FINAL

# Brown Trout Laboratory Reproduction Studies Conducted in Support of Development of a Site-Specific Selenium Criterion

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| | |
|---|---|
| AOC | Administrative Order on Consent |
| CAS | Columbia Analytical Services |
| CF | Cranio Facial |
| CI | Confidence Interval |
| dw | Dry Weight |
| EC/$EC_x$ | Effect Concentration |
| ED | Edematous Tissue |
| FD | Finfold |
| GH-AAS | Gaseous Hydride Atomic Absorption |
| GSI | Graduated Severity Index |
| HS | Hoopes Spring |
| IDEQ | Idaho Department of Environmental Quality |
| ODA | Overburden Disposal Area |
| OLS | Ordinary Least Squares |
| SC | Saratoga National Fish Hatchery |
| SI | Site Investigation |
| SK | Skeletal |
| SPC | Spring Creek Trout Hatchery |
| SSSC | Site-Specific Selenium Criterion |
| TM | Technical Memorandum |
| TRAP | Toxicity Relationship Analysis Program |
| USFS | United States Forest Service |
| USEPA | United States Environmental Protection Agency |

# 1.0 INTRODUCTION

A chronic site-specific selenium criterion (SSSC) is being developed for Hoopes Spring South Fork Sage Creek (SFSC) and the downstream receiving waters including Sage Creek and Crow Creek upstream of the Idaho and Wyoming State Line. Hoopes Spring is located in Sage Valley near the J.R. Simplot Company (Simplot) Smoky Canyon phosphate mine in Southeastern Idaho (Figure 1). In accordance with the Administrative Order on Consent (AOC) entered into by Simplot, Idaho Department of Environmental Quality (IDEQ), the US Forest Service (USFS), and the US Environmental Protection Agency (USEPA), a Site Investigation (SI) was conducted at the mine site in 2003 and 2004. Investigations to date have identified elevated concentrations of selenium in surface water being discharged via Hoopes Spring and South Fork Sage Creek Springs, which ultimately discharges to lower Sage Creek. Selenium released from overburden disposal areas (ODAs) at the mine has the potential to migrate vertically downward into the Wells Formation aquifer. Groundwater from the Wells Formation aquifer discharges at Hoopes Spring and South Fork Sage Creek Springs.

Source control actions implemented at the ODAs will limit infiltration to the Wells Formation, but will not immediately reduce selenium concentrations discharged from the Wells Formation via Hoopes Spring and South Fork Sage Creek Springs. In the interim, modification of the selenium surface water quality standard is being investigated.

Field monitoring studies are in progress to characterize the exposure environment, the aquatic community, and the physical habitat. Activities for the field monitoring studies are documented in the April 2007 Work Plan - Field Monitoring Studies for Developing a Site-Specific Selenium Criterion (NewFields 2007a).

This report for the study of brown trout (*Salmo trutta)* reproduction is presented as the first of two laboratory studies to evaluate the effects of ambient selenium concentrations in aqueous and dietary media on reproductive success of trout from the site. The second study involves a similar scope, but uses Yellowstone cutthroat trout (*Oncorhynchus clarki*). The laboratory studies were developed to complement information available from literature and an extensive field monitoring program for the study area. These laboratory studies are designed to assess potential effects of selenium accumulated in tissue of wild-caught adult brown trout on reproductive success, especially the development of young fish from fertilization through swim-up stages of development. The study design was presented in an October 17, 2007 Technical Memorandum - Methods for Testing Adult Brown Trout Reproductive Success. Laboratory portions of this testing were carried out at ENSR's environmental toxicology laboratory in Ft. Collins, Colorado by Dr. Rami Naddy. The deformities assessment was performed by Dr. Kevin Bestgen at Colorado State University's Larval Fish Laboratory.

The approach for the brown trout laboratory reproduction studies was based in part on the following published works:

- Kennedy et al. (2000). The effect of bioaccumulated selenium on mortalities and deformities in the eggs, larvae, and fry of a wild population of cutthroat trout (*Oncorhynchus clarki lewisi*);
- Holm et al. (2003). An assessment of the development and survival of rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) exposed to elevated selenium in an area of active coal mining;
- Holm et al. (2005). Developmental effects of bioaccumulated selenium in eggs and larvae of two salmonid species; and
- Hardy (2005). Effects of dietary selenium on cutthroat trout (*Oncorhynchus clarki*) growth and reproductive performance.

Based on these and other works, the reproductive success of fish exposed to selenium via diet and water was identified as a highly sensitive endpoint. The approach also reflects the following understanding of the current state of the science regarding selenium toxicity:

- Chronic effects of selenium exposure to fish are due primarily to diet. Chronic toxicity is based on the magnitude and duration of exposure, as well as bio-uptake in the food web. The USEPA (2004) draft criteria document for selenium did not consider or use tests in which aqueous only exposure was tested. EPA states, "[b]ecause diet controls selenium chronic toxicity in the environment and water-only exposures require unrealistic aqueous concentrations in order to elicit a chronic response, only studies in which test organisms were exposed to selenium in their diet alone or in their diet and water were considered in the derivation of a chronic value."
- Fish appear to be the most sensitive aquatic biota in the area of interest to chronic exposure and toxicity from selenium (Coyle et al. 1993; Hamilton et al. 1990; Hermanutz et al. 1996) (as cited in USEPA 2004).
- Reproductive success is the most sensitive biological end point for assessing selenium toxicity to fish (Lemly 1985a,b, 1992; Gillespie and Baumann 1986; Schultz and Hermanutz 1990; Coyle et al. 1993) (as cited in Lemly 1993).
- Selenium impacts on reproductive success in fish are strongly correlated to selenium content in eggs (Parametrix 2009)[1]. Selenium in eggs is derived from maternal tissue, and is well correlated with whole body tissue selenium concentrations in maternal adults.

[1] Parametrix 2009 is a compilation document that reviews a number of important studies in the selenium literature. The conclusions drawn are based on the scientific evidence from numerous studies suggesting ovary or egg concentrations are the best tissue to correlate to effects. This position is also supported by USEPA in their revision of the National Selenium Criteria as relayed to the SSSC Work Group by Dr. Charles Delos.

- To date, three species of trout (i.e., brook, rainbow, and cutthroat) have been tested for bioaccumulation in adults and effects on development of young (Holm et al. 2003, 2005; Kennedy et al. 2000; Hardy 2005; Rudolph et al. 2008). No published literature has been found that indicates brown trout have undergone such testing to assess potential effects.

Because of the site-specific nature of selenium exposure and toxicity, wild-caught, reproducing fish from the study and reference areas are the best measure of current and potential impacts within this watershed. Brown trout are present in Hoopes Spring, Sage Creek, and Crow Creek. It is one of two predominant trout species (the other being Yellowstone cutthroat trout) found in these creeks and, although introduced, is recreationally important. Brown trout are by far the most abundant of the two trout species and are known to reproduce throughout the study area and therefore were used as a test species.

## 1.1 Background

Sage Creek downstream of Hoopes Spring regularly exceeds the chronic water quality standard for selenium. The frequency and magnitude of the exceedences decline downstream with tributary inflows. Only infrequent exceedences have been observed in Crow Creek immediately downstream of Sage Creek. While concentrations of selenium may exceed the surface water standard, it is not an explicit indication that the aquatic community is impaired. National surface water quality criteria adopted by states as standards do not always take into account the types of species present, nor the site-specific conditions, such as aqueous chemistry which may confound toxicity. Many factors influence the in-stream toxicity of selenium including the bioavailability of the form of selenium, tolerance of resident species (e.g., acclimation), and/or other factors that may enhance or ameliorate toxicity.

The brown trout adult reproduction testing used gravid adult wild fish captured at various locations from the study area (Figure 2), as well as hatchery fish for laboratory controls. Maternal transfer is believed to be one of the key factors influencing reproductive toxicity. Wild pre-spawn brown trout were collected from locations that represent the range of observed surface water selenium concentrations (NewFields 2007b). Aqueous and dietary selenium concentrations translate into a range of exposure conditions resulting in different body-burden loadings for parental fish, specifically adult female trout. It was anticipated that tissue concentrations in parental fish would confirm this. Gametes from the adult wild fish were collected and fertilized to evaluate reproduction. Although young were not exposed to aqueous selenium, they consumed any protein-bound organic selenium that was present in the yolk and passed on to the egg via parental exposure. The range and gradient of the selenium exposures, well-defined source area, exceedence of water quality standards and observations of thriving fish populations present a unique situation to examine selenium exposure and effects.

## 1.2 Objectives

The objectives of the testing presented herein are as follows:

- Document the range of selenium concentrations in wild parental fish due to in-situ integrated exposure of diet and water;
- Document the selenium concentrations in eggs produced by adults from different locations in the study area;
- Develop a relationship between selenium concentrations in maternal whole body tissue and egg tissue; and
- Develop relationships between egg tissue concentrations and measures of reproductive success and viability of young.

## 2.0 METHODS

The methods for testing adult brown trout reproductive success, including the study design plan and analysis details for the assessment of selenium exposure, were presented in a SSSC Workgroup – reviewed Technical Memorandum (TM) dated October 17, 2007 (NewFields 2007b). The methods for fish collection, egg collection and fertilization, and laboratory methods are briefly summarized below along with any deviations from the planned methods. ENSR conducted the reproduction testing for brown trout. Columbia Analytical Services (CAS) (Kelso, Washington) conducted the analytical chemistry for selenium concentrations in tissue. Appendix A describes the reproduction studies.

## 2.1 Wild Fish Collection

Because there is limited information on selenium toxicity to brown trout, there was some uncertainty as to where within the previously observed tissue concentration range reproductive effects might occur. To address whether the laboratory study would adequately cover the range of parental tissue concentrations expected in the system, brown trout tissue data for selenium were compiled for the stream segments of interest to examine the range of variability. The mean and its confidence interval (CI) suggest that the data are somewhat variable (mean (CI) - 13.27±1.995). Since the system is comprised of small streams that have already been sampled numerous times, concern for the system is that over sampling can adversely influence the number of fish locally within the system, especially gravid females. Correspondingly, the goal was to identify the number of fish for collection that would provide a reasonably high probability of spanning the tissue concentration range of interest. The representativeness of the study is ultimately determined by capturing the range of effects and not the total number of fish. Next, the sample size to capture the range of tissue variability was estimated. How many samples are needed to cover the range of population of data (i.e., tissue concentrations), including at least one or more sample(s) that represent the upper 10th percentile? The following formula from Gilbert (1987) was used:

$$\alpha = 1-(1-p)^n$$

When rearranged to solve for n, it looks as follows:

$$n = \ln(1-\alpha)/\ln(1-p)$$

where:

$\alpha$ = Probability of at least one sample representing the upper $p^{th}$ percentile;

p = target percent in number format; and

n = number of samples.

For this assessment, alpha was set at 0.05 and 0.1, while p was set at a range of percentile values. At a 95 percent confidence level (i.e., alpha = 0.05), 29 samples should ensure that at least one or more samples would represent the upper $10^{th}$ percentile (i.e., $90^{th}$). These 29 samples (i.e., adult females) were to be divided among the four exposure areas within the Crow Creek drainage. Rather than round down to seven fish per location, the number of fish was rounded up to 8 fish per location, which equaled 32 fish for the four locations. Based on Workgroup comments, the recommendation was to include additional fish samples for the reference area, thus an additional eight fish were added as targets for collection from the reference location. In total, for the five locations, it was estimated that collection of about 32 fish from the Crow Creek locations and 8 fish from the reference location (i.e., n=40) should capture the upper $10^{th}$ percentile of the data distribution.

The upper $10^{th}$ percentile was chosen because there will naturally be extremes in any environmental data, thus attempting to capture the entire range is not practical and over sampling of the spawning-age adults could easily occur in an effort to obtain fish with the highest tissue residues. Use of the $90^{th}$ percentile captures a large proportion of the data. Based on the data currently available, the range of concentrations is such that capturing the $90^{th}$ percentile, or upper $10^{th}$ percentile, will result in capturing fish with 20 mg/kg dry weight (dw) selenium or more. Section 3.2.1 describes the initial data used to derive the upper $10^{th}$ percentile and shows how the tissue concentrations from the adults collected for the reproduction study fit within that distribution. Section 4.7 describes the number of fish collected, and that the number of fish was adequate for the intended purpose of the study.

### 2.1.1 October Fish Collection

From October 22 to October 27, 2007, ripe and running brown trout were collected by electro-fishing at eight locations (Appendix B) (Table 1). In Crow Creek and Sage Creek, target locations included those where brown trout redds had been previously identified during Fall 2006. Other areas within these locations where brown trout might be expected to congregate and spawn due to favorable conditions, such as water depth, velocity, and substrate were also included (Figure 2).

Reference locations on Montpelier Creek and Stump Creek were also sampled for spawning brown trout. Snowslide Creek, near its confluence with Montpelier Creek, was evaluated and deemed to have inadequate flow and water depth.

Target age of fish for use in this study was 3+ years old. Fish of this age typically range from approximately 230 to 300 mm in length. Fish greater than 230 mm were collected, weighed and measured for length.

Adult brown trout were held instream near the location of capture in flow through "live cars". Fish were held until October 30$^{th}$, and were fed a commercial fish food pellet daily beginning October 27$^{th}$. From October 27$^{th}$ to October 30$^{th}$, fish were checked daily for signs of ripening. Ultimately, eggs could not be expressed from any of the retained females and all fish were released.

Water quality data were collected at each of the locations where brown trout were collected and subsequently held for possible spawning. In-situ field parameters, including water temperature, pH, conductivity, and dissolved oxygen were recorded (Table 2). A single water quality grab sample was also collected from each of these locations for analysis of dissolved and total selenium (Table 3 and Table 4).

### 2.1.2 November Fish Collection

From November 12 to 16, 2007, many of the same reaches sampled in October were sampled again for the presence of ripe and running brown trout (Table 5). Ripe or potentially ripe males and females were again held on-site in flow through "live cars" until they could be checked again for eggs or milt depending up gender. Collection methods were similar to those described above. No additional water quality data for selenium or ambient conditions were collected in November.

