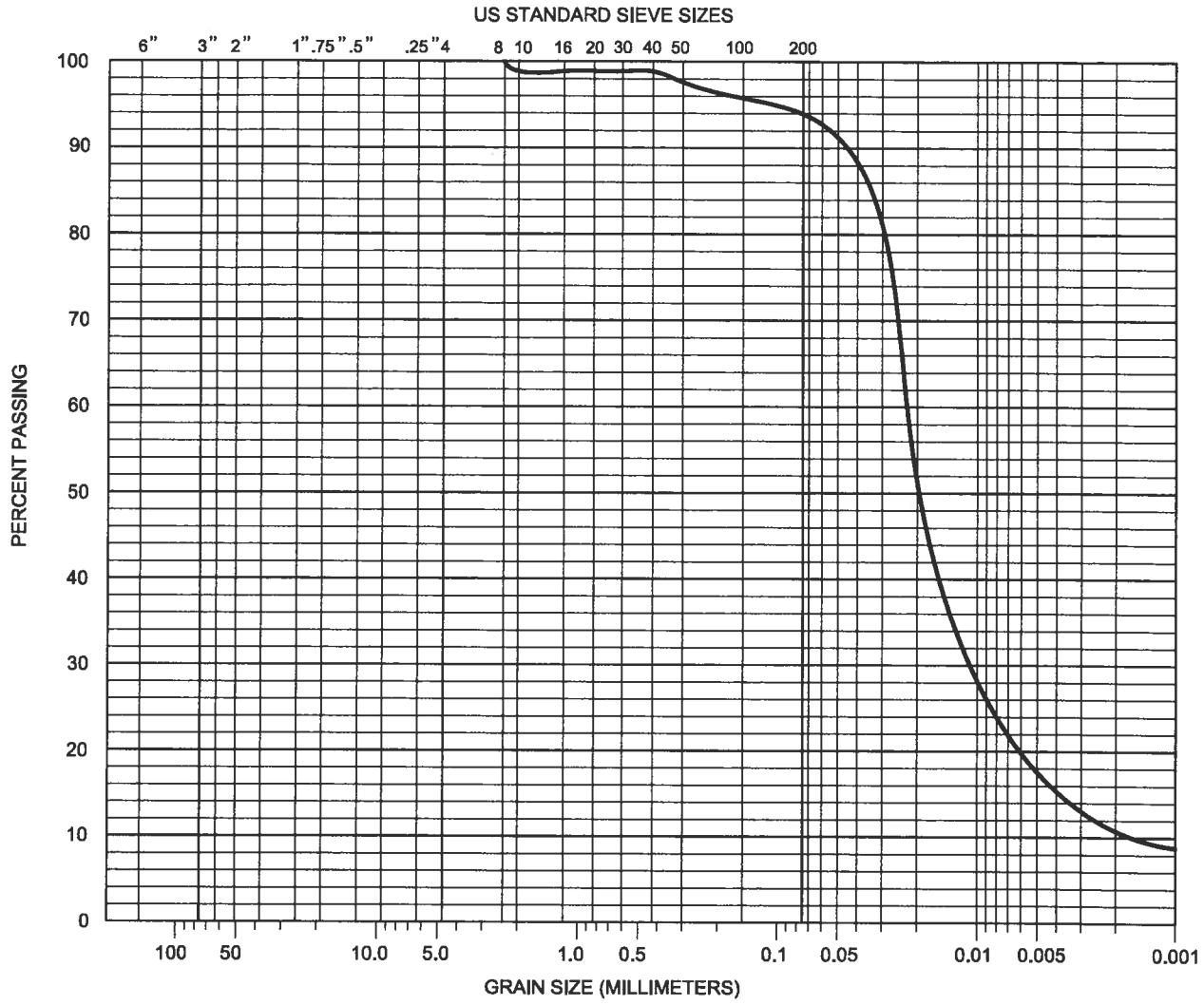
Weight Retained on the #10	0.7	0.62	Tare	13.43	g
Weight Passing the #10	114.45	99.38	Wet Weight + Tare	44.17	g
Total Wet Sample Weight	115.15		Dry Weight + Tare	43.35	g
Total Dry Sample Weight	112.08		Moisture Content	2.74	%

Hydrometer					
Air Dry Weight of Sample Used	53.94		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	52.50	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	52.83	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	44	6	38	72	22	10.1	0.01337	0.029990	72.6
5	34	6	28	72	22	11.7	0.01337	0.020455	53.5
15	25	6	19	72	22	13.2	0.01337	0.012532	36.3
30	21	6	15	72	22	13.8	0.01337	0.009079	28.7
60	18	6	12	72	22	14.3	0.01337	0.006533	22.9
275	13	6	7	72	22	15.1	0.01337	0.003138	13.4
1440	11	6	5	72	22	15.5	0.01337	0.001386	9.6

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0.1	0.09	100
#4	4.75	0.1	0.09	100
#8	2.36	0.4	0.36	100
#10	2.00	0.7	0.62	99
#16	1.18	0.05	0.09	99
#30	0.60	0.27	0.51	99
#40	0.43	0.42	0.79	99
#50	0.30	0.57	1.08	98
#100	0.15	0.93	1.76	98
#200	0.075	2.64	5.00	94
pan		5.14	9.73	90



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	NW2	–	94.0	11	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	NW3		

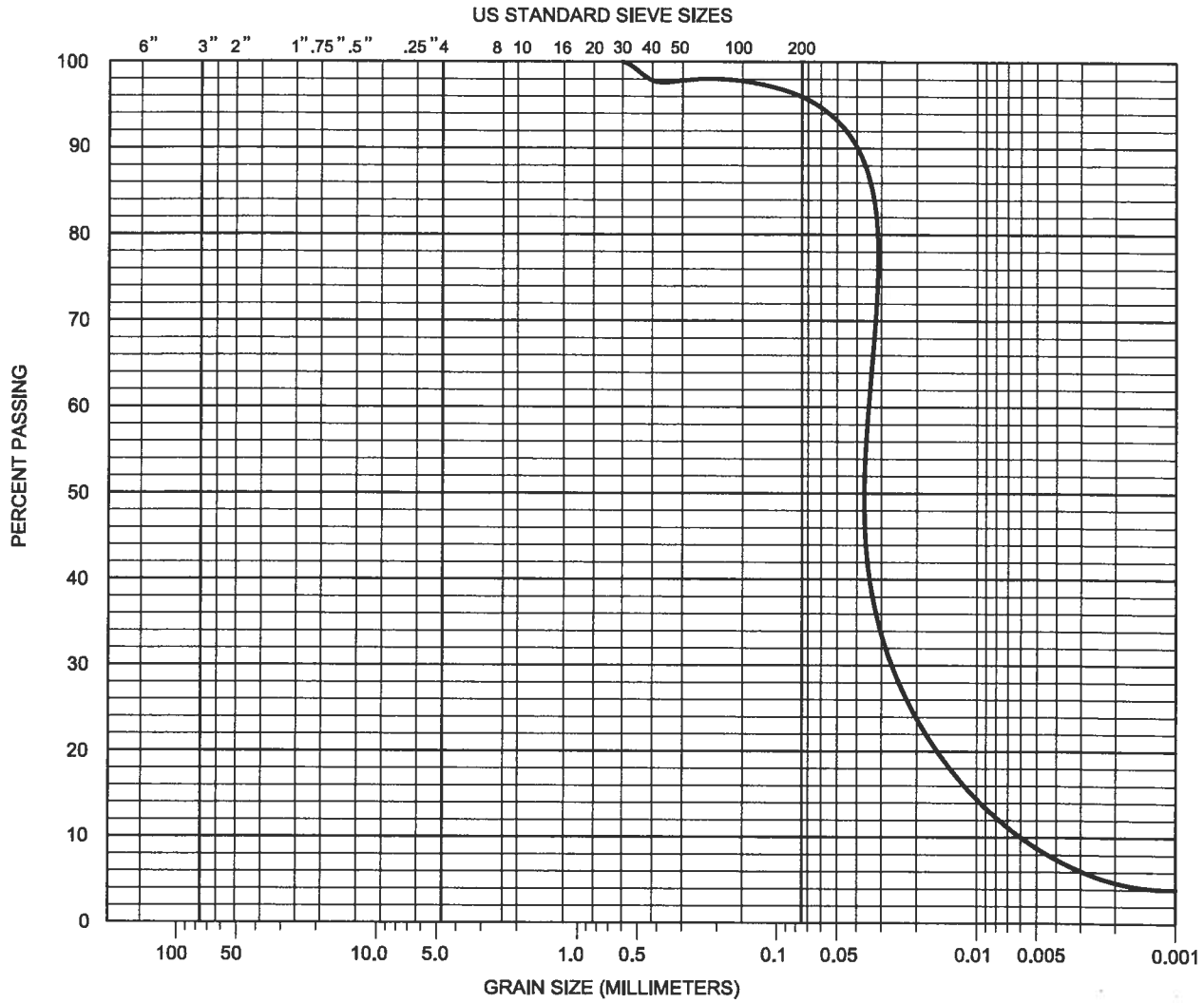
Weight Retained on the #10	0.07	0.05	Tare	13.40	g
Weight Passing the #10	151.26	99.95	Wet Weight + Tare	53.15	g
Total Wet Sample Weight	151.33		Dry Weight + Tare	52.30	g
Total Dry Sample Weight	148.09		Moisture Content	2.19	%

Hydrometer					
Air Dry Weight of Sample Used	65.02		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	63.63	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	63.66	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	31	7	24	72	22	12.4	0.01337	0.033236	38.1
5	23	6	17	72	22	13.5	0.01337	0.021975	27.0
15	20	6	14	72	22	14.0	0.01337	0.012916	22.2
30	15	6	9	72	22	14.8	0.01337	0.009397	14.3
60	13	6	7	72	22	15.1	0.01337	0.006718	11.1
275	10	6	4	72	22	15.6	0.01337	0.003188	6.3
1440	9	6	3	72	22	15.8	0.01337	0.001401	4.8

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0	0.00	100
#4	4.75	0	0.00	100
#8	2.36	0	0.00	100
#10	2.00	0	0.00	100
#16	1.18	0.04	0.06	100
#30	0.60	0.24	0.38	100
#40	0.43	0.35	0.55	99
#50	0.30	0.54	0.85	99
#100	0.15	0.94	1.48	99
#200	0.075	2.52	3.96	96
pan		8.59	13.49	87



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	NW3	–	96.0	5	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	NW4		

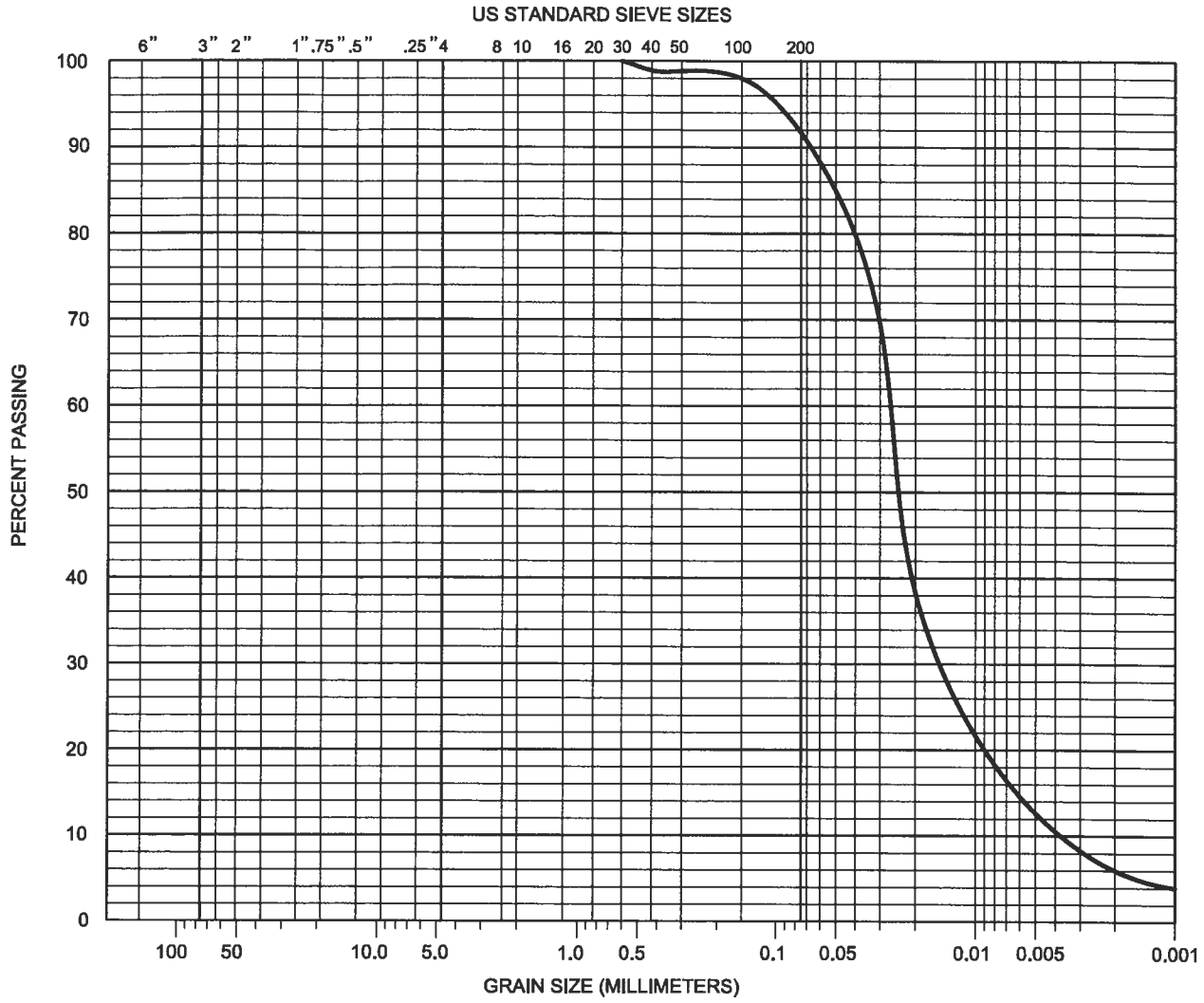
Weight Retained on the #10	0.2	0.17	Tare	15.87	g
Weight Passing the #10	123.03	99.83	Wet Weight + Tare	62.94	g
Total Wet Sample Weight	123.23		Dry Weight + Tare	62.00	g
Total Dry Sample Weight	120.77		Moisture Content	2.04	%

Hydrometer					
Air Dry Weight of Sample Used	58.68		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	57.51	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	57.60	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature $^{?}F$	Temperature $^{?}C$	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	46	7	39	72	22	9.9	0.01337	0.029745	68.4
5	28	6	22	72	22	12.7	0.01337	0.021297	38.6
15	23	6	17	72	22	13.5	0.01337	0.012687	29.8
30	19	6	13	72	22	14.2	0.01337	0.009186	22.8
60	15	6	9	72	22	14.8	0.01337	0.006645	15.8
275	11	6	5	72	22	15.5	0.01337	0.003172	8.8
1440	9	6	3	72	22	15.8	0.01337	0.001401	5.3

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0	0.00	100
#4	4.75	0	0.00	100
#8	2.36	0	0.00	100
#10	2.00	0	0.00	100
#16	1.18	0.00	0.00	100
#30	0.60	0.20	0.35	100
#40	0.43	0.36	0.62	99
#50	0.30	0.53	0.92	99
#100	0.15	0.93	1.61	98
#200	0.075	4.51	7.83	92
pan		15.01	26.06	74



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	NW4	–	92.0	6	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	NW5		

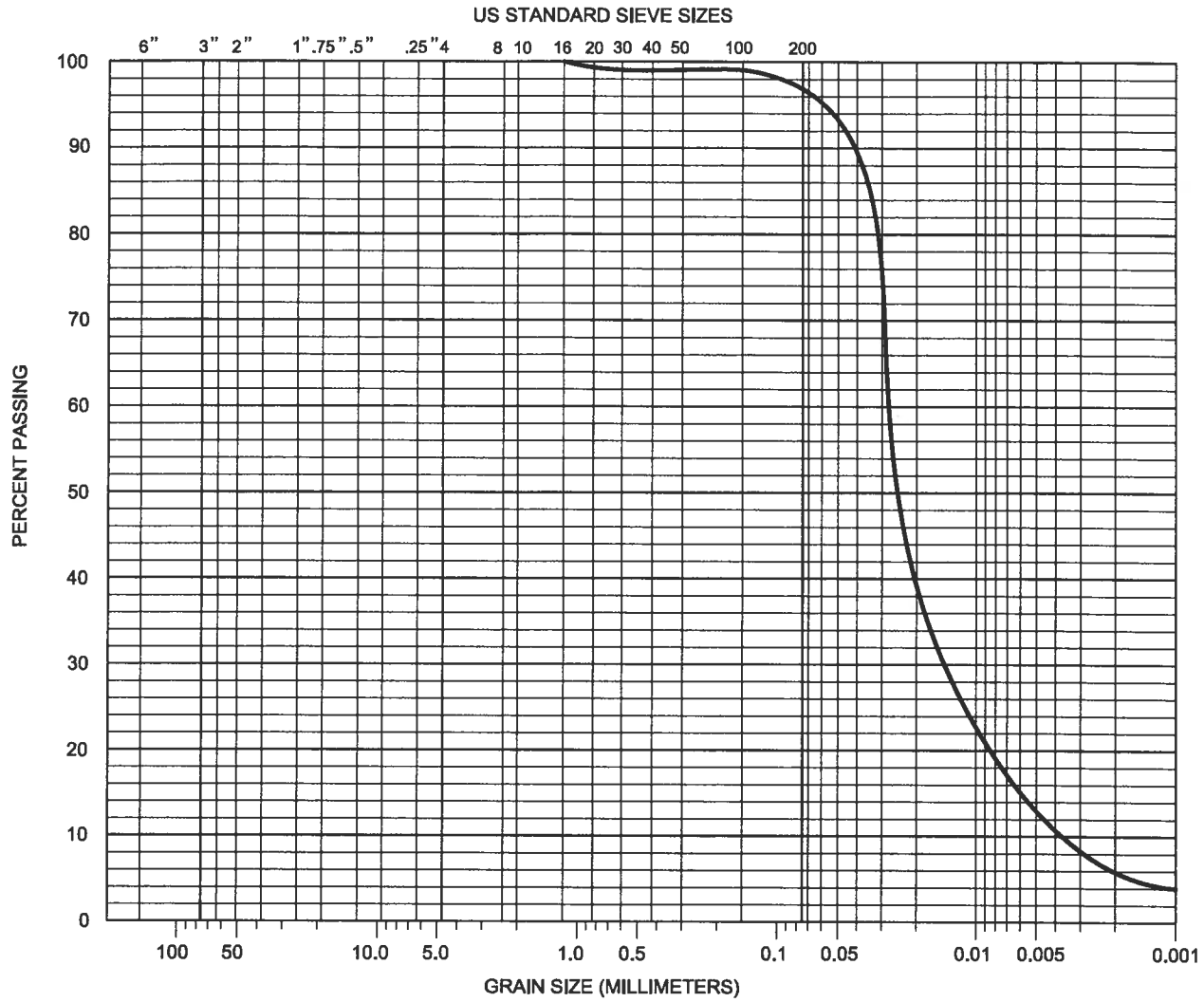
Weight Retained on the #10	0.7	0.42	Tare	13.47	g
Weight Passing the #10	169.44	99.58	Wet Weight + Tare	51.18	g
Total Wet Sample Weight	170.14		Dry Weight + Tare	50.53	g
Total Dry Sample Weight	167.21		Moisture Content	1.75	%

Hydrometer					
Air Dry Weight of Sample Used	66.04		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	64.90	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	65.17	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	48	6	42	72	22	9.4	0.01337	0.028996	65.1
5	34	6	28	72	22	11.7	0.01337	0.020455	43.4
15	23	6	17	72	22	13.5	0.01337	0.012687	26.3
30	17	6	11	72	22	14.5	0.01337	0.009292	17.0
60	15	6	9	72	22	14.8	0.01337	0.006645	13.9
275	11	6	5	72	22	15.5	0.01337	0.003172	7.7
1440	9	6	3	72	22	15.8	0.01337	0.001401	4.6

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0.4	0.24	100
#4	4.75	0.6	0.36	100
#8	2.36	0.6	0.36	100
#10	2.00	0.7	0.42	100
#16	1.18	0.02	0.03	100
#30	0.60	0.08	0.12	99
#40	0.43	0.16	0.25	99
#50	0.30	0.21	0.32	99
#100	0.15	0.40	0.61	99
#200	0.075	1.76	2.70	97
pan		2.66	4.08	96



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	NW5	–	97.0	6	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils
(ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	NW6		

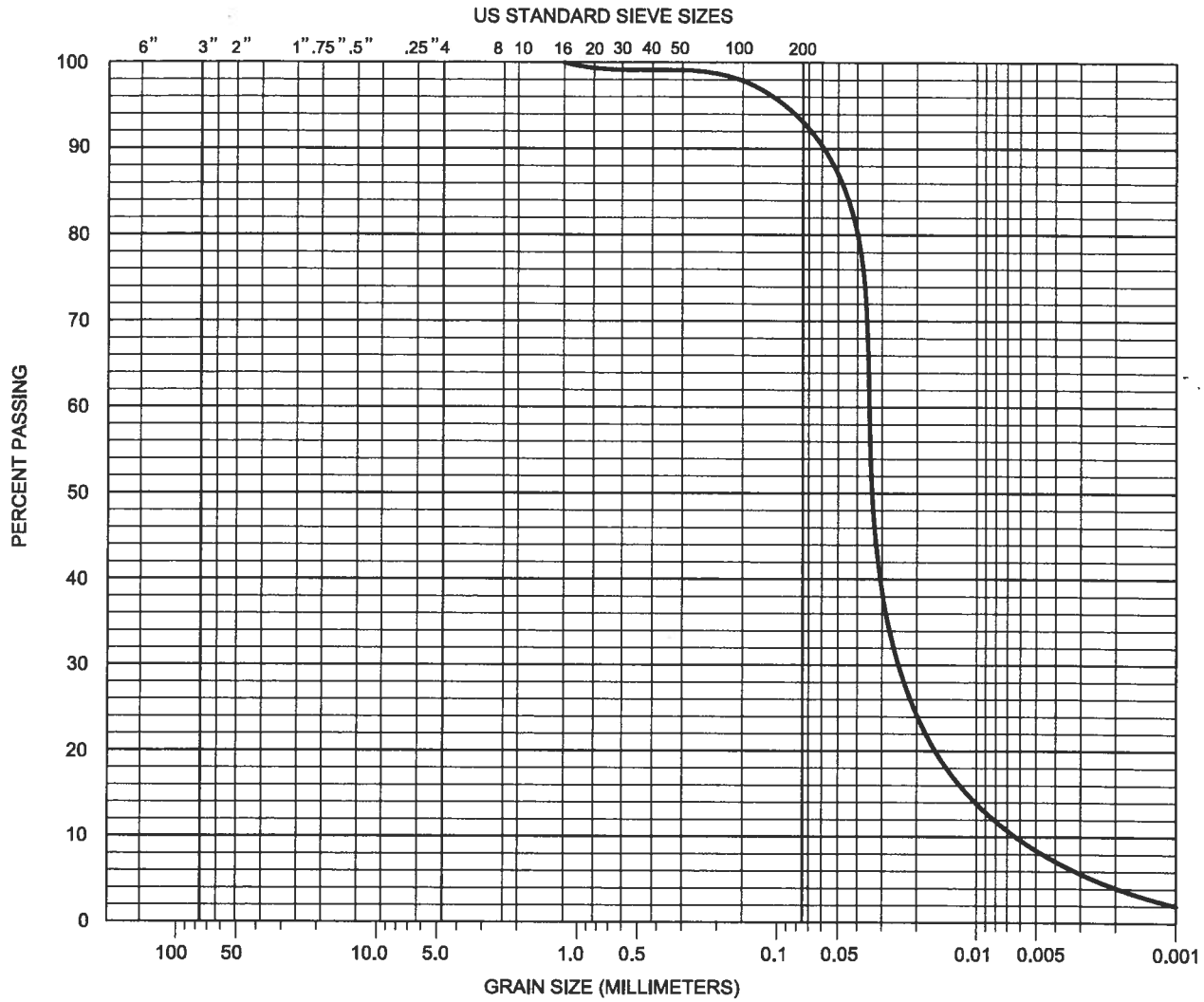
Weight Retained on the #10	0.05	0.11	Tare	13.49	g
Weight Passing the #10	46.92	99.89	Wet Weight + Tare	15.94	g
Total Wet Sample Weight	46.97		Dry Weight + Tare	15.88	g
Total Dry Sample Weight	45.82		Moisture Content	2.51	%

Hydrometer					
Air Dry Weight of Sample Used	30.01		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	29.28	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	29.31	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	22	5	17	72	22	13.5	0.01337	0.034745	58.6
5	15	5	10	72	22	14.7	0.01337	0.022890	34.5
15	12	5	7	72	22	15.1	0.01337	0.013435	24.1
30	9	5	4	72	22	15.6	0.01337	0.009653	13.8
60	8	5	3	72	22	15.8	0.01337	0.006862	10.3
275	7	5	2	72	22	16.0	0.01337	0.003222	6.9
1440	6	5	1	72	22	16.1	0.01337	0.001415	3.4

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0	0.00	100
#4	4.75	0	0.00	100
#8	2.36	0	0.00	100
#10	2.00	0	0.00	100
#16	1.18	0.00	0.00	100
#30	0.60	0.19	0.65	99
#40	0.43	0.29	0.99	99
#50	0.30	0.40	1.36	99
#100	0.15	0.59	2.01	98
#200	0.075	2.03	6.93	93
pan		3.30	11.26	89



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	NW6	–	93.0	4	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

Northwest Geotech, Inc.
Northwest Testing, Inc.

Standard Test Method for Particle-Size Analysis of Soils (ASTM D 422)

Project Name	Kleinfelder Conduit	**Project Number**	1643.1.1
Laboratory Number	07-266	**Date Tested**	07/31/07
Sample Description	NW7		

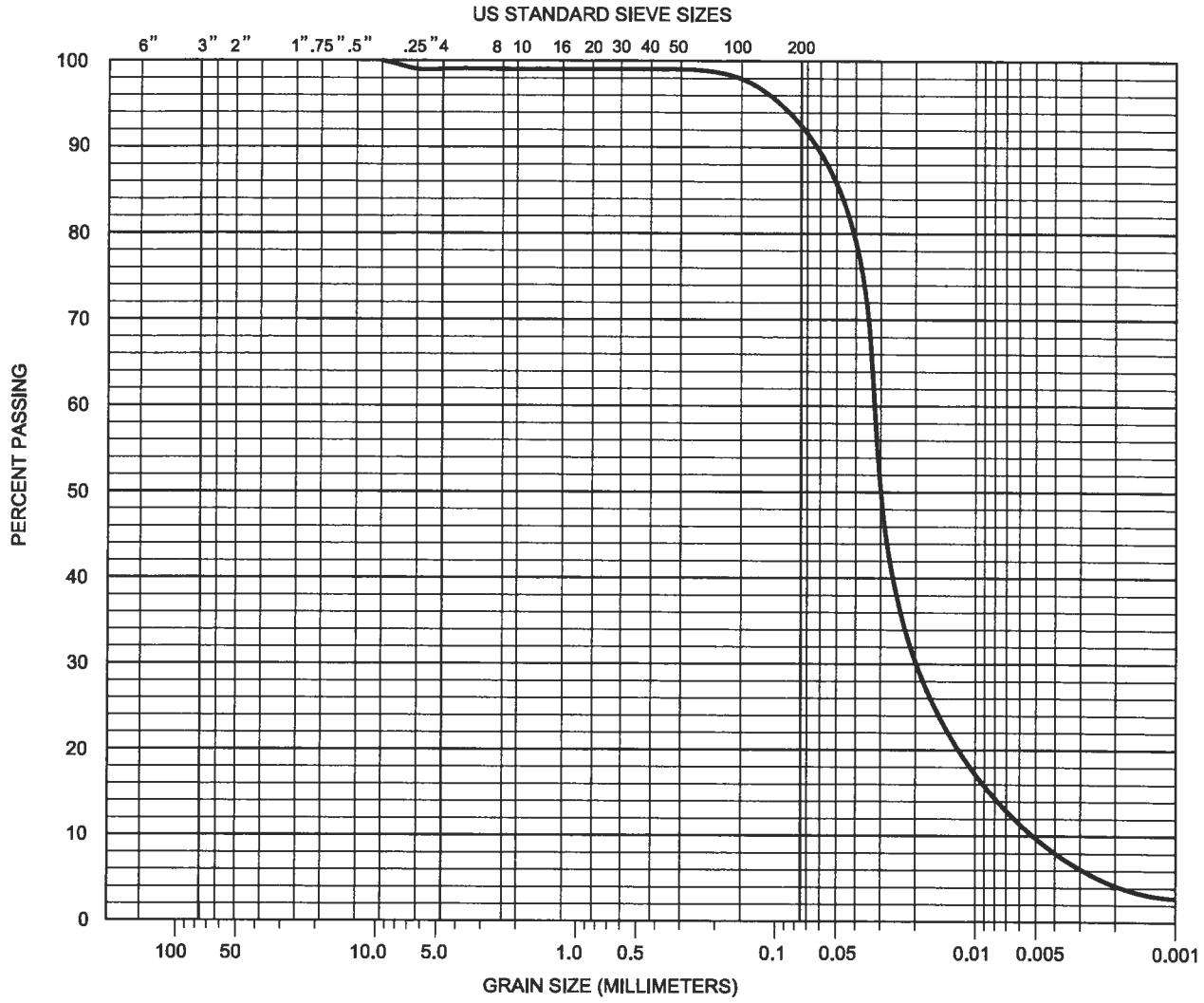
Weight Retained on the #10	1.04	0.75	Tare	13.56	g
Weight Passing the #10	140.62	99.25	Wet Weight + Tare	48.14	g
Total Wet Sample Weight	141.66		Dry Weight + Tare	47.39	g
Total Dry Sample Weight	138.59		Moisture Content	2.22	%

Hydrometer					
Air Dry Weight of Sample Used	52.32		Specific Gravity (assumed)	2.60	
Dry Weight of Sample Used	51.19	g	Specific Gravity Correction Factor	1.01	
Dry Weight Represented (W)	51.57	g			

Elapsed Time, T (min)	Actual Hydrometer Reading	Composite Correction	Hydrometer Reading with Composite Correction Aplied, R	Temperature °F	Temperature °C	Effective Depth of Hydrometer L(cm)	Value of K	Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
2	34	6	28	72	22	11.7	0.01337	0.032342	54.8
5	24	6	18	72	22	13.3	0.01337	0.021841	35.3
15	16	6	10	72	22	14.7	0.01337	0.013215	19.6
30	14	6	8	72	22	15.0	0.01337	0.009449	15.7
60	12	6	6	72	22	15.3	0.01337	0.006754	11.8
275	9	6	3	72	22	15.8	0.01337	0.003205	5.9
1440	8	6	2	72	22	16.0	0.01337	0.001408	3.9

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Weight Retained	Percent Retained	Total Percent Passed
1 1/2"	37.5	0	0.00	100
1"	25	0	0.00	100
3/4"	19	0	0.00	100
1/2"	12.5	0	0.00	100
3/8"	9.5	0	0.00	100
1/4"	6.3	0.71	0.51	99
#4	4.75	0.71	0.51	99
#8	2.36	0.74	0.53	99
#10	2.00	1.03	0.74	99
#16	1.18	0.00	0.00	99
#30	0.60	0.11	0.21	99
#40	0.43	0.18	0.35	99
#50	0.30	0.25	0.48	99
#100	0.15	0.43	0.83	98
#200	0.075	3.38	6.55	93
pan		5.87	11.38	88



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	NW7	–	93.0	5	–

GRADATION TEST RESULTS

PROJECT NO. 1643.1.1	KLEINFELDER LABORATORY TESTING	LAB NO. 07-266

	mercury	conventional	grain size	sieved Hg	sulfide	elutriate	bioassay	bioaccum
	8 oz	8 oz	12 oz	12 oz	2 oz	1 liter	1 liter	1 liter
NW1	1	1	1		1	2	3	1
NW2	1	1	1		1	2	3	1
NW3	1	1	1		1	2	3	1
NW4	1	1	1		1	2	3	1
NW5	1	1	1		1	2	3	1
NW6	1	1	1		1	2	3	1
NW7	1	1	1		1	2	3	1
L Buck	1		1	1				
Buck	1		1	1				
Mill	1		1	1				
Gilmer	1		1	2				
Rattlesnake	1		1	2				
Trout Lake	1		1	2				
Salt Creek	1		1	2				
WS+Col	1		1	1				7
LWS+Col	1		1	1				1
Wind+Col	1		1	1				
	17	7	17	10	7	14	21	14
	24		27		7	49		

ck. # grain size

2 ck Hydr.

APPENDIX E

Report

of

Test No. 762-4

Bioaccumulation of *Lumbriculus variegatus* in a 28-day Exposure to Test Sediments in Support of the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, WA, Kleinfelder Project No. 58336/ 4.

Submitted to

Squier | Kleinfelder
15050 SW Koll Parkway
Suite L
Beaverton, OR 97006-6028

Submitted by

Northwestern Aquatic Sciences
3814 Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

October 2, 2007

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 762-4

Title: *Lumbriculus variegatus* 28-day bioaccumulation exposure to test sediments in support of the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, WA, Kleinfelder Project No. 58336/ 4.

Protocol No.: NAS-XXX-LV5 January 6, 2000 (Revision 4, 11-9-05). Based on EPA Method 100.3 (Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates, EPA/600/R-99/024), the "Inland Testing Manual" (EPA-B-98-004), and ASTM E 1688-97a.

STUDY MANAGEMENT

Study Sponsor: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006

Sponsor's Study Monitor: Mr. David King

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365

Test Location: Newport laboratory

Laboratory's Study Personnel: G.J. Irissarri, B.S., Proj. Man./Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; M.S. Redmond, M.S., Aq. Toxicologist; G.A. Buhler, B.S., Aq. Toxicologist; S.J. Gage, B.A., Sr. Tech.; G.P. Hutchinson, B.S., Tech.; L.P. Sandoval, B.S., Tech.

Study Schedule:

Test Beginning: 8-8-07, 1730

Test Ending: 9-5-07, 1930

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Test Sediments: Freshwater test sediments collected as part the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, Washington, Kleinfelder Project No. 58336 / 4. Details are as follows:

NAS Sample No.	1100G	1099G
Description	NW Lake	LWS-071907
Collection Date	7/18/07	7/19/07
Receipt Date	7/20/07	7/20/07

Control Sediment: The negative control sediment (NAS#1118G) was collected on 7-27-07 from an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR. The control sediment was press sieved through a 1.0 mm screen.

Storage: All test and control sediments were stored at 4°C in the dark until used.

TEST WATER

Source: Dechlorinated municipal tap water.

Dates of Preparation: 8-7-07 to 8-31-07

Water Quality: Averaged: pH 7.1 ± 0.4; conductivity 150 ± 5 µmhos/cm; hardness 40 ± 5 mg/L as $CaCO_3$; alkalinity 35 ± 5 mg/L as $CaCO_3$. Total chlorine was <0.02 mg/L in all batches..

Pretreatment: Dechlorinated and aerated ≥24 hr.

TEST ORGANISMS

4-Day Toxicity Screening Test P762-3:

Species: *Lumbriculus variegatus*.
Age: Adults
Source: Aquatic Foods, Inc., Fresno, CA. Received 8-1-07.
Acclimation: Worms were placed in small aquaria with test dilution water and aerated. Animals were not fed during holding. Water quality conditions for the two days prior to testing averaged: temperature, 20.5 ± 4.2°C; dissolved oxygen, 7.9 mg/L; pH, 7.1; conductivity 213 umhos/cm; hardness, 26 mg/L as CaCO3 and alkalinity, 50 mg/L as CaCO3. Photoperiod: 16:8, L:D.

Bioaccumulation Test P762-4:

Species: *Lumbriculus variegatus*.
Age: Adults
Source: Aquatic Foods, Inc., Fresno, CA. Received 8-1-07.
Acclimation: Worms were placed in small aquaria with test dilution water and aerated. Animals were not fed during holding. Water quality conditions for the week prior to testing averaged: temperature, 22.6 ± 0.3°C; dissolved oxygen, 8.0 ± 0.2 mg/L; pH, 6.7 ± 0.1; conductivity 220 ± 14 umhos/cm; hardness, 26 ± 0 mg/L as CaCO3 and alkalinity, 50 ± 0 mg/L as CaCO3. Photoperiod: 16:8, L:D.

TEST PROCEDURES AND CONDITIONS

Test Design and Summary of Test Procedures: Prior to starting the bioaccumulation test, a 4-day toxicity screening test was conducted to assess survivability and possible avoidance of the worms in the test sediments. The bioaccumulation test required *L. variegatus* to be exposed for 28 days to test and reference/control sediments. 1.7 gallons of each sediment were placed in the bottom of ten-gallon aquaria and filled with 3.4 gallons of dechlorinated municipal tap water one day prior to the date that the worm exposure was to begin. Test chambers were placed in a temperature-controlled room. On the day of test initiation, approximately 13 grams of worms (wet weight) were placed into each test chamber. A zero-time sample was collected and sent to the analytical laboratory, Brooks Rand, on 9-10-07 for analysis. Three times weekly, the overlying water was siphoned out and replaced. Five replicate aquaria were employed for each sediment treatment. The exposure temperatures were 23 ± 1°C. During the exposure period, test chambers were examined for sediment avoidance behavior. After 28 days, worms were removed from the test sediments, cleaned of sediment and debris and returned to clean water-filled beakers without sediment to depurate for 6-8 hours. Worms were then removed from the depuration chambers, rinsed with Milli-Q® deionized water, lightly blotted, weighed and put into clean jars and frozen. Animals were shipped to the analytical laboratory (Brooks Rand) on 9-10-07 for chemical analysis.

4-Day Toxicity Screening Test P762-3 Conditions:

Test Chambers: 300 ml high-form glass beakers
Test Volumes: 100 ml sediment layer; 175 ml test water
Replicates/Treatment: 4
Organisms/Treatment: 40
Water Volume Changes: 2 water volumes per day
Aeration: None.
Feeding: Animals were fed 1.5 ml of TetraFin suspension (1.5 ml contains 6 mg dry solids) per beaker on daily.
Effects Criteria: Survival after 4 days. Death is defined as no visible movement or response to tactile stimulation. Missing organisms were considered to be dead.
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, conductivity, pH, hardness, and alkalinity were measured in the overlying water of one replicate test container per treatment on days 0 and 4 of the test. Temperature and dissolved oxygen were measured daily in the overlying water of one replicate test container per treatment. Hardness and alkalinity were measured with titrimetric methods. The photoperiod was 16:8, L:D.

Bioaccumulation Test P762-4 Conditions:

Test Chambers: 10 gallon glass aquaria (10" x 19.75" x 11.75").
Test Volumes: 1.7 gal sediment and approximately 3.4 gal of overlying freshwater

Replicates/Treatment: 5
Organisms/Treatment: approximately 65 grams wet weight (13 grams per tank)
Water Volume Changes: 75% of overlying water replaced three times weekly.
Aeration: Provided using 1 ml glass pipet placed 3-5 cm above the sediment surface
Feeding: None
Effects Criteria: The primary purpose of the bioaccumulation study was to measure the concentrations of selected sediment contaminants in the tissues of the worms after 28 days of exposure, rather than to observe organism physiological or behavioral responses as in ordinary toxicology tests. NAS performed the laboratory sediment exposure only. After a 6-8-hr depuration period, the surviving worms were frozen and shipped under chain-of-custody to the analytical laboratory (Brooks Rand).
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, pH, conductivity, hardness, alkalinity, and ammonia-N were measured in one replicate of each sediment on Days 0, 7, 14, 21, 28. Temperature and dissolved oxygen were measured in one replicate daily during the 28-day exposure. The values of individual water quality measurements are to be found in the raw data (Appendix II).

DATA ANALYSIS METHODS

Means and standard deviations for water quality parameters and wet tissue weights were calculated using Microsoft Excel 2000.

PROTOCOL DEVIATIONS

None

TEST RESULTS

Results of the preliminary 4-day sediment toxicity screening test are presented in Table 1. None of the sediments tested resulted in a survival of less than 97.5%, indicating that all sediments were acceptable for bioaccumulation testing. Means and standard deviations for water quality measurements collected for the duration of the bioaccumulation study are given in Table 2. Animal biomass prior to and after the 28-day exposure period and tissue sample numbers are given in Table 3. All zero-time and post sediment exposure *Lumbriculus* biomass samples were sent to Brooks Rand on 9-10-07 for analysis.

STUDY APPROVAL

Project Manager/Study Director — 9-26-07 — Date

Quality Assurance Unit — 9/24/07 — Date

Manager, Toxicology — 9/24/07 — Date

Table 1. Results of preliminary 4-day Sediment Toxicity Screening Test.

Sample description	Initial Counts (4 replicates)	% Survival After 4-days Exposure
Control (NAS#1118G)	40	97.5
NW Lake (NAS#1100G)	40	97.5
LWS-071907 (NAS#1099G)	40	97.5

Table 2. Summary of Water Quality Measurements of 28-Day Bioaccumulation Exposure to Test Sediments.

	Mean	S.D.	Min.	Max.	n
Temperature (°C)	23.0	0.2	22.3	23.4	87
Dissolved oxygen (mg/L)	6.5	0.4	5.3	7.4	87
Conductivity (umhos/cm)	166	17	145	195	15
pH	6.6	0.4	6.1	7.1	15
Hardness (as mg/L $CaCO_3$)	45	8	34	51	15
Alkalinity(as mg/L $CaCO_3$)	35	5	30	40	15
Ammonia-N (mg/L)	0.7	0.6	0.1	1.9	15

Table 3. Biomass of Worms, *Lumbriculus variegatus*, Exposed for 28 Days to Test Sediments.

Sediment Description	Total Initial Biomass* (grams)	Total Post-Exposure Biomass (grams)	Tissue Sample Number
0-time	86.8	---	NAS#1138G
Control (NAS#1118G)	86.4	108.9	NAS#1172G
NW Lake (NAS#1100G)	86.4	67.3	NAS#1173G
LWS-071907 (NAS#1099G)	86.6	47.0	NAS#1174G

*Animals added at 1.33 times the target stocking weight (13 grams per aquaria) to account for excess weight from the water in the nonblotted Lumbriculus at the start of the test (EPA/600/R-99/064).

APPENDIX I

PROTOCOL

TEST PROTOCOL

FRESHWATER OLIGOCHAETE, *LUMBRICULUS VARIEGATUS*, 28-DAY SEDIMENT BIOACCUMULATION

1. INTRODUCTION

1.1 Purpose of Study: Laboratory sediment bioaccumulation tests provide an estimate of contaminant uptake by benthic infauna. The purpose of this study is to expose oligochaetes (*Lumbriculus variegatus*) to freshwater sediments for 28 days so that they may bioaccumulate sediment-associated contaminants. After the bioaccumulation period, worms are frozen for subsequent tissue analysis.

1.2 Referenced Method: This protocol is based on EPA Method 100.3 (EPA/600/R-99/064), the "Inland Testing Manual" (EPA-B-98-004) and ASTM E1688-97a.

1.3 Summary of Method: A summary of test conditions for the 28-day oligochaete bioaccumulation test is provided at the end of this protocol.

Because *L. variegatus* is quite sensitive to some contaminants, a 96-hour toxicity screening test is performed to insure that the samples are not overly toxic prior to setting up the bioacummulation test. The screening test is conducted in 300 ml test chambers containing 100 ml of sediment and 175 ml of overlying water. The test is conducted at 23°C, 16:8 photoperiod, with twice daily renewal of overlying water. The screening test is inititated with ten adult oligochaetes per replicate and a minimum of four replicates per treatment. Animals are not fed during the test. If there is significant mortality or animals are exhibiting avoidance behavior, then bioaccumulation testing with *L. variegatus* may not be possible or appropriate. If the screening test indicates that the test sediments are not toxic and animals are not avoiding the sediment, then the bioaccumulation test is started.

The 28-day bioaccumulation test with *Lumbriculus variegatus* is conducted at 23°C with a 16L:8D photoperiod at an illuminance of about 50-100 ft-c. Test chambers are typically 19 L (5 gal) or larger aquaria containing a minimum of 1 to 13 L of sediment and 6-20 L or more of overlying water. The test is stocked at densities of 10-40 g wet biomass per replicate test chamber depending upon chemistry requirements as long as the minimum ratio of sediment TOC to organism dry weight of 50:1 is not violated. Larger test systems may be employed if greater tissue volumes are required. Overlying water is replaced at regular intervals, normally three times per week, but can be up to twice daily as dictated by study needs. There are one to five replicates per treatment, with three normally used. Test organisms are not fed during the test. Gentle aeration will be employed if dissolved oxygen concentration falls below 2.5 mg/L. Overlying water may be culture water, well water, surface water, site water, reconstituted water, dechlorinated municipal water, or other water as per study design. The test endpoint is bioaccumulation.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
3814 Yaquina Bay Road, P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Study Director: _____
Quality Assurance Unit: _____
Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Testing Schedule: The time between sediment collection and use in testing should be kept to a minimum; therefore, bioaccumulation testing is started as soon after sample receipt as logistically possible. For many applications a maximum holding time of 8 weeks is employed.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

3. TEST MATERIAL

The test materials are freshwater sediments. It is recommended that the control, reference, and test sediments be placed in clean, air-tight containers. Sediments for metals bioaccumulation should be stored in the absence of air to minimize the oxidation of reduced forms. Nitrogen can be used to fill the headspace in the containers. Glass containers are recommended for sediments polluted with either metals or organics, although high-density polyethylene and PTFE containers are also acceptable. Large organisms and extraneous materials, such as bivalves or twigs, should be removed from the sediments before storing. At the laboratory the samples are stored at 4°C in the dark. The time between sediment collection and use in testing should be kept to a minimum. A maximum holding time of eight weeks is recommended. A negative control sediment is collected from a clean site or the animal collection site, and should contain no or very low concentrations of the contaminant(s) of concern. In addition, a reference sediment may be employed as a comparison station when evaluating dredged materials

4. TEST WATER

Test water (overlying water) at NAS is normally either moderately hard synthetic water or dechlorinated municipal water. Moderately hard synthetic water is prepared from dechlorinated and deionized municipal water or Milli-Q reagent grade water and reagent grade chemicals. Test water may also be well water, surface water, site water, or other water, depending on the study needs.

5. TEST ORGANISMS

5.1 Species: oligochaete, *Lumbriculus variegatus*.

5.2. Source: Commercial suppliers or laboratory cultures

5.3 Age: Variable

5.4 Acclimation and Pretest Observation: After receipt, worms should be held in the laboratory for at least 24 hours prior to test initiation in order to assess their health and acclimate them to test conditions. Mortality during the holding period should not be excessive.

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers generally used in the toxicity test are 19 L (5 gal) or larger aquaria. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by placement in a temperature-controlled room. Gentle aeration may be employed to insure that dissolved oxygen concentration does not fall below 2.5 mg/L. The test is conducted under an illuminance of 50-100 ft-c with a 16L:8D photoperiod.

6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in EPA/600/4-90/027F. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed twice with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed twice with deionized water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with deionized water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of worms to test, control, and optionally, reference sediments. The sediments are placed on the bottom of the test containers and are overlain with test water. The test exposure is for 28 days. Static replacement of overlying water may be performed three times a week (EPA 823-B-98-004) or up to twice daily at approximately 12 hour intervals (EPA/600/R-99/064). Each treatment consists of one to five replicate test containers, each containing enough organisms to provide approximately the target wet weight. The animals are added to each replicate at about 1.33 times the target stocking weight (the additional 33% accounts for the excess weight from water in the nonblotted oligochaetes). Test chamber positions are completely randomized. Test organisms are randomly distributed to the test chambers. Animals are placed on the sediment surface and allowed to bury.

7.2 Setup of Test Containers: Sediments are homogenized and placed in test chambers on the day before addition of test organisms. After addition of the sediment, test water is gently added to each test container in a manner to prevent resuspension. The overlying water is as mentioned above The test begins when worms are introduced to the test chambers. Initial water quality measurements are taken prior to the addition of test organisms.

7.3 Test Conditions: Gentle aeration may be employed to insure that dissolved oxygen concentration does not fall below 2.5 mg/L. The test temperature employed is 23 ± 1°C. A 16:8, L:D photoperiod is used. Illumination is supplied by daylight fluorescent lamps at 50-100 ft-c. The overlying water is replaced three times per week, or more frequently if required.

7.4 Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described. A one to five replicate zero-time sample of test animals is preserved (frozen) for analysis of initial concentrations of chemicals of concern.

7.5 Feeding: None.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The duration of the bioaccumulation test is 28 days. The type and frequency of observations to be made are summarized as follows:

TYPE OF OBSERVATION	TIMES OF OBSERVATION
BIOLOGICAL DATA	
Observations on behavior	Daily
PHYSICAL AND CHEMICAL DATA	
Hardness, alkalinity, conductivity, pH and total ammonia	Beginning and end of test in overlying water. One replicate per treatment. (Optionally on days 0, 3, 7, 14, 21, 28).
Dissolved oxygen, temperature	Daily in overlying water. One replicate per treatment

Dissolved oxygen is measured using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is measured using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using titrometric methods. Ammonia-nitrogen is measured using the salicylate colorimetric method (Clin. Chim. Acta 14:403, 1996).

7.7 Test Termination and Depuration: At test termination, animals are removed from the sediment by gently sieving test chamber contents through a fine-mesh sieve sufficiently small to retain the oligochaetes (e.g., 500 µm mesh). Immobile organisms should be considered dead. Live oligochaetes from an individual replicate should be transferred to a 1-L beaker containing overlying water without sediment for 6 to 8 hours (or up to 24 hours if needed, depending on the chemicals of concern) to depurate, or eliminate gut contents. Aeration may be required if dissolved oxygen falls below 2.5 mg/L. Each sample is then weighed, placed in a clean container, and frozen for later tissue residue analysis. If an estimate of dry weight is needed, a subsample should be dried to a constant weight at about 60 to 90°C, then brought to room temperature in a dessicator and weighed to the nearest 0.01 mg. Ash-free weight may be desirable in some instances.

7.8 Criteria of Test Acceptance: The test results are acceptable if the test organisms burrow into the sediments, and if there is an adequate mass of test organisms at test completion for detection of target analytes; the test should be considered invalid if overt sediment avoidance is observed.

8. DATA ANALYSIS

The endpoint of the test is bioaccumulation. Surviving worms are depurated for 6 to 8 hours and then frozen for subsequent tissue analysis. Data analysis consists of calculating means and standard deviations for water quality parameters and for tissue chemical concentrations, if chemical data are provided to NAS. Statistical comparisons of treatment groups may be done using standard hypothesis test procedures (i.e. test for normality and homogeneity followed by parametric or non-parmetric comparison tests as appropriate).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum (except that tabulation and analysis of tissue chemical concentrations is optional depending on client requirements): name and identification of the test; the investigator and laboratory; date and time of test beginning and end; information on the test material; information on the source and quality of the overlying/test water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment, tabulation and statistical analysis of measured responses and a summary table of endpoints; a description of the statistical methods used; any unusual information about the test or deviations from procedures; results of the initial screening toxicity test.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED AND/OR CONSULTED GUIDELINES

ASTM. 1997. Determination of the Bioaccumulation of Sediment-Associated Contaminants by Benthic Invertebrates. ASTM Standard Method No. E 1688 – 97a. Am. Soc. Test. Mat., Philadelphia, PA.

Portland Harbor Sediment Management Plan. June 25, 1999. Oregon Department of Environmental Qualtiy.

U.S. EPA. 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates. Second Edition. EPA/600/R-99/064.

U.S. EPA. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual: Inland Testing Manual. EPA 823-B-98-004.

Weber, C.I. (Ed.) 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition). EPA/600/4-90/027F.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SUMMARY OF TEST CONDITIONS

LUMBRICULUS VARIEGATUS, 28-DAY SEDIMENT BIOACCUMULATION

1. Test type:	Static Renewal
2. Test duration:	28 days
3. Temperature:	23 ± 1° C
4. Light quality:	Ambient Laboratory
5. Light itensity:	50-100 ft-c
6. Photoperiod:	16L:8D
7. Test chamber size:	5-10 gal aquaria normally
8. Sediment volume:	normally 1-13 L depending on aquaria size
9. Overlying water volume:	6 to 20L depending on aquaria size
10. Renewal of overlying water:	3x/wk ; or optionaly up to twice daily; approx. 12-hr intervals
11. Age of test organisms:	variable
12. Loading of organisms in chamber:	10-40 g/replicate (or more). Ratio of sediment TOC to organism dry weight ≥ 50:1
13. Replicates per sediment:	1 - 5
14. Test chamber cleaning:	None
15. Feeding:	None
16. Aeration:	Gentle, as needed to keep DO above 2.5 mg/L
17. Overlying water:	Moderatley hard synthetic water, dechlorinated municipal water, culture water, well water, surface water, site water, or other water
18. Study treatments:	Site sediment(s), a reference sediment (optional), and a control sediment.
19. Overlying water quality:	Hardness, alkalinity, conductivity, pH, and ammonia at the beginning and end of a test. Temperature and dissolved oxygen daily.
20. Endpoint:	Bioaccumulation
21. Sample holding requirements:	up to 8 weeks
22. Sample volume required:	5 – 10 L up to 20 gal. or more depending on study design.
23. Test acceptability:	1. Test organisms must burrow into the test sediments (numbers of worms in 4-day screening test should not be signficantly reduced in test sediment relative to control sediment). 2. Adequate mass of test organisms at test completion for detection of target analytes.

APPENDIX II

RAW DATA

TEST DESCRIPTION, MONITORING, AND RESULTS BENCHSHEETS

NORTHWESTERN AQUATIC SCIENCES — PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

REVIEWED PAGES 1-20 -GJI

Test No. 762-4 Client Kleinfelder Investigator

STUDY MANAGEMENT

Client: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006

Client's Study Monitor: Mr. David King

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir.: G.J. Irissarri GJI

QA Officer: L.K. Nemeth

1. Greg Hutchinson GH
2. Susan Gage SG
3. [illegible] WG
4. M.S. Redmond MSR
5. Lidia P. Sandoval LPS

Study Schedule:

Test Beginning: 8-8-07 1730 Test Ending: 9-5-07 1930

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	1118G	1100G	1099G		
Description:	Control	NW Lake	LWS-071907		
Collection Date:	7/27/07	7/18/07	7/19/07		
Receipt Date:	7/27/07	7/20/07	7/20/07		
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
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NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with corrrect date

NORTHWESTERN AQUATIC SCIENCES
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LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-4 Client Kleinfelder Investigator

SEDIMENT DESCRIPTIONS -- SUPPLEMENTAL NOTES

Sample No.	Description
1118G	BLACK FINE MUD
1100G	BLACK FINE MUD W/ STICKS AND PLANT DEBRIS
1099G	BLACK MUDDY SAND W/ PIECES OF WOOD, GRAVEL, AND PLANT DEBRIS

NORTHWESTERN AQUATIC SCIENCES
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LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-4 Client Kleinfelder Investigator _____

TEST WATER

Source: Dechlorinated Newport, OR tap water

Dates of Collection: 8-7-07, 8-7-07 (DOUBLE BATCH), 8-10-07, 8-13-07, 8-17-07, 8-20-07, 8-22-07, 8-24-07, 8-27-07, 8-31-07

pH 6.7, 6.5, 7.1, 6.8, 7.6, 7.4, 7.6, 7.5, 6.8, 7.1 $\bar{X} = 7.1 \pm 0.4$

Cond (umhos/cm2) 150, 150, 160, 150, 150, 150, 150, 150, 140, 145 $\bar{X} = 150 \pm 5$

Hardness (mg/L) 34, 34, 34, 26, 34, 34, 34, 43, 43, 43 $\bar{X} = 40 \pm 5$

Alkalinity (mg/L) 30, 30, 40, 30, 30, 30, 40, 40, 40, 40 $\bar{X} = 35 \pm 5$

Chlorine (mg/L) ALL < 0.02

Treatments: Aerated ≥ 24 hrs

TEST ORGANISMS

Species: *Lumbriculus variegatus* Date received: 8-1-07

Source: Aquatic Foods, Inc., Fresno, CA

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond (umhos/cm²)	Feeding amount	Feeding description	Water changes	Comments
8-3-07	23.1	8.0	6.7	240	NONE		YES	H=26 A=50
8-4-07	22.2	8.1	6.8	220				H=26 A=50
8-5-07	22.5	8.0	6.7	230				H=26 A=50
8-6-07	22.5	8.0	6.8	215			YES	H=26 A=50
8-7-07	22.6	8.3	6.8	215			YES	H=26 A=50
8-8-07	22.8	7.7	6.6	200				H=26 A=50
Mean	22.6	8.0	6.7	220				26 50
S.D.	0.3	0.2	0.1	14				ø ø
(N)	6	6	6	6				6 6

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: 10 gal glass aquaria

Test volumes: 1.7 gal of test sediment; 3.4 gal of dilution water

ADJUSTED FOR TOC 6JJ 8-8-07 13 g

Replicates/treatment: Organisms/treatment: approximately ~~10~~ grams wet tissue per replicate

Test water changes: Three times per week

Aeration: as needed to keep D.O. above 2.5 mg/L

Feeding: None

Test temperature (deg.C): 23 ± 1

Aquaria placement: Total randomization

Photoperiod: 16:8, L:D

Control Sediment:

Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Date collected: 7/27/07

Storage: 4°C in the dark in closed containers. NAS# 1118G

MISCELLANEOUS NOTES

Light Intensity:

Date:	Location	Foot candles	Comments	Initials
8-5-07	TANK # 4	77.1		6JJ
	# 9	84.3		

*To convert ft-candles to lux divide by 0.0929

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LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-4 Client Kleinfelder Investigator _____

Test conducted in (circle one): room 1 (room 2) trailer water bath other:_____

Randomization chart: 2ND SHELF

1	2	3							15

Randomization chart:

Randomization chart:

Randomization chart:

NORTHWESTERN AQUATIC SCIENCES
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PROTOCOL NO. NAS-XXX-LV5

Test No 762-4 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 0 (8/8 07)GH

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
5	22.7	6.3	155	6.3	34	30	0.2	Water changed in all
13	22.8	6.5	155	6.4	34	30	0.1	aquaria.
14	22.6	6.8	175	6.7	34	30	0.1	Time: 1230
								Initials: GH

*Water quality measurements to be taken.

Day 1 (8/9 07)GH

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.7	6.8						
13	23.0	6.2						
14	23.0	7.4						

*Water quality measurements to be taken.

Day 2 (8/10 07)AF

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.3	6.6						Water changed in all
13	22.5	5.6						aquaria.
14	22.6	7.1						Time: 1115
								Initials: LPS

*Water quality measurements to be taken.

Day 3 (8/11 07)AF

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.7	6.4						
13	22.7	5.9						
14	22.8	7.1						

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No 762-4 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 4 (8/12/07 LB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.7	6.2						
13	22.7	5.3						
14	22.8	6.7						

*Water quality measurements to be taken.

Day 5 (8/13/07 AJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.6	6.2						Water changed in all
13	22.6	6.6						aquaria.
14	22.7	6.8						Time: 1045
								Initials: AJ

*Water quality measurements to be taken.

Day 6 (8/14/07 LB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.7	5.9						
13	22.7	6.4						
14	22.7	6.5						

*Water quality measurements to be taken.

Day 7 (8/15/07 AJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
5	22.8	4.2	150	7.0	93	40	0.9	Water changed in all
13	22.8	6.9	150	7.0	92	40	0.8	aquaria.
14	22.9	6.8	195	7.1	95	40	1.1	Time: 1300
								Initials: AJ

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No 762-4 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 8 (8/16/07 CMS)

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.8	6.1						
13	22.9	6.8						
14	22.9	6.7						

*Water quality measurements to be taken.

Day 9 (8/17/07 CMS)

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.0	6.2						Water changed in all
13	23.1	6.9						aquaria.
14	23.1	6.8						Time: 1455
								Initials: CJ

*Water quality measurements to be taken.

Day 10 (8/18/07 CMS)

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.7	6.3						
13	22.9	6.8						
14	22.9	6.8						

*Water quality measurements to be taken.

Day 11 (8/19/07) CJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.2	6.0						
13	23.4	6.4						
14	23.3	6.2						

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No 762-4 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 12 (8/20/07) MD

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.1	6.4						Water changed in all
13	23.1	7.0						aquaria.
14	23.1	7.0						Time: 0845
								Initials: GJ

*Water quality measurements to be taken.

Day 13 (8/21/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.1	6.2						
13	23.2	6.8						
14	23.3	6.3						

*Water quality measurements to be taken.

Day 14 (8/22/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
5	23.3	6.2	165	6.9	51	40	1.5	Water changed in all
13	23.3	6.8	155	6.9	51	40	0.4	aquaria.
14	23.2	6.4	195	7.0	51	40	1.9	Time: 1050
								Initials: GJ

*Water quality measurements to be taken.

Day 15 (8/23/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.2	6.2						
13	23.3	6.8						
14	23.3	6.4						

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

PROTOCOL NO. NAS-XXX-LV5

Test No 762-4 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 16 (8 /24 07) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.9	6.0						Water changed in all
13	23.2	6.6						aquaria.
14	23.2	6.1						Time: 1020
								Initials: GJL

*Water quality measurements to be taken.

Day 17 (8 /25/07) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.1	6.1						
13	23.0	6.7						
14	23.0	6.2						

*Water quality measurements to be taken.

Day 18 (8 /26 07) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.1	6.0						
13	23.2	6.6						
14	23.2	6.1						

*Water quality measurements to be taken.

Day 19 (8 /27/07) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.1	6.0						Water changed in all
13	23.2	6.8						aquaria.
14	23.2	6.0						Time: 1000
								Initials: GJL

*Water quality measurements to be taken.

Test No 762-4 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 20 (8/28/07 SJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.7	6.8						
13	22.9	7.2						
14	22.9	6.5						

*Water quality measurements to be taken.

Day 21 (8/29/07 GH

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
5	22.8	6.2	155	6.7	51	30	1.1	Water changed in all
13	23.0	6.8	145	6.6	51	30	0.2	aquaria.
14	22.9	6.0	180	6.4	51	30	0.4	Time: 1620
								Initials: GH

*Water quality measurements to be taken.

Day 22 (8/30/07 SJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.9	6.5						
13	23.1	7.3						
14	23.1	6.3						

*Water quality measurements to be taken.

Day 23 (8/31/07 GH

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.7	6.4						Water changed in all
13	23.0	7.0						aquaria.
14	23.0	6.2						Time: 1230
								Initials: SJ

*Water quality measurements to be taken.

Test No 762-4 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 24 (9 / 1 / 07 GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.5	6.6						
13	22.6	7.3						
14	22.6	6.2						

*Water quality measurements to be taken.

Day 25 (9 /2 /07) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.9	6.4						
13	23.1	7.0						
14	23.0	6.2						

*Water quality measurements to be taken.

Day 26 (9 /3 /07) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	22.8	5.9						Water changed in all
13	23.1	6.6						aquaria.
14	23.1	6.0						Time: 0940
								Initials: GJL

*Water quality measurements to be taken.

Day 27 (9 /4 NJ NB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5	23.1	6.0						
13	23.4	6.4						
14	23.4	6.2						

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No 762-4 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 28 (9/5 10/7) GB 9-5-07

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	5-19-07 632 (1) Comments
5	23.1	6.2	170	6.1	51	40	0.2 ~~0.2~~	
13	23.2	7.0	160	6.2	51	40	0.1	
14	23.2	6.6	190	6.1	51	30	0.2	

*Water quality measurements to be taken.

Day _____(/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5								
13								
14								

*Water quality measurements to be taken.

Day _____(/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5								
13								
14								

*Water quality measurements to be taken.

Day _____(/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
5								
13								
14								

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-4 Client Kleinfelder Investigator

INITIAL AND POST EXPOSURE WET WEIGHT

Tank	Initial Wet Wt* (g)	Date	Initials	Post Exposure Wet Wt (g)	Date	Initials	Comments
1	17.3	8-8-07	GJL	18.6	9-5-07	GJL	
2	17.4	↓	↓	10.0	↓	↓	
3	17.3			19.1			
4	17.2			26.0			
5	17.2			12.4			
6	17.3			14.5			
7	17.3			11.5			
8	17.2			12.3			
9	17.3			9.0			
10	17.4			24.8			
11	17.3			7.3			
12	17.3			15.2			
13	17.4			8.4			
14	17.2			20.4			
15	17.3			13.7	↓	↓	
0-time repl 1	17.3						
0-time repl 2	17.3						
0-time repl 3	17.4						
0-time repl 4	17.4						
0-time repl 5	17.4	↓	↓				

*Animals added at 1.33 X the target stocking weight (13 g per aquaria) to account for excess weight from the water in the nonblotted Lumbriculus at the start of the test. EPA/600/R-99/064

TEST DATA ANALYSIS RECORDS

Lumbriculus Randomization and Tissue Results

INDEX	TANK	NAS SMPL	CLIENT DESCRIP	REPL		INITIAL WET* WEIGHT (g)	POST EXPOSURE WET WEIGHT (g)	POST EXPOSURE TOTAL WET WEIGHT	TISSUE SAMPLE NUMBER
			0-time	1		17.3			1138G
			0-time	1		17.3			1138G
			0-time	2		17.4			1138G
			0-time	4		17.4			1138G
			0-time	5		17.4			1138G
1	1	1118G	Control	1		17.3	18.6		1172G
2	3	1118G	Control	2		17.3	19.1		1172G
3	10	1118G	Control	3		17.4	24.8		1172G
4	4	1118G	Control	4		17.2	26.0		1172G
5	14	1118G	Control	5	wq replicate	17.2	20.4	108.9	1172G
6	12	1100G	NW Lake	1		17.3	15.2		1173G
7	7	1100G	NW Lake	2		17.3	11.5		1173G
8	6	1100G	NW Lake	3		17.3	14.5		1173G
9	15	1100G	NW Lake	4		17.3	13.7		1173G
10	5	1100G	NW Lake	5	wq replicate	17.2	12.4	67.3	1173G
11	2	1099G	LWS-071907	1		17.4	10.0		1174G
12	8	1099G	LWS-071907	2		17.2	12.3		1174G
13	11	1099G	LWS-071907	3		17.3	7.3		1174G
14	9	1099G	LWS-071907	4		17.3	9.0		1174G
15	13	1099G	LWS-071907	5	wq replicate	17.4	8.4	47.0	1174G

*Animals added at 1.33 times the target stocking weight (13 grams per aquaria) to account for excess weight from the water in the nonblotted Lumbriculus at the start of the test. EPA/600/R-99/064

Test Number: 762-4

Freshwater Sediment Test
Lumbriculus Bioaccumulation Test

Water Quality Data

	NAS	CLIENT			Overlying water						
BKR	SMPL	DESCRIP	REPL	DAY	TEMP	DO	COND	pH	NH3	HARD	ALK
5	1100G	NW Lake	5	0	22.7	6.3	155	6.3	0.2	34	30
13	1099G	LWS-071907	5	0	22.8	6.5	155	6.4	0.1	34	30
14	1118G	Control	5	0	22.6	6.8	175	6.7	0.1	34	30
5	1100G	NW Lake	5	1	22.7	6.8					
13	1099G	LWS-071907	5	1	23.0	6.2					
14	1118G	Control	5	1	23.0	7.4					
5	1100G	NW Lake	5	2	22.3	6.6					
13	1099G	LWS-071907	5	2	22.5	5.6					
14	1118G	Control	5	2	22.6	7.1					
5	1100G	NW Lake	5	3	22.7	6.4					
13	1099G	LWS-071907	5	3	22.7	5.9					
14	1118G	Control	5	3	22.8	7.1					
5	1100G	NW Lake	5	4	22.7	6.2					
13	1099G	LWS-071907	5	4	22.7	5.3					
14	1118G	Control	5	4	22.8	6.7					
5	1100G	NW Lake	5	5	22.6	6.2					
13	1099G	LWS-071907	5	5	22.6	6.6					
14	1118G	Control	5	5	22.7	6.8					
5	1100G	NW Lake	5	6	22.7	5.9					
13	1099G	LWS-071907	5	6	22.7	6.4					
14	1118G	Control	5	6	22.7	6.5					
5	1100G	NW Lake	5	7	22.8	6.2	150	7.0	0.9	43	40
13	1099G	LWS-071907	5	7	22.8	6.9	150	7.0	0.8	34	40
14	1118G	Control	5	7	22.9	6.8	195	7.1	1.1	43	40
5	1100G	NW Lake	5	8	22.8	6.1					
13	1099G	LWS-071907	5	8	22.9	6.8					
14	1118G	Control	5	8	22.9	6.7					
5	1100G	NW Lake	5	9	23.0	6.2					
13	1099G	LWS-071907	5	9	23.1	6.9					
14	1118G	Control	5	9	23.1	6.8					
5	1100G	NW Lake	5	10	22.7	6.3					
13	1099G	LWS-071907	5	10	22.9	6.8					
14	1118G	Control	5	10	22.9	6.8					
5	1100G	NW Lake	5	11	23.2	6.0					
13	1099G	LWS-071907	5	11	23.4	6.4					
14	1118G	Control	5	11	23.3	6.2					
5	1100G	NW Lake	5	12	23.1	6.4					
13	1099G	LWS-071907	5	12	23.1	7.0					
14	1118G	Control	5	12	23.1	7.0					
5	1100G	NW Lake	5	13	23.1	6.2					
13	1099G	LWS-071907	5	13	23.2	6.8					
14	1118G	Control	5	13	23.3	6.3					
5	1100G	NW Lake	5	14	23.3	6.2	165	6.9	1.5	51	40
13	1099G	LWS-071907	5	14	23.3	6.8	155	6.9	0.4	51	40
14	1118G	Control	5	14	23.2	6.4	195	7.0	1.9	51	40
5	1100G	NW Lake	5	15	23.2	6.2					
13	1099G	LWS-071907	5	15	23.3	6.8					
14	1118G	Control	5	15	23.3	6.4					

Test Number: 762-4

Freshwater Sediment Test
Lumbriculus Bioaccumulation Test

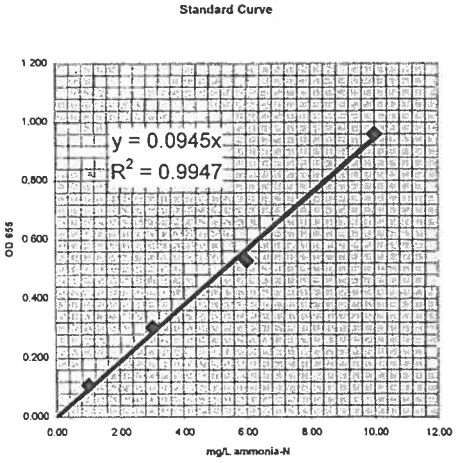
5	1100G	NW Lake	5	16	22.9	6.0					
13	1099G	LWS-071907	5	16	23.2	6.6					
14	1118G	Control	5	16	23.2	6.1					
5	1100G	NW Lake	5	17	23.1	6.1					
13	1099G	LWS-071907	5	17	23.0	6.7					
14	1118G	Control	5	17	23.0	6.2					
5	1100G	NW Lake	5	18	23.1	6.0					
13	1099G	LWS-071907	5	18	23.2	6.6					
14	1118G	Control	5	18	23.2	6.1					
5	1100G	NW Lake	5	19	23.2	6.0					
13	1099G	LWS-071907	5	19	23.2	6.8					
14	1118G	Control	5	19	23.2	6.0					
5	1100G	NW Lake	5	20	22.7	6.8					
13	1099G	LWS-071907	5	20	22.9	7.2					
14	1118G	Control	5	20	22.9	6.5					
5	1100G	NW Lake	5	21	22.8	6.2	155	6.7	1.1	51	30
13	1099G	LWS-071907	5	21	23.0	6.8	145	6.6	0.2	51	30
14	1118G	Control	5	21	22.9	6.0	180	6.4	0.4	51	30
5	1100G	NW Lake	5	22	22.9	6.5					
13	1099G	LWS-071907	5	22	23.1	7.3					
14	1118G	Control	5	22	23.1	6.3					
5	1100G	NW Lake	5	23	22.7	6.4					
13	1099G	LWS-071907	5	23	23.0	7.0					
14	1118G	Control	5	23	23.0	6.2					
5	1100G	NW Lake	5	24	22.5	6.6					
13	1099G	LWS-071907	5	24	22.6	7.3					
14	1118G	Control	5	24	22.6	6.2					
5	1100G	NW Lake	5	25	22.9	6.4					
13	1099G	LWS-071907	5	25	23.1	7.0					
14	1118G	Control	5	25	23.0	6.2					
5	1100G	NW Lake	5	26	22.8	5.9					
13	1099G	LWS-071907	5	26	23.1	6.6					
14	1118G	Control	5	26	23.1	6.0					
5	1100G	NW Lake	5	27	23.1	6.0					
13	1099G	LWS-071907	5	27	23.4	6.4					
14	1118G	Control	5	27	23.4	6.2					
5	1100G	NW Lake	5	28	23.1	6.2	170	6.1	0.9	51	40
13	1099G	LWS-071907	5	28	23.2	7.0	160	6.2	0.1	51	40
14	1118G	Control	5	28	23.2	6.6	190	6.1	0.2	51	30
				Mean	23.0	6.5	166	6.6	0.7	45	35
				SD	0.2	0.4	17	0.4	0.6	8	5
				n	87	87	15	15	15	15	15
				Min	22.3	5.3	145	6.1	0.1	34	30
				Max	23.4	7.4	195	7.1	1.9	51	40

AMMONIA EXPOSURE BENCHSHEETS AND ANALYSIS

Total Ammonia-N in Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD_{655}	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.108	1.00
	3.0 mg/L NH_3-N Std.	-----	0.302	3.00
	6.0 mg/L NH_3-N Std.	-----	0.530	6.00
	10.0 mg/L NH_3-N Std.	-----	0.960	10.00
	3.0 mg/L spike	-----	0.285	3.01
	3.0 mg/L spike dupl.	-----	0.312	3.30
	5.0 mg/L 2nd source	-----	0.420	4.44
1.	Day 0 (8-8-07)			
2.	5	1	0.022	0.23
3.	13	1	0.010	0.11
4.	14	1	0.012	0.13
5.				
6.	Day 7 (8-15-07)			
7.	5	1	0.086	0.91
8.	13	1	0.075	0.79
9.	14	1	0.104	1.10
10.				
11.	Day 14 (8-22-07)			
12.	5	1	0.138	1.46
13.	13	1	0.041	0.43
14.	14	1	0.180	1.90
15.				
16.	Day 21 (8-29-07)			
17.	5	1	0.100	1.06
18.	13	1	0.017	0.18
19.	14	1	0.039	0.41
20.				
21.	Day 28 (9-5-07)			
22.	5	1	0.089	0.94
23.	13	1	0.012	0.13
24.	14	1	0.016	0.17
25.				
26.				
27.				
28.				
29.				
30.				
31.				
32.				
33.				
34.				
35.				
36.				



Reporting limit (mg/L) =	0.1
Recovery (%) =	105.1
Precision (RPD) =	-9.05
2nd source (%) =	88.8
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 762-4
Test Day: 0,7,14, 21,28
Species: *Lumbriculus*

Proj. No.: P762

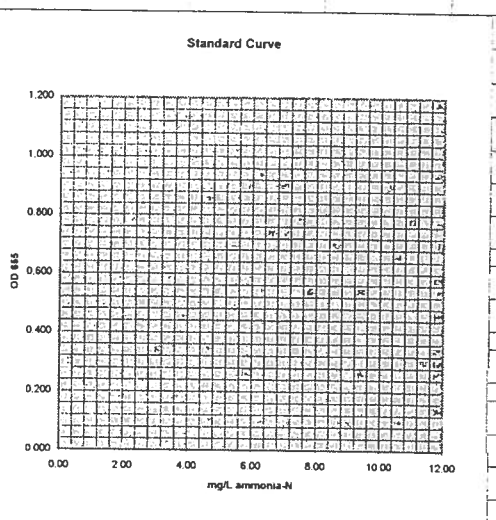
Overlying water

Analyst: MSR
Date analysed: 9/17/07

Total Ammonia-N in Water: Computation Worksheet
Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD_{655}	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.108	1.00
	3.0 mg/L NH_3-N Std.	-----	0.302	3.00
	6.0 mg/L NH_3-N Std.	-----	0.53	6.00
	10.0 mg/L NH_3-N Std.	-----	0.96	10.00
	3.0 mg/L spike	-----	0.285	
	3.0 mg/L spike dupl.	-----	0.312	
	5.0 mg/L 2nd source	-----	0.420	
1.	Day 0 (8-8-07)			
2.	5	1	0.022	
3.	13	1	0.010	
4.	14	1	0.012	
5.				
6.	Day 7 (8-15-07)			
7.	5	1	0.086	
8.	13	1	0.075	
9.	14	1	0.104	
10.				
11.	Day 14 (8-22-07)			
12.	5	1	0.138	
13.	13	1	0.041	
14.	14	1	0.180	
15.				
16.	Day 21 (8-29-07)			
17.	5	1	0.100	
18.	13	1	0.017	
19.	14	1	0.039	
20.				
21.	Day 28 (9-5-07)			
22.	5	1	0.089	
23.	13	1	0.012	
24.	14	1	0.016	
25.				
26.				
27.				
28.				
29.				
30.				
31.				
32.				
33.				
34.				
35.				
36.				



Reporting limit (mg/L) = 0.1

Recovery (%) = #VALUE!
Precision (RPD) = #VALUE!
2nd source (%) = #VALUE!

Sample volume (ml): 0.50
Dilution factor 1

Sample Set Description:
Test No.: 762-4
Test Day: 0,7,14,21,28
Species: *Lumbriculus*

Proj. No.: P762

Overlying water

Analyst: MLR
Date analysed: 9-17-07

CHAIN-OF-CUSTODY RECORDS

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
Yellow: CUSTOMER COPY

Client: NORTHWESTERN AQUATIC SCIENCES	COC receipt confirmation? (Y) / N)	Ship to: **Brooks Rand LLC**
Contact: GERALD IRISSARRI	If yes, by Fax / (Email) (circle one)	3958 6th Avenue NW
Address: P.O. BOX 1437 3814 YAQUINA BAY ROAD NEWPORT, OR 97365	Fax #:	Seattle, WA 98107
	Email: GIRISSARRI @ NWAQUATIC.COM	Phone: 206-632-6206
	Sampler's name: GERALD IRISSARRI	Fax: 206-632-6017
Phone #:	Client project ID: P762	Email:samples@brooksrand.com
PO #:	BRL project ID: KLE001	www.brooksrand.com

	Sample ID	Collection		Miscellaneous				Field Preservation			Analyses required									Comments
		Date	Time	Sampler (initials)	Matrix type *	# of containers	Sample field filtered (Y/N)	Unpreserved / ice only	HCl/HNO_3/BrCl (circle one)	Other (specify)	Total Hg, EPA 1631	Methyl Hg, EPA 1630	Metals ICP-MS (specify)	As / Se species (specify)	% Solids	Filtration	Other (specify)	Other (specify)	Other (specify)	
1	11386 (PRE EXPOSURE)	8/8/07		GJI	L	5		X												* L = LUMBRICULUS VARIEGATUS TISSUE C = CORBICULA FLUMINEA TISSUE
2	11396 (PRE EXPOSURE)	8/9/07		GJI	C	5		X												
3	11726 (POST EXPOSURE)	9/5/07		GJI	L	5		X												
4	11736	9/5/07		GJI	L	5		X												CONTROL
5	1746	9/5/07		GJI	L	5		X												NW LAKE
6	11756	9/6/07		GJI	C	5		X												LWS-071907
7	11766	9/6/07		GJI	C	5		X												CONTROL
8	11776	9/6/07		GJI	C	5		X												NW LAKE
9																				LWS-071907
10																				

Relinquished by: Gerald Irissarri	Date: 9-10-07	Time:	Received by: / Date: / Time:
Relinquished by:	Date:	Time:	Received at BRL by: [signature] Date: 9/11/07 Time: 0915
Shipping carrier: UPS	# of coolers: 2		BRL Tracking #: 07BRI809

CHAIN OF CUSTODY RECORD

Northwestern Aquatic Sciences
3814 Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365
Tel: 541-265-7225, Fax: 541-265-2799, www.nwaquatic.com

Client Name	David E King Kleinfelder, Inc
Project No.	53886
Address	15050 SW Koll Pkwy
Phone No.	503-644-9447
City, State, Zip code	Beaverton, OR 97050
Report Attention	Dave King
Shipping Information	Carrier: / Airbill No.
Sampled by	Scott Shoemaker / Cris Watkins

Testing Required

Lab Sample No.	Date Sampled	Time Sampled	Sample Description	Number of Containers	Lumbriculus Bio Accumulation corbicula	Hyalella Bio Assay Chironomus		ICE CHEST INTERNAL TEMP (°C)		Comments
1099G	7/19/07	1400	LWS-071907 (REF SEDIMENT)	3	x			18.0		5 gallon Buckets
1100G	7/18/07	1500	Northwestern Lake	3	x			18.0		↓
1101G	↓	1000	NW1-071807	3		H		5.0		3202 Jars
1102G		1120	NW2-071809	3		H		↓		↓
1103G		1230	NW3-071807	3		H				
1104G		1300	NW4-071807	3		H				
1105G		1340	NW5-071807	3		H		4.0		
1106G		1420	NW6-071807	3		H		↓		
1107G	↓	1500	NW7-071807	3		H		↓		↓
										H = hold until further notice

Signature	Print Name	Company	Date	Time
Relinquished by: Scott Shoemaker	Scott Shoemaker	Kleinfelder, Inc.	7/20/07	1055
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by laboratory: Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	7/20/07	1055

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Internal Cooler Temperature Upon Lab Receipt (°C)

APPENDIX III

RAW DATA – PRELIMINARY 4-DAY SEDIMENT TOXICITY SCREENING TEST

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-3 Client Kleinfelder Investigator REVIEWED PAGES 1-10 GJI

STUDY MANAGEMENT

Client: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006

Client's Study Monitor: Mr. David King

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L.K. Nemeth

1 Greg Hutchinson GH 2 Susan Gage SG

3

Study Schedule:

Test Beginning: 8-3-07 0930 Test Ending: 8-7-07 1210

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	1118G	1100G	1099G		
Description:	Control	NW Lake	LWS-071907		
Collection Date:	7/27/07	7/18/07	7/19/07		
Receipt Date:	7/27/07	7/20/07	7/20/07		
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
_____:					

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with corrrect date

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-3 Client Kleinfelder Investigator _____

SEDIMENT DESCRIPTIONS -- SUPPLEMENTAL NOTES

Sample No.	Description
1118G	BLACK FINE MUD
1100G	BLACK FINE MUD W/ STICKS AND PLANT DEBRIS
1099G	BLACK MUDDY SAND W/ PIECES OF GRAVEL, CHUNKS OF WOOD, AND PLANT DEBRIS

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-3 Client Kleinfelder Investigator _____

TEST WATER

Source: Dechlorinated Newport, OR tap water

Date of Collection: 7-31-07

pH 6.6

Cond (umhos/cm2) 140

Hardness (mg/L) 26

Alkalinity (mg/L) 30

Chlorine (mg/L) <0.02

Treatments: Aerated ≥ 24 hrs

TEST ORGANISMS

Species: *Lumbriculus variegatus* Date received: 8-1-07

Source: Aquatic Foods, Inc., Fresno, CA

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond (umhos/cm2)	Feeding amount	Feeding description	Water changes	Comments
8-1-07	15.7	–	–	–	–	–	PLACED INTO AQUARIA W/ TAP WATER	
8-2-07	22.8	7.8	7.4	185	–	–		H= 26 A= 50 mg/L
8-3-07	23.1	8.0	6.7	240	–	–		H= 26 A= 50 mg/L
Mean	20.5	7.9	7.1	213				26 50
S.D.	4.2	–	–	–				– –
(N)	3	2	2	2				2 2

Photoperiod during acclimation: 16:8 L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: 300 ml glass beakers

Test volumes: 100 ml of test sediment; 275 ml total volume

Replicates/treatment: (4) 4 Organisms/treatment: (40) 40 (10/REP)

Test water changes: Twice daily

Aeration: only if DO falls below 2.5 mg/L

Feeding: everyday beginning with day zero

Test temperature (deg.C): 23

Beaker placement: Total randomization

Photoperiod: 16:8, L:D

Control Sediment:

Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Date collected: 7/26/07

Sieved through 1.0 -mm screen

Storage: 4°C in the dark in closed containers. NAS# 1118G

MISCELLANEOUS NOTES

Light Intensity:

Date:	Location	Light Intensity (ft-candles*)	Initials
8-1-07	BEAKER # 8	98.9	GH

*To convert ft-candles to lux divide by 0.0929

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-3 Client Kleinfelder Investigator _____

Test conducted in (circle one): room 1 (room 2) trailer water bath other:_____

Randomization chart: @ 6½ 8-18-07 ~~BOTTOM~~ TOP SHELF

5	10								
4	9								
3	8								
2	7	12							
1	6	11							

Randomization chart:

Randomization chart:

Randomization chart:

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No 762-3 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 0 (8/3/07) GH

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* umhos/cm	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3 (ppm)	Comments
4	23.9	7.0	155	6.0	34	30		Each beaker fed 1.5 ml
6	23.9	7.1	155	6.0	34	30		Tetra Fin suspension
11	23.9	6.0	185	6.1	26	30		Initials: GJ1
								Water changed in all
								beakers.
								Time: 0640
								Initials: GJ1
								Water changed in all
								beakers.
								Time: 1630
								Initials: SJ

*Water quality measurements to be taken.