Eggs (from adult female trout) and milt (from adult male trout) were collected in the field November 13-15, 2007 for conduct of the reproduction tests. Fish were anesthetized using MS-222 to loss of equilibrium. Fish weight and length were then measured to the nearest 0.1 g and 1 mm, respectively. Trout were blotted dry, particularly the area around the urogenital opening to remove excess water that might contribute to premature water hardening of the eggs. The milt from several males at each location was expressed using a downward squeezing force, ventrally. Milt from several males was collected into a single plastic bag and stored on ice until added to individual egg batches from all females collected from that location. Eggs from each female were stripped from the vent in a similar fashion as the milt was collected from the males. Eggs from a single female were stripped into a pre-cleaned stainless steel bowl. Any blood, dirt or extraneous material was then removed from the bowl. Approximately 1 ml (depending on relative volume of eggs) of milt was added and then the egg / milt mixture was swirled gently to ensure adequate mixing of gametes. The eggs and milt were allowed to sit undisturbed for ~1 minute. Then ~100 ml of local stream water (enough to just cover the eggs) was added to the bowl. The gametes were gently swirled for three minutes. Afterward, an additional 500 ml of stream water was added to water harden the fertilized eggs. The entire contents of the bowl were then poured into a labeled plastic bag and sealed. Each bag was labeled according to the female from which the eggs came, as well as the location. Prior to transport to the ENSR, the bag containing the fertilized gametes was partially inflated with oxygen, placed into a separate bag (double bagged), and returned to storage on ice (@ 4°C). The fertilized gametes were placed in a cooler for storage and transfer to the laboratory to protect them from sunlight and to keep them cold. A transponder that recorded temperature at 1 minute intervals was placed in each cooler prior to shipment to monitor the temperature during transport.

Adult fish were sacrificed for whole body selenium analysis. The adult fish carcasses were packaged in double plastic Ziploc® bags and stored on ice or frozen prior to shipment to ENSR along with the final egg batches. Because egg batches had to be delivered to ENSR within a narrow time window, and because ENSR had a large walk-in cooler/freezer, adult carcasses were initially shipped to ENSR. Once all carcasses were at ENSR and thoroughly frozen, a single shipment which included a subsample of eggs and all the adult fish carcasses for selenium tissue concentration analysis was sent on dry ice to CAS. Total selenium analysis and percent solids content were performed on all the submitted samples according to the methods described in the Work Plan (NewFields 2007a).

### 2.1.3 Hatchery Fish

Hatchery fish were used as method controls. Two sets of adult brown trout were obtained from the Saratoga National Fish Hatchery, Saratoga, WY (courtesy of Lee Bender) on October 23, 2007. Throughout this study, fish from this hatchery are identified as SC. The initial hatchery fish were obtained approximately three weeks prior to the first field-collected (wild) fish. Eggs from the initial set of hatchery fish were fertilized in the laboratory (transport of eggs and milt separately to the laboratory) according to the methods described above. Maternal fish were sacrificed to obtain whole body selenium tissue concentrations that corresponded to egg clutches from each female, consistent with the methods utilized for the wild fish.

A second set of hatchery fish were obtained in December 2007 from the Spring Creek Trout Hatchery in Lewistown, Montana as an additional method control. Eggs from these fish are referred to as SPC. These gametes were obtained in bulk as eyed eggs (i.e., already fertilized). Parents were unknown and mixed, thus whole body parental tissue concentrations were not obtained. Since the SPC eggs were a batch sample, they were submitted to the analytical laboratory for total selenium analysis as one sample.

The hatchery fish that were obtained served as method controls for the experimental process.. Hatchery fish and the resultant eggs are not subject to the same rigors as wild fish. The additional stresses that wild fish face beyond selenium exposure are not present for hatchery fish. As these non-selenium stressors for wild fish can also affect the test endpoints, including hatchery fish that do not experience these stressors in comparisons between these populations to study endpoints is inappropriate.

While hatchery fish were not used to quantitatively assess effects endpoints, the hatchery fish are important to illustrate the range of method variability that can and does occur in larval fish survival, growth, and deformities when no selenium exposure has occurred. The data for these hatchery fish and the measured response are included alongside the field-collected fish to illustrate that variability.

## 2.2 Reproduction Study and Laboratory Test Methods

The reproduction portions of this testing were carried out by ENSR's environmental toxicology laboratory in Fort Collins, Colorado. The methods are presented in detail in Appendix A. The study plan design was initially developed based on exposure areas and grouping of fish from the same collection areas. However, the study approach was modified to collect trout at several different locations (exposure areas) and raise eggs from each maternal fish as an independent unit (i.e., paired data). The collection of paired data for individual fish is expected to provide better insight on the relationships between tissue concentrations and reproductive success.

Adult trout carcasses and a subsample of eggs were sent to CAS for analysis of total selenium and percent solids. Tissue was analyzed for selenium using Gaseous Hydride Atomic Absorption Spectroscopy (GH-AAS) Method 7742. Percent solids were measured via freeze drying.

## 2.3 Deformity Assessment

Dr. Kevin Bestgen at Colorado State University's Larval Fish Laboratory was contracted to conduct the deformity assessment. He evaluated over 10,000 individuals and each individual fish was evaluated for up to four different deformities and four possible levels of deformity (Appendix C). Dr. Bestgen developed a process for assessing deformities which gave specific measurements to each ranking, thereby allowing for some measure of repeatability and accuracy. He received samples essentially as blinds because he did not know what the sample locations were or their locations relative to selenium concentrations.

The general criteria were adopted from Holm et al. (2003), and included assessments of craniofacial deformities (mostly of the head, eyes, and jaw), vertebral deformities, fin deformities, and edema. The original publication showed pictures of some deformities but others, particularly the intermediate categories, were not illustrated or were poorly described. More specific definitions for each of the assessment categories were developed to give better repeatability and consistency across studies, and to aid others in learning the range of deformities possible.

Deformities in each of the categories described above were given a score from 0-3, with 0 being a normal condition and 3 being the most deformed. Some range finding was conducted over the first several samples to find background and severe levels of deformities in each category. Initial samples were rescored as necessary to bring them into compliance with the standards that were used throughout the assessment.

The protocol for assessing damage was to place several fish, head to the left, in a Petri dish and examine them under a dissecting microscope and 10X magnification. The lateral side was examined for spinal deformities (lordosis, kyphosis), appearance of the eye, head and snout shape, edema, and fin deformities. The fish was turned ventrally to look for mouth deformities and further spinal deformities (scoliosis), turned laterally again for the same criteria as the other side, and then dorsally for issues associated with eyes, head size, spinal deformities.

Craniofacial deformities included shortening of the jaw, snout, and missing or poorly developed eye or eyes, and head shape abnormalities. A slightly shortened lower jaw (<= 1 lip width) received a 1, a shortened jaw = 2 lip widths or a slightly shortened and slightly disfigured jaw = 2, and a flat lower jaw or much disfigured (non-functional) jaw = 3. An assessment of fish independent of this study revealed that other brown trout of the same size and developmental state did not have the slight deformity that was assessed as CF =1 for the jaw (J). Thus, the CF = 1 score where the J was concerned were deemed real. A slightly blunted snout (about 50 percent eye diameter, usually is > than that) = 1, very blunt or flat = 2, deformed or bulbous = 3. Eye deformities were scored as one eye blind or poorly pigmented or poorly developed =1, both poorly developed = 2, both blind = 3. Skulls that were slightly bulbous (1/3 > normal) = 1, moderately bulbous (2/3 > normal) = 2, and bulbous (1x or > than normal) = 3.

Skeletal deformities included any deformity of the vertebrae or spines. A slight bend of less than 45 degrees (but > than body width off of straight) or a minor body constriction (e.g., a tight rubber band about the body effect) was given a score of 1, 2 slight bends or constrictions anywhere, or bend of > 45-90 degrees was scored a 2, and multi-directional bends > 90 degrees were given a 3.

Fin deformities included variation in fin or finfold morphology and a slightly smaller or missing fin (in thin fish, the adipose fin was often absent, indicating fat absorption, not uncommon and scored 1) or one with a bend or incomplete ray development (in older fish) was given a 1, 2 fins damaged or malformed = 2, and > 2 fins malformed or if fins were missing (except adipose) was = 3.

Edema was detected by an obvious swelling and fluid buildup, usually abdominally, and ventrally, which often displaced the gut, and was usually clear fluid that was slightly soft when touched with a blunt probe. Slight edema = 1 was for a fish with up to 1X swelling of the normal body width or depth, up to 2x = 2, and > 2x = 3.

### 2.3.1 Data Reduction of Deformity Rankings

Individual files, representing scoring sheets, were received for each sample evaluated. All files were combined in Excel to form a master file. Data were summarized using the Pivot table function in Excel to produce counts and percentages of normal fish, deformed fish, and total number of fish evaluated. Similar to the method of Holm et al. (2005), a Graduated Severity Index (GSI) was derived based on the deformity rankings and counts for progeny from each parent. A total score was computed as follows:

[(# fish for CF=1) x (1)] + [(# fish for CF=2) x (2)] + [(# fish for CF=3) x (3)].

This method differs slightly from Holm et al. (2005) as it weights each ranking with more weight given to more severe deformities. Fish scored as 0 (normal) observations did not enter into this calculation of total score. The final GSI score was computed as the sum score/total # fish including those ranked as "0". The total scores were summed and divided by the number of categories of deformities assessed (usually 4) to derive a mean GSI score.

Because the USEPA's Toxicity Relationship Analysis Program (TRAP) version 1.2 (Erickson 2008) logistic functions were designed to derive an inverse sigmoidal curve, commonly used to illustrate the dose-response curve of increasing exposure concentration and declining biological observation (e.g., survival, growth, etc.), deformities were evaluated as the sum fraction of normal fish (sum of normal fish/ total number of fish) for each deformity. This approach did not take into account severity of deformity, simply the frequency of deformities which is consistent with USEPA's (2004) approach to analysis of similar data.

## 2.4 Statistical Analysis

Multiple test-effects endpoints were measured at different times during the test including: fecundity, fertilization success, hatching success, deformities, length, weight, survival (different times during the study), and tissue concentrations (egg and whole body). These endpoints were consistent with those of Holm et al. (2005), Hardy (2005), and Kennedy et al. (2000). Feeding success was added as a test endpoint to evaluate the change from endogenous to exogenous feeding post swim up.

Scatter plots and best-fit ordinary least squares (OLS) regressions were used as an exploratory tool to evaluate the potential for meaningful relationships. Ordinary least squares regression analysis was used as a preliminary method to assess if relationships existed between individual exposure assessment endpoints (i.e., parental selenium body burdens or egg selenium concentrations) and test-effects endpoints measured in the study. The dose-response relationships for exposure and effects endpoints were evaluated further. Logistic regression analysis was performed using USEPA regression-analysis software (TRAP version 1.2; Erickson 2008) for the effects endpoints showing the strongest relationships to the exposure endpoints. USEPA's TRAP software provides a number of statistical analysis tools, including logistic regression, to evaluate the presence of dose-response relationships. The logistic regression approach is consistent with the methods utilized by the USEPA in their assessment of dose-response data for the 2004 Draft Criterion. USEPA's TRAP software also allows for prediction of Effect Concentration (EC) values to estimate thresholds for potential effects for brown trout. Both $EC_{10}$ and $EC_{20}$ values were derived for each relevant relationship developed.

# 3.0 RESULTS

## 3.1 Surface Water Quality

Water quality data were collected in October during the initial effort to capture spawning trout. Tables 3, 4, and 5 present field measured parameters, conventional, and selenium concentrations in surface waters, respectively. At the upper Crow Creek locations (CC-75, 150, and 350), total selenium ranged from 0.00055 (CC-75) to 0.0015 mg/L (CC-150). In Sage Creek at LSV-2C, the selenium concentration in surface water was 0.0384 mg/L. At the lower Crow Creek locations downstream of Sage Creek, selenium concentrations were 0.0017 mg/L at CC-3A and 0.0028 mg/L at CC-1A. At both the Montpelier and Stump Creek locations, selenium was less than detectable (0.0002 mg/L) (Table 4). No additional water quality data were collected in November, as the time frame between the October and November sampling period was short. The expected exposure for fish from an exposure area is aggregated over a period of time, thus the exposure is best represented by the dietary and surface water selenium concentrations occurring prior to the time of sampling.

Water quality data for selenium have been collected at numerous locations within the study area and outside the study area over a fairly long period of time. Two additional sources of data are available to evaluate selenium concentrations both temporally and spatially. These datasets include:

- Fall 2006 to Spring 2008 surface water quality data collected for the SSSC study; and
- Spring and Fall annual effectiveness monitoring program data.

Information from these datasets is presented in Section 4 to help put selenium concentrations in surface water measured in October 2007 in context.

## 3.2 Wild Fish

During the October sampling period for spawning brown trout, approximately 300 adult brown trout were captured and 104 were retained as potential spawners. Of these, 36 were males and 68 were suspected females (Table 1). After a brief holding period all of these fish were released at the locations from where they were collected, because no eggs could be stripped from the female fish.

During the second sampling round in November, more than 300 adult brown trout were collected over a five day period. Equivalent numbers of prospective ripe males and females were retained. Eggs were collected from 26 ripe females from three locations representing a range of ambient selenium concentrations in water, including two locations in the watershed upstream of Sage Creek and one location in Sage Creek. Consistent with the October sampling, the largest number of brown trout was collected in Sage Creek from upstream of South Fork Sage Creek to Hoopes Spring. During October and November, several brown trout were collected at the Meade Peak Ranch (CC-1A and CC-3A). However, no ripe females which would readily express eggs were captured. No ripe fish were collected from the Stump Creek reference area (Table 5).

### 3.2.1 Adult Size and Selenium Concentrations -Whole Body and Eggs

The initial target range for fish age and size was 3+ years (>230 mm). The trout collected from the field ranged from 265 mm to 391 mm with most of the females being 300 mm or larger. Ripe fish, particularly females, were generally closer to 300 mm in size and often larger than 300 mm. It is assumed that the size range of female fish collected represents the 3 and 4 year old age classes. A narrower range of adult sizes would have been preferred because fish size (i.e., age and maturity) can affect egg production. However, the number of ripe females collected made it necessary to include fish from a wider size range to meet study goals.

The whole-body selenium concentrations measured in the adult female carcasses whose eggs were used in this study are presented in Table 6. Whole-body selenium concentrations measured in field-collected brown trout ranged from 4.7 to 22.6 mg/kg dw. Figure 3 shows adult hatchery and wild fish lengths relative to their respective whole body selenium concentrations. The hatchery fish are larger and have a lower whole body selenium concentration, while the wild fish have considerable variability in whole body selenium concentrations reflecting the varying histories of selenium exposure. Figure 4 shows a similar relationship using adult fish weight (wet). The range of hatchery fish weights is larger than that observed for length, however, a similar trend is observed for wild adult fish, exhibiting relatively consistent weights despite the variation in whole body selenium concentration.

Figure 5 shows the size distribution (based on adult length) versus the whole body selenium concentration for the adult female brown trout collected as part of this reproduction study in November (red asterisks), the brown trout tissue concentrations collected as part of the field monitoring for the SSSC studies (Table 7), and any brown trout data collected since 2004 when tissue data were collected for the Smoky Canyon Mine Site Investigation. The range of tissue concentrations illustrated in Figure 5 (excluding the adults for the reproduction study) represents the brown trout data available at the time the adult study was being planned and are the basis for the number of samples derived (Section 2.1) as a target for field collection. It is important to note that previous monitoring and redd evaluations indicated very low numbers of adult fish of spawning size found in the Hoopes Spring channel (HS-3) or Hoopes Spring location (HS). As shown in Figure 5, data for fish tissue concentrations greater than 25 mg/kg dw were only found in fish from Hoopes Spring. The range of tissue concentrations for female trout collected in November spans nearly the entire range of brown trout tissue concentrations collected from the previous field monitoring data.

The concentrations of selenium in egg batches from each female parent were also measured. Selenium concentration in fish eggs collected from CC-150 ranged from 6.2 to 12.8 mg/kg dw. Egg selenium concentrations from CC-350 ranged from 6.9 to 14.0 mg/kg dw, while those from LSV-2C ranged from 11.2 to 40.3 mg/kg dw (Table 6). Figure 6 shows the egg selenium concentrations ordered from lowest to highest from hatchery fish and wild collected fish. Appendix D includes the raw data for selenium concentrations in whole body and egg tissue.

### 3.3 Hatchery Fish

The Saratoga National Fish hatchery (SC), Saratoga, WY, was the first source of brown trout eggs for the laboratory controls in this study. Because these fish were spawned about 3 weeks ahead of the field-collected (wild) fish, due to spawning time in the field versus spawning time at the hatchery, it was not possible to select smaller spawning females from the hatchery. These eggs were fertilized at ENSR following collection at the fish hatchery. As discussed later, hatch rates were lower than expected and some fungal contamination occurred in the SC egg batches, therefore, a second set of hatchery eggs were obtained. Spawning was complete for SC hatchery fish, thus an alternative source of eggs was necessary.

The Spring Creek Trout Hatchery (SPC), Lewistown, Montana, was the second source of brown trout eggs for the laboratory controls in this study. This second set of eggs was obtained to ensure that the test system was suitable. Because it was late in the season these eggs were only available as eyed–up embryos.

#### 3.3.1 Adult Size and Selenium Concentrations – Whole Body and Eggs

Eight adult trout from the Saratoga hatchery were used, ranging in length from 420 mm to 562 mm. Hatchery fish were larger than fish captured at field locations (Table 6). Maternal whole-body selenium concentrations measured in the hatchery trout ranged from 2.5 to 4.3 mg/kg dry wt. Bulk eyed-eggs were received from the SPC, thus no information of specific adult size and whole body maternal tissue concentrations was gathered.

The selenium concentration of the SC hatchery eggs ranged from 0.76 to 1.2 mg/kg dw, while the selenium concentration in the SPC hatchery eggs was 0.73 mg/kg dw (Table 6). As illustrated in Figure 6, egg selenium concentrations in the hatchery fish were considerably lower than egg selenium concentrations in the wild fish.

### 3.4 Reproduction Testing

Appendix A details all laboratory results of the reproduction study. The following endpoints were measured in the laboratory: fecundity, hatch, growth, survival/mortality, and feeding success (growth) post swim up. Additional measures included day to first hatch, day of swim up, and day of test termination.

#### 3.4.1 Fecundity

Fecundity, measured as the number of eggs/female, was measured for each parent. Section 3.1 of Appendix A details egg quantity per female, number of eggs used in the study, and selenium tissue concentrations. Twenty-six egg samples from wild-collected brown trout were submitted to ENSR for the reproduction study. Of these, one set of eggs was dead upon arrival (LSV-2C-006). The number of eggs from individual field-collected fish ranged from 161 (LSV-2C-010) to 1,658 (CC-150-016). The number of eggs collected from the individual SC hatchery fish ranged from 1,248 to 5,448. Figure 7 illustrates the number of eggs relative to adult size (length). As mentioned, the hatchery fish were larger than the field-collected (wild) fish, and on average had almost two times or more eggs.

Figure 8 shows the relationship of the total number of eggs produced from each female versus the respective concentration of selenium in the eggs. Figure 9 shows the relationship of the total number of eggs produced from each female versus the respective concentration of selenium in the adult female fish.

#### 3.4.2 Egg Mortality

The goal of the test was to begin each test chamber with 600 fertilized eggs. Not all wild fish produced sufficient egg numbers to do this, so a proportion of eggs was used to begin the test that allowed for adequate biomass of eggs to be left over for selenium concentration analysis. The minimum number of eggs included in a test chamber was 100 (LSV-2C-010). For sample LSV-2C-006, the entire egg batch was declared dead upon delivery to the laboratory and was not included in the test. For sample LSV-2C-007, eggs were initially included in the test, but it was determined, due to high numbers of eggs turning opaque, that these eggs were not fertilized, thus eggs from this sample were also not included in the test. Maternal whole body tissue and an egg subsample were collected for these two samples. Table 3-1 in Appendix A summarizes the number of eggs placed in the study for each sample. Egg mortality was measured based on the number of fish that hatched subtracted from the number of eggs at test initiation for each sample.

Egg mortality for the SPC parents was low (<3 percent), while egg mortality for SC parents ranged from 6.8 percent to 88 percent. It is not clear if higher egg mortality in SC derived eggs was due to incomplete fertilization or due to the fungal problem that arose with these eggs. Egg mortality from parents collected at the background areas ranged from as low as about 3 percent to as high as 85 percent. From the LSV-2C exposure area, egg mortality ranged from 1 percent to 49 percent across each of the conditions: hatchery, background (CC-150), low (CC-350), or high (LSV-2C) exposure, egg mortality was highly variable (Figure 10).

### 3.4.3 Hatch to Swim Up

Appendix A, Table 3-3 summarizes hatch data for the different samples, including day of first hatch, percent hatched, day of swim up, and percent swim up. Day of first hatch was simply the day when hatching was first observed for eggs in a sample. Percent hatch was the number of eggs that successfully hatched divided by the original number of eggs for that sample times 100. The day of swim up was when greater than 80 percent of the alevins for a specific clutch of eggs reached swim up (i.e., absorbed their yolk and were actively feeding). Percent swim up was the number of alevins that had absorbed their yolk sac and were actively feeding divided by the total number of eggs used to begin the test times 100.

The percent hatch for the SPC hatchery fish was 97.5 to 100 percent. The holding period was significantly shorter for SPC eggs. This difference may contribute to the higher hatch success. The percent hatch for the field collected eggs was 11 to 93 percent. Eggs samples collected from CC-150 ranged from 14.8 to 97.3 percent, with an average of 71.9 percent. Average hatch out for the eggs collected from fish at CC-350 was 56.4 percent. Average hatch out from LSV-2C was 83.9 percent (not including LSV-2C-007 whose eggs were not fertilized). The lowest percent hatch from the LSV-2C treatments was 50.6 percent, while the highest was 99.0 percent. The field collected fish eggs (which were fertilized in the field) indicated that the change in fertilization technique (field fertilization vs. laboratory fertilization) resulted in a higher hatch success rate compared with the SC hatchery fish (which were fertilized in the laboratory). Figure 11 illustrates percent hatch for each sample ranked from lowest to highest egg selenium concentration. Figure 12 shows the relationship of percent hatch to swim up. There is for most fish, a 1:1 relationship of hatch to swim up. However, for several LSV-2C samples, while eggs hatched (>50 percent), yolk fry never swam up, despite the extension of the study 15 days past the time of swim up to assess feeding transition. The range of egg selenium concentrations for those alevins that did not swim up was 26.8 to 40.3 mg/kg dw. Except those five samples shown for LSV-2C, eggs that hatched resulted in young that were able to reach swim up. As shown in Figure 13, the eggs from those five samples had the highest selenium concentrations (i.e., greater than 25 mg/kg dw). Figure 13 shows the number of days to first hatch and swim up versus egg selenium concentrations. While hatch rates were similar across the board, the number of days to swim up increased with egg selenium concentrations greater than 25 mg/kg dw.

### 3.4.4 Mortality

Mortality was assessed at several different periods during the test, including:

- **at swim up** ([number of eggs used to begin the test - number of fish surviving to swim up] / total number of eggs at beginning of test] * 100);
- **from hatch to test termination** ([percent survival at hatch - percent survival at test end]);
- **at test termination as overall mortality** ([number of eggs used to begin the test - total number of fish at the end of the test] / total number of eggs at beginning of test] *100); and
- **at the end of the 15-day post swim up feeding success trial** ([number of fish used to begin the post swim up feeding trial, usually n = 100 – number of fish at the end of the feeding trial at 15 days / total number of fish used to begin the test] * 100).

Mortality at swim up ranged from 0 to 6 percent in SPC fish, 7 to 90 percent in SC fish, and about 4 to 92 percent in wild fish (excluding the samples where no eggs were fertilized or eggs died before test initiation). Figure 14 shows mortality at swim up and overall mortality at the end of the test by location ranked by egg selenium concentration. It shows that overall mortality closely tracks mortality at swim up for most samples, except those from LSV-2C where overall mortality is greater than swim-up mortality. No real trends are observable from these data.

Figure 15 shows mortality in a similar fashion for the period, hatch to test termination. Mortality from hatch to the end shows a clear trend of low mortality in most all samples (i.e., <10 percent) and much higher mortality in a number of samples from Sage Creek below Hoopes Spring.

Percent mortality for fish from hatch to test end was substantially greater in the same five LSV-2C samples as those that did not achieve swim up (Section 3.4.3) and that had the highest egg selenium concentrations (greater than 25 mg/kg dw). Mortality during this period drops substantially in samples where egg selenium was about 20 mg/kg or less as shown by the 10 percent or less mortality for all remaining samples.

Finally, mortality as a function of the 15-day post swim up feeding trials was evaluated and is shown on Figure 16. The duration during which mortality was measured for this phase of the test was short, extending from swim up to 15 days past swim up to evaluate if fish could transition to active feeding. Similar to mortality from hatch to test end, mortality during the feeding trial shows highest mortality only occurred in the LSV-2C samples. Isolation of post-hatch mortality shows that for fish from most samples, mortality is low and only increases at locations where egg selenium concentrations were highest. Furthermore, the greatest percentage of mortality occurred in the last 15 days of test as shown in the difference between mortality rates in Figures 15 and 16. This is consistent with the prior observations that several of the samples from LSV-2C with the highest egg selenium concentrations did not swim up, therefore, their ability to transition to active exogenous feeding was impaired.

### 3.4.5 Growth

Growth endpoints measured include length and dry weight. The results of length and dry weight analysis for the target of 20 organisms per chamber at the end of the 15-day post swim up phase of the study are provided in Appendix A, Table 3-5. Average length of fish per sample location is shown in Figure 17. There were no apparent differences in length noted between hatchery fish and wild fish, or among wild fish, following the feeding trial. Growth as measured by dry weight is shown in Figure 18. Similar to the length data, these are presented in a rank order from lowest to highest egg selenium concentrations. There does appear to be an inverse relationship of increasing egg selenium and reduced dry weight. However this difference is not as apparent when the hatchery fish are excluded.

### 3.4.6 Deformities

Appendix B provides a summary of the counts of deformity rankings for each sample and a series of graphics illustrating sample deformities as a percentage of each sample. Observations made during scoring that resulted in defining a level of severity for a fish being examined are reported below:

- **Cranio-Facial Deformities** - Usually factors occurred together so a combination of two "1" conditions = 2, three "1" conditions = 3, or a 1 and a 2 = 3, and so on. For example, a deformed jaw and a blind eye = 2, two blind eyes = 2, but a badly deformed jaw (= 2 alone) plus a blind eye (= 1 alone), = 3.

- **Skeletal Deformities** - Bends caused by skeletal deformities were usually detectable from normal bending of the body during preservation (these fish were usually well preserved, very straight) by presence of a slight or greater bump below the surface of the epidermis on the outside of the bend. However, some fish with SD = 1 had just a very slight bend in the range the deformity described but could be due to preservation or the poor condition of the fish. This was sometimes especially true in larger fish, which may be more muscular and undergo stronger contraction during preservation and thus, bend slightly. A score "CF = 1" was a slight deformity, if at all. The scores of SD = 1 involving kyphosis or lordosis were deemed real because that is an unusual preservation deformity. Also, samples BKD 015 SU (i.e., extra fry from CC-150-015 at swim up), LOW 008 SU (i.e., extra fry from CC-350-008 at swim up), and SC 003 SU (i.e., extra fry from SC-003 at swim up) were re-examined; most fish were very straight so some samples with higher SD scores (e.g., post swim-up samples) were determined accurate. Thin fish were difficult to score, as they often looked emaciated.

- **Fin and Finfold Deformities -** Often fins were malformed associated with vertebral deformities that did not permit proper development. Folded finfolds as a result of preservation were not counted.

- **Edema** - Edema was not originally scheduled for assessment because it was thought sometimes not a teratogenic effect and may be transitory as fish develop. However, it was assessed because it was common in one early sample and not others, and because it was thought a condition that could affect emergence, mobility, and other factors that may limit survival of fish in the wild. The yolk, which was present in some quantity in some study specimens, also created some swelling but was typically yellowish, opaque, and small, and hard to the touch in preservation.

A sample of 50 fish and a sample of 30 fish were scored twice, the same fish for each batch but not necessarily the same order. This sample was characterized by a low incidence of fin deformities (slow development) and a high incidence of jaw deformities and blindness (SC 003 SU). Those cranio-facial traits are difficult to score because they are additive, and subjective as to severity. Thus, the results may be a conservative view of what score replicability should be like for other traits in other samples that are easier to score.

Replicability of frequency of cranio-facial abnormalities was high among assessments at 50 and 52 percent in the first sample of 50 fish, and identical frequencies of 46.7 percent in each assessment for the sample of 30 fish. The cumulative sums of the scores were also quite close, but reflecting variability in scoring for all three categories of severity in each sample. Replicability of fin ray development assessments for both frequency and the sum of the scores was identical in both samples.