Day 1 (8/4/07) GJ1

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.8	7.4						EACH BEAKER FED 1.5 ML
6	22.8	7.6						TETRA FIN SUSTENSION
11	22.8	7.2						-GJ1
								WATER CHANGED IN ALL
								BEAKERS
								TIME: 0640
								INITIALS: GJ1
								WATER CHANGED IN ALL
								BEAKERS
								TIME:
								INITIALS:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No 762-3 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 2 (8/5/07) GM

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	23.0	7.5						Each beaker fed 1.5 ml
6	23.1	7.4						Tetra Fin suspension
11	23.1	7.2						Initials: GM
								Water changed in all
								beakers.
								Time: 0635
								Initials: GM
								Water changed in all
								beakers.
								Time: 1820
								Initials: GM

*Water quality measurements to be taken.

Day 3 (8/6/07) GH

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
4	22.9	6.6						Each beaker fed 1.5 ml
6	22.9	6.5						Tetra Fin suspension
11	23.0	6.5						Initials: GM
								Water changed in all
								beakers.
								Time: 0645
								Initials: GM
								Water changed in all
								beakers.
								Time: 1650
								Initials: GH

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No 762-3 Client Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 4 (8 / 7 /07) GH

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* umhos/cm	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3 (ppm)	Comments
4	22.9	7.9	165	6.3	34	30		Each beaker fed 1.5 ml
6	22.8	7.8	160	6.3	34	40		Tetra Fin suspension
11	22.8	7.4	170	6.3	34	30		Initials: —
								Water changed in all
								beakers.
								Time: 0655
								Initials: GJ
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

Day _____(/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-LV5

LUMBRICULUS VARIEGATUS 4-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-3 Client Kleinfelder Investigator _____

DAY 4 TEST TERMINATION SHEET

Beaker No.	Number of survivors	Initials
1	10	GJL
2	9	GJL
3	9	GJL
4	10	GJL
5	10	GJL
6	10	GJL
7	10	GJL
8	10	GJL
9	9	GJL
10	10	GJL
11	10	GJL
12	10	GJL
13		
14		
15		
16		
17		
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33		
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35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		

Beaker No.	Number of survivors	Initials
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
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60		
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89		
90		

Test Number: 762-3

Freshwater Sediment Test
Lumbriculus variegatus 4-day test

Endpoints Data Entry and Calculations File

BKR=beaker number
INIT=initial number
SURV=number survivors
MORT=number dead=INIT-SURV
PSURV=%survival=100(SURV/INIT)
PMORT=%mortality=100(MORT/INIT)

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL		INIT	SURV	MORT	PSURV	PMORT		SURV	MORT	PSURV	PMORT
1	8	1118G	Control	1		10	10	0	100.0	0.0					
2	5	1118G	Control	2		10	10	0	100.0	0.0	Mean	9.8	0.3	97.5	2.5
3	2	1118G	Control	3		10	9	1	90.0	10.0	SD	0.5	0.5	5.0	5.0
4	11	1118G	Control	4	wq replicate	10	10	0	100.0	0.0	n	4	4	4	4
5	9	1100G	NW Lake	1		10	9	1	90.0	10.0					
6	7	1100G	NW Lake	2		10	10	0	100.0	0.0	Mean	9.8	0.3	97.5	2.5
7	10	1100G	NW Lake	3		10	10	0	100.0	0.0	SD	0.5	0.5	5.0	5.0
8	6	1100G	NW Lake	4	wq replicate	10	10	0	100.0	0.0	n	4	4	4	4
9	1	1099G	LWS-071907	1		10	10	0	100.0	0.0					
10	12	1099G	LWS-071908	2		10	10	0	100.0	0.0	Mean	9.8	0.3	97.5	2.5
11	3	1099G	LWS-071909	3		10	9	1	90.0	10.0	SD	0.5	0.5	5.0	5.0
12	4	1099G	LWS-071910	4	wq replicate	10	10	0	100.0	0.0	n	4	4	4	4

Test Number: 762-3

Freshwater Sediment Test
4-Day Lumbriculus variegatus

Water Quality Data

BKR	NAS SMPL	CLIENT DESCRIP	REPL	DAY	Overlying water TEMP	DO	COND	pH	HARD	ALK
4	1099G	LWS-071910	4	0	23.9	7.0	155	6.0	34	30
6	1100G	NW Lake	4	0	23.9	7.1	155	6.0	34	30
11	1118G	Control	4	0	23.9	6.0	185	6.1	26	30
4	1099G	LWS-071910	4	1	22.8	7.4				
6	1100G	NW Lake	4	1	22.8	7.6				
11	1118G	Control	4	1	22.8	7.2				
4	1099G	LWS-071910	4	2	23.0	7.5				
6	1100G	NW Lake	4	2	23.1	7.4				
11	1118G	Control	4	2	23.1	7.2				
4	1099G	LWS-071910	4	3	22.9	6.6				
6	1100G	NW Lake	4	3	22.9	6.5				
11	1118G	Control	4	3	23.0	6.5				
4	1099G	LWS-071910	4	4	22.9	7.9	165	6.3	34	30
6	1100G	NW Lake	4	4	22.8	7.8	160	6.3	34	40
11	1118G	Control	4	4	22.8	7.4	170	6.3	34	30
				Mean	23.1	7.1	165	6.2	33	32
				SD	0.4	0.5	11	0.2	3	4
				n	15	15	6	6	6	6
				Min	22.8	6.0	155	6.0	26	30
				Max	23.9	7.9	185	6.3	34	40

REFERENCE TOXICANT RESULTS AND ANALYSIS

NORTHWESTERN AQUATIC SCIENCES

PROTOCOL NO. NAS- _____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2299 Client: QC Test Investigator REVIEWED PAGES 1-6 -EJI

Test Type (rangefinding/definitive) _____ Test Length (hr) 96

Species *Lumbriculus variegatus*

STUDY MANAGEMENT

Client: QC test

Client's Study Monitor: QC test

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. IRISSARRI GJI

QA Officer L. K. Nemeth

1. Greg Hutchinson GH 2. Susan Gage sg

3. _____ 4. _____

Study Schedule:

Test Beginning: 8-3-07 0925 Test Ending: 8-7-07 1010

TEST MATERIAL

Description: Potassium Chloride Crystals - Lot No.: 045768

NAS Sample No.				
Date of Collection:				
Date of Receipt:				
Temperature (deg C):				
Dissolved oxygen (mg/L):				
pH:				
Conductivity (umhos/cm):				
Hardness (mg/L):				
Alkalinity (mg/L):				
Salinity (ppt):				
Total chlorine (mg/L):				
Total ammonia-N (mg/L):				
_____:				

DILUTION WATER

Description: Moderately hard synthetic water

Date of Preparation/Collection: 7-30-07

Water Quality: Cond. (umhos/cm): 310 Salinity (ppt) — pH 7.2

Hardness (mg/L as $CaCO_3$): 86 Alkalinity (mg/L as $CaCO_3$): 70

Treatments: Aerated ≥ 24 hrs

TEST LOCATION

Test conducted in (circle one): room 1 (room 2) trailer water bath other: _____

Randomization chart:

REP B	0.125	∅	0.5	1	0.25	2				
A	0.25	1	0.125	2	0.5	∅				

Error codes: 1) Correction of handwriting error
2) Written in wrong location; entry deleted
3) Wrong date deleted; replaced with correct date
4) Error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2299 Client QC Test Investigator _____

TEST ORGANISMS

Species: *Lumbriculus variegatus* Age: adult Size: _____

Source: AQUATIC FOODS, FRESNO, CA Date received: 8-1-07

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding Amount	Feeding description	Water changes
8-2-07	22.8	7.8	7.4	185	26	50	NONE		YES
8-3-07	23.1	8.0	6.7	240	26	50		"	YES
8-1-07	15.7	—	—	—	—	—			RECEIVING
Mean	20.5	7.9	7.1	213	26	50			
S.D.	4.2	—	—	—	—	—			
(N)	3	2	2	2	2	2			

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 2, 1, 0.5, 0.25, 0.125, 0 g/L

Test chamber: 250 ml glass beakers Test volume: 100 ml

Replicates/treatment: 2 Organisms/treatment: 20 (10/rep)

Test water changes: None Aeration during test: None

Feeding: None

Duration: 24-hr, 48-hr, (96-hr) Test temperature (deg.C): 23 ± 1

Beaker placement: Stratified randomization Photoperiod: 16:8, L:D

MISCELLANEOUS NOTES

Test solution preparation:

Working stock: Dissolve 1.0 g KCl crystals in dilution water and dilute to 100 mL.
Final conc.: 10 g/L.

Test concentration (g/L)	KCl working stock (ml/200ml)	ml of dilution water per 200 ml
2	40	160
1	20	180
0.5	10	190
0.25	5	195
0.125	2.5	197.5
0	0	0

8-3-07 6.51

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2299 Client QC Test

DAILY RECORD SHEET

Day 0 (8 / 3 /07) GH/GJ1

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 2	23.9	8.3	3200	7.9	86	70	10	10
2. 1	23.8	8.2	1880	7.8			10	10
3. 0.5	23.8	8.3	1130	7.7			10	10
4. 0.25	23.8	8.3	730	7.6			10	10
5. 0.125	23.8	8.2	520	7.5			10	10
6. 0	23.8	8.2	320	7.3	86	70	10	10

Day 1 (8 / 4 /07) GJ1

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 2	23.5	6.5	3050	7.3			8(2D)	6(4D)
2. 1	23.5	5.2	1770	7.0			10	10
3. 0.5	23.5	5.0	1080	6.9			10	10
4. 0.25	23.5	6.5	715	7.0			10	10
5. 0.125	23.5	6.9	510	6.9			10	10
6. 0	23.6	6.8	300	7.0			10	10

Day 2 (8 / 5 / 07 CB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 2	23.4	6.2	3070	7.0			4(4D)	5(1D)
2. 1	23.5	5.2	1790	6.9			10	10
3. 0.5	23.5	5.1	1120	6.8			10	10
4. 0.25	23.4	4.8	710	7.0			10	10
5. 0.125	23.4	7.0 6.6	505	7.0			10	10
6. 0	23.5	6.8 6.4	310	6.8			10	10

Day 3 (8 / 6 /07) GH

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 2	23.6	7.3	3100	7.5			Ø(4d)	Ø(5d)
2. 1	23.5	5.2	1840	7.0			5(5d)	5(5d)
3. 0.5	23.6	4.5	1135	6.8			8(2d)	10
4. 0.25	23.4	6.8	735	7.1			10	10
5. 0.125	23.5	7.2	530	7.0			10	10
6. 0	23.6	7.0	320	6.8			10	10

Day 4 (8 / 7 /07) GH

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 2	—	—	—	—	—	—	Ø	Ø
2. 1	23.5	6.2	1850	7.2			1(4D)	Ø(5D)
3. 0.5	23.6	5.2	1135	7.1			8	10
4. 0.25	23.6	6.8	740	7.1			10	10
5. 0.125	23.6	7.2	530	7.1			10	10
6. 0	23.6	7.0	320	6.8	86	70	10	10

Mean

SD

n

Revised 12-5-01

Acute 96-hr Toxicity Test-96 Hr Survival

Start Date:	8/3/2007 09:25	Test ID:	999-2299	Sample ID:	REF-Ref Toxicant
End Date:	8/7/2007 10:10	Lab ID:	ORNAS-Northwestern Aquati	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAF 91-EPA Freshwater	Test Species:	Lumbriculus variegatus
Comments:					

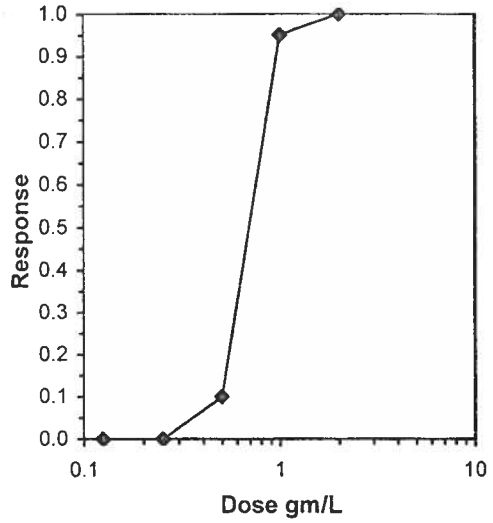
Conc-gm/L	1	2
D-Control	1.0000	1.0000
0.125	1.0000	1.0000
0.25	1.0000	1.0000
0.5	0.8000	1.0000
1	0.1000	0.0000
2	0.0000	0.0000

			Transform: Arcsin Square Root					Number	Total
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
D-Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.125	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.25	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	2	0	20
0.5	0.9000	0.9000	1.2596	1.1071	1.4120	17.115	2	2	20
1	0.0500	0.0500	0.2403	0.1588	0.3218	47.963	2	19	20
2	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	0.6830	0.6089	0.7662
5.0%	0.6870	0.6080	0.7762
10.0%	0.6928	0.6467	0.7423
20.0%	0.6928	0.6467	0.7423
Auto-0.0%	0.6830	0.6089	0.7662



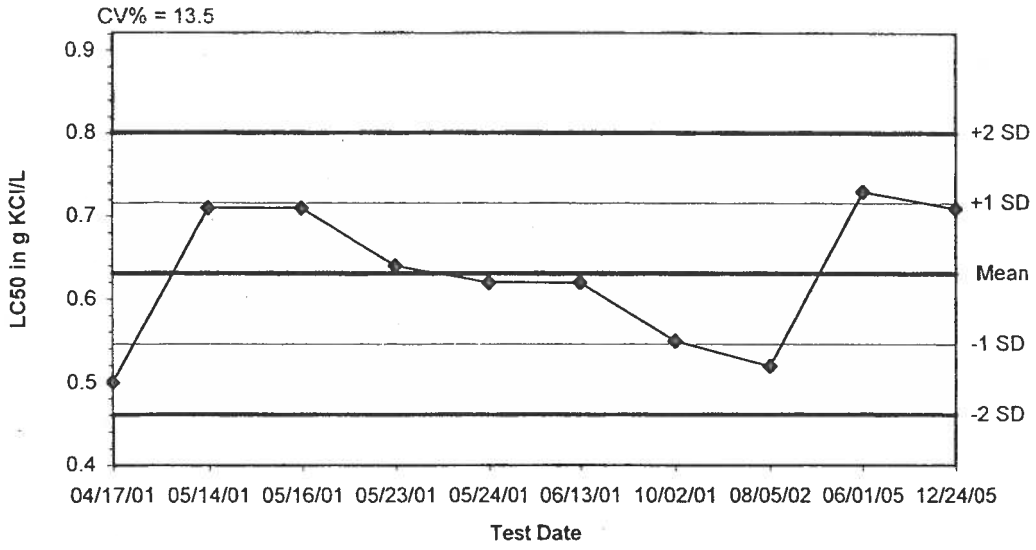
ToxCalc v5.0.23

Reviewed by:_____

Test: AT-Acute 96-hr Toxicity Test							Test ID: 999-2299		
Species: Lumbriculus variegatus							Protocol: EPAF 91-EPA Freshwater		
Sample ID: REF-Ref Toxicant							Sample Type: KCL-Potassium chloride		
Start Date: 8/3/2007 09:25			End Date: 8/7/2007 10:10				Lab ID: ORNAS-Northwestern Aquatic Sciences		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	10	10	10	10	10	
	2	2	D-Control	10	10	10	10	10	
	3	1	0.125	10	10	10	10	10	
	4	2	0.125	10	10	10	10	10	
	5	1	0.250	10	10	10	10	10	
	6	2	0.250	10	10	10	10	10	
	7	1	0.500	10	10	10	8	8	
	8	2	0.500	10	10	10	10	10	
	9	1	1.000	10	10	10	5	1	
	10	2	1.000	10	10	10	5	0	
	11	1	2.000	10	8	4	0	0	
	12	2	2.000	10	6	5	0	0	

Comments:

Lumbriculus variegatus reference toxicant test - all points



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/17/01	0.5000	0.6310	0.5461	0.4612	0.7159	0.8008
05/14/01	0.7100	0.6310	0.5461	0.4612	0.7159	0.8008
05/16/01	0.7100	0.6310	0.5461	0.4612	0.7159	0.8008
05/23/01	0.6400	0.6310	0.5461	0.4612	0.7159	0.8008
05/24/01	0.6200	0.6310	0.5461	0.4612	0.7159	0.8008
06/13/01	0.6200	0.6310	0.5461	0.4612	0.7159	0.8008
10/02/01	0.5500	0.6310	0.5461	0.4612	0.7159	0.8008
08/05/02	0.5200	0.6310	0.5461	0.4612	0.7159	0.8008
06/01/05	0.7300	0.6310	0.5461	0.4612	0.7159	0.8008
12/24/05	0.7100	0.6310	0.5461	0.4612	0.7159	0.8008

MSR
1-19-06

Report

of

Test No. 762-5

Bioaccumulation of *Corbicula fluminea* in a 28-day Exposure to Test Sediments in Support of the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, WA, Kleinfelder Project No. 58336/ 4.

Submitted to

Squier | Kleinfelder
15050 SW Koll Parkway
Suite L
Beaverton, OR 97006-6028

Submitted by

Northwestern Aquatic Sciences
3814 Yaquina Bay Road
P.O. Box 1437
Newport, OR 97365

October 2, 2007

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 762-5

Title: *Corbicula fluminea* 28-day bioaccumulation exposure to test sediments in support of the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, WA, Kleinfelder Project No. 58336/ 4.

Protocol No.: NAS-XXX-CF5 August 20, 2001 (Revision 2, 11-9-05). Based on 1) Portland Harbor Sediment Management Plan - Appendix G; 2) EPA/600/R-93/183; 3) EPA 823-B-98-004; 4) and ASTM E-1688-97a.

STUDY MANAGEMENT

Study Sponsor: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006

Sponsor's Study Monitor: Mr. David King

Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365

Test Location: Newport laboratory

Laboratory's Study Personnel: G.J. Irissarri, B.S., Proj. Man./Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; M.S. Redmond, M.S., Aq. Toxicologist; G.A. Buhler, B.S., Aq. Toxicologist; S.J. Gage, B.A., Sr. Tech.; G.P. Hutchinson, B.S., Tech.; L.P. Sandoval, B.S., Tech.

Study Schedule:

Test Beginning: 8-9-07, 1315

Test Ending: 9-6-07, 1400

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.

Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Test Sediments: Freshwater test sediments collected as part the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, Washington, Kleinfelder Project No. 58336 / 4. Details are as follows:

NAS Sample No.	1100G	1099G
Description	NW Lake	LWS-071907
Collection Date	7/18/07	7/19/07
Receipt Date	7/20/07	7/20/07

Control Sediment: The negative control sediment (NAS#1118G) was collected on 7-27-07 from an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR. The control sediment was press sieved through a 1.0 mm screen.

Storage: All test and control sediments were stored at 4°C in the dark until used.

TEST WATER

Source: Dechlorinated municipal tap water.

Dates of Preparation: 8-8-07 to 8-29-07

Water Quality: Averaged: pH 7.3 ± 0.4; conductivity 144 ± 5 µmhos/cm; hardness 39 ± 5 mg/L as $CaCO_3$; alkalinity 35 ± 6 mg/L as $CaCO_3$. Total chlorine was <0.02 mg/L in all batches.

Pretreatment: Dechlorinated, aerated ≥24 hr.

TEST ORGANISMS

Species: *Corbicula fluminea*.

Age: Adult

Source: Upper Clinch River, VA. Collected by Virginia Polytechnic Institute and State University, Blacksburg, VA.
Received: 8-3-07.
Acclimation: Clams were placed in small aquaria with dechlorinated tap water and aeration. Animals were not fed during holding. Water quality conditions for the week prior to testing averaged: temperature, 20.1 ± 0.9°C; dissolved oxygen, 9.1 ± 0.1 mg/L; pH, 7.1 ± 0.1; conductivity 187 ± 4 umhos/cm; hardness, 39 ± 5 mg/L as CaCO3 and alkalinity, 50 ± 0 mg/L as CaCO3. Photoperiod: 16:8, L:D.

TEST PROCEDURES AND CONDITIONS

Test Design and Summary of Test Procedures: The bioaccumulation test required *C. fluminea* to be exposed for 28 days to test and control sediments. Two and one half liters of each sediment were placed in the bottom of five-gallon aquaria and filled with 8 liters of dechlorinated municipal tap water one day prior to the date that the clam exposure was to begin. Test chambers were placed in a temperature-controlled room. On the day of test initiation, 20 clams (approximately 10.2 grams of wet tissue weight) were placed into each test chamber. Five replicate zero-time samples were collected and sent to analytical laboratory, Brooks Rand, on 9-10-07 for analysis. Three times per week, the overlying water was siphoned out and replaced. Five replicate aquaria were employed for each sediment treatment. The exposure temperature was 20 ± 1°C. During the exposure period, test chambers were examined for sediment avoidance behavior. After 28 days, clams were removed from the test sediments, rinsed with test dilution water, and placed into clean plastic bags and frozen. Animals were shipped to the analytical laboratory (Brooks Rand) on 9-10-07 for analysis.

Test Chambers: Five-gallon glass aquaria (8" x 16" x 10").
Test Volumes: 2.5 L sediment and approximately 8 L of overlying seawater
Replicates/Treatment: 5
Organisms/Treatment: 100 clams or approximately 51 grams wet tissue weight (20 clams or 10.2 grams per tank)
Water Volume Changes: 75% of overlying water replaced three times per week.
Aeration: Provided using 1 ml glass pipet placed 3-5 cm above the sediment surface.
Feeding: None
Effects Criteria: The primary purpose of the bioaccumulation study was to measure the concentrations of selected sediment contaminants in the tissues of the clams after 28 days of exposure, rather than to observe organism physiological or behavioral responses as in ordinary toxicology tests. NAS performed the laboratory exposure only. After 28 days of exposure, the surviving clams were frozen and shipped under chain-of-custody to the analytical laboratory (Brooks Rand).
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, pH, conductivity, hardness, and alkalinity were measured in one replicate of each treatment on Days 0, 7, 14, 21, 28. Ammonia-N was measured in one replicate of each treatment on Days 0, 14, 21, and 28. Temperature and dissolved oxygen were measured in one replicate daily during the 28-day exposure. The values of individual water quality measurements are to be found in the raw data (Appendix II). The overall means, standard deviations, and the minimum and maximum values for the water quality parameters taken during the 28-day exposure period are given in Table 1.

DATA ANALYSIS METHODS

Means and standard deviations for water quality parameters and tissue weights were calculated using Microsoft Excel 2000.

PROTOCOL DEVIATIONS

The light intensity was below protocol specifications. This deviation is not likely to have affected the test results.

TEST RESULTS

Water quality measurements for the 28-day exposure period are summarized in Table 1. Average clam size and weights at test initiation are listed in Table 2. Clam survival at the end of the 28-day exposure period and tissue sample number are listed in Table 3. All zero-time and post sediment exposure *Corbicula* biomass samples were sent to Brooks Rand on 9-10-07 for analysis.

STUDY APPROVAL

Gerald Ankley 9-26-07
Project Manager/Study Director Date

Linda K. Nemeth 9/24/07
Quality Assurance Unit Date

Linda K. Nemeth 9/24/07
Manager, Toxicology Date

Table 1. Summary of Water Quality Measurements of 28-Day Bioaccumulation Exposure to Test Sediments.

	Mean	S.D.	Min.	Max.	n
Temperature (°C)	19.9	0.4	19.2	21.0	87
Dissolved oxygen (mg/L)	8.4	0.5	6.2	9.2	87
Conductivity (umhos/cm)	165	12	150	185	15
pH	6.9	0.4	6.1	7.6	15
Hardness (as mg/L $CaCO_3$)	44	7	34	60	15
Alkalinity(as mg/L $CaCO_3$)	43	8	30	50	15
Ammonia-N (mg/L)	---	---	<0.1	0.5	12

Table 2. Shell Width, Whole Clam Weight, and Wet Tissue Weight of *Corbicula Fluminea* used to Calculate Number of Clams to Add to Sediment Exposure Tanks.

	Shell Width (cm)	Whole Clam Weight (gm)	Wet Weight of Clam Tissue (gm)
	2.4	4.51	0.54
	2.2	3.33	0.48
	2.2	4.08	0.47
	2.2	4.13	0.47
	2.3	4.27	0.51
	2.5	5.77	0.67
	2.4	4.43	0.57
	1.8	2.19	0.29
	2.4	5.78	0.64
	2.3	4.42	0.51
	2.4	4.47	0.58
	2.2	4.21	0.49
	2.3	4.29	0.50
	2.0	3.57	0.44
	2.1	4.10	0.45
Mean	2.2	4.24	0.51
SD	0.2	0.95	0.10
N	15	15	15

Table 3. Survival of Live Clams, *Corbicula fluminea*, Exposed for 28 Days to Test Sediments. The initial number of clams added per sediment was 100 (20 per replicate).

Sediment Description	Number Alive on Day 28	Tissue Sample Number
0-time	---	NAS#1139G
Control (NAS#1118G)	100	NAS#1175G
NW Lake (NAS#1100G)	100	NAS#1176G
LWS-071907 (NAS#1099G)	100	NAS#1177G

APPENDIX I

PROTOCOL

TEST PROTOCOL

FRESHWATER CLAM, *CORBICULA FLUMINEA*, 28-DAY SEDIMENT BIOACCUMULATION

1. INTRODUCTION

1.1 Purpose of Study: Laboratory sediment bioaccumulation tests provide an estimate of contaminant uptake by benthic infauna. The purpose of this study is to expose Asiatic clams (*Corbicula fluminea*) to freshwater sediments for 28 days so that they may bioaccumulate sediment-associated contaminants. After the bioaccumulation period, clam soft tissues are frozen for subsequent tissue analysis.

1.2 Referenced Method: There are currently no standard methods available for testing with this species. The following sources or methods were consulted in development of this protocol: 1) Portland Harbor Sediment Management Plan - Appendix G; 2) EPA/600/R-93/183; 3) Inland Testing Manual (EPA 823-B-98-004; and 4) ASTM E-1688-97a.

1.3 Summary of Method: A summary of test conditions for the 28-day clam bioaccumulation test is provided at the end of this protocol.

The 28-day bioaccumulation test with *Corbicula fluminea* is conducted at 20°C with a 16L:8D photoperiod at an illuminance of about 50-100 ft-c. Test chambers are 5 to 10-gallon aquaria containing 3 to 13 L of sediment and 6 to 20 L of overlying water. Twenty to forty clams are used in each of one to five replicate aquaria to give a stocking density of 10-40 g wet tissue per replicate (≈250g wet sediment per g soft tissue). Test organisms are not fed during the test. Gentle aeration is employed to insure that dissolved oxygen concentration does not fall below 2.5 mg/L. Each chamber receives three replacement volumes of overlying water per week. Overlying water can be culture water, well water, surface water, site water, reconstituted water, or dechlorinated municipal water. The test endpoint is bioaccumulation.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
3814 Yaquina Bay Road, P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Study Director: _____
Quality Assurance Unit: _____

Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Testing Schedule: The time between sediment collection and use in testing should be kept to a minimum; therefore, bioaccumulation testing is started as soon after sample receipt as logistically possible. For many applications a maximum holding time of 8 weeks is employed.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

3. TEST MATERIAL

The test materials are freshwater sediments. It is recommended that the control, reference, and test sediments be placed in clean, air-tight containers. Sediments for metals bioaccumulation should be stored in the absence of air to minimize the oxidation of reduced forms. Nitrogen can be used to fill the headspace in the containers. Glass containers are recommended for sediments polluted with either metals or organics, although high-density polyethylene and PTFE containers are also acceptable. Large organisms and extraneous materials, such as bivalves or twigs, should be removed from the sediments before storing. At the laboratory the samples are stored at 4°C in the dark. The time between sediment collection and use in testing should be kept to a minimum. A maximum holding time of eight weeks is recommended. A negative control sediment is collected from a clean site or the animal collection site, and should contain no or very low concentrations of the contaminant(s) of concern. In addition, a reference sediment may be employed as a comparison station when evaluating dredged materials

4. TEST WATER

Test water (overlying water) at NAS is normally moderately hard synthetic water or dechlorinated municipal water. Moderately hard synthetic water is prepared from dechlorinated and deionized municipal water or Milli-Q reagent grade water and reagent grade chemicals. Test water may also be well water, surface water, site water, or other water, depending on the study needs.

5. TEST ORGANISMS

5.1 Species: clam, *Corbicula fluminea*.

5.2. Source: Commercial suppliers or field collection from uncontaminated sites.

5.3 Age: adult (0.3 to 1.0 g soft tissue/clam)

5.4 Acclimation and Pretest Observation: After receipt, clams should be held in the laboratory for at least 24 hours prior to test initiation in order to assess their health and acclimate them to test conditions. Mortality during the holding period should not be excessive.

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers generally used in the test are 5-10 gal aquaria. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by placement in a temperature-controlled room. Gentle aeration is

employed to insure that dissolved oxygen concentration does not fall below 2.5 mg/L. The test is conducted under an illuminance of 50-100 ft-c with a 16L:8D photoperiod

6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in EPA/600/4-90/027F. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed twice with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed twice with deionized water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with deionized water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of clams to test, control, and, optionally, reference sediments. The sediments are placed on the bottom of the test containers and are overlain with test water. The test exposure is for 28 days. Static replacement of overlying water is performed three times per week. Each treatment consists of three to five replicate test containers, each containing approximately 20-40 organisms (10-40 g soft tissue wet weight). Test chamber positions are completely randomized. Test organisms are randomly distributed to the test chambers. Animals are placed on the sediment surface and allowed to bury.

7.2 Setup of Test Containers: Sediments are homogenized and placed in test chambers on the day before addition of test organisms. From 3 to 13 L of sediment is placed into each of three to five replicate aquaria. After addition of the sediment, 6-20 L of test water is gently added to each test container in a manner to prevent resuspension. The test begins when clams are introduced to the test chambers. Initial water quality measurements are taken prior to the addition of test organisms.

7.3 Test Conditions: Gentle aeration is employed to insure that dissolved oxygen concentration does not fall below 2.5 mg/L. The test temperature employed is 20 ± 1°C. A 16:8, L:D photoperiod is used. Illumination is supplied by daylight fluorescent lamps at 50-100 ft-c. The overlying water is replaced three times per week.

7.4 Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described. A three to five replicate zero-time sample of test animals is preserved (frozen) for analysis of initial concentrations of chemicals of concern.

7.5 Feeding: None.

7.6 Test Duration, Type and Frequency of Observations, and Methods: The duration of the bioaccumulation test is 28 days. The type and frequency of observations to be made are summarized as follows:

TYPE OF OBSERVATION	TIMES OF OBSERVATION
BIOLOGICAL DATA	
Survival	Daily; any dead animals are removed
PHYSICAL AND CHEMICAL DATA	
Hardness, alkalinity, conductivity, pH and total ammonia	Beginning and end of test in overlying water. One replicate per treatment. (optionally on days 0, 7, 14, 21, 28).
Dissolved oxygen, temperature	Daily in overlying water. One replicate per treatment

Dissolved oxygen is measured using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is measured using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer.

Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using titrometric methods. Ammonia-nitrogen is measured using the salicylate colorimetric method (Clin. Chim. Acta 14:403, 1996).

7.7 Test Termination and Depuration: At test termination, animals are removed from the sediment by gently sieving test chamber contents. Any gaping animals that are unresponsive to gentle prodding should be considered dead and excluded from subsequent tissue analysis. All surviving organisms from an individual replicate should be transferred to 1-L beakers containing clean water for 24 hours to purge their gut contents. After this 24-hour period, whole animals are placed in clean containers and frozen for subsequent tissue residue analysis.

7.8 Criteria of Test Acceptance: The test results are acceptable if the test organisms burrow into the sediments; the test should be considered invalid if overt sediment avoidance is observed.

8. DATA ANALYSIS

The endpoint of the test is bioaccumulation. Surviving clams are depurated for 24 hours and then frozen for subsequent tissue analysis. Data analysis consists of calculating means and standard deviations for water quality parameters and tissue chemical concentrations, if the chemical data are provided to NAS. Statistical comparisons of treatment groups may be done using standard hypothesis test procedures (i.e. test for normality and homogeneity followed by parametric or non-parametric comparison tests as appropriate).

9. REPORTING

The final report of the test results must include all of the following standard information at a minimum (except that tabulation and analysis of tissue chemical concentrations is optional depending on client requirements): name and identification of the test; the investigator and laboratory; date and time of test beginning and end; information on the test material; information on the source and quality of the overlying/test water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment, tabulation and statistical analysis of measured responses and a summary table of endpoints; a description of the statistical methods used; any unusual information about the test or deviations from procedures; results of the initial screening toxicity test.

10. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

11. REFERENCED AND/OR CONSULTED GUIDELINES

ASTM. 1997. Determination of the Bioaccumulation of Sediment-Associated Contaminants by Benthic Invertebrates. ASTM Standard Method No. E 1688 – 97a. Am. Soc. Test. Mat., Philadelphia, PA.

Portland Harbor Sediment Management Plan. June 25, 1999. Oregon Department of Environmental Quality.

U.S. EPA. 1993. Guidance Manual: Bedded Sediment Bioaccumulation Tests: Bedded Sediment Bioaccumulation Tests. EPA/600/R-93/183.

U.S. EPA. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S. – Testing Manual: Inland Testing Manual. EPA 823-B-98-004.

Weber, C.I. (Ed.) 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition). EPA/600/4-90/027F.

12. APPROVALS

_____ for _____
Name Date

_____ for Northwestern Aquatic Sciences
Name Date

SUMMARY OF TEST CONDITIONS

CORBICULA FLUMINEA, 28-DAY SEDIMENT BIOACCUMULATION

1. Test type:	Static Renewal
2. Test duration:	28 days
3. Temperature:	20± 1° C
4. Light quality:	Ambient Laboratory
5. Light itensity:	50-100 ft-c
6. Photoperiod:	16L:8D
7. Test chamber size:	5 - 10 gal aquarium
8. Sediment volume:	3 - 13 L (≈250g wet sediment per g soft tissue)
9. Overlying water volume:	6 - 20 L
10. Renewal of overlying water:	3x/wk
11. Age of test organisms:	Adults (0.3 to 1.0 g soft tissue/clam)
12. Loading of organisms in chamber:	20 - 40 (10-40 g soft tissue wet weight)
13. Replicates per sediment:	1 to 5
14. Test chamber cleaning	None
15. Feeding:	None
16. Aeration:	Gentle, as needed to keep DO from falling below 2.5 mg/L
17. Overlying water:	Moderately hard synthetic water, dechlorinated municipal water, culture water, well water, surface water, or site water.
18. Study treatments:	Site sediment(s), a reference sediment (optional), and a control sediment.
19. Overlying water quality:	Hardness, alkalinity, conductivity, pH, and ammonia at the beginning and end of a test (optionally on days 3, 7, 14, & 21). Temperature and dissolved oxygen daily.
20. Endpoint:	Bioaccumulation
21. Sample holding requirements:	Up to 8 weeks
22. Sample volume required:	18 - 36 L (5-10 gal)
23. Test acceptability:	Test organisms must burrow into the test sediments.

APPENDIX II

RAW DATA

TEST DESCRIPTION, MONITORING, AND RESULTS BENCHSHEETS

NORTHWESTERN AQUATIC SCIENCES
CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST
PROTOCOL NO. NAS-XXX-CF5

REVIEWED PAGES 1-21 -GJI

Test No. 762-5 Client Kleinfelder Investigator

STUDY MANAGEMENT

Client: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006
Client's Study Monitor: Mr. David King
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir.: G.J. Irissarri GJI
QA Officer: L.K. Nemeth
1. Susan Gage SG
2. KA Ashton KA
3. Greg Hutchinson GH
4. Lidia P. Sandoval LPS
5. M.S. Redmond MSR
6.
7.
8.

Study Schedule:
Test Beginning: 8-9-07 1315 Test Ending: 9-6-07 1400

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	1118G	1100G	1099G		
Description:	Control	NW Lake	LWS-071907		
Collection Date:	7/27/07	7/18/07	7/19/07		
Receipt Date:	7/27/07	7/20/07	7/20/07		
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with corrrect date
4) error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-CF5
CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-5 Client Kleinfelder Investigator

SEDIMENT DESCRIPTIONS -- SUPPLEMENTAL NOTES

Sample No.	Description
1118G	BLACK FINE MUD
1100G	BLACK FINE MUD W/ STICKS AND PLANT DEBRIS
1099G	BLACK MUDDY SAND W/ PIECES OF WOOD, GRAVEL, AND PLANT DEBRIS

NORTHWESTERN AQUATIC SCIENCES
CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

PROTOCOL NO. NAS-XXX-CF5

Test No. 762-5 Client Kleinfelder Investigator

TEST WATER

Source: Dechlorinated Municipal tap water

Date of Collection: 8-8-07, 8-16-07, 8-22-07, 8-29-07

pH 6.8, 7.2, 7.6, 7.6 $\bar{X}$ = 7.3 ± 0.4

Cond (umhos/cm2) 150, 145, 140, 140 $\bar{X}$ = 144 ± 5

Hardness (mg/L) 34, 34, 43, 43 $\bar{X}$ = 39 ± 5

Alkalinity (mg/L) 30, 30, 40, 40 $\bar{X}$ = 35 ± 6

Chlorine (mg/L) ALL <0.02

Treatments: Aerated ≥ 24 hrs

TEST ORGANISMS

Species: *Corbicula fluminea* Date received: 8-3-07

Source: UPPER CLINCH RIVER, VA. COLLECTED BY VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY, BLACKSBURG, VA.

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond (umhos/cm²)	Feeding amount	Feeding description	Water changes	Comments	
8-4-07	18.7	9.3	7.1	180	NONE			H=34	A=50
8-5-07	19.1	9.2	7.0	190				H=34	A=50
8-6-07	20.6	9.2	7.0	190			YES	H=34	A=50
8-7-07	20.5	8.9	7.0	190			YES	H=43	A=50
8-8-07	20.8	9.1	7.1	185			YES	H=43	A=50
8-9-07	20.6	9.0	7.1	185				H=43	A=50
Mean	20.1	9.1	7.1	187				39	50
S.D.	0.9	0.1	0.1	4				5	∅
(N)	6	6	6	6				6	6

Photoperiod during acclimation: 16:8 L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: ~~10~~ 5 gal glass aquaria 9-18-07 GJL WRONG NUMBER

Test volumes: 2.5 L of test sediment; 8 L of dilution water

Replicates/treatment: 5 Organisms/treatment: 10 grams wet tissue

Test water changes: 3 times per week

Aeration: yes

Feeding: everyday beginning with day zero

Test temperature (deg.C): 20 ± 1

Beaker placement: Total randomization

Photoperiod: 16:8, L:D

Control Sediment:

Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Date collected: 7/27/07

Storage: 4°C in the dark in closed containers. NAS# 1118G

MISCELLANEOUS NOTES

LIGHT INTENSITY:

8-9-07 TANK #6 32.2 FT CANDLES GJL

TANK #11 40.8 FT CANDLES

NORTHWESTERN AQUATIC SCIENCES
CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST
PROTOCOL NO. NAS-XXX-CF5

Test No. 762-5 Client Kleinfelder Investigator _____

Test conducted in (circle one): room 1 room 2 (trailer) water bath other: _____

Randomization chart: TOP SHELF

1	2	3	—					—	15

Randomization chart:

Randomization chart:

Randomization chart:

NORTHWESTERN AQUATIC SCIENCES
CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

PROTOCOL NO. NAS-XXX-CF5

Test No. 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 0 (8/9 0764/EJJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
1	20.9	6.4	150	6.1	34	50	0.5	
2	20.9	6.8	175	6.3	34	30	0.3	
7	20.9	6.2	150	6.1	34	40	0.5	

*Water quality measurements to be taken.

Day 1 (8/10 07 AJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.8	8.6						Water changed in all aquaria
2	19.8	7.1						Time: 1130
7	19.7	8.7						Initials: AJ

*Water quality measurements to be taken.

Day 2 (8/11 07 AJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.6	9.1	~~8.8~~					
2	19.6	8.5	8.5					
7	19.6	9.2	LPS @ 8-12-05					

*Water quality measurements to be taken.

Day 3 (8/12 07) LPS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	20.0	8.8						
2	20.0	8.5						
7	19.9	8.4						

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST
PROTOCOL NO. NAS-XXX-CF5

Test No 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 4 (8/13/07) LPS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.4	8.8						Water changed in all aquaria
2	19.4	8.5						Time: 1115
7	19.3	8.9						Initials: LPS

*Water quality measurements to be taken.

Day 5 (8/14/07) LPS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.9	8.6						
2	19.8	8.7						
7	19.7	8.9						

*Water quality measurements to be taken.

Day 6 (8/15/07) AS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	21.0	8.7						Water changed in all aquaria
2	21.0	8.6						Time: 1550
7	20.8	7.6						Initials: LPS

*Water quality measurements to be taken.

Day 7 (8/16/07) CMS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
1	20.0	8.7	160	7.0	43	30		
2	20.0	8.8	180	7.0	43	30		
7	19.7	8.6	160	7.0	51	40		

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-CF5
CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 8 (8/17 07) MJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.8	8.8						Water changed in all aquaria
2	19.9	8.6						Time: 1725
7	19.9	8.7						Initials: GH

*Water quality measurements to be taken.

Day 9 (8/18 07) MJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.6	8.9						
2	19.6	8.8						
7	19.6	8.6						

*Water quality measurements to be taken.

Day 10 (8/19 07) GSL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.7	8.9						
2	19.6	8.9						
7	20.0	8.4						

*Water quality measurements to be taken.

Day 11 (8/20 07) MJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	20.2	9.0						Water changed in all aquaria
2	20.1	8.9						Time: 0920
7	20.2	8.8						Initials: GSL

*Water quality measurements to be taken.

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CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 12 (8/21/02) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	20.2	8.6						
2	20.1	8.3						
7	20.3	7.9						

*Water quality measurements to be taken.

Day 13 (8/22/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.9	8.2						Water changed in all aquaria
2	19.8	8.7						Time: 1125
7	19.9	8.4						Initials: GJ

*Water quality measurements to be taken.

Day 14 (8/23/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
1	19.6	7.8	150	7.1	43	40	0.2	
2	19.4	8.6	170	7.5	43	40	<0.1	
7	19.7	8.1	165	7.6	51	50	<0.1	

*Water quality measurements to be taken.

Day 15 (8/24/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.9	8.4						Water changed in all aquaria
2	19.8	8.4						Time: 1130
7	19.9	8.1						Initials: GJ

*Water quality measurements to be taken.

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CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 16 (8/25/67) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	20.0	8.4						
2	19.9	8.4						
7	20.1	8.4						

*Water quality measurements to be taken.

Day 17 (8/26/67) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.9	8.4						
2	19.9	8.4						
7	20.1	7.9						

*Water quality measurements to be taken.

Day 18 (8/27/67) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.2	8.4						Water changed in all aquaria
2	19.2	8.5						Time: 1645
7	19.4	7.9						Initials: GJL

*Water quality measurements to be taken.

Day 19 (8/28/67) GJL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.3	8.2						
2	19.3	8.4						
7	19.6	7.8						

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
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CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 20 (8/29/07 AS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.6	8.3			~~43~~ AS	~~50~~		Water changed in all aquaria
2	19.6	8.6						Time: 1540
7	19.8	8.1						Initials: AS

*Water quality measurements to be taken.

Day 21 (8/30/07 AS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
1	20.0	7.4	150	7.0	43	50	0.2	
2	19.9	7.8	165	6.9	43	40	0.2	
7	20.1	8.3	170	7.2	60	50	0.2	

*Water quality measurements to be taken.

Day 22 (8/31/07 AS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	20.0	8.8						Water changed in all aquaria
2	19.9	8.5						Time: 8:20
7	20.1	8.9						Initials: AS

*Water quality measurements to be taken.

Day 23 (9/1/07 AS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	20.0	8.4						
2	19.8	8.6						
7	20.0	8.2						

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-CF5

CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 24 (9/2/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.4	8.9						
2	19.3	8.2						
7	19.2	8.8						

*Water quality measurements to be taken.

Day 25 (9/3/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.8	8.8						Water changed in all aquaria
2	19.7	8.2						Time: 1020
7	19.6	8.6						Initials: GJ

*Water quality measurements to be taken.

Day 26 (9/4/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	20.1	8.8						
2	20.0	8.2						
7	19.9	8.7						

*Water quality measurements to be taken.

Day 27 (9/5/07 AF)

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	19.9	8.7						Water changed in all aquaria
2	19.9	8.1						Time: 0900
7	19.7	8.4						Initials: AF

*Water quality measurements to be taken.

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CORBICULA FLUMINEA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-5 Client Kleinfelder Investigator

DAILY RECORD SHEET

Day 28 (9 / 6 07 07)

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
1	19.6	8.4	145	6.8	51	50	0.4	
2	19.5	7.9	180	6.7	43	50	0.1	
7	19.5	8.1	185	6.9	51	50	0.1	

*Water quality measurements to be taken.

Day (/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments

*Water quality measurements to be taken.

Day (/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments

*Water quality measurements to be taken.

Day (/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments

*Water quality measurements to be taken.

Test No. 762-5 Client Kleinfelder Investigator

PRE SEDIMENT EXPOSURE AVERAGE WET WEIGHT DETERMINATION

Clam	Shell Size (cm)	Whole Clam Wt (g)	Wet Tissue Wt (g)	Initials	Comments
1	2.4	4.51	0.54	GSI	
2	2.2	3.33	0.48		
3	2.2	4.08	0.47		
4	2.2	4.13	0.47		
5	2.3	4.27	0.51		
6	2.5	5.77	0.67		
7	2.4	4.43	0.57		
8	1.8	2.19	0.29		
9	2.4	5.78	0.64		
10	2.3	4.42	0.51		
11	2.4	4.47	0.58		
12	2.2	4.21	0.49		
13	2.3	4.29	0.50		
14	2.0	3.57	0.44		
15	2.1	4.10	0.45		
Mean	2.2	4.24	0.51		
SD	0.2	0.95	0.10		
N	15	15	15		

CORBICULA FLUMENIA 28-DAY SOLID PHASE BIOACCUMULATION TEST

Test No. 762-5 Client Kleinfelder

28-DAY TEST TERMINATION SHEET

	Date: 8-9-07		Date: 9-6-07		
TANK	Initial number of clams	Initials GJ	Final number of clams	Initials	Comments
1	20		20	GJ	
2	20		20		
3	20		20		
4	20		20		
5	20		20		
6	20		20		
7	20		20		
8	20		20		
9	20		20		
10	20		20		
11	20		20		
12	20		20		
13	20		20		
14	20		20		
15	20		20		

TEST DATA ANALYSIS RECORDS

Test Number: 762-5

Freshwater Sediment Test
Corbicula Bioaccumulation test

Corbicula Randomization and Tissue Results

INDEX	TANK	NAS SMPL	CLIENT DESCRIP	REPL	INITIAL WET* WEIGHT (g)	INITIAL NUMBER OF CLAMS	POST EXPOSURE NUMBER OF CLAMS	TISSUE SAMPLE NUMBER
			0-time					1139G
1	4	1118G	Control	1	10.2	20	20	1175G
2	10	1118G	Control	2	10.2	20	20	1175G
3	15	1118G	Control	3	10.2	20	20	1175G
4	9	1118G	Control	4	10.2	20	20	1175G
5	2	1118G	Control	5 wq replicate	10.2	20	20	1175G
6	13	1100G	NW Lake	1	10.2	20	20	1176G
7	11	1100G	NW Lake	2	10.2	20	20	1176G
8	12	1100G	NW Lake	3	10.2	20	20	1176G
8	6	1100G	NW Lake	4	10.2	20	20	1176G
8	7	1100G	NW Lake	5 wq replicate	10.2	20	20	1176G
11	8	1099G	LWS-071907	1	10.2	20	20	1177G
12	5	1099G	LWS-071907	2	10.2	20	20	1177G
13	3	1099G	LWS-071907	3	10.2	20	20	1177G
14	14	1099G	LWS-071907	4	10.2	20	20	1177G
15	1	1099G	LWS-071907	5 wq replicate	10.2	20	20	1177G

*Based upon the average wet tissue weight of 0.51 grams per clam.

Test Number: 762-5

Freshwater Sediment Test
Corbicula Bioaccumulation Test

Water Quality Data

	NAS	CLIENT			Overlying water						
BKR	SMPL	DESCRIP	REPL	DAY	TEMP	DO	COND	pH	NH3	HARD	ALK
1	1099G	LWS-071907	5	0	20.9	6.4	150	6.1	0.5	34	50
2	1118G	Control	5	0	20.9	6.8	175	6.3	0.3	34	30
7	1100G	NW Lake	5	0	20.9	6.2	150	6.1	0.5	34	40
1	1099G	LWS-071907	5	1	19.8	8.6					
2	1118G	Control	5	1	19.8	7.1					
7	1100G	NW Lake	5	1	19.7	8.7					
1	1099G	LWS-071907	5	2	19.6	9.1					
2	1118G	Control	5	2	19.6	8.5					
7	1100G	NW Lake	5	2	19.6	9.2					
1	1099G	LWS-071907	5	3	20.0	8.8					
2	1118G	Control	5	3	20.0	8.5					
7	1100G	NW Lake	5	3	19.9	8.4					
1	1099G	LWS-071907	5	4	19.4	8.8					
2	1118G	Control	5	4	19.4	8.5					
7	1100G	NW Lake	5	4	19.3	8.9					
1	1099G	LWS-071907	5	5	19.9	8.6					
2	1118G	Control	5	5	19.8	8.7					
7	1100G	NW Lake	5	5	19.7	8.9					
1	1099G	LWS-071907	5	6	21.0	8.7					
2	1118G	Control	5	6	21.0	8.6					
7	1100G	NW Lake	5	6	20.8	7.6					
1	1099G	LWS-071907	5	7	20.0	8.7	160	7.0		43	30
2	1118G	Control	5	7	20.0	8.8	180	7.0		43	30
7	1100G	NW Lake	5	7	19.7	8.6	160	7.0		51	40
1	1099G	LWS-071907	5	8	19.8	8.8					
2	1118G	Control	5	8	19.9	8.6					
7	1100G	NW Lake	5	8	19.9	8.7					
1	1099G	LWS-071907	5	9	19.6	8.9					
2	1118G	Control	5	9	19.6	8.8					
7	1100G	NW Lake	5	9	19.6	8.6					
1	1099G	LWS-071907	5	10	19.7	8.9					
2	1118G	Control	5	10	19.6	8.9					
7	1100G	NW Lake	5	10	20.0	8.4					
1	1099G	LWS-071907	5	11	20.2	9.0					
2	1118G	Control	5	11	20.1	8.9					
7	1100G	NW Lake	5	11	20.2	8.8					
1	1099G	LWS-071907	5	12	20.2	8.6					
2	1118G	Control	5	12	20.1	8.3					
7	1100G	NW Lake	5	12	20.3	7.9					
1	1099G	LWS-071907	5	13	19.9	8.2					
2	1118G	Control	5	13	19.8	8.7					
7	1100G	NW Lake	5	13	19.9	8.4					
1	1099G	LWS-071907	5	14	19.6	7.8	150	7.1	0.2	43	40
2	1118G	Control	5	14	19.4	8.6	170	7.5	<0.1	43	40
7	1100G	NW Lake	5	14	19.7	8.1	165	7.6	<0.1	51	50
1	1099G	LWS-071907	5	15	19.9	8.4					
2	1118G	Control	5	15	19.8	8.4					
7	1100G	NW Lake	5	15	19.9	8.1					

Test Number: 762-5

Freshwater Sediment Test
Corbicula Bioaccumulation Test

1	1099G	LWS-071907	5	16	20.0	8.6					
2	1118G	Control	5	16	19.9	8.4					
7	1100G	NW Lake	5	16	20.1	8.4					
1	1099G	LWS-071907	5	17	19.9	8.4					
2	1118G	Control	5	17	19.9	8.4					
7	1100G	NW Lake	5	17	20.1	7.8					
1	1099G	LWS-071907	5	18	19.2	8.4					
2	1118G	Control	5	18	19.2	8.5					
7	1100G	NW Lake	5	18	19.4	7.9					
1	1099G	LWS-071907	5	19	19.3	8.2					
2	1118G	Control	5	19	19.3	8.4					
7	1100G	NW Lake	5	19	19.6	7.8					
1	1099G	LWS-071907	5	20	19.6	8.3					
2	1118G	Control	5	20	19.6	8.6					
7	1100G	NW Lake	5	20	19.8	8.1					
1	1099G	LWS-071907	5	21	20.0	7.4	150	7.0	0.2	43	50
2	1118G	Control	5	21	19.9	7.8	165	6.9	0.2	43	40
7	1100G	NW Lake	5	21	20.1	8.3	170	7.2	0.2	60	50
1	1099G	LWS-071907	5	22	20.0	8.8					
2	1118G	Control	5	22	19.9	8.5					
7	1100G	NW Lake	5	22	20.1	8.9					
1	1099G	LWS-071907	5	23	20.0	8.4					
2	1118G	Control	5	23	19.8	8.6					
7	1100G	NW Lake	5	23	20.0	8.2					
1	1099G	LWS-071907	5	24	19.4	8.9					
2	1118G	Control	5	24	19.3	8.2					
7	1100G	NW Lake	5	24	19.2	8.8					
1	1099G	LWS-071907	5	25	19.8	8.8					
2	1118G	Control	5	25	19.7	8.2					
7	1100G	NW Lake	5	25	19.6	8.6					
1	1099G	LWS-071907	5	26	20.1	8.8					
2	1118G	Control	5	26	20.0	8.2					
7	1100G	NW Lake	5	26	19.9	8.7					
1	1099G	LWS-071907	5	27	19.9	8.7					
2	1118G	Control	5	27	19.9	8.1					
7	1100G	NW Lake	5	27	19.7	8.6					
1	1099G	LWS-071907	5	28	19.6	8.4	165	6.8	0.4	51	50
2	1118G	Control	5	28	19.5	7.9	180	6.7	0.1	43	50
7	1100G	NW Lake	5	28	19.5	8.1	185	6.9	0.1	51	50
				Mean	19.9	8.4	165	6.9	---	44	43
				SD	0.4	0.5	12	0.4	---	7	8
				n	87	87	15	15	12	15	15
				Min	19.2	6.2	150	6.1	<0.1	34	30
				Max	21.0	9.2	185	7.6	0.5	60	50

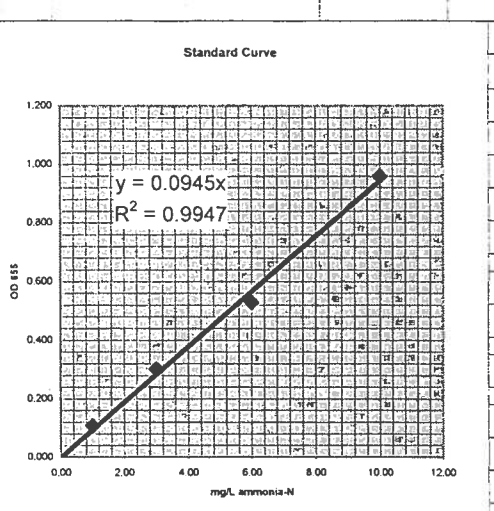
AMMONIA EXPOSURE BENCHSHEETS AND ANALYSIS

Total Ammonia-N in Water: Computation Worksheet

Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD_{655}	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.108	1.00
	3.0 mg/L NH_3-N Std.	-----	0.302	3.00
	6.0 mg/L NH_3-N Std.	-----	0.530	6.00
	10.0 mg/L NH_3-N Std.	-----	0.960	10.00
	3.0 mg/L spike	-----	0.285	3.01
	3.0 mg/L spike dupl.	-----	0.312	3.30
	5.0 mg/L 2nd source	-----	0.420	4.44
1.	Day 0 (8-9-07)			
2.	1	1	0.043	0.45
3.	2	1	0.030	0.32
4.	7	1	0.045	0.48
5.				
6.	Day 14 (8-23-07)			
7.	1	1	0.015	0.16
8.	2	1	0.009	ND
9.	7	1	0.002	ND
10.				
11.	Day 21 (8-30-07)			
12.	1	1	0.015	0.16
13.	2	1	0.018	0.19
14.	7	1	0.018	0.19
15.				
16.	Day 28 (9-6-07)			
17.	1	1	0.039	0.41
18.	2	1	0.011	0.12
19.	7	1	0.011	0.12
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				
31.				
32.				
33.				
34.				
35.				
36.				



Reporting limit (mg/L) =	0.1
Recovery (%) =	105.1
Precision (RPD) =	-9.05
2nd source (%) =	88.8
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 762-5
Test Day: 0,14,21,28
Species: *Corbicula*

Proj. No.: P762

Overlying water

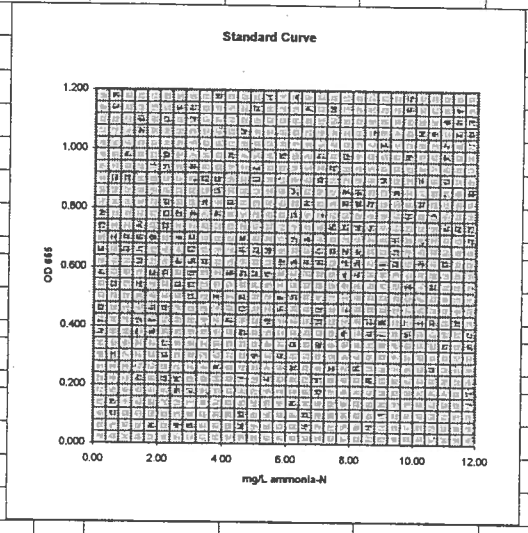
Analyst: MSR
Date analysed: 9/17/07

Total Ammonia-N in Water: Computation Worksheet

Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH3-N Std.	-----	0.108	1.00
	3.0 mg/L NH3-N Std.	-----	0.302	3.00
	6.0 mg/L NH3-N Std.	-----	0.53	6.00
	10.0 mg/L NH3-N Std.	-----	0.96	10.00
	3.0 mg/L spike	-----	0.285	
	3.0 mg/L spike dupl.	-----	0.312	
	5.0 mg/L 2nd source	-----	0.420	
1.	Day 0 (8-9-07)			
2.	1	1	0.043	
3.	2	1	0.030	
4.	7	1	0.045	
5.				
6.	Day 14 (8-23-07)			
7.	1	1	0.015	
8.	2	1	0.009	
9.	7	1	0.002	
10.				
11.	Day 21 (8-30-07)			
12.	1	1	0.015	
13.	2	1	0.018	
14.	7	1	0.018	
15.				
16.	Day 28 (9-6-07)			
17.	1	1	0.039	
18.	2	1	0.011	
19.	7	1	0.011	
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				
31.				
32.				
33.				
34.				
35.				
36.				



Reporting limit (mg/L) =	0.1
Recovery (%) =	#VALUE!
Precision (RPD) =	#VALUE!
2nd source (%) =	#VALUE!
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.:	762-5
Test Day:	0,14,21,28
Species:	*Corbicula*
Proj. No.:	P762
Overlying water	
Analyst:	MLR
Date analysed:	9-17-07

CHAIN-OF-CUSTODY RECORDS

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
Yellow: CUSTOMER COPY

Client: NORTHWESTERN AQUATIC SCIENCES	COC receipt confirmation? (Y) / N)	Ship to: **Brooks Rand LLC**
Contact: GERALD IRISSARRI	If yes, by Fax / (Email) (circle one)	3958 6th Avenue NW
Address: P.O. BOX 1437 3814 YAQUINA BAY ROAD NEWPORT, OR 97365	Fax #:	Seattle, WA 98107
	Email: GIRISSARRI @ NW AQUATIC.COM	Phone: 206-632-6206
	Sampler's name: GERALD IRISSARRI	Fax: 206-632-6017
Phone #:	Client project ID: P762	Email:samples@brooksrand.com
PO #:	BRL project ID: KLE001	www.brooksrand.com

	Sample ID	Collection		Miscellaneous				Field Preservation			Analyses required									Comments
		Date	Time	Sampler (initials)	Matrix type *	# of containers	Sample field filtered (Y/N)	Unpreserved / ice only	HCl/HNO_3/BrCl (circle one)	Other (specify)	Total Hg, EPA 1631	Methyl Hg, EPA 1630	Metals ICP-MS (specify)	As / Se species (specify)	% Solids	Filtration	Other (specify)	Other (specify)	Other (specify)	
1	11386 (PRE EXPOSURE)	8/8/07		GJI	L	5		X												* L = LUMBRICULUS VARIEGATUS TISSUE C = CORBICULA FLUMINEA TISSUE
2	11396 (PRE EXPOSURE)	8/9/07		GJI	C	5		X												
3	1172G (POST EXPOSURE)	9/5/07		GJI	L	5		X												
4	11756	9/5/07		GJI	L	5		X												CONTROL
5	1746	9/5/07		GJI	L	5		X												NW LAKE
6	11756	9/6/07		GJI	C	5		X												LWS-071907
7	11766	9/6/07		GJI	C	5		X												CONTROL
8	11776	9/6/07		GJI	C	5		X												NW LAKE
9																				LWS-071907
10																				

Relinquished by: Gerald Irissarri	Date: 9-10-07	Time:	Received by:
Relinquished by:	Date:	Time:	Received at BRL by:
Shipping carrier: UPS	# of coolers: 2		BRL Tracking #: 07BR1809

Received by:	Date:	Time:
Received at BRL by:	Date: 9/11/07	Time: 0915
BRL Tracking #: 07BR1809		

CHAIN OF CUSTODY RECORD

Northwestern Aquatic Sciences
3814 Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365
Tel: 541-265-7225, Fax: 541-265-2799, www.nwaquatic.com

Client Name	Project No.	Shipping Information
David E King Kleinfelder, Inc	53886	Carrier:
Address	**Phone No.**	Airbill No.
15050 SW Koll Pkwy	503-624-9447	
City, State, Zip code	**Report Attention**	
Beaverton, OR 97050	Dave King	

Lab Sample No.	Date Sampled	Time Sampled	Sampled by: Scott Shoemaker / Chris Watkins Sample Description	Number of Containers	Testing Required: Lumbriculus Bio Accumulation control	Testing Required: Hyalella Bio Assay Chironomus	Testing Required:	Testing Required:	ICE CHEST INTERNAL TEMP (°C)		Comments
0996	7/19/07	1400	LWS-071907 (REF SEDIMENT)	3	X				18.0		5 gallon Bucket
1100G	7/18/07	1500	Northwestern Lake	3	X				18.0		↓
1101G	↓	1000	NW1-071807	3		H			5.0		32oz Jar
1102G		1120	NW2-071809	3		H			↓		↓
1103G		1230	NW3-071807	3		H					
1104G		1300	NW4-071807	3		H					
1105G		1340	NW5-071807	3		H			4.0		
1106G		1420	NW6-071807	3		H			↓		
1107G	↓	1500	NW7-071807	3		H					
											H = hold until further Notice

Signature	Print Name	Company	Date	Time	Cooler Custody Seal
Relinquished by: Scott Shoemaker	Scott Shoemaker	Kleinfelder, Inc.	7/20/07	1055	Present / Not Present
Received by					Intact / Not Intact
Relinquished by					Internal Cooler Temperature Upon Lab Receipt (°C)
Received by					
Relinquished by					
Received by laboratory: Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	7/20/07	1055	

APPENDIX F

REPORT

of

TEST NO. 762-6 & 7

Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342)
White Salmon, Washington
Kleinfelder Project No. 58336 / 4

Submitted to

Squier | Kleinfelder
15050 SW Koll Parkway, Suite L
Beaverton, Oregon 97006

Submitted by

NORTHWESTERN AQUATIC SCIENCES
3814 YAQUINA BAY ROAD
P.O. BOX 1437
NEWPORT, OR 97365

October 10, 2007

EXECUTIVE SUMMARY OF SEDIMENT BIOASSAYS

Two freshwater sediment bioassays, a 10-day *Hyalella azteca* survival test and a 10-day *Chironomus dilutus* (formerly *C. tentans*) growth and survival test, were conducted for Squier Kleinfelder as part of the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, Washington, Kleinfelder Project No. 58336 / 4. One composite test sediment was compared to a reference sediment to assess sediment toxicity and to interpret organism response under the one-hit/two-hit rules described in *Northwest Regional Sediment Evaluation Framework* –Interim Final - September 2006 (U.S. Army Corps of Engineers, Seattle District, Portland District, Walla Walla District, and Northwestern Division; U.S. Environmental Protection Agency, Region 10, Washington Department of Natural Resources, Washington Department of Ecology, Oregon Department of Environmental Ecology, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service) The test and reference sediments tested are listed in Table 1.

TEST, REFERENCE, AND CONTROL SEDIMENT INFORMATION

The test and reference sediments were provided to Northwestern Aquatic Sciences by Squier Kleinfelder personnel. The negative control sediment was collected by NAS personnel from an area adjacent to the Highway 101 bridge at Beaver Creek, approximately 8 miles south of Newport, Oregon. All sediments were stored at 4°C in the dark until used. Sample identification and collection information is as follows:

Table 1. Sample identification and collection dates.

Sample description	Kleinfelder Sample Identification	NAS Sample Identification	Collection Date	Receipt Date
Beaver Creek Control	Control	1142G	8-15-07	8-15-07
Test sediment	NW1-071807	1101G	7-18-07	7-20-07
Reference sediment*	NW7-071807	1107G	7-18-07	7-20-07

*Reference used for data interpretation.

BIOASSAY INTERPRETATION CRITERIA

Biological test interpretation as presented in the "Evaluation Framework" relies upon two levels of observed response in the test organism. These are known as "one-hit" and "two-hit" criteria failures. The bioassay-specific guidelines for each of these response categories are listed below. In general, a one-hit failure is a marked response in comparison to the level of response from a reference in any one biological test. A two-hit failure exhibits a lower intensity response that must be present in two or more biological tests.

One-Hit Criteria

When any one of the biological tests shows a test sediment response that exceeds the bioassay-specific response guidelines (presented below), and that response is "statistically different" from the reference, the test sediment is judged to have failed the bioassay. A "statistically different" response is defined in the "Evaluation Framework" as having a response that is greater than 20% difference from that of the control, and is statistically different (alpha=0.05) from that of the reference sediment.

In accordance with the "Evaluation Framework", the bioassay-specific response guidelines for evaluating the "one hit criteria" are as follows:

Amphipod Bioassay. Mean test mortality is greater than 15 percent over the mean reference response, and statistically different from the reference (alpha = 0.05).

Midge Bioassay. Mean mortality in the test sediment is 20 percent over the reference mortality and statistically different from reference (alpha = 0.05). For the growth test, a mean biomass that is less than 60 percent of the reference sediment response and statistically different from reference (alpha = 0.05).

Two-Hit Criteria

When any two of the biological tests show test sediment responses that are less than the bioassay specific guidelines noted above for a one-hit failure, but are significantly different statistically from the reference sediment, the test sediment is judged to have failed bioassay testing (unacceptable risk to ecological receptors or unsuitable for unconfined aquatic disposal).

RESULTS OF AMPHIPOD, *HYALELLA AZTECA* 10-DAY SURVIVAL TEST (762-6)

All water quality observations were within the protocol specified ranges (Table 1, Section A). The test met all other applicable acceptability criteria including positive control performance (Section A).

The control and reference sediments exhibited mean mortalities of 1.3% and 0.0%, respectively (Table 2). Mortality of the test sediment was 6.3%. The test sediment mortality did not meet the criteria for failure under the one hit rule.

RESULTS OF MIDGE, *CHIRONOMUS DILUTUS*, 10-DAY SURVIVAL AND GROWTH TEST (762-7)

All water quality observations were within the protocol specified ranges (Table 1, Section B). The test met all other applicable acceptability criteria including positive control performance (Section B).

The mortality in the control and the reference sediments in the *Chironomid* test was 1.3% and 5.0%, respectively (Table 2). Mortality for the NW1-071807 test sediment was 3.8%. The control average individual ash-free weight was 0.74 mg. The average individual ash-free weight for the reference and test sediments was 0.76 mg and 0.62 mg, respectively. The test sediment did not meet the criteria for failure under the one hit rule for either mortality or biomass.

SUMMARY OF SEDIMENT BIOASSAY RESULTS

For a test sample to fail the "Evaluation Framework" Interpretive Criteria, the sample must be shown to exceed the "single-hit" criteria or that of the "two-hit" criteria to determine whether the sample passed or failed bioassay testing. The NW1-071807 test sediment (NAS# 1101G) did not meet the criteria for test failure under the "one hit" or "two-hit" rules (Table 2).

STUDY APPROVAL

Richard A. Caldwell 10-9-07
Laboratory Director Date

Gerald Lissarri 10-9-07
Project Manager Date

Table 2. Data summary and interpretation.

Sample Description	*Hyalella* % Mortality (Mean ± SD)	Failure under the one-hit rule?	Midge % Mortality (Mean ± SD)	Failure under the one-hit rule?	Average ind. ash-free wt/midge[1] (mg)	Failure under the one-hit rule?	Failure under the two-hit rule?	Overall Result
Control (NAS# 1142G)	1.3 ± 3.5	---	1.3 ± 3.5	---	0.74 ± 0.05	---	---	---
NW1-071807 (NAS# 1101G)	6.3 ± 7.4*	No	3.8 ± 5.2	No	0.62 ± 0.05*	No	No	Pass
NW7-071807 [2] (NAS# 1107G)	0.0 ± 0.0	---	5.0 ± 5.3	---	0.76 ± 0.05	---	---	---

[1] Pupae were not included in the sample to estimate dry weight (as per EPA/600/R-99/064, p. 59, section 12.3.8.2)
[2]Reference sediment used for data interpretation.
*Statistically significantly different from the reference

SECTION A

Amphipod (*Hyalella azteca*) sediment bioassay 762-6 data report

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 762-6

Title: Toxicity of freshwater sediments using a 10-day amphipod, *Hyalella azteca*, sediment bioassay as part of the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, Washington, Kleinfelder Project No. 58336 / 4.
Protocol No.: NAS-XXX-HA4b, April 7, 1998 (Revision 1, 10-27-03). Based on ASTM 2001 (Standard test methods for measuring the toxicity of sediment-associated contaminants with fresh water invertebrates, E1706-00), Am. Soc. Test. Mat. Phila., PA, and EPA Method 100.1 (Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates, EPA/600/R-99/064).

STUDY MANAGEMENT

Study Sponsor: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006-6028
Sponsor's Study Monitor: Mr. David King
Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365
Test Location: Newport laboratory
Laboratory's Study Personnel: G.J. Irissarri, B.S., Proj. Man./Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; M.S. Redmond, M.S., Aq. Toxicologist; G.A. Buhler, B.S., Aq. Toxicologist; Tech.; S.J. Gage, B.A., Sr. Tech.; G. Hutchinson, B.S., Tech; L.P. Sandoval, B.S., Tech.
Study Schedule:

Test Beginning: 8-31-07, 1000 hrs.
Test Ending: 9-10-07, 0900 hrs.

Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.
Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).
Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Test Sediments: Freshwater test sediments collected as part the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, Washington, Kleinfelder Project No. 58336 / 4. Details are as follows:

NAS Sample No.	1101G	1107G
Description	NW1-071807	NW7-071807
Collection Date	7/18/07	7/18/07
Receipt Date	7/20/07	7/20/07

Reference Sediment: The reference sediment used for comparative analysis was NW7-071807 (1107G).
Control Sediment: The negative control sediment (NAS#1142G) was collected on 8-15-07 from an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.
Treatments: Homogenized at test set up by mixing using stainless steel implements.
Storage: All test, reference, and control sediments were stored at 4°C in the dark in sealed containers until used.

TEST WATER

Source: Dechlorinated municipal tap water, which is also used as culture water.
Dates of Preparation: 8-27-07, 8-31-07

Water Quality:
pH: 7.0 (n=2)
conductivity: 143 (n=2) µmhos/cm
hardness: 43 (n=2) mg/L as $CaCO_3$
alkalinity: 40 (n=2) mg/L as $CaCO_3$.
total chlorine: <0.02 (n=2) mg/L
Pretreatment: Dechlorinated and aerated ≥24 hr.

TEST ORGANISMS

Species: *Hyalella azteca,* amphipod.
Age/Size: 7-8 days old
Source: Chesapeake Cultures, Hayes, VA; received 8-29-07
Acclimation: Holding conditions prior to testing averaged: Temperature, 22.3 ± 0.2 °C; dissolved oxygen, 10.6 ± 3.8 mg/L; pH, 7.8 ± 0.4; conductivity, 313 ± 72 µmhos/cm; hardness, 103 ± 9 mg/L as $CaCO_3$; and alkalinity, 150 ± 56 mg/L as $CaCO_3$. Photoperiod, 16:8, L:D. Half of the water was replaced daily with dechlorinated municipal tap water during holding. Animals were fed YTC daily during holding.

TEST PROCEDURES AND CONDITIONS

The following is an abbreviated statement of the test procedures and a statement of the test conditions actually employed. See the test protocol (Appendix I) for a more detailed description of the test procedures used in this study.

Test Chambers: 300 ml high-form glass beakers
Test Volumes: 100 ml sediment layer; 175 ml test water.
Replicates/Treatment: 8
Organisms/Treatment: 80
Water Volume Changes: 2 water volumes per day
Aeration: None.
Feeding: Animals are fed 1.0 ml of YTC suspension per beaker daily.
Effects Criterion: Survival after 10 days. Death is defined as no visible movement or response to tactile stimulation. Missing organisms were considered to be dead.
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, conductivity, pH, hardness, alkalinity and ammonia-nitrogen were measured in the overlying water of one replicate test container per treatment on days 0 and 10 of the test. Temperature and dissolved oxygen were measured daily in the overlying water of one replicate test container per treatment. Hardness and alkalinity were measured with titrimetric methods. Ammonia-N was measured using Hach reagents based on the salicylate (Clin. Chim. Acta 14:403, 1996) colorimetric method; samples were not distilled prior to analysis. The photoperiod was 16:8, L:D.

DATA ANALYSIS METHODS

Survival and mortality were calculated for each replicate as follows:

percent survival = 100 x (number surviving/initial number tested)
percent mortality = 100 x (number dead/initial number tested)

Means and standard deviations for the biological endpoints described above, and for water quality data, were computed using Microsoft Excel 2000. The value for mortality for each test sediment was statistically compared to the reference sediment. Where appropriate, an arcsine square root transformation was performed on proportional mortality data before analysis. Following determination of normality and homogeneity of variances, a one-tailed Student T-test, Mann-Whitney or Approximate T test was conducted at the 0.05 level of significance. The statistical software used was BioStat (Beta v.4.1 (EXCEL)) bioassay software developed by the U.S. Army Corps of Engineers, Seattle District.

PROTOCOL DEVIATIONS

None

REFERENCE TOXICANT TEST

The reference toxicant test is a multi-concentration toxicity test using potassium chloride, to evaluate the performance of the test organisms used in the sediment toxicity test. The performance is evaluated by comparing the results of this test with historical results obtained at the laboratory. A summary of the reference toxicant test result is given below. The reference toxicant test raw data are found in Appendix III.

Test No.: 999-2320
Reference Toxicant and Source: Potassium Chloride (KCl), Fisher Lot #045768.
Test Date: 8-31-07.
Dilution Water Used: Moderately hard synthetic water prepared from Milli-Q® deionized water.
Result: 96-hr LC50, 0.36 g/L. This result is within the laboratory's control chart warning limits (0.27 – 0.53 g/L).

TEST RESULTS

Observations of water quality in the overlying water throughout the test are summarized in Table 1. A detailed tabulation of the water quality results by sample and test day can be found in Appendix II. The means and standard deviations of percent mortality of *Hyalella* exposed for 10 days to sediments are summarized in Table 2. Detailed data organized by sample and replicate, and summary statistics for these observations, are given in Appendix II.

All water quality observations of overlying water temperature and dissolved oxygen were within the protocol specified ranges. Ammonia-N in the overlying water ranged between 0.1 and 0.3 mg/L for all day 0 and day 10 measurements.

The test met the acceptability criteria specified in the *Northwest Regional Sediment Evaluation Framework* – Interim Final - September 2006 with 1.3 % mean control mortality (≤20% required) and 0.0 % reference sediment survival (≤25% required). The reference toxicant (positive control) EC50 result was within the laboratory's control chart limits (0.36 g/L; control chart mean ± 2 S.D. = 0.40 ± 0.13).

Data interpretation was conducted as described in *Northwest Regional Sediment Evaluation Framework* – Interim Final - September 2006 (U.S. Army Corps of Engineers, Seattle District, Portland District, Walla Walla District, and Northwestern Division; U.S. Environmental Protection Agency, Region 10, Washington Department of Natural Resources, Washington Department of Ecology, Oregon Department of Environmental Ecology, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service). For a test sediment to fail under the single hit rule, the mean test mortality must be greater than 15 percentage points over the reference sediment response and "statistically different" ($\alpha = 0.05$) from the reference sediment. A "statistically different" response is defined in the "Evaluation Framework" as having a mortality response that is greater than 20% difference from that of the control, and is statistically different ($\alpha = 0.05$) from that of the reference sediment. Following these guidelines, the NW1-071807 (NAS#1101G) test sediment mortality of 6.3% did not result in a failure under the one-hit rule.

STUDY APPROVAL

Gerald Lussier 9-26-07
Project Manager/Study Director Date

Linda K. Nemeth 9/24/07
Quality Assurance Unit Date

Linda K. Nemeth 9/24/07
Laboratory Director Date
FOR R.S. CALDWELL

Table 1. Summary of water quality conditions during tests of the amphipod, *Hyalella azteca*, exposed to freshwater sediments.

Water Quality Parameter	Mean ± S.D.	Minimum	Maximum	N
Temperature (°C)	22.6 ± 0.4	22.0	23.3	33
Dissolved oxygen (mg/L)	6.9 ± 0.5	5.6	7.4	33
Conductivity (µmhos/cm)	165 ± 6	155	170	6
pH	6.6 ± 0.4	6.2	7.0	6
Hardness (mg/L as $CaCO_3$)	51 ± 0	51	51	6
Alkalinity (mg/L as $CaCO_3$)	43 ± 5	40	50	6
Total ammonia (mg/L)	0.2 ± 0.1	0.1	0.3	6

Table 2. Mortality results of *Hyalella* 10-day toxicity test and data interpretation using guidelines from the "Northwest Regional Sediment Evaluation Framework –Interim Final", September 2006. For a test sediment to fail under the single hit rule, the mean test mortality must be >15% over the reference sediment response, and "statistically different" (α = 0.05) from the reference sediment. A "statistically different" response is defined in the "Evaluation Framework" as having a response that is greater than 20% difference from that of the control, and is statistically different (α = 0.05) from that of the reference sediment.

Sample description	Percent mortality (Mean ± SD)	Statistically significantly different than that of the reference?	Difference from negative control sediment	Difference from reference sediment	Failure under 1-hit rule?
Control (NAS# 1142G)	1.3 ± 3.5	---	---	---	---
NW1-071807	6.3 ± 7.4	Yes	5.0	6.3	No
NW7-071807*	0.0 ± 0.0	---	---	---	---

*Reference sediment

APPENDIX I

PROTOCOL

TEST PROTOCOL

FRESHWATER AMPHIPOD, *HYALELLA AZTECA*, 10-DAY SEDIMENT TOXICITY TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this study is to characterize the toxicity of freshwater sediments based on survival and, optionally, growth using the amphipod, *Hyalella azteca.*

1.2 Referenced Method: This protocol is based on EPA Method 100.1 (EPA/600/R-99/064) and ASTM Method E 1706-00 (ASTM 2001).

1.3 Summary of Method: A summary of test conditions for the amphipod 10-day sediment toxicity test is tabulated below. The 10-day sediment toxicity test with *Hyalella azteca* is conducted at 23 ± 1°C with a 16L:8D photoperiod at an illuminance of about 100 to 1000 lux. Test chambers are 300-mL high-form lipless beakers containing 100 mL of sediment and 175 mL of overlying water. Ten 7-14 day old amphipods (1 to 2 day range in age) are used in each replicate. The number of replicates/treatment depends on the objective of the test. Eight replicates are recommended for routine testing. Amphipods in each test chamber are fed 1.0 mL of a YCT food daily. Each chamber receives two volume additions per day of overlying water. Overlying water can be culture water, well water, surface water, site water, or reconstituted water. Test endpoints include survival and/or growth.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
3814 Yaquina Bay Road, P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Study Director: _____
Quality Assurance Unit: _____
Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Testing Schedule: Tests are to begin within 14 days of sample collection unless otherwise specified. Reference toxicant test to be run concurrently.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

3. TEST MATERIAL

The test materials are freshwater sediments. The control, reference, and test sediments are placed in solvent cleaned 1 L glass jars fitted with PTFE-lined screw caps. At the laboratory the samples are stored at 4°C in the dark. The original sealed containers may be stored for up to 14 days prior to testing. If jars are not not full when received or if sediment is removed for testing, headspaces should be filled with nitrogen to retard deterioration. A negative control sediment is collected from a clean site. In addition, a reference sediment, a clean sediment with physical characteristics similar to the test sediments, may be employed as a comparison station.

4. TEST WATER

Test water (overlying water) at NAS is normally moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals. Test water may also be well water, surface water or site water, depending on the study design.

5. TEST ORGANISMS

5.1 Species: amphipod, *Hyalella azteca*.

5.2 Source: Cultured at NAS or purchased from a reputable commercial supplier.

5.3 Age: 7-14 days old at start of test; with 1 to 2 day range in age.

5.4 Acclimation and Pretest Observation: Test organisms must be cultured and tested at 23°C . Ideally they should be cultured in the same water that will be the test water. However, acclimation to test water is not required. Isolated young should be held similarly to mass cultures for at least two days (eliminate the feeding instructions) before starting the test to eliminate animals injured during handling

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers used in the toxicity test are 300-mL high-form lipless glass beakers. Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by placement in a temperature-controlled room. Aeration is not employed unless dissolved oxygen drops below 2.5 mg/L. The test is conducted under an illuminance of 100 to 1000 lx with a 16L:8D photoperiod.

6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in EPA/600/4-90/027F. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed twice with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed twice with deionized water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with deionized water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of amphipods to test, control, and reference sediments. The sediments are placed on the bottom of the test containers and are overlain with test water. The test exposure is for 10 days. The renewal of overlying water consists of two volume additions per day, either continuous or

intermittent. Each treatment consists of eight replicate test containers, each containing 10 organisms. Test chamber positions are completely randomized. Test organisms are randomly distributed to the test chambers. Blind testing is normally used.

7.2 Setup of Test Containers: Sediments are homogenized and placed in test chambers on the day before addition of test organisms. Sediment (100 ml) is placed into each of eight replicate beakers. After addition of the sediment, 175 ml of test water is gently added to each beaker in a manner to prevent resuspension. The overlying water is replaced twice daily. The test begins when amphipods are introduced to the test chambers. Initial water quality measurements are taken prior to the addition of test organisms.

7.3 Effect Criterion: The effect criterion used in the amphipod bioassay is mortality, defined as the lack of movement of body or appendages on response to tactile stimulation. The optional sublethal effect criterion is growth which is determined by using dry weight measurements or body length measurements.

7.4 Test Conditions: No aeration is employed unless dissoved oxygen falls below 2.5 mg/L. The test temperature employed is 23 ± 1°C. A 16:8, L:D photoperiod is used. Illumination is supplied by daylight fluorescent lamps at 100 to 1000 lux. The overlying water is replaced twice daily.

7.5 Beginning the Test: On the day the test begins, amphipods are impartially counted into small containers of test water (10/container). The test is begun by rinsing test organisms into the equilibrated test containers. If the optional growth endpoint is to be used. Twenty organisms are archived for length determination or 80 organisms for dry weight.

7.6 Feeding: Amphipods are fed 1.0 mL of YCT daily per test chamber. A feeding may be skipped if there is a build up of excess food. However, all beakers must be treated similarly.

7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the acute toxicity test is 10 days. The type and frequency of observations to be made are summarized as follows:

TYPE OF OBSERVATION	TIMES OF OBSERVATION
BIOLOGICAL DATA	
Survival, growth	Day 10
PHYSICAL AND CHEMICAL DATA	
Hardness, alkalinity, ammonia-N, conductivity, pH, dissolved oxygen, and temperature	Beginning and end of test in overlying water of one replicate beaker from each treatment.
Dissolved oxygen, temperature	Daily in overlying water of one replicate beaker from each treatment.

Dissolved oxygen is measured using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is measured using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using titrometric methods. Ammonia-nitrogen is measured using the salicylate colerimetric method (Clin. Chim. Acta 14:403, 1996).

Overlying water should be sampled just before water renewal from about 1 to 2 cm above the sediment surface using a pipet. It may be necessay to pool water samples from individual replicates. The pipet should be checked to make sure no organisms are removed during sampling of overlying water.

7.8 Growth Measurement: Growth is measured as average dry weight of animals in a test replicate at the end of the test on day 10 or average total length of preserved animals. Pooled animals from each test replicate are rinsed with deionized water and placed into tared aluminum weigh pans. The pans are dried at 60-90°C to constant weight. The dried amphipods are placed into a dessicator and weighed as soon as possible to the nearest 0.01 mg (desirable

to use 0.001 mg). The total weight of the dried amphipods in each pan is divided by the number of amphipods weighed to obtain an average dry weight per surviving amphipod per replicate.

If the length growth endpoint is to be used, either in place of or along with the weight endpoint, amphipods from each replicate are pooled and preserved in vials. Later, the preserved amphipods from one vial are carefully stretched out on a glass microscope slide and quickly measured using a dissecting microscope fitted with a calibrated ocular micrometer. Then, if weight is to be determined, the animals are quickly transferred to tared aluminum foil cups. Fine-tipped forceps or fine brushes are required for these handling operations.

If both measurements are to be used, total length measurements are taken first, then the animals are transferred to tared aluminum foil cups for weighing.

8. CRITERIA OF TEST ACCEPTANCE

The test results are acceptable if the minimum survival of organisms in the control treatment at the end of the test is at least 80%. For the growth endpoint, the test results are acceptable if there is measureable growth of test organisms in the control sediment.

9. DATA ANALYSIS

The endpoints of the toxicity test are survival and growth (optional). Survival is obtained as a direct count of living organisms in each test container at the end of the test. Average amphipod dry weight, also measured at the end of the test, may be used to compare growth between treatment sediments and the control or reference sediment. Body length may be used instead of dry weight. Ordinarily the following data analysis is performed. Due to special requirements, alternative methods may be used. The means and standard deviations are calculated for each treatment level. Identification of toxic sediments is established by statistical comparison of test endpoints between test and control or reference sediments. Between treatment comparisons may be made using a Student's t-test or Wilcoxon's Two-Sample test, where each treatment is compared to the control or the reference sediment. An arcsine-square root transformation of proportional data, and tests for normality and heterogeneity of variances, are performed prior to statistical comparisons.

10. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; date and time of test beginning and end; information on the test material; information on the source and quality of the overlying/test water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including feeding, if any, and water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses and a summary table of endpoints; a description of the statistical methods used; any unusual information about the test or deviations from procedures; reference toxicant testing information.

11. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

12. REFERENCE TOXICANT

The reference toxicant test is a standard multi-concentration toxicity test using a specified chemical toxicant to evaluate the performance of test organisms used in the study. Reference toxicant tests are 96-hour, water only exposures, not 10-day sediment exposures. The reference toxicant test is run concurrently. Performance is evaluated by comparing the results of the reference toxicant test with historical results (e.g., control charts) obtained at the laboratory.

13. REFERENCED GUIDELINES

ASTM. 2001. Standard Test Methods for Measuring the Toxicity of Sediment-Associated Contaminants with Fresh Water Invertebrates. ASTM Standard Method No. E 1706-00. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. EPA. 2000. Section 11, Test Method 100.1, *Hyalella azteca* 10-d Survival and Growth Test for Sediments, pp. 47-54 In: Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates (Second Edition). EPA/600/R-99/064.

Weber, C.I. (Ed.) 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition). EPA/600/4-90/027F.

14. APPROVALS

_____ for _____
Name Date

_____ for **Northwestern Aquatic Sciences**
Name Date

Appendix A
Test Conditions Summary

1. Test type	whole sediment toxicity test with renewal of overlying water
2. Test duration	10 days
3. Temperature	23 ± 1°C
4. Light quality	daylight flourescent light
5. Illuminance	100 - 1000 lux
6. Photoperiod	16L:8D
7. Test chamber size	300-mL high-form lipless beakers, (Pyrex® 1040 or equivalent)
8. Sediment volume	100 mL
9. Overlying water volume	175 mL
10. Renewal overlying water	2 volume additions/day (continuous or intermittent)
11. Age of test organisms	7-14 days old at test initiation (1 to 2 day range in age)
12. Organisms per test chamber	10
13. Replicates per treatment	8 recommended for routine testing (depends on design)
14. Organisms per treatment	80
15. Feeding regime	YCT food, fed 1.0 mL daily/chamber
16. Cleaning	if screens are used, clean as needed
17. Aeration	None, unless DO falls below 2.5 mg/L
18. Overlying (test) water	Culture water, well water, surface water, site water or reconstituted water
19. Water quality	Hardness, alkalinity, conductivity, pH, ammonia-N beginning and end; temperature and dissolved oxygen daily
20. Endpoints	Survival (optional, growth by dry weight or length)
21. Test acceptability criteria	Minimum control survival of 80%
22. Sample holding	14 days at 4°C in the dark
23. Sample volume required	1L (800 mL per sediment)
24. Reference toxicant	Concurrent testing required

APPENDIX II

RAW DATA

TEST DESCRIPTION, MONITORING, AND RESULTS BENCHSHEETS

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b
HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

REVIEWED PAGE 1-18 -GJI

Test No. 762-6 Client Squier Kleinfelder Investigator

STUDY MANAGEMENT

Client: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006
Client's Study Monitor: Mr. David King
Testing Laboratory: Northwestern Aquatic Sciences
Test Location: Newport Laboratory
Laboratory's Study Personnel:
Proj. Man./Study Dir. G.J. Irissarri GJI
QA Officer L.K. Nemeth
1. GA Burton GAB 2. M.S. Redmond MSR
3. Greg Hutchinson GH 4. Lidia P. Sandoval LPS
5. Susan Gaff SG 6.
7. 8.
Study Schedule:
Test Beginning: 8-31-07 1000 Test Ending: 9-10-07 0900

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	1142G	1101G	1107 GJI ① 0942G 8-31-07		
Description:	Control	NW1-071807	NW7-071807		
Collection Date:	8/15/07	7/18/07	7/18/07		
Receipt Date:	8/15/07	7/20/07	③ 7/20/07 GJI 9-19-07		
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with corrrect date
4) error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator

SEDIMENT DESCRIPTIONS -- SUPPLEMENTAL NOTES

Sample No.	Description
1142G	BLACK FINE MUD
1101G	DARK BROWN FINE MUD, PLANT DEBRIS, CHIRONOMID LARVAE & WORMS
1107G	DARK BROWN FINE MUD W/ SOME LIGHT SAND, PLANT DEBRIS, CHIRONOMID LARVAE

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator

TEST WATER

Source: Dechlorinated municipal tap water

Date of Collection: 8-31-07, 8-27-07

pH 7.1, 6.8 $\bar{x}$ = 7.0

Cond (umhos/cm2) 145, 140 $\bar{x}$ = 143

Hardness (mg/La0 43, 43 $\bar{x}$ = 43

Alkalinity (mg/L) 40, 40 $\bar{x}$ = 40

Total Chlorine (mg/L) <0.02, <0.02

Treatments: Dechlorinated, aerated

TEST ORGANISMS

Species: *Hyalella azteca* Age: 5-6 DAYS AT RECEIPT

Source: Chesapeake Cultures, Hayes, VA Date received: 8-29-07

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding amount	Feeding description	Water changes
8-29-07	22.1	>15.0	7.4	395	111	210	10 mL	YTC	YES
8-30-07	22.5	8.5	8.1	285	103	140	10 mL	YTC	YES
8-31-07	22.4	8.4	7.8	260	94	100	—	—	—
Mean	22.3	10.6	7.8	313	103	150			
S.D.	0.2	3.8	0.4	72	9	56			
(N)	3	3	3	3	3	3			

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: 300 ml glass beakers

Test volumes: 100 ml of test sediment; 275 ml total volume

Replicates/treatment: (8) 8 Organisms/treatment: (80) 80 (10/REP)

Test water changes: Twice daily

Aeration: only if DO falls below 2.5 mg/L

Feeding: everyday beginning with day zero

Test temperature (°C): 23 ± 1

Beaker placement: Total randomization

Photoperiod: 16:8, L:D

Control Sediment:

Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.

Date collected: 08/15/07

Sieved through 0.5 -mm screen

Storage: darkness at 4°C, in sealed containers NAS# 1142G

MISCELLANEOUS NOTES

Light intensity:

Date	Location	Measurement	Initials
8-31-07	BEAKER #13	84 FT-CANDLES	GJ

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b
HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator _____

Test conducted in (circle one): room 1 (room 2) trailer water bath other:_____

Randomization chart: TOP SHELF

5	10	15	20						
4	9	14	19	24					
3	8	13	18	23					
2	7	12	17	22					
1	6	11	16	21					

Randomization chart:

Randomization chart:

Randomization chart:

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 0 (8 / 31 / 07 GW

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* umhos/cm	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
6	22.8	7.2	160	6.2	51	40	0.3 0.27	Each beaker fed 1.0 ml
15	23.0	7.4	170	6.3	51	50	0.3 0.26	YTC suspension
16	22.9	7.4	155	6.3	51	50	0.3	Initials: GJ
								Water changed in all beakers.
								Time: 0635
								Initials: GJ
								Water changed in all beakers.
								Time: 1645
								Initials: GJ

*Water quality measurements to be taken.

Day 1 (9 / 1 / 07 GW

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	22.6	7.1						Each beaker fed 1.0 ml
15	22.4	7.2						YTC suspension
16	22.5	7.2						Initials: GW
								Water changed in all beakers.
								Time: 0630
								Initials: GW
								Water changed in all beakers.
								Time: 1700
								Initials: AJ

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 2 (9/12 07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	22.9	7.1						Each beaker fed 1.0 ml
15	23.0	7.2						YTC suspension
16	22.8	7.2						Initials: GJ
								Water changed in all
								beakers.
								Time: 0645
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1900
								Initials: JMR

*Water quality measurements to be taken.

Day 3 (9/13 07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	23.0	7.2						Each beaker fed 1.0 ml
15	23.1	7.2						YTC suspension
16	22.9	7.0						Initials: GJ
								Water changed in all
								beakers.
								Time: 0645
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1645
								Initials: GH

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 4 (9/4/07) GB

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	23.2	7.1						Each beaker fed 1.0 ml
15	23.3	7.0						YTC suspension
16	23.1	7.1						Initials: EJL
								Water changed in all
								beakers.
								Time: 0640
								Initials: EJL
								Water changed in all
								beakers.
								Time: 1725
								Initials: EJL

*Water quality measurements to be taken.

Day 5 (9/5/07) LBS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	22.8	7.1						Each beaker fed 1.0 ml
15	23.0	7.2						YTC suspension
16	22.7	6.7						Initials: EJL
								Water changed in all
								beakers.
								Time: 0605
								Initials: EJL
								Water changed in all
								beakers.
								Time: 1655
								Initials: MB

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 6 (9/6/07) GS LPS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	22.7	6.4						Each beaker fed 1.0 ml
15	22.9	6.7						YTC suspension
16	22.7	6.1						Initials: GS
								Water changed in all
								beakers.
								Time: 0925
								Initials: GS
								Water changed in all
								beakers.
								Time: 1645
								Initials: GH

*Water quality measurements to be taken.

Day 7 (9/7/07) GSL

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	22.3	7.1						Each beaker fed 1.0 ml
15	22.5	6.8						YTC suspension
16	22.4	6.6						Initials: GSL
								Water changed in all
								beakers.
								Time: 0645
								Initials: GSL
								Water changed in all
								beakers.
								Time: 1655
								Initials: GH

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b
HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator

DAILY RECORD SHEET

Day 8 (9/8/07) sf

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	22.2	6.5						Each beaker fed 1.0 ml
15	22.3	6.8						YTC suspension
16	22.2	6.1						Initials: sf
								Water changed in all beakers.
								Time: 0630
								Initials: sf
								Water changed in all beakers.
								Time: 1630
								Initials: ws

*Water quality measurements to be taken.

Day 9 (9/9/07 LPS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. umhos/cm	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6	22.2	6.56						Each beaker fed 1.0 ml
15	22.4	5.6						YTC suspension
16	22.2	5.6						Initials: LPS
								Water changed in all beakers.
								Time: 0630
								Initials: LPS
								Water changed in all beakers.
								Time: 1740
								Initials: ws

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES

PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 10 (9 /10 /07) 6SJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (µmhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
6	22.1	7.3	165	7.0	51	40	0.2	Each beaker fed 1.0 ml
15	22.2	7.2	170	7.0	51	40	0.2	YTC suspension
16	22.0	7.2	170	7.0	51	40	0.1	Initials: —
								Water changed in all
								beakers.
								Time: 0645
								Initials: 6SJ
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

Day _____(/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (µmhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
6								Each beaker fed 1.0 ml
15								YTC suspension
16								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-HA4b

HYALELLA AZTECA 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-6 Client Squier Kleinfelder Investigator _____

DAY 10 TEST TERMINATION SHEET

Beaker No.	Number of survivors	Initials
1	10	GAB
2	10	GAB
3	10	GAB
4	10	GAB
5	9	GAB
6	10	GAB
7	9	GAB
8	9	GAB
9	9	GAB
10	10	GAB
11	10	GAB
12	10	GAB
13	10	GAB
14	10	GAB
15	10	GAB
16	10	GAB
17	10	GAB
18	10	GAB
19	10	GAB
20	10	GAB
21	10	GAB
22	9	GAB
23	9	GAB
24	10	GAB
25		
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Beaker No.	Number of survivors	Initials
46		
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Chesapeake Cultures

P.O. Box 507 Hayes, VA 23072 (804)693-4046 (804)694-4704 fax
www.c-cultures.com
growfish@c-cultures.com

NAS
Shipment Information

Species Hyalella azteca Date 8/28/07

Size/Age 4-5 d; ~1.5 mm P.O. No. verbal

Quantity 470+ Invoice No. 5853

Temperature 24°C Salinity — pH 7.96

Notes Thank you!

Biologist [signature]

* *Please inspect shipment and report any problem immediately* *

Recd 8-29-07 sf

TEST DATA ANALYSIS RECORDS

Endpoints Data Entry and Calculations File

BKR=beaker number
INIT=initial number
SURV=number survivors
MORT=number dead=INIT-SURV
PSURV=%survival=100(SURV/INIT)
PMORT=%mortality=100(MORT/INIT)

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL		INIT	SURV	MORT	PSURV	PMORT		SURV	MORT	PSURV	PMORT
1	5	1142G	Control	1		10	9	1	90.0	10.0					
2	14	1142G	Control	2		10	10	0	100.0	0.0					
3	17	1142G	Control	3		10	10	0	100.0	0.0					
4	22	1142G	Control	4		10	10	0	100.0	0.0					
5	12	1142G	Control	5		10	10	0	100.0	0.0	Mean	9.9	0.1	98.8	1.3
6	11	1142G	Control	6		10	10	0	100.0	0.0	SD	0.4	0.4	3.5	3.5
7	13	1142G	Control	7		10	10	0	100.0	0.0	n	8	8	8	8
8	15	1142G	Control	8	wq replicate	10	10	0	100.0	0.0					
9	9	1101G	NW1-071807	1		10	8	2	80.0	20.0					
10	8	1101G	NW1-071807	2		10	9	1	90.0	10.0					
11	7	1101G	NW1-071807	3		10	9	1	90.0	10.0					
12	20	1101G	NW1-071807	4		10	10	0	100.0	0.0					
13	3	1101G	NW1-071807	5		10	10	0	100.0	0.0	Mean	9.4	0.6	93.8	6.3
14	19	1101G	NW1-071807	6		10	10	0	100.0	0.0	SD	0.7	0.7	7.4	7.4
15	23	1101G	NW1-071807	7		10	9	1	90.0	10.0	n	8	8	8	8
16	6	1101G	NW1-071807	8	wq replicate	10	10	0	100.0	0.0					
17	18	1107G	NW7-071807	1		10	10	0	100.0	0.0					
18	4	1107G	NW7-071807	2		10	10	0	100.0	0.0					
19	24	1107G	NW7-071807	3		10	10	0	100.0	0.0					
20	1	1107G	NW7-071807	4		10	10	0	100.0	0.0					
21	10	1107G	NW7-071807	5		10	10	0	100.0	0.0	Mean	10.0	0.0	100.0	0.0
22	21	1107G	NW7-071807	6		10	10	0	100.0	0.0	SD	0.0	0.0	0.0	0.0
23	2	1107G	NW7-071807	7		10	10	0	100.0	0.0	n	8	8	8	8
24	16	1107G	NW7-071807	8	wq replicate	10	10	0	100.0	0.0					

Project Name: P765-6 Hyalella 10-day; % Mortality

Sample:	x1
Samp ID:	NW1-071807
Alias:	NAS#1101G - X1
Replicates:	8
Mean:	6.25
SD:	7.44
Tr Mean:	10.234
Trans SD:	11.259

Ref Samp:	x2
Ref ID:	NW7-071807
Alias:	NAS#1107G - X2
Replicates:	8
Mean:	0
SD:	0
Tr Mean:	0
Trans SD:	0

Shapiro-Wilk Results:		Levene's Results:		Test Results:	
Residual Mean:	0	Test Residual Mean:	0	Statistic:	1-Sample t-Test
Residual SD:	0	Test Residual SD:	0	Balanced Design:	Yes
SS:	0	Ref. Residual Mean:	0	Transformation:	ArcSin
K:	0	Ref. Residual SD:	0		
b:	0	Deg. of Freedom:	N/A		
				Experimental Hypothesis	
Alpha Level:	N/A	Alpha Level:	N/A	Null:	x1 <= x2
Calculated Value:	N/A	Calculated Value:	N/A	Alternate:	x1 > x2
Critical Value:	N/A	Critical Value:	N/A		
Normally Distributed:	N/A	Variances Homogeneous:	N/A	Degrees of Freedom:	7
				Experimental Alpha Level:	0.05
Override Option:	N/A			Calculated Value:	2.5708
				Critical Value:	>= 1.895
				Accept Null Hypothesis:	No
				Power:	
				Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	20	26.565	0	0					
2	10	18.435	0	0					
3	10	18.435	0	0					
4	0	0	0	0					
5	0	0	0	0					
6	0	0	0	0					
7	10	18.435	0	0					
8	0	0	0	0					
9									
10									
11	THE % MORTALITY OF NW1-071807 (NAS#1101G) WAS								
12	SIGNIFICANTLY GREATER THAN THAT OF THE								
13	REFERENCE (NW7-071807) AT $\alpha = 0.05$.								
14									
15	-631								
16									

Water Quality Data

	NAS	CLIENT			Overlying water						
BKR	SMPL	DESCRIP	REPL	DAY	TEMP	DO	COND	pH	NH3	HARD	ALK
6	1101G	NW1-071807	8	0	22.8	7.2	160	6.2	0.3	51	40
15	1142G	Control	8	0	23.0	7.4	170	6.3	0.3	51	50
16	1107G	NW7-071809	8	0	22.9	7.4	155	6.3	0.3	51	50
6	1101G	NW1-071807	8	1	22.6	7.1					
15	1142G	Control	8	1	22.4	7.2					
16	1107G	NW7-071809	8	1	22.5	7.2					
6	1101G	NW1-071807	8	2	22.9	7.1					
15	1142G	Control	8	2	23.0	7.2					
16	1107G	NW7-071809	8	2	22.8	7.2					
6	1101G	NW1-071807	8	3	23.0	7.2					
15	1142G	Control	8	3	23.1	7.2					
16	1107G	NW7-071809	8	3	22.9	7.0					
6	1101G	NW1-071807	8	4	23.2	7.1					
15	1142G	Control	8	4	23.3	7.0					
16	1107G	NW7-071809	8	4	23.1	7.1					
6	1101G	NW1-071807	8	5	22.8	7.1					
15	1142G	Control	8	5	23.0	7.2					
16	1107G	NW7-071809	8	5	22.7	6.7					
6	1101G	NW1-071807	8	6	22.7	6.4					
15	1142G	Control	8	6	22.9	6.7					
16	1107G	NW7-071809	8	6	22.7	6.1					
6	1101G	NW1-071807	8	7	22.3	7.1					
15	1142G	Control	8	7	22.5	6.8					
16	1107G	NW7-071809	8	7	22.4	6.6					
6	1101G	NW1-071807	8	8	22.2	6.5					
15	1142G	Control	8	8	22.3	6.8					
16	1107G	NW7-071809	8	8	22.2	6.1					
6	1101G	NW1-071807	8	9	22.2	6.2					
15	1142G	Control	8	9	22.4	5.6					
16	1107G	NW7-071809	8	9	22.2	5.6					
6	1101G	NW1-071807	8	10	22.1	7.3	165	7.0	0.2	51	40
15	1142G	Control	8	10	22.2	7.2	170	7.0	0.2	51	40
16	1107G	NW7-071809	8	10	22.0	7.2	170	7.0	0.1	51	40
				Mean	22.6	6.9	165	6.6	0.2	51	43
				SD	0.4	0.5	6	0.4	0.1	0	5
				n	33	33	6	6	6	6	6
				Min	22.0	5.6	155	6.2	0.1	51	40
				Max	23.3	7.4	170	7.0	0.3	51	50

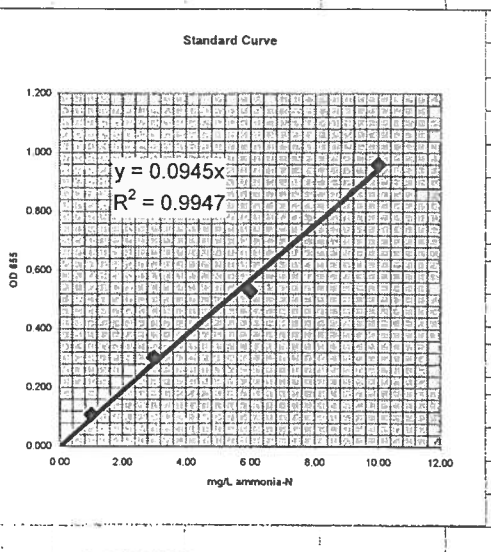
AMMONIA EXPOSURE BENCHSHEETS AND ANALYSIS

Total Ammonia-N in Water: Computation Worksheet

Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD_{655}	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.108	1.00
	3.0 mg/L NH_3-N Std.	-----	0.302	3.00
	6.0 mg/L NH_3-N Std.	-----	0.530	6.00
	10.0 mg/L NH_3-N Std.	-----	0.960	10.00
	3.0 mg/L spike	-----	0.285	3.01
	3.0 mg/L spike dupl.	-----	0.312	3.30
	5.0 mg/L 2nd source	-----	0.420	4.44
1.	Day 0 (8/31/07)			
2.	6	1	0.026	0.27
3.	15	1	0.025	0.26
4.	16	1	0.028	0.30
5.				
6.	Day 10 (9/10/07)			
7.	6	1	0.015	0.16
8.	15	1	0.015	0.16
9.	16	1	0.013	0.14



Reporting limit (mg/L) =	0.1
Recovery (%) =	105.1
Precision (RPD) =	-9.05
2nd source (%) =	88.8
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 762-6
Test Day: 0 & 10
Species: *Hyalella azteca*
Proj. No.: P762
Overlying water

Analyst: MSR
Date analysed: 9/17/07

Total Ammonia-N in Water: Computation Worksheet

Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.108	1.00
	3.0 mg/L NH_3-N Std.	-----	0.302	3.00
	6.0 mg/L NH_3-N Std.	-----	0.153	6.00
	10.0 mg/L NH_3-N Std.	-----	0.196	10.00
	3.0 mg/L spike	-----	0.285	
	3.0 mg/L spike dupl.	-----	0.312	
	5.0 mg/L 2nd source	-----	0.420	
1.	Day 0 (8-31-07)			
2.	6	1	0.026	
3.	15	1	0.025	
4.	16	1	0.028	
5.	Day 10 (9-10-07)			
6.	6	1	0.015	
7.	15	1	0.015	
8.	16	1	0.013	
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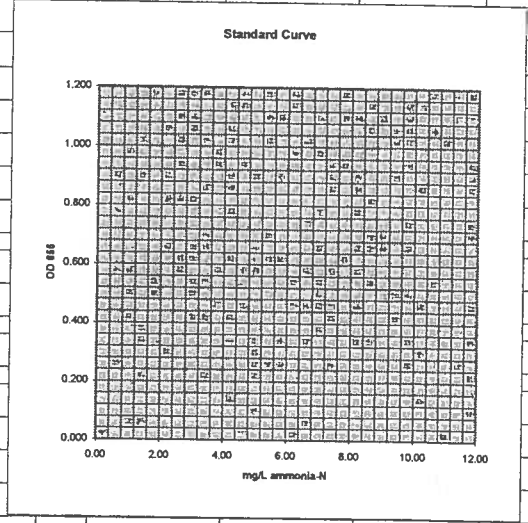


Reporting limit (mg/L) =	0.1
Recovery (%) =	#VALUE!
Precision (RPD) =	#VALUE!
2nd source (%) =	#VALUE!
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 762-6
Test Day: 0 & 10
Species: *Hyalella azteca*
Proj. No.: P762

Overlying water

Analyst: MSR
Date analysed: 9-17-07

CHAIN-OF-CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

Northwestern Aquatic Sciences
3814 Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365
Tel: 541-265-7225, Fax: 541-265-2799, www.nwaquatic.com

Client Name	Project No.	Shipping Information
David E King Kleinfelder, Inc	53886	Carrier:
Address: 15050 SW Koll Pkwy	Phone No.: 503-644-9447	Airbill No.
City, State, Zip code: Beaverton, OR 97050	Report Attention: Dave King	

Sampled by: Scott Shoemaker / Cris Watkins

Lab Sample No.	Date Sampled	Time Sampled	Sample Description	Number of Containers	Testing Required: Bio Accumulation Lumbriculus corticulus	Bio Assay Hyalella Chironomus		ICE CHEST INTERNAL TEMP (°C)		Comments
1099G	7/19/07	1400	LWS-071907 (REF SEDIMENT)	3	x			18.0		5 gallon Buckets
1100G	7/18/07	1500	Northwestern Lake	3	x			18.0		↓
1101G	↓	1000	NW1-071807	3		H		5.0		3202 Jars
1102G		1120	NW2-071807	3		H		↓		↓
1103G		1230	NW3-071807	3		H				
1104G		1300	NW4-071807	3		H				
1105G		1340	NW5-071807	3		H		4.0		
1106G		1420	NW6-071807	3		H		↓		
1107G	↓	1500	NW7-071807	3		H		↓		↓
										H = hold until further notice

Signature	Print Name	Company	Date	Time
Relinquished by: Scott Shoemaker	Scott Shoemaker	Kleinfelder, Inc.	7/20/07	1055
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by laboratory: Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	7/20/07	1055

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Internal Cooler Temperature Upon Lab Receipt (°C)

APPENDIX III

RAW DATA – REFERENCE TOXICANT TEST

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS- _____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2320 Client: QC Test Investigator REVIEWED PAGES 1-7 -GJI

Test Type (rangefinding/definitive) _____ Test Length (hr) 96

Species *Hyalella azteca*

STUDY MANAGEMENT

Client: QC test

Client's Study Monitor: QC test

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L. K. Nemeth

1. GABRIELSON GAB 2. M.S. Redmond MSR

3. _____ 4. _____

Test Beginning: 9-3-07 0900 Test Ending: 9-4-07 1050

TEST MATERIAL

Description: Potassium Chloride Crystals - Lot No.: FISHER 045768

NAS Sample No.				
Date of Collection:				
Date of Receipt:				
Temperature (deg C):				
Dissolved oxygen (mg/L):				
pH:				
Conductivity (umhos/cm):				
Hardness (mg/L):				
Alkalinity (mg/L):				
Salinity (ppt):				
Total chlorine (mg/L):				
Total ammonia-N (mg/L):				
_____:				

DILUTION WATER

Description: Moderately hard synthetic water

Date of Preparation/Collection: 8-24-07

Water Quality: Cond. (umhos/cm): 260 Salinity (ppt) — pH 7.9

Hardness (mg/L as $CaCO_3$): 86 Alkalinity (mg/L as $CaCO_3$): 70

Treatments: Aerated ≥ 24 hrs

TEST LOCATION

Test conducted in (circle one): room 1 (room 2) trailer water bath other: _____

Randomization chart:

REPL B	0.5	0.063	0.25	0.125	1	Ø				
REPL A	0.25	1	Ø	0.5	0.063	0.125				

Error codes: 1) Correction of handwriting error
2) Written in wrong location; entry deleted
3) Wrong date deleted; replaced with correct date
4) Error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2320 Client QC Test Investigator _____

TEST ORGANISMS

Species: *Hyalella azteca* Age: 5-6 DAYS Size: _____

Source: Chesapeake Cultures, Hayes, VA Date received: 8-29-07

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding		Water changes
							Amount	description	
8-29-07	22.1	>15.0	7.7	395	111	210	10 mL	YTC	YES
8-30-07	22.5	8.5	8.1	285	103	140	10 mL	YTC	YES
8-31-07	22.4	8.4	7.8	260	94	100	-	-	-
Mean	22.3	10.6	7.8	313	103	150			
S.D.	0.2	3.8	0.4	72	9	56			
(N)	3	3	3	3	3	3			

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 1, 0.5, 0.25, 0.125, 0.063 0 g/L

Test chamber: 250 ml glass beakers Test volume: 100 ml

Replicates/treatment: 2 Organisms/treatment: 20 (10/rep)

Test water changes: None Aeration during test: None

Feeding: 0.5 ml YTC suspension per beaker on days 0 and 2

Duration: 24-hr, 48-hr, (96-hr) Test temperature (deg.C): (23 ± 1) or 20 ± 1

Beaker placement: Stratified randomization Photoperiod: 16:8, L:D

MISCELLANEOUS NOTES

Test solution preparation:

Working stock: Dissolve 0.5g KCl crystals in dilution water and dilute to 500 mL.
Final conc.: 1.0 g/L.

Test concentration (g/L)	KCl working stock (ml/200ml)	Dilution water
1	200	Brought up to final volume of 200 ml with dilution water and distributed evenly between two replicates
0.5	100	
0.25	50	
0.125	25	
0.063	12.5	
0	0	

8-31-07 GSI

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2320 Client QC Test

DAILY RECORD SHEET

Day 0 (8/31 07) GB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	23.1	8.5	1735	7.8	94	80	10	10
2. 0.5	23.0	8.7	1035	7.8			10	10
3. 0.25	23.0	8.9	660	7.8			10	10
4. 0.125	23.1	8.6	475	7.8			10	10
5. 0.063	23.0	8.7	375	7.8			10	10
6. 0	23.1	8.6	280	7.8	94	80	10	10
All animals fed 0.5 ml YTC suspension. Initials: GB								

Day 1 (9/1 07) GB

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	22.3	8.6	1680	7.7			9(6D)	5(5D)
2. 0.5	22.2	8.7	1010	7.7			8(2D)	10
3. 0.25	22.3	8.6	660	7.7			10	10
4. 0.125	22.3	8.4	480	7.6			10	10
5. 0.063	22.3	8.7	380	7.6			10	10
6. 0	22.2	8.5	285	7.6			10	10

Day 2 (9/2 07) GS

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	23.1	7.6	1830	7.6			2(2D)	∅(5D)
2. 0.5	23.1	7.6	1065	7.5			4(4D)	6(4D)
3. 0.25	23.1	7.7	710	7.5			10	9(M)
4. 0.125	23.1	7.7	510	7.4			10	10
5. 0.063	23.1	7.8	410	7.4			10	10
6. 0	23.1	7.8	295	7.3			10	10
All animals fed 0.5 ml YTC suspension. Initials: GS								

Day 3 (9 / 3 07) GS

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	23.3	7.7	1870	7.8			∅(2D)	∅
2. 0.5	23.4	7.6	1075	7.7			2(2D)	5(1D)
3. 0.25	23.3	7.7	725	7.6			9(1M)	9
4. 0.125	23.3	7.8	515	7.6			10	10
5. 0.063	23.2	7.8	430	7.6			10	10
6. 0	23.3	7.6	315	7.5			10	10

Day 4 (9 / 4 / 07) GS

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Survivors A	Survivors B
1. 1	—	—	—	—	—	—	∅	∅
2. 0.5	23.5	7.5	1090	7.7			∅(2D)	2(3D)
3. 0.25	23.5	7.6	730	7.6			9	9
4. 0.125	23.4	7.8	520	7.6			10	10
5. 0.063	23.4	7.7	425	7.5			10	10
6. 0	23.4	7.7	310	7.6	86	80	10	9(1M)
Mean	23.0	8.1	-	7.6	91	80		
SD	0.4	0.5	-	0.1	5	∅		
n	29	29	-	29	3	3		

Chesapeake Cultures

P.O. Box 507 Hayes, VA 23072 (804)693-4046 (804)694-4704 fax
www.c-cultures.com
growfish@c-cultures.com

NAS

Shipment Information

Species *Hyalella azteca* Date 8/28/07

Size/Age 4-5 d; ~1.5 mm P.O. No. verbal

Quantity 470+ Invoice No. 5853

Temperature 24°C Salinity — pH 7.96

Notes Thank you!

Biologist

* *Please inspect shipment and report any problem immediately* *

Recd 8-29-07 sf

Acute 96-hr Toxicity Test-96 Hr Survival

Start Date:	8/31/2007 09:15	Test ID:	999-2320	Sample ID:	REF-Ref Toxicant
End Date:	9/4/2007 10:50	Lab ID:	ORNAS-Northwestern Aquati	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAA 91-EPA Acute	Test Species:	HA-Hyalella azteca
Comments:					

Conc-gm/L	1	2
D-Control	1.0000	0.9000
0.063	1.0000	1.0000
0.125	1.0000	1.0000
0.25	0.9000	0.9000
0.5	0.0000	0.2000
1	0.0000	0.0000

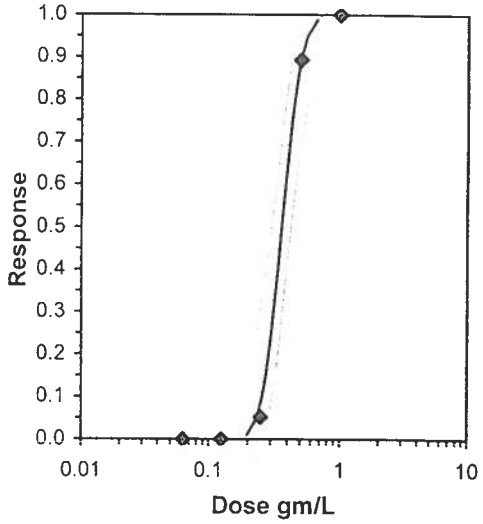
			Transform: Arcsin Square Root					Number	Total
Conc-gm/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Resp	Number
D-Control	0.9500	1.0000	1.3305	1.2490	1.4120	8.661	2	1	20
0.063	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	2	0	20
0.125	1.0000	1.0526	1.4120	1.4120	1.4120	0.000	2	0	20
0.25	0.9000	0.9474	1.2490	1.2490	1.2490	0.000	2	2	20
0.5	0.1000	0.1053	0.3112	0.1588	0.4636	69.269	2	18	20
1	0.0000	0.0000	0.1588	0.1588	0.1588	0.000	2	20	20

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Normality of the data set cannot be confirmed				
Equality of variance cannot be confirmed				

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	8.79953	1.95227	4.97309	12.626	0.05	0.67994	7.81472	0.88	-0.4457	0.11364	3
Intercept	8.92229	0.89093	7.17605	10.6685							
TSCR	0.01668	0.01655	-0.0158	0.04912							

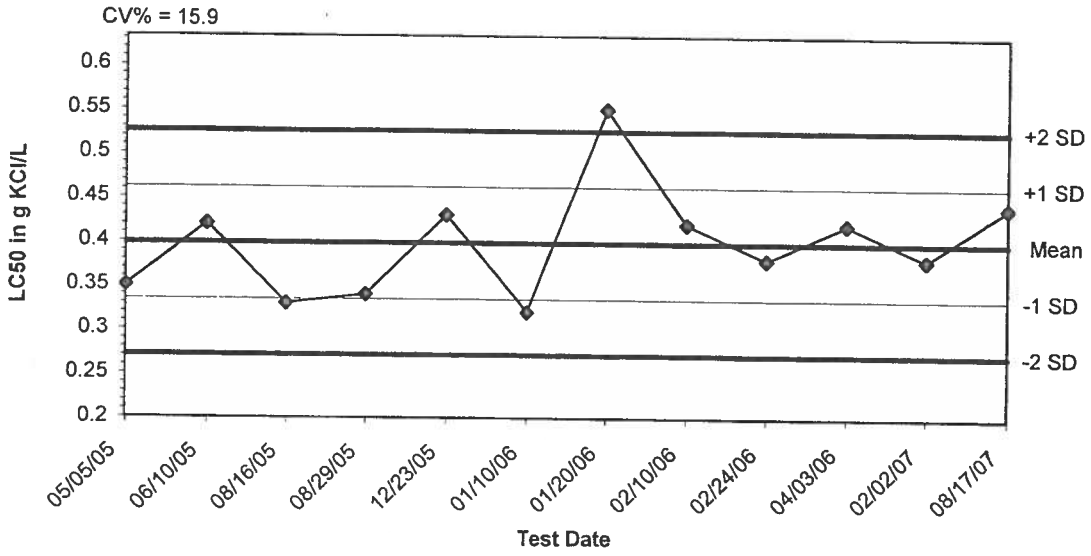
Point	Probits	gm/L	95% Fiducial Limits	
EC01	2.674	0.19493	0.11369	0.24665
EC05	3.355	0.23299	0.15399	0.2827
EC10	3.718	0.25623	0.18041	0.30507
EC15	3.964	0.2732	0.20031	0.32185
EC20	4.158	0.28749	0.2173	0.33642
EC25	4.326	0.30034	0.23266	0.35001
EC40	4.747	0.33533	0.27391	0.39015
EC50	5.000	0.35831	0.29974	0.41985
EC60	5.253	0.38287	0.32564	0.45511
EC75	5.674	0.42748	0.36776	0.52885
EC80	5.842	0.44659	0.38409	0.56402
EC85	6.036	0.46994	0.40297	0.60964
EC90	6.282	0.50107	0.42663	0.67451
EC95	6.645	0.55104	0.46203	0.7874
EC99	7.326	0.65862	0.53154	1.06255



Test: AT-Acute 96-hr Toxicity Test							Test ID: 999-2320		
Species: HA-Hyalella azteca							Protocol: EPAA 91-EPA Acute		
Sample ID: REF-Ref Toxicant							Sample Type: KCL-Potassium chloride		
Start Date: 8/31/2007 09:15			End Date: 9/4/2007 10:50				Lab ID: ORNAS-Northwestern Aquatic Sciences		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	10	10	10	10	10	
	2	2	D-Control	10	10	10	10	9	
	3	1	0.063	10	10	10	10	10	
	4	2	0.063	10	10	10	10	10	
	5	1	0.125	10	10	10	10	10	
	6	2	0.125	10	10	10	10	10	
	7	1	0.250	10	10	10	9	9	
	8	2	0.250	10	10	9	9	9	
	9	1	0.500	10	8	4	2	0	
	10	2	0.500	10	10	6	5	2	
	11	1	1.000	10	4	2	0	0	
	12	2	1.000	10	5	0	0	0	

Comments:

Amphipod, Hyalella azteca, acute reference toxicant test - all points



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/05/05	0.3500	0.3983	0.3348	0.2713	0.4618	0.5254
06/10/05	0.4200	0.3983	0.3348	0.2713	0.4618	0.5254
08/16/05	0.3300	0.3983	0.3348	0.2713	0.4618	0.5254
08/29/05	0.3400	0.3983	0.3348	0.2713	0.4618	0.5254
12/23/05	0.4300	0.3983	0.3348	0.2713	0.4618	0.5254
01/10/06	0.3200	0.3983	0.3348	0.2713	0.4618	0.5254
01/20/06	0.5500	0.3983	0.3348	0.2713	0.4618	0.5254
02/10/06	0.4200	0.3983	0.3348	0.2713	0.4618	0.5254
02/24/06	0.3800	0.3983	0.3348	0.2713	0.4618	0.5254
04/03/06	0.4200	0.3983	0.3348	0.2713	0.4618	0.5254
02/02/07	0.3800	0.3983	0.3348	0.2713	0.4618	0.5254
08/17/07	0.4400	0.3983	0.3348	0.2713	0.4618	0.5254

yrsk
9-18-07

SECTION B

Midge (*Chironomus dilutus*) sediment bioassay 762-7 data report

TOXICITY TEST REPORT

TEST IDENTIFICATION

Test No.: 762-7

Title: Toxicity of freshwater sediments using a 10-day midge, *Chironomus dilutus* (formerly *C. tentans*), sediment bioassay as part of the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, Washington, Kleinfelder Project No. 58336 / 4.

Protocol No.: NAS-XXX-CT4b, April 7, 1998. Revision 1 (10-28-03). Based on ASTM 2001 (Standard test methods for measuring the toxicity of sediment-associated contaminants with fresh water invertebrates, E1706-00), Am. Soc. Test. Mat., Phila., PA, and EPA Method 100.2 (Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates, EPA/600/R-99/064).

STUDY MANAGEMENT

Study Sponsor: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006-6028
Sponsor's Study Monitor: Mr. David King
Testing Laboratory: Northwestern Aquatic Sciences, P.O. Box 1437, Newport, OR 97365
Test Location: Newport laboratory
Laboratory's Study Personnel: G.J. Irissarri, B.S., Proj. Man./Study Dir.; L.K. Nemeth, B.A., M.B.A., QA Officer; M.S. Redmond, M.S., Aq. Toxicologist; S.J. Gage, B.A., Sr. Tech.; G. Hutchinson, B.S., Tech. L.P. Sandoval, B.S., Tech.
Study Schedule:
Test Beginning: 8-31-07, 1015 hrs.
Test Ending: 9-10-07, 1010 hrs.
Disposition of Study Records: All specimens, raw data, reports and other study records are stored according to Good Laboratory Practice regulations at Northwestern Aquatic Sciences, 3814 Yaquina Bay Rd., Newport, OR 97365.
Good Laboratory Practices: The test was conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).
Statement of Quality Assurance: The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

TEST MATERIAL

Test Sediments: Freshwater test sediments collected as part the Supplemental Mercury Re-Evaluation for the Northwestern Lake Sediment Characterization Condit Dam Removal Project (FERC No.2342), White Salmon, Washington, Kleinfelder Project No. 58336 / 4. Details are as follows:

NAS Sample No.	1101G	1107G
Description	NW1-071807	NW7-071807
Collection Date	7/18/07	7/18/07
Receipt Date	7/20/07	7/20/07

Reference Sediment: The reference sediment used for comparative analysis was NW7-071807 (1107G).
Control Sediment: The negative control sediment (NAS#1142G) was collected on 8-15-07 from an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.
Treatments: Homogenized at test set up by mixing using stainless steel implements.
Storage: All test, reference, and control sediments were stored at 4°C in the dark in sealed containers until used.

TEST WATER

Source: Dechlorinated municipal tap water, which is also used as culture water.
Dates of Preparation: 8-27-07, 8-31-07

Water Quality:
pH: 7.0 (n=2)
conductivity: 143 (n=2) µmhos/cm
hardness: 43 (n=2) mg/L as $CaCO_3$
alkalinity: 40 (n=2) mg/L as $CaCO_3$.
total chlorine: <0.02 (n=2) mg/L
Pretreatment: Dechlorinated and aerated ≥24 hr.

TEST ORGANISMS

Species: *Chironomus dilutus* (formerly *C. tentans*), midge.
Size: 3rd instar, mean initial wt: 0.20 ± 0.02 mg
Source: NAS cultures, originally obtained from EPA, Duluth, MN.
Acclimation: Holding conditions prior to testing averaged: Temperature, 23.4 ± 0.9°C; dissolved oxygen, 7.8 ± 0.3 mg/L; pH, 7.5 ± 0.3; conductivity, 178 ± 7 µmhos/cm; hardness, 51 mg/L as $CaCO_3$; and alkalinity, 50 mg/L as $CaCO_3$. Photoperiod was 16:8, L:D. Half of the water in culture tanks was replaced twice weekly with dechlorinated municipal tap water during holding. Animals were fed Tetra Fin suspension and *Selenastrum.*

TEST PROCEDURES AND CONDITIONS

The following is an abbreviated statement of the test procedures and a statement of the test conditions actually employed. See the test protocol (Appendix I) for a more detailed description of the test procedures used in this study.

Test Chambers: 300 ml high-form glass beakers
Test Volumes: 100 ml sediment layer; 175 ml test water.
Replicates/Treatment: 8
Organisms/Treatment: 80
Water Volume Changes: 2 water volumes per day
Aeration: None.
Feeding: Animals were fed 1.5 ml of Tetra Fin suspension (1.5 ml contains 6 mg dry solids) per beaker daily.
Effects Criteria: 1) survival after 10 days, and 2) average individual biomass (based on ash-free dry weight) after 10 days. Death is defined as no visible movement or response to tactile stimulation. Missing organisms were considered to be dead.
Water Quality and Other Test Conditions: The temperature, dissolved oxygen, conductivity, pH, hardness, alkalinity and ammonia-nitrogen were measured in the overlying water of one replicate test container per treatment on days 0 and 10 of the test. Temperature and dissolved oxygen were measured daily in the overlying water of one replicate test container per treatment. Hardness and alkalinity were measured with titrimetric methods. Ammonia-N was measured using Hach reagents based on the salicylate (Clin. Chim. Acta 14:403, 1996) colorimetric method; samples were not distilled prior to analysis. The photoperiod was 16:8, L:D.

DATA ANALYSIS METHODS

Survival and individual biomass were calculated for each replicate as follows:

percent survival = 100 x (number surviving/initial number tested)
average individual ash-free dry wt. = (ash-free dry wt.)/number weighed,
where:
ash-free dry wt. = dry weight of organisms recovered on day 10 – ashed dry weight, in mg

Means and standard deviations for the biological endpoints described above, and for water quality data, were computed using Microsoft Excel 2000. The values for mortality and individual ash-free dry wt for each test sediment were statistically compared against the reference sediment. Where appropriate, an arcsine square root transformation was performed on proportional mortality data before analysis. Following determination of normality and homogeneity of variances, a one-tailed Student T-test, Mann-Whitney or Approximate T test was

conducted at the 0.05 level of significance. The statistical software used was BioStat (Beta v.4.1 (EXCEL)) bioassay software developed by the U.S. Army Corps of Engineers, Seattle District.

PROTOCOL DEVIATIONS

None

REFERENCE TOXICANT TEST

The reference toxicant test is a multi-concentration toxicity test using potassium chloride, to evaluate the performance of the test organisms used in the sediment toxicity test. The performance is evaluated by comparing the results of this test with historical results obtained at the laboratory. A summary of the reference toxicant test result is given below. The reference toxicant test raw data are found in Appendix III.

Test No.: 999-2321
Reference Toxicant and Source: Potassium chloride (KCl), Fisher, Lot No. 045768.
Test Date: 8-31-07
Dilution Water Used: Moderately hard synthetic water prepared from Milli-Q® deionized water.
Result: 96-hr LC50, 6.60 g/L. This result is within the laboratory's control chart warning limits (3.89 to 7.44 g/L).

TEST RESULTS

Observations of water quality in the overlying water throughout the test are summarized in Table 1. A detailed tabulation of the water quality results by sample and test day can be found in Appendix II. The means and standard deviations of percent mortality and growth (ash-free dry wt.) of midges exposed for 10 days to sediments are summarized in Tables 2 and 3. Detailed data organized by sample and replicate, and summary statistics for these observations, are given in Appendix II.

All water quality observations of overlying water temperature and dissolved oxygen were within the protocol specified ranges. Ammonia-N in the overlying water ranged between 0.2 and 0.5 mg/L for all day 0 and day 10 measurements.

The test met the acceptability criteria specified in the *Northwest Regional Sediment Evaluation Framework* – Interim Final - September 2006 with 1.3% mean control mortality (≤30% required) and 5.0% reference sediment mean mortality (≤30% required) and a control mean ash-free dry weight of 0.74 mg per larvae (≥0.48 mg required) and reference mean ash-free dry weight of 0.76 mg per larvae (≥80% of the negative control, i.e. ≥0.59 mg, required). The reference toxicant (positive control) EC50 result was within the laboratory's control chart limits (6.60 g/L; control chart mean ± 2 S.D. = 5.67 ± 1.78).

Data interpretation was conducted as described in *Northwest Regional Sediment Evaluation Framework* – Interim Final - September 2006 (U.S. Army Corps of Engineers, Seattle District, Portland District, Walla Walla District, and Northwestern Division; U.S. Environmental Protection Agency, Region 10, Washington Department of Natural Resources, Washington Department of Ecology, Oregon Department of Environmental Ecology, Idaho Department of Environmental Quality, National Marine Fisheries Service, and U.S. Fish and Wildlife Service). For a test sediment to fail under the single hit rule, the mean test mortality must be greater than 20 percentage points over the reference sediment response and "statistically different" from the reference sediment. Alternatively, if the reduction in the mean individual biomass is greater than 40% than that of the mean reference weight and is statistically different from the reference then the one hit rule also applies. A "statistically different" response is defined in the "Evaluation Framework" as having a mortality or growth response that is greater than 20% difference from that of the control, and is statistically different ($\alpha = 0.05$) from that of the reference sediment. If either or both endpoints fail the guideline, the test is considered a hit.

The NW1-071807 (NAS#1101G) test sediment did not produce mortality or growth endpoint results that met the above Evaluation Framework requirements for failure under the one hit rule.

STUDY APPROVAL

Gerald Lussier 9-26-07
Project Manager/Study Director Date

Linda K. Nemeth 9/24/07
Quality Assurance Unit Date

Linda K. Nemeth 9/24/07
Laboratory Director Date
FOR R.S. CALDWELL

Table 1. Summary of water quality conditions during tests of the midge, *Chironomus dilutus*, exposed to freshwater sediments.

Water Quality Parameter	Mean ± S.D.	Minimum	Maximum	N
Temperature (°C)	22.5 ± 0.3	22.1	23.1	33
Dissolved oxygen (mg/L)	6.1 ± 1.0	3.4	7.4	33
Conductivity (µmhos/cm)	164 ± 6	155	170	6
pH	6.5 ± 0.2	6.2	6.7	6
Hardness (mg/L as $CaCO_3$)	51 ± 0	51	51	6
Alkalinity (mg/L as $CaCO_3$)	42 ± 4	40	50	6
Total ammonia (mg/L)	0.3 ± 0.1	0.2	0.5	6

Table 2. Mortality results of *Chironomus* toxicity test and data interpretation using guidelines from the "*Northwest Regional Sediment Evaluation Framework* –Interim Final," September 2006. For a test sediment to fail under the single hit rule using the mortality endpoint, the mean test mortality must be >20 percentage points over the reference sediment response, and "statistically different" from the reference sediment. A "statistically different" response is defined in the "Evaluation Framework" as having a response that is greater than 20% difference from that of the control, and is statistically different ($\alpha = 0.05$) from that of the reference sediment.

Sample description	Percent mortality (Mean ± SD)	Statistically significantly different than that of the reference?	Difference from negative control sediment	Difference from reference sediment	Failure under 1-hit rule?
Control (NAS# 1142G)	1.3 ± 3.5	---	---	---	---
NW1-071087 (NAS# 1101G)	3.8 ± 5.2	No	2.5%	-1.2%	No
NW7-071087 (NAS# 1107G) *	5.0 ± 5.3	---	---	---	---

*Reference sediment

Table 3. Growth results of *Chironomus* toxicity test and data interpretation using guidelines from the "*Northwest Regional Sediment Evaluation Framework* –Interim Final," September 2006. For a test sediment to fail under the single hit rule using the growth endpoint, the mean test biomass must be reduced by >40% from the reference sediment response, and "statistically different" ($\alpha = 0.05$) from the reference sediment. A "statistically different" response is defined in the "Evaluation Framework" as having a response that is greater than 20% difference from that of the control, and is statistically different ($\alpha = 0.05$) from that of the reference sediment.

Sample description	Average ash-free dry wt/midge (mg)[1] (Mean ± SD)	Statistically significantly different that that of the reference?	Greater than 20% difference (i.e. <0.59 mg) from that of the control?	Greater than 40% difference (i.e. <0.46 mg) from that of the reference?	Failure under 1-hit rule?
Control (NAS# 1142G)	0.74 ± 0.05	---	---	---	---
NW1-071087 (NAS# 1101G)	0.62 ± 0.05	Yes	No	No	No
NW7-071087 (NAS# 1107G) *	0.76 ± 0.05	---	---	---	---

[1] Pupae were not included in the sample to estimate ash-free dry weight (as per EPA/600/R-99/064, p. 59, section 12.3.8.2)
*Reference sediment

APPENDIX I

PROTOCOL

TEST PROTOCOL

FRESHWATER MIDGE, *CHIRONOMUS TENTANS*, 10-DAY SEDIMENT TOXICITY TEST

1. INTRODUCTION

1.1 Purpose of Study: The purpose of this study is to characterize the toxicity of freshwater sediments based on midge survival and growth using the midge, *Chironomus tentans*.

1.2 Referenced Method: This protocol is based on EPA Method 100.2 (EPA/600/R-99/064) and ASTM Method E 1706-00 (ASTM 2001).

1.3 Summary of Method: A summary of test conditions for the midge 10-day sediment toxicity test is tabulated below. The 10-day sediment toxicity test with *Chironomus tentans* is conducted at 23°C with a 16L:8D photoperiod at an illuminance of about100-1000 lux. Test chambers are 300-mL high-form lipless beakers containing 100 mL of sediment and 175 mL of overlying water. Ten second to third-instar midges are used in each replicate (all organisms must be third instar or younger and at least 50% of the larvae must be third instar). The number of replicates/treatment depends on the objective of the test. Eight replicates are recommended for routine testing. Midges in each test chamber are fed 1.5 mL of a 4 g/L fish food flakes suspension daily. Each chamber receives two volume additions per day of overlying water. Overlying water can be culture water, well water, surface water, site water, or reconstituted water. Test endpoints include survival and/or growth.

2. STUDY MANAGEMENT

2.1 Sponsor's Name and Address:

_____
_____
_____
_____

2.2 Sponsor's Study Monitor:

_____

2.3 Name of Testing Laboratory:
Northwestern Aquatic Sciences
3814 Yaquina Bay Road, P.O. Box 1437
Newport, OR 97365.

2.4 Test Location: _____

2.5 Laboratory's Personnel to be Assigned to the Study:
Study Director: _____
Quality Assurance Unit: _____
Aquatic Toxicologist: _____
Aquatic Toxicologist: _____

2.6 Proposed Testing Schedule: Tests are to begin within 14 days of sample collection. Eight week holding times may apply in some circumstances. Reference toxicant test to be run concurrently.

2.7 Good Laboratory Practices: The test is conducted following the principles of Good Laboratory Practices (GLP) as defined in the EPA/TSCA Good Laboratory Practice regulations revised August 17, 1989 (40 CFR Part 792).

3. TEST MATERIAL

The test materials are freshwater sediments. The control, reference, and test sediments are placed in solvent cleaned 1 L glass jars fitted with PTFE-lined screw caps. At the laboratory the samples are stored at 4°C in the dark. The original sealed containers may be stored for up to 14 days prior to testing. Eight week holding times may apply in some circumstances. If jars are not full when received or if sediment is removed for testing, headspaces should be filled with nitrogen to retard deterioration. A negative control sediment is collected from a clean site. In addition, a reference sediment, a clean sediment with physical characteristics similar to the test sediments, may be employed as a comparison station.

4. TEST WATER

Test water (overlying water) at NAS is normally *C. tentans* culture water, which is moderately hard synthetic water at a hardness of 80-100 mg/L as $CaCO_3$ and alkalinity of 60-70 mg/L as $CaCO_3$. Dilution water is prepared from Milli-Q reagent grade water and reagent grade chemicals. Test water may also be well water, surface water or site water depending on the study design.

5. TEST ORGANISMS

5.1 Species: midge, *Chironomus tentans*.

5.2 Source: Cultured at NAS (Originally obtained from U.S. EPA Environmental Research Lab, Duluth, MN) or purchased from a reputable commercial supplier.

5.3 Age: Third instar or younger larvae (at least 50% of the larvae must be in the third instar at the start of the test). Third instar is normally 9 to 11 days after hatching; head capsule widths range from 0.33 to 0.45 mm; or length ranges from 4-6 mm; or dry weight ranges 0.08 to 0.23 mg/individual.

5.4 Acclimation and Pretest Observation: Cultures are maintained at 23 ± 1°C under a 16:8 L:D photoperiod. The culture water is moderately hard synthetic water. Midge are fed finely ground Tetrafin flakes in suspension (10g Tetrafin in 100 mL Milli-Q water). Mortality during the 48-hr prior to testing should not be excessive.

6. DESCRIPTION OF TEST SYSTEM

6.1 Test Chambers and Environmental Control: Test chambers used in the toxicity test are 300-mL high-form lipless glass beakers (Pyrex® 1040 or equivalent). Test chambers are maintained at constant temperature by partial immersion in a temperature-controlled water bath or by placement in a temperature-controlled room. Aeration is not empolyed unless dissolved oxygen drops below 2.5 mg/L. The test is conducted under an illuminance of 100 to 1000 lux with a 16L:8D photoperiod.

6.2 Cleaning: All laboratory glassware, including test chambers, is cleaned as described in EPA/600/4-90/027F. New glassware and test systems are soaked 15 minutes in tap water and scrubbed with detergent (or cleaned in automatic dishwasher); rinsed twice with tap water; carefully rinsed once with fresh, dilute (10%, V:V) hydrochloric or nitric acid to remove scale, metals, and bases; rinsed twice with deionized water; rinsed once with acetone to remove organic compounds (using a fume hood or canopy); and rinsed three times with deionized water. Test systems and chambers are rinsed again with dilution water just before use.

7. EXPERIMENTAL DESIGN AND TEST PROCEDURES

7.1 Experimental Design: The test involves exposure of midge larvae to test, control, and reference sediments. The sediments are placed on the bottom of the test containers and are overlain with test water. The test exposure is

for 10 days. The renewal of overlying water consists of two volume additions per day, either continuous or intermittent. Each treatment consists of eight replicate test containers, each containing 10 organisms. Test chamber positions are completely randomized. Test organisms are randomly distributed to the test chambers. Blind testing is normally used.

7.2 Setup of Test Containers: Sediments are homogenized and placed in test chambers on the day before addition of test organisms. Sediment (100 ml) is placed into each of eight replicate beakers. After addition of the sediment, 175 ml of test water is gently added to each beaker in a manner to prevent resuspension. The overlying water is replaced twice daily. The test begins when midges are introduced to the test chambers. Initial water quality measurements are taken prior to the addition of test organisms.

7.3 Effect Criterion: The acute effect criterion used in the midge bioassay is mortality, defined as the lack of movement of body or appendages on response to tactile stimulation. The optional chronic effect criterion is growth which is determined by using dry weight measurements.

7.4 Test Conditions: No aeration is employed unless dissoved oxygen falls below 2.5 mg/L. The test temperature employed is 23°C (range of ± 1°C). A 16:8, L:D photoperiod is used. Illumination is supplied by daylight fluorescent lamps at 100-1000 lux. The overlying water is replaced twice daily.

7.5 Beginning the Test: The test is begun by adding the organisms to the equilibrated test containers as previously described. Three extra replicates of midge larvae should be counted out and randomly selected for drying to determine initial average weight and instar data.

7.6 Feeding: Midge larvae are fed 1.5 mL daily per test chamber (1.5 mL contains 6.0 mg of dry solids). A feeding may be skipped if there is a build up of excess food. However, all beakers must be treated similarly.

7.7 Test Duration, Type and Frequency of Observations, and Methods: The duration of the acute toxicity test is 10 days. The type and frequency of observations to be made are summarized as follows:

Type Of Observation	Times Of Observation
Biological Data	
Survival, growth	Day 10
Physical And Chemical Data	
Hardness, alkalinity, ammonia-N, conductivity, pH, dissolved oxygen, and temperature	Beginning and end of test in overlying water of one replicate beaker from each treatment.
Dissolved oxygen, temperature	Daily in overlying water of one replicate beaker from each treatment.

Dissolved oxygen is measured using a polarographic oxygen probe calibrated according to the manufacturer's recommendations. The pH is measured using a pH probe and a properly calibrated meter with scale divisions of 0.1 pH units. Temperature is measured with a calibrated mercury thermometer or telethermometer. Conductivity is measured with a conductivity meter. Hardness and alkalinity are measured using titrometric methods. Ammonia-nitrogen is measured using the salicylate colerimetric method (Clin. Chim. Acta 14:403, 1996).

7.8 Growth Measurement: Growth is measured as ash-free dry weight (AFDW) of animals in a test replicate at the end of the test on day 10. Pooled animals from each test replicate are rinsed with deionized water, gently blotted and placed into tared aluminum weigh pans. The pans are dried at 60-90°C to constant weight. The dried organisms are placed into a dessicator and weighed as soon as possible to the nearest 0.01 mg (desirable to use 0.001 mg). The total weight of the dried midge in each pan is divided by the number of midge weighed to obtain an average dry weight per midge. The dried larvae in the pan are then ashed at 550°C for two hours. The pan with the ashed larvae is then reweighed and the tissue mass of the larvae is determined as the difference between the weight

of the dried larvae plus pan and the weight of the ashed larvae plus pan. Pupae or adult organisms are not included in the sample to estimate AFDW.

8. CRITERIA OF TEST ACCEPTANCE:

The test results are acceptable if the minimum survival of organisms in the control treatment at the end of the test is at least 70% and the average ash-free dry weight of *C. tentans* in the surviving controls is at least 0.48 mg.

9. DATA ANALYSIS

The endpoints of the toxicity test are survival and growth. Survival is obtained as a direct count of living organisms in each test container at the end of the test. Average midge ash-free dry weight, also measured at the end of the test, may be used to compare growth between treatment sediments and the control or reference sediment. Ordinarily the following data analysis is performed. Due to special requirements, alternative methods may be used. The means and standard deviations are calculated for each treatment level. Identification of toxic sediments is established by statistical comparison of test endpoints between test and control or reference sediments. Between treatment comparisons may be made using a Student's t-test or Wilcoxon's Two-Sample test, where each treatment is compared to the control or the reference sediment. An arcsine-square root transformation of proportional data, and tests for normality and heterogeneity of variances, are performed prior to statistical comparisons.

10. REPORTING

The final report of the test results must include all of the following standard information at a minimum: name and identification of the test; the investigator and laboratory; date and time of test beginning and end; information on the test material; information on the source and quality of the overlying/test water; detailed information about the test organisms including acclimation conditions; a description of the experimental design and test chambers and other test conditions including feeding, if any, and water quality; definition of the effect criteria and other observations; responses, if any, in the control treatment; tabulation and statistical analysis of measured responses and a summary table of endpoints; a description of the statistical methods used; any unusual information about the test or deviations from procedures; reference toxicant testing information.

11. STUDY DESIGN ALTERATION

Amendments made to the protocol must be approved by the sponsor and study director and should include a description of the change, the reason for the change, the date the change took effect and the dated signatures of the study director and sponsor. Any deviations in the protocol must be described and recorded in the study raw data.

12. REFERENCE TOXICANT

The reference toxicant test is a standard multi-concentration toxicity test using a specified chemical toxicant to evaluate the performance of test organisms used in the study. Reference toxicant tests are 96-hour, water only exposures, not 10-day sediment exposures. The reference toxicant test is run concurrently. Performance is evaluated by comparing the results of the reference toxicant test with historical results (e.g., control charts) obtained at the laboratory.

13. REFERENCED GUIDELINES

ASTM. 2001. Standard Test Methods for Measuring the Toxicity of Sediment-associated Contaminants with Fresh water Invertebrates. ASTM Standard Method No. E 1706-00. Am. Soc. Test. Mat., Philadelphia, PA.

U.S. EPA. 2000. Section 12, Test Method 100.2, *Chironomus tentans* 10-d Survival and Gowth Test for Sediments, pp. 55-62. In: Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates (Second Edition). EPA/600/R-99/064.

Weber, C.I. (Ed.) 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (Fourth Edition). EPA/600/4-90/027F.

14. APPROVALS

_____ for _____
Name Date

_____ for **Northwestern Aquatic Sciences**
Name Date

Appendix A
Test Conditions Summary

1. Test type	whole sediment toxicity test with renewal of overlying water
2. Test duration	10 days
3. Temperature	23 ± 1°C
4. Light quality	daylight flourescent light
5. Illuminance	100-1000 lux
6. Photoperiod	16L:8D
7. Test chamber size	300-mL high-form lipless beakers (Pyrex® 1040 or equivalent)
8. Sediment volume	100 mL
9. Overlying water volume	175 mL
10. Renewal overlying water	2 volume additions/day (continuous or intermittent)
11. Age of test organisms	2nd to 3rd instar or younger larvae (≥ 50% of organisms must be 3rd instar)
12. Organisms per test chamber	10
13. Replicates per treatment	8 recommended for routine (depends on design)
14. Organisms per treatment	80
15. Feeding regime	Fish food flakes, fed 1.5 mL chamber (1.5 mL contains 6.0 mg of dry solids) daily on days 0 - 9.
16. Aeration	None, unless DO falls below 2.5 mg/L.
17. Overlying (test) water	**Culture water**, well water, surface water, site water or reconstituted water
18. Water quality	Hardness, alkalinity, conductivity, pH, ammonia-N beginning and end; temperature and DO daily
19. Endpoints	Survival and growth (dry weight)
20. Test acceptability criteria	Minimum control survival of 70%; mean weight of surviving control organisms 0.48 mg AFDW
21. Sample holding	≤14 days at 4°C in the dark Longer under certain conditions
22. Sample volume required	1L (800 mL per sediment)
23. Reference toxicant	Concurrent testing required

APPENDIX II

RAW DATA

TEST DESCRIPTION, MONITORING, AND RESULTS BENCHSHEETS

NORTHWESTERN AQUATIC SCIENCES

PROTOCOL NO. NAS-XXX-CT4b

CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator REVIEWED PAGE 1-20 - GJI

STUDY MANAGEMENT

Client: Squier | Kleinfelder, 15050 SW Koll Parkway, Suite L, Beaverton, OR 97006

Client's Study Monitor: Mr. David King

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L.K. Nemeth

1. GA Buhler WD
2. M.S. Redmond MSR
3. Greg Hutchison GH
4. Lidia P. Sandoval LPS
5. Susan Gage sf
6.
7.
8.

Study Schedule:

Test Beginning: 8-31-07 1015 Test Ending: 9-10-07 1010

TEST MATERIAL

General description (see sample logbook/chain-of-custody for details):

NAS Sample No.:	1142G	1101G	~~0942G~~ 1107G GJI ② 9-31-07		
Description:	Control	NW1-071807	NW7-071807		
Collection Date:	8/15/07	7/18/07	7/18/07		
Receipt Date:	8/15/07	7/20/0~~6~~7	③ 7/20/0~~6~~7 GJI 9-18-07		
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					
NAS Sample No.:					
Description:					
Collection Date:					
Receipt Date:					
:					

Error codes: 1) correction of handwriting error
2) written in wrong location; entry deleted
3) wrong date deleted, replaced with corrrect date
4) error found in measurement; measurement repeated

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CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator _____

SEDIMENT DESCRIPTIONS -- SUPPLEMENTAL NOTES

Sample No.	Description
1142G	BLACK FINE MUD
1101G	DARK BROWN FINE MUD, PLANT DEBRIS, CHIRONOMID LARVAE & WORMS
1107G	DARK BROWN FINE MUD, W/SOME LIGHT SAND, PLANT DEBRIS, CHIRONOMID LARVAE

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-CT4b
CHIRONOMUS TENTANS. 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator

TEST WATER

Source: Dechlorinated municipal tap water
Date of Collection: 8-27-07, 8-31-07
pH 6.8, 7.1 $\bar{x}$ = 7.0
Cond (umhos/cm2) 140, 145 $\bar{x}$ = 143
Hardness (mg/L) 43, 43 $\bar{x}$ = 43
Alkalinity (mg/L) 40, 40 $\bar{x}$ = 40
Total Chlorine (mg/L) ALL <0.02
Treatments: Dechlorinated, aerated

TEST ORGANISMS

Species: *Chironomus tentans* Age: 3rd instar
Source: NAS cultures Date received: n/a

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding	Water changes
8-17-07	23.4	8.0	7.6	180	–	–	Animals fed Tetra Fin	YES
8-20-07	24.5	7.8	7.6	175	–	–	and *Selenastrum*	YES
8-24-07	23.9	7.2	7.2	190	51	50	Details recorded on	YES
8-27-07	21.8	7.9	7.9	180	–	–	Chironomid culture	YES
8-29-07	23.5	7.9	7.4	170	51	50	data sheets	–
8-31-07	23.0	7.9	7.2	175	–	–		YES
Mean	23.4	7.8	7.5	178	51	50		
S.D.	0.9	0.3	0.3	7	–	–		
(N)	6	6	6	6	2	2		

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test chambers: 300 ml glass beakers
Test volumes: 100 ml of test sediment; 275 ml total volume
Replicates/treatment: (8) 8 Organisms/treatment: (80) 80 (10/REP)
Test water changes: Twice daily
Aeration: only if DO falls below 2.5 mg/L
Feeding: everyday beginning with day zero
Test temperature (°C): 23 ± 1
Beaker placement: Total randomization
Photoperiod: 16:8, L:D

Control Sediment:
Source: From an area approximately one mile east of the Hwy. 101 bridge at Beaver Creek, approx. 8 miles south of Newport, OR.
Date collected: 8/15/07
Sieved through 0.5 -mm screen
Storage: darkness at 4°C, in sealed containe NAS# 1142G

MISCELLANEOUS NOTES

Light intensity:

Date	Location	Measurement	Initials
8-31-07	BEAKER #8	87 FT-CANDLES	GJZ

NORTHWESTERN AQUATIC SCIENCES
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Test conducted in (circle one): room 1 (room 2) trailer water bath other: _____

Randomization chart: TOP SHELF

5	10	15	20						
4	9	14	19	24					
3	8	13	18	23					
2	7	12	17	22					
1	6	11	16	21					

Randomization chart:

Randomization chart:

Randomization chart:

CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 0 (8/31/07) MS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
1	22.8	7.3	160	6.2	51	40		Each beaker fed 1.5 ml
17	22.8	7.2	155	6.3	51	40		Tetra Fin suspension
18	22.9	7.4	170	6.5	51	50		Initials: GJL
								Water changed in all
								beakers.
								Time: 0635
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1645
								Initials: GJL

*Water quality measurements to be taken.

Day 1 (9/1 07) MS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.2	7.1						Each beaker fed 1.5 ml
17	22.4	7.2						Tetra Fin suspension
18	22.4	7.3						Initials: GJL
								Water changed in all
								beakers.
								Time: 0630
								Initials: MS
								Water changed in all
								beakers.
								Time: 1700
								Initials: AF

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
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Test No. 762-7 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 2 (9/2 67) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.7	6.9						Each beaker fed 1.5 ml
17	22.7	6.8						Tetra Fin suspension
18	22.7	6.8						Initials: GJ
								Water changed in all
								beakers.
								Time: 0645
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1900
								Initials: MSR

*Water quality measurements to be taken.

Day 3 (9/3 67) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.9	6.8						Each beaker fed 1.5 ml
17	22.9	6.8						Tetra Fin suspension
18	22.9	6.6						Initials: GJ
								Water changed in all
								beakers.
								Time: 0645
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1645
								Initials: GH

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

PROTOCOL NO. NAS-XXX-CT4b

Test No. 762-7 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 4 (9/4/07)

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	23.1	6.7						Each beaker fed 1.5 ml
17	23.0	6.6						Tetra Fin suspension
18	23.1	6.8						Initials: GJL
								Water changed in all
								beakers.
								Time: 0640
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1725
								Initials: GJL

*Water quality measurements to be taken.

Day 5 (9/5/07) GJS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.7	5.6						Each beaker fed 1.5 ml
17	22.7	5.0						Tetra Fin suspension
18	22.7	5.2						Initials: GJL
								Water changed in all
								beakers.
								Time: 0605
								Initials: GJL
								Water changed in all
								beakers.
								Time: 1655
								Initials: GJS

*Water quality measurements to be taken.

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CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 6 (9/18 07) CMS LPS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.6	4.8						Each beaker fed 1.5 ml
17	22.5	4.9						Tetra Fin suspension
18	22.5	5.2						Initials: GB
								Water changed in all
								beakers.
								Time: 0625
								Initials: VB
								Water changed in all
								beakers.
								Time: 1645
								Initials: GH

*Water quality measurements to be taken.

Day 7 (9/19 07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.4	5.6						Each beaker fed 1.5 ml
17	22.4	5.4						Tetra Fin suspension
18	22.4	5.6						Initials: GJ
								Water changed in all
								beakers.
								Time: 0645
								Initials: GJ
								Water changed in all
								beakers.
								Time: 1655
								Initials: GH

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

PROTOCOL NO. NAS-XXX-CT4b

Test No. 762-7 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 8 (9/8/07 sf

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.2	5.4						Each beaker fed 1.5 ml
17	22.1	5.6						Tetra Fin suspension
18	22.2	5.3						Initials: sf
								Water changed in all
								beakers.
								Time: 0630
								Initials: sf
								Water changed in all
								beakers.
								Time: 1630
								Initials: US

*Water quality measurements to be taken.

Day 9 (9/9/07 LBS

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1	22.2	5.1						Each beaker fed 1.5 ml
17	22.2	5.0						Tetra Fin suspension
18	22.2	5.4						Initials: LBS
								Water changed in all
								beakers.
								Time: 0630
								Initials: LB
								Water changed in all
								beakers.
								Time: 1740
								Initials: GJL

*Water quality measurements to be taken.

CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator _____

DAILY RECORD SHEET

Day 10 (9/10/07) GJ

Beaker No.	Temp.* (deg.C)	DO* (ppm)	Cond.* (umhos/cm)	pH*	Hardness* (mg/L)	Alkalinity* (mg/L)	NH3* (ppm)	Comments
1	22.1	6.3	165	6.7	51	40		Each beaker fed 1.5 ml
17	22.1	6.1	170	6.7	51	40		Tetra Fin suspension
18	22.1	5.9	165	6.5	51	40		Initials: –
								Water changed in all
								beakers.
								Time: 0645
								Initials: GJ
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

Day _____(/ /)

Beaker No.	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	NH3 (ppm)	Comments
1								Each beaker fed 1.5 ml
17								Tetra Fin suspension
18								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:
								Water changed in all
								beakers.
								Time:
								Initials:

*Water quality measurements to be taken.