The results of the deformity assessment are visually displayed in Figures 19 through Figure 22. The results of the cranio-facial (CF), skeletal (SK), finfold (FD), and edematous tissue (ED) deformity frequency are depicted separately. Each of these figures is similar for the remaining deformity assessments and present the data on a percent basis for each of the rankings used in the assessment.

### *Cranio-Facial Deformities*

For CF deformities (Figure 19 and Appendix B Figure 1), hatchery fish, except young from two parents, showed that greater than 80 percent of the young in each sample were ranked as normal. When deformities were present in the hatchery fish, they were ranked as slight. For the two samples that had higher numbers of non-normal fish (SC-003 and 004), craniofacial deformities ranged from slight to severe. For wild fish, from background and low areas (CC-150 and CC-350) from about 65 to 75 percent of all fish were ranked as normal for cranio-facial deformities. CF deformities ranked as slight were observed more often in fish from CC-150. At

CC-150, the percentage of normal fish ranged from 52 to 96 percent, whereas at CC-350 it ranged from 59 to 93 percent. For the CC-150 and CC-350 samples, fish not ranked as normal were predominantly ranked as slightly deformed for the CF characteristic. For samples from the LSV-2C area, more than 70 percent of the fish examined ranked as normal. Of the 12 samples submitted from the LSV-2C area, five (LSV-2C 003, 004, 005, 021, and 010) had a higher incidence of slight, moderate, and severe CF deformities in fry examined. For these five samples, fish were more often ranked as moderately deformed than those ranked as slightly deformed for this characteristic. In the remaining 7 samples, from 77 to 97 percent of fish in each sample ranked as normal, similar to the hatchery or background samples (Figure 19).

***Skeletal Deformities***

For SK deformities, the range of normal fish found in each sample was 60 to 91 percent and collectively, for both sets of hatchery fish was greater than 80 percent for all samples. In fish samples from CC150 and 350, the range of normal fish was 51 to 92 percent. For all sample from CC-150, 80 percent were ranked as normal fish, while at CC-350, only 66 percent of fish were ranked as normal. For fish from the LSV-2C area, the range of normal fish was 0 to 93 percent (Figure 20 and Appendix C Figure 2). Overall, 65 percent of the fish were ranked as normal. For this deformity category, there was a higher frequency of fish in most samples ranked as slight. The frequency of SK deformities in the moderate to severe range for hatchery fish or fish from CC-150 was low. Moderate to severe SK deformities were observed more frequently in fish from CC-350. Fish from LSV-2C showed a similar trend for SK deformities to those observed for CF deformities. The same five samples had higher percentages of the sample with slight, moderate, and severe SK deformities. For some of the fish in these five samples, larvae had deteriorated and could not accurately be ranked (shown as the blank category Figure 20). As noted in Appendix A, some larvae were clearly dying, but not dead, thus began deteriorating prior to them being preserved.

***Fin or Finfold Deformities***

For fin or FD deformities, the range of hatchery fish ranked as normal was 81 to 100 percent while overall for both sets of hatchery fish, greater than 90 percent of the fish were ranked as normal. For fish from CC-150, the range was 92 to 100 percent of fish ranked as normal in individual samples, while overall, 98 percent of the CC-150 fish were ranked as normal. The range of fish ranked as normal for CC-350 samples was 73 to 89 percent while overall, 85 percent of the fish from all samples were ranked as normal. Fish ranked as slight moderate, and severe for finfold deformities were observed more often in samples from CC-350 but the percentages were 6 percent or less for each of these categories. Normal fish from the LSV-2C area ranged from 0 to 100 percent. Across all samples, 80 percent of the fish were ranked as normal. Excluding samples LSV-2C 003 and 010, whose fish were too deteriorated to accurately assess fin deformities, the range of normal fish was 16 to 100 percent normal (Figure

21 and Appendix C Figure 3). The same five samples from LSV-2C either could not be evaluated for this characteristic, due to the condition of the fish in that sample, or had higher frequencies of moderate and severe fin deformities. As stated previously, several samples from LSV-2C experienced mortality before the swim up stage or did not swim up at all. Some of these fish were deteriorated and an accurate assessment of the severity of the deformity for this condition could not be made.

### *Edema Deformities*

ED was almost non-existent in hatchery fish and fish from CC-150 and CC-350 (Figure 22 and Appendix C Figure 4). Similar to the other three categories of deformities evaluated, edema was present at a higher and more severe level in the same five samples as identified previously for LSV-2C samples.

### *Graduated Severity Index (GSI)*

To capture the severity of each of these deformities into a single unit, a GSI was derived for fry originating from each egg batch as described in Section 2.3.1. The mean GSI score for all treatments ranked from left to right by the lowest to highest egg selenium concentrations is shown in Figure 23. Because a fish can have more than one deformity score, rankings higher than 1 are possible. Mean GSI scores show that for most samples GSI scores are 0.2 or less and a small number of samples ranged from 0.2 to 0.4. Mean GSI scores of 0.4 or less span the range of treatments/sites (hatchery and field). Only a small number of samples, the same five as identified in previous sections, from LSV-2C had mean GSI scores that were substantially greater than 0.4, ranging from 0.87 to 1.7 indicating that these samples had a higher frequency and severity in the level of deformities found. Figure 23 also shows the number of fish assessed from each sample.

## 4.0 ANALYSIS OF RESULTS

The following section presents preliminary analysis of the brown trout study data. A focus of these analyses is the relationship between maternal tissue concentrations and various reproductive effects identified in literature. Additional analyses will ultimately be conducted in conjunction with the full range of Site-specific information on exposure conditions and the biological community structure. These findings will also be contrasted with the work of others.

### 4.1 Surface Water Quality

Table 4 shows selenium concentrations from October 2007 surface waters, as well as selenium concentration data collected from pre- and post-October 2007 monitoring events. Both total and dissolved selenium analyses were conducted, and dissolved selenium is dominant in all surface water samples. At all of the upstream background locations on Crow Creek, the October 2007 total selenium concentrations are within the range of total selenium concentrations measured from 2006 to 2008 during seasonal monitoring. Total selenium concentrations at the Crow Creek locations upstream of Sage Creek (CC-75, CC-150, CC-350) are always below Idaho's Surface Water Quality selenium standard (0.005 mg/L).

The total selenium concentration at LSV-2C in October 2007 was high (0.0384 mg/L) compared to previous sampling events at this site. Figure 24 shows longer-term monitoring at the Hoopes Spring location immediately upstream of the LSV-2C location and shows that surface water selenium concentrations were increasing in 2007 and 2008.

Longer-term water quality monitoring in Sage Creek near Crow Creek road (LSV-4) provides information on selenium concentrations in Sage Creek before discharge to Crow Creek. Figure 24 shows longer-term selenium concentration data from this location and a gradual increase in selenium concentrations during 2007 and 2008 consistent with increases observed at Hoopes Spring and South Fork Sage Creek Springs. Concentrations during 2007 and 2008 ranged from 0.008 to 0.011 mg/L total selenium at LSV-4.

Selenium concentrations measured in Crow Creek samples collected downstream of Sage Creek at CC-1A and CC-3A in October 2007 were lower than Idaho's Surface Water Quality Standard. This is consistent with measurement data before and after this time period for these locations (Table 5). Selenium in Crow Creek downstream of Sage Creek is typically lower than the State Standard as illustrated by data in Figure 24 and Table 4.

Overall, selenium concentrations are highest in Hoopes Spring and Sage Creek immediately below Hoopes Spring (LSV-2C), and decrease in surface water with distance downstream of

Hoopes Spring (Figure 24). In Sage Creek upstream of its discharge to Crow Creek, selenium concentrations exceeded the State Standard of 0.005 mg/L, recently by about 2 times. In Crow Creek downstream of Sage Creek, infrequent exceedences of the State Standard have been observed. Regular monitoring data suggested selenium in Crow Creek downstream of Sage Creek is on average about 0.5 times the State Standard (0.005 mg/L). These surface water data set the stage for selenium exposure to fish and their food resources. Exposure is primarily dietary for fish but does include an aqueous component. Whole body maternal tissue concentrations of selenium described below integrate the water and diet exposures to provide a good indicator of exposure and bioaccumulation.

## 4.2 Relationship of Maternal Whole Body to Egg Selenium Concentrations

While more recent studies focus on selenium concentrations in eggs as the best predictor of reproductive effects there is also a substantial amount of information on whole body tissue concentrations in the literature. This initial regression analysis was performed to better understand the relationship between maternal whole body and egg selenium concentrations, and the results of the preliminary analysis confirm a strong relationship. The remainder of the analyses in this study focuses on the effects endpoint relationships to egg selenium concentrations. The relationship between egg selenium and whole body selenium allows for consideration of both measures as the study progresses.

Both selenium concentrations in whole body maternal fish and their eggs were measured. Figure 25 shows the relationship of egg selenium to whole body tissue selenium for wild brown trout collected for this study. This relationship is strong ($R^2$ = 0.80) with 80 percent of the egg selenium variability in wild fish explained by the selenium content of maternal tissue. It is important that this relationship be strong in order to confidently predict whole body tissue concentrations from egg concentrations. This is consistent with USEPA (2004) methods that developed translators for various tissue types. In this case, effects are related to egg selenium concentration, which, based on the current literature, is the best tissue for measuring a response for effects due to selenium.

## 4.3 Relationship of Egg Selenium Concentrations to Specific Effects Endpoints

Data for selenium in brown trout egg tissue are evaluated for effects on various endpoints for reproduction. Scatter plots and best-fit ordinary least squares regressions are used as an exploratory tool to further evaluate potential relationships. These regression relationships are not used as a final analysis tool or to determine biological significance of the regression because the distribution of the various effects endpoints (e.g., dependent variable) is typically skewed. Tests for normality were conducted and these data are not normally distributed nor are they log-normally distributed, which is one of the underlying assumptions of a least squares regression analysis. Use of logistic regression approach as an analysis tool is presented in Section 4.4.

Figure 7 shows total number of eggs per female versus the individual female length. As expected, the smaller, wild fish produced fewer numbers of eggs relative to the larger, hatchery fish. Size may not be the only controlling factor. Overall health of the fish due to environmental and or chemical stressors may also play a role, as discussed previously. As shown in Figures 8 and 9, selenium concentrations in eggs or whole body adults, while varied, suggest relatively similar egg production, although when just examining wild fish egg production, there does appear to be a relationship of decreasing egg abundance with higher parental or egg selenium concentrations. Figure 26 shows wild brown trout egg abundance relative to selenium concentrations in egg tissue. For fish collected as part of this study, the relationship is poor ($R^2 = 0.2$); only a small percentage of the variability in observed egg production for wild fish is explained by egg selenium concentrations. Because fecundity can be related to the size of the female (i.e., heavier, longer fish, are indicative of older fish potentially in a more robust condition), these data were also normalized to 320 mm by dividing the total number of eggs by the length of the female parent. This value was then multiplied times 320. The red diamonds on Figure 26 illustrate that length-normalized fecundity does not reduce variability nor improve this weak relationship. Based on these data, it is difficult to suggest that fecundity is an important endpoint in assessing selenium effects in trout. The literature and field data will be used to further assess this endpoint through examination of literature-reported fecundity effects and observed population data from the Crow and Sage Creeks.

Figure 27 illustrates the percent hatch of brown trout fry versus egg selenium concentrations for hatchery and wild fish. No apparent relationship was observed. Figure 28 illustrates both hatchery and wild fish egg selenium concentration versus the percent of fry that achieved swim up. The regression analysis indicates a possible relationship ($R^2 = 0.49$) between the percent of fry that swim up and egg selenium concentration.

Larval fish growth, measured as the dry weight of the organism following the 15-day post swim up feeding trial, was also investigated as a potentially important endpoint. Figure 29 shows dry weights of larval fish versus egg selenium concentrations and two relationships, one including the hatchery fish and one including only the wild fish. Both relationships show decreased dry weight with increasing egg selenium concentrations. However, the strength of the relationship is moderate at best (i.e., its predictive ability) when including the hatchery fish ($R^2 = 0.66$) data and poor when using the wild fish data ($R^2 = 0.26$). The growth data provides a strong indication about how inclusion of hatchery fish in the analysis may provide misleading results. Note the difference in the $R^2$ values for the two relationships shown in Figure 29. Clearly, hatchery larvae are larger as a group when compared to wild fish. Clearly, egg selenium concentrations in hatchery fish are lower than any wild fish collected. However, many other factors including differences in nutrition, relative physical stresses such as energy needed to forage, and size of wild versus hatchery fish adults may have effects that are independent of selenium exposures.

### 4.3.1 Survival/Mortality and Deformities

As discussed in Section 3, survival or mortality of eggs, alevins, and swim ups was measured throughout the study. For the purpose of the following analyses and those later presented for the logistic regression analysis, survival will be the endpoint used. The logistic regression analysis software requires that the effects variables be declining in their relationship to the exposure variables, and thus, will only correctly analyze, for example, survival data, not mortality data. To put these data in the same context for those analyses that precede the logistic regression analyses, survival data will be presented.

Survival was evaluated at several key points during the life stage: egg, hatch, swim up, at test termination following a 15-day feeding trial, and as overall survival. Of these, overall survival was initially evaluated as one of the endpoints more obviously correlated to egg selenium concentration. Figure 30 shows a scatter plot of this relationship, including wild and hatchery fish. Both hatchery fish and wild fish survival rates are variable on the lower end of the egg selenium range; however, it is clear from the data presented on Figure 30 that survival drops consistently to 30 percent or less at egg selenium concentrations above about 25 mg/kg dw. A third order polynomial regression provides a best fit model for these data ($R^2$ = 0.543) with egg selenium explaining about 54 percent of the variability in the overall survival endpoint when only wild fish are considered. The correlation coefficient is lower when hatchery fish are included.

Given the variability of the overall survival/mortality endpoint, as shown in Figures 14 and 15, and the influence of egg hatch on overall mortality/survival, the endpoint of survival/mortality from time of hatch to test end was investigated. Figure 31 illustrates this relationship including wild and hatchery fish. Review of this figure indicates a substantial decrease in survival between 20 and 25 mg/kg dw selenium in eggs. When both wild and hatchery fish are included in the 3rd order polynomial regression, the relationship is strong ($R^2$ = 0.90) with egg selenium concentrations explaining 90 percent of the variability in survival from hatch to test end. When considering only wild fish, the correlation coefficient $R^2$ remains essentially the same (0.89).

Figure 32 shows percent survival during the 15 day post swim up feeding trial versus egg selenium concentrations. When both wild and hatchery fish are included in the 3rd order polynomial regression, the relationship is strong ($R^2$ = 0.96) with egg selenium concentrations explaining 96 percent of the variability in survival during the post swim up feeding trial. When considering only wild fish, the correlation coefficient $R^2$ remains essentially the same (0.96). Of the survival terms, survival measured during the post swim up feeding trial presents the strongest relationship to egg selenium concentrations. As discussed later in Section 4.5, the strong relationship of post-hatch alevins and fish survival to selenium concentrations in egg or ovary tissue is consistent with the findings of others.

Frequency and severity of deformities, or lack thereof, was also evaluated relative to egg selenium concentrations. Figure 33 shows the sum fraction of non-normal fish larvae relative to egg selenium. The 3rd order polynomial function provided the best fit line ($R^2 = 0.85$). The increase in non normal fish is evident between 20 to 25 mg/kg egg selenium. Recall that a similar break point was also observed for survival (Figures 31 and 32) which indicates an important break point in two related but different effects endpoints.

Figure 34 shows the sum fraction normal fish versus egg selenium concentration. The 3rd order polynomial function provided the best fit line ($R^2 = 0.87$) and a slightly stronger relationship than the fraction of non-normal fish. This may result due to the higher numbers of fish that were ranked as normal for each sample as opposed to having some level of deformity. Again, as egg selenium concentration increases, there is a distinct break in the data for the fraction of normal fish, which in this case, decreases substantially at egg selenium concentrations greater than 25 mg/kg dw.

Figure 35 shows the mean GSI score versus egg selenium concentration and again, a 3rd order polynomial provides the best fit line ($R^2 = 0.84$). The mean GSI score, fraction non-normal fish, and fraction normal fish provide very similar endpoints, albeit based on the same data, the derivation for each is quite different. Fraction non-normal and normal fish are simply frequency values, while the GSI score is frequency and severity of the deformity.

Figure 33 through 35 similarly illustrate an inflection point, similar to the survival endpoints where increased effects are occurring relative to egg selenium concentrations. Due to the strong relationship of the deformity frequency and GSI effects endpoints to egg selenium, additional analyses of the individual frequency for the different deformity categories will also be assessed in the subsequent section.

## 4.4 Logistic Analyses

Based on the results of the preliminary regression analyses described above, a subset of effects endpoints was selected for logistic-regression analysis[2] to determine dose-response

[2] Unlike traditional linear regression models, which assume equality of variance and normal distributions, the logistic regression model does not require nor have the same assumptions which can lead to Type I and Type II errors. Logistic regression has many analogies to OLS regression: logit coefficients correspond to b coefficients in the logistic regression equation, the standardized logit coefficients correspond to beta weights, and a pseudo $R^2$ statistic is available to summarize the strength of the relationship. Logistic regression does not assume linearity of relationship between the independent variables and the dependent, does not require normally distributed variables, does not assume homoscedasticity, and in general has less stringent requirements. Logistic regression finds the equation that best predicts the value of the Y variable for each value of the X variable. The Y variable is not directly measured; it is instead the probability of obtaining a particular value of a nominal variable.

relationships with egg selenium concentrations. Log-transformed egg selenium tissue concentrations (mg/kg dw) were related to growth (based on larval fish weight), survival (various stages), and deformities (various measures) (Table 8). USEPA's TRAP software was used to derive a best fit logistic regression model for each effect endpoint distribution. Summary statistics for each regression run, a graphic of the curve plotting the actual data and predicted curve, and $EC_x$ for egg selenium residues based on the endpoint effect distribution are included in Appendix C for each of the models run.

### 4.4.1 Growth

Growth was measured in the post swim up feeding trial fish at the end of the 15 day period. These fish were carried through the test to the swim up stage. Twenty fish (or fewer if 20 were not available), for each sample, were fed for another 15 days to examine if there might be differences in the ability of swim ups to transition from endogenous to exogenous feeding. Morphological or physiological impairments could arise in young fish exposed to elevated selenium that may limit successful growth. Average growth of post feeding swim ups, as measured by dry weight, was related to egg selenium levels. Figure 37 shows this relationship for wild fish. Except for samples LSV-2C-003 and LSV-2C-010, 20 fish were included in this analysis for every location (Appendix A). The $R^2$ for this model is 0.208 and, as illustrated in Figure 36, the model fit does not resemble a dose response curve. TRAP software indicates a large standard error for the steepness of the slope. Table 8 shows the $EC_{10}$ and $EC_{20}$ values for growth along with the predicted confidence intervals. Slope steepness, or lack thereof combined with wide confidence intervals in the predictive ability of the model suggests a poor relationship of growth to egg selenium concentrations. The lack of fit may be due to several factors.

### 4.4.2 Survival

Survival was also measured as part of the post swim up study. Figure 37 shows the logistic regression curve fitted to survival data in the post swim up feeding trial versus log egg selenium concentrations. The $R^2$ for this model is high (0.96) and the fit of the predicted data to the observed data is good. Confidence intervals are also narrow for the predicted $EC_{10}$ and $EC_{20}$ values (Table 8). Recall that percent survival measured as part of the 15 day post swim up feeding trial had the best fit polynomial regression to egg selenium concentration as well. While the time frame of this endpoint is narrow, it is based on eggs resulting from maternal transfer of selenium, successful hatch, successful swim up, and survival of the larvae from the alevin endogenous feeding stage to exogenous feeding stage. The dose response curve reflected by this model illustrates a similar breakpoint in effects as previously mentioned.

Total survival through the duration of the test related to log egg selenium concentration is shown in Figure 38. The $R^2$ for this relationship is 0.31 and the error report of the logistic regression model output from TRAP indicates a large standard error for the slope steepness. As illustrated, the fit of the data between observed and predicted values is low and the width of the confidence intervals about the $EC_{10}$ or $EC_{20}$ values is large, encompassing a large range of the curve. While the endpoint is relevant, the variability of the overall survival endpoint is not well suited for the logistic function, and thus its predictive ability for $EC_x$ values is low.

Figure 39 shows the logistic regression for log egg selenium concentrations versus percent survival (hatch to test end). As illustrated, the predicted line fits the data well resulting in an $R^2$ of 0.89. The confidence intervals for the predicted $EC_{10}$ and $EC_{20}$ values are narrow and no errors (standard error was small and convergence was met) were reported in the TRAP software output (Table 8). Reduced variability of the survival term post-hatch likely strengthens this relationship and removes factors such as incomplete fertilization or egg viability, which could be affected by egg selenium concentrations as well as other factors. The strength of this model suggests it is a good predictor of survival effects post hatch due to selenium concentrations.

Based on the growth and survival models evaluated, the survival endpoints provide a much stronger measure of effects relative to egg selenium concentrations than does the growth endpoint. $EC_x$ values for the three survival endpoints are very similar, although each endpoint represents different stages of development of young fish. Percent survival in the post swim up feeding study and percent survival from hatch to test end both appear to provide data that are strongly related to log egg selenium concentrations in terms of a dose response. Both predict similar $EC_x$ values and narrow confidence intervals about the $EC_x$. Both provide biologically meaningful and relevant measures of effects, although survival during the 15 day post swim up feeding trial is more refined, as the variability of survival pre-swim up is eliminated. Survival from hatch to test end is an inclusive endpoint and encompasses the 15 day post swim up survival rate. The similarity of the two endpoints and the effects predicted based on their relationship to egg selenium concentration suggests that either endpoint may provide a suitable measure from which to gage effects.

### 4.4.3 Deformities

The four primary deformity categories examined were: cranio-facial; skeletal; fin fold; and edema. Initial analyses were conducted to derive fractions or percentages of deformed fish relative to the total number of fish evaluated for an egg clutch. However, the TRAP software is sensitive to a declining effects response versus the exposure variable. For the purposes of fitting within the model framework, these data were structured in terms of the fraction of normal fish (number of normal fish/the total number of fish evaluated for an egg clutch). The GSI data are not structured for use in the TRAP model as GSI scores increase with increasing egg selenium. Summary data and graphics for deformity counts are presented in the earlier results section of this document and in Appendix C.

Figure 40 shows the logistic function for log egg selenium versus the fraction normal for cranio-facial deformity assessment. Scatter of the observed values relative to the predicted values reduced the fit of this model as well as the $R^2$ (0.70). The TRAP software error report of the logistic regression model output indicates a large standard error for the slope steepness. The confidence intervals for the predicted $EC_{10}$ and $EC_{20}$ values are slightly larger than that found for the total fraction normal endpoint.

Figure 41 shows the logistic function for log egg selenium versus the fraction normal for skeletal deformity assessment. Similar to the cranio-facial plot, the observed data do not fit the predicted model, although the $R^2$ value is higher than that of the craniofacial endpoint ($R^2$ = 0.81). The TRAP software error report of the logistic regression model output indicates a large standard error for the slope steepness, convergence was not reached at the maximum number of model iterations, and the steepness was at a maximum or minimum limit.

Figure 42 shows the logistic function for log egg selenium versus the fraction normal for finfold deformity assessment. The $R^2$ for this function is low (0.28) probably due to the lack of adequate data at the high end of the egg selenium concentration. Skeletal deformities for some samples could not be accurately assessed. The TRAP software error report of the logistic regression model output indicates a large standard error for the slope steepness, and convergence was not reached at the maximum number of model iterations. The errors associated with this model and poor fit reduce the utility of predicted $EC_{10}$ and $EC_{20}$ values.

Figure 43 shows the logistic function for log egg selenium versus the fraction normal for edema deformity assessment. The $R^2$ for this function is high (0.96) and the observed data fit the predicted model well. No errors were reported for this model from the TRAP software output. The predicted $EC_{10}$ and $EC_{20}$ values and their confidence intervals intersect the predicted dose response curve at the top end of the curve, with no inclusion of higher effects levels at the lower end of the curve.

Figure 44 illustrates the logistic regression for log egg selenium versus total fraction normal. This endpoint is a summed value proportion of the total number of normal fish per egg clutch to the total number of fish examined for that egg clutch. Because an individual fish could have more than one type of deformity and because it is a summation of fractions, it can be greater than 1 and in fact could be as high as 4. These data show a good fit to the predicted function and the confidence limits for the predicted ECs are narrow. Residual error is small (Appendix E) and the $R^2$ is high (0.88). A plot of the $EC_{10}$ and $EC_{20}$ and their confidence intervals over the predicted curve shows the EC values intersects the predicted line, bisecting the observed data where a clear break in effects has been previously discussed for other endpoints. The confidence limits are tight about the predicted $EC_{10}$ and $EC_{20}$ values suggesting not only a good fit, but a low variability as well. Figure 45 shows essentially the same relationship, only the mean fraction normal was used as the dependent variable. The $R^2$ is the same as for sum fraction normal and the $EC_{10}$ and $EC_{20}$ values are nearly identical.

## 4.5 Predicted Effects Concentration for Brown Trout – Consistency with Literature

USEPA (2004) opted to use logistic regression analysis to define the dose-response relationship to derive its Draft chronic tissue-based value. The $EC_{20}$ was used and defined as a reduction of 20 percent in the response observed at control. As presented above, both $EC_{20}$ and $EC_{10}$ values were derived using the TRAP software. In its 2004 Draft criterion document, USEPA provides the rationale for selection of the $EC_{20}$ as the chronic value. USEPA states that the $EC_{20}$ represents a low level of effect that is generally significantly different from the control (U.S. EPA 1999). Smaller reductions in growth, survival, or other endpoints only rarely can be detected statistically. Effect concentrations associated with such small reductions have wide uncertainty bands, making them unreliable for criteria derivation (USEPA 2004). In his work to develop a screening benchmark, Suter (1996) indicates that “the 20 percent figure was chosen because it is a little lower than the mean level of effect on individual response parameters observed at CVs, and it is a minimum detectable difference in population characteristics in the field.” In its revision of the 2004 Draft Selenium Criterion, USEPA is contemplating the use of $EC_{10}$s for long-term exposure criteria for tissue. Results of the analyses presented as part of this Site-specific laboratory study include both the $EC_{10}$ and $EC_{20}$ values.

For this study, an analysis consistent with the approach utilized by EPA for the 2004 draft criterion was utilized. For these analyses, “controls” are the response of fish from background locations. Based on the preliminary analysis presented above, the best-suited end points to calculate $EC_x$ for brown trout egg selenium concentrations (dw) would be the sum fraction normal fish (causing less than a some percent reduction in the sum fraction of normal fish/total fish), and survival (causing less than a some percent reduction in survival post hatch). In total, logistic regression models were run for nine different endpoints including growth, survival, and deformities. For almost all (8 out of 9) of the models run, predicted $EC_{10}$ or $EC_{20}$ values were within 1 to 3 mg/kg dw egg selenium concentration of each other, respectively. The two models that appear to have a good overall fit with tight confidence intervals about the $EC_{10}$ or $EC_{20}$ predictions, and are biologically relevant, are the survival (hatch to test end) and total fraction normal endpoints. $EC_{10}$ values for these endpoints are 17.67 and 19.33 mg/kg dw, respectively, while the $EC_{20}$ values for these two endpoints are 21.63 and 21.7 mg/kg dw, respectively.

The endpoint for survival, based on hatch to test end, is consistent with the findings of Rudolph et al. (2008), who found a significant relationship of alevin mortality to egg selenium concentration. It has been suggested that selenium does not exert its toxic effects until a developing fish absorbs its yolk and accumulated selenium (Lemly 1997 and Holm et al. 2005 as cited in Rudolph et al. 2008). Hatchability of eggs is not affected by elevated selenium even though there may be a high incidence of deformities in resultant larvae and fry, and many may fail to survive (Gillespie and Baumann 1986; Coyle et al. 1983).

Data for brown trout presented in this study showed a highly variable mortality rate prior to hatch, which may have been due several factors, including incomplete fertilization, disease, or reduced egg viability due to elevated selenium concentrations. However, the latter is not consistent with the review by Holm et al. (2005) who reports that although egg selenium is present in the yolk throughout development, it may affect larval development rather than egg development because it is mobilized to a greater degree after hatch.