NORTHWESTERN AQUATIC SCIENCES
PROTOCOL NO. NAS-XXX-CT4b

CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator _____

DAY 10 TEST TERMINATION SHEET

Beaker No.	Number of survivors	Initials
1	9	GJL
2	10	GJL
3	9	GJL
4	10	GJL
5	10	GJL
6	9	GJL
7	10	GJL
8	10	GJL
9	9	GJL
10	10	GJL
11	10	GJL
12	10	GJL
13	10	GJL
14	9	GJL
15	10	GJL
16	10	GJL
17	9	GJL
18	10	GJL
19	9	GJL
20	10	GJL
21	10	GJL
22	9	GJL
23	10	GJL
24	10	GJL
25		
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27		
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Beaker No.	Number of survivors	Initials
46		
47		
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NORTHWESTERN AQUATIC SCIENCES
CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

PROTOCOL NO. NAS-XXX-CT4b

Test No. 762-7 Client Squier Kleinfelder Investigator

WEIGHING DATA SHEET

Tare:	Date 9-7-07	Oven temp (C.) 550	Drying time (hr.) 2	Initials GJL
	Standard Weights:	10 mg: 10.003	100mg: 100.017	
Final #1:	Date 9-11-07	Oven temp (C.) 62	Drying time (hr.) 24	Initials GJZ
	Standard Weights:	10 mg: 10.005	100mg: 100.019	
Final #2:	Date 9-12-07	Oven temp (C.) 62	Drying time (hr.) 26	Initials GJZ
	Standard Weights:	10 mg: 10.005	100mg: 100.018	
Final #3:	Date 9-14-07	Oven temp (C.) 550	Drying time (hr.) 2	Initials GJZ
	Standard Weights:	10 mg: 10.002	100mg: 100.015	

Equip. used: Oven BLUE M #1, FISHER ISOTEMP MUFFLE FURNACE Balance SARTORIUS MSP

(Dry overnight at 60-90 degrees C) **(Final ashing is at 550 degrees C for 2 hours)**

Bkr. #	Pan #	Tare wt. (mg)	Dry total wt. (mg) 1	Dry total wt. (mg) 2	no. weighed	put into pans-initials	Ash weight (mg)	Comments
1	1	81.56	91.07	90.95	9	AF	84.98	
2	2	84.62	93.64	93.50	10	AF	86.32	
3	3	83.01	94.05	93.92	9	AF	87.32	
4	4	85.40	95.33	95.21	10	AF	87.57	
5	5	84.41	93.89	93.77	10	AF	86.52	
6	6	83.17	93.94	93.82	9	AF	87.13	
7	7	76.04	86.03	85.93	10	AF	78.07	
8	8	83.72	96.83	96.69	10	AF	88.67	
9	9	80.53	89.60	89.50	9	AF	84.04	
10	10	80.69	89.61	89.51	10	AF	84.15	
11	11	86.95	98.45	98.34	10	AF	91.56	
12	12	78.89	87.51	87.41	10	AF	80.76	
13	13	91.30	102.05	101.94	10	AF	95.41	
14	14	84.33	94.09	93.98	9	AF	86.51	
15	15	85.94	98.21	98.09	10	AF	90.65	
16	16	81.41	91.42	91.32	10	AF	85.33	
17	17	79.53	91.90	91.78	9	AF	84.72	
18	18	82.52	92.15	92.05	10	AF	84.88	
19	19	85.45	98.32	98.21	9	AF	90.74	
20	20	87.53	100.58	100.46	10	AF	92.98	
21	21	78.08	87.01	86.91	10	AF	80.10	
22	22	81.69	90.31	90.23	9	AF	84.82	
23	23	80.27	92.18	92.06	10	AF	85.23	
24	24	75.57	85.95	85.85	10	AF	79.64	
25	25							
26	26							
27	27							
28	28							
29	29							
30	30							
31	31							
32	32							
33	33							

CHIRONOMUS TENTANS 10-DAY SOLID PHASE SEDIMENT TEST

Test No. 762-7 Client Squier Kleinfelder Investigator _____

Tare: Date 8-30-07 Oven temp (C.) 64 Drying time (hr.) 36 Initials GJL
Standard Weights: 10 mg: 10.006 100mg: 100.013

Final #1 Date 9-4-07 Oven temp (C.) 62 Drying time (hr.) 24 Initials GJL
Standard Weights: 10 mg: 10.004 100mg: 100.016

Final: #2 Date 9-6-07 Oven temp (C.) 62 Drying time (hr.) 24 Initials GJL
Standard Weights: 10 mg: 10.004 100mg: 100.021

Equip. used: Oven: BLUE M #1 Balance: SARTORIUS M3P

(Dry overnight at 60-90 degrees C)

Pan #	Tare wt. (mg)	Total wt. (mg) 1	Total wt. (mg) 2	#weighed	
1	86.59	88.54	88.54	10	
2	81.65	83.88	83.87	10	
3	83.58	85.43	85.43	10	

TEST DATA ANALYSIS RECORDS

Endpoints Data Entry and Calculations File

BKR=beaker number
INIT=initial number
SURV=number survivors
MORT=number dead=INIT-SURV
PSURV=%survival=100(SURV/INIT)
PMORT=%mortality=100(MORT/INIT)

TARE WT= ashed weight of pan used for that replicate at test termination (mg), or dry weight of pan if ash-free dry weight is not an endpoint
WT COUNT= number of test organisms weighed at test end
DRY WT= TARE WT + dry weight of test organisms recovered at test termination (mg)
TWT=total biomass=DRY WT-TARE WT
WT=average individual biomass=TWT/WT COUNT

ASHED DRY WT= weight of ashed pan + weight of ashed test organisms recovered at test termination
TAFDW=DRY WT - ASHED DRY WT= total ash-free organism weight for given replicate
AFDW=average individual ash-free biomass=TAFDW/WT COUNT

INITIAL WEIGHT

pan #	tare wt (mg)	final wt (mg)	wt count	avg wt/ organism
1	86.59	88.54	10	0.20
2	81.65	83.87	10	0.22
3	83.58	85.43	10	0.19

INDEX	BKR	NAS SMPL	CLIENT DESCRIP	REPL	INIT	SURV	MORT	PSURV	PMORT	TARE WT (mg)	WT COUNT	DRY WT (mg)	ASHED DRY WT (mg)	TWT (mg)	WT (mg)	TAFDW (mg)	AFDW (mg)
1	5	1142G	Control	1	10	10	0	100.0	0.0	84.41	10	93.77	86.52	9.36	0.94	7.25	0.73
2	12	1142G	Control	2	10	10	0	100.0	0.0	78.89	10	87.41	80.76	8.52	0.85	6.65	0.66
3	4	1142G	Control	3	10	10	0	100.0	0.0	85.40	10	95.21	87.57	9.81	0.98	7.64	0.76
4	14	1142G	Control	4	10	9	1	90.0	10.0	84.33	9	93.98	86.51	9.65	1.07	7.47	0.83
5	21	1142G	Control	5	10	10	0	100.0	0.0	78.08	10	86.91	80.10	8.83	0.88	6.81	0.68
6	7	1142G	Control	6	10	10	0	100.0	0.0	76.04	10	85.93	78.07	9.89	0.99	7.86	0.79
7	2	1142G	Control	7	10	10	0	100.0	0.0	84.62	10	93.50	86.32	8.88	0.89	7.18	0.72
8	18	1142G	Control	8 wq replicate	10	10	0	100.0	0.0	82.52	10	92.05	84.88	9.53	0.95	7.17	0.72
9	10	1101G	NW1-071807	1	10	10	0	100.0	0.0	80.69	10	89.51	84.15	8.82	0.88	5.36	0.54
10	22	1101G	NW1-071807	2	10	9	1	90.0	10.0	81.69	9	90.23	84.82	8.54	0.95	5.41	0.60
11	24	1101G	NW1-071807	3	10	10	0	100.0	0.0	75.57	10	85.85	79.64	10.28	1.03	6.21	0.62
12	13	1101G	NW1-071807	4	10	10	0	100.0	0.0	91.30	10	101.94	95.41	10.64	1.06	6.53	0.65
13	23	1101G	NW1-071807	5	10	10	0	100.0	0.0	80.27	10	92.06	85.23	11.79	1.18	6.83	0.68
14	9	1101G	NW1-071807	6	10	9	1	90.0	10.0	80.53	9	89.50	84.04	8.97	1.00	5.46	0.61
15	16	1101G	NW1-071807	7	10	10	0	100.0	0.0	81.41	10	91.32	85.33	9.91	0.99	5.99	0.60
16	1	1101G	NW1-071807	8 wq replicate	10	9	1	90.0	10.0	81.56	9	90.95	84.98	9.39	1.04	5.97	0.66
17	6	1107G	NW7-071807	1	10	9	1	90.0	10.0	83.17	9	93.82	87.13	10.65	1.18	6.69	0.74
18	3	1107G	NW7-071807	2	10	9	1	90.0	10.0	83.01	9	93.92	87.32	10.91	1.21	6.60	0.73
19	15	1107G	NW7-071807	3	10	10	0	100.0	0.0	85.94	10	98.09	90.65	12.15	1.22	7.44	0.74
20	8	1107G	NW7-071807	4	10	10	0	100.0	0.0	83.72	10	96.69	88.67	12.97	1.30	8.02	0.80
21	19	1107G	NW7-071807	5	10	9	1	90.0	10.0	85.45	9	98.21	90.74	12.76	1.42	7.47	0.83
22	11	1107G	NW7-071807	6	10	10	0	100.0	0.0	86.95	10	98.34	91.56	11.39	1.14	6.78	0.68
23	20	1107G	NW7-071807	7	10	10	0	100.0	0.0	87.53	10	100.46	92.98	12.93	1.29	7.48	0.75
24	17	1107G	NW7-071807	8 wq replicate	10	9	1	90.0	10.0	79.53	9	91.78	84.72	12.25	1.36	7.06	0.78

	SURV	MORT	PSURV	PMORT	WT	AFDW
Mean	9.9	0.1	98.8	1.3	0.94	0.74
SD	0.4	0.4	3.5	3.5	0.07	0.05
n	8	8	8	8	8	8
Mean	9.6	0.4	96.3	3.8	1.02	0.62
SD	0.5	0.5	5.2	5.2	0.09	0.05
n	8	8	8	8	8	8
Mean	9.5	0.5	95.0	5.0	1.26	0.76
SD	0.5	0.5	5.3	5.3	0.09	0.05
n	8	8	8	8	8	8

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Project Name: P765-7 Chironomus 10-day; % Mortality

Sample: x1
Samp ID: NW1-071807
Alias: NAS#1101G - X1
Replicates: 8
Mean: 3.75
SD: 5.175
Tr Mean: 6.913
Trans SD: 9.541

Ref Samp: x2
Ref ID: NW7-071807
Alias: NAS#1107G - X2
Replicates: 8
Mean: 5
SD: 5.345
Tr Mean: 9.217
Trans SD: 9.854

Shapiro-Wilk Results:

Residual Mean: 0
Residual SD: 8.325
SS: 1316.902
K: 8
b: 31.024

Alpha Level: 0.05
Calculated Value: 0.7309
Critical Value: <= 0.887

Normally Distributed: No

Override Option: Not Invoked

Levene's Results:

Test Residual Mean: 8.641
Test Residual SD: 2.385
Ref. Residual Mean: 9.217
Ref. Residual SD: 0
Deg. of Freedom: 14

Alpha Level: 0.1
Calculated Value: 0.6831
Critical Value: >= 1.761

Variances Homogeneous: Yes

Test Results:

Statistic: Mann-Whitney
Balanced Design: Yes
Transformation: rank-order

Experimental Hypothesis
Null: x1 <= x2
Alternate: x1 > x2

Mann-Whitney N1: 8
Mann-Whitney N2: 8
Degrees of Freedom:
Experimental Alpha Level: 0.05
Calculated Value: 28
Critical Value: >= 49.0
Accept Null Hypothesis: Yes

Power:
Min. Difference for Power:

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0	5	10	13	6.913	9.217	0		-9.217
2	10	13	10	13	11.522	9.217	0		-9.217
3	0	5	0	5	6.913	9.217	0		-9.217
4	0	5	0	5	6.913	9.217	0		-9.217
5	0	5	10	13	6.913	9.217	0		-6.913
6	10	13	0	5	11.522	9.217	0		-6.913
7	0	5	0	5	6.913	9.217	0		-6.913
8	10	13	10	13	11.522	9.217	0		-6.913
9							0		-6.913
10							0		-6.913
11							18.435		9.217
12							18.435		9.217
13							18.435		9.217
14							18.435		9.217
15							18.435		11.522
16							18.435		11.522
							18.435		11.522

THE % MORTALITY OF NW1-071807 (NAS# 1101G) WAS NOT SIGNIFICANTLY GREATER THAN THAT OF THE REFERENCE (NW7-071807) AT $\alpha = 0.05$.
-GSL

Project Name: P765-7 Midge 10-d; ind.biomass (ash-free dry wt)

Sample:	x1
Samp ID:	NW1-071807
Alias:	NAS#1101G - X1
Replicates:	8
Mean:	0.62
SD:	0.044
Tr Mean:	0.62
Trans SD:	0.044

Ref Samp:	x2
Ref ID:	NW7-071807
Alias:	NAS#1107G - X2
Replicates:	8
Mean:	0.756
SD:	0.046
Tr Mean:	0.756
Trans SD:	0.046

Shapiro-Wilk Results:

Residual Mean:	0
Residual SD:	0.039
SS:	0.028
K:	8
b:	0.164
Alpha Level:	0.05
Calculated Value:	0.949
Critical Value:	<= 0.887
Normally Distributed:	Yes
Override Option:	N/A

Levene's Results:

Test Residual Mean:	0.033
Test Residual SD:	0.027
Ref. Residual Mean:	0.035
Ref. Residual SD:	0.027
Deg. of Freedom:	14
Alpha Level:	0.1
Calculated Value:	0.2109
Critical Value:	>= 1.761
Variances Homogeneous:	Yes

Test Results:

Statistic:	Student's t
Balanced Design:	Yes
Transformation:	No Transformation

Experimental Hypothesis

Null:	x1 >= x2
Alternate:	x1 < x2
Degrees of Freedom:	14
Experimental Alpha Level:	0.05
Calculated Value:	6.0516
Critical Value:	>= 1.761
Accept Null Hypothesis:	No
Power:	
Min. Difference for Power:	

Replicate Number	Test Data	Trans. Test Data	Reference Data	Trans. Reference Data	Levene's Test Residuals	Levene's Reference Residuals	Mann-Whitney Ranks	Rankits	Shipiro-Wilk Residuals
1	0.54	0.54	0.74	0.74	0.08	0.016			-0.08
2	0.6	0.6	0.73	0.73	0.02	0.026			-0.076
3	0.62	0.62	0.74	0.74	0	0.016			-0.026
4	0.65	0.65	0.8	0.8	0.03	0.044			-0.02
5	0.68	0.68	0.83	0.83	0.06	0.074			-0.02
6	0.61	0.61	0.68	0.68	0.01	0.076			-0.016
7	0.6	0.6	0.75	0.75	0.02	0.006			-0.016
8	0.66	0.66	0.78	0.78	0.04	0.024			-0.01
9									-0.006
10									0
11									0.024
12									0.03
13									0.04
14									0.044
15									0.06
16									0.074

THE MEAN INDIVIDUAL ASH-FREE DRY WT OF NW1-071807 (NAS# 1101G) WAS SIGNIFICANTLY LESS THAN THAT OF THE REFERENCE (NW7-071807) AT $\alpha = 0.05$

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Water Quality Data

	NAS	CLIENT			Overlying water						
BKR	SMPL	DESCRIP	REPL	DAY	TEMP	DO	COND	pH	NH3	HARD	ALK
1	1101G	NW1-071807	8	0	22.8	7.3	160	6.2	0.2	51	40
17	1107G	NW7-071808	8	0	22.8	7.2	155	6.3	0.2	51	40
18	1142G	Control	8	0	22.9	7.4	170	6.5	0.5	51	50
1	1101G	NW1-071807	8	1	22.2	7.1					
17	1107G	NW7-071808	8	1	22.4	7.2					
18	1142G	Control	8	1	22.4	7.3					
1	1101G	NW1-071807	8	2	22.7	6.9					
17	1107G	NW7-071808	8	2	22.7	6.8					
18	1142G	Control	8	2	22.7	6.8					
1	1101G	NW1-071807	8	3	22.9	6.8					
17	1107G	NW7-071808	8	3	22.9	6.8					
18	1142G	Control	8	3	22.9	6.6					
1	1101G	NW1-071807	8	4	23.1	6.7					
17	1107G	NW7-071808	8	4	23.0	6.6					
18	1142G	Control	8	4	23.1	6.8					
1	1101G	NW1-071807	8	5	22.7	5.6					
17	1107G	NW7-071808	8	5	22.7	5.0					
18	1142G	Control	8	5	22.7	5.2					
1	1101G	NW1-071807	8	6	22.6	4.8					
17	1107G	NW7-071808	8	6	22.5	4.9					
18	1142G	Control	8	6	22.5	5.2					
1	1101G	NW1-071807	8	7	22.4	5.6					
17	1107G	NW7-071808	8	7	22.4	5.4					
18	1142G	Control	8	7	22.4	5.6					
1	1101G	NW1-071807	8	8	22.2	5.4					
17	1107G	NW7-071808	8	8	22.1	5.6					
18	1142G	Control	8	8	22.2	5.3					
1	1101G	NW1-071807	8	9	22.2	5.1					
17	1107G	NW7-071808	8	9	22.2	5.0					
18	1142G	Control	8	9	22.2	3.4					
1	1101G	NW1-071807	8	10	22.1	6.3	165	6.7	0.3	51	40
17	1107G	NW7-071808	8	10	22.1	6.1	170	6.7	0.3	51	40
18	1142G	Control	8	10	22.1	5.9	165	6.5	0.3	51	40
				Mean	22.5	6.1	164	6.5	0.3	51	42
				SD	0.3	1.0	6	0.2	0.1	0	4
				n	33	33	6	6	6	6	6
				Min	22.1	3.4	155	6.2	0.2	51	40
				Max	23.1	7.4	170	6.7	0.5	51	50

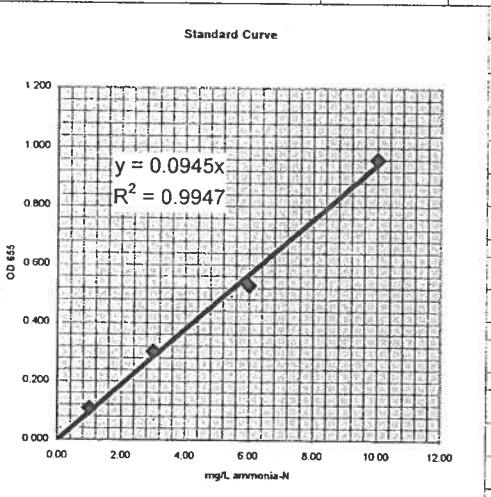
AMMONIA EXPOSURE BENCHSHEETS AND ANALYSIS

Total Ammonia-N in Water: Computation Worksheet

Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD_{655}	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.108	1.00
	3.0 mg/L NH_3-N Std.	-----	0.302	3.00
	6.0 mg/L NH_3-N Std.	-----	0.530	6.00
	10.0 mg/L NH_3-N Std.	-----	0.960	10.00
	3.0 mg/L spike	-----	0.285	3.01
	3.0 mg/L spike dupl.	-----	0.312	3.30
	5.0 mg/L 2nd source	-----	0.420	4.44
1.	Day 0 (8-31-07)			
2.	1	1	0.022	0.23
3.	17	1	0.020	0.21
4.	18	1	0.045	0.48
5.	Day 10 (9-10-07)			
6.	1	1	0.026	0.27
7.	17	1	0.030	0.32
8.	18	1	0.032	0.34



Reporting limit (mg/L) =	0.1
Recovery (%) =	105.1
Precision (RPD) =	-9.05
2nd source (%) =	88.8
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.: 762-7
Test Day: 0 & 10
Species: *Chironomus dilutus*

Proj. No.: P762

Overlying water

Analyst: MSR
Date analysed: 9/17/05

Total Ammonia-N in Water: Computation Worksheet

Salicylate Method (SOP #5492)

Result

	Sample description	Dilution factor	OD655	NH_3-N (mg/L)
	Blank	-----	-----	-----
	1.0 mg/L NH_3-N Std.	-----	0.108	1.00
	3.0 mg/L NH_3-N Std.	-----	0.302	3.00
	6.0 mg/L NH_3-N Std.	-----	0.153	6.00
	10.0 mg/L NH_3-N Std.	-----	0.96	10.00
	3.0 mg/L spike	-----	0.285	
	3.0 mg/L spike dupl.	-----	0.312	
	5.0 mg/L 2nd source	-----	0.420	
1.	Day 0 (8-31-07)			
2.	1	1	0.022	
3.	17	1	0.020	
4.	18	1	0.045	
5.	Day 10 (9-10-07)			
6.	1	1	0.026	
7.	17	1	0.030	
8.	18	1	0.032	
9.				
10.				
11.				
12.				
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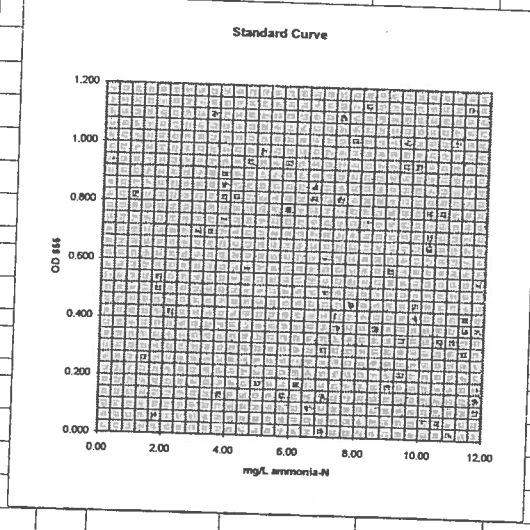


Reporting limit (mg/L) =	0.1
Recovery (%) =	#VALUE!
Precision (RPD) =	#VALUE!
2nd source (%) =	#VALUE!
Sample volume (ml):	0.50
Dilution factor	1

Sample Set Description:

Test No.:	762-7
Test Day:	0 & 10
Species:	*Chironomus dilutus*
Proj. No.:	P762
	Overlying water
Analyst:	MR
Date analysed:	9-17-07

CHAIN-OF-CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

Northwestern Aquatic Sciences
3814 Yaquina Bay Rd., P.O. Box 1437, Newport, OR 97365
Tel: 541-265-7225, Fax: 541-265-2799, www.nwaquatic.com

Client Name	David E King Kleinfelder, Inc
Project No.	53886
Address	15050 SW Koll Pkwy
Phone No.	503-644-9447
City, State, Zip code	Beaverton, OR 97050
Report Attention	Dave King
Shipping Information	Carrier: Airbill No.
Sampled by	Scott Shoemaker / Cris Watkins

Testing Required

Lab Sample No.	Date Sampled	Time Sampled	Sample Description	Number of Containers	Lumbriculus Bio Accumulation corbicula	Hyalella Bio Assay Chironomus		ICE CHEST INTERNAL TEMP (°C)		Comments
1099G	7/19/07	1400	LWS-071907 (REF SEDIMENT)	3	x			18.0		5 gallon Buckets
1100G	7/18/07	1500	Northwestern Lake	3	x			18.0		↓
1101G	↓	1000	NW1-071807	3		H		5.0		3202 Jars
1102G		1120	NW2-071809	3		H		↓		↓
1103G		1230	NW3-071807	3		H				
1104G		1300	NW4-071807	3		H		↓		
1105G		1340	NW5-071807	3		H		4.0		
1106G		1420	NW6-071807	3		H		↓		
1107G	↓	1500	NW7-071807	3		H		↓		↓
										H = hold until further notice

Signature	Print Name	Company	Date	Time
Relinquished by: Scott Shoemaker	Scott Shoemaker	Kleinfelder, Inc.	7/20/07	1055
Received by				
Relinquished by				
Received by				
Relinquished by				
Received by laboratory: Gerald Irissarri	GERALD IRISSARRI	NORTHWESTERN AQUATIC SCIENCES	7/20/07	1055

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Internal Cooler Temperature Upon Lab Receipt (°C)

APPENDIX III

RAW DATA – REFERENCE TOXICANT TEST

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS- _____

ACUTE TOXICITY TEST (ALL SPECIES)

REVIEWED PAGE 1-7 -GJI

Test No. 999-2321 Client: QC Test Investigator _____

Test Type (rangefinding/definitive) _____ Test Length (hr) 96

Species *Chironomus dilutus*

STUDY MANAGEMENT

Client: QC test

Client's Study Monitor: QC test

Testing Laboratory: Northwestern Aquatic Sciences

Test Location: Newport Laboratory

Laboratory's Study Personnel:

Proj. Man./Study Dir. G.J. Irissarri GJI

QA Officer L. K. Nemeth

1. GABuhler GJI 2. M.S. Redmond MSR

3. _____ 4. _____

Study Schedule:

Test Beginning: 8-31-07 0950 Test Ending: 9-4-07 1110

TEST MATERIAL

Description: Potassium Chloride Crystals - Lot No.: FISHER 045768

NAS Sample No.				
Date of Collection:				
Date of Receipt:				
Temperature (deg C):				
Dissolved oxygen (mg/L):				
pH:				
Conductivity (umhos/cm):				
Hardness (mg/L):				
Alkalinity (mg/L):				
Salinity (ppt):				
Total chlorine (mg/L):				
Total ammonia-N (mg/L):				
_____:				

DILUTION WATER

Description: Moderately hard synthetic water

Date of Preparation/Collection: 8-24-07

Water Quality: Cond. (umhos/cm): 260 Salinity (ppt) — pH 7.9

Hardness (mg/L as $CaCO_3$): 86 Alkalinity (mg/L as $CaCO_3$): 70

Treatments: Aerated ≥ 24 hrs

TEST LOCATION

Test conducted in (circle one): room 1 (room 2) trailer water bath other: _____

Randomization chart:

Error codes: 1) Correction of handwriting error
2) Written in wrong location; entry deleted
3) Wrong date deleted; replaced with correct date
4) Error found in measurement; measurement repeated

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2321 Client QC Test Investigator _____

TEST ORGANISMS

Species: *Chironomus dilutus* Age: 3rd instar

Source: NAS cultures Date received: _____

Acclimation Data:

Date	Temp. (deg.C)	DO (mg/L)	pH	Cond. umhos/cm	Hardness (mg/L)	Alkalinity (mg/L)	Feeding	Water changes
8-17-07	23.4	8.0	7.6	180	–	–	Animals fed Tetra Fin	YES
8-20-07	24.5	7.8	7.6	175	–	–	and *Selenastrum*	YES
8-24-07	23.9	7.2	7.2	190	51	50	Details recorded on	YES
8-27-07	21.8	7.9	7.9	180	–	–	Chironomid culture	YES
8-29-07	23.5	7.9	7.4	170	51	50	data sheets	–
8-31-07	23.0	7.9	7.2	175	–	–		YES
Mean	23.4	7.8	7.5	178	51	50		
S.D.	0.9	0.3	0.3	7	Ø	Ø		
(N)	6	6	6	6	2	2		

Photoperiod during acclimation: 16:8, L:D

TEST PROCEDURES AND CONDITIONS

Test concentrations (50% series recommended): 20, 10, 5, 2.5, 1.25, 0 g/L

Test chamber: 30 ml plastic cups Test volume: 20 ml

Replicates/treatment: 10 Organisms/treatment: 10 (1/rep)

Test water changes: None Aeration during test: None

Feeding: 0.25 ml Prime Tropical Flakes (4g/L) suspension per cup on days 0 and 2

Duration: 24-hr, 48-hr, 96-hr Test temperature (deg.C): 23 ± 1

Beaker placement: Stratified randomization Photoperiod: 16:8, L:D

MISCELLANEOUS NOTES

Test solution preparation:

Working stock: Dissolve 10g KCl crystals in dilution water and dilute to 500 mL.
Final conc.: 20 g/L.

Test concentration (g/L)	KCl working stock (ml/200ml)	ml of dilution water per 200 ml
20	200	0
10	100	100
5	50	150
2.5	25	175
1.25	12.5	187.5
0	0	0

8-31-07 bjl

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2321 Client QC Test

DAILY RECORD SHEET

Day 0 (8 / 31 / 07 WS) Temp Beaker (°C): 23.3

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 20	23.6	8.4	14180	7.9	94	90	
2. 10	23.6	8.6	10450	7.9			
3. 5	23.6	8.5	6070	7.9			
4. 2.5	23.6	8.7	3470	7.9			
5. 1.25	23.6	8.6	1970	7.8			
6. 0	23.7	8.5	285	7.7	94	80	
All animals fed 0.25 ml Tetra Fin suspension. Initials: GJL							

Day 1 (9 / 1 / 07 WS) Temp Beaker (°C): 22.1

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 20							
2. 10							
3. 5							
4. 2.5							
5. 1.25							
6. 0							

Day 2 (9 / 2 / 07) GJL Temp Beaker (°C): 23.1

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 20							
2. 10							
3. 5							
4. 2.5							
5. 1.25							
6. 0							
All animals fed 0.25 ml Tetra Fin suspension. Initials:							

Day 3 (9 / 3 / 07) GJL Temp Beaker (°C): 23.3

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 20							
2. 10							
3. 5							
4. 2.5							
5. 1.25							
6. 0							

Day 4 (9 / 4 / 07) WS Temp Beaker (°C): 23.3

Conc. (g/L)	Temp. (deg.C)	DO (ppm)	Cond. (umhos/cm)	pH	Hardness (mg/L)	Alkalinity (mg/L)	Comments
1. 20	–	–	–	–	–	–	
2. 10	–	–	–	–			
3. 5	23.4	7.2	6180	7.6			
4. 2.5	23.4	7.2	3460	7.6			
5. 1.25	23.5	7.1	1960	7.5			
6. 0	23.5	7.1	330	7.4	111	90	
Mean	23.6	8.0	–	7.7	100	87	
SD	0.1	0.7	–	0.2	10	6	
n	10	10	–	10	3	3	

NORTHWESTERN AQUATIC SCIENCES PROTOCOL NO. NAS-_____

ACUTE TOXICITY TEST (ALL SPECIES)

Test No. 999-2321 Client QC Test Investigator _____

DAILY RECORD SHEET - Survivors

Day 0 (8/31/07) GJL

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 20	1	1	1	1	1	1	1	1	1	1	10
2. 10	1	1	1	1	1	1	1	1	1	1	10
3. 5	1	1	1	1	1	1	1	1	1	1	10
4. 2.5	1	1	1	1	1	1	1	1	1	1	10
5. 1.25	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 1 (9/1/07) GJ

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 20	1	1	1	1	1	1	1	1	1	1	10
2. 10	1	1	1	1	1	1	1	1	1	1	10
3. 5	1	1	1	1	1	1	1	1	1	1	10
4. 2.5	1	1	1	1	1	1	1	1	1	1	10
5. 1.25	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 2 (9/2/07) GJL

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 20	X	X	X	X	X	X	X	X	X	X	∅ (10D)
2. 10	X	X	X	X	X	X	X	X	X	X	∅ (10D)
3. 5	1	1	1	1	1	1	1	1	1	1	10
4. 2.5	1	1	1	1	1	1	1	1	1	1	10
5. 1.25	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 3 (9/3/07) GJL

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 20	X	X	X	X	X	X	X	X	X	X	∅
2. 10	X	X	X	X	X	X	X	X	X	X	∅
3. 5	1	1	1	1	1	1	1	1	1	1	10
4. 2.5	1	1	1	1	1	1	1	1	1	1	10
5. 1.25	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Day 4 (9/4/07) GJL

Conc. (g/L)	Survivors in Replicate: 1	2	3	4	5	6	7	8	9	10	Total
1. 20	X	X	X	X	X	X	X	X	X	X	∅
2. 10	X	X	X	X	X	X	X	X	X	X	∅
3. 5	X	1	1	1	1	1	1	1	1	1	9 (1D)
4. 2.5	1	1	1	1	1	1	1	1	1	1	10
5. 1.25	1	1	1	1	1	1	1	1	1	1	10
6. 0	1	1	1	1	1	1	1	1	1	1	10

Acute 96-hr Toxicity Test-96 Hr Survival

Start Date:	8/31/2007 09:50	Test ID:	999-2321	Sample ID:	REF-Ref Toxicant
End Date:	9/4/2007 11:10	Lab ID:	ORNAS-Northwestern Aquati	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAF 91-EPA Freshwater	Test Species:	CT-Chironomus tentans
Comments:					

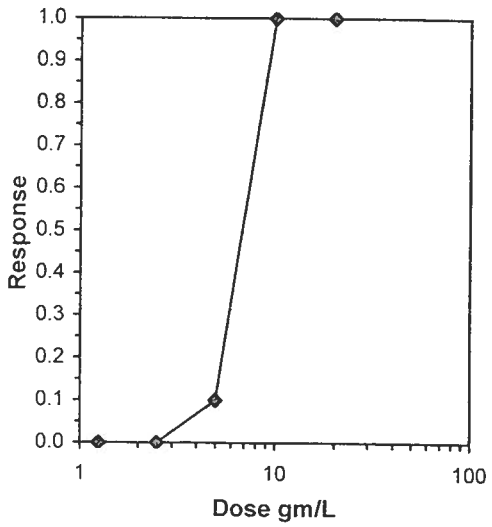
Conc-gm/L	1
D-Control	1.0000
1.25	1.0000
2.5	1.0000
5	0.9000
10	0.0000
20	0.0000

Conc-gm/L	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical	Number Resp	Total Number
D-Control	1.0000	1.0000	0	10	10	1			0	10
1.25	1.0000	1.0000	0	10	10	1	1.0000	0.0500	0	10
2.5	1.0000	1.0000	0	10	10	1	1.0000	0.0500	0	10
5	0.9000	0.9000	1	9	10	1	0.5000	0.0500	1	10
*10	0.0000	0.0000	10	0	10	1	0.0000	0.0500	10	10
*20	0.0000	0.0000	10	0	10	1	0.0000	0.0500	10	10

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	5	10	7.07107	

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	6.5975	5.7845	7.5249
5.0%	6.7460	5.7246	7.9495
10.0%	6.8040	6.2734	7.3794
20.0%	6.8040	6.2734	7.3794
Auto-0.0%	6.5975	5.7845	7.5249

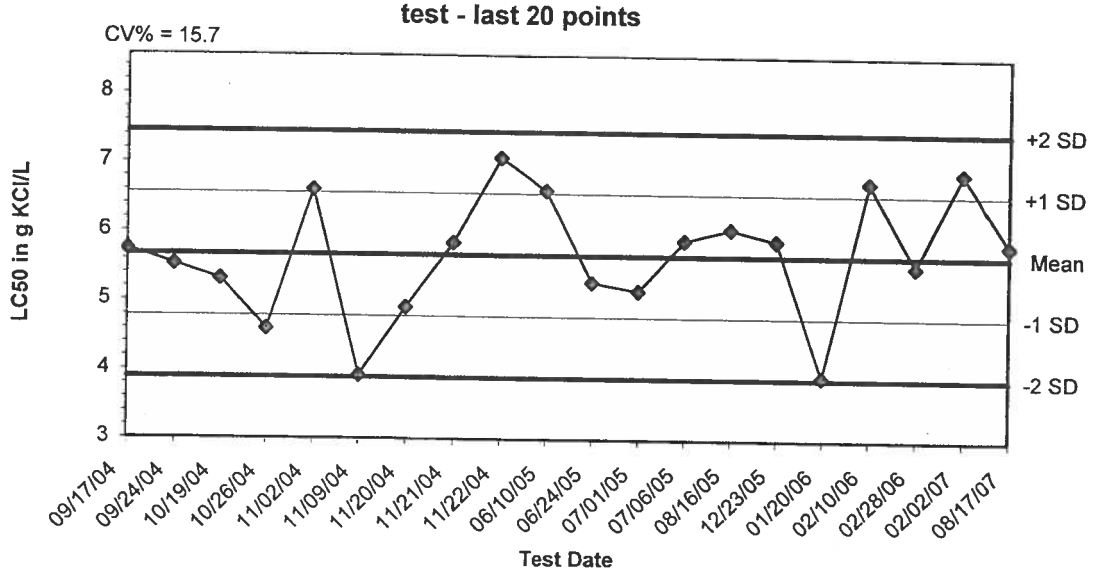


Reviewed by:_____

Test: AT-Acute 96-hr Toxicity Test						Test ID: 999-2321			
Species: CT-Chironomus tentans						Protocol: EPAF 91-EPA Freshwater			
Sample ID: REF-Ref Toxicant						Sample Type: KCL-Potassium chloride			
Start Date: 8/31/2007 09:50				End Date: 9/4/2007 11:10		Lab ID: ORNAS-Northwestern Aquatic Sciences			
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	10	10	10	10	10	
	2	1	1.250	10	10	10	10	10	
	3	1	2.500	10	10	10	10	10	
	4	1	5.000	10	10	10	10	9	
	5	1	10.000	10	10	0	0	0	
	6	1	20.000	10	10	0	0	0	

Comments:

Third instar larval midge, Chironomus dilutus, acute reference toxicant test - last 20 points



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/17/04	5.7400	5.6650	4.7757	3.8863	6.5543	7.4437
09/24/04	5.5200	5.6650	4.7757	3.8863	6.5543	7.4437
10/19/04	5.3100	5.6650	4.7757	3.8863	6.5543	7.4437
10/26/04	4.5900	5.6650	4.7757	3.8863	6.5543	7.4437
11/02/04	6.6000	5.6650	4.7757	3.8863	6.5543	7.4437
11/09/04	3.9200	5.6650	4.7757	3.8863	6.5543	7.4437
11/20/04	4.9100	5.6650	4.7757	3.8863	6.5543	7.4437
11/21/04	5.8400	5.6650	4.7757	3.8863	6.5543	7.4437
11/22/04	7.0700	5.6650	4.7757	3.8863	6.5543	7.4437
06/10/05	6.6000	5.6650	4.7757	3.8863	6.5543	7.4437
06/24/05	5.2800	5.6650	4.7757	3.8863	6.5543	7.4437
07/01/05	5.1600	5.6650	4.7757	3.8863	6.5543	7.4437
07/06/05	5.8900	5.6650	4.7757	3.8863	6.5543	7.4437
08/16/05	6.0600	5.6650	4.7757	3.8863	6.5543	7.4437
12/23/05	5.8900	5.6650	4.7757	3.8863	6.5543	7.4437
01/20/06	3.9300	5.6650	4.7757	3.8863	6.5543	7.4437
02/10/06	6.7400	5.6650	4.7757	3.8863	6.5543	7.4437
02/28/06	5.5300	5.6650	4.7757	3.8863	6.5543	7.4437
02/02/07	6.8800	5.6650	4.7757	3.8863	6.5543	7.4437
08/17/07	5.8400	5.6650	4.7757	3.8863	6.5543	7.4437

YMR
9-18-07

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Total Mercury Analysis of Fish Tissue Samples

Project Name/Purchase Order: CONDIT 53886/5

For Samples Received: June 6, 2007

Report Date:

June 19, 2007

Prepared for:

Mr. David Earl King
Kleinfelder
15050 SW Koll Parkway
Suite L
Beaverton, OR 97006

Brooks Rand
Project #: KLE001
Report #: 07BR0799

3958 6th Avenue NW
Seattle, WA 98107
www.brooksrand.com
Phone: 206-632-6206
Fax: 206-632-6017
Email: brl@brooksrand.com

Brooks Rand Labs

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BRL Tracking #: 07BR0799 **BRL Project: KLE001**

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Brooks Rand Labs Case Narrative

Total Mercury Analysis of Fish Tissue

Client Project ID: CONDIT 53886/5 **Purchase Order No.: 53886/5**

BRL Tracking #: 07BR0799 **BRL Project: KLE001**

All samples were received, stored, prepared, and analyzed according to Brooks Rand Labs (BRL) standard operating procedures (SOPs) and EPA Methodology. BRL certifies that the reported test results for mercury by EPA Method 1631E meet all requirements of NELAC. BRL is a NELAC accredited laboratory (OR ELAP ID WA200006).

Shipping and Receiving
Three composite fish samples were received at 10:00 AM on 6/6/07. The samples arrived in a cooler with ice at a temperature less than 0 °C. The requested analysis for the samples was total mercury (THg). All samples were stored in a sample storage freezer at -10°C until further processing.

Holding Time, Preservation and Storage
All method holding time, preservation and storage requirements were satisfied.

Homogenization
Once thawed, the fish fillet samples were homogenized with the skin on using precleaned commercial grade homogenization equipment. A homogenization blank was collected after cleaning the equipment and prior to homogenization of the samples. The blank was digested as a fish tissue sample and analyzed along with the associated homogenates. The result for the homogenization blank was less than 10 times the lowest sample result, indicating that no significant contamination occurred during homogenization.

Total Mercury, Appendix to EPA Method 1631 (BRL SOP BR-0002)
All samples are prepared and analyzed in accordance with the Appendix to EPA Method 1631. Biota samples are digested with nitric acid/sulfuric acid (HNO_3/H_2SO_4) and heat, and further oxidized with bromine monochloride (BrCl). All samples are analyzed with stannous chloride ($SnCl_2$) reduction, single gold amalgamation and cold vapor atomic fluorescence spectroscopy (CVAFS) detection using a BRL Model III CVAFS Mercury Analyzer.

Batch # 07-0633

Preparation: The samples were digested on June 13, 2007.

Analysis: The samples were analyzed on June 15, 2007.

Quality Assurance: Sample results may have been evaluated using detection limits that were adjusted to account for sample aliquot size; please refer to the Quality Assurance Summary for a list of the sample specific method detection limits (MDLs)/practical quantitation limits (PQLs) and QA details. All QA criteria were met and no qualification of the data was required.

Blank correction: All sample results for low-level mercury analysis are blank corrected as described in EPA Method 1631 Revision E.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. In addition, I certify that to the best of my knowledge and belief, the data as reported are true and accurate. The Laboratory Director or her designee, as verified by the following signature has authorized release of the data contained in this data package.

Elizabeth Madonick
Project Manager

Reported by

Brooks Rand LLC

Contact: Elizabeth Madonick

3958 6th Avenue NW
Seattle, WA 98107
Tel: 206-632-6206 *Fax: 206-632-6017*

Summary of Results for

Kleinfelder

Contact: Dave King

15050 SW Koll Parkway
Beaverton OR 97006
Tel: 503-644-9447

Lab Project # KLE001
Lab Tracking # 07BR0799

Client Project CONDIT 53886/5
Purchase Order 53886/5

Sample/Sampling/Receiving Info

Kleinfelder | *BRL*

Sample Identification	Sampling Date	Matrix	Submatrix	Sample Number	Receiving Date
Northwest Lake Fish #1	6/5/2007	Biota	Fish	07BR0799 - 01	6/6/2007
Northwest Lake Fish #2	6/5/2007	Biota	Fish	07BR0799 - 02	6/6/2007
Northwest Lake Fish #3	6/5/2007	Biota	Fish	07BR0799 - 03	6/6/2007
HB-07-0606-Hg	6/8/2007	Biota	Homog. Blank	07BR0799 - 04	6/6/2007

Tuesday, June 19, 2007

Elizabeth Madonick
Project Manager

Reported by

Brooks Rand LLC

Contact: Elizabeth Madonick

3958 6th Avenue NW
Seattle, WA 98107
Tel: 206-632-6206 Fax: 206-632-6017

Summary of Results for

Kleinfelder

Contact: Dave King

15050 SW Koll Parkway
Beaverton OR 97006
Tel: 503-644-9447

Lab Project # KLE001
Lab Tracking # 07BR0799

Client Project CONDIT 53886/5
Purchase Order 53886/5

Hg

Sample Identification	BRL Number	Total or Dissolved	Preparation date	Analysis date	Batch #	Result	Units	Qualifier (Q)
Northwest Lake Fish #1	07BR0799 - 01	T	6/13/2007	6/15/2007	07-0633	297.000	ng/g	
Northwest Lake Fish #2	07BR0799 - 02	T	6/13/2007	6/15/2007	07-0633	308.000	ng/g	
Northwest Lake Fish #3	07BR0799 - 03	T	6/13/2007	6/15/2007	07-0633	185.000	ng/g	
HB-07-0606-Hg	07BR0799 - 04	T	6/13/2007	6/15/2007	07-0633	0.070	ng/g	B

Tuesday, June 19, 2007

Elizabeth M. Madonick
Project Manager

BROOKS RAND LABS

DATA QUALIFIERS and their DEFINITIONS
(Effective 6/23/06)

B - Detected by the instrument, above MDL but less than or equal to the PQL (ML). Measured result is reported and considered an estimate.

E - An estimated value due to the presence of interferences. A full explanation will be presented in the case narrative.

H - Holding time and/or preservation requirements not met. Results are estimated.

J – Estimated value.

M -Duplicate precision (RPD) was not within acceptance criteria.

N - Spike recovery was not within acceptance criteria.

R - Rejected, unusable value. A full explanation will be presented in the QA Report.

U – Result below or equal to the method detection limit (MDL) and therefore analyte was not detected. Results reported at the MDL.

These qualifiers are based on those previously utilized by Brooks Rand, LLC, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18 and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review: USEPA; July 2002. These supercede all previous qualifiers ever employed by BRL.

QUALITY ASSURANCE SUMMARY Brooks Rand Report #07BR0799

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

3958 6th Avenue NW
Seattle, WA 98107
Voice: 206-632-6206
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Batch #: **07-0633**

Method #: **BR-0002**

Analyte: **Hg**

Matrix: **Biota**

BIAS *Criterion: Recovery = 77-123%*
Continuing Calibration Verification (CCV)

QCS ID	*Certified Value ng/L*	*Measured Value ng/L*	*Recovery %*
CCV1	5.00	5.25	105%
CCV2	5.00	5.05	101%
CCV3	5.00	5.07	101%
CCV4	5.00	4.54	91%
CCV5	5.00	5.11	102%

BIAS *Criterion: Recovery = 85-115%*
Independent Calibration Verification (ICV)

QCS ID	*Certified Value ng/L*	*Measured Value ng/L*	*Recovery %*
ICV*	16.01	15.67	98%

* Preparation of the CRM NIST 1641d.

BIAS *Criterion: Recovery = 75-125%*
Certified Reference Material (CRM)

CRM ID	*Certified Value ng/g*	*Measured Value ng/g*	*Recovery %*
TORT-2	270	300	111%
DORM-2	4640	4342	94%

BIAS *Criteria: Recovery = 70-130%, RPD ≤ 30%*
Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

		Matrix Spike			*Matrix Spike Duplicate*			
Sample ID	*Sample Value ng/g AR*	*Spiked Value ng/g AR*	*Measured Value ng/g AR*	*MS Recovery %*	*Spiked Value ng/g AR*	*Measured Value ng/g AR*	*MSD Recovery %*	*Duplicate RPD*
07BR0789-66	96.1	548.6	681.1	107%	530.9	632.6	101%	7%
07BR0799-01	297	1150	1442	100%	1211	1577	106%	9%
07BR0805-02	23.7	479.8	506.7	101%	N/A	N/A	N/A	N/A

PRECISION *Criteria: RPD ≤ 30% if average result > 5x MDL*
Method Duplicate Analysis (MD)

Sample ID	*Sample Value ng/g AR*	*Duplicate Value ng/g AR*	*Average Value ng/g AR*	*Duplicate RPD*
07BR0789-66	96.1	100.0	98.1	4%
07BR0799-01	297	300	299	1%
07BR0805-01	7.7	8.6	8.2	12%

Method Blanks (MB) *Criteria: Avg. <2x MDL. Std Dev < 2/3 MDL or sample results > 10x highest MB*

MB1 ng/g	*MB2 ng/g*	*MB3 ng/g*	*MB4 ng/g*	*Average ng/g*	*StDev ng/g*
0.03	0.05	0.04	0.03	0.04	0.01

Method Detection Limits	
MDL ng/g	*PQL ng/g*
0.04	0.10

Sample Specific Reporting Limits		
Sample ID	*MDL ng/g*	*PQL ng/g*
07BR0765-70	0.8	1.9
07BR0765-71	1.0	2.5
07BR0765-72	1.0	2.4
07BR0765-73	0.8	2.0
07BR0765-74	0.8	1.9
07BR0765-75	1.0	2.5
07BR0789-06	1.5	3.9
07BR0789-07	1.6	4.1
07BR0789-15	1.8	4.5
07BR0789-16	0.17	0.42
07BR0789-61	1.5	3.8

Sample Specific Reporting Limits		
Sample ID	*MDL ng/g*	*PQL ng/g*
07BR0789-62	0.17	0.43
07BR0789-66	1.9	4.8
07BR0789-68	1.7	4.3
07BR0789-69	1.8	4.4
07BR0799-01	5	12
07BR0799-02	4	10
07BR0799-03	4	10
07BR0805-01	0.9	2.3
07BR0805-02	0.9	2.2
07BR0805-03	1.6	3.9
07BR0805-04	2	6

Nicole C. Mead
Quality Assurance Officer

Elizabeth Madsen
Project Manager

	Batch:	07-0633		Analyte:	THg		Date:	06/15/07				MDL:	0.04	ng/g	*Nitric/Sulfuric Prep*
	Analyst:	AM		Matrix:	Biota		Instrument ID:	BR-10				PQL:	0.10	ng/g	
Run No.	Run Type	Tracking #	Sample ID	Sample Wt mg	Dilution Vol. mL	Analyzed Vol. mL	PA	Hg pg	Hg ng/g	TV/ Spike	Recovery		MDL	PQL	Comments
1	CB						91	7.48				74.75			= avg PA of CB
2	CB						77	6.33				12.45			= std dev PA CB
3	CB						62	5.10				6.14			= avg pg of CB
4	CB						69	5.67				1.02			= std dev pg CB
5	CS						373			25	98%				
6	CS						1276			100	99%				
7	CS						6256			500	102%				
8	CS						30619			2500	100%	0.0822			= avg cal coeff
9	CS						123383			10000	101%	2%			= RSD cal coeff
10	ICV						19141	1567		1601	98%	1.0000			= R value
11	CCV						6466	525.2		500	105%				
88	CCV						6223	505.3		500	101%				
89	MB			1000	40.00	10.00	163	7.25	0.03			36.49			= average total pg
90	MB			1000	40.00	10.00	229	12.68	0.05			0.04			= avg MB ng/g
91	MB			1000	40.00	10.00	193	9.72	0.04			0.01			= std dev MB ng/g
92	MB			1000	40.00	10.00	158	6.84	0.03						
93	LFB	PQL Spike		1000	40.00	10.00	6377	517.9	2.04	0.10	2035%				**R&D only**
94	QCS	CRM-1	TORT-2	192.0	40.00	1.000	17632	1443	300	270	111%				
95	QCS	CRM-2	DORM-2	185.8	40.00	0.100	24620	2017	4342	4640	94%				
96	S	07BR0789	66	416.5	40.00	0.500	6167	500.7	96.1				1.9	4.8	
97	S	07BR0789	06	517.9	40.00	0.500	536	37.91	5.8				1.5	3.9	
98	S	07BR0789	07	493.2	40.00	0.500	43974	3608	585.1				1.6	4.1	
99	S	07BR0789	15	448.7	40.00	0.500	4147	334.7	59.6				1.8	4.5	
100	S	07BR0789	16	473.6	40.00	0.500	426	*28.87*	*4.8*				*1.7*	*4.2*	**Near PQL - reanalyzed.**
101	S	07BR0789	61	528.6	40.00	0.500	9996	815.3	123.3				1.5	3.8	
102	S	07BR0789	62	465.5	40.00	0.500	434	*29.52*	*5.0*				*1.7*	*4.3*	**Near PQL - reanalyzed.**
103	S	07BR0789	68	468.1	40.00	0.500	3699	297.8	50.8				1.7	4.3	
104	S	07BR0789	69	454.0	40.00	0.500	22003	1802	317.5				1.8	4.4	
105	S	07BR0805	01	888.1	40.00	0.500	1117	85.65	7.7				0.9	2.3	
106	MR	07BR0789	66MD	474.5	40.00	0.500	7297	593.5	100.0			4%	1.7	4.2	= MD RPD
107	MS	07BR0789	66MS	455.7	40.00	0.500	47287	3880	681.1	548.6	107%		1.8	4.4	
108	MSD	07BR0789	66MSD	470.9	40.00	0.500	45392	3724	632.6	530.9	101%	7%	1.7	4.2	= MS/MSD RPD
109	CCV						6245	507.1		500	101%				
110	S	07BR0805	02*	461.2	20.00	0.500	3406	273.8	23.7				0.9	2.2	
111	S	07BR0805	03*	254.5	20.00	0.500	10993	897.3	140.9				1.6	3.9	
112	S	07BR0805	04*	172.6	20.00	0.500	916	69.13	16				2	6	
113	S	07BR0765	70	1043.6	40.00	0.500	4472	361.4	27.7				0.8	1.9	
114	S	07BR0765	71	801.0	40.00	0.500	2241	178.0	17.7				1.0	2.5	
115	S	07BR0765	72*	410.7	20.00	0.500	2397	190.8	18.5				1.0	2.4	
116	S	07BR0765	73	980.5	40.00	0.500	3898	314.2	25.6				0.8	2.0	
117	S	07BR0765	74	1052.8	40.00	0.500	2341	186.2	14.1				0.8	1.9	
118	S	07BR0765	75	814.6	40.00	0.500	4372	353.2	34.6				1.0	2.5	
119	S	07BR0765	80	1001.5	40.00	10.00	170	7.83	-0.01	U			0.04	0.10	**Homogenization blank**

	Batch:	07-0633		Analyte:	THg		Date:	06/15/07				MDL:	0.04	ng/g	*Nitric/Sulfuric Prep*
	Analyst:	AM		Matrix:	Biota		Instrument ID:	BR-10				PQL:	0.10	ng/g	

Run No.	Run Type	Tracking #	Sample ID	Sample Wt mg	Dilution Vol. mL	Analyzed Vol. mL	PA	Hg pg	Hg ng/g	TV/ Spike	Recovery		MDL	PQL	Comments
120	MR	07BR0805	01MD*	534.6	20.00	0.500	1491	116.4	8.6			12%	0.7	1.9	= MD RPD
121	MS	07BR0805	02MS*	521.1	20.00	0.500	80413	6602	506.7	479.8	101%		0.8	1.9	
123	CCV						5598	453.9		500	91%				
124	S	07BR0799	01	818.0	40.00	0.100	7454	606.4	297				5	12	
125	S	07BR0799	02	994.0	40.00	0.100	9388	765.4	308				4	10	
126	S	07BR0799	03	965.3	40.00	0.100	5507	446.4	185				4	10	
127	S	07BR0799	04	1005.0	40.00	10.00	386	25.58	0.07	B			0.04	0.10	**Homogenization blank**
128	S	07BR0789	16R	473.6	40.00	5.000	3434	276.1	4.59				0.17	0.42	
128	S	07BR0789	62R	465.5	40.00	5.000	3969	320.0	5.42				0.17	0.43	
129	MR	07BR0799	01MD	862.1	40.00	0.100	7950	647.2	300			1%	5	12	= MD RPD
130	MS	07BR0799	01MS	869.8	40.00	0.100	38220	3135	1442	1150	100%		5	11	
131	MSD	07BR0799	01MSD	825.9	40.00	0.100	39694	3256	1577	1211	106%	9%	5	12	= MS/MSD RPD
132	CCV						6298	511.4		500	102%				

* Prepped using smaller vial and 1/2 volume of acid due to limited sample mass.

Hg Prep Log for Solids (CVAFS) T-Hg / Other _____ Page 1 of 2
Revision #: 009

Batch: 07-0633 Matrix: Biota (invert. insect Fish) Technician: AM Date: 6/13/07

Sample I.D.	Aliquot (mg)	Sample I.D.	Aliquot (mg)
MB-1	—	~~07BR0789~~	* 07BR0789-69 1454.0
MB-2	—	* 07BR0805-01	888.1
MB-3	—	* -02	461.2
MB-4	— AM	* -02MS ~~-02MD~~	521.1
PQL LFB	— 6/13	* -03	254.5
CRM-1	192.0 AM 6/13	* -04	172.6
07BR0789-06	~~47.6~~ 517.9	07BR0765-70	1043.6
-07	493.2	* -71	801.0
-15	448.7	* -72	410.7
-16	473.6	-73	980.5
-61	528.6	* -74	1052.8
* -62	465.5	* -75	814.6
-66	416.5	-80	1001.5
-66MD	474.5	07BR0799-01	818.0
* -66MS	455.7	-02	994.0
-66MSD	470.9	-03	965.3
-68	466.1	-04	1005.0

AM 6/13

} in 20mL vials

20mL vials

*Sample extinguished
*Some sample overflowed on hot plate, no noticeable diff in sample vol.
)2x reagents added

Matrix Spike/Matrix Spike Duplicate

Sample I.D.	Hg Standard I.D.	Hg Standard Conc. (ng/mL)	Hg Standard Vol. used (mL)	Matrix Spike Conc. (ng/g)
07BR0789-66MS, MSD	~~07~~ 06-339-02	1000 ng/mL	0.25mL	548.6, 530.9
07BR0805-02MS				~~530.9~~ 479.8
07BR0799-01MS			1.00mL	1150 AM 6/13
-01MSD				1211
		MM 6/16/07		

Certified Reference Material (CRM)

CRM I.D.	CRM Source	CRM Conc. (ng/g) / (mg/kg)	CRM Mass used (mg)
CRM-1	TORT-2	0.270 ~~0.152~~ mg/kg AM 6/13	192.0
CRM-2	DORM-2	464 mg/kg	185.8
PQL	1ng/mL	1.0ng/mL STD	0.100mL

Spike Witness Initials/Date JB 6-13-07

HNO_3 Reagent I.D. #: 07-162-01 BrCl I.D. #: 07-159-02

HCl / H_2SO_4 Reagent I.D. #: 06361-05 Final Dil. Volume: 40mL

Target Temp. 1 (if required): 70 °C Measured Temp.: 75 °C Digestion Time: 1hr

Target Temp. 2 (if required): 90 °C Measured Temp.: 90 °C Digestion Time: 3hr

Comments: In some samples, low sample amount dictated that 20mL vials be used to retain PQL. ½ amount of acids were added except to 07BR0805-03

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Hg Prep Log for Solids (CVAFS) T-Hg / Other _____ Page 2 of 2
Revision #: ~~009~~

Batch: 07-063 Matrix: Biota Technician: AM Date: 6/13/07

Sample I.D.	Aliquot (mg)	Sample I.D.	Aliquot (mg)
CRM-2	185.8		
07B0805-01MD	534.6		
07B0799-01MD	867.1		
-01MS	869.8		
-01MSD	825.9		

in 20mL vial

AM 6/16/07

AM 6/16/07

See page one

Matrix Spike/Matrix Spike Duplicate

Sample I.D.	Hg Standard I.D.	Hg Standard Conc. (ng/mL)	Hg Standard Vol. used (mL)	Matrix Spike Conc. (ng/g)

AM 6/16/07

Certified Reference Material (CRM)

CRM I.D.	CRM Source	CRM Conc. (ng/g) / (mg/kg)	CRM Mass used (mg)

Spike Witness Initials/Date _____

HNO_3 Reagent I.D. #: _____ BrCl I.D. #: _____

HCl / H_2SO_4 Reagent I.D. #: _____ Final Dil. Volume: _____

Target Temp. 1 (if required): _____ °C Measured Temp.: _____ °C Digestion Time: _____

Target Temp. 2 (if required): _____ °C Measured Temp.: _____ °C Digestion Time: _____

Comments: _____

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Hg Analysis Sheet: T-Hg Other: ____ (form 1) Page 1 of 5

Batch: 07-0616, 07-0633, 07-0612 Matrix: Biota Analyst: [illegible] Date: 6/15/07

Mod. III ID#: BR10 Cal. Blanks X: 74.75 PA Cl X: 0.0822 pg/PA

NH_2OHHCl #: 07-159-03 10 ng Hg/mL std. #: 07-145-04 RSD: 2 %

$SnCl_2$ #: 07-159-02 1.0 ng Hg/mL std. #: 07-145-05 low std. Rec.: 98 %

Run #	Split Bottle	Trap	Bubb.	Brooks Rand Sample ID	Analy. Vol. (mL)	PA	Comments
1	1	T1	1	CB-1	—	91	
2	2	T2	2	CB-2	—	77	
3	3	T3	3	CB-3	—	62	
4	4	T4	4	CB-4	—	69	
5	1	T5	1	25 pg	0.025	373	1 ng/mL
6	2	T6	2	100 pg	0.100	1276	↓
7	3	T7	3	500 pg	0.050	6256	10 ng/mL
8	4	T8	4	2500 pg	0.250	30619	↓
9	1	T9	1	10000 pg	1.00	123383	↓
10	2	T10	2	ICV 1001 pg	1.00	19141	N'st 1641d
11	3	T11	3	CCV	0.050	6466	10 ng/mL
12	4	T1	4	MB-1	10.00	218	
13	1	T2	1	CCB	—	115	
14	2	T3	2	MB-2	10.00	224	
15	3	T4	3	MB-3	10.00	309	
16	4	T5	4	MB-4	10.00	245	
17	1	T6	1	CRM	1.00	20135	
18	2	T7	2	ROLLED	10.00	2442	
19	3	T8	3	07BR0789-41	5.00	8283	
20	4	T9	4	-42	5.00	21894	
21	1	T10	1	-43	5.00	10879	
22	2	T11	2	-44	1.00	2873	
23	3	T1	3	-44MD	1.00	2774	
24	4	T2	4	-44MS	1.00	81677	

Comments: ____

Check standard: 07-145-04 Verification standard: 07-162-01

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07-0616, 07-0612 Blots JH 6/15/07

25	1	T3	1	07BR0787-44MSD	1.00	85484	
26	2	T4	2	-45	5.00	11076	
27	3	T5	3	-46	5.00	20345	
28	4	T6	4	-47	5.00	11745	
29	1	T7	1	-48	5.00	8402	
30	2	T8	2	-49	5.00	20891	
31	3	T9	3	-50	5.00	5455	
32	4	T10	4	CCV	0.050	6305	10 ng/mL
33	1	T11	1	07BR0789-51	5.00	13740	
34	2	T1	2	-52	5.00	13918	
35	3	T2	3	-53	5.00	11632	
36	4	T3	4	-54	5.00	4508	
37	1	T4	1	-55	5.00	4504	
38	2	T5	2	-56	1.00	5422	
39	3	T6	3	-56MD	1.00	5098	
40	4	T7	4	-56MS	1.00	~~[illegible]~~ 84800	0115
41	1	T8	1	-56MSD	1.00	81354	
42	2	T9	2	-57	5.00		
43	3	T10	3	-58	5.00		
44	4	T11	4	-59	5.00		
45	1	T1	1	-60	5.00		
46	2	T2	2	CCV	0.050	5883	10 ng/mL
~~[illegible]~~	~~3~~	~~[illegible]~~	~~3~~	~~MB-1~~	~~10.00~~		~~07-0612~~
~~[illegible]~~	~~4~~	~~[illegible]~~	~~4~~	~~MB-2~~			
47	1	T3	1	MB-1	10.00	186	07.0612
48	2	T4	2	-2		213	
49	3	T5	3	-3		224	
50	4	T6	4	-4		171	
51	1	T7	1	PQL LFB		1803	
52	2	T8	2	CRM-2	1.00	4590	
53	3	T9	3	07BR0789.01		300	
54	4	T10	4	-04		1242	

AM analyst

Hg Analysis Sheet (1-Hg) Others Page 3 of 5

07-0613 Biota AM 6/15/07

55	1	T11	1	07BR0784-05	1.00	377		
56	2	T1	2	-08		6296		
57	3	T2	3	-09 -10		2278		AM 6/15
58	4	T3	4	-10 -11		8852		
59	1	T4	1	-11	5.00	4632		
60	2	T5	2	-12		38435		AM 6/15
61	3	T6	3	-13		26167		
62	4	T7	4	-14		17958		
63	1	T8	1	-01R		945		
64	2	T9	2	-05R		1256		
65	3	T10	3	-04MD	1.00	776		
66	4	T11	4	-10MD		9448		
67	1	T1	1	-04MS		1441		
68	2	T2	2	-04MSD		1955		
71	3	T3	3	CCV	0.050	5450	Abnormal peak shape – % recovery passes	
72	4	T4	4	07BR0784-67	2.50	26600		
69	1	T5	1	07BR0784-04	5.00	~~27321~~	5814 PA	AM 6/15
70	2	T6	2	-04MD		~~859~~	2883 PA	
73	3	T7	3	-35	2.50	27321		
74	4	T8	4	-36		859		
75	1	T9	1	-37		1951		
76	2	T10	2	-38		21461		
77	3	T11	3	-39		6487	single spiked estimate only	
78	4	T1	4	-40		19623		
79	1	T3	1	-39R		6234		
80	2	T7	2	-63		14705		
81	3	T4	3	-64		65578		
82	4	T5	4	-65		12337		
83	1	T6	1	-35MD		30633		
84	2	T7	2	-67MD		40889		
85	3	T8	3	-67MS		39688		
86	4	T9	4	-67MSD		42034		

4 5

07-0633 Di'd Am 6/15/07

88	1	T10	1	CCV	0.050	6223		
89	2	T11	2	MD-1	10.00	163	07-0633	
90	3	T1	3	MD-2	↓	229		
91	4	T2	4	MD-3	↓	193		
~~1~~		~~1~~		~~MD-4~~	↓		AM 6/13	
2		2		PQL LFB	10.00			
3		3		CRM-1	1.00			
~~4~~		~~4~~		~~CRM-2~~	~~0.100~~			
87	1	T3	1	07BR0784-67PBS	2.50	16497	+ 5000 PJ	
12	2	T4	2	MD-4	1000	158		
93	3	T5	3	PQL LFB	↓	6377		
94	4	T6	4	CRM-1	1.00	17632		
95	1	T7	1	CRM-2	0.100	24620		
96	2	T8	2	0784-66	0.500	6167		
97	3	T9	3	-06		536		
98	4	T3	4	-07		43974		
99	1	T10	1	-15		4147		
100	2	T11	2	-16		426		
101	3	T1	3	-61		9996		
102	4	T2	4	-62		434		
103	1	T5	1	-68		3699		
104	2	T6	2	-69		22003		
105	3	T7	3	07BR0805-01		1117		
106	4	T8	4	07BR0784-66MD		7297	-66 MD	AM 6/15
107	1	T9	1	-66MS		47287		
108	2	T10	2	-66MSD		45392		AM 6/15
109	3	T10	3	CCV	0.050	6245		
120	4	T11	4	07BR0805-02	0.500	3406		
111	1	T1	1	-03		10993		
112	2	T2	2	-04		916		
113	3	T3	3	07BR0765-70		4472		
114	4	T4	4	-71		2241		

5 5

07-0633 Biot. AM 6/15/07

115	1	T5	1	07BR0765-72		0.500	2397
116	2	T6	2		-73		3818
117	3	T7	3		-74		2341
118	4	T8	4		-75		4372
119	1	T9	1		-80	10.00	170
120	2	T10	2	07BR0805-01MD		0.500	1491
121	3	T11	3		-02MS		80413
122	4	T1	4	CCV		0.050	5598
123	1	T2	1	07BR0792-01		0.100	7454
124	2	T3	2		-02		9388
125	3	T11	3		-03		5507
126	4	T5	4		-04 ~~-09~~	10.00	386
127	1	T6	1	07BR0784-16		5.00	3434
128	2	T7	2		-62		3964
129	3	T8	3	07BR0799-01MD		0.100	7450
130	4	T9	4		-01MS		38220
131	1	T10	1		-01MSD	0.100	39644
132	2	T11	2	CCV		0.050	6298

AM 6/15

AM 6/15

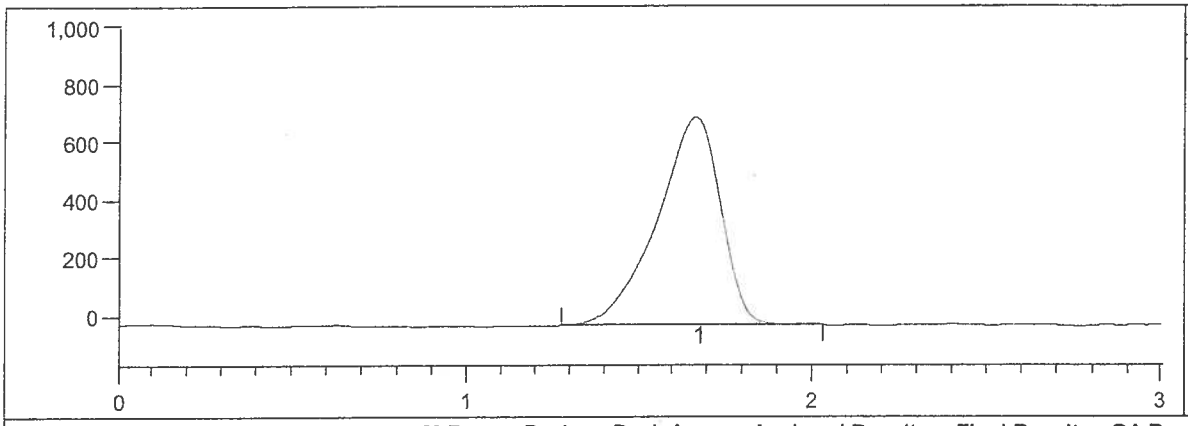
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 wm
Analyst Name: am

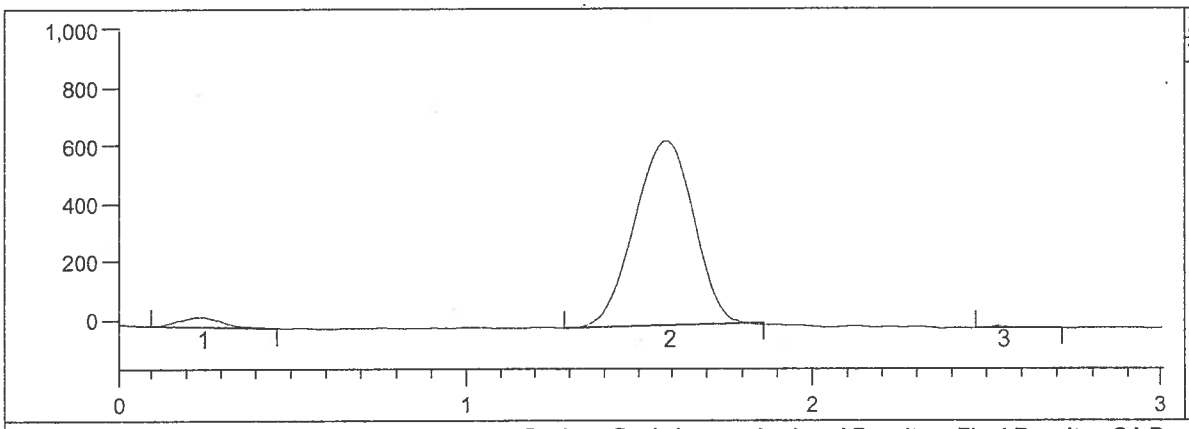


Date:	6/15/07
Time:	7:43 AM

Peak	rt	Area
1	1.66	90,967

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
1	Run	Run		1	90,967	0.00		0.00	<999999999	accept

Notes

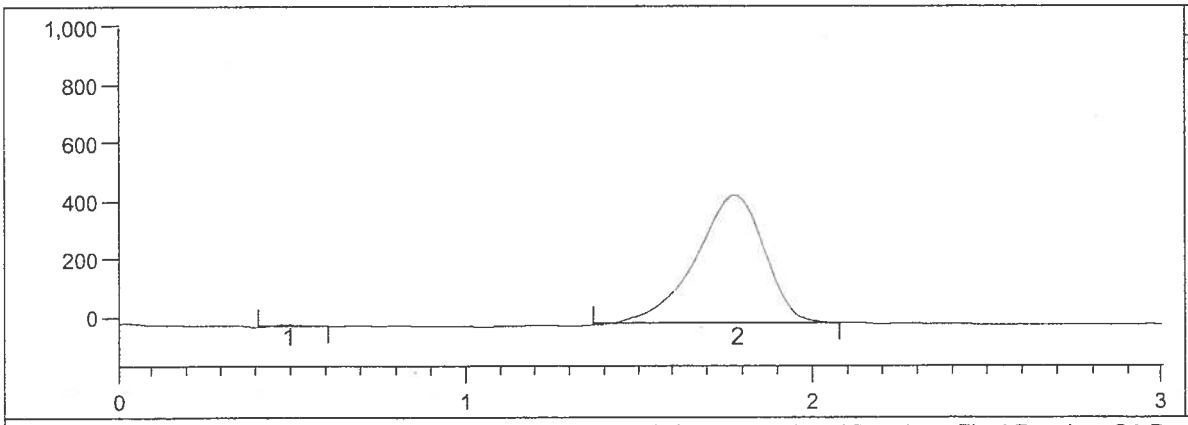


Date:	6/15/07
Time:	7:48 AM

Peak	rt	Area
1	0.23	3,073
2	1.58	76,947
3	2.53	370

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
2	Run	Run		2	76,947	0.00		0.00	<999999999	accept

Notes



Date:	6/15/07
Time:	7:52 AM

Peak	rt	Area
1	0.47	510
2	1.77	62,367

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
3	Run	Run		2	62,367	0.00		0.00	<999999999	accept

Notes

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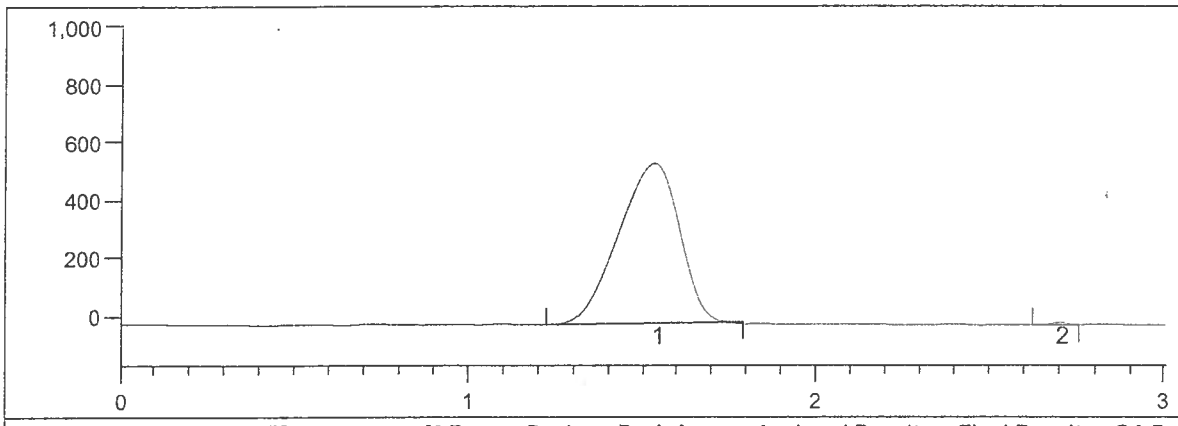
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

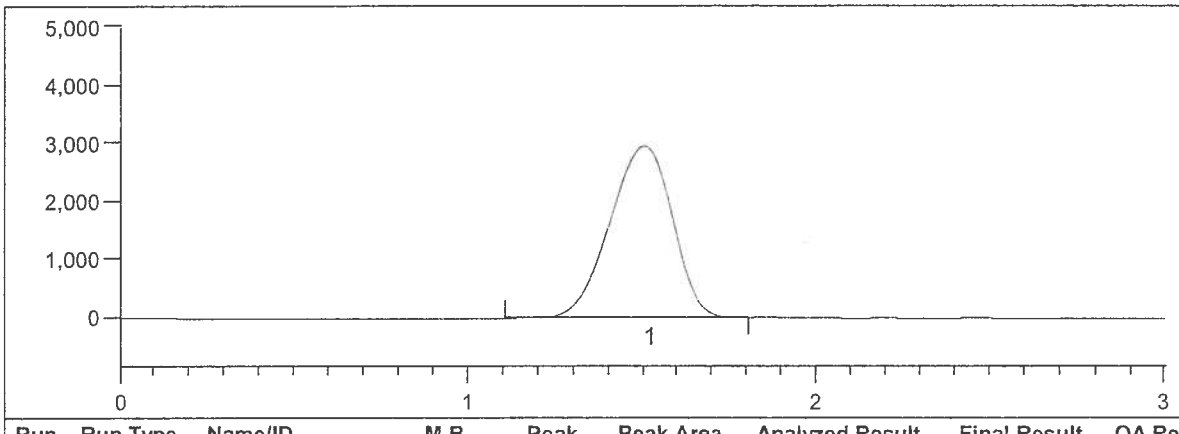


Date: 6/15/07
Time: 7:56 AM

Peak	rt	Area
1	1.53	69,326
2	2.70	331

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
4	Run	Run		1	69,326	0.00		0.00	<999999999	accept

Notes

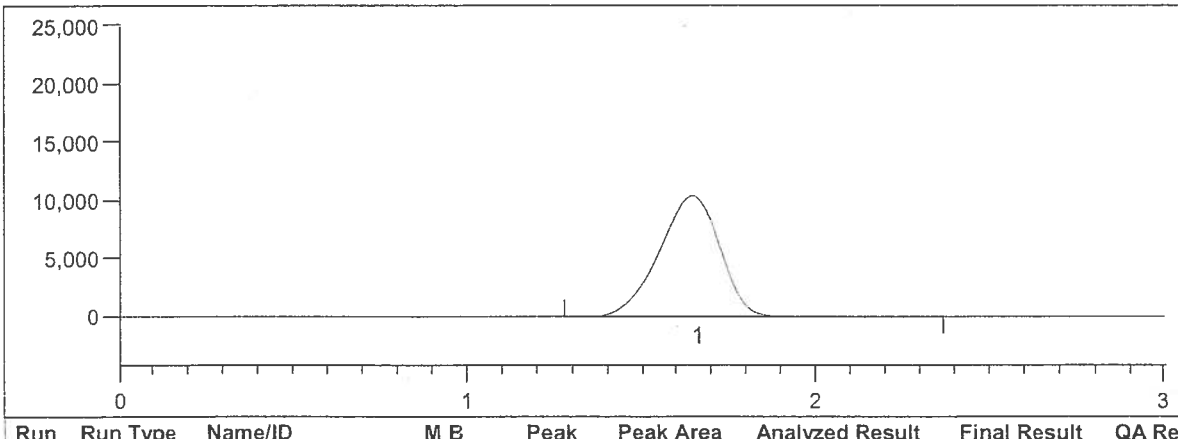


Date: 6/15/07
Time: 8:03 AM

Peak	rt	Area
1	1.50	373,374

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
5	Run	Run		1	373,374	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 8:07 AM

Peak	rt	Area
1	1.64	1,276,442

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
6	Run	Run		1	1,276,442	0.00		0.00	<999999999	accept

Notes

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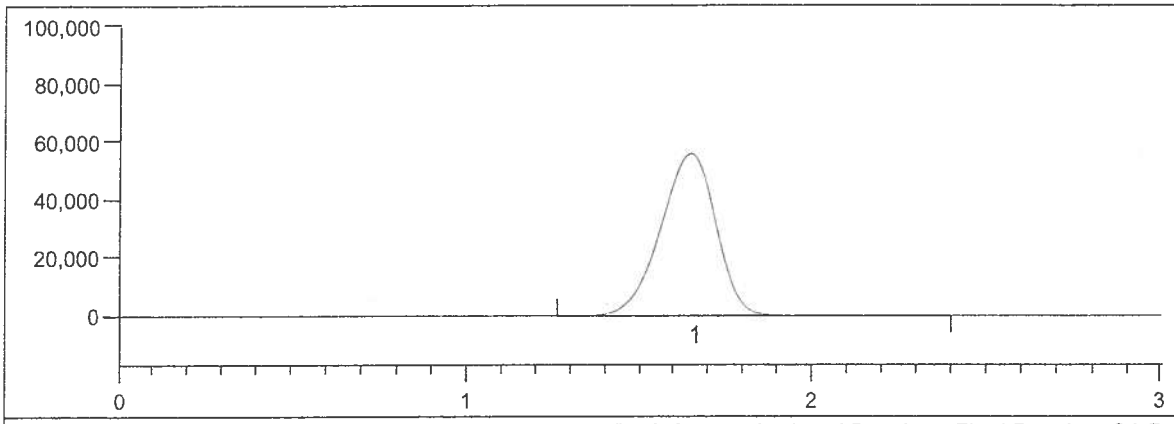
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 nm
Analyst Name: am

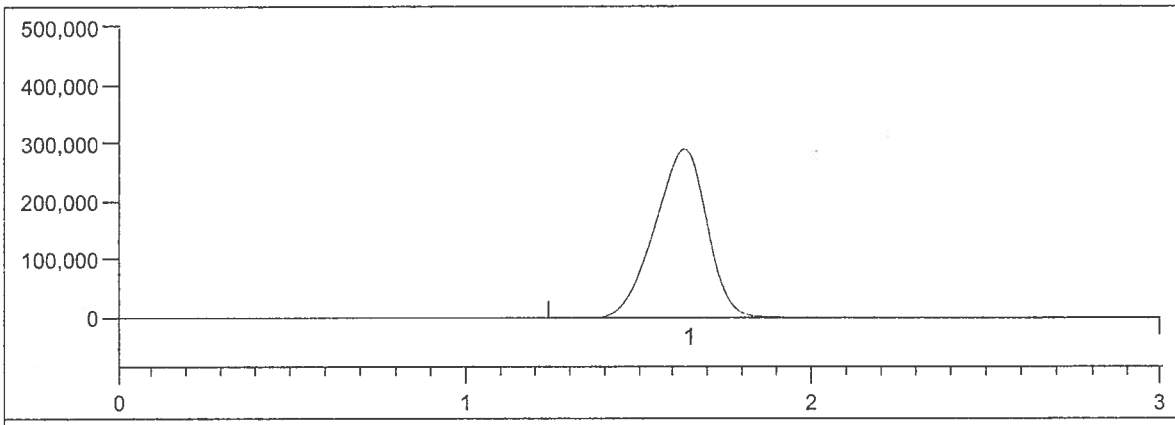


Date: 6/15/07
Time: 8:14 AM

Peak	rt	Area
1	1.64	6,255,975

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
7	Run	Run		1	6,255,975	0.00		0.00	<999999999	accept

Notes

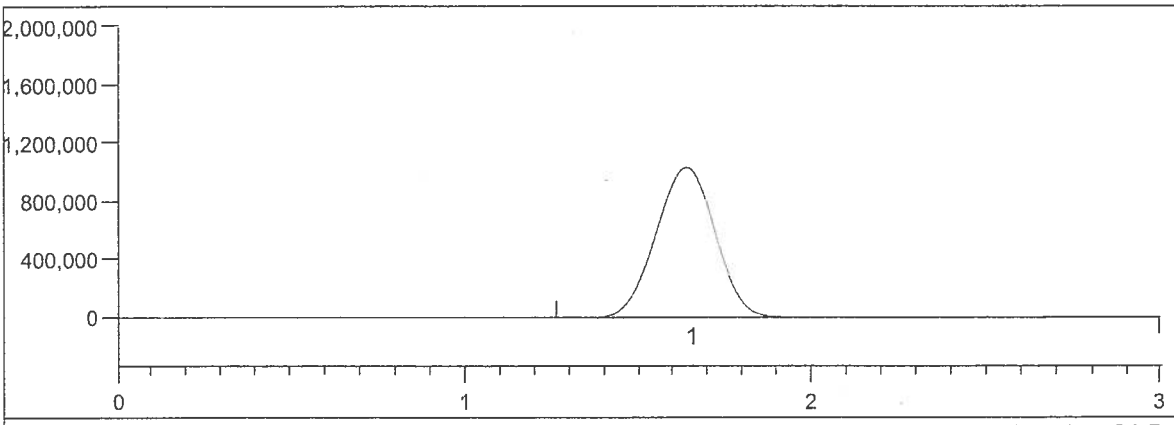


Date: 6/15/07
Time: 8:18 AM

Peak	rt	Area
1	1.62	30,619,302

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
8	Run	Run		1	30,619,302	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 8:25 AM

Peak	rt	Area
1	1.63	123,383,424

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
9	Run	Run		1	123,383,424	0.00		0.00	<999999999	accept

Notes

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The spectra from runs 12-31, 33-45, 47-70, 72-87 were not part of batch # 07-0633 and were not included in this report. eam 6/19/07

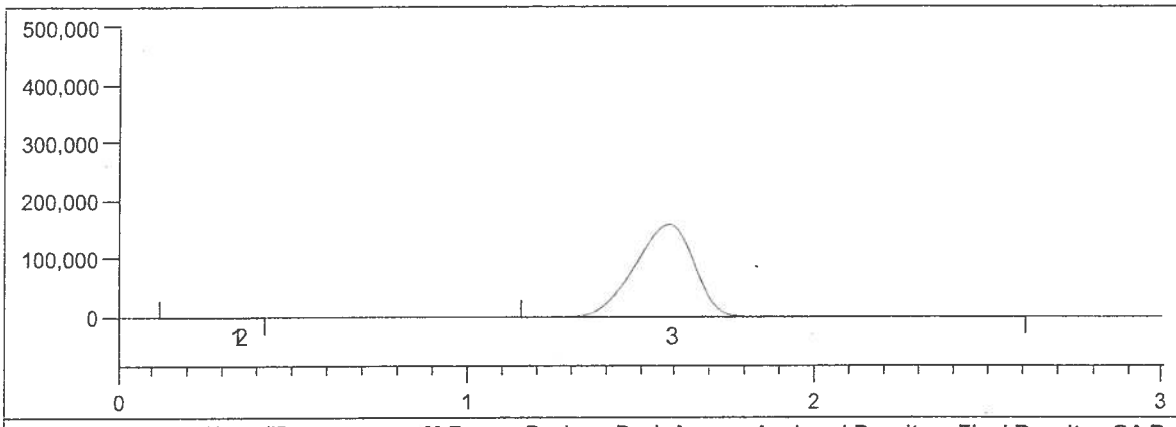
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 nm
Analyst Name: am

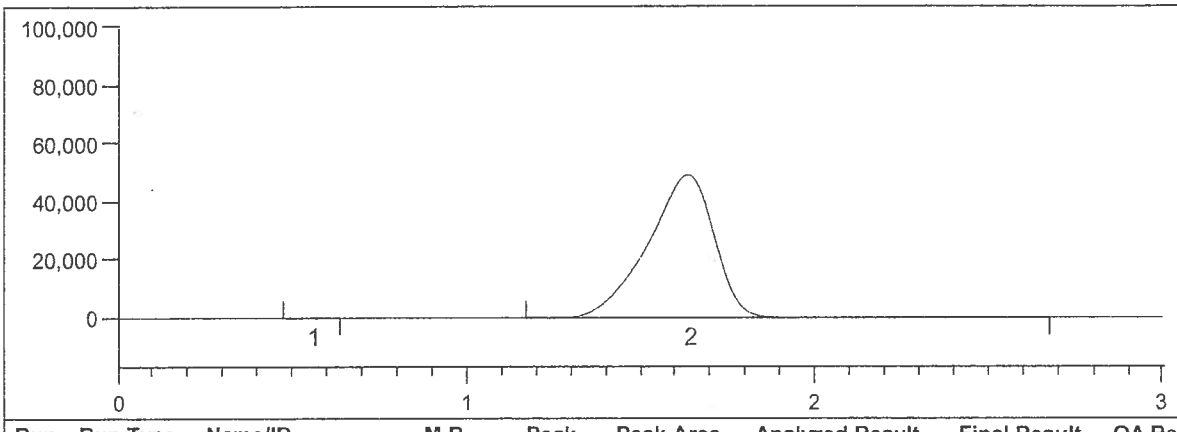


Date: 6/15/07
Time: 8:29 AM

Peak	rt	Area
1	0.32	785
2	0.34	285
3	1.58	19,141,070

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
10	Run	Run		3	19,141,070	0.00		0.00	<999999999accept	