Deformity frequency, as measured in this study based on fraction normal fish relative to the total number of fish assessed for deformities provides an endpoint that is consistent with the studies of Holm et al. (2005), Kennedy et al. (2000), Hardy (2005), Rudolph et al. (2008), Muscatello et al. (2006), and de Rosemond et al. (2005) in terms of cited developmental effects due to increased egg selenium concentrations. Table 9 shows the range of effects concentrations for the varying endpoints evaluated.

Hodson and Hilton (1983) and Lemly (1997) both suggest that developmental malformations are reliable indicators of chronic selenium toxicity to fish. Lemly (1997) described the sequence of selenium toxicity to larval fish: parental exposure, maternal deposition of selenium into eggs during vitellogenesis, and subsequent exposure during yolk resorption in developing larvae. Both the literature and the results of this study indicate that survival and developmental malformations of larval fish are clear and supportable endpoints for developing effects concentrations for fish. For brown trout, this study indicates that $EC_{20}$ values would range from 21.6 to 21.7 mg/kg egg selenium for alevin survival (measured as hatch to test end) and larval deformities (measured as the sum fraction of normal fish), respectively.

### 4.6 Extrapolating Selenium Concentrations in Egg Tissue to Whole Body Tissue

In Section 4.2, the relationship of maternal whole body selenium concentrations to egg selenium concentrations was derived using wild brown trout collected for this study. The regression relationship has the form:

$$\mathrm{Log10}(y) = 1.1926(\mathrm{Log10}x) - 0.0071$$

The $R^2$ for whole body maternal selenium concentration relationship to selenium concentration in their respective eggs is 0.8. As stated previously, this relationship becomes important in this preliminary analysis in order to relate $EC_x$ values derived for selenium concentrations in egg tissue back to selenium concentrations in whole body fish. Outside of this specific reproduction study, the larger body of data available for this site is for whole body tissue. Furthermore, whole body tissue concentration is a more practical endpoint to measure throughout the year than is egg tissue. Based on an effects threshold value derived for selenium concentration in eggs and the site-specific relationship developed for whole body to eggs, a whole body tissue concentration of 13.35 mg/kg dw was derived based on the $EC_{20}$ for survival and a whole body tissue concentration of 11.27 mg/kg dw was derived based on the $EC_{10}$ for survival. Muscatello et al. (2006) reported whole body selenium $EC_{20}$ of 15.56 mg/kg dw for northern pike derived from the egg $EC_{20}$. Hardy (2005) reported a whole body NOEC for cutthroat trout of 11.37 mg/kg dw. Conversion of the Holm (2002) and Holm et al. (2003) ovary tissue selenium concentrations presented as chronic values from ovary to whole body using USEPA (2004) equations yields the following values: 19.96 mg/kg dw (rainbow trout), 16.06 mg/kg dw (rainbow trout), and 12.24 mg/kg dw (brook trout). Currently, the Draft National criterion recommends a value of 7.91 mg/kg dw.

These preliminary values of 11.27 or 13.25 mg/kg dw were derived for comparison purposes only to evaluate if the relationships derived for brown trout are consistent with values in the literature from other studies of maternal transfer. Based on the literature reviewed, the brown trout whole body value falls within the range of whole body tissue concentrations reported for other cold water species.

## 4.7 Data Adequacy

The critical question to be addressed for this study is whether or not the data adequately address the range of tissue concentrations in maternal parents which ultimately affects the offspring produced. Four key points address the adequacy of the data utilized for this study:

1. The goal was to capture adult brown trout with tissue selenium concentrations greater than 20 mg/kd dw, which represented the upper $90^{th}$ percentile of the tissue selenium data for brown trout available when this study commenced. That goal was met as shown in the data presented earlier in this document.

2. Studies carried out with the brown trout and eggs collected yielded results that spanned a range of effects, including no or low effects and high and adverse levels of effects. In any toxicity study, being able to define the upper thresholds of effects is a critical component of the study. Effects were well defined for two important endpoints out of several that were evaluated, including survival and deformities for a sensitive life stage of brown trout, which are consistent endpoints defined in the literature for other trout species.

3. The distribution of effects and exposure data indicates that there are no large gaps in the data and that relationships between effects and egg selenium concentrations can be defined with confidence.

4. Collection of more fish with tissue concentrations higher than those collected for this study will not improve the study because effects are defined near the middle of the egg selenium concentrations which correspond to whole body selenium tissue concentrations that are lower than the upper whole body tissue concentrations (i.e., greater than 20 mg/kg dw).

## 4.8 Dose Response Analysis Update

Throughout this report, reference has been made to two particular effects thresholds, the $EC_{10}$ and $EC_{20}$. The brown trout data presented in the Draft Final Brown Trout Laboratory Reproduction Studies Conducted in Support of Development of a Site-Specific Selenium Criterion (NewFields 2009) were submitted to USEPA for use in their derivation of the National Criterion. The first draft of the Interpretive Report (August 2010) proposed an $EC_{20}$ as the SSC for this project based on the brown trout data. USEPA provided formal comments (December 21, 2010) on the Draft Interpretive Report and the criterion proposed and suggested that some alternative evaluations may be practical. USEPA's review of the brown trout data indicates agreement with the selection of the endpoint for survival (hatch to test end). Further, the USEPA has made it clear that they intend to propose an $EC_{10}$ in their Draft National Criterion, which includes the brown trout data developed as part of this study. In their comments, EPA stated that, for this project, the $EC_{10}$ is a more appropriate endpoint than the proposed $EC_{20}$ in developing a proposed SSC for the Smoky Canyon Site. Their primary rationale is that as a bioaccumulative pollutant that accumulates in fish tissue, concentrations in fish tissue are more stable over time than aqueous selenium concentrations. This stability may lead to concentrations that are just below the criterion for extended periods of time.

The TRAP software used to derive the logistic regression conducted throughout this brown trout study also includes two additional non-linear models, threshold sigmoidal and piecewise linear models. USEPA's comment letter illustrated an investigation of each of these models relative to the logistic model used as part of the brown trout studies presented above, and found that the projected $EC_x$ values are likely conservative. As part of the USEPA's evaluation, another alternative examined exclusion of data points that exceeded 30 mg/kg dw in eggs, due to the fact that effects were already occurring between 15 and 30 mg/kg dw. This approach was investigated as a means of optimizing the model output. By eliminating the three highest data points, the logistic model is able to focus on the region of interest (i.e., between 15 and 30 mg/kg dw egg selenium). Using this approach, the logistic model run using log-transformed exposure data (egg selenium concentrations) versus survival (hatch to test end) results in a model with a $R^2$ = 0.99 (Figure 46). This improved model results in an $EC_{10}$ equal to 20.8 (95 percent LCL – 19.89, 95 percent UCL – 21.83) mg/kg dw egg selenium and an $EC_{20}$ equal to 23.1 (95 percent LCL – 22.37, 95 percent UCL – 23.77) mg/kg dw egg selenium.

Confidence intervals derived for the estimated $EC_x$ values are also tight about the estimates and the standard error of the model is low.

The effects concentration for fraction normal fish was also re-evaluated to assess whether the previously derived $EC_{10}$ and $EC_{20}$ values were similarly affected. Using the same approach as presented above, the revised $EC_{10}$ and $EC_{20}$ values for fraction normal fish are 22 and 23.4 mg/kg dw egg selenium, respectively.

Using the brown trout regression model presented in Section 4.6 as a translator between egg selenium and whole body selenium concentrations, the resulting whole body values corresponding to the egg $EC_{10}$ and $EC_{20}$ values are 12.91 and 14.1 mg/kg dw, respectively.

## 5.0 SUMMARY AND CONCLUSIONS

The effects of maternal selenium transfer in wild brown trout were evaluated as part of this study. Eggs from wild female brown trout collected from different locations with varying selenium exposure levels were used to assess a number of reproductive endpoints as part of this study. Initially, the data were plotted and reviewed for any obvious relationships and patterns. In the initial review, a consistent breakpoint was identified where egg selenium concentrations were contrasted with reproduction test endpoints. These observed relationships are consistent with expected dose-response relationships.

Moving forward from these initially-defined relationships, adult whole body and egg selenium concentrations were considered the independent variables in a regression-based analysis approach. The focus of the analysis was narrowed to focus on egg selenium concentration versus growth, survival, and deformity endpoints. Logistic regression was used to develop dose-response relationships and predict egg selenium concentrations related to different effects ($EC_x$). Post-hatch survival and total deformity frequency (fraction normal) were found to be the most biologically relevant endpoints exhibiting dose response relationships and concurrence of observed data to predicted values. The predicted post-hatch survival $EC_{20}$ was 21.63 (95 percent LCL – 17.77, 95 percent UCL – 26.32) mg/kg dw egg selenium, while the $EC_{10}$ for this endpoint was 17.68 (95 percent LCL – 13.44, 95 percent UCL – 23.25) mg/kg dw egg selenium. For deformities, the sum fraction normal endpoint, the $EC_{20}$ was 21.7 (95 percent LCL – 18.09, 95 percent UCL – 26.02) mg/kg dw egg selenium, while the $EC_{10}$ for this endpoint was 19.33 (95 percent LCL – 15.07, 95 percent UCL – 24.79) mg/kg dw egg selenium.

Consistent with comments received from the USEPA relative to derivation of the effect concentrations previously presented, a revised dose-response model was utilized that included using the same logistic regression model, and eliminated egg selenium concentrations above the already defined effects threshold (i.e., >30 mg/kg dw). Using this approach allowed the model to be more focused on the region where effects occur to brown trout. This improved model results in an $EC_{20}$ equal to 23.1 (95 percent LCL – 22.37, 95 percent UCL – 23.77) mg/kg dw egg selenium and an $EC_{10}$ equal to 20.8 (95 percent LCL – 19.89, 95 percent UCL – 21.83) mg/kg dw.

Egg tissue concentrations may not be a practical endpoint for routine monitoring because it requires collection of samples during a narrow window of opportunity during autumn of each year. Collection of adult tissue samples is more practical since it can be done with lower effort and with less stringent constraints for the schedule under which sampling must be done. Therefore, the high correlation between selenium in eggs and adult tissue was used to identify an adult tissue concentration that corresponds to the revised $EC_{20}$ and $EC_{10}$ estimates based on egg selenium. The resulting adult (whole body) tissue concentration for this Site based on the revised $EC_{20}$ is 14.1 mg/kg dw and based on the revised $EC_{10}$ it is 12.9 mg/kg dw.

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**TABLES**

**Table 1**
**Monitoring Locations, Coordinates, and Counts for October 2007 Sampling in Support of the Brown Trout Laboratory Toxicity Studies**

| Location | Reach | Reach Boundary | Easting | Northing | Date | Fishing Time (Sec) | # caught and released | | # retained | | Total Brown Trout |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | >230<300 | >300 | males | females | |
| **Reference** | | | | | | | | | | | |
| MPC-1 | Montepelier Creek | Downstream | 485847 | 4690589 | 10/23/2007 | 3750 | 3 | 0 | 0 | 0 | 3 |
| | | Upstream | 485591 | 4693679 | | | | | | | |
| STUMP-3 | Stump Creek | Downstream | 493711 | 4738229 | 10/26/2007 | 2378 | 7 | 0 | 7 | 9 | 23 |
| | | Upstream | 488968 | 4743637 | | | | | | | |
| **Upstream of Sage Creek** | | | | | | | | | | | |
| CC-75 | Crow Creek upstream of Wells Canyon | Downstream | 486291 | 4710439 | 10/22/2007 | 1008 | 6 | 1 | 7 | 5 | 19 |
| | | Upstream | 486334 | 4710260 | | | | | | | |
| CC-150-Redd | Crow Creek upstream of Deer Creek | Downstream | 487299 | 4713431 | 10/24/2007 | 1422 | 10 | 6 | 1 | 8 | 25 |
| | | Upstream | 487204 | 4713372 | | | | | | | |
| CC-350 | Crow Creek downstream of Deer Creek | Downstream | 489434 | 4715598 | 10/22/2008 | 4122 | 26 | 7 | 5 | 8 | 44 |
| | | Upstream | 489460 | 4715334 | 10/24/2008 | | | | | | |
| **Hoopes Spring and Sage Creek** | | | | | | | | | | | |
| LSV-2c | Lower Sage Creek downstream of Hoopes Spring | Downstream | 491398 | 4720245 | 10/25/2007 | 2865 | 56 | 44 | 10 | 32 | 142 |
| | | Upstream | 491293 | 4720575 | | | | | | | |
| **Downstream of Sage Creek** | | | | | | | | | | | |
| CC-1A | Crow Creek downstream of Sage Creek | Downstream | 493433 | 4719137 | 10/22/2007 | 2034 | 2 | 0 | 3 | 4 | 12 |
| | | Upstream | 493280 | 4719057 | | | | | | | |
| CC-3A | Crow Creek downstream of Sage Creek and CC-1A | Downstream | 494938 | 4720410 | 10/24/2007 | 3848 | 18 | 0 | 3 | 2 | 33 |
| | | Upstream | 494648 | 4720085 | | | | | | | |
| | | | | | | **Totals** | **128** | **58** | **36** | **68** | **301** |