Notes

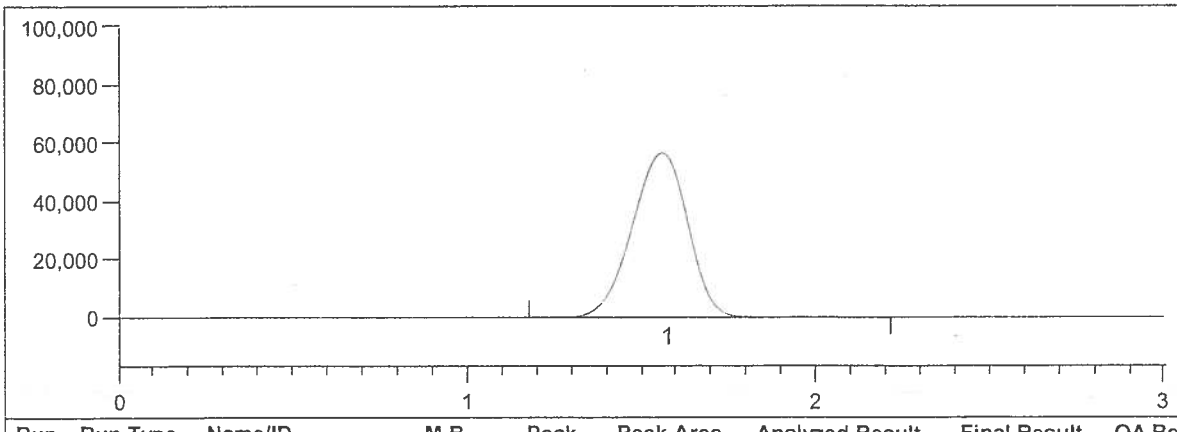


Date: 6/15/07
Time: 8:33 AM

Peak	rt	Area
1	0.54	417
2	1.63	6,466,167

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
11	Run	Run		2	6,466,167	0.00		0.00	<999999999accept	

Notes



Date: 6/15/07
Time: 10:29 AM

Peak	rt	Area
1	1.56	6,305,400

Not part of batch 07-0633. nm 6/16/07

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
32	Run	Run		1	6,305,400	0.00		0.00	<999999999accept	

Notes

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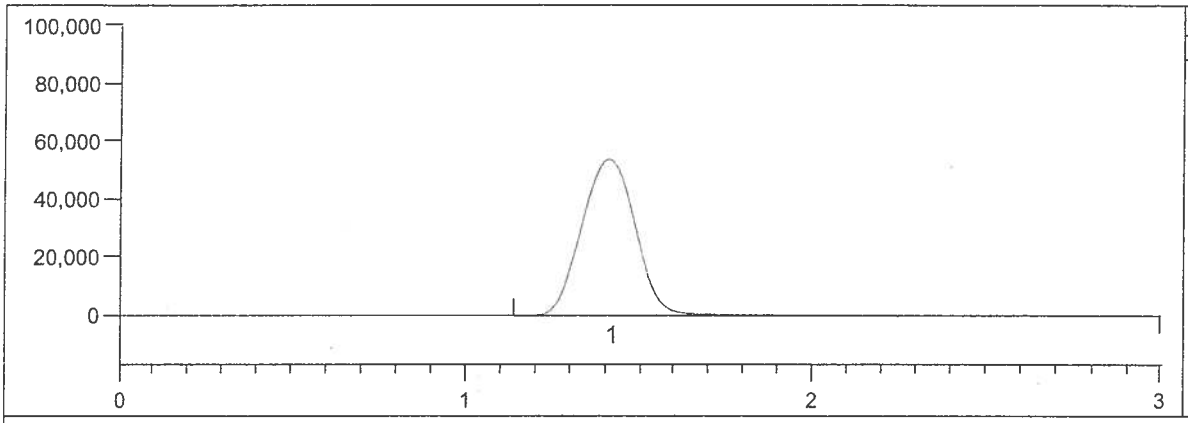
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am



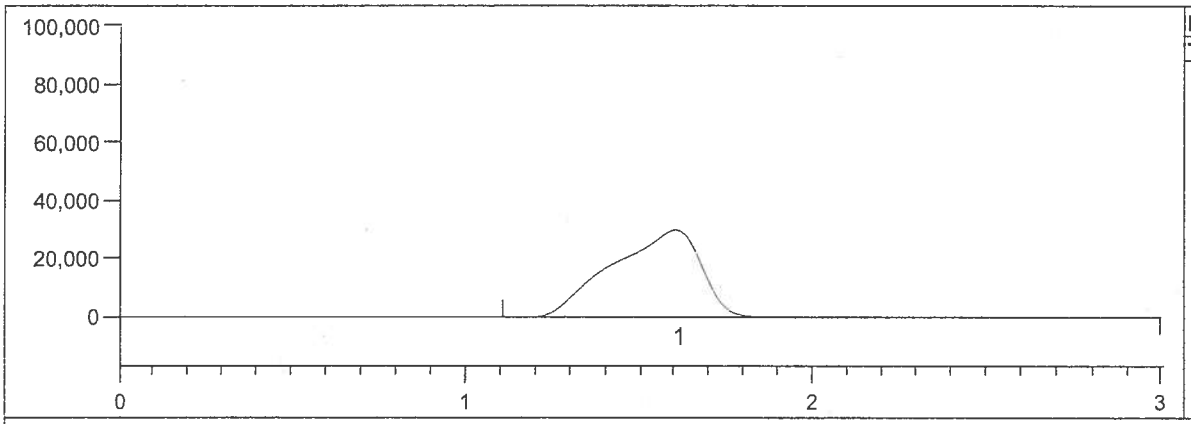
Date: 6/15/07
Time: 11:44 AM

Peak	rt	Area
1	1.40	5,883,071

Not part of batch 07-0633 mm 6/16/07

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
46	Run	Run		1	5,883,071	0.00		0.00	<999999999accept	

Notes



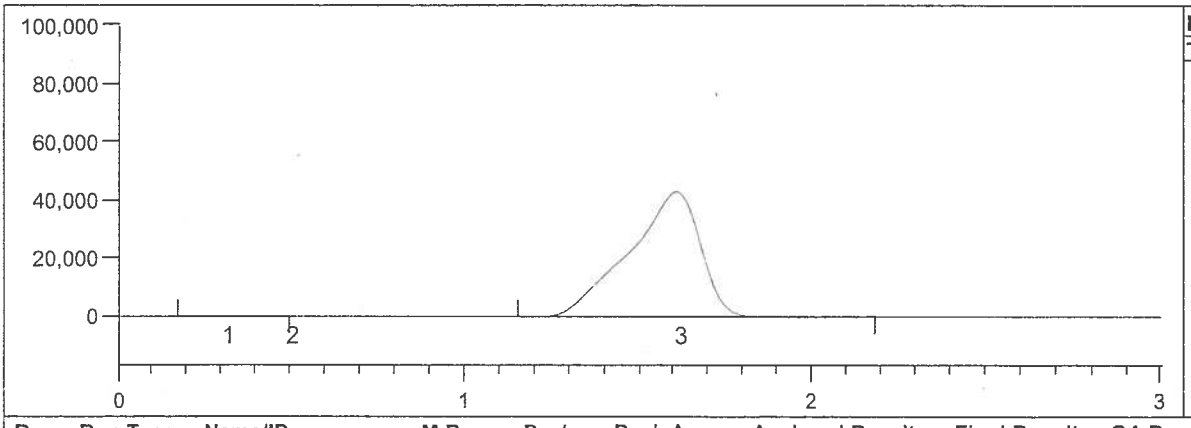
Date: 6/15/07
Time: 3:09 PM

Peak	rt	Area
1	1.60	5,449,972

Not part of batch 07-0633. mm 6/16/07

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
71	Run	Run		1	5,449,972	0.00		0.00	<999999999accept	

Notes



Date: 6/15/07
Time: 4:52 PM

Peak	rt	Area
1	0.30	1,103
2	0.49	19
3	1.60	6,223,215

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
88	Run	Run		3	6,223,215	0.00		0.00	<999999999accept	

Notes

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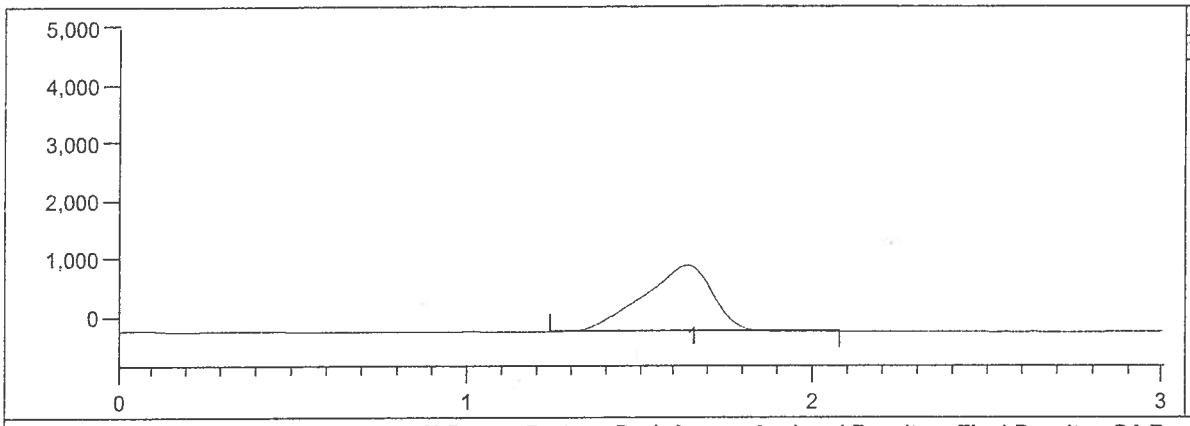
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

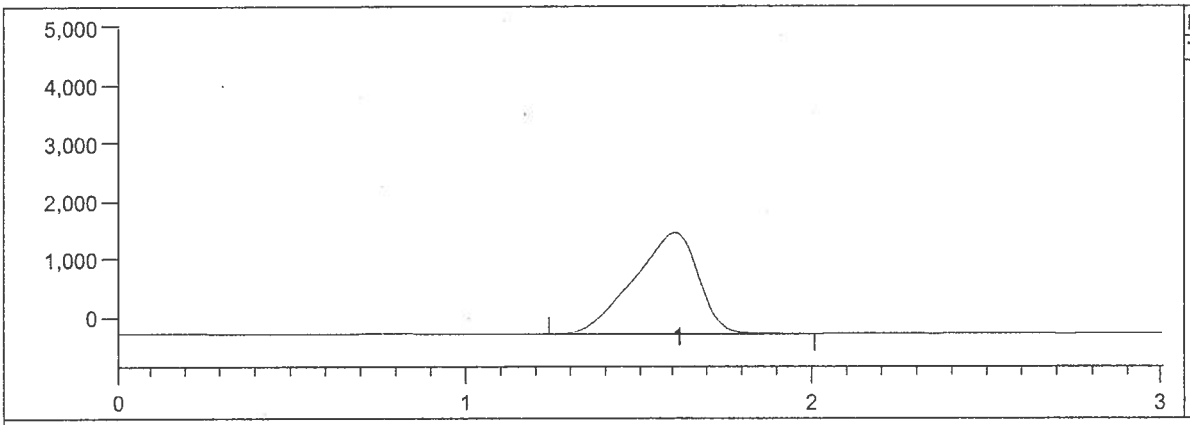


Date: 6/15/07
Time: 4:58 PM

Peak	rt	Area
1	1.63	162,762

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
89	Run	Run		1	162,762	0.00		0.00	<999999999	accept

Notes

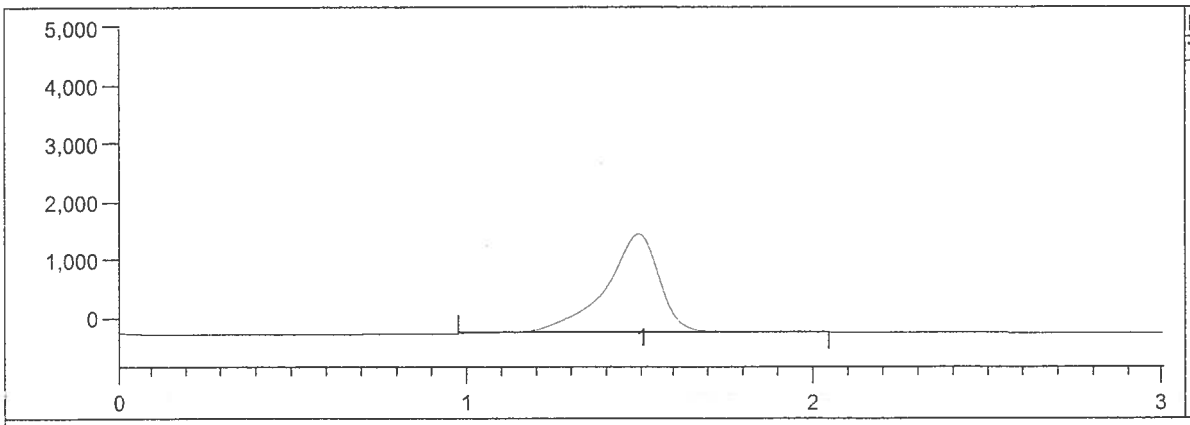


Date: 6/15/07
Time: 5:03 PM

Peak	rt	Area
1	1.60	228,655

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
90	Run	Run		1	228,655	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 5:07 PM

Peak	rt	Area
1	1.49	192,689

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
91	Run	Run		1	192,689	0.00		0.00	<999999999	accept

Notes

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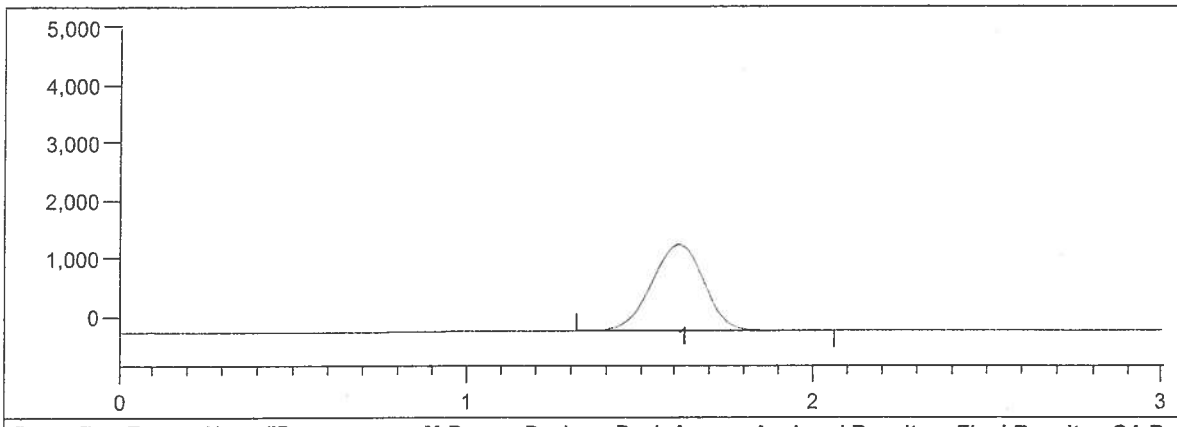
Peak Report

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

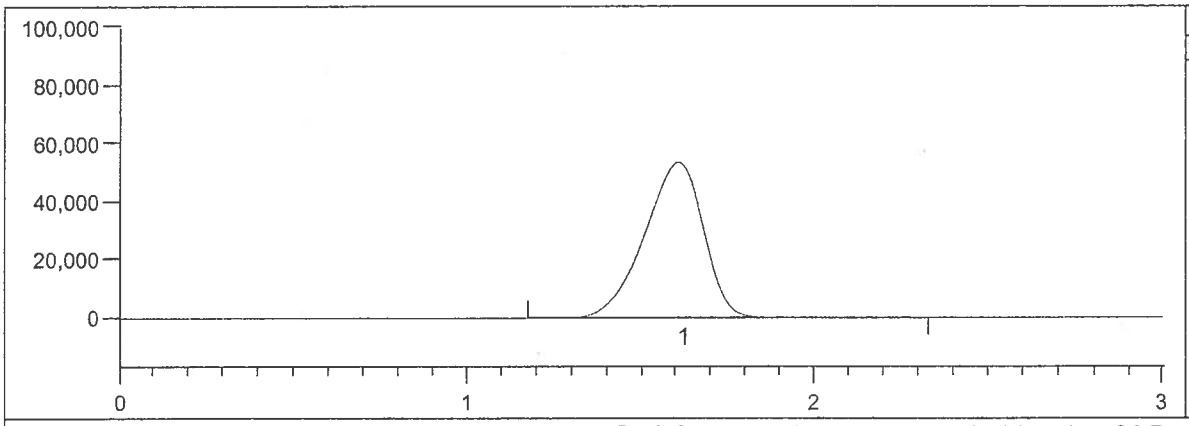


Date: 6/15/07
Time: 5:11 PM

Peak	rt	Area
1	1.60	158,499

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
92	Run	Run		1	158,499	0.00		0.00	<999999999	accept

Notes

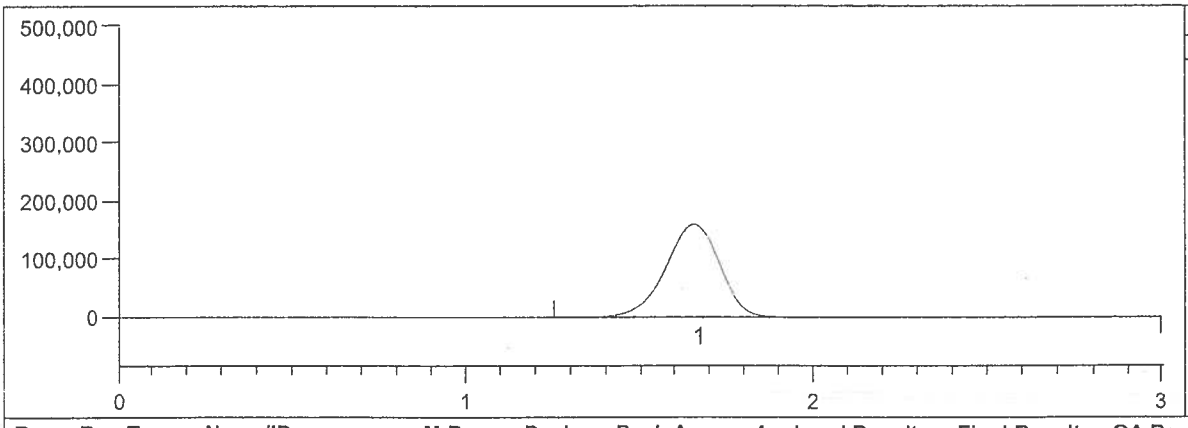


Date: 6/15/07
Time: 5:16 PM

Peak	rt	Area
1	1.60	6,377,226

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
93	Run	Run		1	6,377,226	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 5:20 PM

Peak	rt	Area
1	1.65	17,631,618

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
94	Run	Run		1	17,631,618	0.00		0.00	<999999999	accept

Notes

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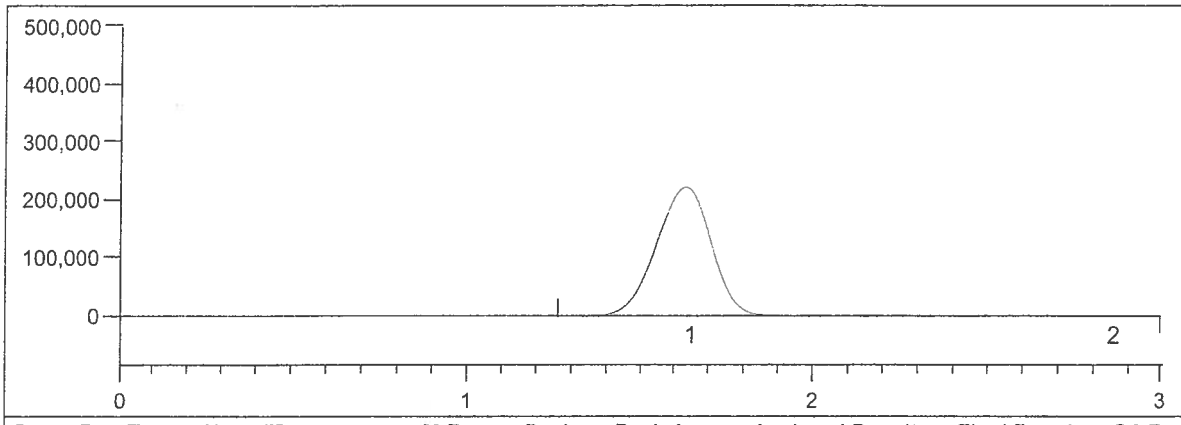
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

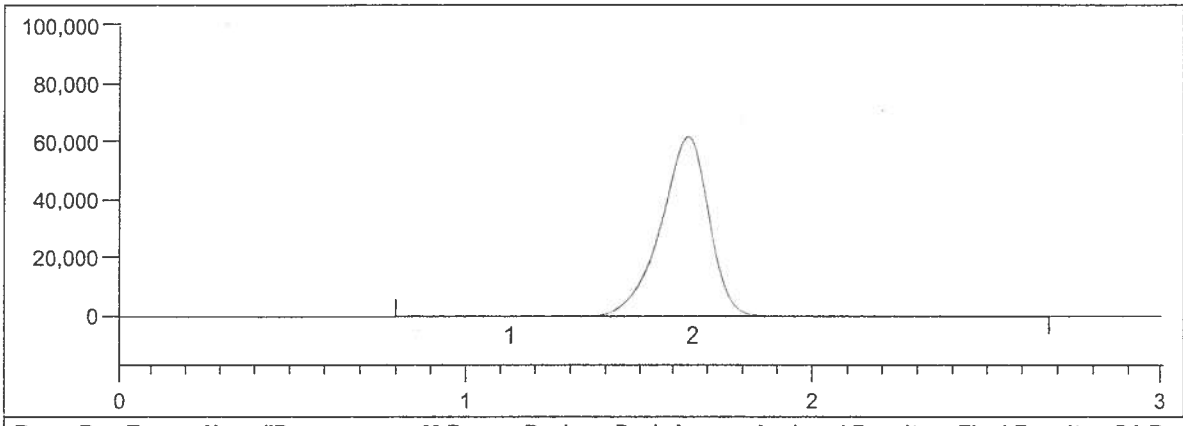


Date: 6/15/07
Time: 5:25 PM

Peak	rt	Area
1	1.62	24,620,372
2	2.84	5,469

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
95	Run	Run		1	24,620,372	0.00		0.00	<999999999	accept

Notes

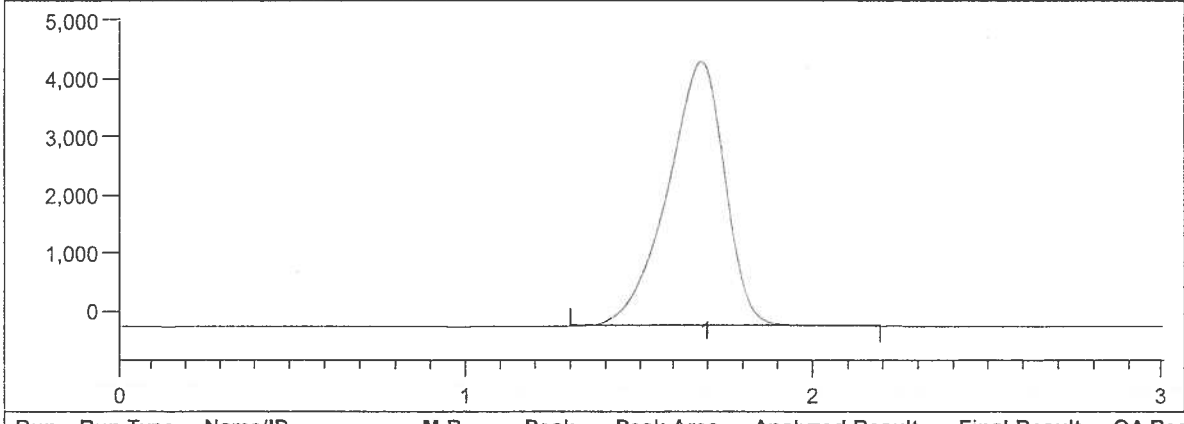


Date: 6/15/07
Time: 5:28 PM

Peak	rt	Area
1	1.11	11,364
2	1.63	6,167,208

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
96	Run	Run		2	6,167,208	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 5:33 PM

Peak	rt	Area
1	1.67	536,464

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
97	Run	Run		1	536,464	0.00		0.00	<999999999	accept

Notes

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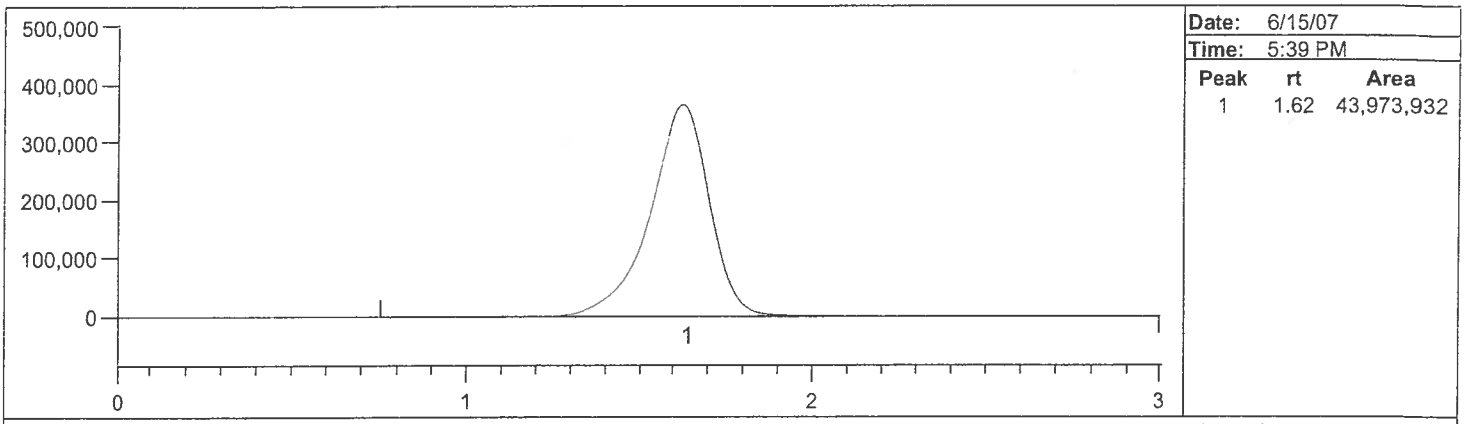
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/08~~ 6/15/07 vhm
Analyst Name: am

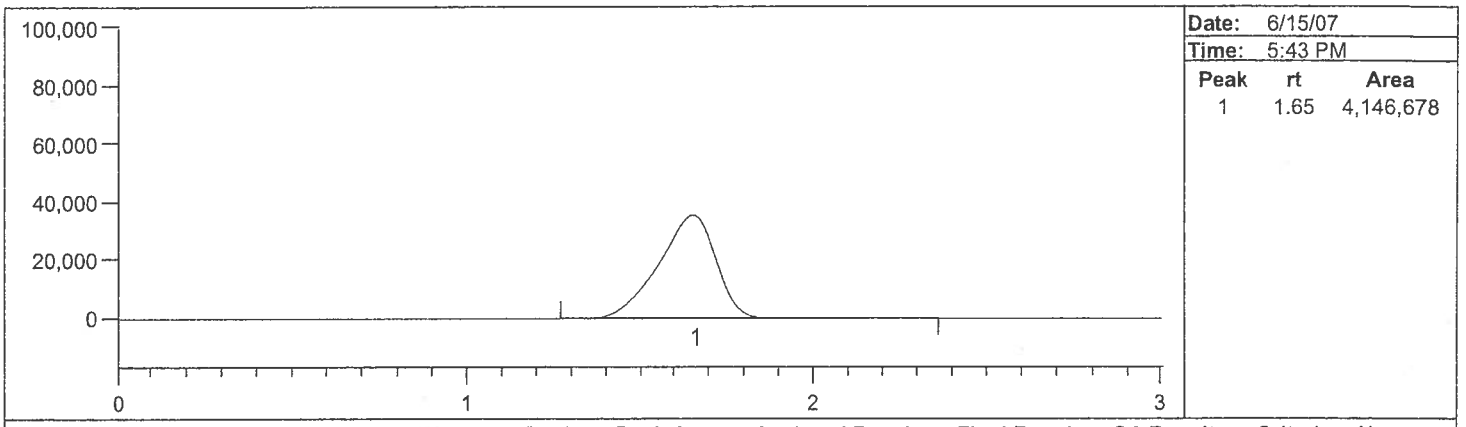


Date: 6/15/07
Time: 5:39 PM

Peak	rt	Area
1	1.62	43,973,932

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
98	Run	Run		1	43,973,932	0.00		0.00	<999999999	accept

Notes

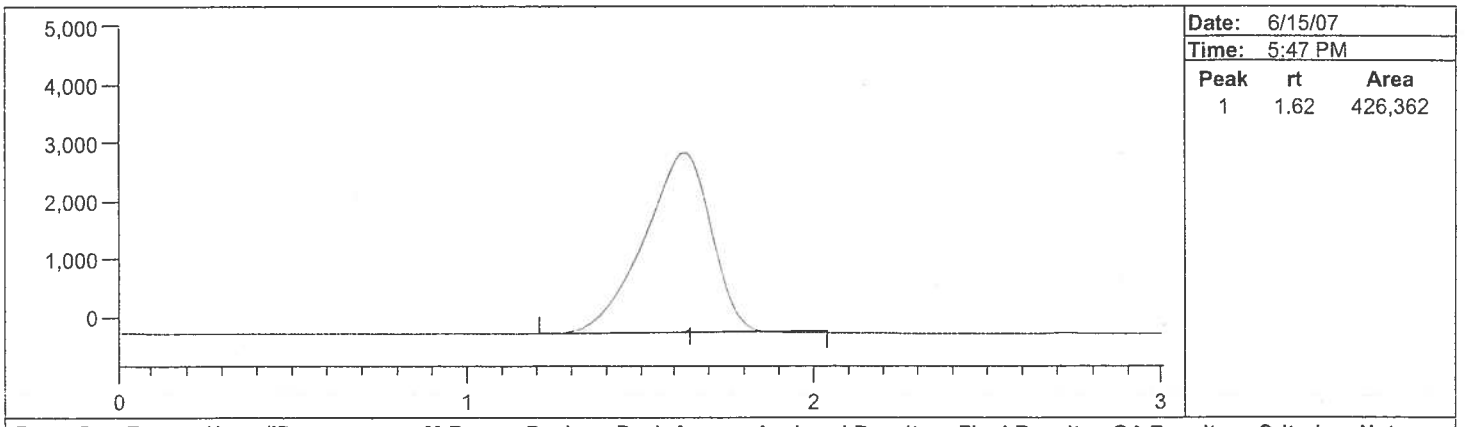


Date: 6/15/07
Time: 5:43 PM

Peak	rt	Area
1	1.65	4,146,678

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
99	Run	Run		1	4,146,678	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 5:47 PM

Peak	rt	Area
1	1.62	426,362

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
100	Run	Run		1	426,362	0.00		0.00	<999999999	accept

Notes

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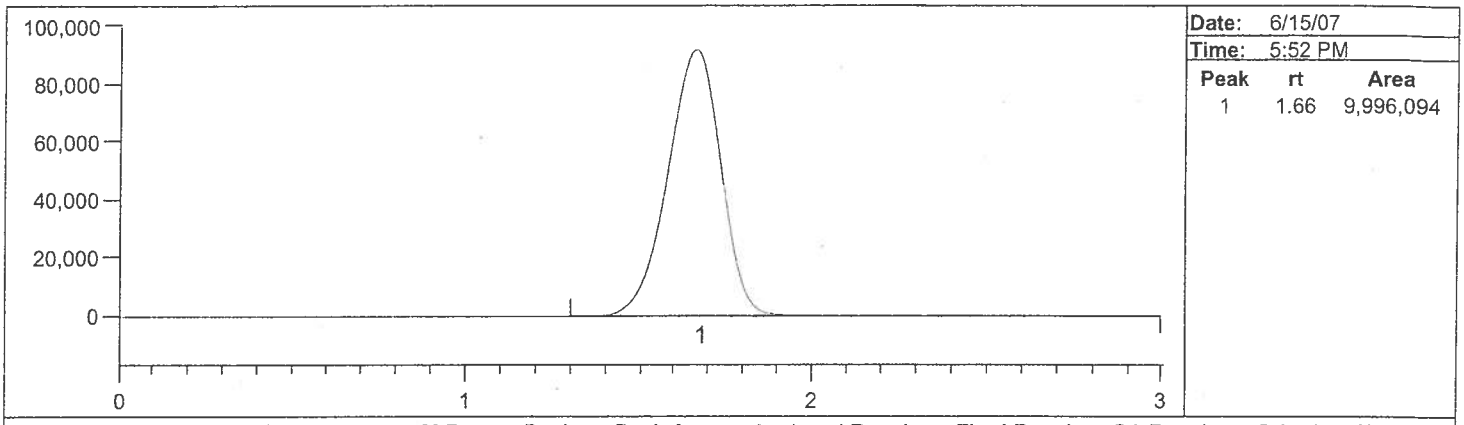
Peak Report

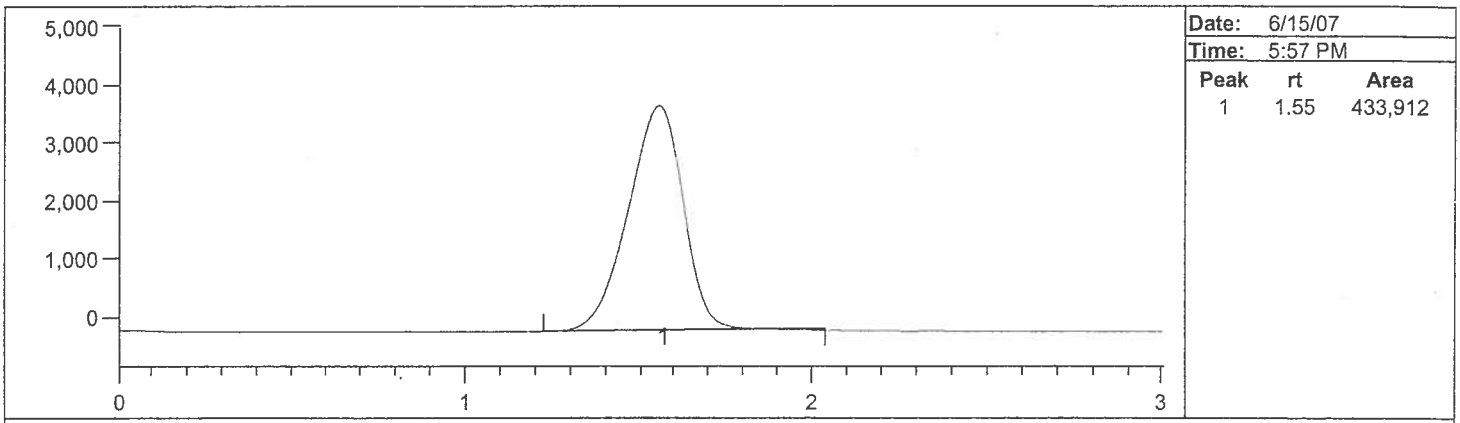
Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

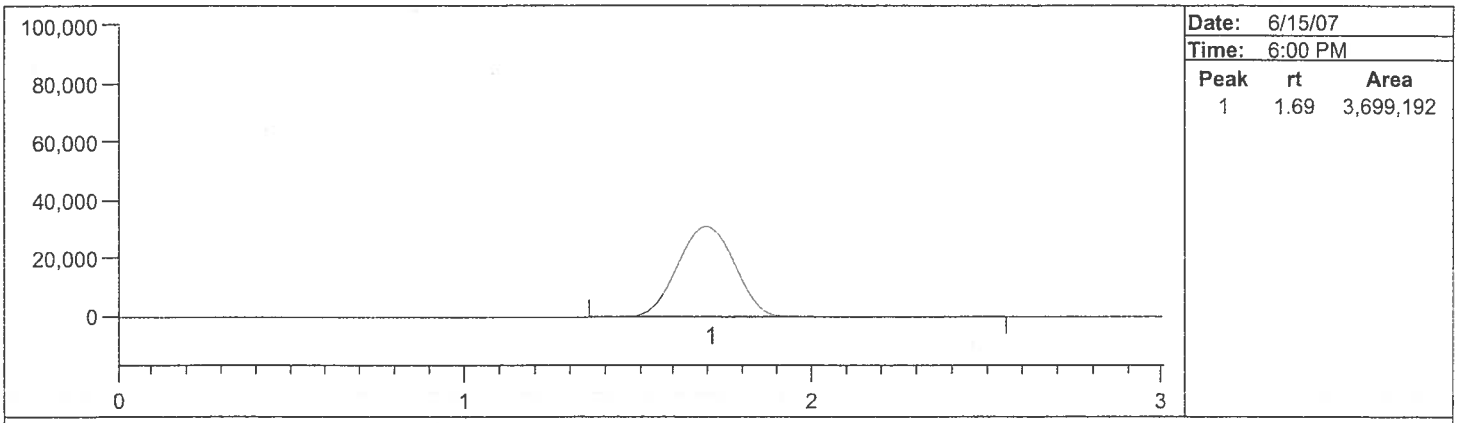
Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am



Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
101	Run	Run		1	9,996,094	0.00		0.00	<999999999	accept
Notes										



Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
102	Run	Run		1	433,912	0.00		0.00	<999999999	accept
Notes										



Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
103	Run	Run		1	3,699,192	0.00		0.00	<999999999	accept
Notes										

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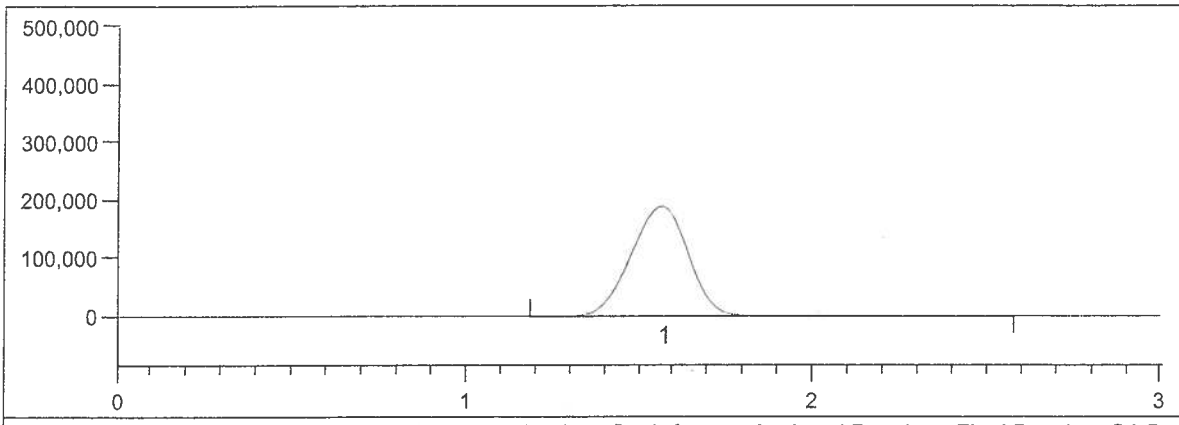
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

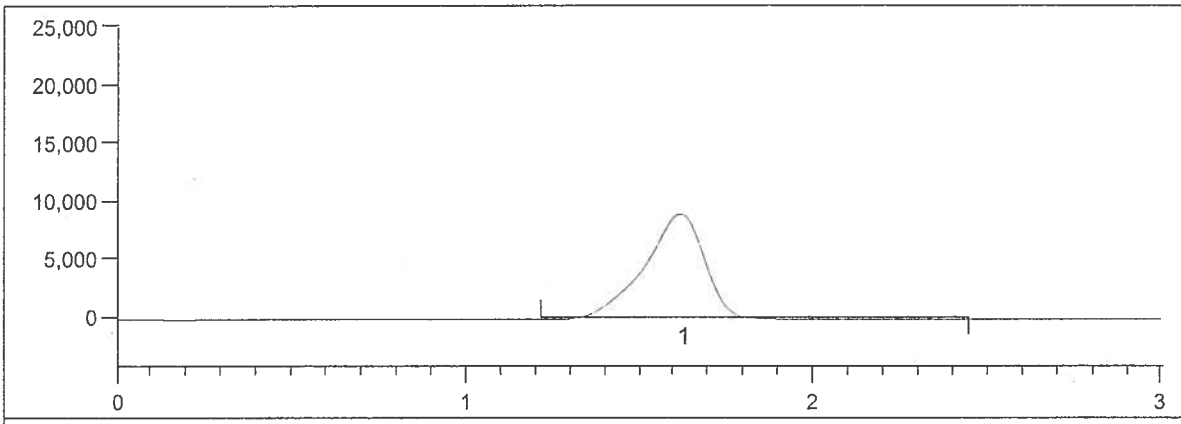


Date: 6/15/07
Time: 6:05 PM

Peak	rt	Area
1	1.56	22,003,348

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
104	Run	Run		1	22,003,348	0.00		0.00	<999999999	accept

Notes

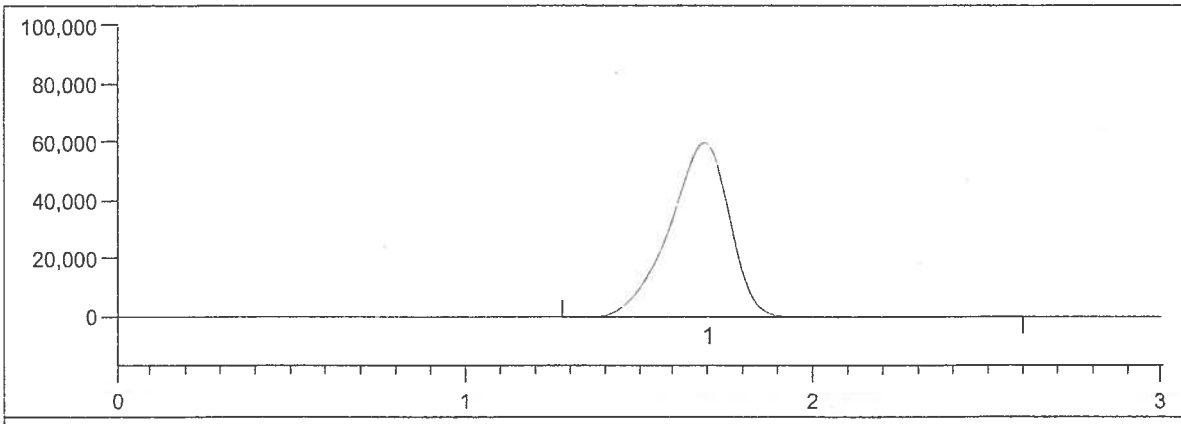


Date: 6/15/07
Time: 6:09 PM

Peak	rt	Area
1	1.62	1,117,051

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
105	Run	Run		1	1,117,051	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 6:13 PM

Peak	rt	Area
1	1.68	7,297,056

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
106	Run	Run		1	7,297,056	0.00		0.00	<999999999	accept

Notes

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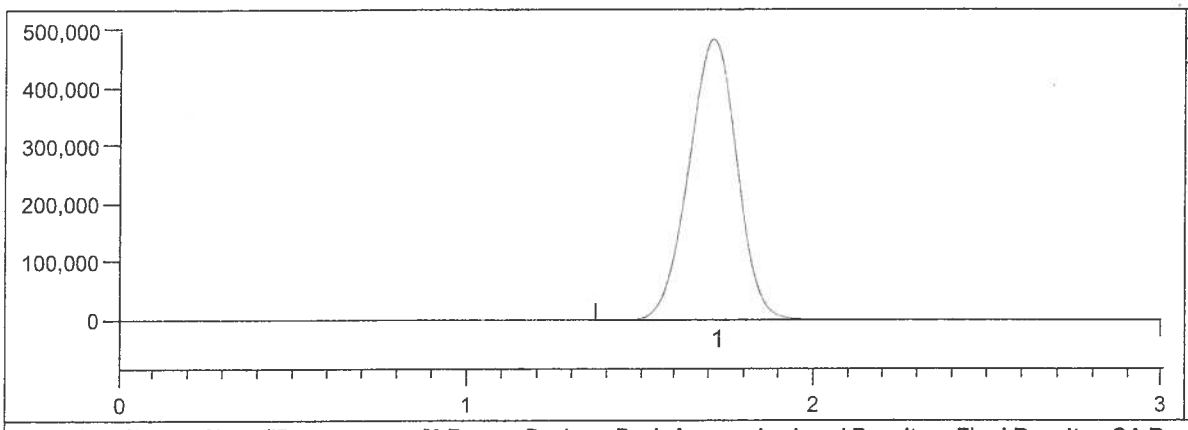
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

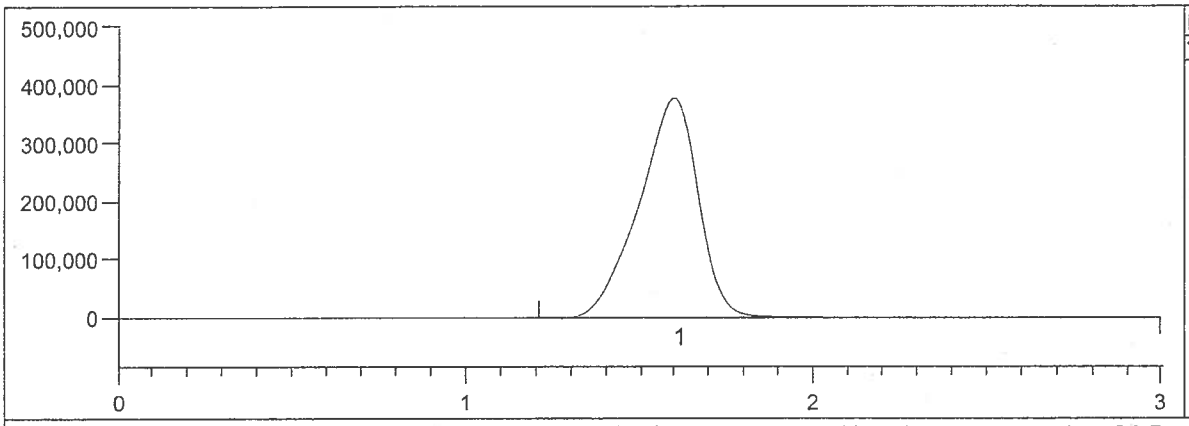


Date: 6/15/07
Time: 6:17 PM

Peak	rt	Area
1	1.70	47,287,269

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
107	Run	Run		1	47,287,269	0.00		0.00	<999999999	accept

Notes

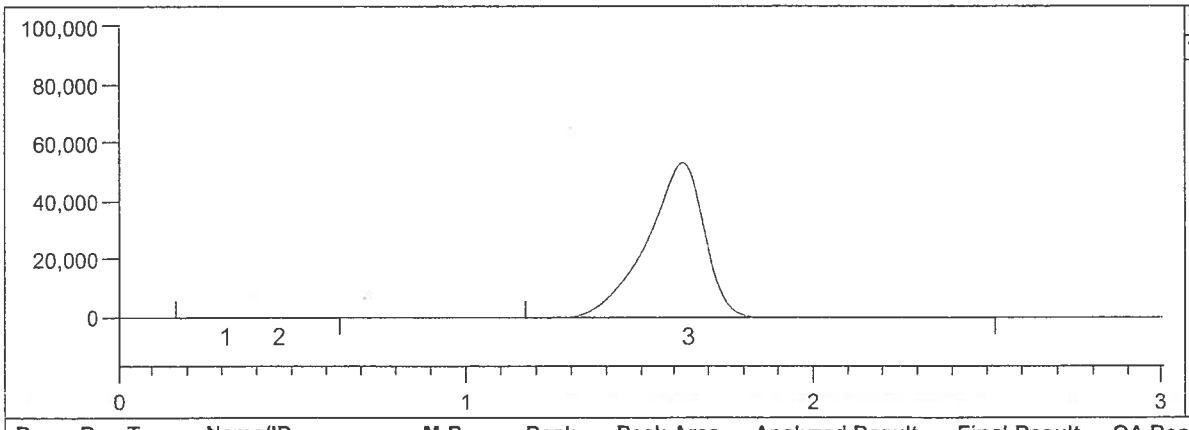


Date: 6/15/07
Time: 6:21 PM

Peak	rt	Area
1	1.59	45,392,345

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
108	Run	Run		1	45,392,345	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 6:25 PM

Peak	rt	Area
1	0.29	1,068
2	0.44	706
3	1.62	6,244,826

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
109	Run	Run		3	6,244,826	0.00		0.00	<999999999	accept

Notes

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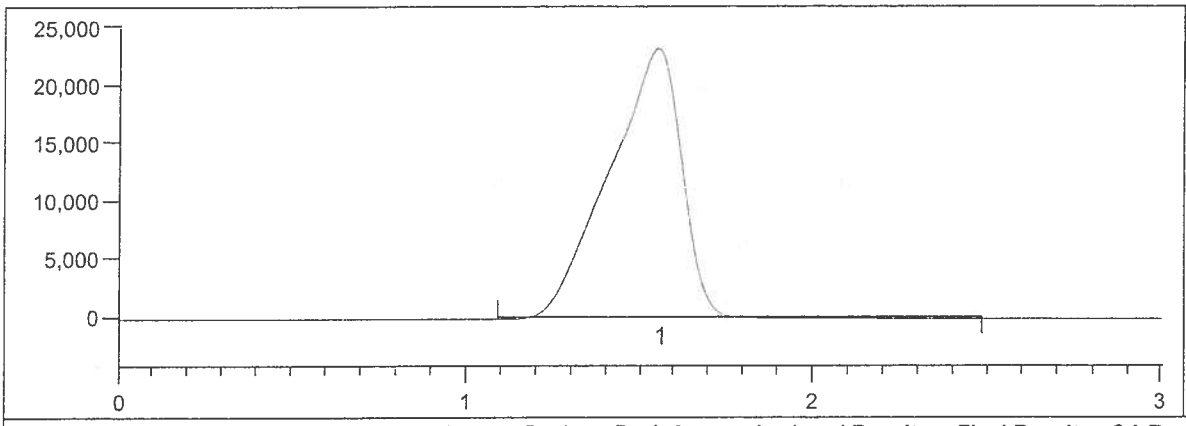
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 nm
Analyst Name: am

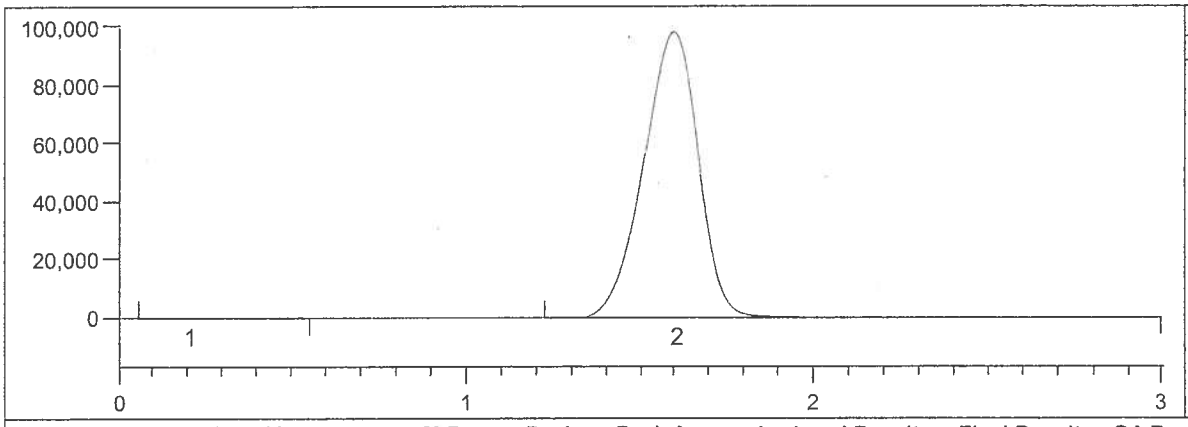


Date: 6/15/07
Time: 6:29 PM

Peak	rt	Area
1	1.54	3,406,173

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
110	Run	Run		1	3,406,173	0.00		0.00	<999999999	accept

Notes

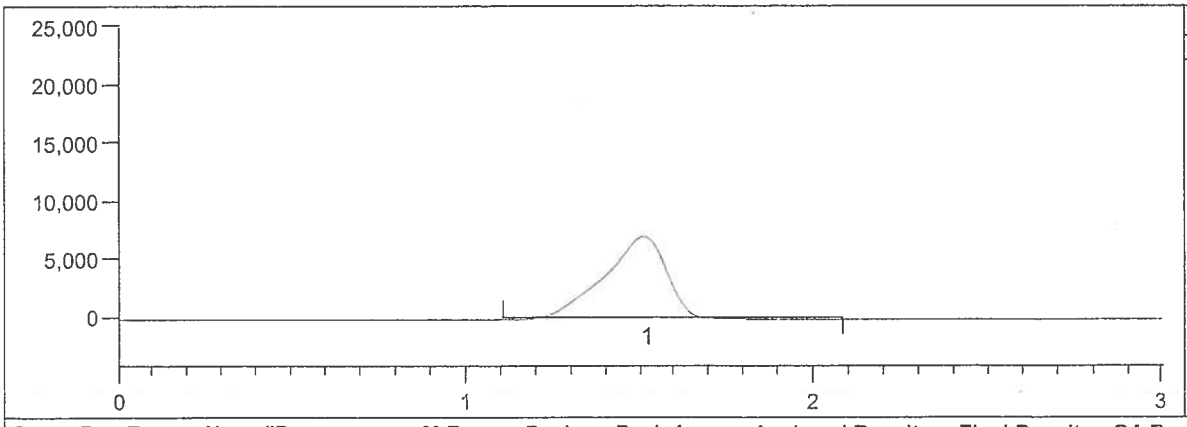


Date: 6/15/07
Time: 6:34 PM

Peak	rt	Area
1	0.19	5,112
2	1.59	10,993,295

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
111	Run	Run		2	10,993,295	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 6:39 PM

Peak	rt	Area
1	1.50	916,283

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
112	Run	Run		1	916,283	0.00		0.00	<999999999	accept

Notes

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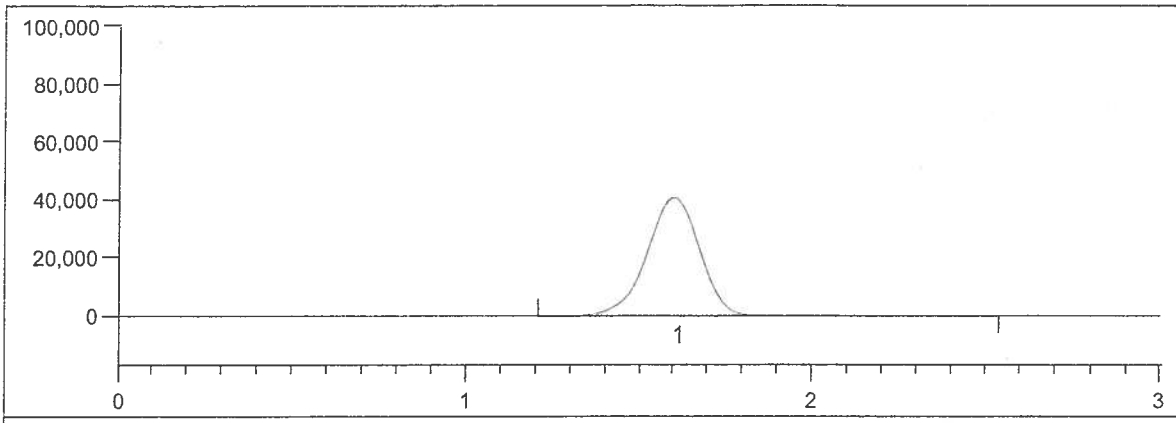
Peak Report

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

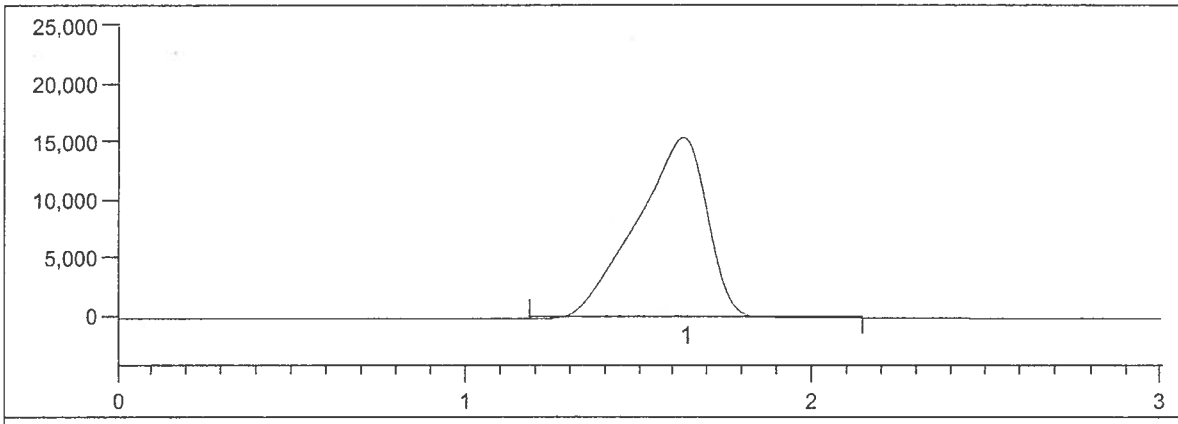


Date: 6/15/07
Time: 6:44 PM

Peak	rt	Area
1	1.59	4,471,942

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
113	Run	Run		1	4,471,942	0.00		0.00	<999999999	accept

Notes

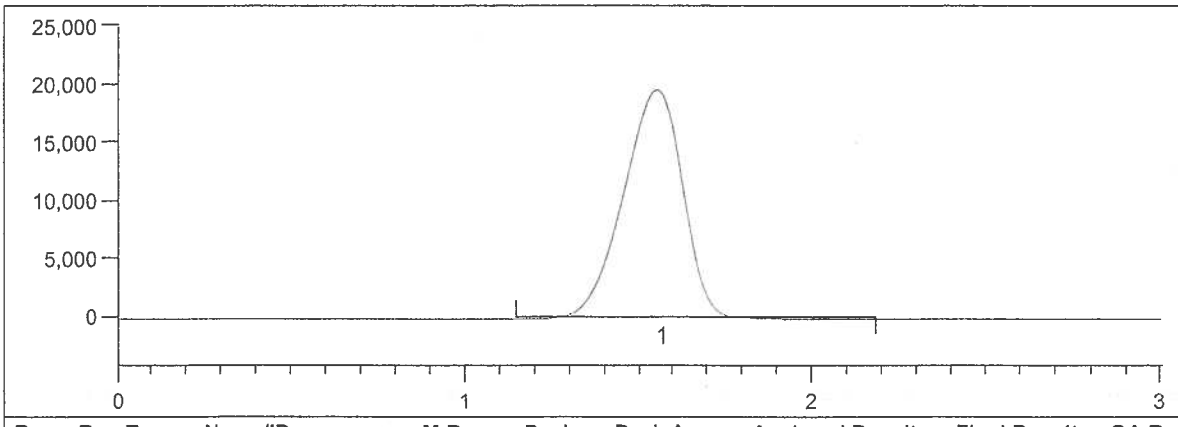


Date: 6/15/07
Time: 6:48 PM

Peak	rt	Area
1	1.62	2,241,006

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
114	Run	Run		1	2,241,006	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 6:54 PM

Peak	rt	Area
1	1.55	2,396,840

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
115	Run	Run		1	2,396,840	0.00		0.00	<999999999	accept

Notes

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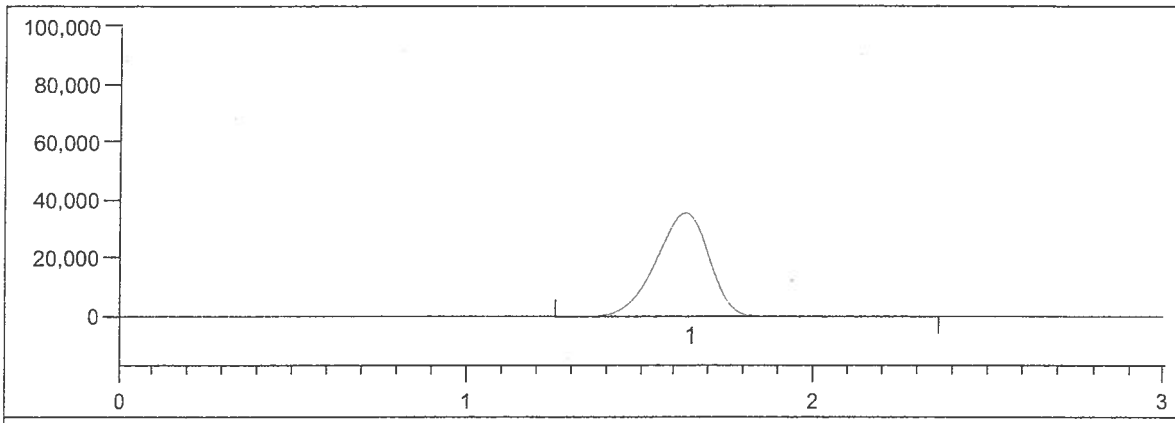
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

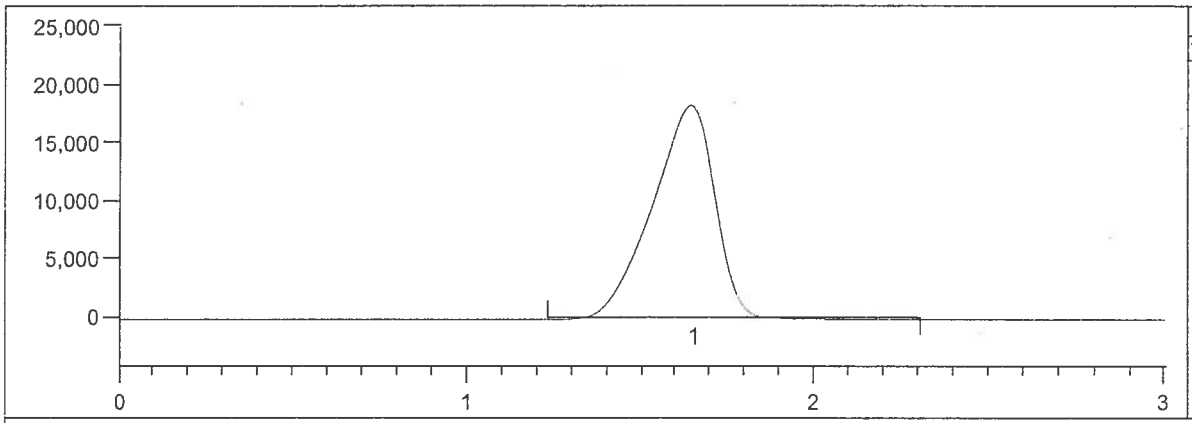


Date: 6/15/07
Time: 6:59 PM

Peak	rt	Area
1	1.62	3,898,723

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
116	Run	Run		1	3,898,723	0.00		0.00	<999999999	accept

Notes

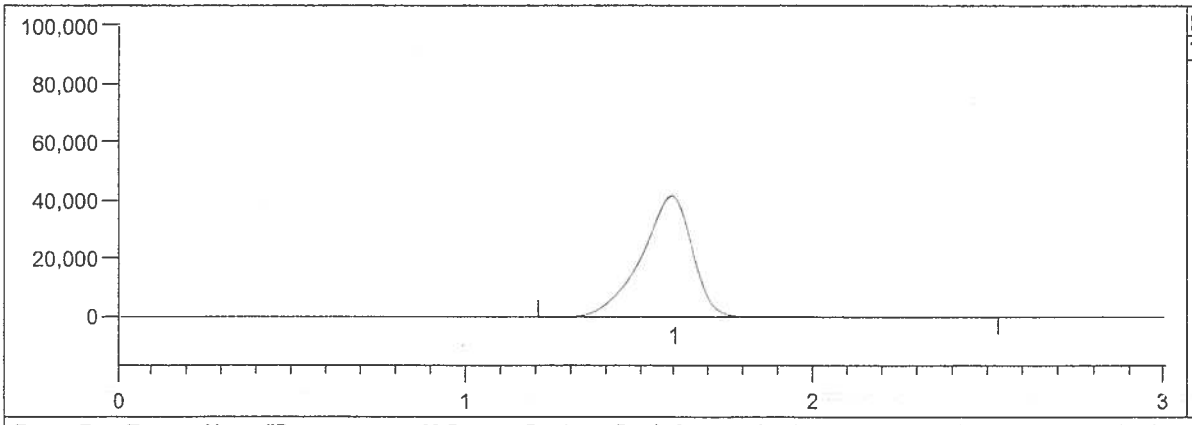


Date: 6/15/07
Time: 7:04 PM

Peak	rt	Area
1	1.64	2,340,610

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
117	Run	Run		1	2,340,610	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 7:07 PM

Peak	rt	Area
1	1.58	4,371,851

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
118	Run	Run		1	4,371,851	0.00		0.00	<999999999	accept

Notes

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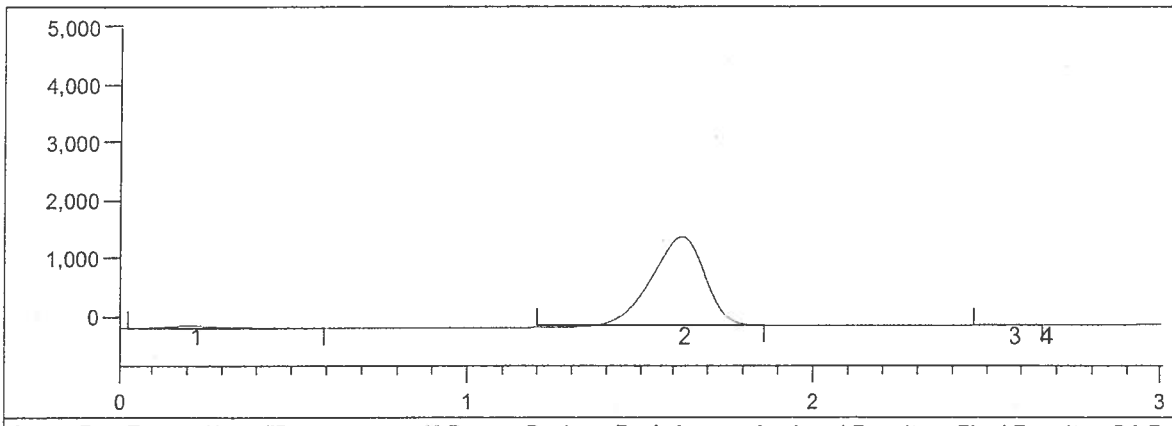
Peak Report

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

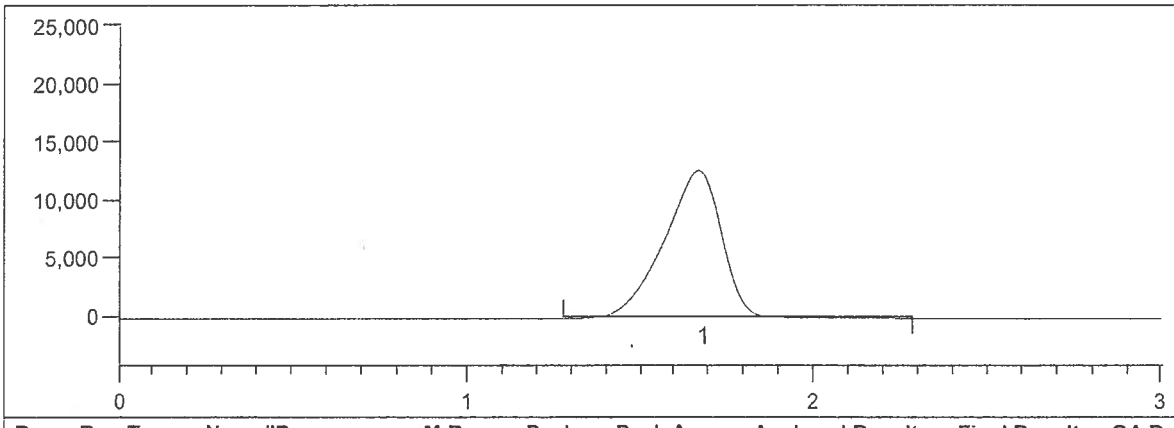


Date: 6/15/07
Time: 7:15 PM

Peak	rt	Area
1	0.20	4,097
2	1.62	169,659
3	2.56	365
4	2.66	13

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
119	Run	Run		2	169,659	0.00		0.00	<999999999	accept

Notes

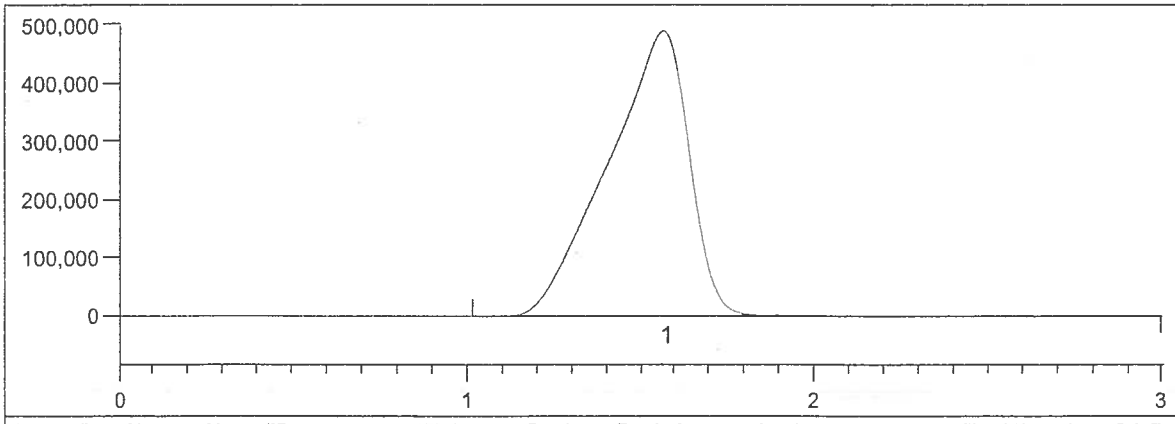


Date: 6/15/07
Time: 7:20 PM

Peak	rt	Area
1	1.66	1,491,380

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
120	Run	Run		1	1,491,380	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 7:25 PM

Peak	rt	Area
1	1.56	80,412,815

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
121	Run	Run		1	80,412,815	0.00		0.00	<999999999	accept

Notes

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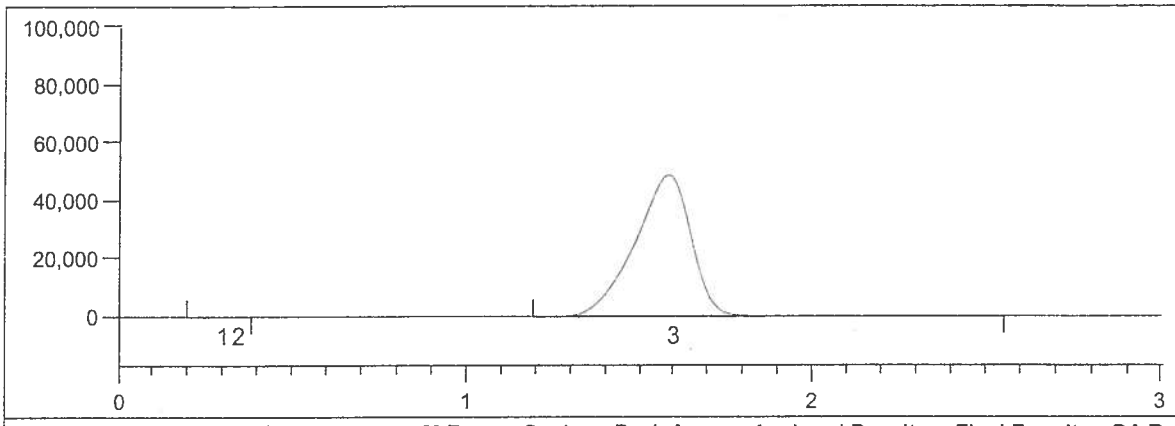
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

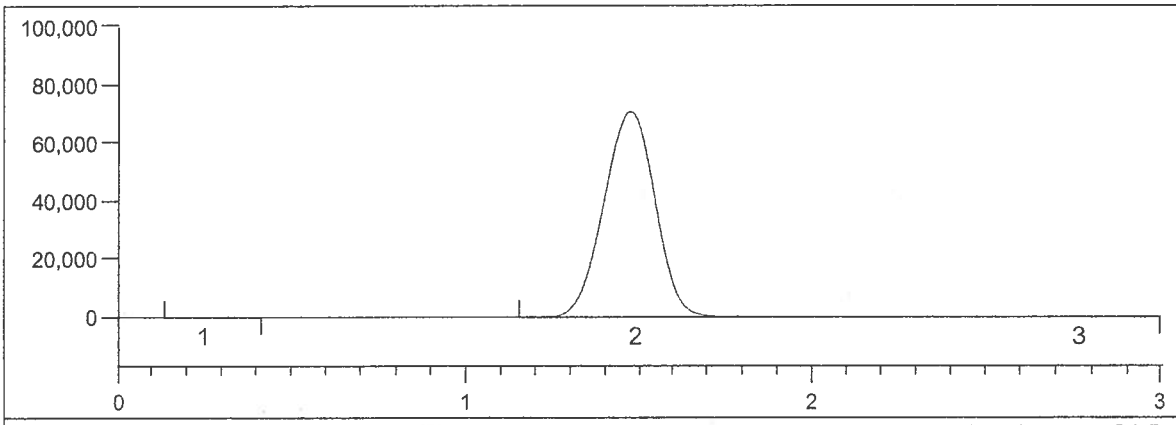
Date Analyzed: ~~7/14/06~~ 6/15/07 nm
Analyst Name: am



Date: 6/15/07
Time: 7:29 PM

Peak	rt	Area
1	0.28	229
2	0.33	97
3	1.58	5,598,423

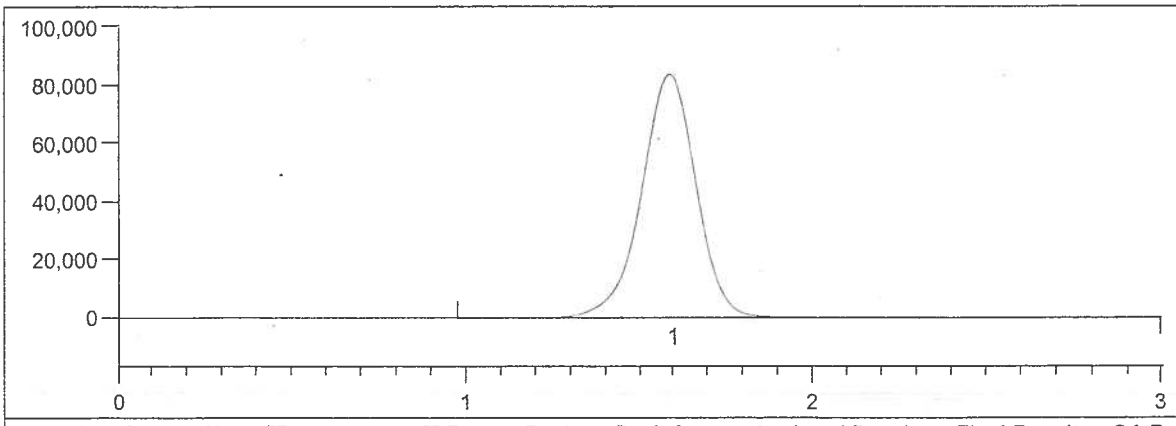
Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
122	Run	Run		3	5,598,423	0.00		0.00	<999999999	accept
Notes										



Date: 6/15/07
Time: 7:35 PM

Peak	rt	Area
1	0.23	1,354
2	1.47	7,454,122
3	2.75	4,284

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
123	Run	Run		2	7,454,122	0.00		0.00	<999999999	accept
Notes										



Date: 6/15/07
Time: 7:40 PM

Peak	rt	Area
1	1.58	9,387,607

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
124	Run	Run		1	9,387,607	0.00		0.00	<999999999	accept
Notes										

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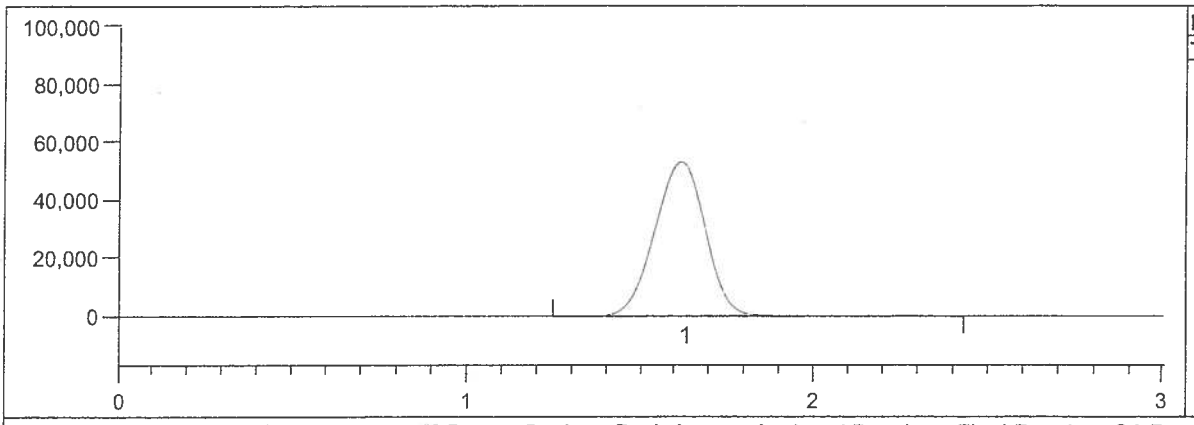
Peak Report

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

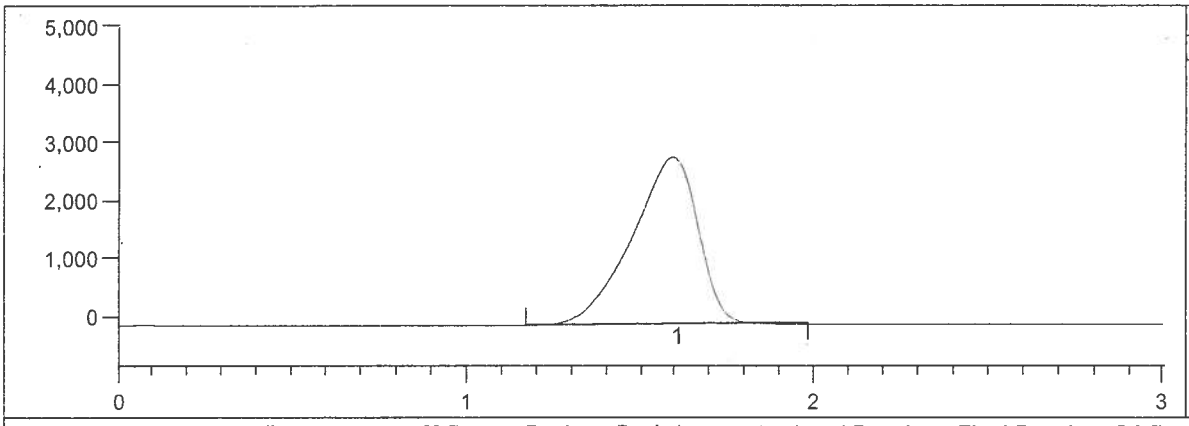
Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am



Date: 6/15/07
Time: 7:45 PM

Peak	rt	Area
1	1.61	5,506,955

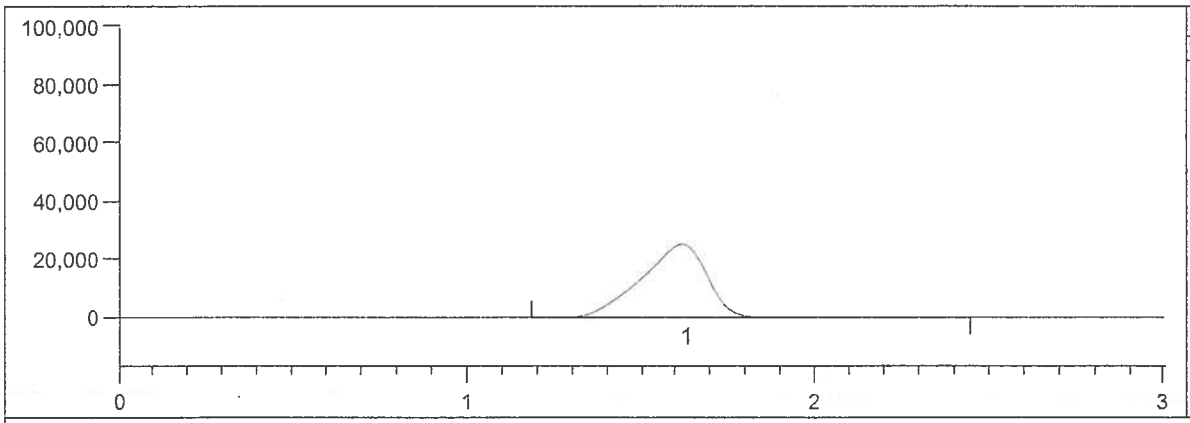
Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
125	Run	Run		1	5,506,955	0.00		0.00	<999999999	accept
Notes										



Date: 6/15/07
Time: 7:53 PM

Peak	rt	Area
1	1.59	386,455

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
126	Run	Run		1	386,455	0.00		0.00	<999999999	accept
Notes										



Date: 6/15/07
Time: 8:00 PM

Peak	rt	Area
1	1.61	3,434,245

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
127	Run	Run		1	3,434,245	0.00		0.00	<999999999	accept
Notes										

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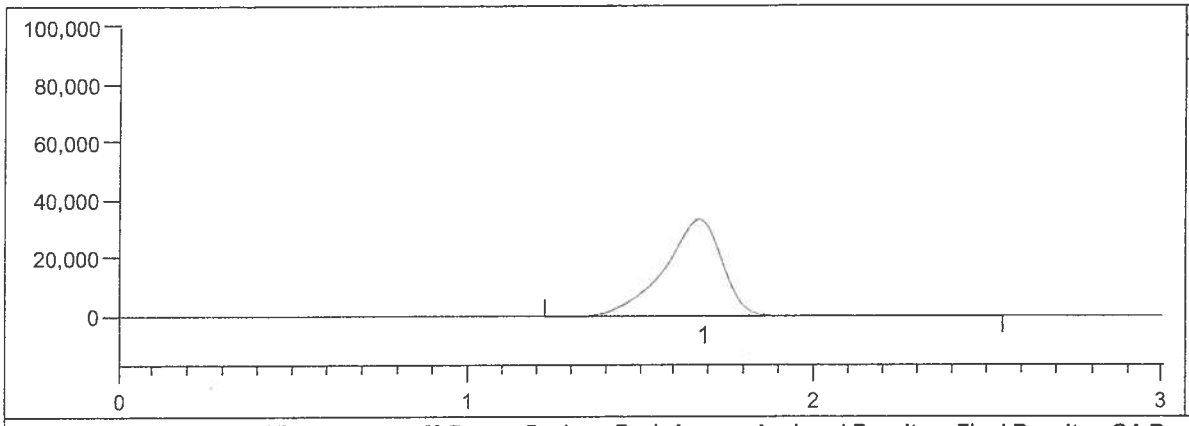
Peak Report

Brooks Rand Report #07BR0799

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am

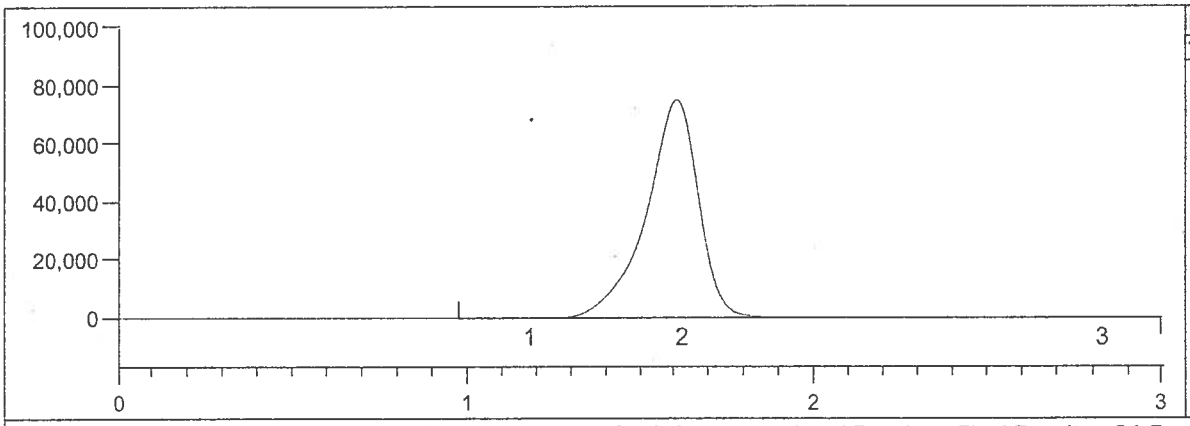


Date: 6/15/07
Time: 8:04 PM

Peak	rt	Area
1	1.66	3,968,771

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
128	Run	Run		1	3,968,771	0.00		0.00	<999999999	accept

Notes

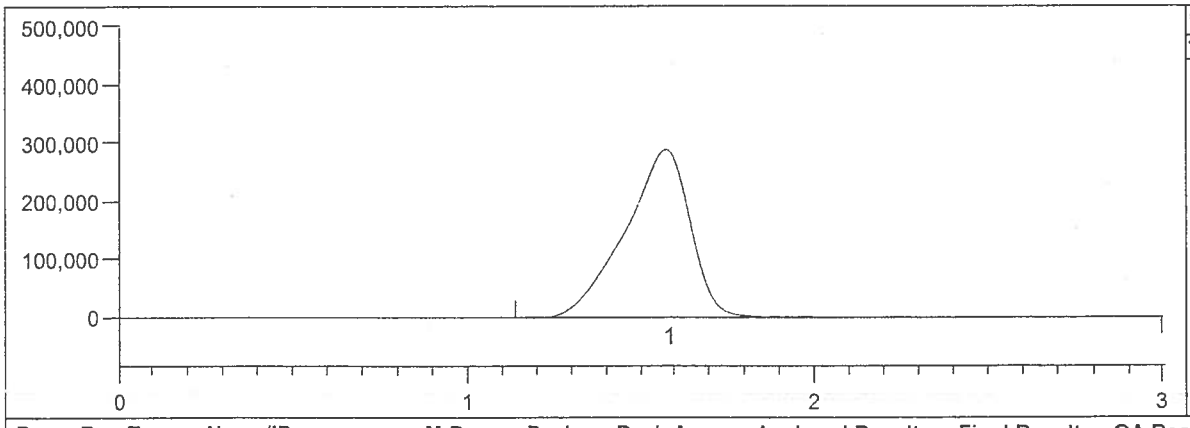


Date: 6/15/07
Time: 8:09 PM

Peak	rt	Area
1	1.16	332
2	1.60	7,950,146
3	2.81	5,626

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
129	Run	Run		2	7,950,146	0.00		0.00	<999999999	accept

Notes



Date: 6/15/07
Time: 8:13 PM

Peak	rt	Area
1	1.57	38,220,172

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
130	Run	Run		1	38,220,172	0.00		0.00	<999999999	accept

Notes

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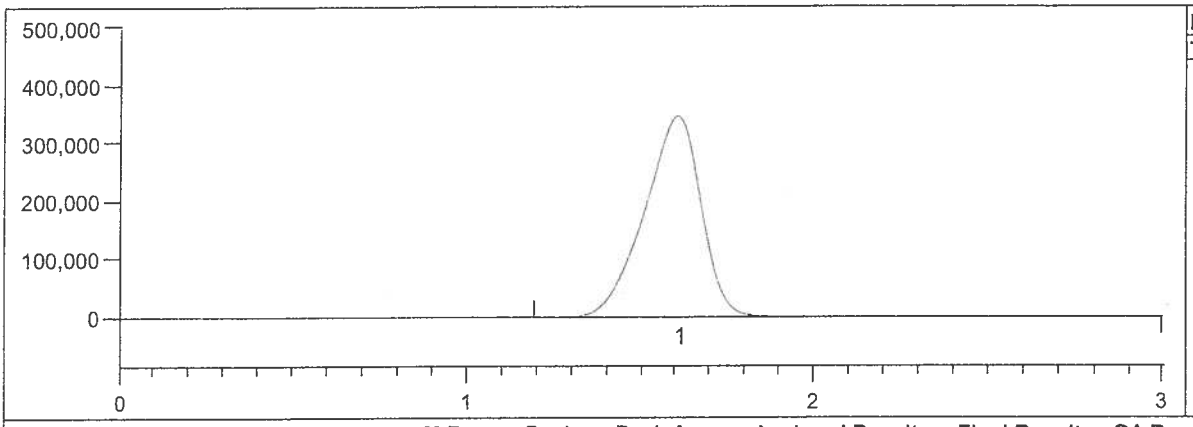
Peak Report

Batch Number: 07-0633
Method Number: THg

Project Number(s):
Instrument ID: br-10

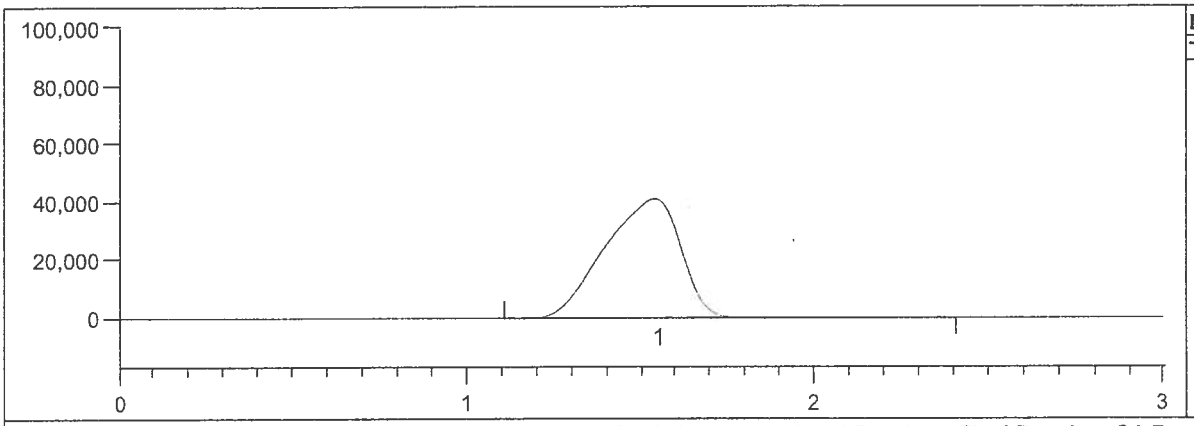
Date Analyzed: ~~7/14/06~~ 6/15/07 mm
Analyst Name: am



Date:	6/15/07
Time:	8:17 PM

Peak	rt	Area
1	1.60	39,693,542

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
131	Run	Run		1	39,693,542	0.00		0.00	<999999999	accept
Notes										



Date:	6/15/07
Time:	8:21 PM

Peak	rt	Area
1	1.54	6,298,406

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
132	Run	Run		1	6,298,406	0.00		0.00	<999999999	accept
Notes										

Mercury Guru ver 3.2 © 2006 Brooks Rand LLC

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

3958 6th Avenue NW | Phone: 206-632-6206
Seattle, WA 98107 | Fax: 206-632-6017
www.brooksrand.com | Email: brl@brooksrand.com

Sample Receiving Log

Tracking # **07BR0799**

Customer: Kleinfelder
Contact: Dave King
Project Ref. #: KLE001

BRL Project Manager: Elizabeth Madonick

QA Level: Full

Sample Condition: Intact
Shipping container intact?: Yes

Shipping container type: Cooler
Shipping container temp: -20.0 C
Shipping container coolant: Dry ice

Sample Turnaround Time:
Contract Turnaround Time: 14 days

Due Date: 6/20/2007
Receiving Date: 6/6/2007
Receiving Time: 10:00 AM

Logged-in by: Katie Jahanmir
Log-in Date: 6/6/2007
Log-in Time: 3:03 PM

Airbill present?: Yes
Airbill #: 1Z897E500195063817
Courier: UPS

Custody seal present?: No
Custody seal intact?: No
COC Present?: Yes
COC/Sample tag agree?: Yes

COC Number: N/A

Comments:

Lab ID:

01

Sample Tag #: Northwest Lake Fish #1
Collection Date/Time: 6/5/2007,
ContainerType and Lot #: Plastic Bag,
Size:

Matrix/Sub-Matrix: Biota, Fish
Preservation: none
Acid Lot#: n/a
pH:
Filtered?: No
Sample Storage Location: Freezer #3

Comments:

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

02

Sample Tag #: Northwest Lake Fish #2
Collection Date/Time: 6/5/2007,
ContainerType and Lot #: Plastic Bag,
Size:

Matrix/Sub-Matrix: Biota, Fish
Preservation: none
Acid Lot#: n/a
pH:
Filtered?: No
Sample Storage Location: Freezer #3

Comments:

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

03

Sample Tag #:	Northwest Lake Fish #3	Matrix/Sub-Matrix:	Biota, Fish
Collection Date/Time:	6/5/2007,	Preservation:	none
ContainerType and Lot #:	Plastic Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #3

Comments:

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

Sample Custodian signature 6/6/07 Date

Nicole E. Mead 6/6/07
Reviewed By signature Date

SQUIER ASSOCIATES
4260 Galewood
Post Office Box 1317
Lake Oswego, Oregon
97035
(503) 635-4419
Fax 635-1430

Chain of Custody

LABORATORY NUMBER: _____
LABORATORY NAME: _____

Project Manager: DAVID EARL KING
Project Name: COND IT
Project Number: 53806 / 4
Site Location: Northwestern Lake
Sampled By: FRANK SHIRER

TURN AROUND TIME

☐ 24 hr. ☐ 48 hr. ☐ 5 day ☐ 10 day

LAB ID	SAMPLE ID	DATE	TIME	MATRIX	NUMBER OF CONTAINERS
	NORTHWST LAKE FISH #1	05/Jun/07		FISH	1
	NORTHWST LAKE FISH #2	05/Jun/07		FISH	1
	NORTHWST LAKE FISH #3	05/Jun/07		FISH	1
	Total Number of Containers:				3

ANALYSIS REQUEST

PETROLEUM HYDROCARBONS										ORGANICS							INORG.			TCLP			OTHER					
TPH-HCID State: OR/WA	TPH-G State: OR/WA	TPH-D State: OR/WA	418.1M State: OR/WA	EPA 418.1	8270 SIM	8020M-BETX only	8310 HPLC PAHs	7421 Lead	TCLP Cr, Cd, Pb	8010 Halogenated VOCs	8020 Aromatic VOCs	8040 Phenols	8240 GCMS Volatiles	8270 GCMS Semivolatiles	8080 OC Pesticides/PCBs	8080M PCBs only	Drinking Water (8)	Priority Pol. Metals (13)	ICP Metal Scan (22)	TCLP Metals (8)	TCLP Vol. 8240 ZH-EXT	TCLP Semivolatiles 8270	EPA 1631 Amp Hg					
																							X					
																							X					
																							X					

Special Instructions:

QUOTE NO.
KLE001

RELINQUISHED BY: 1.
Signature: _____ Time: _____
Company: KLEINFELDER Date: _____

RECEIVED BY: 1.
Signature: _____ Time: 1000
Company: BRL Date: 6/6/07
Container:
Sealed: ☐ N ☐ Iced: ☐ Y ☐ N

RELINQUISHED BY: 2.
Signature: _____ Time: _____
Company: _____ Date: _____

RECEIVED BY: 2.
Signature: _____ Time: _____
Company: _____ Date: _____
Container:
Sealed: ☐ Y ☐ N Iced: ☐ Y ☐ N

RELINQUISHED BY: 3.
Signature: _____ Time: _____
Company: _____ Date: _____

RECEIVED BY: 3.
Signature: _____ Time: _____
Company: _____ Date: _____
Container:
Sealed: ☐ Y ☐ N Iced: ☐ Y ☐ N

DISTRIBUTION: White, Canary = Analytical Laboratory; Pink = Squier Files

Brooks Rand Report #07BR0799

UPS Internet Shipping: View/Print Label

1. **Print the label(s):** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the dotted line.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers without a Daily Pickup
   - Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   - Hand the package to any UPS driver in your area.
   - Take your package to a location of The UPS Store®, UPS Drop Box, UPS Customer Center or Authorized Shipping Outlet near you. Items sent via UPS Return Services (including Ground Returns) are accepted at any UPS Drop Box.
   - To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.

   Customers with a Daily Pickup
   - Your driver will pickup your shipment(s) as usual.

FOLD HERE

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TRACE METALS ANALYSIS & PRODUCTS

Total Mercury Analysis of Biota Samples
(Lumbriculus Variegatus and Corbicula Fluminea)

Project Name: Pacific Corp/Dam Investigation

Purchase Order: 53886/5

For Samples Received: September 11, 2007

Report Date:

September 26, 2007

Prepared for:

Mr. David Earl King
Kleinfelder
15050 SW Koll Parkway
Suite L
Beaverton, OR 97006

Brooks Rand
Project #: KLE001
Report #: 07BR1309

3958 6th Avenue NW
Seattle, WA 98107
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Phone: 206-632-6206
Fax: 206-632-6017
Email: brl@brooksrand.com

Brooks Rand Labs Case Narrative

Total Mercury analysis of Lumbriculus Variegatus and Corbicula Fluminea
Kleinfelder
Pacific Corp/Dam Investigation

Purchase Order No.: 53886/5
BRL Tracking No.: 07BR1309

Client Project ID: P762
BRL Project Reference: KLE001

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Brooks Rand Labs Case Narrative

Total Mercury analysis of Lumbriculus Variegatus and Corbicula Fluminea
Kleinfelder
Pacific Corp/Dam Investigation

Purchase Order No.: 53886/5
BRL Tracking No.: 07BR1309

Client Project ID: P762
BRL Project Reference: KLE001

Shipping and Receiving

Four clam and four worm samples (in five containers) were received at 2:52 PM on September 11, 2007. The samples arrived in two coolers with ice at temperatures of 0.2 °C and 4.0 °C. The requested analysis for the samples was total mercury (THg). The clam samples were stored in a refrigerator overnight in a locked storage room. The worm samples were stored in a storage freezer at less than -10°C until further processing.

Holding Time, Preservation and Storage

All method holding time, preservation and storage requirements were satisfied.

Homogenization

The clam samples were shucked the day after receipt and then frozen. Once thawed, the clam and worm samples were homogenized using precleaned commercial grade homogenization equipment. The contents of the five containers provided for each sample were composited and homogenized together. At the time of preparation, five replicate aliquots from each composite were prepared and analyzed.

The worm composites were received in their native environment. The worms could not be separated from the rest of the contents and the client instructed BRL to homogenize the total contents of each container. Also, some of the worm mass appeared to have congealed to the lids and to the sample container walls, even after having been thoroughly thawed.

A homogenization blank for each sample matrix was collected. The blanks were digested as tissue samples and analyzed along with the associated homogenates. The results for the homogenization blanks were non-detects, indicating that no significant contamination occurred during homogenization.

Total Mercury, Appendix to EPA Method 1631 (BRL SOP BR-0002)
Biota samples are digested with nitric acid/sulfuric acid (HNO_3/H_2SO_4) and heat, and further oxidized with bromine monochloride (BrCl). All samples are analyzed with stannous chloride ($SnCl_2$) reduction, single gold amalgamation and cold vapor atomic fluorescence spectroscopy (CVAFS) detection using a BRL Model III CVAFS Mercury Analyzer.

Batch # 07-01008
Preparation: The samples were digested on August 20, 2007.

Analysis: The samples were analyzed on August 24, 2007.

Quality Assurance: Sample results may have been evaluated using detection limits that were adjusted to account for sample aliquot size; please refer to the Quality Assurance Summary for a list of the sample specific method detection limits/practical quantitation limits (MDLs/PQLs) and QA results. Sample results less than or equal to the MDL have been qualified "U" as non-detects and have been reported at the MDL. All QA criteria were met and no additional qualification of the data was required.

The matrix spike/matrix spike duplicate (MS/MSD) set prepared from sample "1173G (Post Exposure) 1" (07BR1309-16) was spiked at concentrations lower than the native value and was, therefore, not a valid indication of bias. The MS/MSD results were reported for the purpose of demonstrating duplicate precision only. A post preparation spike was analyzed at an appropriate concentration and produced a recovery within the control limits.

The average of the method blanks (MBs) was greater than two times the MDL and the standard deviation (SD) between the MBs was greater than two-thirds the MDL. An estimated MDL (EMDL) was calculated as three times the SD and the estimated PQL (EPQL) was calculated as three times the EMDL. All sample results were greater than the EPQL with the exception of the two homogenization blanks. Both blank results yielded peak areas less than that of the lowest standard indicating no significant contamination was introduced by the homogenization process.

Blank correction: All sample results for low-level mercury analysis are blank corrected as described in EPA Method 1631 Revision E.

We certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. In addition, I

certify that to the best of my knowledge and belief, the data as reported are true and accurate. The Laboratory Director or her designee, as verified by the following signature has authorized release of the data contained in this data package.

Tiffany Stilwater
Project Coordinator
tiffany@brookrand.com

Elizabeth Madonick
Project Manager
elizabeth@brookrand.com

Reported by

Brooks Rand LLC

Contact: Elizabeth Madonick

3958 6th Avenue NW
Seattle, WA 98107
Tel: 206-632-6206 Fax: 206-632-6017

Summary of Results for

Kleinfelder

Contact: Dave King

15050 SW Koll Parkway
Beaverton OR 97006
Tel: 503-644-9447

Lab Project # KLE001
Lab Tracking # 07BR1309

Client Project Pacific Corp/ Dam Investigation
Purchase Order 53886/5

Sample/Sampling/Receiving Info

Kleinfelder				*BRL*	
Sample Identification	**Sampling Date**	**Matrix**	**Submatrix**	**Sample Number**	**Receiving Date**
1138G (Pre exposure) 1	8/8/2007	Biota	Worms	07BR1309 - 01	9/11/2007
1138G (Pre exposure) 2	8/8/2007	Biota	Worms	07BR1309 - 02	9/11/2007
1138G (Pre exposure) 3	8/8/2007	Biota	Worms	07BR1309 - 03	9/11/2007
1138G (Pre exposure) 4	8/8/2007	Biota	Worms	07BR1309 - 04	9/11/2007
1138G (Pre exposure) 5	8/8/2007	Biota	Worms	07BR1309 - 05	9/11/2007
1139G (Pre exposure) 1	8/9/2007	Biota	Bivalve	07BR1309 - 06	9/11/2007
1139G (Pre exposure) 2	8/9/2007	Biota	Bivalve	07BR1309 - 07	9/11/2007
1139G (Pre exposure) 3	8/9/2007	Biota	Bivalve	07BR1309 - 08	9/11/2007
1139G (Pre exposure) 4	8/9/2007	Biota	Bivalve	07BR1309 - 09	9/11/2007
1139G (Pre exposure) 5	8/9/2007	Biota	Bivalve	07BR1309 - 10	9/11/2007
1172G (Post Exposure) 1	9/5/2007	Biota	Worms	07BR1309 - 11	9/11/2007
1172G (Post Exposure) 2	9/5/2007	Biota	Worms	07BR1309 - 12	9/11/2007
1172G (Post Exposure) 3	9/5/2007	Biota	Worms	07BR1309 - 13	9/11/2007
1172G (Post Exposure) 4	9/5/2007	Biota	Worms	07BR1309 - 14	9/11/2007
1172G (Post Exposure) 5	9/5/2007	Biota	Worms	07BR1309 - 15	9/11/2007
1173G (Post Exposure) 1	9/5/2007	Biota	Worms	07BR1309 - 16	9/11/2007
1173G (Post Exposure) 2	9/5/2007	Biota	Worms	07BR1309 - 17	9/11/2007
1173G (Post Exposure) 3	9/5/2007	Biota	Worms	07BR1309 - 18	9/11/2007
1173G (Post Exposure) 4	9/5/2007	Biota	Worms	07BR1309 - 19	9/11/2007
1173G (Post Exposure) 5	9/5/2007	Biota	Worms	07BR1309 - 20	9/11/2007
1174G (Post Exposure) 1	9/5/2007	Biota	Worms	07BR1309 - 21	9/11/2007
1174G (Post Exposure) 2	9/5/2007	Biota	Worms	07BR1309 - 22	9/11/2007
1174G (Post Exposure) 3	9/5/2007	Biota	Worms	07BR1309 - 23	9/11/2007
1174G (Post Exposure) 4	9/5/2007	Biota	Worms	07BR1309 - 24	9/11/2007
1174G (Post Exposure) 5	9/5/2007	Biota	Worms	07BR1309 - 25	9/11/2007
1175G (Post Exposure) 1	9/6/2007	Biota	Bivalve	07BR1309 - 26	9/11/2007
1175G (Post Exposure) 2	9/6/2007	Biota	Bivalve	07BR1309 - 27	9/11/2007
1175G (Post Exposure) 3	9/6/2007	Biota	Bivalve	07BR1309 - 28	9/11/2007
1175G (Post Exposure) 4	9/6/2007	Biota	Bivalve	07BR1309 - 29	9/11/2007
1175G (Post Exposure) 5	9/6/2007	Biota	Bivalve	07BR1309 - 30	9/11/2007
1176G (Post Exposure) 1	9/6/2007	Biota	Bivalve	07BR1309 - 31	9/11/2007
1176G (Post Exposure) 2	9/6/2007	Biota	Bivalve	07BR1309 - 32	9/11/2007
1176G (Post Exposure) 3	9/6/2007	Biota	Bivalve	07BR1309 - 33	9/11/2007
1176G (Post Exposure) 4	9/6/2007	Biota	Bivalve	07BR1309 - 34	9/11/2007
1176G (Post Exposure) 5	9/6/2007	Biota	Bivalve	07BR1309 - 35	9/11/2007
1177G (Post Exposure) 1	9/6/2007	Biota	Bivalve	07BR1309 - 36	9/11/2007
1177G (Post Exposure) 2	9/6/2007	Biota	Bivalve	07BR1309 - 37	9/11/2007
1177G (Post Exposure) 3	9/6/2007	Biota	Bivalve	07BR1309 - 38	9/11/2007
1177G (Post Exposure) 4	9/6/2007	Biota	Bivalve	07BR1309 - 39	9/11/2007

Tuesday, September 25, 2007

Project Manager

Reported by
Brooks Rand LLC
Contact: Elizabeth Madonick
3958 6th Avenue NW
Seattle, WA 98107
Tel: 206-632-6206 *Fax: 206-632-6017*

Summary of Results for
Kleinfelder
Contact: Dave King
15050 SW Koll Parkway
Beaverton *OR* *97006*
Tel: 503-644-9447

Lab Project # KLE001
Lab Tracking # 07BR1309

Client Project Pacific Corp/ Dam Investigation
Purchase Order 53886/5

Sample/Sampling/Receiving Info continued...

Kleinfelder ***BRL***

Sample Identification	Sampling Date	Matrix	Submatrix	Sample Number	Receiving Date
1177G (Post Exposure) 5	9/6/2007	Biota	Bivalve	07BR1309 - 40	9/11/2007
HB-Hg-07-1022-1	9/13/2007	Biota	Blank	07BR1309 - 41	9/11/2007
HB-Hg-07-0992-1	9/14/2007	Biota	Blank	07BR1309 - 42	9/11/2007

Elizabeth Madonick
Project Manager

Tuesday, September 25, 2007

Reported by

Brooks Rand LLC

Contact: Elizabeth Madonick

3958 6th Avenue NW
Seattle, WA 98107
Tel: 206-632-6206 Fax: 206-632-6017

Summary of Results for

Kleinfelder

Contact: Dave King

15050 SW Koll Parkway
Beaverton OR 97006
Tel: 503-644-9447

Lab Project # KLE001
Lab Tracking # 07BR1309

Client Project Pacific Corp/ Dam Investigation
Purchase Order 53886/5

Hg

Sample Identification	BRL Number	Total or Dissolved	Preparation date	Analysis date	Batch #	Result	Units	Qualifier (Q)
1138G (Pre exposure) 1	07BR1309- 01	T	9/20/2007	9/24/2007	07-1008	4.390	ng/g	
1138G (Pre exposure) 2	07BR1309- 02	T	9/20/2007	9/24/2007	07-1008	4.160	ng/g	
1138G (Pre exposure) 3	07BR1309- 03	T	9/20/2007	9/24/2007	07-1008	4.240	ng/g	
1138G (Pre exposure) 4	07BR1309- 04	T	9/20/2007	9/24/2007	07-1008	4.340	ng/g	
1138G (Pre exposure) 5	07BR1309- 05	T	9/20/2007	9/24/2007	07-1008	3.970	ng/g	
1139G (Pre exposure) 1	07BR1309- 06	T	9/20/2007	9/24/2007	07-1008	29.900	ng/g	
1139G (Pre exposure) 2	07BR1309- 07	T	9/20/2007	9/24/2007	07-1008	30.900	ng/g	
1139G (Pre exposure) 3	07BR1309- 08	T	9/20/2007	9/24/2007	07-1008	31.000	ng/g	
1139G (Pre exposure) 4	07BR1309- 09	T	9/20/2007	9/24/2007	07-1008	27.900	ng/g	
1139G (Pre exposure) 5	07BR1309- 10	T	9/20/2007	9/24/2007	07-1008	29.200	ng/g	
1172G (Post Exposure) 1	07BR1309- 11	T	9/20/2007	9/24/2007	07-1008	13.400	ng/g	
1172G (Post Exposure) 2	07BR1309- 12	T	9/20/2007	9/24/2007	07-1008	13.500	ng/g	
1172G (Post Exposure) 3	07BR1309- 13	T	9/20/2007	9/24/2007	07-1008	13.300	ng/g	
1172G (Post Exposure) 4	07BR1309- 14	T	9/20/2007	9/24/2007	07-1008	13.100	ng/g	
1172G (Post Exposure) 5	07BR1309- 15	T	9/20/2007	9/24/2007	07-1008	12.300	ng/g	
1173G (Post Exposure) 1	07BR1309- 16	T	9/20/2007	9/24/2007	07-1008	340.000	ng/g	
1173G (Post Exposure) 2	07BR1309- 17	T	9/20/2007	9/24/2007	07-1008	346.000	ng/g	
1173G (Post Exposure) 3	07BR1309- 18	T	9/20/2007	9/24/2007	07-1008	354.000	ng/g	
1173G (Post Exposure) 4	07BR1309- 19	T	9/20/2007	9/24/2007	07-1008	340.000	ng/g	
1173G (Post Exposure) 5	07BR1309- 20	T	9/20/2007	9/24/2007	07-1008	357.000	ng/g	
1174G (Post Exposure) 1	07BR1309- 21	T	9/20/2007	9/24/2007	07-1008	4.980	ng/g	
1174G (Post Exposure) 2	07BR1309- 22	T	9/20/2007	9/24/2007	07-1008	4.740	ng/g	
1174G (Post Exposure) 3	07BR1309- 23	T	9/20/2007	9/24/2007	07-1008	4.460	ng/g	
1174G (Post Exposure) 4	07BR1309- 24	T	9/20/2007	9/24/2007	07-1008	4.910	ng/g	
1174G (Post Exposure) 5	07BR1309- 25	T	9/20/2007	9/24/2007	07-1008	4.980	ng/g	
1175G (Post Exposure) 1	07BR1309- 26	T	9/20/2007	9/24/2007	07-1008	32.200	ng/g	
1175G (Post Exposure) 2	07BR1309- 27	T	9/20/2007	9/24/2007	07-1008	35.100	ng/g	
1175G (Post Exposure) 3	07BR1309- 28	T	9/20/2007	9/24/2007	07-1008	34.000	ng/g	
1175G (Post Exposure) 4	07BR1309- 29	T	9/20/2007	9/24/2007	07-1008	35.000	ng/g	
1175G (Post Exposure) 5	07BR1309- 30	T	9/20/2007	9/24/2007	07-1008	34.800	ng/g	
1176G (Post Exposure) 1	07BR1309- 31	T	9/20/2007	9/24/2007	07-1008	38.400	ng/g	
1176G (Post Exposure) 2	07BR1309- 32	T	9/20/2007	9/24/2007	07-1008	40.900	ng/g	
1176G (Post Exposure) 3	07BR1309- 33	T	9/20/2007	9/24/2007	07-1008	37.100	ng/g	
1176G (Post Exposure) 4	07BR1309- 34	T	9/20/2007	9/24/2007	07-1008	40.400	ng/g	
1176G (Post Exposure) 5	07BR1309- 35	T	9/20/2007	9/24/2007	07-1008	41.800	ng/g	
1177G (Post Exposure) 1	07BR1309- 36	T	9/20/2007	9/24/2007	07-1008	35.900	ng/g	
1177G (Post Exposure) 2	07BR1309- 37	T	9/20/2007	9/24/2007	07-1008	35.700	ng/g	
1177G (Post Exposure) 3	07BR1309- 38	T	9/20/2007	9/24/2007	07-1008	36.900	ng/g	
1177G (Post Exposure) 4	07BR1309- 39	T	9/20/2007	9/24/2007	07-1008	34.000	ng/g	
1177G (Post Exposure) 5	07BR1309- 40	T	9/20/2007	9/24/2007	07-1008	38.000	ng/g	
HB-Hg-07-1022-1	07BR1309- 41	T	9/20/2007	9/24/2007	07-1008	0.650	ng/g	U
HB-Hg-07-0992-1	07BR1309- 42	T	9/20/2007	9/24/2007	07-1008	0.650	ng/g	U

Tuesday, September 25, 2007

Elizabeth Madonick
Project Manager

BROOKS RAND LABS

DATA QUALIFIERS and their DEFINITIONS
(Effective 6/23/06)

B - Detected by the instrument, above MDL but less than or equal to the PQL (ML). Measured result is reported and considered an estimate.

E - An estimated value due to the presence of interferences. A full explanation will be presented in the case narrative.

H - Holding time and/or preservation requirements not met. Results are estimated.

J – Estimated value.

M -Duplicate precision (RPD) was not within acceptance criteria.

N - Spike recovery was not within acceptance criteria.

R - Rejected, unusable value. A full explanation will be presented in the QA Report.

U – Result below or equal to the method detection limit (MDL) and therefore analyte was not detected. Results reported at the MDL.

These qualifiers are based on those previously utilized by Brooks Rand, LLC, those found in the EPA SOW ILM03.0, Exhibit B, Section III, pg. B-18 and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review; USEPA; July 2002. These supercede all previous qualifiers ever employed by BRL.

QUALITY ASSURANCE SUMMARY

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

3958 6th Avenue NW
Seattle, WA 98107
Voice: 206-632-6206
Fax: 206-632-6017

Batch #: **07-1008**

Method #: **BR-0002**

Analyte: **Hg**

Matrix: **Biota**

BIAS *Criterion: Recovery = 77-123%*
Continuing Calibration Verification (CCV)

QCS ID	*Certified Value ng/L*	*Measured Value ng/L*	*Recovery %*
CCV1	5.00	5.30	106%
CCV2	5.00	5.00	100%
CCV3	5.00	5.27	105%
CCV4	5.00	5.26	105%
CCV5	5.00	4.93	99%
CCV6	5.00	5.04	101%

BIAS *Criterion: Recovery = 85-115%*
Independent Calibration Verification (ICV)

QCS ID	*Certified Value ng/L*	*Measured Value ng/L*	*Recovery %*
ICV*	16.01	16.05	100%

* Preparation of the CRM NIST 1641d.

BIAS *Criterion: Recovery = 75-125%*
Certified Reference Material (CRM)

CRM ID	*Certified Value ng/g*	*Measured Value ng/g*	*Recovery %*
DORM-2	4640	4764	103%
DORM-2	4640	4806	104%

BIAS *Criteria: Recovery = 70-130%, RPD ≤ 30%*
Matrix Spikes/Matrix Spike Duplicates (MS/MSD)

		Matrix Spike			*Matrix Spike Duplicate*			
Sample ID	*Sample Value ng/g AR*	*Spiked Value ng/g AR*	*Measured Value ng/g AR*	*MS Recovery %*	*Spiked Value ng/g AR*	*Measured Value ng/g AR*	*MSD Recovery %*	*Duplicate RPD*
07BR1309-01	4.39	189.8	216.9	112%	190.5	225.4	116%	4%
07BR1309-06	29.9	483	558	109%	459	486	99%	14%
07BR1309-16	340	185	532	*	191	518	*	3%
07BR1309-31	38.4	483	537	103%	422	503	110%	6%

* 07BR1309-16 MS/MSD underspiked, recovery criteria does not apply. PPS analyzed.

BIAS *Criteria: Recovery 85-115%*
Post-Preparation Spike Analysis (PPS)

Sample ID	*Sample Value ng/g AR*	*Spiked Value ng/g AR*	*Measured Value ng/g AR*	*PPS Recovery %*
07BR1309-01	4.39	9.93	15.19	109%
07BR1309-16	340	652	1028	105%

Quality Assurance Officer

Project Manager

QUALITY ASSURANCE SUMMARY

Batch #: **07-1008 cont.** ***Method #:*** **BR-0002**

Analyte: **Hg** ***Matrix:*** **Biota**

PRECISION *Criteria: RPD ≤ 30% if average result > 5x PQL*

Method Duplicate Analysis (MD)

Sample ID	*Sample Value ng/g AR*	*Duplicate Value ng/g AR*	*Average Value ng/g AR*	*Duplicate RPD*
07BR1309-01	4.39	3.66	4.03	18%
07BR1309-06	29.9	31.4	30.7	5%
07BR1309-16	340	329	335	3%
07BR1309-31	38.4	39.1	38.8	2%

Method Blanks (MB) *Criteria: Avg. <2x MDL, Std Dev < 2/3 MDL or sample results > 10x highest MB*

MB1 ng/g	*MB2 ng/g*	*MB3 ng/g*	*MB4 ng/g*	*Average ng/g*	*StDev ng/g*
0.31	0.53	0.08	0.06	0.25	0.22

High MB average and standard deviation, EMDL/EPQL calculated, see narrative.

Method Detection Limits	
MDL ng/g	*PQL ng/g*
0.04	0.10

Estimated Detection Limits	
EMDL ng/g	*EPQL ng/g*
0.65	1.96

Sample Specific Reporting Limits		
Sample ID	*MDL ng/g*	*PQL ng/g*
07BR1309-06	1.2	3.5
07BR1309-07	1.1	3.3
07BR1309-08	1.2	3.7
07BR1309-09	1.3	3.8
07BR1309-10	1.1	3.4
07BR1309-16	21	64
07BR1309-17	13	38
07BR1309-18	13	39
07BR1309-19	13	38
07BR1309-20	12	36
07BR1309-26	1.1	3.4
07BR1309-27	1.2	3.7
07BR1309-28	1.2	3.7

Sample Specific Reporting Limits		
Sample ID	*MDL ng/g*	*PQL ng/g*
07BR1309-29	1.3	3.8
07BR1309-30	1.2	3.6
07BR1309-31	1.2	3.5
07BR1309-32	1.3	3.9
07BR1309-33	1.2	3.7
07BR1309-34	1.2	3.6
07BR1309-35	1.3	3.8
07BR1309-36	1.2	3.5
07BR1309-37	1.3	3.8
07BR1309-38	1.3	3.8
07BR1309-39	1.1	3.4
07BR1309-40	1.2	3.6

Quality Assurance Officer

Project Manager

	Batch:	07-1008		Analyte:	THg		Date:	09/24/07	MDL:	0.04	ng/g	EMDL:	0.65	ng/g	Nitric/Sulfuric Prep
	Analyst:	JH		Matrix:	Biota		Instrument ID:	BR10	PQL:	0.10	ng/g	EPQL:	1.96	ng/g	

Run No.	Run Type	Tracking #	Sample ID	Sample Wt mg	Dilution Vol. mL	Analyzed Vol. mL	PA	Hg pg	Hg ng/g	TV/ Spike	Recovery		MDL	PQL	Comments
1	CB						61	5.92				80.50			= avg PA of CB
2	CB						83	8.06				14.18			= std dev PA CB
3	CB						95	9.22				7.82			= avg pg of CB
4	CB						83	8.06				1.38			= std dev pg CB
5	CS						328			25	96%				
6	CS						1093			100	98%				
7	CS						5222			500	100%				
8	CS						26496			2500	103%	0.0971			= avg cal coeff
9	CS						106715			10000	104%	3%			= RSD cal coeff
10	ICV						16609	1605		1601	100%	1.0000			= R value
11	CCV						5536	530		500	106%				
12	MB		MB-1	1000	40.00	10.00	877	77	0.309			246.41			= average total pg
13	CB						68	6.60							used for blk corr
14	MB		MB-2	1000	40.00	10.00	1440	131.99	0.528						
15	MB		MB-3	1000	40.00	10.00	298	21.12	0.084			0.25			= avg MB ng/g
16	MB		MB-4	1000	40.00	10.00	245	15.97	0.064			0.22			= std dev MB ng/g
17	QCS	Dorm-2	CRM-1	204	40.00	0.05	12596	1215	4764	4640	103%				
18	QCS	Dorm-2	CRM-2	205	40.00	0.05	12769	1232	4806	4640	104%				
19	LFB	PQL Spike		1000	40.00	10.00	602	51	-0.04	0.10	-44%				
20	S	07BR1309	41	1010	40.00	10.00	158	7.52	-0.21				0.65	1.94	
21	MB		MB-1R	1000	40.00	10.00	914	81	0.324						*Confirmation only*
22	MB		MB-2R	1000	40.00	10.00	1449	132.87	0.531						*Confirmation only*
23	S	07BR1309	42	1010	40.00	10.000	302	21.51	-0.16				0.65	1.94	
24	*S*	*07BR1309*	*01*	*1007*	*40.00*	*0.500*	*620*	*52.38*	*3.92*				*13*	*39*	*<5X EPQL; reanalyzed*
25	*S*	*07BR1309*	*06*	*1131*	*40.00*	*0.500*	*3806*	*361.70*	*25.4*				*12*	*35*	*<5X EPQL; reanalyzed*
26	*S*	*07BR1309*	*11*	*1060*	*40.00*	*0.500*	*1823*	*169.18*	*12.5*				*12*	*37*	*<5X EPQL; reanalyzed*
27	S	07BR1309	16	1023	40.00	0.500	46114	4469.33	349				13	38	
28	*S*	*07BR1309*	*21*	*1006*	*40.00*	*0.500*	*707*	*60.83*	*4.59*				*13*	*39*	*<5X EPQL; reanalyzed*
29	S	07BR1309	26	1161	40.00	5.000	48574	4708.17	32.2				1.1	3.4	
30	S	07BR1309	31	1123	40.00	5.000	55864	5415.94	38.4				1.2	3.5	
31	S	07BR1309	36	1111	40.00	5.000	51721	5013.70	35.9				1.2	3.5	
32	S	07BR1309	01R	1007	40.00	10.000	12089	1165.89	4.39				0.65	1.95	
33	S	07BR1309	06R	1131	40.00	5.000	43955	4259.71	29.9				1.2	3.5	
34	S	07BR1309	11R	1060	40.00	10.000	37356	3619.03	13.4				0.62	1.85	
35	S	07BR1309	21R	1006	40.00	10.000	13605	1313.08	4.98				0.65	1.95	
36	S	07BR1309	16R	1023	40.00	0.300	26986	2612.22	340				21	64	
37	MR	07BR1309	01MD	1039	40.00	10.000	10516	1013.17	3.66			18%	0.63	1.89	= MD RPD
38	*MS*	*07BR1309*	*01MS*	*1054*	*40.00*	*10.000*	*502026*	*48733.20*	*184.7*	*189.75*	*95%*		*0.62*	*1.86*	*Over calibration*
39	MS	07BR1309	01MS	1054	40.00	1.000	59023	5722.65	216.9	189.75	112%		6.2	19	
40	CB						93	9.03							
41	CB						105	10.19							
42	MSD	07BR1309	01MSD	1050	40.00	1.000	61075	5921.87	225.4	190.48	116%	4%	6.2	19	= MS/MSD RPD
43	PPS	07BR1309	01PPS	1007	40.00	10.000	40096	3885.05	15.19	9.93	109%		0.65	1.95	
44	CCV						5229	500		500	100%				
45	MR	07BR1309	06MD	1165	40.00	5.000	47449	4598.94	31.4			5%	1.1	3.4	= MD RPD
46	MS	07BR1309	06MS	1036	40.00	0.250	37296	3613.20	558	483	109%		25	76	
47	MSD	07BR1309	06MSD	1089	40.00	0.250	34165	3309.22	486	459	99%	14%	24	72	= MS/MSD RPD
48	S	07BR1309	02	1020	40.00	10.000	11640	1122.30	4.16				0.64	1.92	
49	*S*	*07BR1309*	*03*	*1058*	*40.00*	*10.000*	*83823*	*8130.44*	*30.5*				*0.62*	*1.86*	*High result compaired to split samples, reanalyzed.*
50	S	07BR1309	04	1066	40.00	10.000	12625	1217.93	4.34				0.61	1.84	
51	S	07BR1309	05	999	40.00	10.000	10936	1053.95	3.97				0.66	1.97	

	Batch:	07-1008		Analyte:	THg		Date:	09/24/07	MDL:	0.04	ng/g	EMDL:	0.65	ng/g	*Nitric/Sulfuric Prep*
	Analyst:	JH		Matrix:	Biota	Instrument ID:		BR10	PQL:	0.10	ng/g	EPQL:	1.96	ng/g	

Run No.	Run Type	Tracking #	Sample ID	Sample Wt mg	Dilution Vol. mL	Analyzed Vol. mL	PA	Hg pg	Hg ng/g	TV/ Spike	Recovery		MDL	PQL	Comments
52	S	07BR1309	07	1193	40.00	5.000	47876	4640.40	30.9				1.1	3.3	
53	S	07BR1309	08	1048	40.00	5.000	42169	4086.31	31.0				1.2	3.7	
54	S	07BR1309	09	1023	40.00	5.000	37131	3597.18	27.9				1.3	3.8	
55	S	07BR1309	10	1145	40.00	5.000	43454	4211.07	29.2				1.1	3.4	
56	S	07BR1309	12	1056	40.00	10.000	37358	3619.22	13.48				0.62	1.86	
57	S	07BR1309	03R	1058	40.00	10.000	12255	1182.01	4.24				0.62	1.86	
58	CCV						5507	527		500	105%				
59	MR	07BR1309	16MD	1123	40.00	0.300	28681	2776.78	329			6%	19	58	= MD RPD
60	MS	07BR1309	16MS	1082	40.00	0.300	44531	4315.64	532	185	104%		20	60	
61	MSD	07BR1309	16MSD	1046	40.00	0.300	41979	4067.87	518	191	93%	3%	21	63	= MS/MSD RPD
62	PPS	07BR1309	16PPS	1023	40.00	0.300	81312	7886.65	1028	652	105%		21	64	
63	MR	07BR1309	31MD	1040	40.00	5.000	52742	5112.83	39.1			2%	1.3	3.8	= MD RPD
64	MS	07BR1309	31MS	1035	40.00	0.250	35871	3474.85	537	483	103%		25	76	
65	MSD	07BR1309	31MSD	1185	40.00	0.250	38479	3728.06	503	422	110%	6%	22	66	= MS/MSD RPD
66	S	07BR1309	13	1069	40.00	10.000	37330	3616.50	13.3				0.61	1.84	
67	S	07BR1309	14	1038	40.00	10.000	35773	3465.34	13.1				0.63	1.89	
68	S	07BR1309	15	1069	40.00	10.000	34632	3354.56	12.3				0.61	1.84	
69	S	07BR1309	17	1041	40.00	0.500	46468	4503.70	346				13	38	
70	S	07BR1309	18	1016	40.00	0.500	46377	4494.86	354				13	39	
71	S	07BR1309	19	1033	40.00	0.500	45268	4387.19	340				13	38	
72	S	07BR1309	20	1089	40.00	0.500	50165	4862.64	357				12	36	
73	S	07BR1309	22	1030	40.00	10.000	13275	1281.04	4.74				0.64	1.91	
74	CCV						5499	526		500	105%				
75	S	07BR1309	23	1008	40.00	10.000	12289	1185.31	4.46				0.65	1.95	
76	S	07BR1309	24	1014	40.00	10.000	13546	1307.35	4.91				0.65	1.94	
77	S	07BR1309	25	1118	40.00	10.000	15048	1453.17	4.98				0.59	1.76	
78	S	07BR1309	27	1054	40.00	5.000	48054	4657.68	35.1				1.2	3.7	
79	S	07BR1309	28	1059	40.00	5.000	46742	4530.30	34.0				1.2	3.7	
80	S	07BR1309	29	1030	40.00	5.000	46872	4542.92	35.0				1.3	3.8	
81	S	07BR1309	30	1104	40.00	5.000	49839	4830.98	34.8				1.2	3.6	
82	S	07BR1309	32	1019	40.00	5.000	54119	5246.52	40.9				1.3	3.9	
83	S	07BR1309	33	1058	40.00	5.000	50882	4932.25	37.1				1.2	3.7	
84	S	07BR1309	34	1091	40.00	5.000	57181	5543.81	40.4				1.2	3.6	
85	CCV						5158	493		500	99%				
86	S	07BR1309	35	1031	40.00	5.000	55858	5415.36	41.8				1.3	3.8	
87	S	07BR1309	37	1039	40.00	5.000	48142	4666.22	35.7				1.3	3.8	
88	S	07BR1309	38	1031	40.00	5.000	49322	4780.79	36.9				1.3	3.8	
89	S	07BR1309	39	1148	40.00	5.000	50671	4911.76	34.0				1.1	3.4	
90	S	07BR1309	40	1089	40.00	5.000	53741	5209.82	38.0				1.2	3.6	
91	CCV						5268	504		500	101%				

Hg Prep Log for Solids (CVAFS) T-Hg / Other _____ Page 1 of 2
Revision #: 009

Batch: 07-1008 Matrix: BIOTA Technician: MM Date: 9/20/07

Sample I.D.	Aliquot (mg)	Sample I.D.	Aliquot (mg)
MB-1	—	07BR1309-06	1131
-2	—	-06MD	1165
-3	—	-06MS	1036
-4	—	-06MSD	1089
CRM-1	204	-07	1193
-2	205	-08	1048
PQL LFB	—	-09	1023
07BR1309-41	1010	-10	1145
-42	1010	-11	1060
07BR1309-01	1007	-12	1056
-01MD	1039	-13	1069
-01MS	1054	-14	1038
-01MSD	1050	-15	1069
-02	1020	-16	1023
-03	1058	-16MD	1123
-04	1066	-16MS	1082
-05	999	-16MSD	1046

Matrix Spike/Matrix Spike Duplicate

Sample I.D.	Hg Standard I.D.	Hg Standard Conc. (ng/mL)	Hg Standard Vol. used (mL)	Matrix Spike Conc. (ng/g)
07BR1309-01MS	0737037	1000ng/mL	0.200mL	see analytical
-01MSD	↓	↓	↓	spreadsheet
-06MS		1000ng/mL	0.500mL	↓
-06MSD		↓	↓	
-16MS			0.200mL	
-16MSD	↓	↓	↓	

Certified Reference Material (CRM)

CRM I.D.	CRM Source	CRM Conc. (ng/g) / (mg/kg)	CRM Mass used (mg)	Spike Witness Initials/Date
CRM-1 & 2	PORM-2	4640	204, 205	
PQL LFB	0734055	1ng/mL	0.100mL	JH 9/20/07
			MM 9/25/07	

HNO_3 Reagent I.D. #: 07-162-1 BrCl I.D. #: 0735006

HCl / H_2SO_4 Reagent I.D. #: 07-179-03 Final Dil. Volume: 40mL

Target Temp. 1 (if required): 70 °C Measured Temp.: 72 °C Digestion Time: 1 HRS

Target Temp. 2 (if required): 90-110 °C Measured Temp.: 95 °C Digestion Time: 3HRS

Comments: _____

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Hg Prep Log for Solids (CVAFS) (T-Hg) / Other _____ Page 2 of 2
Revision #: 009

Batch: 07-1008 Matrix: Biota Technician: MU Date: 9/20/07

Sample I.D.	Aliquot (mg)	Sample I.D.	Aliquot (mg)
07BR1309-17	1041	07BR1309-31MSD	1185
-18	1016	-32	1019
-19	1033	-33	1058
-20	1089	-34	1091
-21	1006	-35	1031
-22	1030	-36	1111
-23	1008	-37	1039
-24	1014	-38	1031
-25	1118	-39	1148
-26	1161	-40	1089
-27	1054		
-28	1059		
-29	1030		
-30	1104		
-31	1123		
-31MD	1040		
-31MS	1035		

MU 9/20/07

Matrix Spike/Matrix Spike Duplicate

Sample I.D.	Hg Standard I.D.	Hg Standard Conc. (ng/mL)	Hg Standard Vol. used (mL)	Matrix Spike Conc. (ng/g)
07BR1309-31MS	0737037	1000ng/mL	0.50mL	see analytical
-31MSD	↓	↓	↓	spreadsheet

mm 9/25/07

Certified Reference Material (CRM)

CRM I.D.	CRM Source	CRM Conc. (ng/g) / (mg/kg)	CRM Mass used (mg)

Spike Witness Initials/Date

See page one mm

mm 9/25/07

HNO_3 Reagent I.D. #: _____ BrCl I.D. #: _____

HCl / H_2SO_4 Reagent I.D. #: _____ Final Dil. Volume: _____

Target Temp. 1 (if required): _____ °C Measured Temp.: _____ °C Digestion Time: _____

Target Temp. 2 (if required): _____ °C Measured Temp.: _____ °C Digestion Time: _____

Comments: _____

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Exhibit B

Sample Physical Characteristics Log

Page 1 of 2

Prep Technician: MM Date: 09/20/07

Client ID(s): KLE001

Sample ID	Matrix/Submatrix	Physical Characteristics
07BR1309-01	Biota / WORM	BROWN, well homogenized (MM 9/20/07), watery (MM 9/20/07) soupy, smelly
-02		
-03		
-04		
-05		
-06	Biota / Bivalve	tan/light grey, pasty, well homogenized
-07		
-08		
-09		
-10		
-11	Biota / ~~Bivalve~~ WORM (MM 9/20/07)	dark brown, watery/soupy, well homogenized
-12		
-13		
-14		
-15		
-16		dark brown, smelly, pasty, well homogenized
-17		
-18		
-19		
-20		

Additional Notes:

Exhibit B
page 2 of 2

Sample Physical Characteristics Log

Prep Technician: MU Date: 09/20/07

Client ID(s): KLE001

Sample ID	Matrix/Submatrix	Physical Characteristics
07BR1309-21	Biota / worms	dark brown, pasty, well homogenized
-22		
-23		
-24		
-25		
-26	/ Bivalve	tan/light grey, pasty, well homogenized
-27		
-28		
-29		
-30		
-31		
-32		
-33		
-34		
-35		
-36		
-37		
-38		
-39		
-40		

Additional Notes:

Hg Analysis Sheet: (T-Hg) / **Other:** _____ (form 1) Page 1 of 4

Batch: 07-1608 Matrix: Biota Analyst: JH Date: 9/24/07

Mod. III ID#: BR-10 Cal. Blanks X: 80.50 PA CF X: 0.0971 pg/PA

NH_2OHHCl #: 0738003 10 ng Hg/mL std. #: 0734056 RSD: 3 %

$SnCl_2$ #: 0737035 1.0 ng Hg/mL std. #: 0734055 low std. Rec.: 96 %

Run #	Split Bottle	Trap	Bubb.	Brooks Rand Sample ID	Analy. Vol. (mL)	PA	Comments
1	1	X 1	1	CB-1	-	81	
2	2	X 2	2	CB-2	-	83	
3	3	X 3	3	CB-3	-	95	
4	4	X 4	4	CB-4	-	83	
5	1	X 5	1	25pg	0.025	328	JH 9/24 @ 1 ng/mL
6	2	X 6	2	100pg	0.100	1093	↓
7	3	X 7	3	500pg	0.050	5227	10 ng/mL
8	4	X 8	4	2500pg	0.250	26496	↓
9	1	X 9	1	10000pg	1.00	106715	↓
10	2	X 10	2	ICV 1601pg	1.00	16609	Nist 1641d
11	3	X 11	3	CCV	0.050	5536	10 ng/mL
12	4	X 12	4	MB-1	10.00	877	
13	1	X 1	1	CCB	--	68	
14	2	X 2	2	MB-2	10.00	1440	
15	3	X 3	3	MB-3	10.00	290	
16	4	X 4	4	MB-4	10.00	245	
17	1	X 5	1	CRM-1	0.050	12596	
18	2	X 6	2	CRM-2	0.050	12769	
19	3	X 7	3	POLLFB	10.00	602	
20	4	X 8	4	07BR1309-41	10.00	158	
21	1	X 9	1	MB-1R	10.00	914	
22	2	X 10	2	MB-2R	10.00	1449	
JH 9/24 23	3	X 11	3	07BR1309-~~01~~ 42	~~0.500~~ 10.00	302	
24	4	X 12	4	↓ -~~66~~ 01	0.500	620	

Comments: _____

Check standard: 0734056 Verification standard: 0737030

Hg Analysis Sheet: T-Hg Other: (Form 2) Page 2 of 4

Batch: 07-1008 Matrix: Biota Analyst: JH Date: 9/24/07

Run #	Split Bottle	Trap	Bubb.	Brooks Rand Sample ID	Analy. Vol. (mL)	PA	Comments
25	1	X 1	1	07BR1309 - 06	0.500	3806	
26	2	X 2	2	- 11		1823	
27	3	X 3	3	- 16		46114	
28	4	X 4	4	- 21		707	
29	1	X 5	1	- 26	5.00	48574	
30	2	X 6	2	- 31		55864	
31	3	X 7	3	- 36		51721	
32	4	X 8	4	-01R	10.00	12089	
33	1	X 9	1	-06R	5.00	43955	
34	2	X 10	2	-11R	10.00	JH 9/24 37356	
35	3	X 11	3	-21R	10.00	13605	
36	4	X 12	4	-16R	0.300	26986	
37	1	X 1	1	-01MD	10.00	10516	
38	2	X 2	2	-01MS		502026	
~~39~~	~~3~~	~~X 3~~	~~3~~	~~-01MSD~~			
JH 9/24 ~~40~~	~~4~~	~~X 4~~	~~4~~	~~01PPS~~			~~2500pg spike~~
				CCV	0.050		
JH 9/24				~~07BR1309 - 06MD~~			
39	1	X 5	1	07BR1309 - 01MS	1.00	59023	
40	2	X 6	2	CCB	—	93	
41	3	X 7	3	CCB	—	105	
42	4	X 8	4	07BR1309 - 01MSD	1.00	61075	
43	1	X 9	1	↓ -01PPS	10.00	40096	2500pg spike
44	2	X 10	2	CCV	0.050	5224	1079/mL
45	3	X 11	3	07BR1309 - 06MD	5.00	47449	
46	4	X 12	4	-06MS	0.250	37296	
47	1	X 1	1	-06MSD	0.250	34165	
48	2	X 2	2	- 02	10.00	11640	
49	3	X 3	3	-03		83823	
50	4	X 4	4	-04		12025	

Comments:

All Brooks Rand LLC (BRL) SOPs are proprietary information and considered to be trade secret.

Hg Analysis Sheet: T-Hg / Other: ____ (form 2) Page 3 of 4

Batch: 07-1008 Matrix: Biota Analyst: JH Date: 9/24/07

Run #	Split Bottle	Trap	Bubb.	Brooks Rand Sample ID	Analy. Vol. (mL)	PA	Comments
51	1	X 5	1	07BR1309-05	10.00	10936	
52	2	X 6	2	-07	5.00	47876	
53	3	X 7	3	-08	5.00	42169	
54	4	X 8	4	-09	5.00	37131	
55	1	X 9	1	-10	5.00	43454	
56	2	X 10	2	-12	10.00	37358	
57	3	X 11	3	-03R	10.00	12255	
58	4	X 12	4	CCV	0.050	5507	10 pg/mL
59	1	X 1	1	07BR1309-16MD	0.300	28691	
60	2	X 2	2	-16MS		44531	
61	3	X 3	3	-16MSD		41979	
62	4	X 4	4	-16PDS		81312	5000pg spike
63	1	X 5	1	-31MD	5.00	52742	
64	2	X 6	2	-31MS	0.250	35871	
65	3	X 7	3	-31MSD	0.250	38479	
66	4	X 8	4	-13	10.00	37330	
67	1	X 9	1	-14		35773	
68	2	X 10	2	-15		34632	
69	3	X 11	3	-17	0.500	46468	
70	4	X 12	4	-18		46377	
71	1	X 1	1	-19	0.500	45208	
72	2	X 2	2	-20		50165	
73	3	X 3	3	-22	10.00	13275	
74	4	X 4	4	CCV	0.050	5499	10 pg/mL
75	1	X 5	1	07BR1309-23	10.00	12289	
76	2	X 6	2	-24		13546	
77	3	X 7	3	-25		15048	
78	4	X 8	4	-27	5.00	48054	
79	1	X 9	1	-28		46742	
80	2	X 10	2	-29		46872	
81	3	X 11	3	-30		49839	
82	4	X 12	4	-32	5.00	54119	

Comments: ____

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Hg Analysis Sheet: T-Hg Other: Form 2: Page 4 of 4

Batch: 070005 Matrix: Biota Analyst: JH Date: 9/24/07

Run #	Split Bottle	Trap	Bubbler	Brooks Rand Sample ID	Analyte Vol. (mL)	PA	Comments
83	1	X 1	1	07BR1309-33	5.00	50892	
84	2	X 2	2	↓ -34	↓	57181	
85	3	X 3	3	CCV	0.500	5158	10 ng/mL
86	4	X 4	4	07BR1309-35	5.00	55858	
87	1	X 5	1	-37		48142	
88	2	X 6	2	-38		44322	
89	3	X 7	3	-39		50671	
90	4	X 8	4	-40		53741	
91	1	X 9	1	CCV	0.050	5268	10 ng/mL

JAM 9/25/07

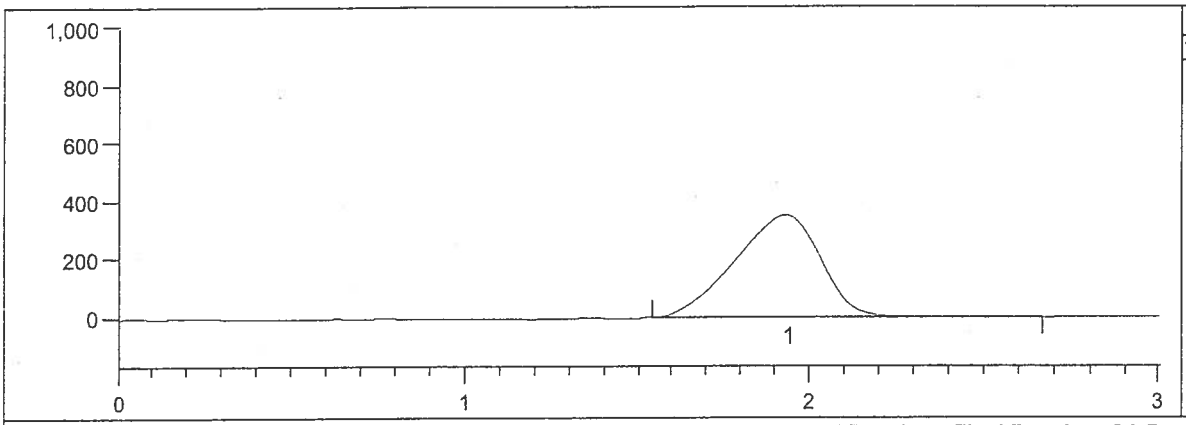
Continued:

Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

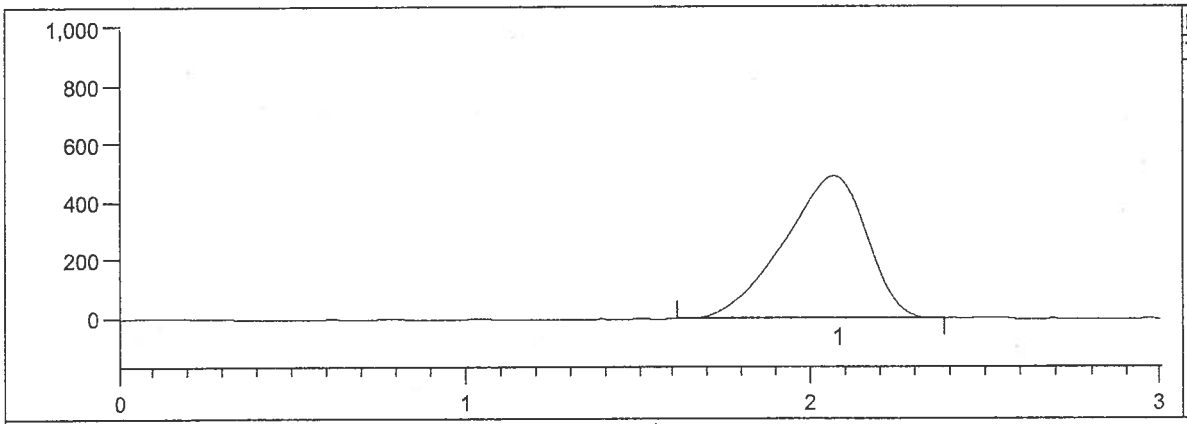


Date: 9/24/07
Time: 9:50 AM

Peak	rt	Area
1	1.92	61,177

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
1	CB	CB		1	61,177	5.94		5.94	< 50	accept

Notes

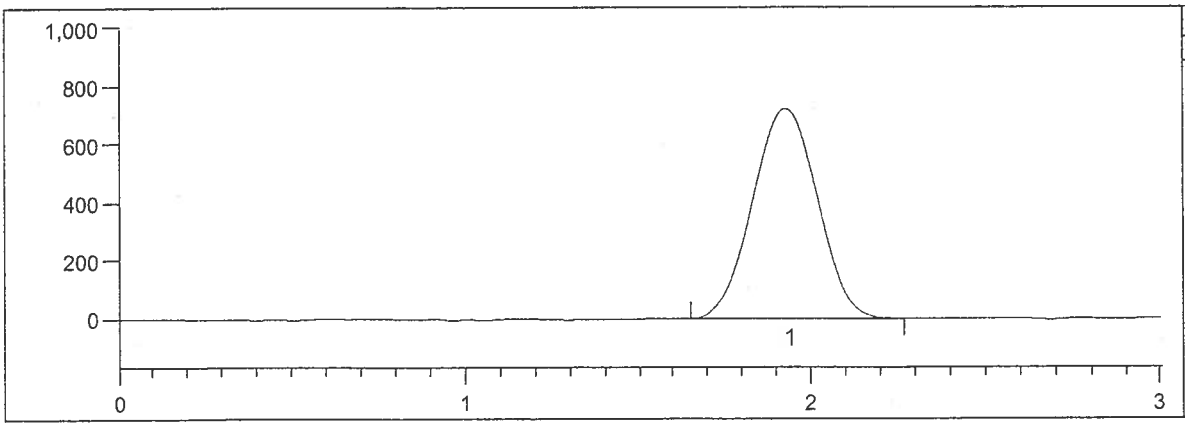


Date: 9/24/07
Time: 9:54 AM

Peak	rt	Area
1	2.06	83,153

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
2	CB	CB		1	83,153	8.07		8.07	< 50	accept

Notes



Date: 9/24/07
Time: 9:59 AM

Peak	rt	Area
1	1.92	94,775

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
3	CB	CB		1	94,775	9.20		9.20	< 50	accept

Notes

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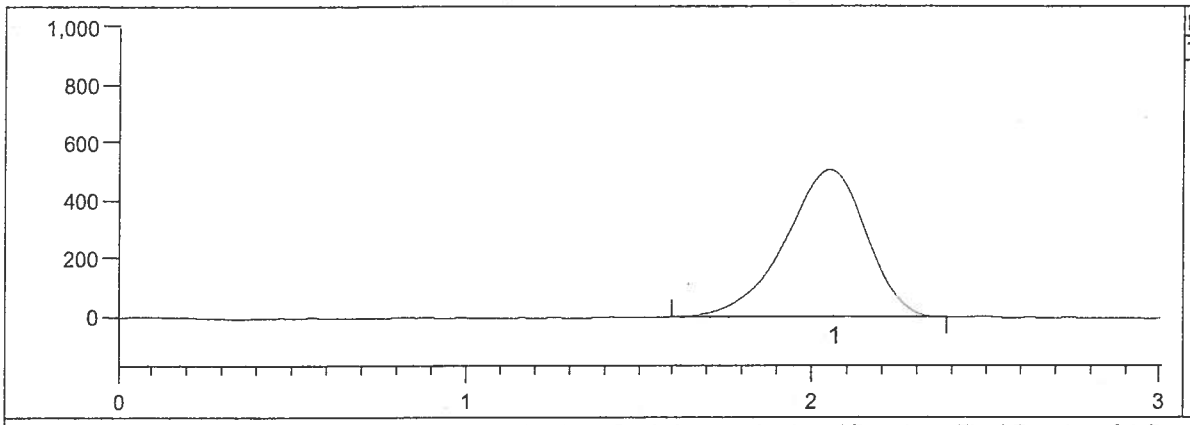
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

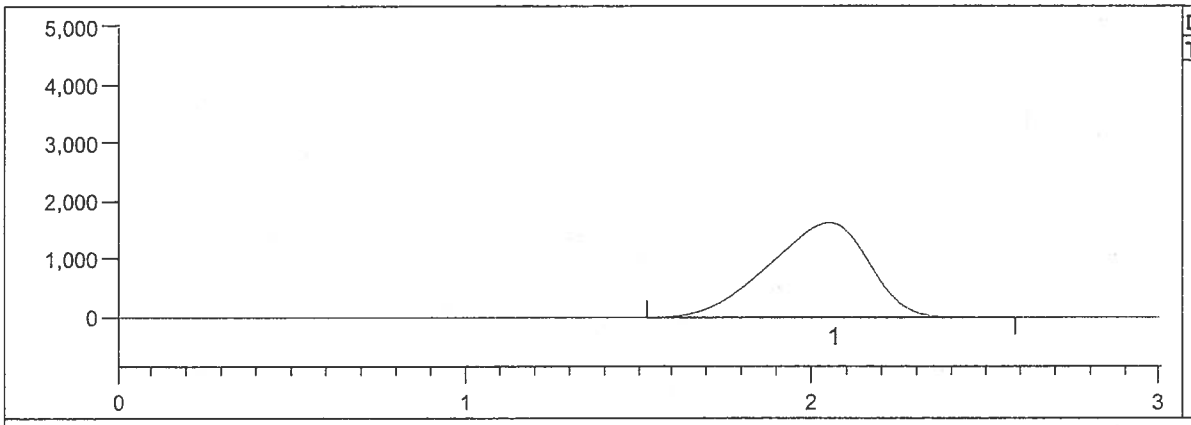


Date: 9/24/07
Time: 10:02 AM

Peak	rt	Area
1	2.04	82,503

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
4	CB	CB		1	82,503	8.01		8.01	< 50	accept

Notes

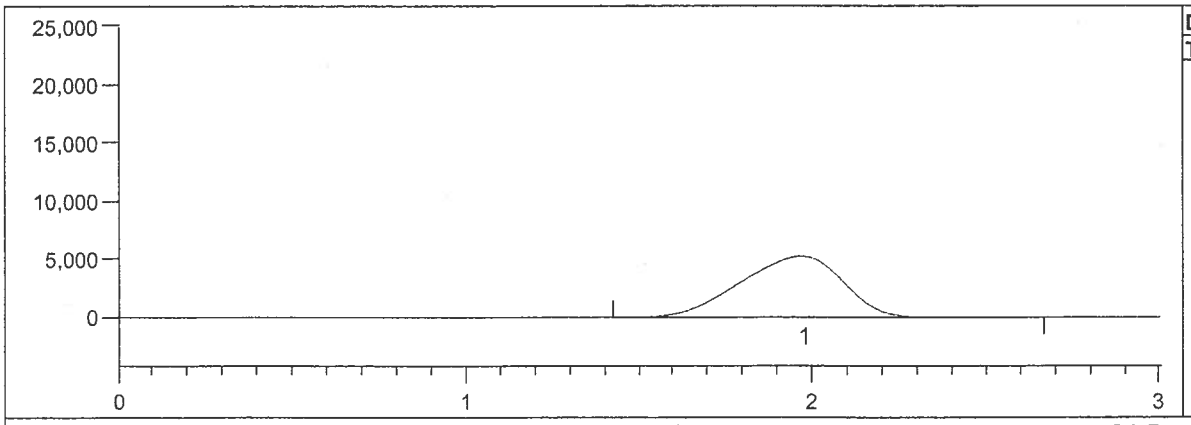


Date: 9/24/07
Time: 10:12 AM

Peak	rt	Area
1	2.04	328,337

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
5	STD	25 pg		1	328,337	24.1		96.2	75-125	accept

Notes



Date: 9/24/07
Time: 10:16 AM

Peak	rt	Area
1	1.96	1,093,112

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
6	STD	100 pg		1	1,093,112	98.3		98.3	75-125	accept

Notes

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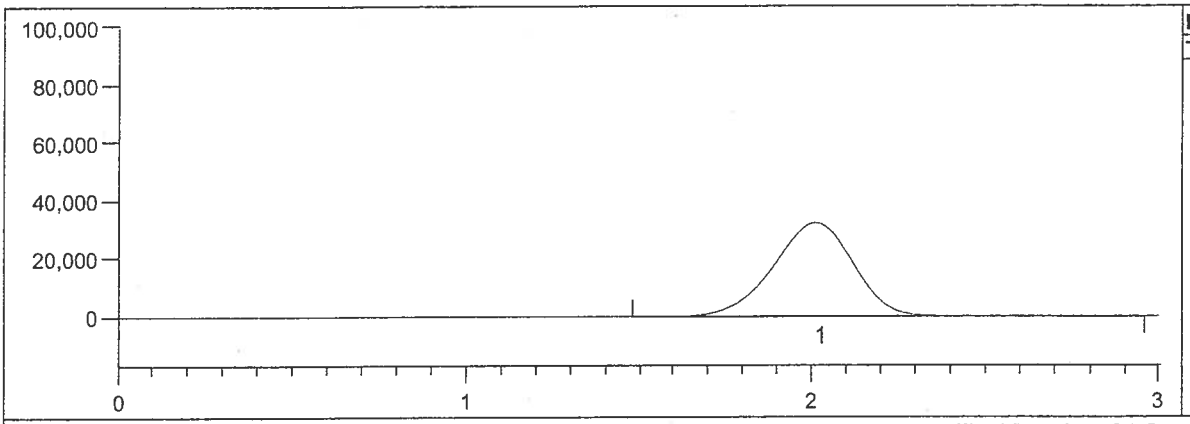
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

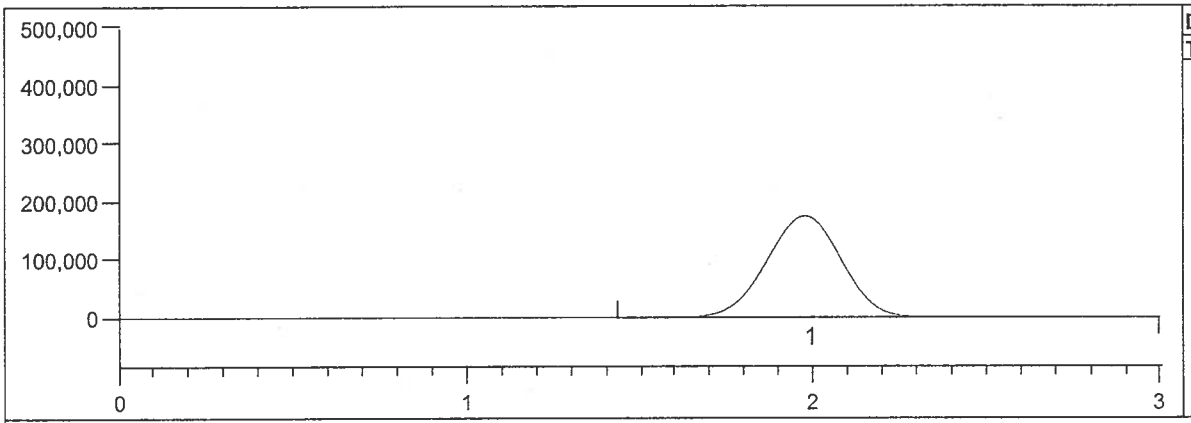


Date: 9/24/07
Time: 10:20 AM

Peak	rt	Area
1	2.00	5,221,992

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
7	STD	500 pg		1	5,221,992	499		99.8	75-125	accept

Notes

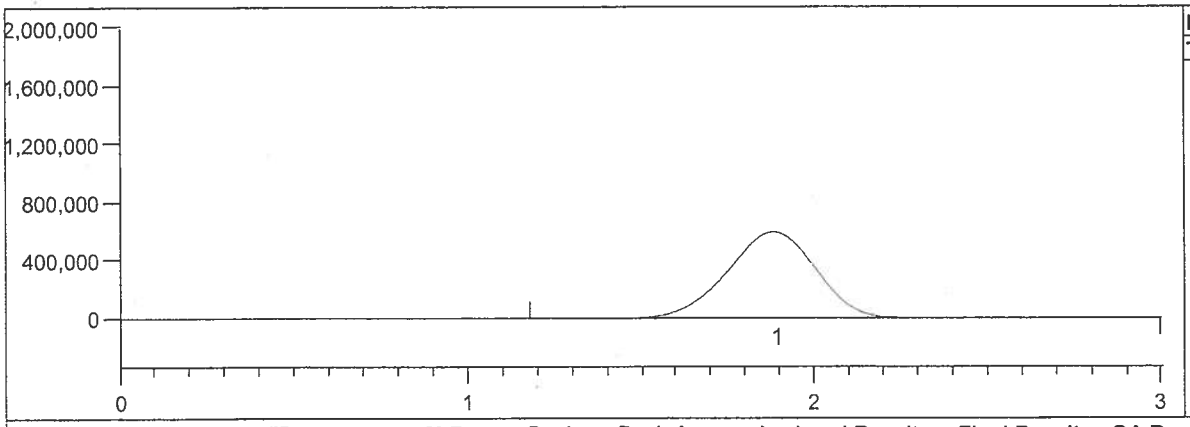


Date: 9/24/07
Time: 10:27 AM

Peak	rt	Area
1	1.97	26,495,900

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
8	STD	2500 pg		1	26,495,900	2,560		103	75-125	accept

Notes



Date: 9/24/07
Time: 10:31 AM

Peak	rt	Area
1	1.88	106,714,600

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
9	STD	10000 pg		1	106,714,600	10,300		103	75-125	accept

Notes

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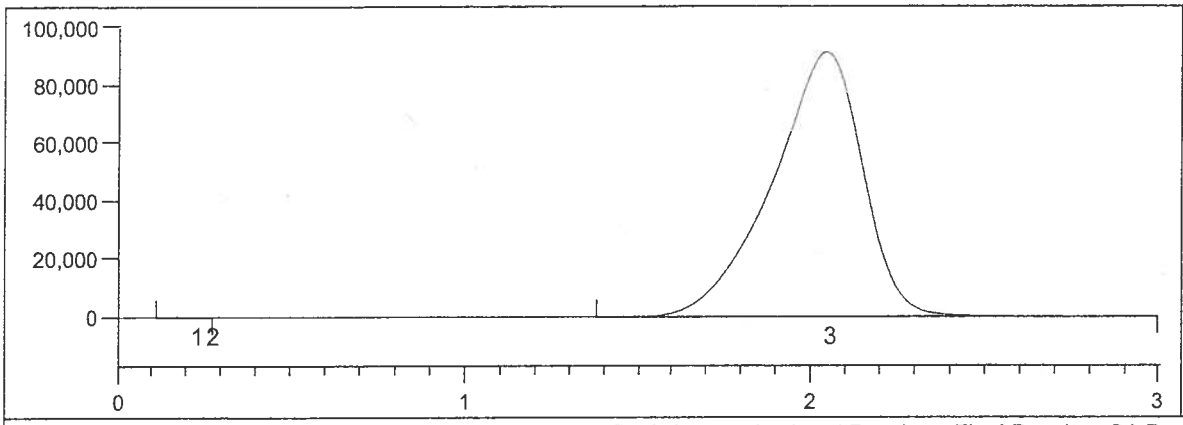
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

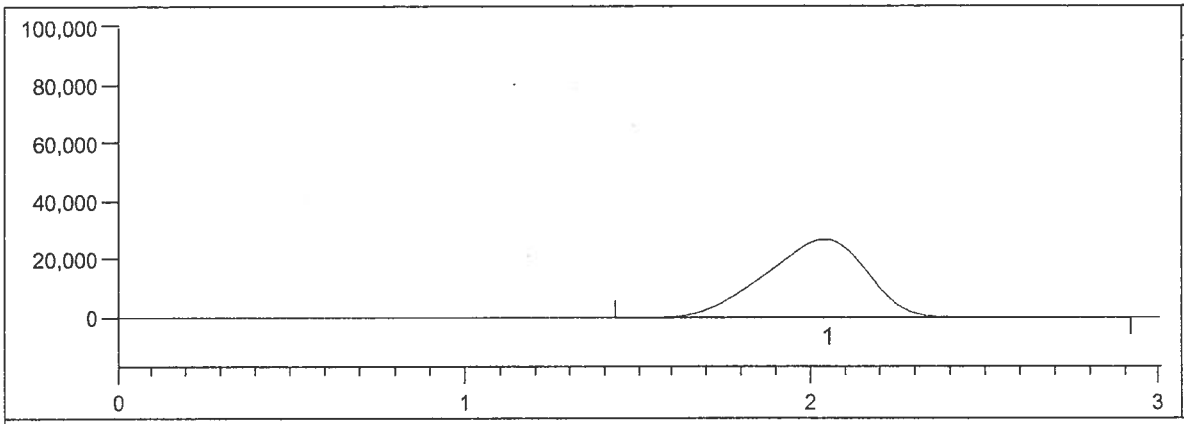


Date: 9/24/07
Time: 10:36 AM

Peak	rt	Area
1	0.22	220
2	0.26	25
3	2.04	16,609,387

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
10	IPR	ICV 1601 pg		3	16,609,387	1,600		100.	85-115	accept

Notes

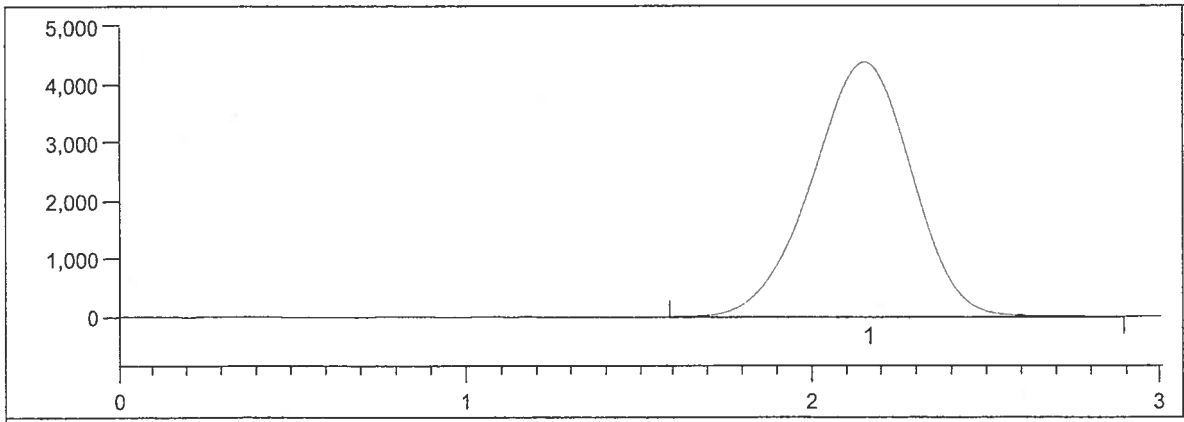


Date: 9/24/07
Time: 10:41 AM

Peak	rt	Area
1	2.03	5,536,303

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
11	OPR	CCV 500 pg		1	5,536,303	529		106	70-130	accept

Notes



Date: 9/24/07
Time: 10:45 AM

Peak	rt	Area
1	2.14	877,332

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
12	MBA	MB-1	MBA	1	877,332	77.3	0.309	0.309	< 0.14	reject

Notes

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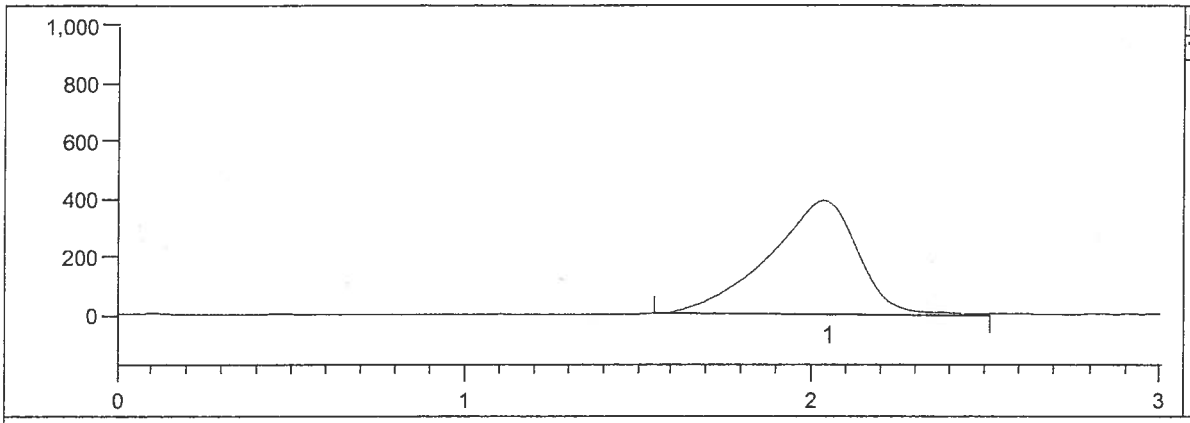
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