## Table 2

## Summary of Field-Measured Water Quality Parameters Collected in October 2007 for Sampling in Support of the Brown Trout Laboratory Toxicity Studies

| Stream | Location | Date | pH (SU) | Specific Conductance (umhos/cm) | Temp. (°C) | Dissolved Oxygen (mg/L) | ORP (mV) |
|---|---|---|---|---|---|---|---|
| **Reference** | | | | | | | |
| Montpelier Creek | MC-1 | 10/23/2007 | 7.70 | 437 | 2.1 | 12.36 | 152.1 |
| Stump Creek | SC-3 | 10/26/2007 | 8.19 | 610 | 9.16 | 11.98 | 127.2 |
| **Upstream of Sage Creek** | | | | | | | |
| Crow Creek | CC-75 | 9/2/2006 | 7.93 | 426 | 7.11 | 8.22 | NM |
| | | 5/8/2007 | 8.29 | 532 | 7.01 | 11.59 | 176.5 |
| | | 8/23/2007 | 8.04 | 551 | 10.32 | 10.65 | 131.8 |
| | | 10/22/2007 | 8.21 | 572 | 5.45 | 11.37 | 82.5 |
| | | 5/12/2008 | 8.05 | 397 | 6.31 | 10.55 | 161.2 |
| | CC-150 | 9/3/2006 | 7.58 | 399 | 7.94 | 9.26 | NM |
| | | 5/9/2007 | 8.34 | 444 | 9.42 | 9.32 | 204.3 |
| | | 8/24/2007 | 8.35 | 437 | 8.12 | 11.84 | 194.3 |
| | | 5/12/2008 | 8.53 | 361 | 10.44 | 10.00 | 164.3 |
| | CC-350 | 8/31/2006 | 8.89 | 458 | 14.8 | 10.57 | NM |
| | | 5/8/2007 | 8.47 | 572 | 14.27 | 11.23 | 104.6 |
| | | 8/23/2007 | 8.61 | 643 | 17.1 | 11.16 | 90.1 |
| | | 10/22/2007 | 8.79 | 573 | 6.24 | 13.06 | 55.6 |
| | | 5/13/2008 | 8.44 | 431 | 15.04 | 9.05 | 202.9 |
| **Hoopes Spring and Sage Creek** | | | | | | | |
| Hoopes Spring | HS | 9/8/2006 | 7.46 | 461 | 11.77 | 5.46 | NM |
| | | 5/14/2007 | 7.60 | 503 | 11.84 | 5.21 | 51.9 |
| | | 8/24/2007 | 7.49 | 473 | 11.89 | 6.32 | 78.2 |
| | | 5/17/2008 | 7.33 | 302 | 12.02 | 6.08 | 201.1 |
| | HS-3 | 9/6/2006 | 7.43 | 489 | 10.37 | 7.33 | NM |
| | | 5/12/2007 | 8.46 | 484 | 16.57 | 7.22 | 89.5 |
| | | 8/28/2007 | 8.25 | 460 | 17.1 | 9.41 | 85.4 |
| | | 5/17/2008 | 8.38 | 289 | 17.05 | 9.01 | 152.7 |
| Sage Creek | LSV-2C | 9/6/2006 | 8.56 | 478 | 18.62 | 6.72 | NM |
| | | 5/12/2007 | 8.35 | 498 | 11.09 | 8.90 | 19.7 |
| | | 8/28/2007 | 8.37 | 458 | 14.27 | 10.68 | -37.1 |
| | | 10/25/2007 | 8.31 | 462 | 8.17 | 11.36 | 124.4 |
| | | 5/17/2008 | 8.40 | 283 | 18.72 | 8.92 | 188.6 |
| | LSV-4 | 9/5/2006 | 7.81 | 454 | 9.49 | 7.95 | NM |
| | | 5/9/2007 | 8.50 | 402 | 16.54 | 7.60 | 125.4 |
| **Downstream of Sage Creek** | | | | | | | |
| Crow Creek | CC-1A | 9/1/2006 | 8.37 | 590 | 13.4 | 9.08 | NM |
| | | 5/10/2007 | 8.44 | 591 | 10.39 | 9.14 | 156.5 |
| | | 8/25/2007 | 8.43 | 577 | 10.61 | 12.62 | 29.3 |
| | | 10/22/2007 | 8.31 | 572 | 3.06 | 12.73 | 129.2 |
| | | 5/14/2008 | 8.09 | 358 | 7.39 | 9.80 | 161.2 |
| | CC-3A | 9/4/2006 | 7.91 | 561 | 11.32 | 8.94 | NM |
| | | 5/11/2007 | 8.47 | 601 | 9.48 | 9.28 | 161.2 |
| | | 8/26/2007 | 8.20 | 583 | 11.26 | 10.12 | 19.8 |
| | | 10/24/2007 | 8.08 | 616 | 4.02 | 11.55 | 183.7 |
| | | 5/15/2008 | 8.42 | 370 | 13.42 | 10.49 | 219.6 |

Note: All field monitoring data collected through Spring 2008 is presented on this table. Green shading highlights October 2007 monitoring data.

**Table 3**
**Water Quality Parameters Measured During the October 2007 Sampling in Support of the Brown Trout Laboratory Toxicity Studies**

| Stream | Location | Date | Alkalinity (mg/L) | Hardness (mg/L as CaCO3) | Sulfate, SO4 (mg/L) |
|---|---|---|---|---|---|
| **Reference** | | | | | |
| Montpelier Creek | MPC-1 | 10/23/2007 | 95.9J | 138J | 13.6J |
| Stump Creek | SC-3 | 10/26/2007 | 195J | 222J | 39.2J |
| **Upstream of Sage Creek** | | | | | |
| Crow Creek | CC-75 | 9/2/2006 | 215J | 199 | 24.6 |
| | | 5/8/2007 | 230J | 175 | 23.5 |
| | | 8/23/2007 | 214J | 152J | 25.5 |
| | | 8/23/2007-dup | 127J | 212J | 23.4 |
| | | 10/22/2007 | 208J | 233J | 32.6J |
| | | 5/12/2008 | 196 | 208 | 24.7 |
| | | 5/12/2008-dup | 195 | 205 | 24.7 |
| | CC-150 | 9/3/2006 | 175J | 153 | 11.8 |
| | | 5/9/2007 | 209 | 152 | 14.4 |
| | | 8/24/2007 | 179J | 204J | 12.6 |
| | | 5/12/2008 | 192 | 199 | 17.8 |
| | CC-150 REDD | 10/24/2007 | 190J | 202J | 13.1J |
| | CC-350 | 8/31/2006 | 200J | 187 | 16.1 |
| | | 5/8/2007 | 203J | 149 | 18.4 |
| | | 8/23/2007 | 134J | 197J | 17.8 |
| | | 10/22/2007 | 124J | 224J | 18.5J |
| | | 5/13/2008 | 197 | 211 | 23.7 |
| **Hoopes Spring and Sage Creek** | | | | | |
| Hoopes Spring | HS | 9/8/2006 | 194 | 209 | 47.2 |
| | | 9/8/2006-dup | 194 | 199 | 46.8 |
| | | 5/14/2007 | 197 | 149 | 48.7 |
| | | 8/24/2007 | 154J | 231J | 46.5 |
| | | 5/17/2008 | 196 | 232 | 49.8 |
| | HS-3 | 9/6/2006 | 205J | 220 | 39.1 |
| | | 5/12/2007 | 196 | 150 | 44.3 |
| | | 8/28/2007 | 202J | 222J | 42.0 |
| | | 5/17/2008 | 197 | 223 | 43.2 |
| Sage Creek | LSV-2C | 9/6/2006 | 201J | 206 | 38 |
| | | 5/12/2007 | 209 | 156 | 41.0 |
| | | 8/28/2007 | 205J | 223J | 40.3 |
| | | 10/25/2007 | 198J | 237J | 42.8J |
| | | 5/17/2008 | 199 | 218 | 38.7 |
| | LSV-4 | 9/5/2006 | 203J | 187 | 29 |
| | | 5/9/2007 | 186 | 129 | 31.2 |
| **Downstream of Sage Creek** | | | | | |
| Crow Creek | CC-1A | 9/1/2006 | 162J | 160 | 24.7 |
| | | 5/10/2007 | 140 | 151 | 22.4 |
| | | 5/10/2007-dup | 187 | 155 | 28.5 |
| | | 8/25/2007 | 202J | 213J | 35.0 |
| | | 10/22/2007 | 199J | 229J | 34.9J |
| | | 5/14/2008 | 202 | 221 | 31.4 |
| | CC-3A | 9/4/2006 | 211J | 195 | 17.5 |
| | | 9/4/2006-dup | 206J | 191 | 19.3 |
| | | 5/11/2007 | 206 | 152 | 29.9 |
| | | 8/26/2007 | 195J | 212J | 35.8 |
| | | 10/24/2007 | 195J | 228J | 36.5J |
| | | 5/15/2008 | 197 | 216 | 32.1 |

Note: All field monitoring data collected to date is presented on this table. Green shading highlights October 2007 monitoring data.

## Table 4
## Summary of Total Selenium Concentrations Measured in Surface Waters in Support of the Brown Trout Laboratory Toxicity Studies

| Stream | Location | Date | Selenium Concentrations: Total Selenium (mg/L) | Selenium Concentrations: Dissolved Selenium (mg/L) |
|---|---|---|---|---|
| **Reference** | | | | |
| Montpelier Creek | MPC-1 | 10/23/2007 | 0.0002UJ | 0.0002UJ |
| | | 10/23/2007-dup | 0.0002UJ | 0.0002UJ |
| Stump Creek | SC-3 | 10/26/2007 | 0.0002UJ | 0.0002R |
| **Upstream of Sage Creek** | | | | |
| Crow Creek | CC-75 | 9/2/2006 | 0.00053 | 0.00057 |
| | | 5/8/2007 | 0.00047J | 0.00046J |
| | | 8/23/2007 | 0.00033J | 0.00033J- |
| | | 8/23/2007-dup | 0.00079J | 0.0004J- |
| | | 10/22/2007 | 0.00055J- | 0.0002UJ |
| | | 5/12/2008 | 0.0012 | 0.0012 |
| | | 5/12/2008-dup | 0.0012 | 0.0011 |
| | CC-150 | 9/3/2006 | 0.00062 | 0.00067 |
| | | 5/9/2007 | 0.00083J | 0.00092J |
| | | 8/24/2007 | 0.00059J | 0.00068J- |
| | | 5/12/2008 | 0.0018 | 0.0014 |
| | | 5/12/2008-dup | NM | NM |
| | CC-150 REDD | 10/24/2007 | 0.0015J- | 0.0011J- |
| | CC-350 | 9/1/2006 | 0.00083 | 0.00082 |
| | | 5/8/2007 | 0.00084J | 0.0011J |
| | | 8/23/2007 | 0.0002UJ | 0.00026J- |
| | | 10/22/2007 | 0.0003J- | 0.0002UJ |
| | | 5/13/2008 | 0.001 | 0.00089 |
| **Hoopes Spring and Sage Creek** | | | | |
| Hoopes Spring | HS | 9/8/2006 | **0.0174** | 0.0174 |
| | | 9/8/2006-dup | **0.0174** | 0.0168 |
| | | 5/14/2007 | **0.0301J** | 0.0205J |
| | | 8/24/2007 | **0.0242J** | 0.0214J- |
| | | 5/17/2008 | **0.0296** | 0.0273 |
| | HS-3 | 9/6/2006 | **0.0108** | 0.0092 |
| | | 5/12/2007 | **0.0198J** | 0.018J |
| | | 8/28/2007 | **0.0158J** | 0.0161J- |
| | | 5/17/2008 | **0.0223** | 0.026 |
| Sage Creek | LSV-2C | 9/6/2006 | **0.0095** | 0.0093 |
| | | 5/12/2007 | **0.0135J** | 0.0135J |
| | | 8/28/2007 | **0.0144J** | 0.0143J- |
| | | 10/25/2007 | **0.0384J-** | 0.0279J- |
| | | 5/17/2008 | **0.0145** | 0.0141 |
| **Downstream of Sage Creek** | | | | |
| Crow Creek | CC-1A | 9/1/2006 | 0.0029 | 0.0027 |
| | | 5/10/2007 | 0.0016J | 0.0012J |
| | | 5/10/2007-dup | 0.0025J | 0.002J |
| | | 8/25/2007 | 0.0014J | 0.0022J- |
| | | 10/22/2007 | 0.0028 | 0.0013J- |
| | | 5/14/2008 | 0.0032 | 0.0029 |
| | CC-3A | 9/4/2006 | 0.003 | 0.0029 |
| | | 9/4/2006-dup | 0.0029 | 0.0027 |
| | | 5/11/2007 | 0.0013J | 0.0014J |
| | | 5/11/2007-dup | NM | NM |
| | | 8/26/2007 | 0.0011J | 0.0018J- |
| | | 8/26/2007-dup | NM | NM |
| | | 10/24/2007 | 0.0017J- | 0.001J- |
| | | 5/15/2008 | 0.0036 | 0.0026 |

Note: All field monitoring data collected through Spring 2008 is presented on this table. Green shading highlights October 2007 monitoring data.
J - Estimated, NM-Not measured, Bold concentrations are those currently exceeding the State standard for total selenium (0.005 mg/L).

**Table 5**
**Monitoring Locations, Coordinates, and Counts for November 2007 Sampling in Support of the Brown Trout Laboratory Toxicity Studies**

| Reach | Location | Reach Boundary | Easting | Northing | Date | Fishing Time (Sec) | # Caught | | Retained Ripe | | Total Brown Trout | Total # Egg Samples Submitted | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | >230<300 mm | >300 mm | males | females | | | |
| **Reference** | | | | | | | | | | | | | |
| Stump-1 and 3 | Stump Creek | Downstream | 493804 | 4737886 | 11/16/2007 | 2,594 | NC | 26 | 0 | 2 | 28 | 0 | captured, checked for ripeness, released >300 mm, 2 females appeared ripe, no eggs expressed |
| | | Upstream | 493711 | 4738229 | | | | | | | | | |
| | Stump Creek | Downstream | 490825 | 4742505 | | | | | | | | | |
| | | Upstream | 490605 | 4742633 | | | | | | | | | |
| **Upstream of Sage Creek** | | | | | | | | | | | | | |
| CC-150 | Nate property to CC-150 and upstream of CC-150 | Downstream | 487299 | 4713431 | 11/12/2007 | 8,347 | 43 | 18 | 7 | 13 | 81 | 9 | 9 out of 13 females expressed eggs |
| | | Upstream | 487178 | 4712722 | 11/15/2007 | | | | | | | | |
| CC-350 | Crow Creek downstream of Deer Creek | Downstream | 489569 | 4715684 | 11/15/2007 | 3,441 | 25 | 10 | 5 | 3 | 43 | 3 | |
| | | Upstream | 489491 | 4715286 | | | | | | | | | |
| **Hoopes Spring and Sage Creek** | | | | | | | | | | | | | |
| LSV-2c | Lower Sage Creek downstream of Hoopes Spring | Downstream | 491298 | 4719723 | 11/14/2007 | 7,090 | 42 | 41 | 17 | 21 | 121 | 14 | Stopped counting at ~40, too many fish. Estimate >300 fish >230mm caught |
| | | Upstream | 491283 | 4720601 | | | | | | | | | |
| **Downstream of Sage Creek** | | | | | | | | | | | | | |
| CC-1A | Crow Creek downstream of Sage Creek | Downstream | 493433 | 4719137 | 11/13/2007 | 7,129 | 32 | 37 | 2 | 0 | 69 | 0 | |
| | | Upstream | 493136 | 471904 | | | | | | | | | |
| Between CC-3A and CC-1A, upstream of CC-1A | Crow Creek downstream of Sage Creek | Downstream | 494676 | 4720149 | 11/13/2007 | | | | | | | | |
| | | Upstream | 494036 | 4719245 | | | | | | | | | |
| | | Downstream | 493433 | 4719137 | | | | | | | | | |
| | | Upstream | 493136 | 471904 | | | | | | | | | |
| CC-3A and downstream | Crow Creek downstream of Sage Creek and CC-1A | Downstream | 495176 | 4720411 | 11/16/2007 | 3,184 | 0 | 28 | 3 | 0 | 31 | 0 | |
| | | Upstream | 494874 | 4720281 | | | | | | | | | |
| | | | | | | **Totals** | **142** | **160** | **34** | **39** | **373** | | |

Note: Note all trout collected or retained were spawned. Some females which appeared initially to be ripe, based on external features or even an initial expulsion of eggs did not provide eggs when stripping was conducted.

**Table 6**
**Adult Female Brown Trout Length and Whole-Body Selenium (mg/kg dw) Data**

| Location | Sample ID | Total length (mm) | Wet weight (g) | Whole-body Selenium Concentration (mg/kg dw) | Egg Selenium Concentration (mg/kg dw) |
|---|---|---|---|---|---|
| Hatchery Fish | Saratoga National Fish Hatchery (SC-001) | 498 | 1,855[a] | 3.6 | 0.76 |
| | Saratoga National Fish Hatchery (SC-002) | 420 | 1,089[a] | 4.1 | 0.94 |
| | Saratoga National Fish Hatchery (SC-003) | 520 | 2,072[a] | 3.7 | 0.83 |
| | Saratoga National Fish Hatchery (SC-004) | 562 | 3,350[a] | 4.3 | 0.92 |
| | Saratoga National Fish Hatchery (SC-005) | 558 | 2,927[a] | 3 | 1.2 |
| | Saratoga National Fish Hatchery (SC-006) | 439 | 1,111[a] | 3.1 | 1.2 |
| | Saratoga National Fish Hatchery (SC-007) | 449 | 1,561[a] | 2.7 | 1 |
| | Saratoga National Fish Hatchery (SC-008) | 494 | 1,927[a] | 2.5 | 0.96 |
| Hatchery Fish (Second Set) | Spring Creek Fish Hatchery (SPC-001) | | | | 0.73 |
| | Spring Creek Fish Hatchery (SPC-002) | | | | |
| | Spring Creek Fish Hatchery (SPC-003) | | | | |
| | Spring Creek Fish Hatchery (SPC-004) | | | | |
| | Spring Creek Fish Hatchery (SPC-005) | | | | |
| | Spring Creek Fish Hatchery (SPC-006) | | | | |
| Wild Fish | Crow Creek (CC-150-009) | 324 | 315 | 8.4 | 12.8 |
| | Crow Creek (CC-150-011) | 342 | 351 | 5.6 | 8.4 |
| | Crow Creek (CC-150-012) | 317 | 269 | 6.7 | 8.5 |
| | Crow Creek (CC-150-013) | 332 | 376 | 5.9 | 8.4 |
| | Crow Creek (CC-150-015) | 313 | 281 | 6 | 9.1 |
| | Crow Creek (CC-150-016) | 391 | 621 | 7 | 7.5 |
| | Crow Creek (CC-150-017) | 265 | 178 | 5.6 | 6.6 |
| | Crow Creek (CC-150-018) | 308 | 279 | 4.7 | 6.9 |
| | Crow Creek (CC-150-020) | 310 | 318 | 7.2 | 6.2 |
| | Crow Creek (CC-350-006) | 370 | 475 | 9.2 | 14 |
| | Crow Creek (CC-350-007) | 350 | 416 | 5.5 | 6.9 |
| | Crow Creek (CC-350-008) | 335 | 341 | 8.5 | 9.5 |
| | Lower Sage Creek (LSV2C-002) | 304 | 280 | 8.9 | 12.8 |
| | Lower Sage Creek (LSV2C-003) | 300 | 260 | 13.8 | 40.3 |
| | Lower Sage Creek (LSV2C-004) | 290 | 260 | 17.9 | 36 |
| | Lower Sage Creek (LSV2C-005) | 294 | 250 | 13.6 | 26.8 |
| | Lower Sage Creek (LSV2C-006) | 346 | 420 | 17.2 | 26.9 |
| | Lower Sage Creek (LSV2C-007) | 315 | 290 | 6.7 | 18.6 |
| | Lower Sage Creek (LSV2C-008) | 296 | 230 | 9.6 | 17.7 |
| | Lower Sage Creek (LSV2C-010) | 311 | 314 | 22.6 | 38.8 |
| | Lower Sage Creek (LSV2C-012) | 360 | 434a | 7.2 | 13.2 |
| | Lower Sage Creek (LSV2C-016) | 300 | 260 | 9.2 | 13.4 |
| | Lower Sage Creek (LSV2C-017) | 341 | 310 | 13.2 | 20.5 |
| | Lower Sage Creek (LSV2C-019) | 330 | 364 | 8.6 | 12.5 |
| | Lower Sage Creek (LSV2C-020) | 280 | 241 | 11.3 | 11.2 |
| | Lower Sage Creek (LSV2C-021) | 307 | 317 | 20 | 28.1 |

[a]Data not found or measured. Weights were estimated from the relationship between the wet weights of field collected fish and wet weights measured by CAS ($r^2$ = 0.963).

**Table 7**
**Summary of Brown Trout Tissue Selenium Data Collected in Support of the Brown Trout Laboratory Toxicity Studies**

| Stream | Location | Date | Brown Trout (mg/kg dw) | | | |
|---|---|---|---|---|---|---|
| | | | Count | Mean | Min | Max |
| **Upstream of Sage Creek** | | | | | | |
| Crow Creek | CC-150 | 9/3/06 | 4 | 5.83 | 4.75 | 7.71 |
| | | 5/9/07 | 3 | 8.67 | 8.00 | 10.00 |
| | | 8/24/07 | 2 | 5.20 | 4.30 | 6.10 |
| | | 10/30/07 | 1 | 5.40 | 5.40 | 5.40 |
| | | 11/15/07 | 9 | 6.34 | 4.70 | 8.40 |
| | | 5/13/08 | 3 | 9.82 | 8.61 | 11.80 |
| | CC-350 | 8/31/06 | 1 | 7.40 | 7.40 | 7.40 |
| | | 5/8/07 | 0 | na | na | na |
| | | 8/23/07 | 3 | 5.43 | 4.60 | 6.00 |
| | | 11/15/07 | 3 | 7.73 | 5.50 | 9.20 |
| | | 5/13/08 | 0 | na | na | na |
| **Sage Creek** | | | | | | |
| Sage Creek | LSV-2C | 9/6/06 | 6 | 19.45 | 16.00 | 22.82 |
| | | 5/12/07 | 4 | 12.78 | 8.50 | 22.20 |
| | | 8/28/07 | 9 | 22.67 | 10.80 | 33.30 |
| | | 11/14/07 | 20 | 14.03 | 6.20 | 23.80 |
| | | 5/16/08 | 6 | 20.25 | 11.40 | 29.60 |
| **Downstream of Sage Creek** | | | | | | |
| Crow Creek | CC-1A | 9/1/06 | 3 | 9.76 | 8.15 | 11.86 |
| | | 5/10/07 | 2 | 9.05 | 7.40 | 10.70 |
| | | 8/25/07 | 11 | 9.95 | 6.30 | 14.80 |
| | | 10/30/07 | 1 | 8.70 | 8.70 | 8.70 |
| | | 5/14/08 | 5 | 17.54 | 16.40 | 18.30 |
| | CC-3A | 9/4/06 | 3 | 11.15 | 9.14 | 14.34 |
| | | 5/11/07 | 4 | 9.20 | 7.50 | 12.70 |
| | | 8/27/07 | 13 | 11.25 | 7.80 | 15.60 |
| | | 10/24/07 | 4 | 6.50 | 5.30 | 8.00 |
| | | 5/14/08 | 4 | 15.38 | 15.00 | 15.80 |

Note: All field monitoring data collected through Spring 2008 is presented on this table.
Green shading highlights October/November 2007 monitoring data.

na-Not Applicable.

## Table 8
## Effect Concentration ($EC_x$) Values for Egg Selenium Tissue Residues Versus Different Biological Endpoints for Brown Trout

| Biological Endpoints | Effect Concentration ($EC_x$) | | | $R^2$ |
|---|---|---|---|---|
| | 50 | 20 | 10 | |
| **Growth and Survival** | | | | |
| Growth | 46.23 | 33.79 | 28.13 | 0.21 |
| 95% LCL | 27.05 | 22.84 | 13.09 | |
| 95% UCL | 79.01 | 50.00 | 60.44 | |
| 15-Day Post Survival | 34.73 | 24.52 | 20.00 | 0.96 |
| 95% LCL | 33.11 | 22.26 | 17.37 | |
| 95% UCL | 36.42 | 26.99 | 23.02 | |
| Total Survival | 24.83 | 21.43 | 19.66 | 0.31 |
| 95% LCL | 19.27 | 13.60 | 10.75 | |
| 95% UCL | 32.00 | 33.77 | 35.98 | |
| Survival Hatch -Test End | 30.52 | 21.63 | 17.68 | 0.89 |
| 95% LCL | 27.58 | 17.77 | 13.44 | |
| 95% UCL | 33.78 | 26.32 | 23.25 | |
| **Deformities** | | | | |
| Fraction normal | 26.43 | 21.70 | 19.33 | 0.88 |
| 95% LCL | 23.94 | 18.09 | 15.07 | |
| 95% UCL | 29.19 | 26.02 | 24.79 | |
| CF fraction normal | 26.04 | 22.31 | 20.37 | 0.68 |
| 95% LCL | 22.06 | 15.91 | 12.79 | |
| 95% UCL | 30.75 | 31.27 | 32.47 | |
| SD fraction normal | 25.13 | 23.30 | 22.29 | 0.81 |
| 95% LCL | 19.89 | 15.01 | 12.68 | |
| 95% UCL | 31.76 | 36.18 | 39.20 | |
| FD fraction normal | 27.65 | 23.22 | 20.96 | 0.28 |
| 95% LCL | 24.27 | 17.85 | 14.30 | |
| 95% UCL | 31.49 | 30.19 | 30.73 | |
| ED fraction normal | 26.98 | 21.23 | 18.45 | 0.96 |
| 95% LCL | 25.31 | 18.96 | 15.82 | |
| 95% UCL | 28.76 | 23.77 | 21.52 | |

CF-Cranio-facial deformity

SD-Skeletal deformity

FD-Fin deformity

ED-Edematous Tissue deformity

**Table 9**
**Summary of Toxicity Studies that Evaluated Selenium Toxicity to Embyo/Larvae Resulting from Maternal Transfer**

| Species | Reference | Adult Exposure | Endpoint | Tissue | Selenium Concentration (µg/g dry weight) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | NOEC | LOEC | $EC_{10}$ | $EC_{20}$ |
| Bluegill | Bryson et al. 1984 | Field | Larval mortality | Ovary | -- | <49 | -- | -- |
| | Bryson et al. 1985a | Field | Hatchability/swim-up | Ovary | >9.1 | -- | -- | -- |
| | | Field | Hatchability/swim-up | Ovary | - | <30 | -- | -- |
| | Bryson et al. 1985b | Field | Hatchability/swim-up | Ovary | >14.8 | -- | -- | -- |
| | | Field | Hatchability/swim-up | Ovary | >9.2 | -- | -- | -- |
| | Gillespie and Baumann 1986 | Field | Larval edema | Ovary | -- | <38.6 | -- | -- |
| | Doroshov et al. 1992 | Lab | Larval edema | Ovary | 3.94 | 21.1 | 15 | 17 |
| | | Lab | Larval edema | Egg | 8.55 | 25.81 | 21 | 23 |
| | Coyle et al. 1993 | Lab | Larval mortality | WB | 7 | 16 | 8 | 8.5 |
| | | Lab | Larval mortality | Ovary | 20 | 35 | 24 | 27 |
| | | Lab | Larval mortality | Egg | 22.5 | 41.3 | 22 | 26 |
| | Hermanutz et al. 1996 | Mesocosm | Larval edema | WB | 4.4 | 21.8 | -- | -- |
| | | Mesocosm | Larval edema | Ovary | 17.3 | 69 | -- | -- |
| Fathead minnow | Ogle and Knight 1989 | Lab | Reproduction | WB | >7.5 | -- | -- | -- |
| | | Lab | Reproduction | Ovary | >10.92 | -- | -- | -- |
| | Schultz and Hermanutz 1990 | Mesocosm | Larval edema/lordosis | Ovary | - | <39.3 | - | - |
| | GEI Consultants | Field | Larval deformities/edema | WB | -- | -- | 33 | -- |
| | | Field | Larval deformities/edema | Ovary | -- | -- | 45[a] | |
| Brook trout | Holm et al. 2005 | Field | Larval deformities | Egg | >20 | - | 20 (EC06) | - |
| Cutthroat trout | Kennedy et al. 2000 | Field | Larval deformities/ mortality | Egg | >21 | - | - | - |
| | Hardy 2005 | Lab | Larval deformities/ mortality | WB | >11.37 | - | - | - |
| | | Lab | Larval deformities/ mortality | Egg | >16.04 | - | - | - |
| | Rudolph et al. 2008 | Field | Larval deformities | Egg | 20.6 | 46.8 | - | - |
| | | Field | Alevin mortality | Egg | - | - | 17 | 23 |
| Rainbow trout | Holm et al. 2005 | Field | Larval deformities | Egg | 17 | 25 | 26 | 29 |
| Northern pike | Muscatello et al. 2006 | Field | Larval deformities | Egg | 3.8 | 31.28 | 20.4 | 33.55 |
| White sucker | de Rosemond et al. 2005 | Field | Larval deformities | Egg | - | - | 26 (EC13) | - |

Original table Source: Selenium Tissue thresholds - Tissue Selection Criteria, Threhsold Development Endpoints, and Potential to Predict Population or Community Effects in the Field (NAMC 2009).

[a] An ovary-based $EC_{10}$ of 44.6502 µg/g was estimated from a whole-body $EC_{10}$ of 33.07 µg/g based on the whole-body-ovary selenium relationship for fathead minnows (FHM) presented in GEI Consultants (2008): FHM [Se] dw WB = 0.75826*(FHM ovary [Se] dw) - 0.78645.

# FIGURES

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