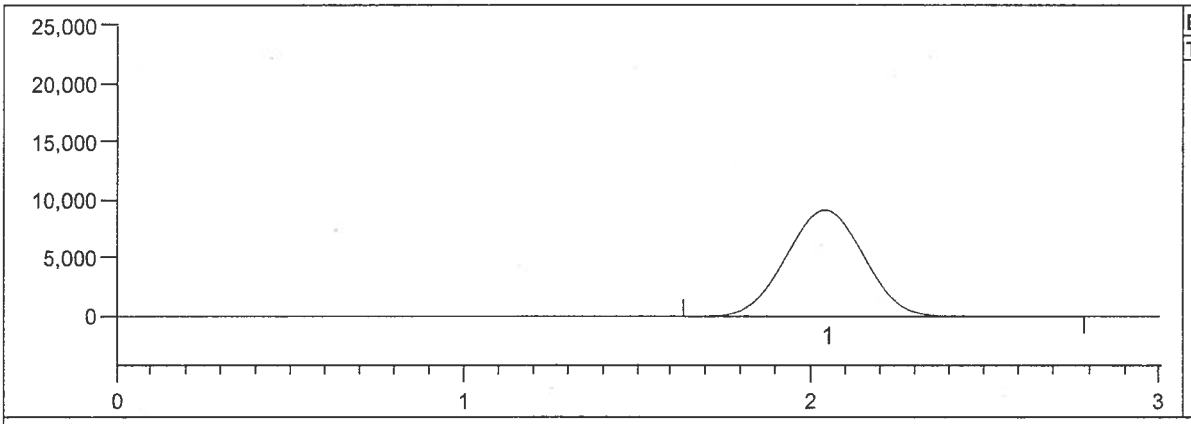


Date: 9/24/07
Time: 10:56 AM

Peak	rt	Area
1	2.03	68,073

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
13	CCB	CCB		1	68,073	-1.20		-1.20	< 50	accept

Notes

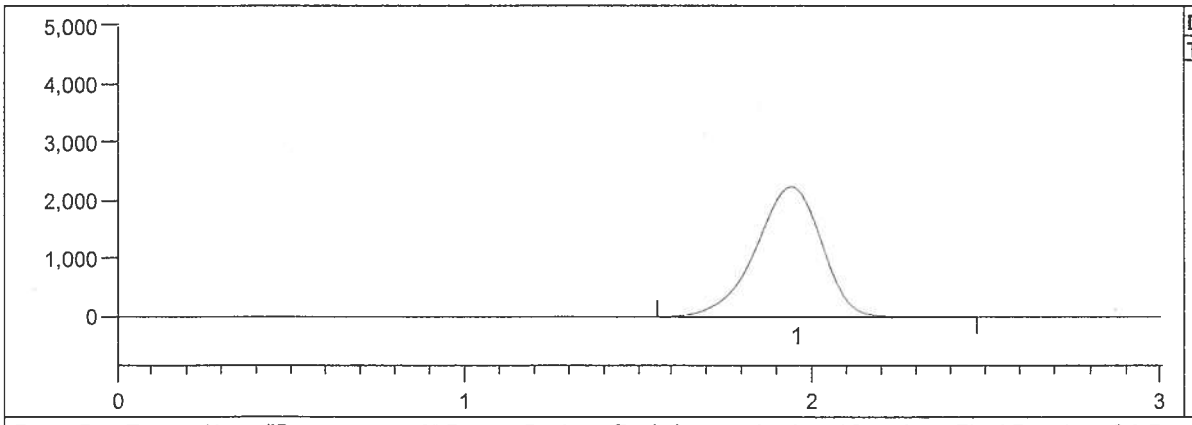


Date: 9/24/07
Time: 11:00 AM

Peak	rt	Area
1	2.03	1,440,208

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
14	MBA	MB-2	MBA	1	1,440,208	132	0.528	0.528	< 0.14	reject

Notes



Date: 9/24/07
Time: 11:03 AM

Peak	rt	Area
1	1.93	298,480

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
15	MBA	MB-3	MBA	1	298,480	21.2	0.0847	0.0847	< 0.14	accept

Notes

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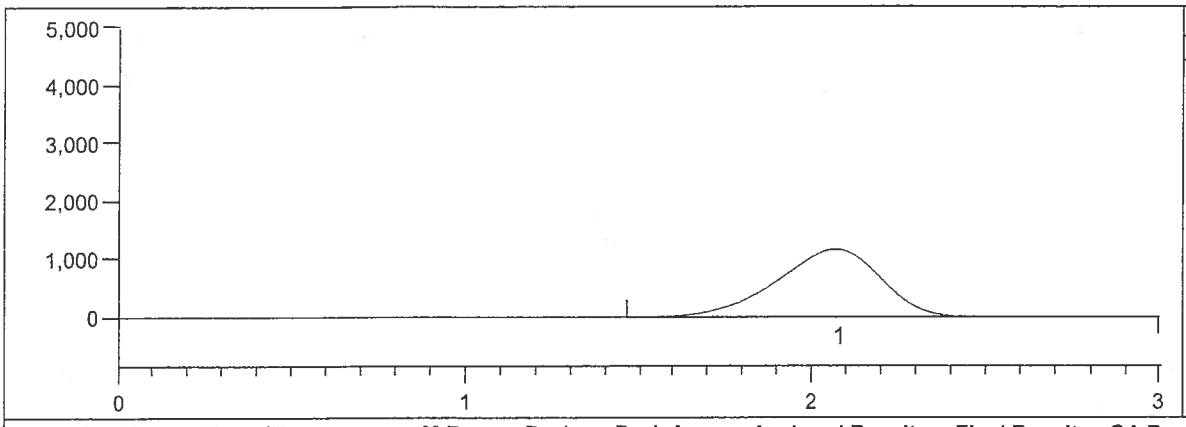
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

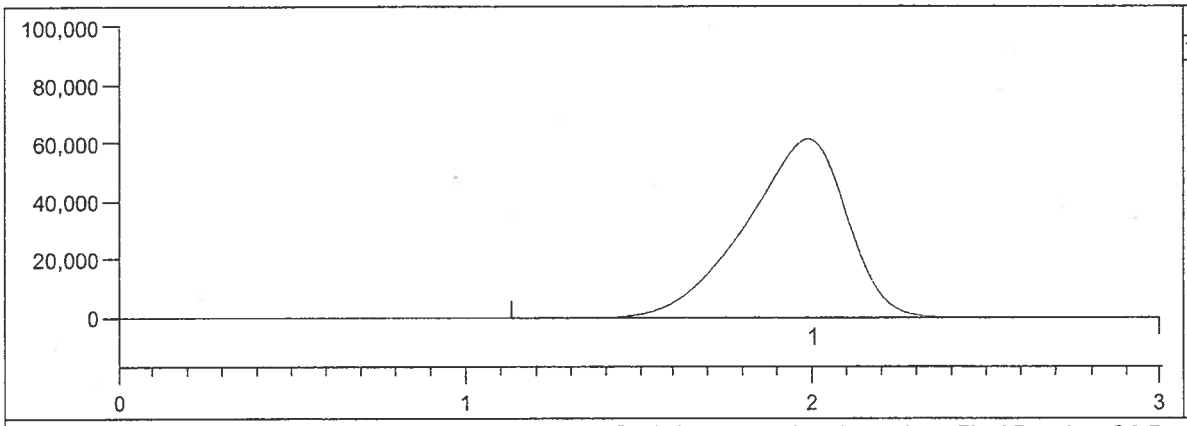


Date: 9/24/07
Time: 11:07 AM

Peak	rt	Area
1	2.06	244,503

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
16	MBA	MB-4	MBA	1	244,503	15.9	0.0637	0.0637	< 0.14	accept

Notes

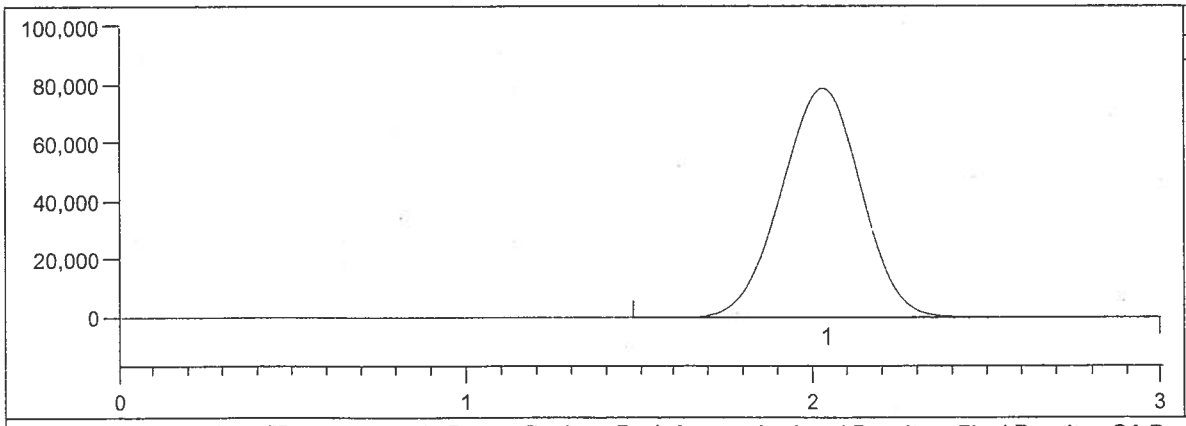


Date: 9/24/07
Time: 11:16 AM

Peak	rt	Area
1	1.98	12,595,542

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
17	QCS	CRM-1	MBA	1	12,595,542	1,210	4,760	103	65-135	accept

Notes



Date: 9/24/07
Time: 11:20 AM

Peak	rt	Area
1	2.02	12,768,660

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
18	QCS	CRM-2	MBA	1	12,768,660	1,230	4,810	104	65-135	accept

Notes

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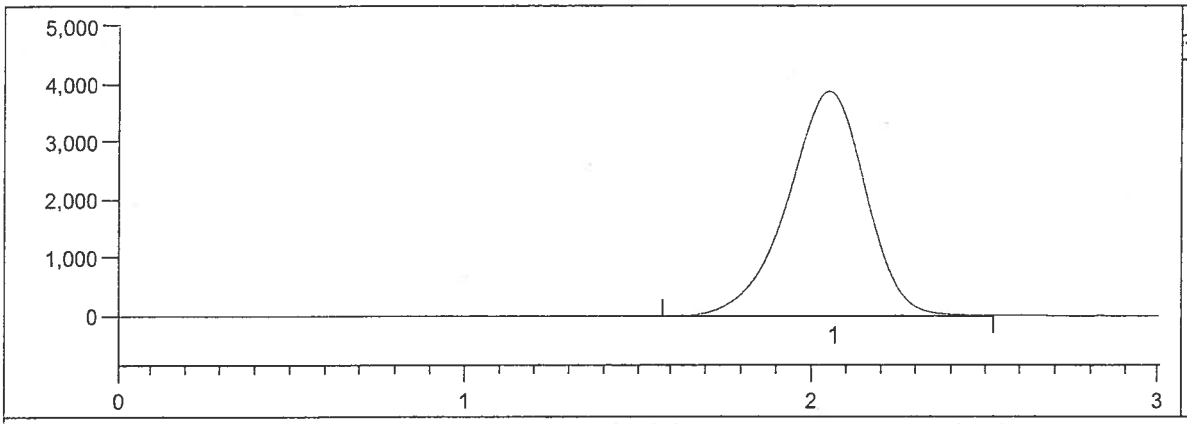
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

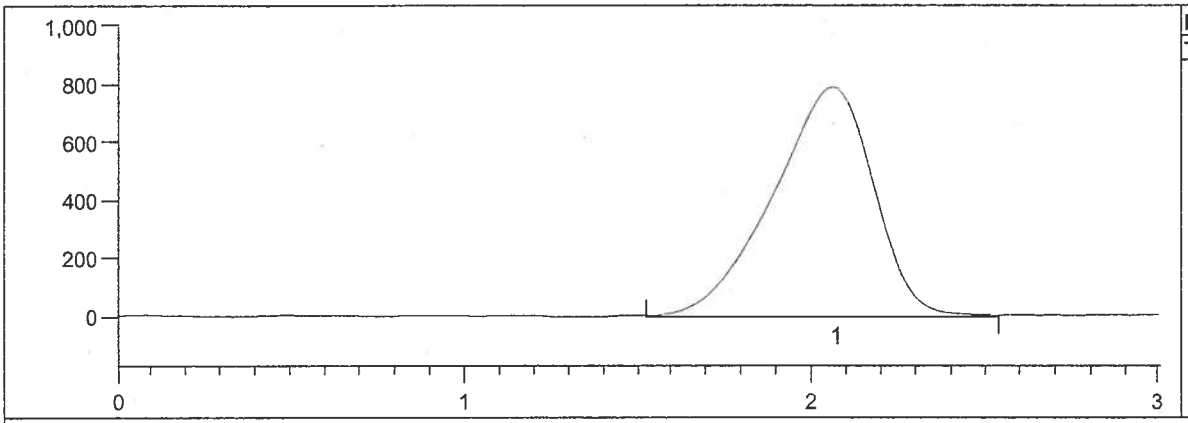


Date: 9/24/07
Time: 11:24 AM

Peak	rt	Area
1	2.04	602,106

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
19	S	PQLLFB	MBA	1	602,106	50.6	0.128		< HS	accept

Notes

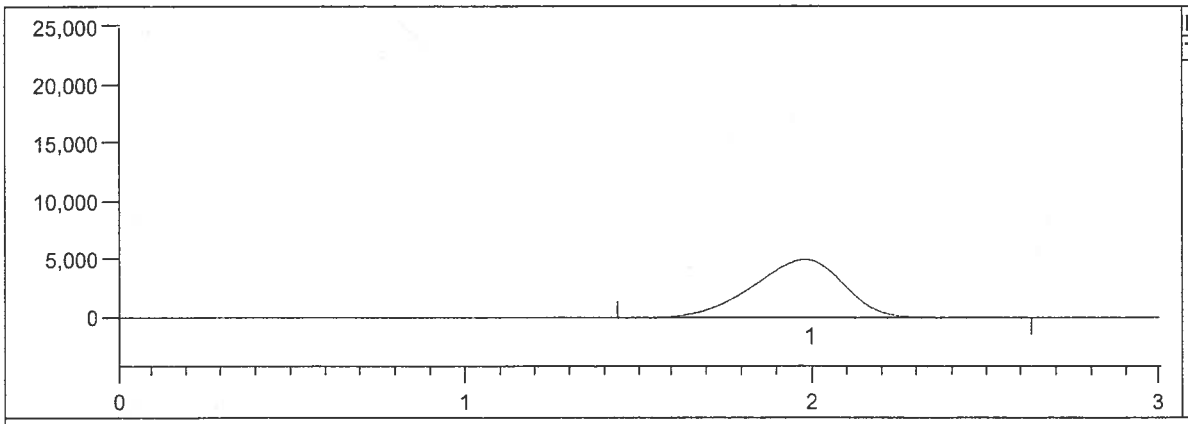


Date: 9/24/07
Time: 11:28 AM

Peak	rt	Area
1	2.06	157,524

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
20	S	07BR1309-41	MBA	1	157,524	7.48	-0.0445		< HS	accept

Notes



Date: 9/24/07
Time: 11:40 AM

Peak	rt	Area
1	1.97	914,481

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
21	MBA	MB-1R	MBA	1	914,481	80.9	0.324	0.324	< 0.14	reject

Notes

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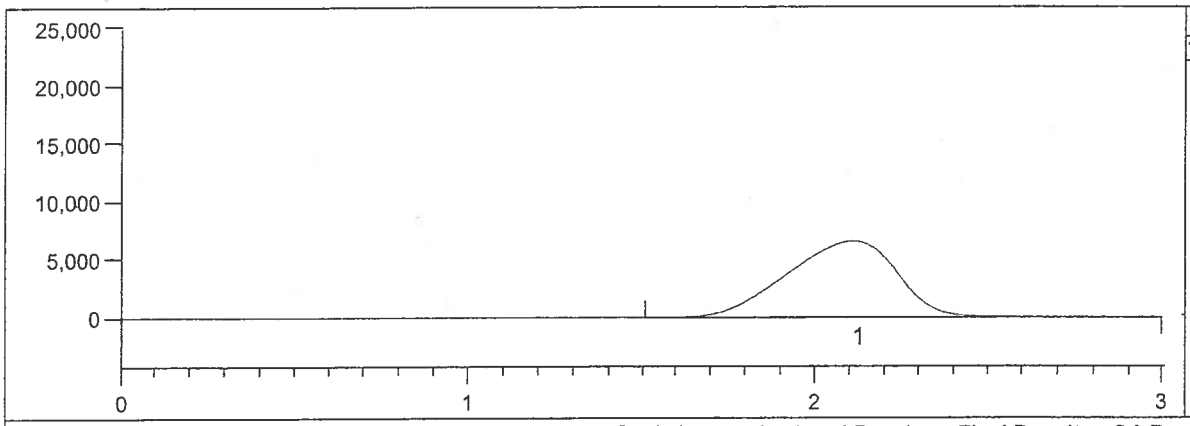
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

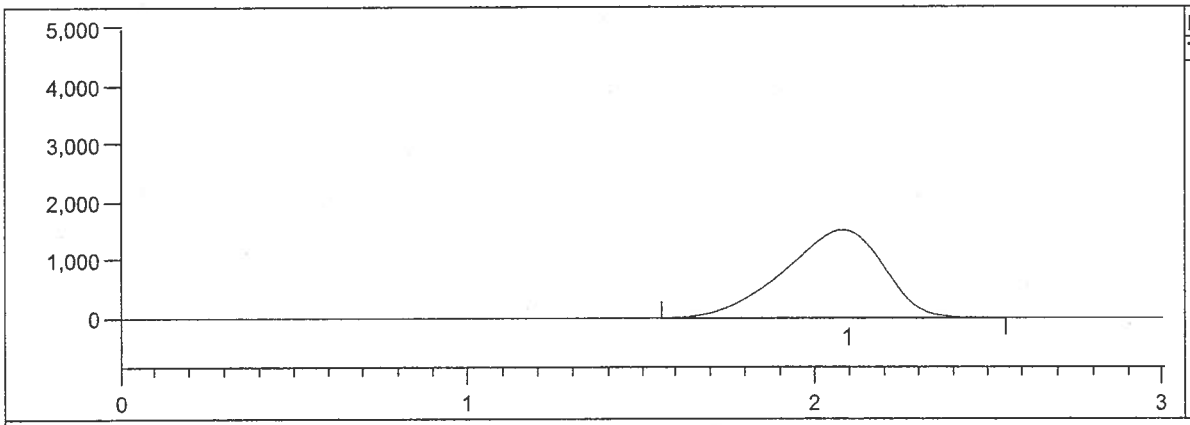


Date: 9/24/07
Time: 11:44 AM

Peak	rt	Area
1	2.10	1,448,511

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
22	MBA	MB-2R	MBA	1	1,448,511	133	0.531	0.531	< 0.14	reject

Notes

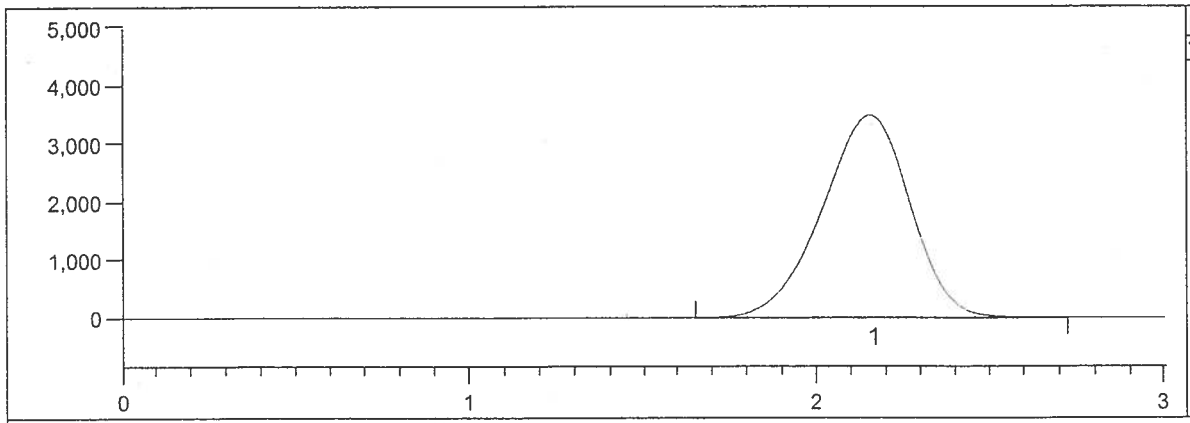


Date: 9/24/07
Time: 11:48 AM

Peak	rt	Area
1	2.08	302,219

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
23	S	07BR1309-42	MBA	1	302,219	21.5	0.0111		< HS	accept

Notes



Date: 9/24/07
Time: 11:55 AM

Peak	rt	Area
1	2.15	620,231

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
24	S	07BR1309-01	MBA	1	620,231	52.4	4.09		< HS	accept

Notes

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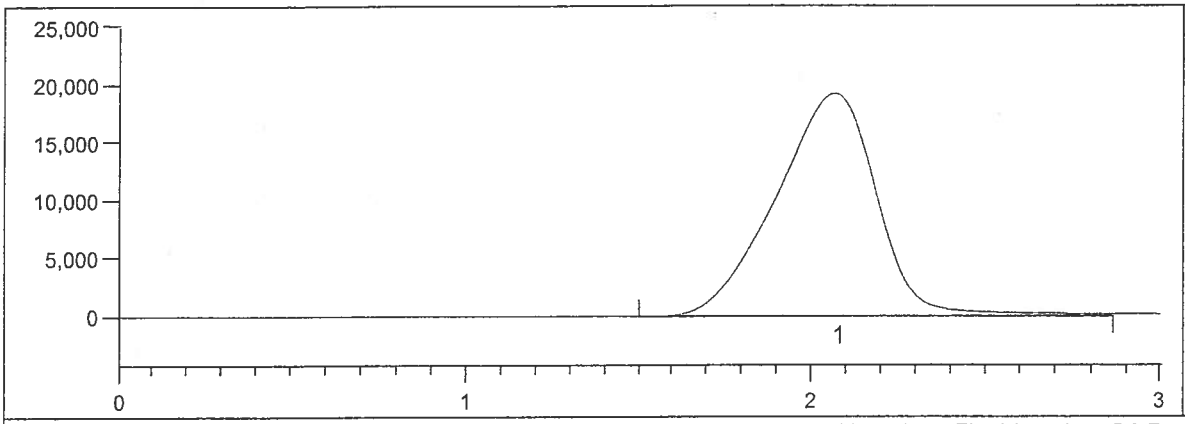
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

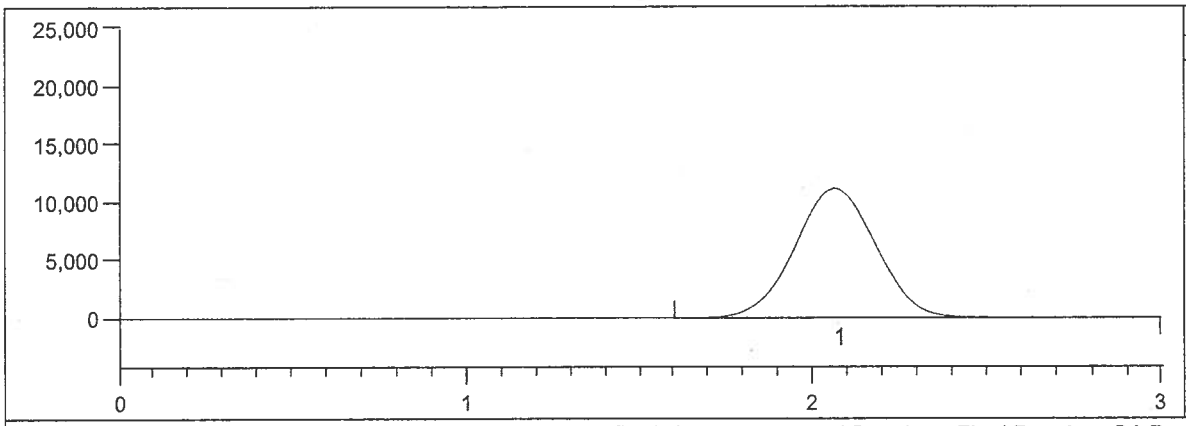


Date: 9/24/07
Time: 11:59 AM

Peak	rt	Area
1	2.06	3,805,757

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
25	S	07BR1309-06	MBA	1	3,805,757	362	25.5		< HS	accept

Notes

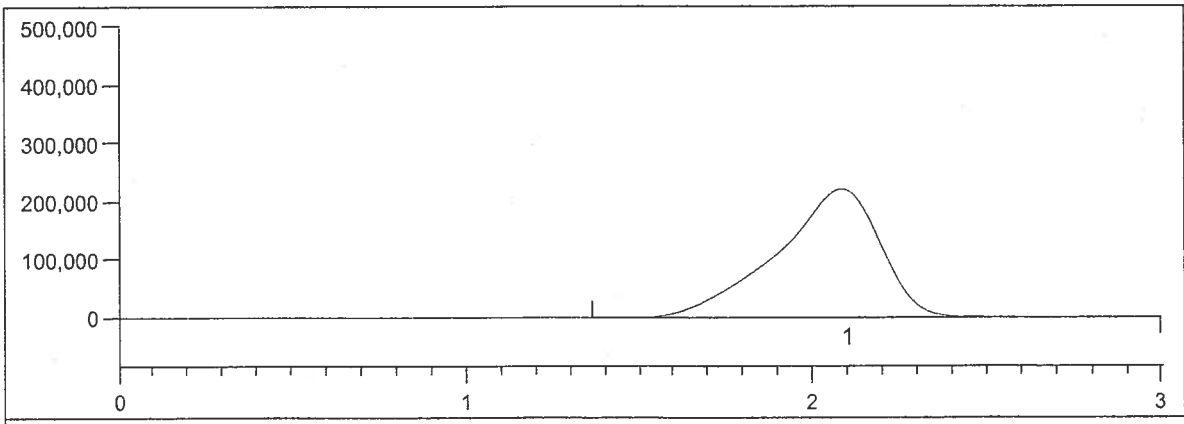


Date: 9/24/07
Time: 12:05 PM

Peak	rt	Area
1	2.06	1,823,283

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
26	S	07BR1309-11	MBA	1	1,823,283	169	12.7		< HS	accept

Notes



Date: 9/24/07
Time: 12:09 PM

Peak	rt	Area
1	2.08	46,114,282

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
27	S	07BR1309-16	MBA	1	46,114,282	4,470	349		< HS	accept

Notes

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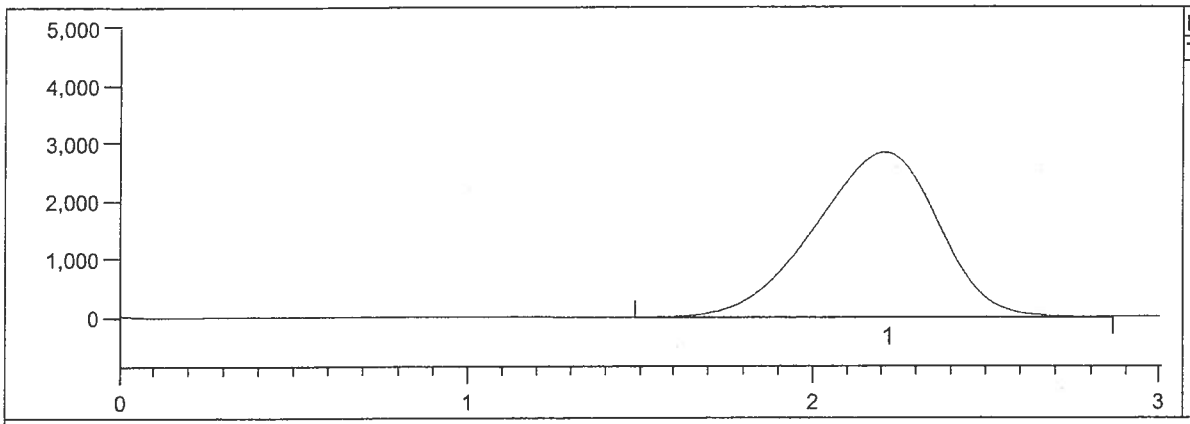
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

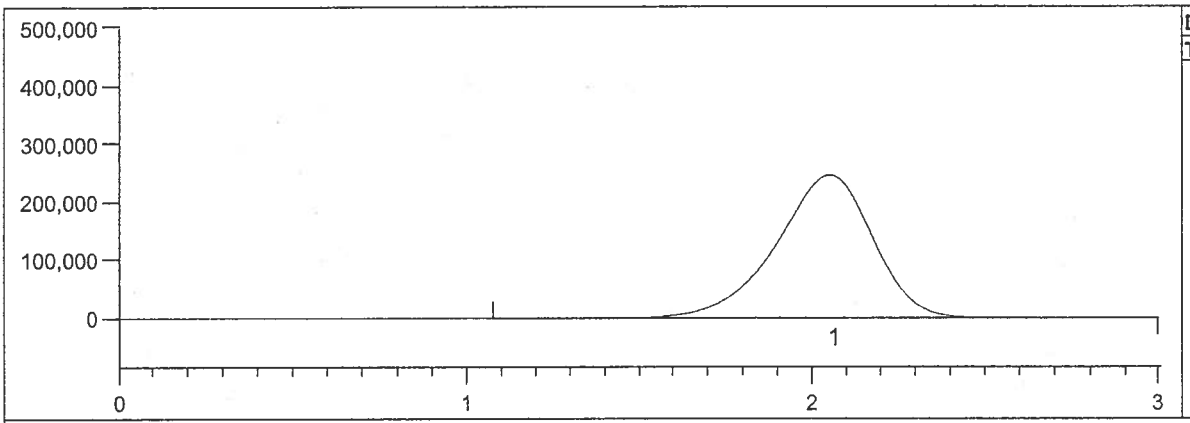


Date: 9/24/07
Time: 12:12 PM

Peak	rt	Area
1	2.20	707,043

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
28	S	07BR1309-21	MBA	1	707,043	60.8	4.76		< HS	accept

Notes

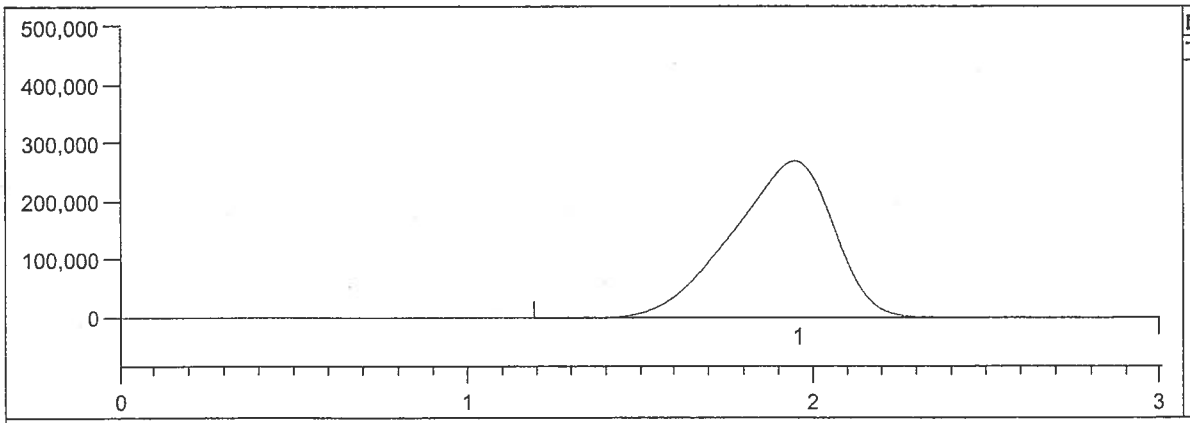


Date: 9/24/07
Time: 12:30 PM

Peak	rt	Area
1	2.04	48,573,850

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
29	S	07BR1309-26	MBA	1	48,573,850	4,710	32.4		< HS	accept

Notes



Date: 9/24/07
Time: 12:34 PM

Peak	rt	Area
1	1.94	55,864,445

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
30	S	07BR1309-31	MBA	1	55,864,445	5,410	38.5		< HS	accept

Notes

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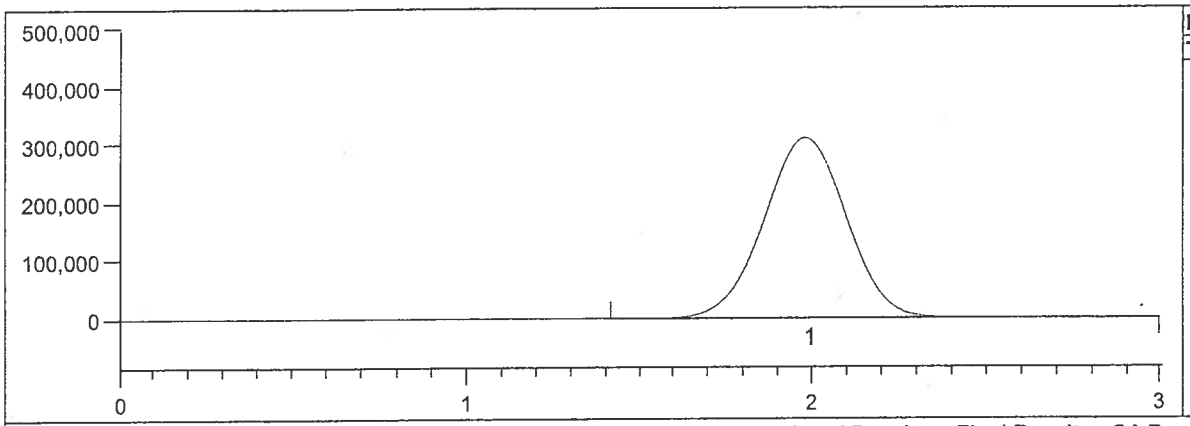
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

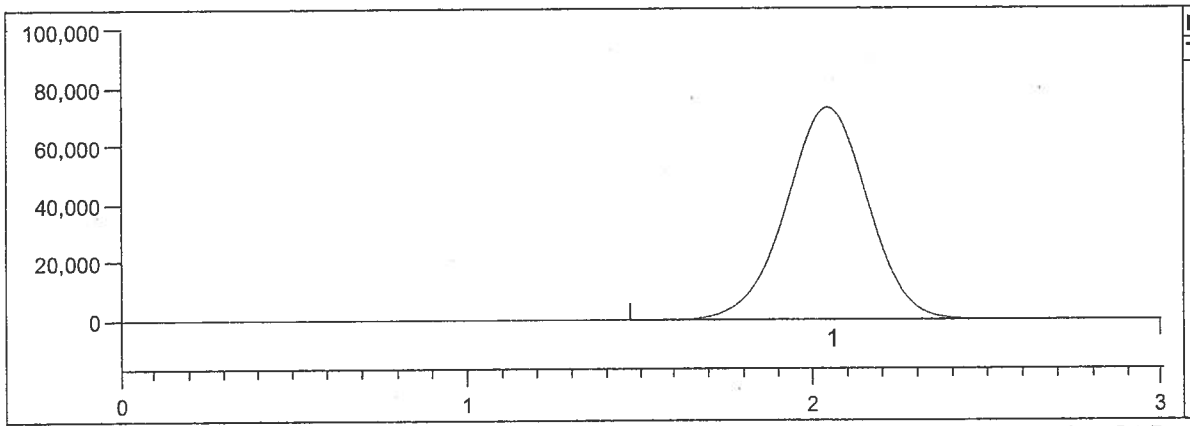


Date: 9/24/07
Time: 12:38 PM

Peak	rt	Area
1	1.97	51,720,753

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
31	S	07BR1309-36	MBA	1	51,720,753	5,010	36.0		< HS	accept

Notes

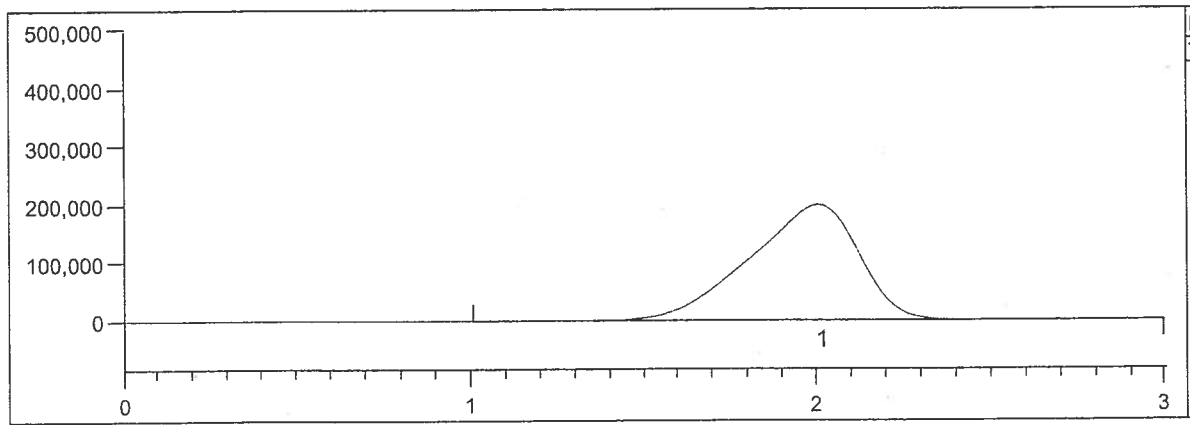


Date: 9/24/07
Time: 12:42 PM

Peak	rt	Area
1	2.04	12,088,762

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
32	S	07BR1309-01R	MBA	1	12,088,762	1,170	4.56		< HS	accept

Notes



Date: 9/24/07
Time: 12:50 PM

Peak	rt	Area
1	2.00	43,955,370

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
33	S	07BR1309-06R	MBA	1	43,955,370	4,260	30.0		< HS	accept

Notes

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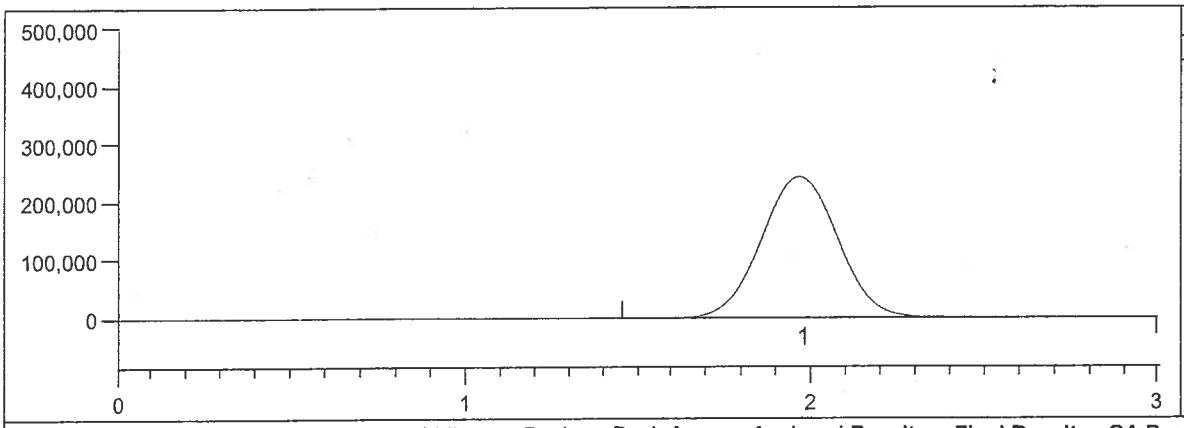
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

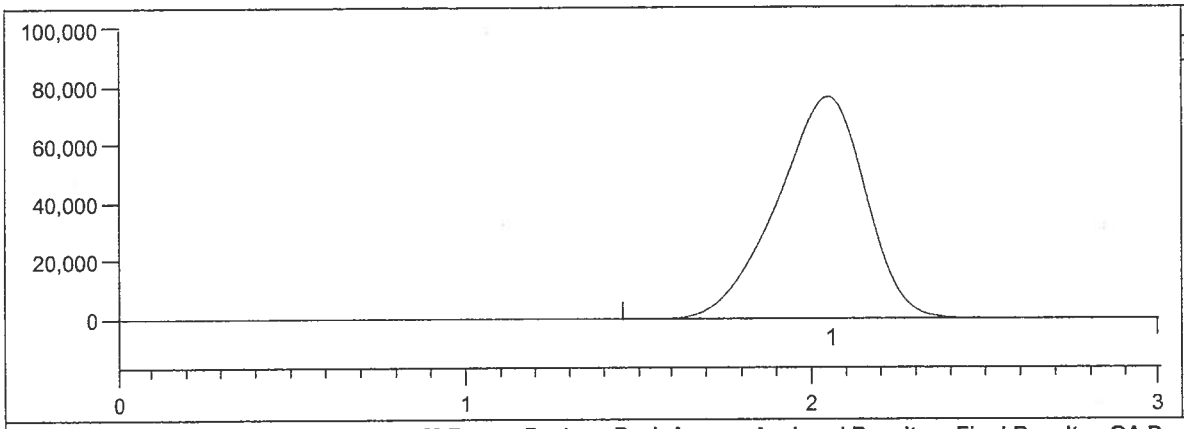


Date: 9/24/07
Time: 12:56 PM

Peak	rt	Area
1	1.96	37,356,048

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
34	S	07BR1309-11R	MBA	1	37,356,048	3,620	13.6		< HS	accept

Notes

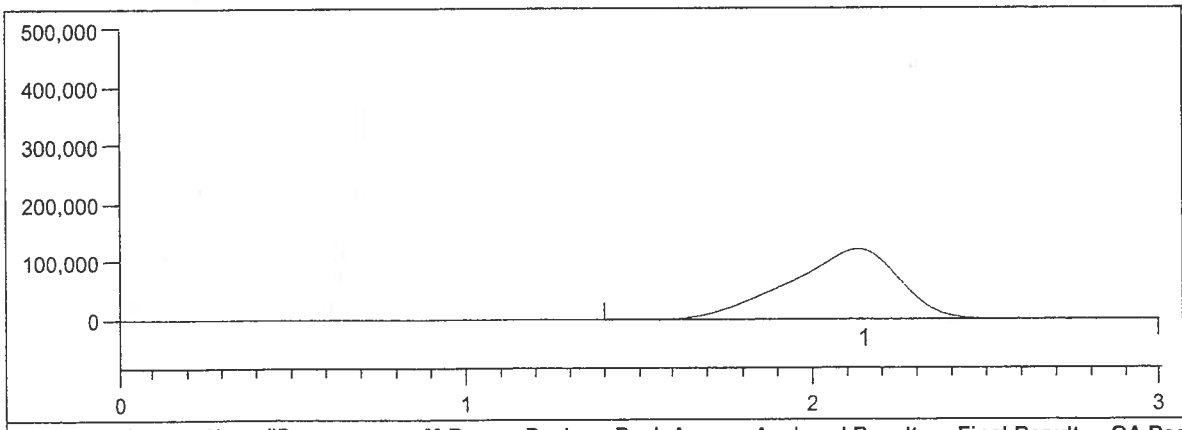


Date: 9/24/07
Time: 1:01 PM

Peak	rt	Area
1	2.04	13,605,306

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
35	S	07BR1309-21R	MBA	1	13,605,306	1,310	5.14		< HS	accept

Notes



Date: 9/24/07
Time: 1:08 PM

Peak	rt	Area
1	2.13	26,986,456

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
36	S	07BR1309-16R	MBA	1	26,986,456	2,610	340.		< HS	accept

Notes

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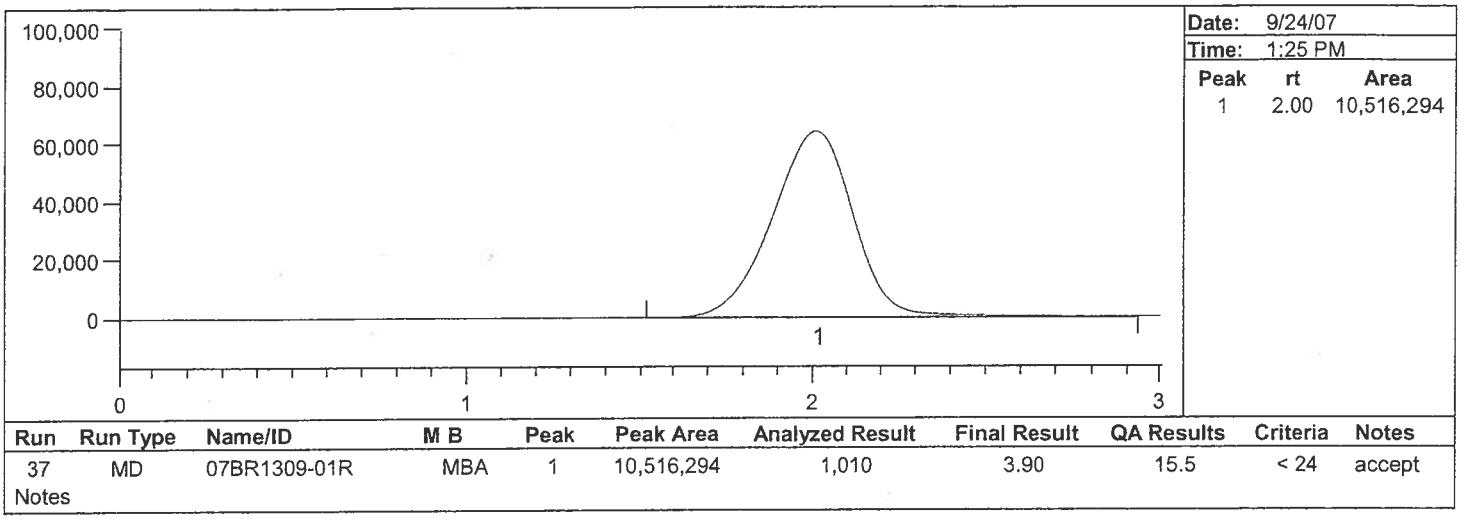
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

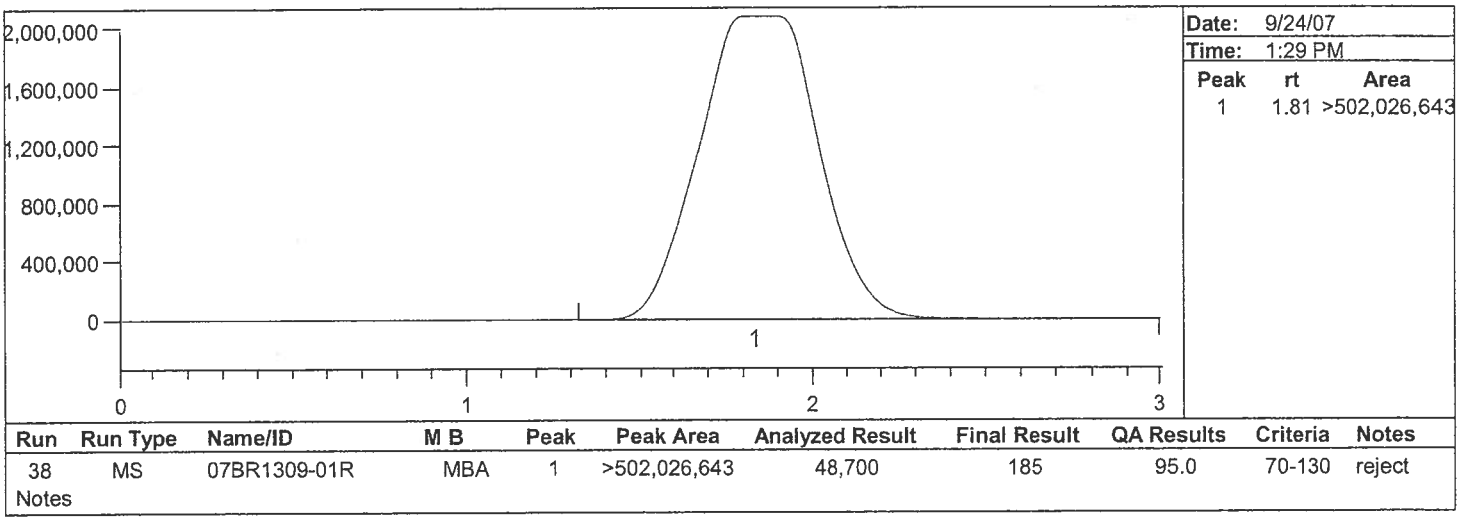


Date: 9/24/07
Time: 1:25 PM

Peak	rt	Area
1	2.00	10,516,294

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
37	MD	07BR1309-01R	MBA	1	10,516,294	1,010	3.90	15.5	< 24	accept

Notes

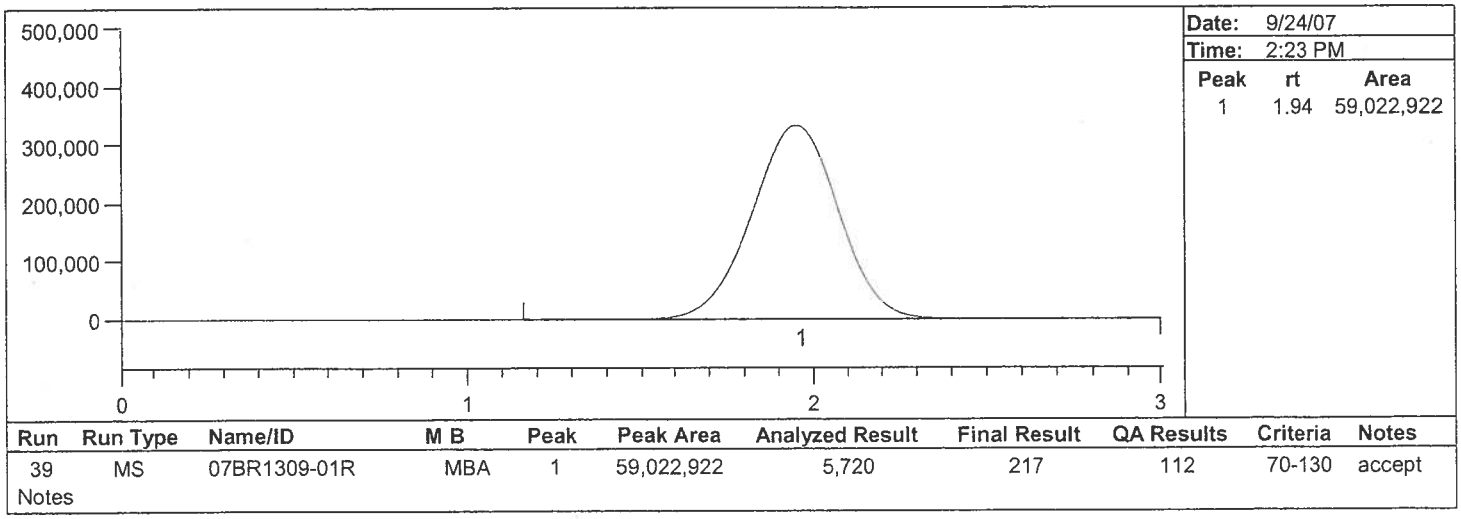


Date: 9/24/07
Time: 1:29 PM

Peak	rt	Area
1	1.81	>502,026,643

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
38	MS	07BR1309-01R	MBA	1	>502,026,643	48,700	185	95.0	70-130	reject

Notes



Date: 9/24/07
Time: 2:23 PM

Peak	rt	Area
1	1.94	59,022,922

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
39	MS	07BR1309-01R	MBA	1	59,022,922	5,720	217	112	70-130	accept

Notes

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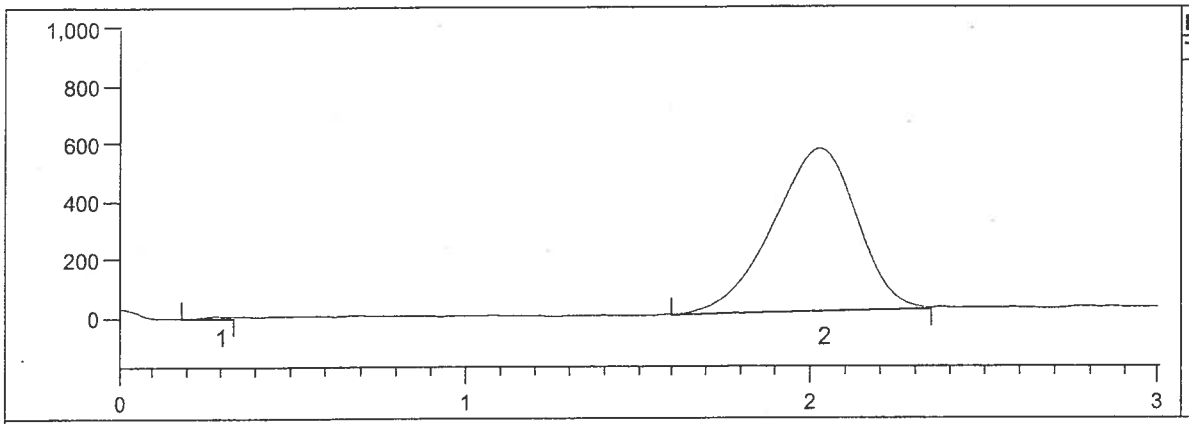
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

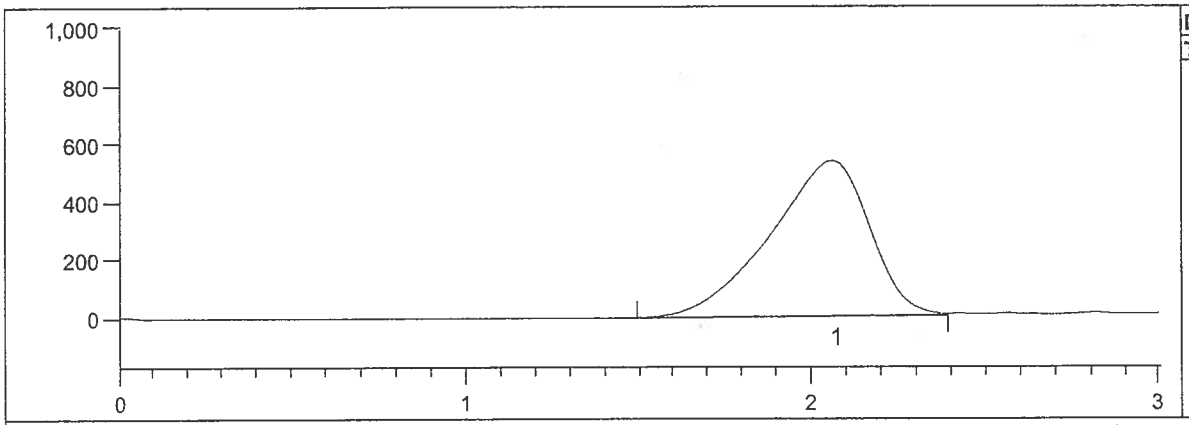


Date: 9/24/07
Time: 2:27 PM

Peak	rt	Area
1	0.28	283
2	2.02	92,666

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
40	CCB	CCB		2	92,666	1.19		1.19	< 50	accept

Notes

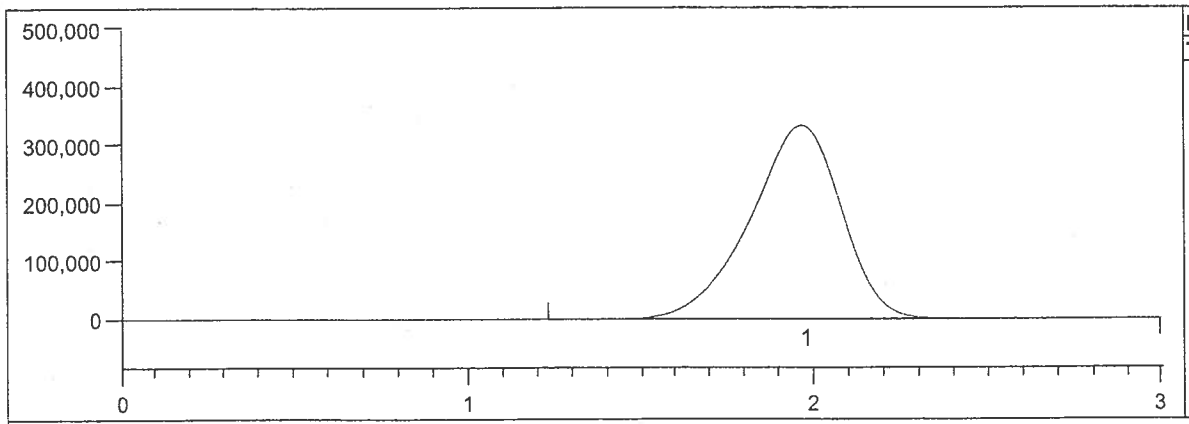


Date: 9/24/07
Time: 2:33 PM

Peak	rt	Area
1	2.05	104,976

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
41	CCB	CCB		1	104,976	2.38		2.38	< 50	accept

Notes



Date: 9/24/07
Time: 2:37 PM

Peak	rt	Area
1	1.96	61,074,621

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
42	MSD	07BR1309-01R	MBA	1	61,074,621	5,920	225	116	70-130	accept

Notes

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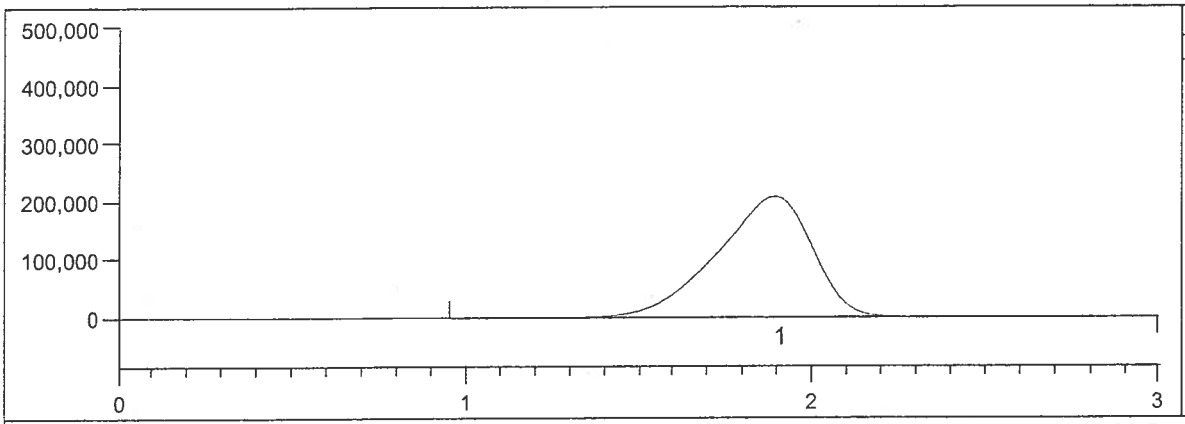
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

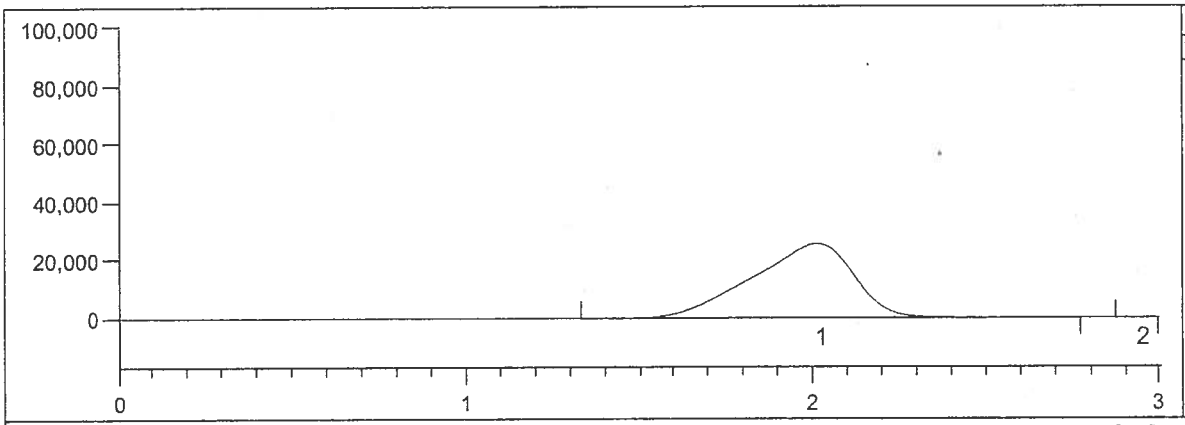


Date: 9/24/07
Time: 2:43 PM

Peak	rt	Area
1	1.89	40,095,530

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
43	MS	07BR1309-01R	MBA	1	40,095,530	3,880	15.4	109	70-130	accept

Notes

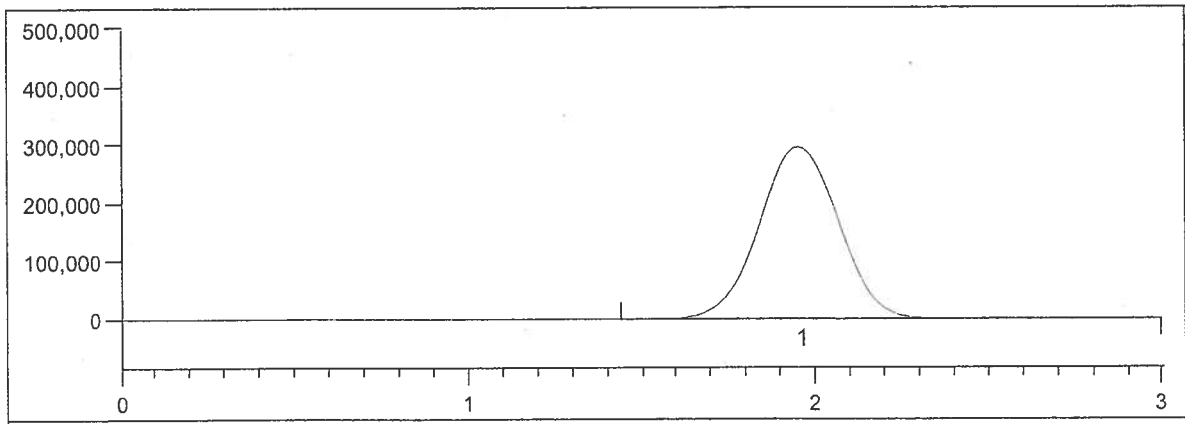


Date: 9/24/07
Time: 2:48 PM

Peak	rt	Area
1	2.01	5,229,137
2	2.93	63

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
44	OPR	CCV		1	5,229,137	500.		99.9	70-130	accept

Notes



Date: 9/24/07
Time: 2:52 PM

Peak	rt	Area
1	1.95	47,448,831

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
45	MD	07BR1309-06R	MBA	1	47,448,831	4,600	31.6	4.94	< 24	accept

Notes

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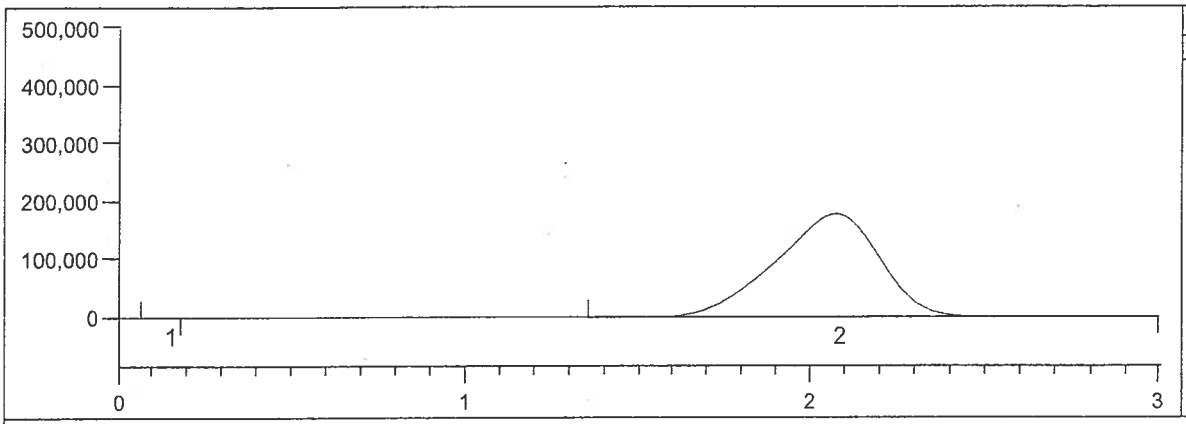
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

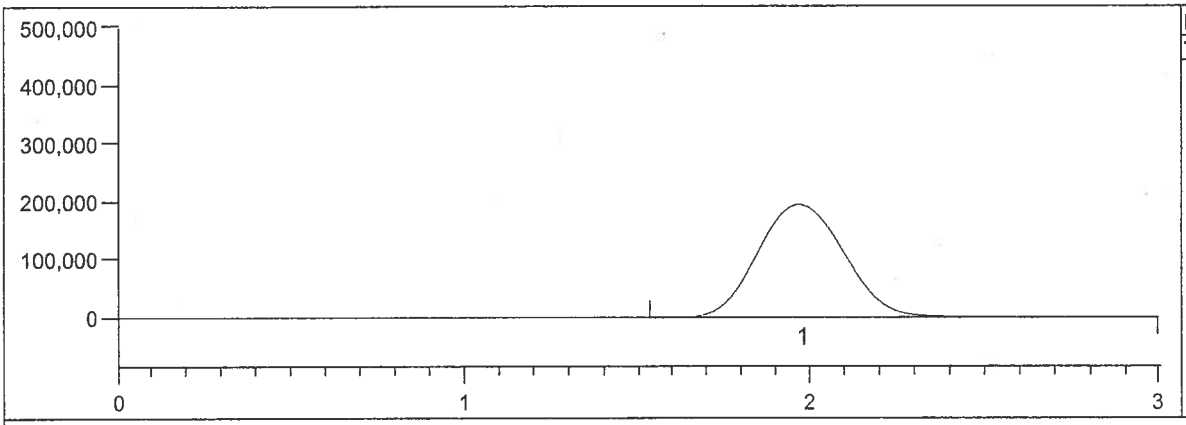


Date: 9/24/07
Time: 2:56 PM

Peak	rt	Area
1	0.13	192
2	2.07	37,295,545

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
46	MS	07BR1309-06R	MBA	2	37,295,545	3,610	558	109	70-130	accept

Notes

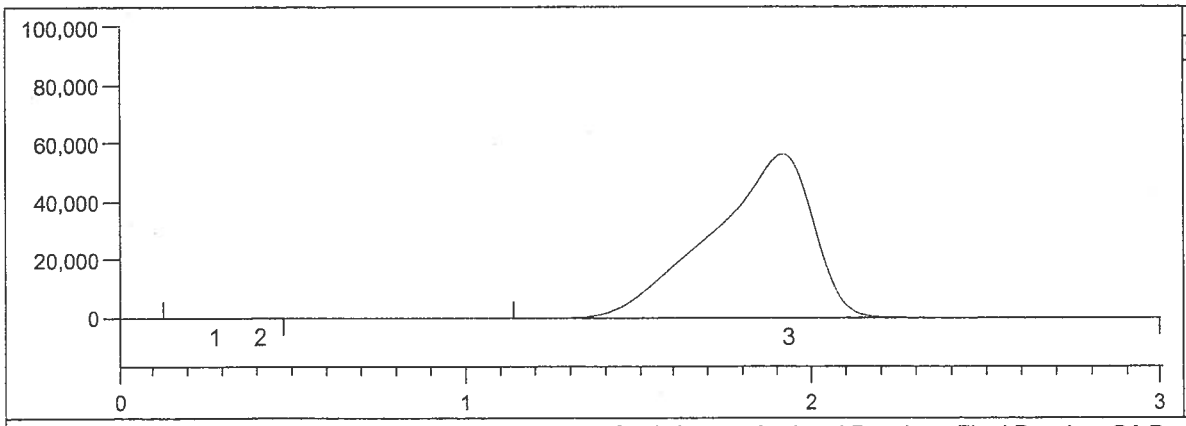


Date: 9/24/07
Time: 3:03 PM

Peak	rt	Area
1	1.96	34,164,964

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
47	MSD	07BR1309-06R	MBA	1	34,164,964	3,310	486	99.3	70-130	accept

Notes



Date: 9/24/07
Time: 3:07 PM

Peak	rt	Area
1	0.26	981
2	0.39	263
3	1.91	11,639,990

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
48	S	07BR1309-02	MBA	3	11,639,990	1,120	4.33		< HS	accept

Notes

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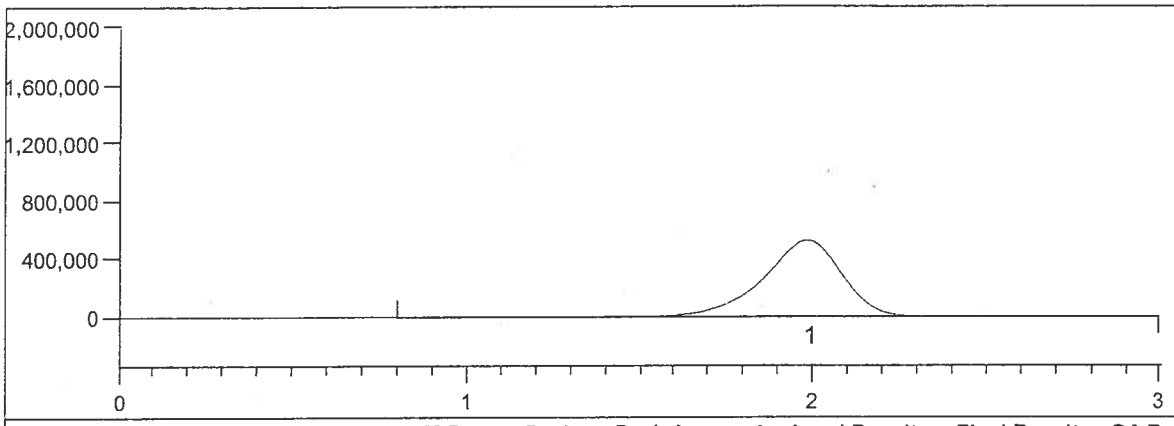
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

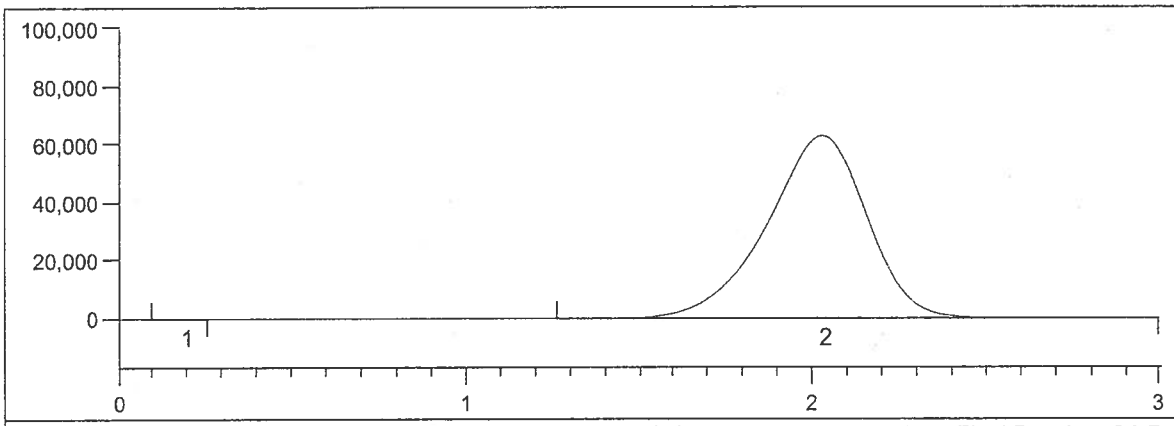


Date: 9/24/07
Time: 3:12 PM

Peak	rt	Area
1	1.98	83,823,174

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
49	S	07BR1309-03	MBA	1	83,823,174	8,130	30.7		< HS	accept

Notes

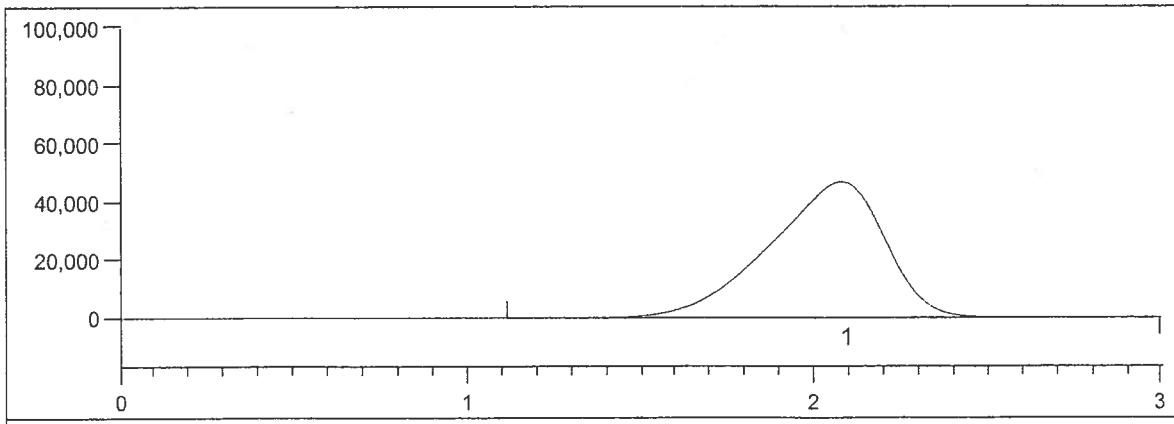


Date: 9/24/07
Time: 3:18 PM

Peak	rt	Area
1	0.18	315
2	2.02	12,625,476

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
50	S	07BR1309-04	MBA	2	12,625,476	1,220	4.49		< HS	accept

Notes



Date: 9/24/07
Time: 3:30 PM

Peak	rt	Area
1	2.08	10,936,048

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
51	S	07BR1309-05	MBA	1	10,936,048	1,050	4.14		< HS	accept

Notes

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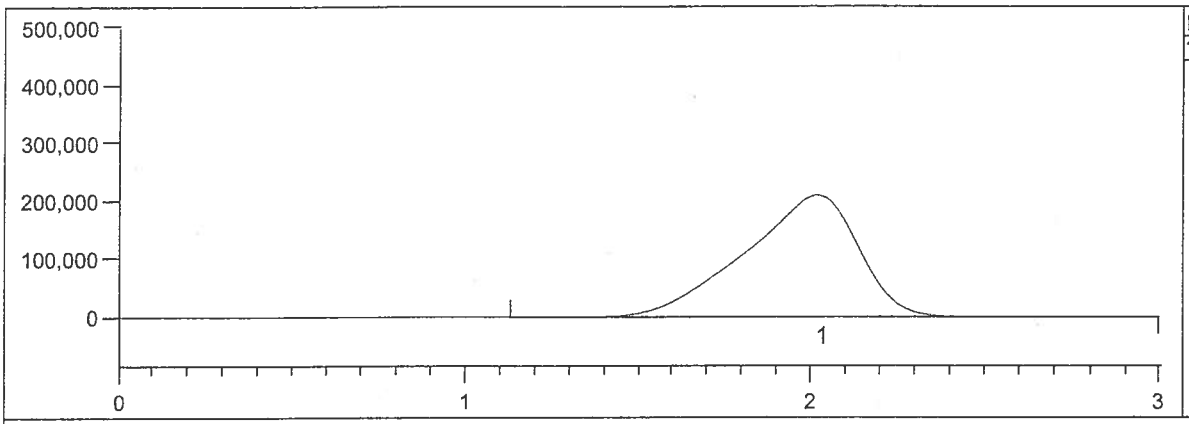
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

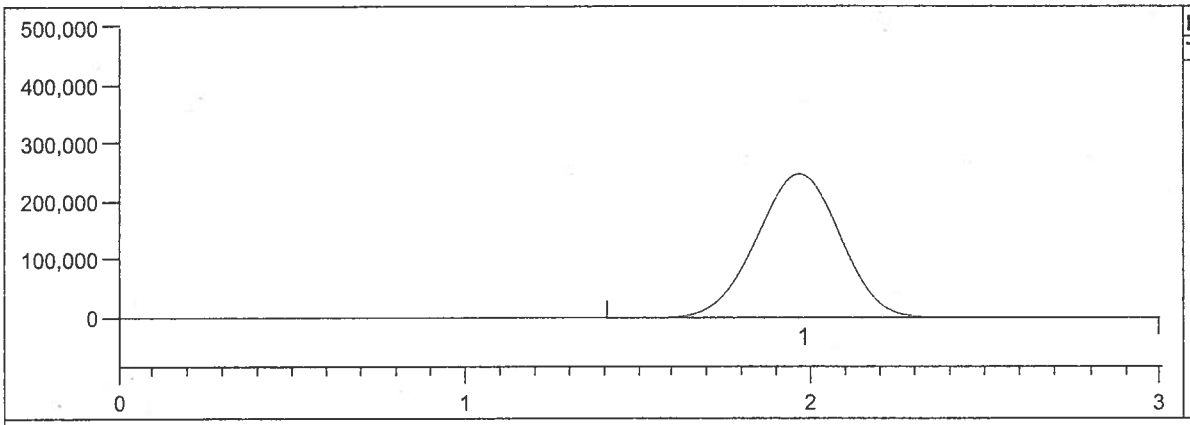


Date: 9/24/07
Time: 3:35 PM

Peak	rt	Area
1	2.01	47,876,172

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
52	S	07BR1309-07	MBA	1	47,876,172	4,640	31.0		< HS	accept

Notes

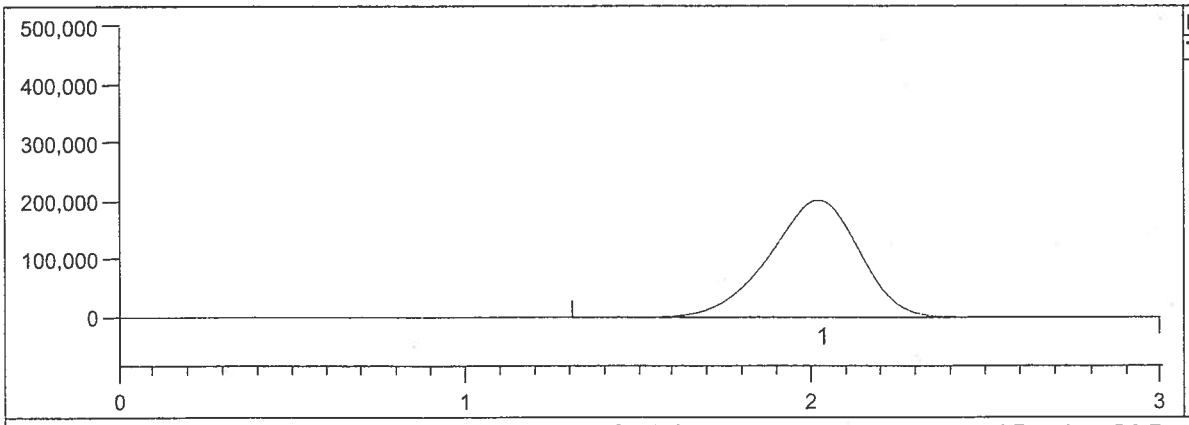


Date: 9/24/07
Time: 3:39 PM

Peak	rt	Area
1	1.96	42,169,320

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
53	S	07BR1309-08	MBA	1	42,169,320	4,080	31.1		< HS	accept

Notes



Date: 9/24/07
Time: 3:44 PM

Peak	rt	Area
1	2.02	37,131,082

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
54	S	07BR1309-09	MBA	1	37,131,082	3,600	28.0		< HS	accept

Notes

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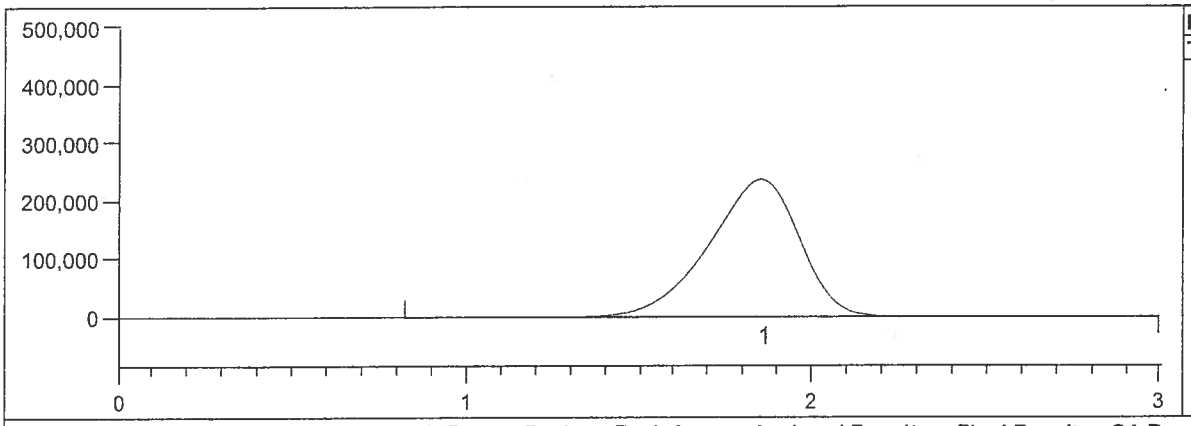
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

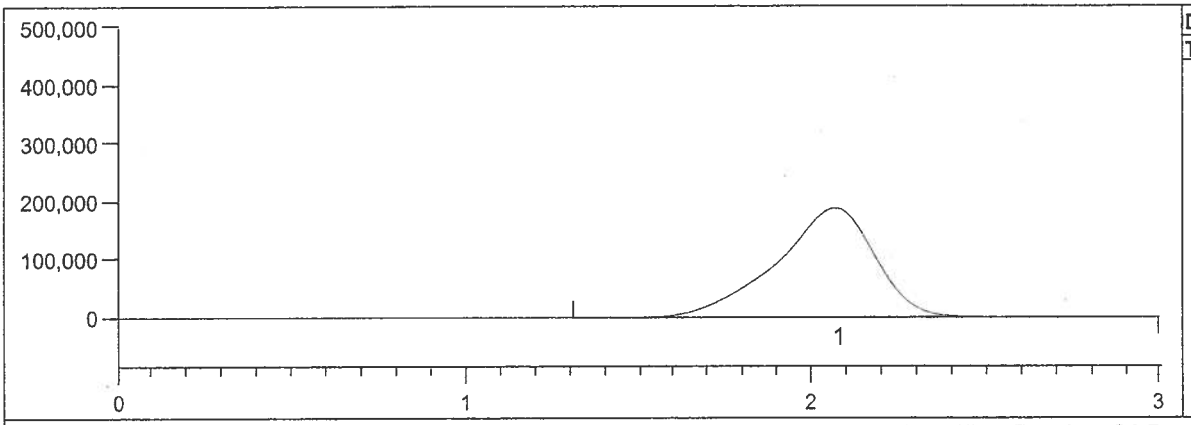


Date: 9/24/07
Time: 3:50 PM

Peak	rt	Area
1	1.85	43,454,488

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
55	S	07BR1309-10	MBA	1	43,454,488	4,210	29.3		< HS	accept

Notes

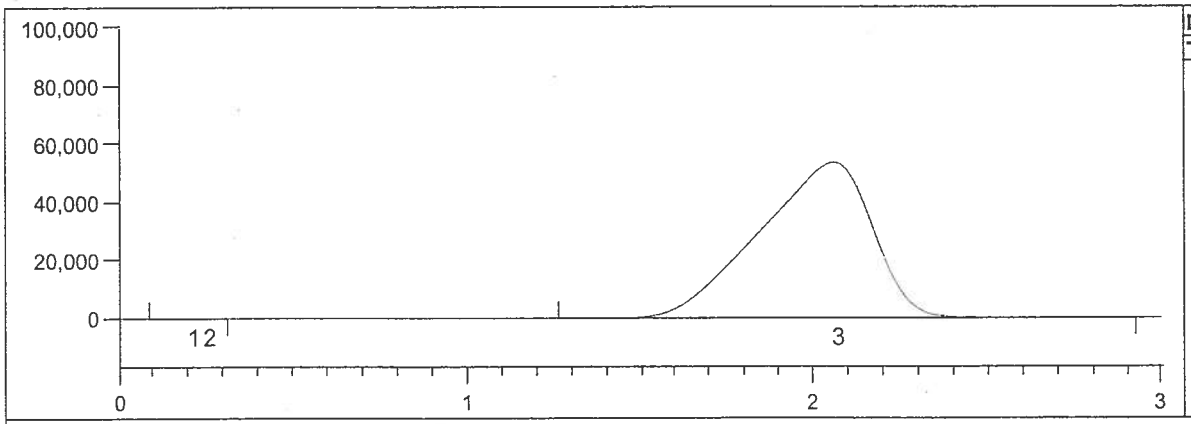


Date: 9/24/07
Time: 3:56 PM

Peak	rt	Area
1	2.06	37,358,037

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
56	S	07BR1309-12	MBA	1	37,358,037	3,620	13.6		< HS	accept

Notes



Date: 9/24/07
Time: 4:00 PM

Peak	rt	Area
1	0.20	346
2	0.25	167
3	2.05	12,255,113

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
57	S	07BR1309-03R	MBA	3	12,255,113	1,180	4.39		< HS	accept

Notes

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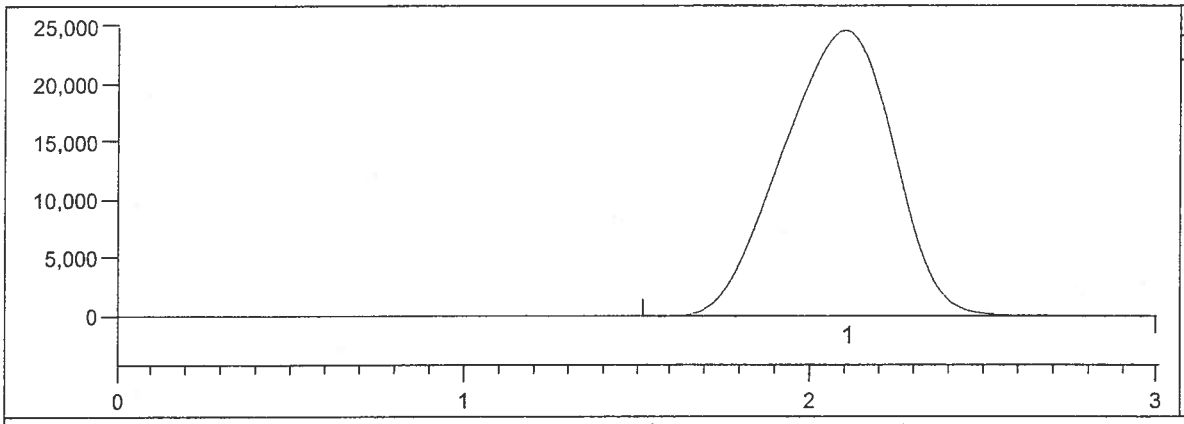
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

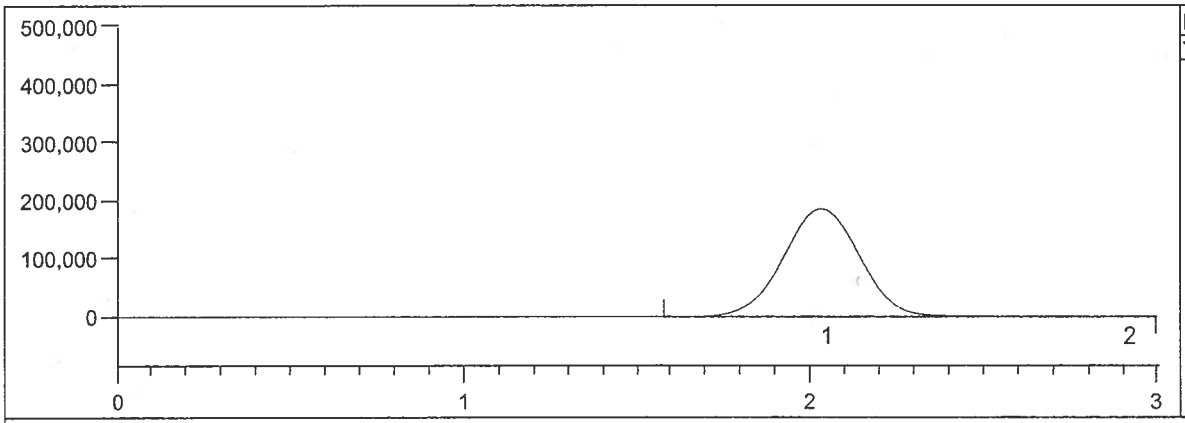


Date: 9/24/07
Time: 4:04 PM

Peak	rt	Area
1	2.09	5,506,794

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
58	OPR	CCV		1	5,506,794	527		105	70-130	accept

Notes

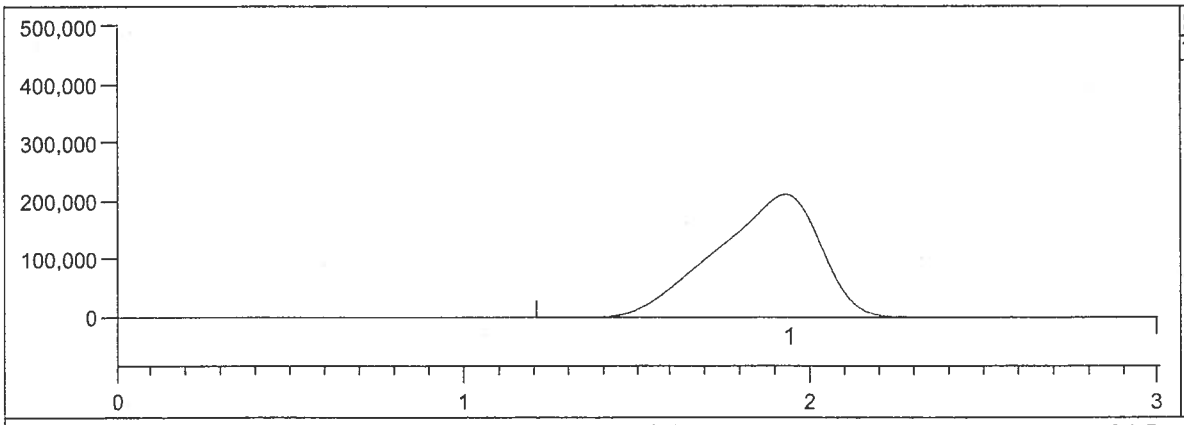


Date: 9/24/07
Time: 4:16 PM

Peak	rt	Area
1	2.03	28,680,851
2	2.90	6,234

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
59	MD	07BR1309-16R	MBA	1	28,680,851	2,780	330.	3.20	< 24	accept

Notes



Date: 9/24/07
Time: 4:20 PM

Peak	rt	Area
1	1.92	44,530,933

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
60	MS	07BR1309-16R	MBA	1	44,530,933	4,310	532	103	70-130	accept

Notes

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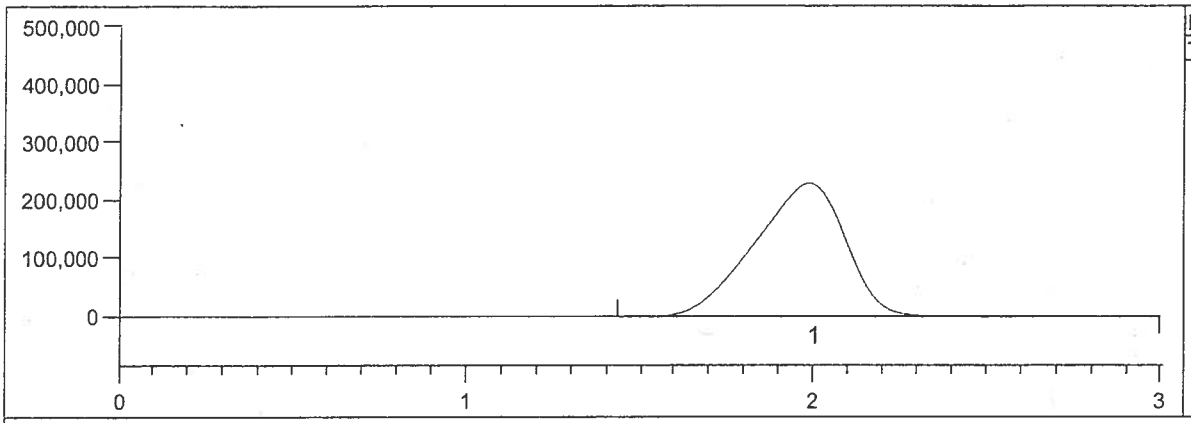
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

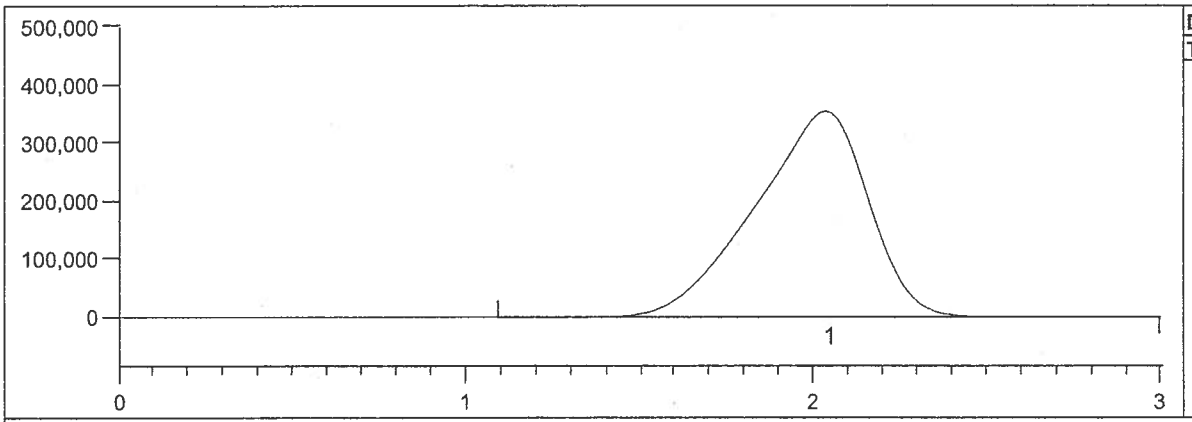


Date: 9/24/07
Time: 4:25 PM

Peak	rt	Area
1	1.98	41,978,785

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
61	MSD	07BR1309-16R	MBA	1	41,978,785	4,070	518	93.1	70-130	accept

Notes

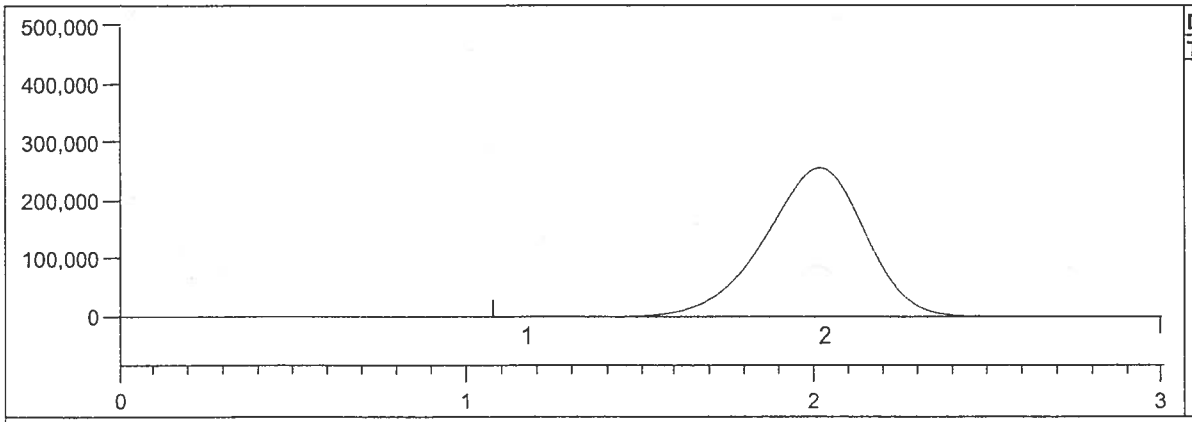


Date: 9/24/07
Time: 4:32 PM

Peak	rt	Area
1	2.03	81,311,979

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
62	MS	07BR1309-16R	MBA	1	81,311,979	7,880	1,030	105	70-130	accept

Notes



Date: 9/24/07
Time: 4:40 PM

Peak	rt	Area
1	1.15	174
2	2.01	52,742,471

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
63	MD	07BR1309-31	MBA	2	52,742,471	5,110	39.3	2.11	< 24	accept

Notes

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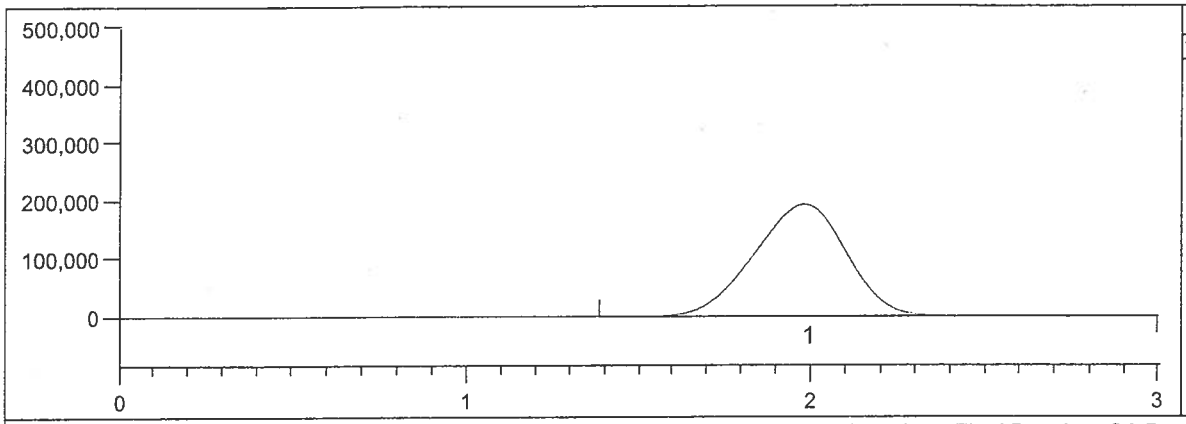
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

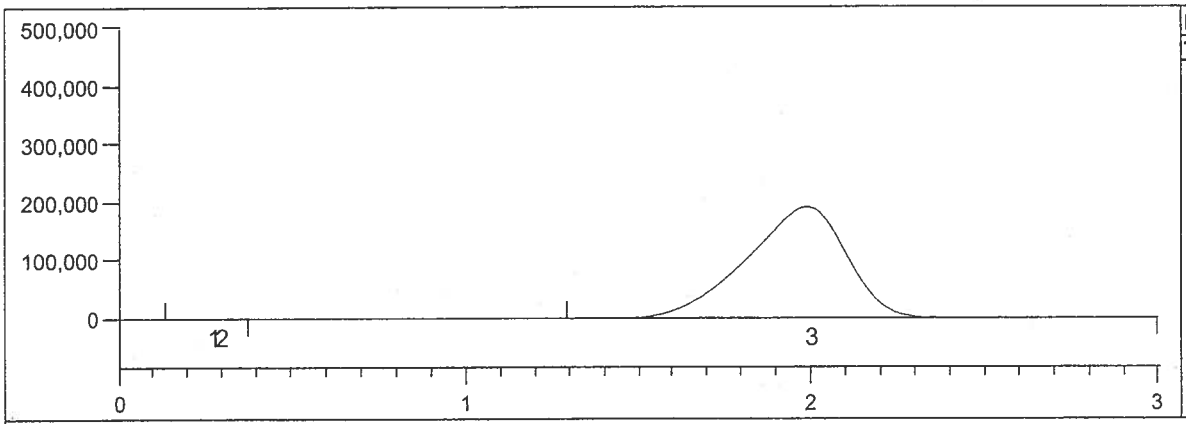


Date: 9/24/07
Time: 4:45 PM

Peak	rt	Area
1	1.98	35,870,990

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
64	MS	07BR1309-31	MBA	1	35,870,990	3,470	537	103	70-130	accept

Notes

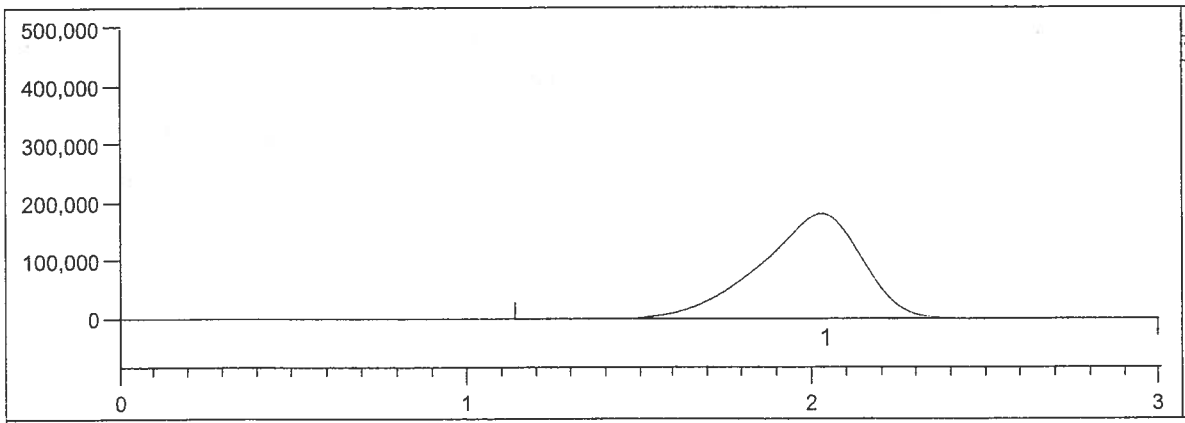


Date: 9/24/07
Time: 4:48 PM

Peak	rt	Area
1	0.26	357
2	0.28	252
3	1.98	38,479,051

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
65	MSD	07BR1309-31	MBA	3	38,479,051	3,730	503	110.	70-130	accept

Notes



Date: 9/24/07
Time: 4:53 PM

Peak	rt	Area
1	2.02	37,330,272

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
66	S	07BR1309-13	MBA	1	37,330,272	3,620	13.5		< HS	accept

Notes

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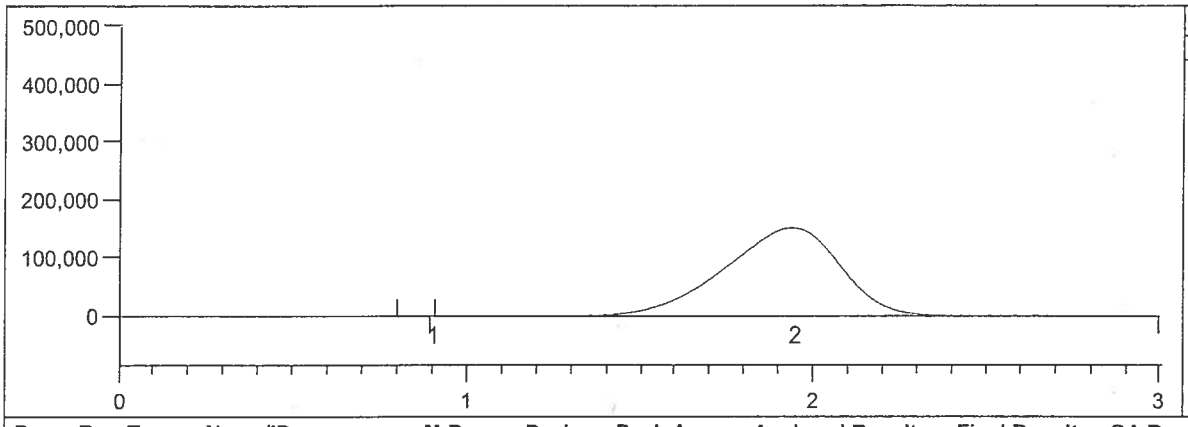
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

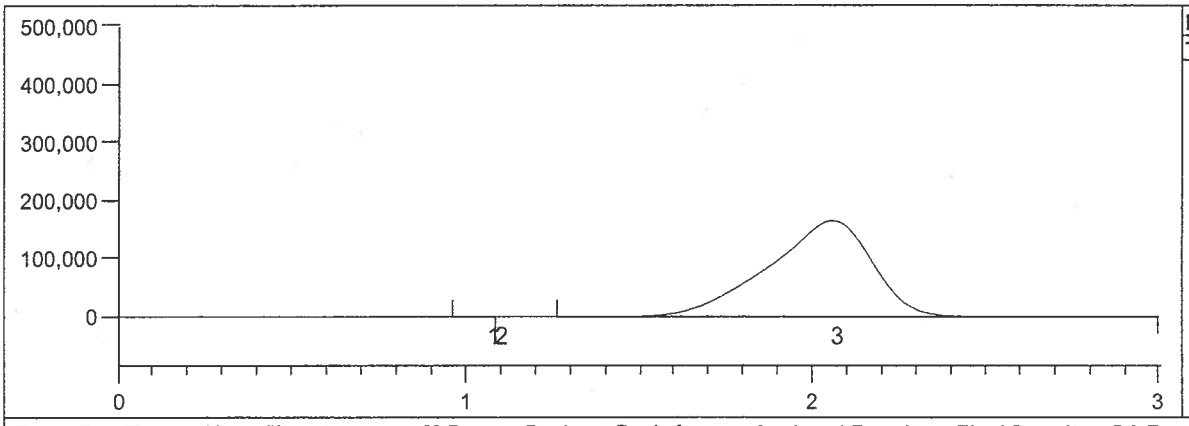


Date: 9/24/07
Time: 5:00 PM

Peak	rt	Area
1	0.89	34
2	1.93	35,772,997

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
67	S	07BR1309-14	MBA	2	35,772,997	3,460	13.3		< HS	accept

Notes

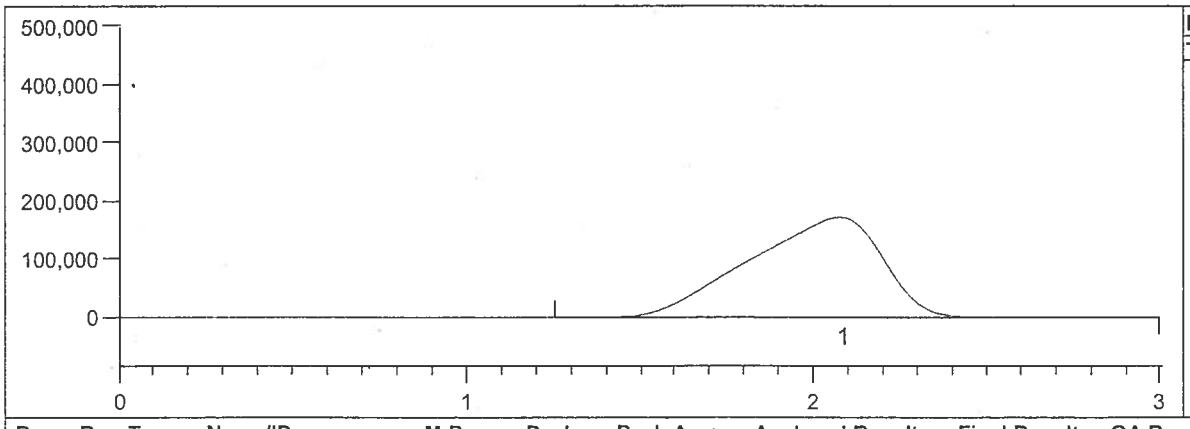


Date: 9/24/07
Time: 5:04 PM

Peak	rt	Area
1	1.06	96
2	1.09	12
3	2.05	34,632,111

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
68	S	07BR1309-15	MBA	3	34,632,111	3,350	12.5		< HS	accept

Notes



Date: 9/24/07
Time: 5:09 PM

Peak	rt	Area
1	2.07	46,467,720

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
69	S	07BR1309-17	MBA	1	46,467,720	4,500	346		< HS	accept

Notes

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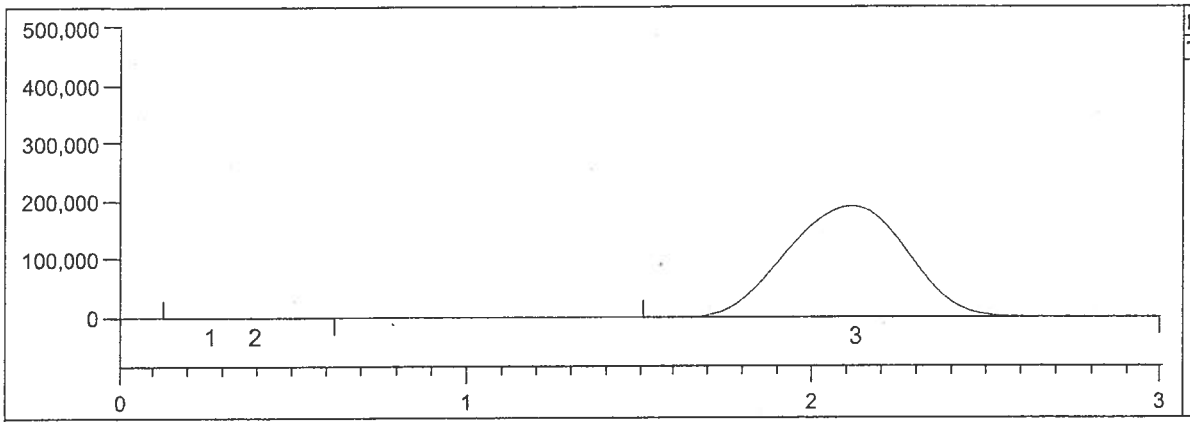
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

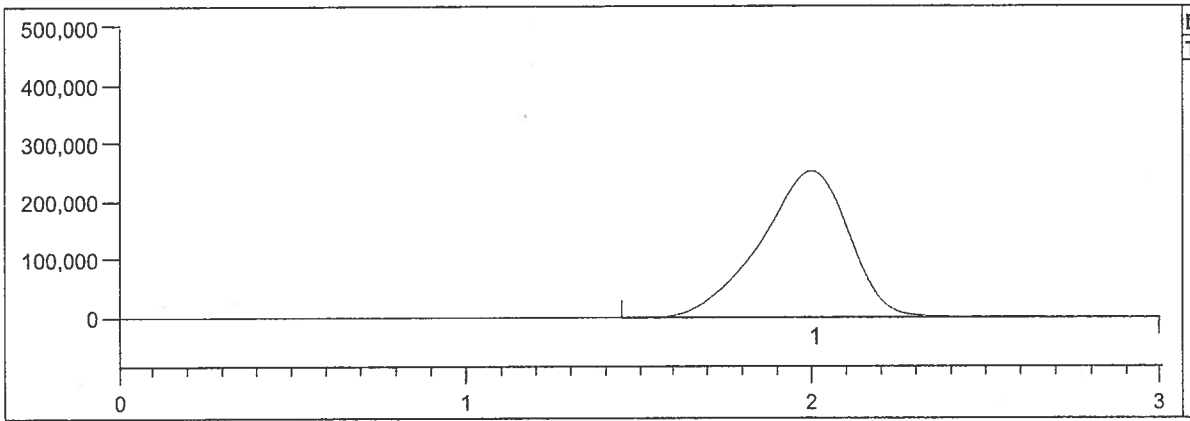


Date: 9/24/07
Time: 5:13 PM

Peak	rt	Area
1	0.24	935
2	0.38	1,138
3	2.11	46,377,375

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
70	S	07BR1309-18	MBA	3	46,377,375	4,490	354		< HS	accept

Notes

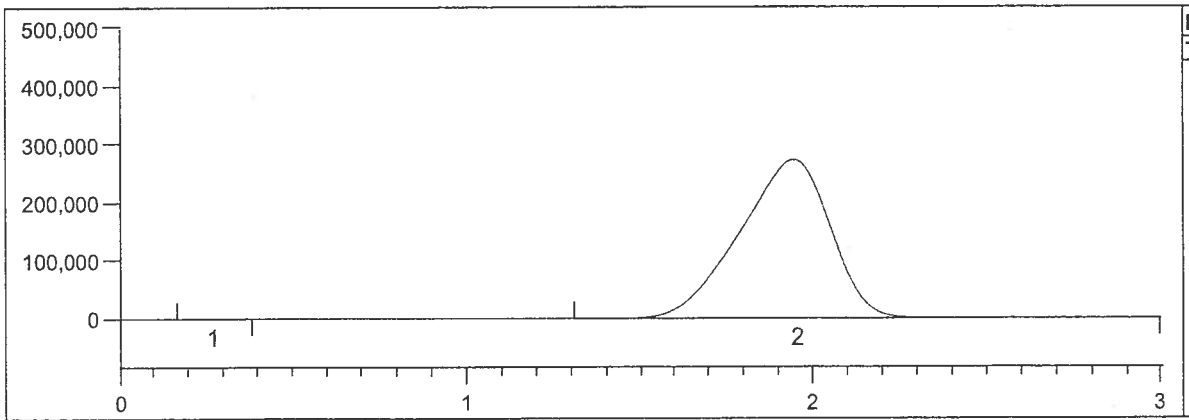


Date: 9/24/07
Time: 5:19 PM

Peak	rt	Area
1	1.99	45,268,425

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
71	S	07BR1309-19	MBA	1	45,268,425	4,390	340.		< HS	accept

Notes



Date: 9/24/07
Time: 5:24 PM

Peak	rt	Area
1	0.25	564
2	1.94	50,164,612

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
72	S	07BR1309-20	MBA	2	50,164,612	4,860	357		< HS	accept

Notes

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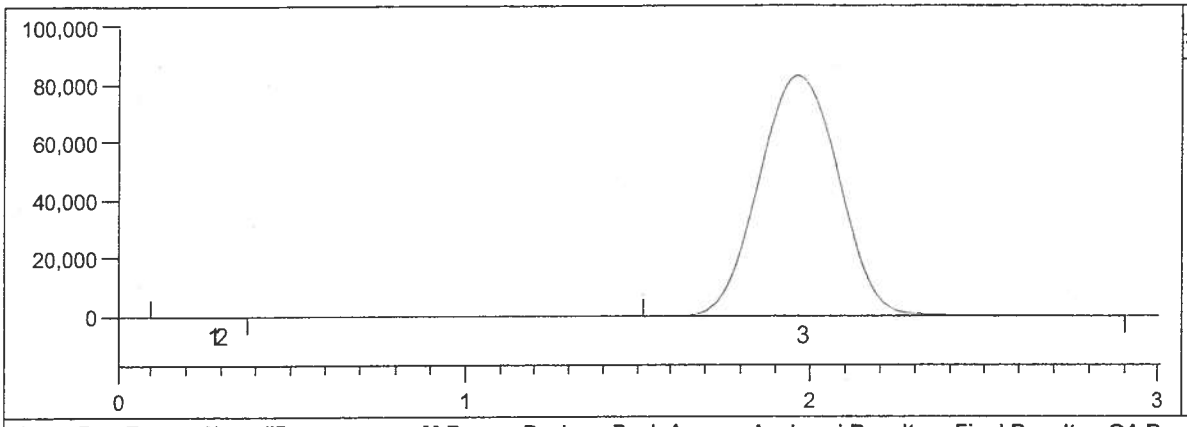
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

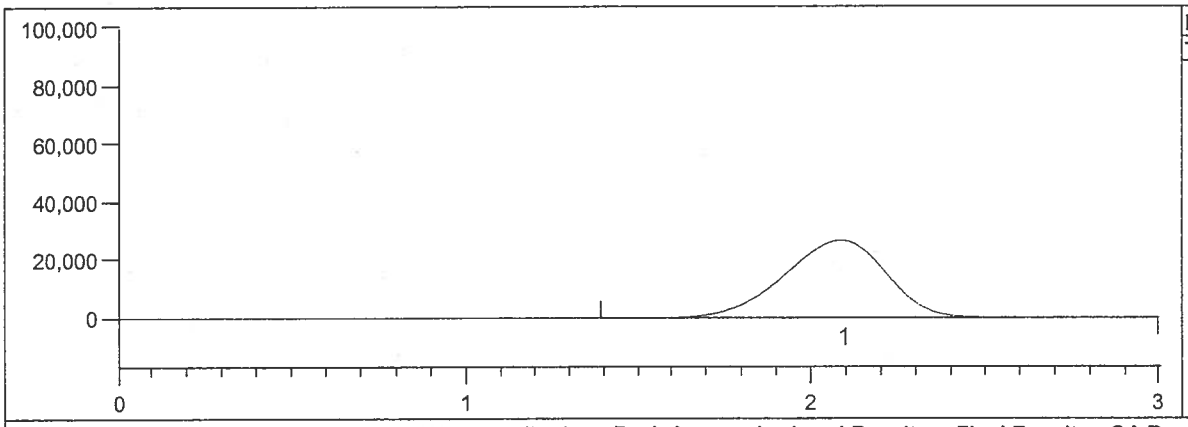


Date:	9/24/07
Time:	5:28 PM

Peak	rt	Area
1	0.26	530
2	0.28	269
3	1.96	13,274,682

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
73	S	07BR1309-22	MBA	3	13,274,682	1,280	4.90		< HS	accept

Notes

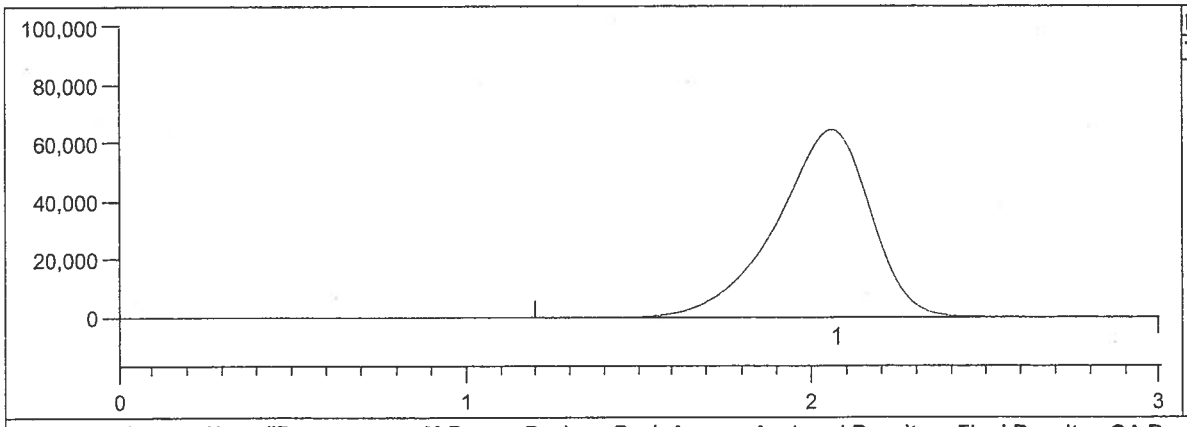


Date:	9/24/07
Time:	5:32 PM

Peak	rt	Area
1	2.08	5,498,905

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
74	OPR	CCV		1	5,498,905	526		105	70-130	accept

Notes



Date:	9/24/07
Time:	5:39 PM

Peak	rt	Area
1	2.05	12,289,105

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
75	S	07BR1309-23	MBA	1	12,289,105	1,180	4.63		< HS	accept

Notes

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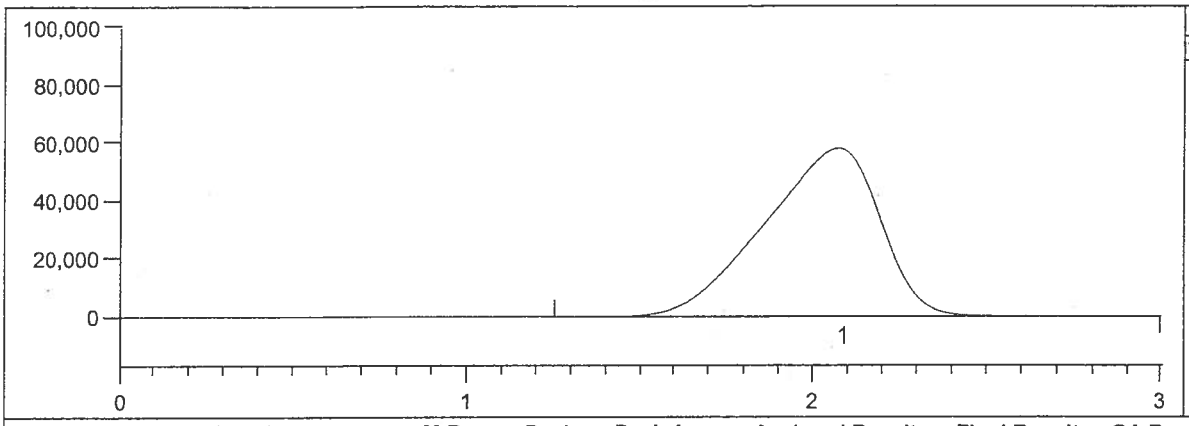
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

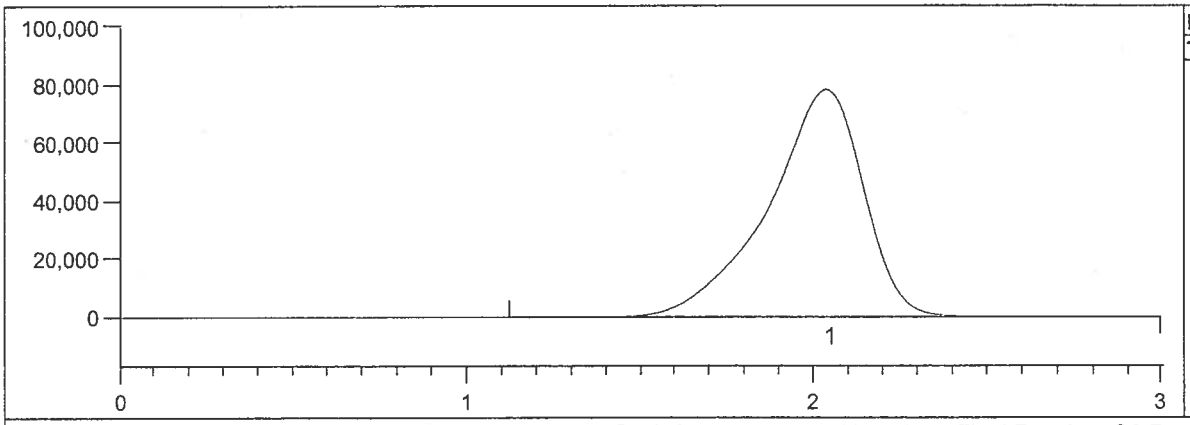


Date: 9/24/07
Time: 5:44 PM

Peak	rt	Area
1	2.07	13,545,738

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
76	S	07BR1309-24	MBA	1	13,545,738	1,310	5.08		< HS	accept

Notes

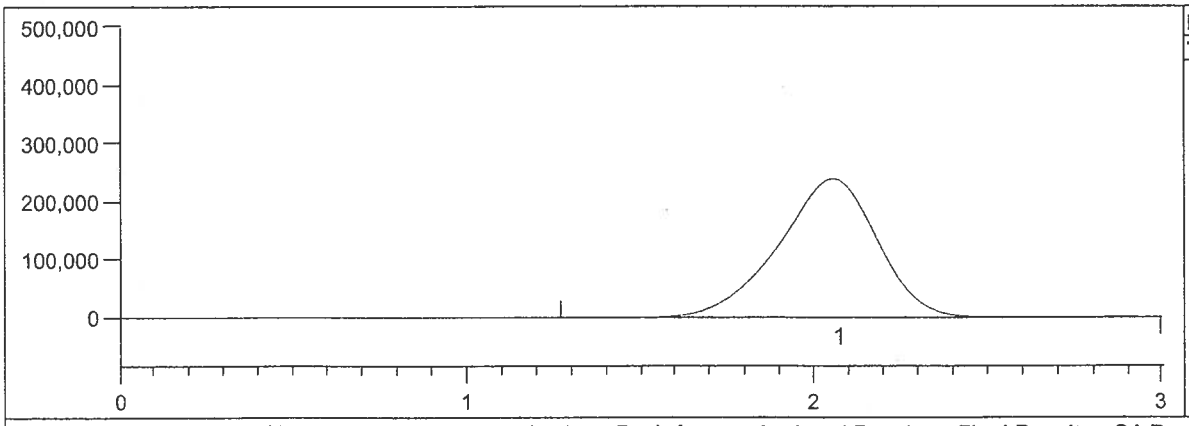


Date: 9/24/07
Time: 5:48 PM

Peak	rt	Area
1	2.03	15,048,305

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
77	S	07BR1309-25	MBA	1	15,048,305	1,450	5.12		< HS	accept

Notes



Date: 9/24/07
Time: 5:52 PM

Peak	rt	Area
1	2.05	48,053,837

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
78	S	07BR1309-27	MBA	1	48,053,837	4,660	35.3		< HS	accept

Notes

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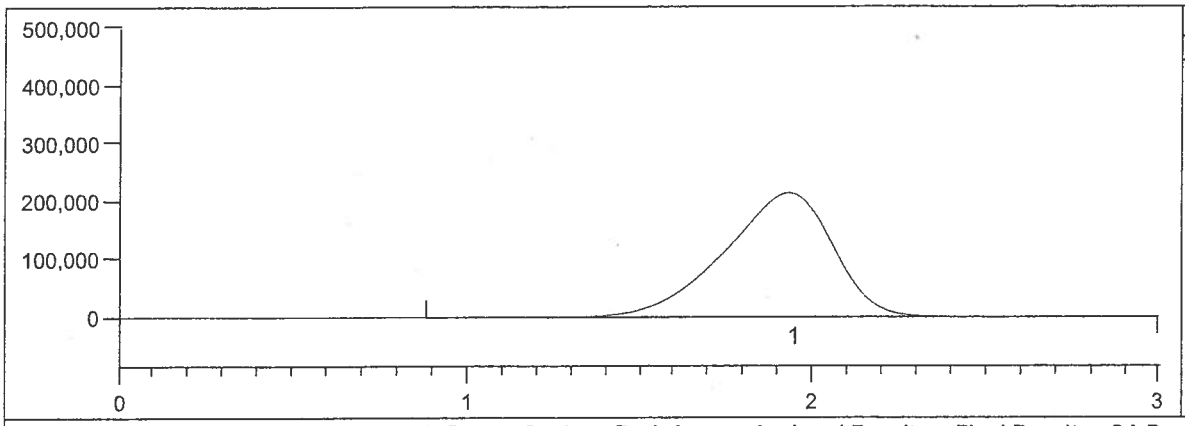
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

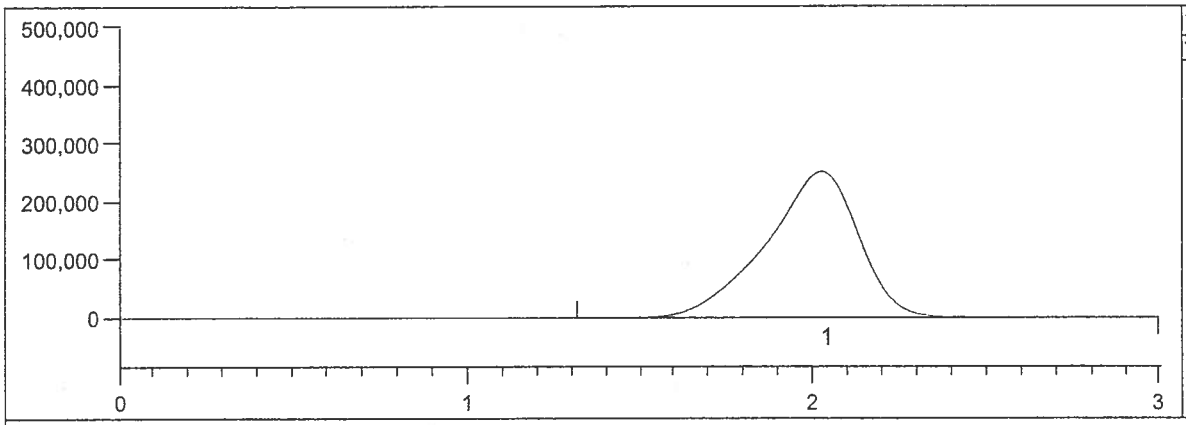


Date: 9/24/07
Time: 5:59 PM

Peak	rt	Area
1	1.93	46,742,472

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
79	S	07BR1309-28	MBA	1	46,742,472	4,530	34.1		< HS	accept

Notes

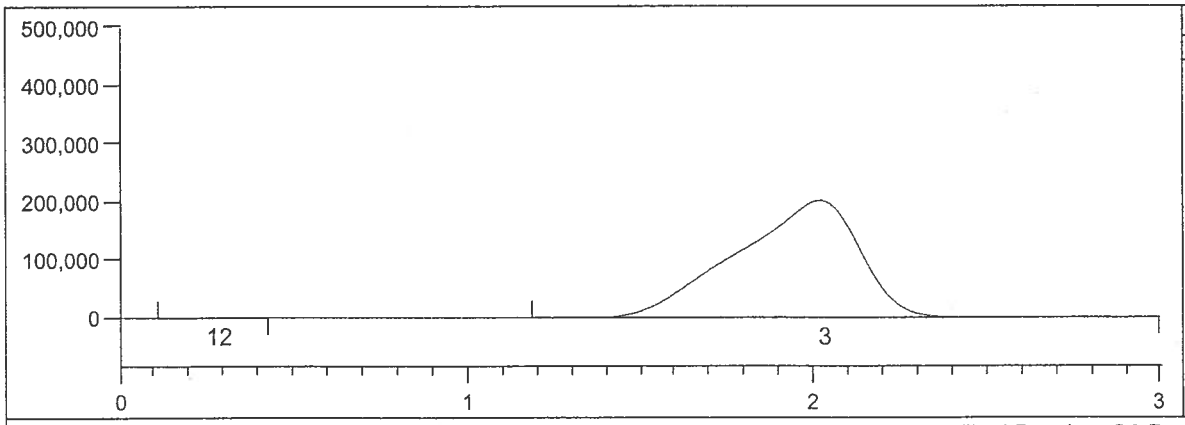


Date: 9/24/07
Time: 6:03 PM

Peak	rt	Area
1	2.02	46,872,352

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
80	S	07BR1309-29	MBA	1	46,872,352	4,540	35.2		< HS	accept

Notes



Date: 9/24/07
Time: 6:07 PM

Peak	rt	Area
1	0.25	822
2	0.29	576
3	2.01	49,839,380

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
81	S	07BR1309-30	MBA	3	49,839,380	4,830	34.9		< HS	accept

Notes

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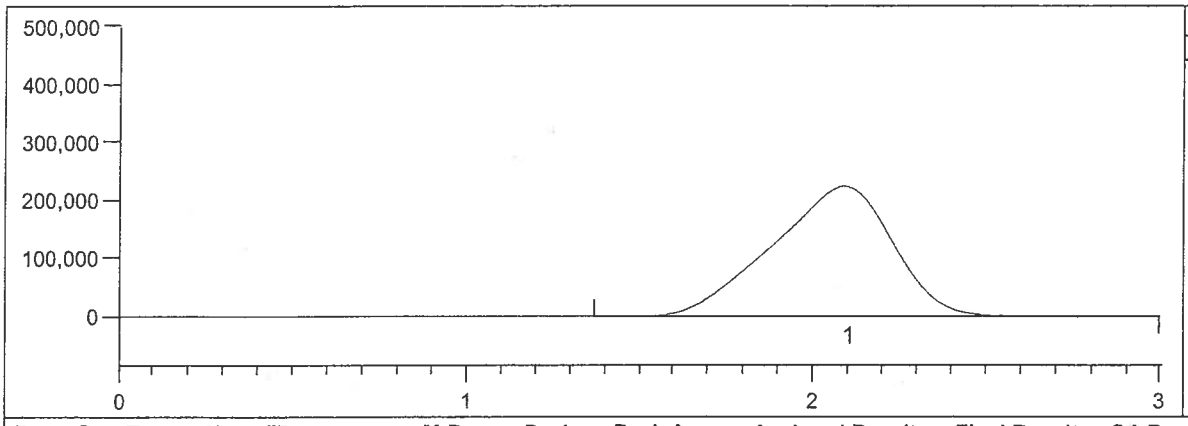
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

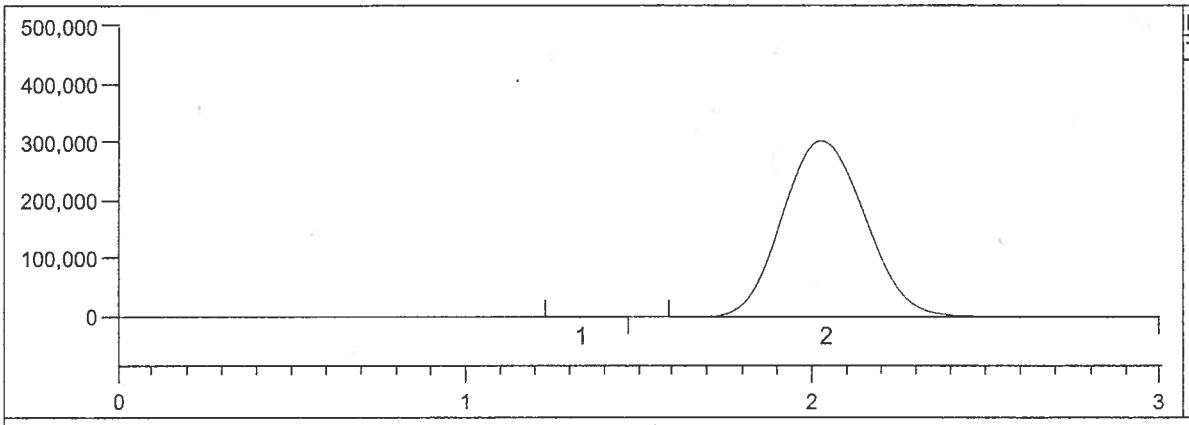


Date: 9/24/07
Time: 6:11 PM

Peak	rt	Area
1	2.08	54,118,976

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
82	S	07BR1309-32	MBA	1	54,118,976	5,240	41.1		< HS	accept

Notes

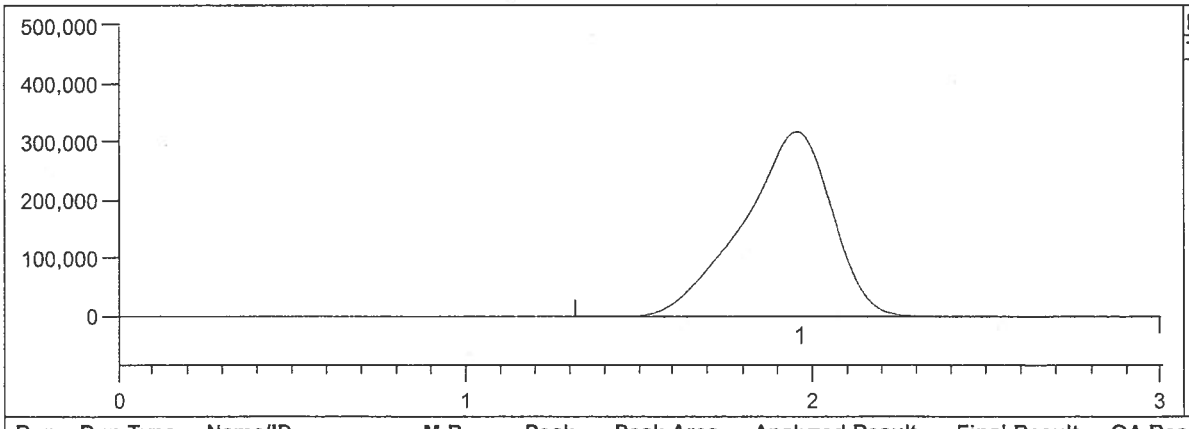


Date: 9/24/07
Time: 6:19 PM

Peak	rt	Area
1	1.32	532
2	2.02	50,881,964

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
83	S	07BR1309-33	MBA	2	50,881,964	4,930	37.2		< HS	accept

Notes



Date: 9/24/07
Time: 6:24 PM

Peak	rt	Area
1	1.95	57,180,983

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
84	S	07BR1309-34	MBA	1	57,180,983	5,540	43.4		< HS	accept

Notes

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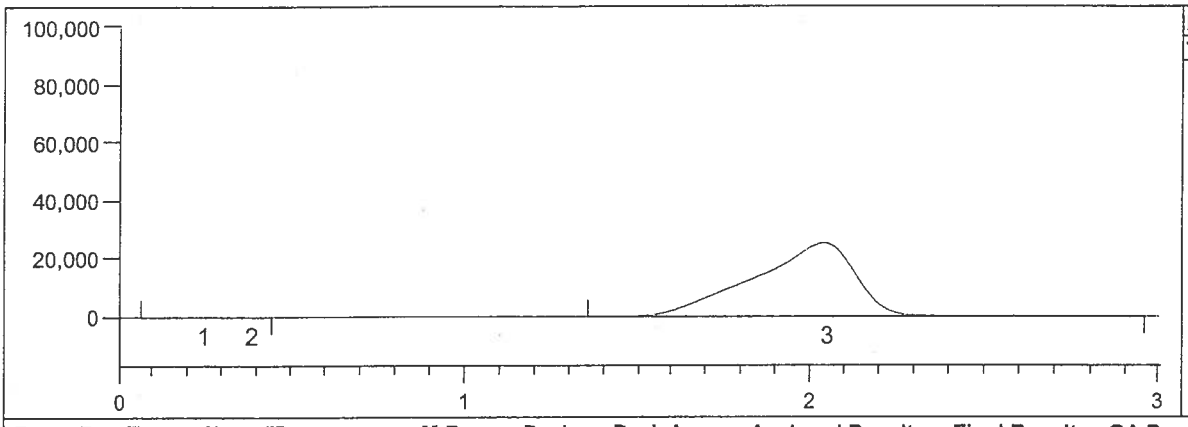
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

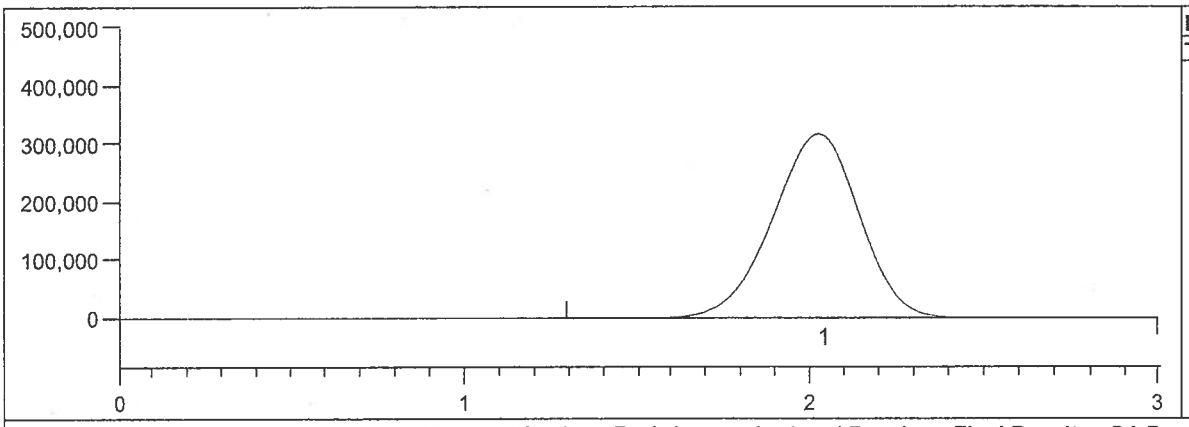


Date: 9/24/07
Time: 6:27 PM

Peak	rt	Area
1	0.23	1,297
2	0.37	138
3	2.03	5,158,170

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
85	OPR	CCV		3	5,158,170	493		98.6	70-130	accept

Notes

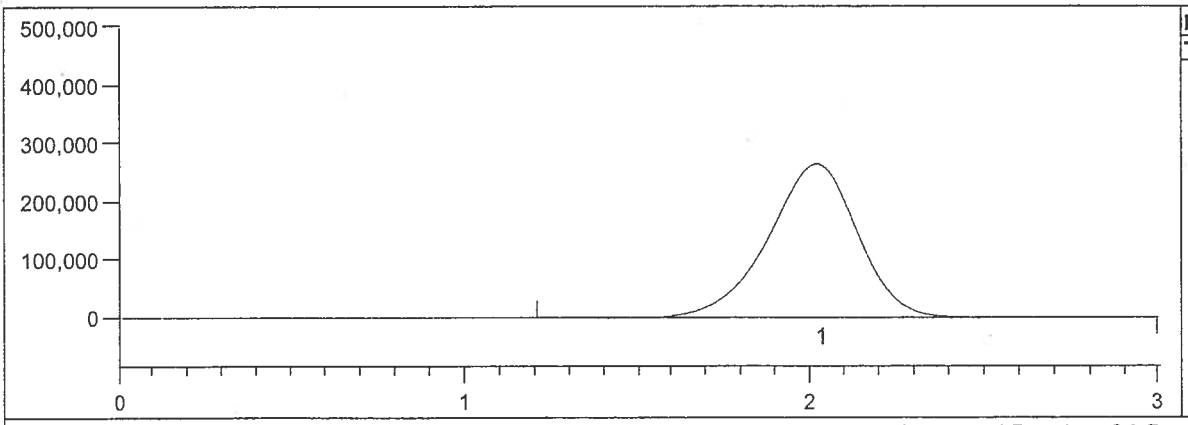


Date: 9/24/07
Time: 6:32 PM

Peak	rt	Area
1	2.02	55,857,865

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
86	S	07BR1309-35	MBA	1	55,857,865	5,410	41.9		< HS	accept

Notes



Date: 9/24/07
Time: 6:38 PM

Peak	rt	Area
1	2.02	48,141,576

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
87	S	07BR1309-37	MBA	1	48,141,576	4,660	35.8		< HS	accept

Notes

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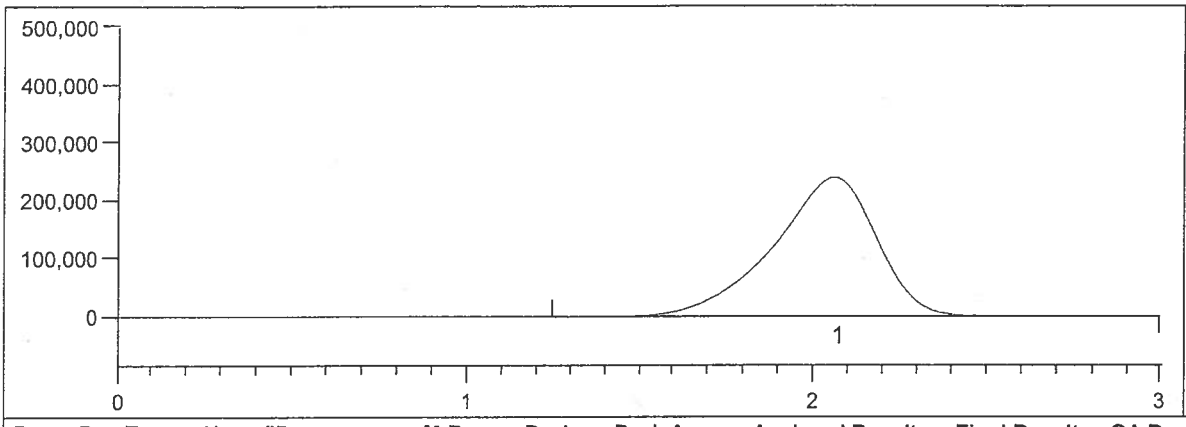
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:

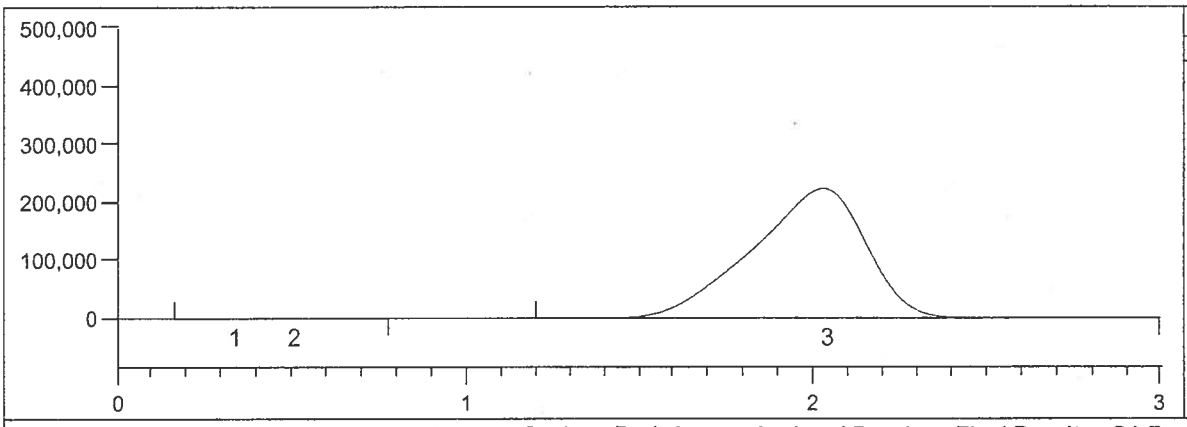


Date: 9/24/07
Time: 6:43 PM

Peak	rt	Area
1	2.06	49,321,688

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
88	S	07BR1309-38	MBA	1	49,321,688	4,780	37.0		< HS	accept

Notes

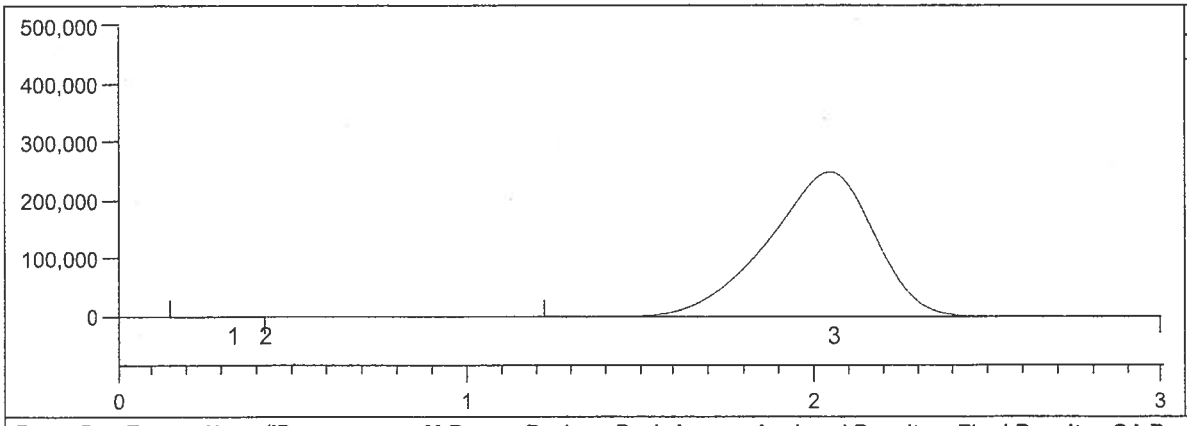


Date: 9/24/07
Time: 6:47 PM

Peak	rt	Area
1	0.32	1,866
2	0.49	703
3	2.02	50,670,939

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
89	S	07BR1309-39	MBA	3	50,670,939	4,910	34.1		< HS	accept

Notes



Date: 9/24/07
Time: 6:50 PM

Peak	rt	Area
1	0.32	758
2	0.41	30
3	2.04	53,741,292

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
90	S	07BR1309-40	MBA	3	53,741,292	5,210	38.2		< HS	accept

Notes

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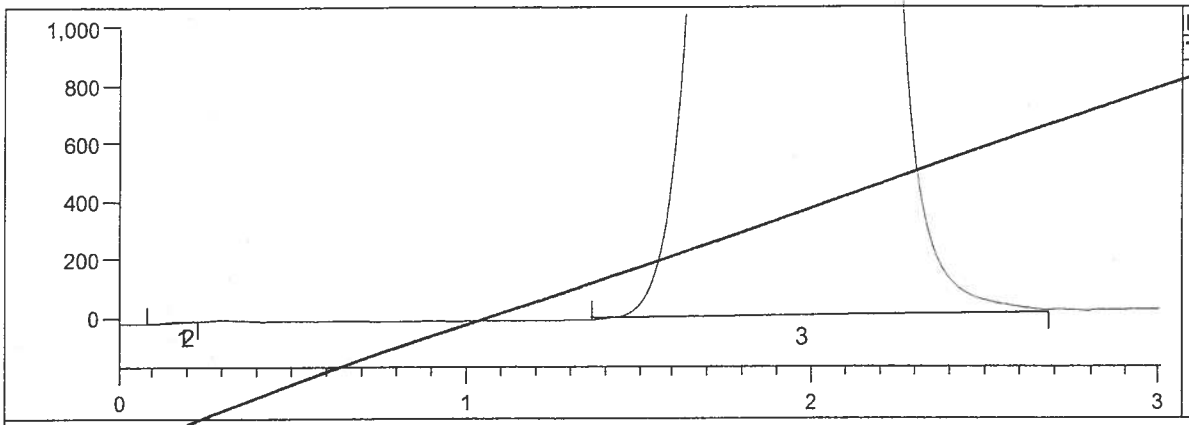
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:



Date:	9/24/07	
Time:	6:55 PM	
Peak	**rt**	**Area**
1	0.16	154
2	0.18	117
3	1.95	5,267,550

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
91	OPR	CCV		1	154	-7.79		-1.56	70-130	accept

Notes

Guru error, see next page.
DLA 9/25/07.

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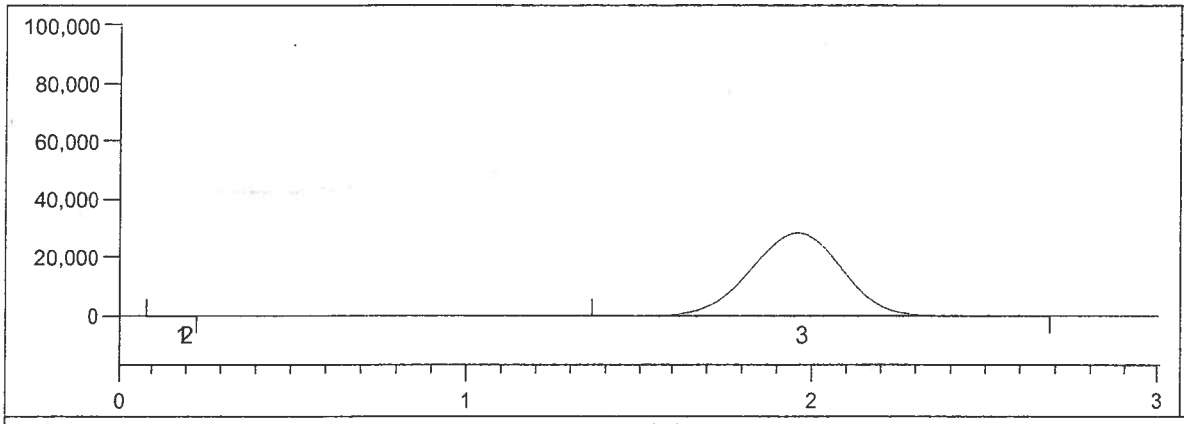
Peak Report

Batch Number:
Method Number: 1631 Mod.

Project Number(s):
Instrument ID:

Date Analyzed: 9/24/07
Analyst Name:



Date: 9/24/07
Time: 6:55 PM

Peak	rt	Area
1	0.16	154
2	0.18	117
3	1.95	5,267,550

Run	Run Type	Name/ID	M B	Peak	Peak Area	Analyzed Result	Final Result	QA Results	Criteria	Notes
91	OPR	CCV		3	5,267,550	503		101	70-130	accept

Notes

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Exhibit A

Sample Homogenization

Date: 9/14/07
Technician: JR

Objectives:

1) Start time of homogenizing (comments section)
2) List of samples homogenized
3) Time homogenizer blank is taken (which homogenizer blanked – comments section)
4) List of samples homogenized after blank
5) End time of homogenizing (comments section)

	~~Date~~ Time	Sample ID	Equip. #	Comments (i.e. start/stop time, consistency of sample, sample vs. homogenization blank; if a blank then how preserved, what analytes to be tested for, etc.)
1	9:45	07BR1309-05		Some of the worms were on the
2	10:10	-01		sides and I scraped off as much
3	10:49	-04		as I could. Not all got in.
4	11:29	-10		blank
5	11:31	-03		
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Exhibit B

Sample Physical Characteristics Log

Prep Technician: JB Date: 9/13/07

Client ID(s): KLE001

Sample ID	Matrix/Submatrix	Physical Characteristics
07BR1309-07	Biota/clams	64g
-02	Biota/clams	76g
-03	Biota/clam	65g
-06	Biota/clam	66g

Additional Notes: Blank done between -03 and -06

Exhibit A

Sample Homogenization

Date: 9/13/07
Technician: JB

Objectives:

1) Start time of homogenizing (comments section)
2) List of samples homogenized
3) Time homogenizer blank is taken (which homogenizer blanked – comments section)
4) List of samples homogenized after blank
5) End time of homogenizing (comments section)

	~~Date~~ Time	Sample ID	Equip. #	Comments (i.e. start/stop time, consistency of sample, sample vs. homogenization blank; if a blank then how preserved, what analytes to be tested for, etc.)
1	2:23	07BR1309-02		66g
2	2:32	-08		56g
3	2:40	-07		54g
4	2:49	-06		56g
5	2:38	-09		blank
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

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Seattle, WA 98107	Fax: 206-632-6017
www.brooksrand.com	Email: brl@brooksrand.com

Sample Receiving Log

Tracking # **07BR1309**

Customer:	Kleinfelder
Contact:	Dave King
Project Ref. #:	KLE001
BRL Project Manager:	Elizabeth Madonick
QA Level	Full
Sample Condition	Intact
Shipping container intact?	Yes
Shipping container type:	Cooler
Shipping container temp:	See Comments
Shipping container coolant:	Ice
Sample Turnaround Time:	
Contract Turnaround Time:	14 days

Due Date:	9/25/2007
Receiving Date:	9/11/2007
Receiving Time:	9:15 AM
Logged-in by:	Katie Jahanmir
Log-in Date:	9/11/2007
Log-in Time:	2:52 PM
Airbill present?	Yes
Airbill #	See Comments
Courier:	UPS
Custody seal present?	Yes
Custody seal intact?	Yes
COC Present?	Yes
COC/Sample tag agree?	Yes
COC Number:	N/A

Comments: Cooler 1: 1Z8491690110033098, 0.2 C Cooler 2: 1Z8491690110033105, 4.0 C

Lab ID:

01

Sample Tag #:	1138G (Pre exposure) 1	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	8/8/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	4 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample consists of 5 separate jars. All 5 sample containers homogenized together.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

02

Sample Tag #:	1138G (Pre exposure) 2	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	8/8/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	4 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-01.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

03

Sample Tag #:	1138G (Pre exposure) 3	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	8/8/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	4 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-01.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

04

Sample Tag #:	1138G (Pre exposure) 4	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	8/8/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	4 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-01.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

05

Sample Tag #:	1138G (Pre exposure) 5	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	8/8/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	4 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-01.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

06

Sample Tag #:	1139G (Pre exposure) 1	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	8/9/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample consists of 5 separate jars, aproximately 100 clams. All 5 sample containers homogenized together.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

07

Sample Tag #:	1139G (Pre exposure) 2	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	8/9/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-06.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

08

Sample Tag #:	1139G (Pre exposure) 3	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	8/9/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-06.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

09

Sample Tag #:	1139G (Pre exposure) 4	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	8/9/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-06.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

10

Sample Tag #:	1139G (Pre exposure) 5	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	8/9/2007,	Preservation:	none
ContainerType and Lot #:	Glass jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-06.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

11

Sample Tag #:	1172G (Post Exposure) 1	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample consists of 5 separate jars. All 5 sample containers homogenized together.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

12

Sample Tag #:	1172G (Post Exposure) 2	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-11.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

13

Sample Tag #:	1172G (Post Exposure) 3	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-11.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

14

Sample Tag #:	1172G (Post Exposure) 4	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-11.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

15

Sample Tag #:	1172G (Post Exposure) 5	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-11.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

16

Sample Tag #:	1173G (Post Exposure) 1	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample consists of 5 separate jars. All 5 sample containers homogenized together.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

17

Sample Tag #:	1173G (Post Exposure) 2	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-16.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

18

Sample Tag #:	1173G (Post Exposure) 3	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-16.

Lab ID:

Analysis / Method: Hg — EPA 1631, Appendix
Analysis / Method: Homogenization — BR-0103

19

Sample Tag #: 1173G (Post Exposure) 4
Collection Date/Time: 9/5/2007,
ContainerType and Lot #: HDPE jar,
Size: 8 oz.

Matrix/Sub-Matrix: Biota, Worms
Preservation: none
Acid Lot#: n/a
pH:
Filtered?: No
Sample Storage Location: Freezer #4

Comments: Sample split from BRL sample 07BR1309-16.

Analysis / Method: Hg — EPA 1631, Appendix
Analysis / Method: Homogenization — BR-0103

20

Sample Tag #: 1173G (Post Exposure) 5
Collection Date/Time: 9/5/2007,
ContainerType and Lot #: HDPE jar,
Size: 8 oz.

Matrix/Sub-Matrix: Biota, Worms
Preservation: none
Acid Lot#: n/a
pH:
Filtered?: No
Sample Storage Location: Freezer #4

Comments: Sample split from BRL sample 07BR1309-16.

Analysis / Method: Hg — EPA 1631, Appendix
Analysis / Method: Homogenization — BR-0103

21

Sample Tag #: 1174G (Post Exposure) 1
Collection Date/Time: 9/5/2007,
ContainerType and Lot #: HDPE jar,
Size: 8 oz.

Matrix/Sub-Matrix: Biota, Worms
Preservation: none
Acid Lot#: n/a
pH:
Filtered?: No
Sample Storage Location: Freezer #4

Comments: Sample consists of 5 separate jars. All 5 sample containers homogenized together.

Analysis / Method: Hg — EPA 1631, Appendix
Analysis / Method: Homogenization — BR-0103

22

Sample Tag #: 1174G (Post Exposure) 2
Collection Date/Time: 9/5/2007,
ContainerType and Lot #: HDPE jar,
Size: 8 oz.

Matrix/Sub-Matrix: Biota, Worms
Preservation: none
Acid Lot#: n/a
pH:
Filtered?: No
Sample Storage Location: Freezer #4

Comments: Sample split from BRL sample 07BR1309-21.

Analysis / Method: Hg — EPA 1631, Appendix
Analysis / Method: Homogenization — BR-0103

23

Sample Tag #: 1174G (Post Exposure) 3
Collection Date/Time: 9/5/2007,
ContainerType and Lot #: HDPE jar,
Size: 8 oz.

Matrix/Sub-Matrix: Biota, Worms
Preservation: none
Acid Lot#: n/a
pH:
Filtered?: No
Sample Storage Location: Freezer #4

Comments: Sample split from BRL sample 07BR1309-21.

Analysis / Method: Hg — EPA 1631, Appendix
Analysis / Method: Homogenization — BR-0103

24

Sample Tag #:	1174G (Post Exposure) 4	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-21.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

25

Sample Tag #:	1174G (Post Exposure) 5	Matrix/Sub-Matrix:	Biota, Worms
Collection Date/Time:	9/5/2007,	Preservation:	none
ContainerType and Lot #:	HDPE jar,	Acid Lot#:	n/a
Size:	8 oz.	pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-21.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103

26

Sample Tag #:	1175G (Post Exposure) 1	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziploc Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample consists of 5 separate bags, aproximately 100 clams. All 5 sample containers homogenized together.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

27

Sample Tag #:	1175G (Post Exposure) 2	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-26.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

28

Sample Tag #:	1175G (Post Exposure) 3	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-26.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

29

Sample Tag #:	1175G (Post Exposure) 4	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-26.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

30

Sample Tag #:	1175G (Post Exposure) 5	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-26.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

31

Sample Tag #:	1176G (Post Exposure) 1	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziploc Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample consists of 5 separate bags, aproximately 100 clams. All 5 sample containers homogenized together.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

32

Sample Tag #:	1176G (Post Exposure) 2	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-31.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

33

Sample Tag #:	1176G (Post Exposure) 3	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-31.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

34

Sample Tag #:	1176G (Post Exposure) 4	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-31.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

35

Sample Tag #:	1176G (Post Exposure) 5	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-31.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

36

Sample Tag #:	1177G (Post Exposure) 1	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziploc Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample consists of 5 separate bags, aproximately 100 clams. All 5 sample containers homogenized together.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

37

Sample Tag #:	1177G (Post Exposure) 2	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-36.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

38

Sample Tag #:	1177G (Post Exposure) 3	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-36.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

Lab ID:

39

Sample Tag #:	1177G (Post Exposure) 4	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-36.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

40

Sample Tag #:	1177G (Post Exposure) 5	Matrix/Sub-Matrix:	Biota, Bivalve
Collection Date/Time:	9/6/2007,	Preservation:	none
ContainerType and Lot #:	Ziplock Bag,	Acid Lot#:	n/a
Size:		pH:	Filtered?: No
		Sample Storage Location:	Freezer #4

Comments: Sample split from BRL sample 07BR1309-36.

Analysis / Method:	Hg	EPA 1631, Appendix
Analysis / Method:	Homogenization	BR-0103
Analysis / Method:	Shucking	In-house

41

Sample Tag #:	HB-Hg-07-1022-1	Matrix/Sub-Matrix:	Biota, Blank
Collection Date/Time:	9/13/2007, 2:38:00 PM	Preservation:	none
ContainerType and Lot #:	FLPE bottle, 07-199	Acid Lot#:	n/a
Size:	250-mL	pH:	Filtered?: No
		Sample Storage Location:	Cabinet #5

Comments: This homog blank is applicable to the clam samples.

Analysis / Method:	Hg	EPA 1631, Appendix	Do Not Spike

42

Sample Tag #:	HB-Hg-07-0992-1	Matrix/Sub-Matrix:	Biota, Blank
Collection Date/Time:	9/14/2007, 9:45:00 AM	Preservation:	0.4% HCl
ContainerType and Lot #:	FLPE bottle, 07-199	Acid Lot#:	07-234-06
Size:	250-mL	pH:	<2 Filtered?: No
		Sample Storage Location:	Cabinet #5

Comments: This homog blank is applicable to the worms samples.

Analysis / Method:	Hg	EPA 1631, Appendix	Do Not Spike

9/26/07 updated
Sample Custodian signature Date

9/26/07 updated
Reviewed By signature Date

BROOKSRAND
TRACE METALS ANALYSIS & PRODUCTS

Chain Of Custody Record

White: LAB COPY
Yellow: CUSTOMER COPY

Client: NORTHWESTERN AQUATIC SCIENCES	COC receipt confirmation? (Y) / N)	Ship to: **Brooks Rand LLC**
Contact: GERALD IRISSARRI	If yes, by Fax / (Email) (circle one)	3958 6th Avenue NW
Address: P.O. BOX 1437 3814 YAQUINA BAY ROAD NEWPORT, OR 97365	Fax #:	Seattle, WA 98107
	Email: GIRISSARRI@NWAQUATIC.COM	Phone: 206-632-6206
	Sampler's name: GERALD IRISSARRI	Fax: 206-632-6017
Phone #:	Client project ID: P762	Email:samples@brooksrand.com
PO #:	BRL project ID: KLE001	www.brooksrand.com

	Sample ID	Collection		Miscellaneous				Field Preservation			Analyses required									Comments
		Date	Time	Sampler (initials)	Matrix type *	# of containers	Sample field filtered (Y/N)	Unpreserved / ice only	HCl/HNO_3/BrCl (circle one)	Other (specify)	Total Hg, EPA 1631	Methyl Hg, EPA 1630	Metals ICP-MS (specify)	As / Se species (specify)	% Solids	Filtration	Other (specify)	Other (specify)	Other (specify)	
1	11386 (PRE EXPOSURE)	8/8/07		GJI	L	5		X												* L = LUMBRICULUS VARIEGATUS TISSUE C = CORBICULA FLUMINEA TISSUE
2	11396 (PRE EXPOSURE)	8/9/07		GJI	C	5		X												
3	11726 (POST EXPOSURE)	9/5/07		GJI	L	5		X												
4	11736	9/5/07		GJI	L	5		X												CONTROL NW LAKE LWS-071907
5	11746	9/5/07		GJI	L	5		X												
6	11756	9/6/07		GJI	C	5		X												CONTROL NW LAKE LWS-071907
7	11766	9/6/07		GJI	C	5		X												
8	11776	9/6/07		GJI	C	5		X												
9																				
10																				

Relinquished by: Gerald Irissarri	Date: 9-10-07	Time:	Received by:
Relinquished by:	Date:	Time:	Received at BRL by:
Shipping carrier: UPS	# of coolers: 2		BRL Tracking #: 10 R1309

Received by:	Date:	Time:
Received at BRL by:	Date: 9/11/07	Time: 0915
BRL Tracking #: 10 R1309		

UPS Next Day Air®
EXTREMELY URGENT
1
1Z 849 169 01 1003 309 8
TRACKING NUMBER
UPS
Louisville, KY
10/97 M

UPS Next Day Air®
EXTREMELY URGENT
1Z 849 169 01 1003 310 5
TRACKING NUMBER
UPS
Louisville, KY
10/97 M

Summary: DATA VALID ? YES NO

Analytical Laboratory Data Validation Check Sheet

Job Name: CONDIT Job Number: 53886/5

Date of Review: 12 Oct 07 Lab Name: BROOKS RAND Lab Batch Id #: KLE001/07BR1309

Chain of Custody

1.) Correct containers used ? yes no

2.) Correct preservative (if any) used ? – NONE REQ'D yes no

3.) Signature blocks complete and ending with lab ? yes no

4.) Analyses requested matches analyses reported ? yes no

5.) Sample identification number matches with lab report ? yes no

6.) Trip Blank Submitted ? yes no

7.) Field Blank Submitted ? CONTROL SAMPLES (REFERENCE INCLUDED) ~~yes no~~

Timing

8.) Samples extracted within holding time ? yes no

9.) Analysis performed within holding time ? yes no

Quality Assurance/Quality Control

10.) Lab Blank Completed ? yes no

11.) Lab, Field, or Trip Blank(s) reports contaminants ? yes no

If yes, indicate blank type, chemical(s) and concentration(s):

12.) Are Reporting Limits raised ? (If yes, explain @ "Comments") yes no

Accuracy

13.) Surrogate Recovery within limits (Default 70-130 %)? NA ~~yes no~~

14.) Matrix Spike (MS) Recovery within limits (Default 70-130 %)? 103-112 ~~91-116~~ yes no

15.) Matrix Spike Duplicate (MSD) Recovery within limits (Default 70-130 %)? yes no 99-116

If no, list exceptions:

Precision

16.) Rel. % Diff. (RPD) within limits (Default 25%) ? 3-14 yes no

17.) RPD calculation for Field Duplicates within limits (Default 25%) ? ~~yes no~~

Comments: NA.

Initial Review By: DEK **Final** Review By: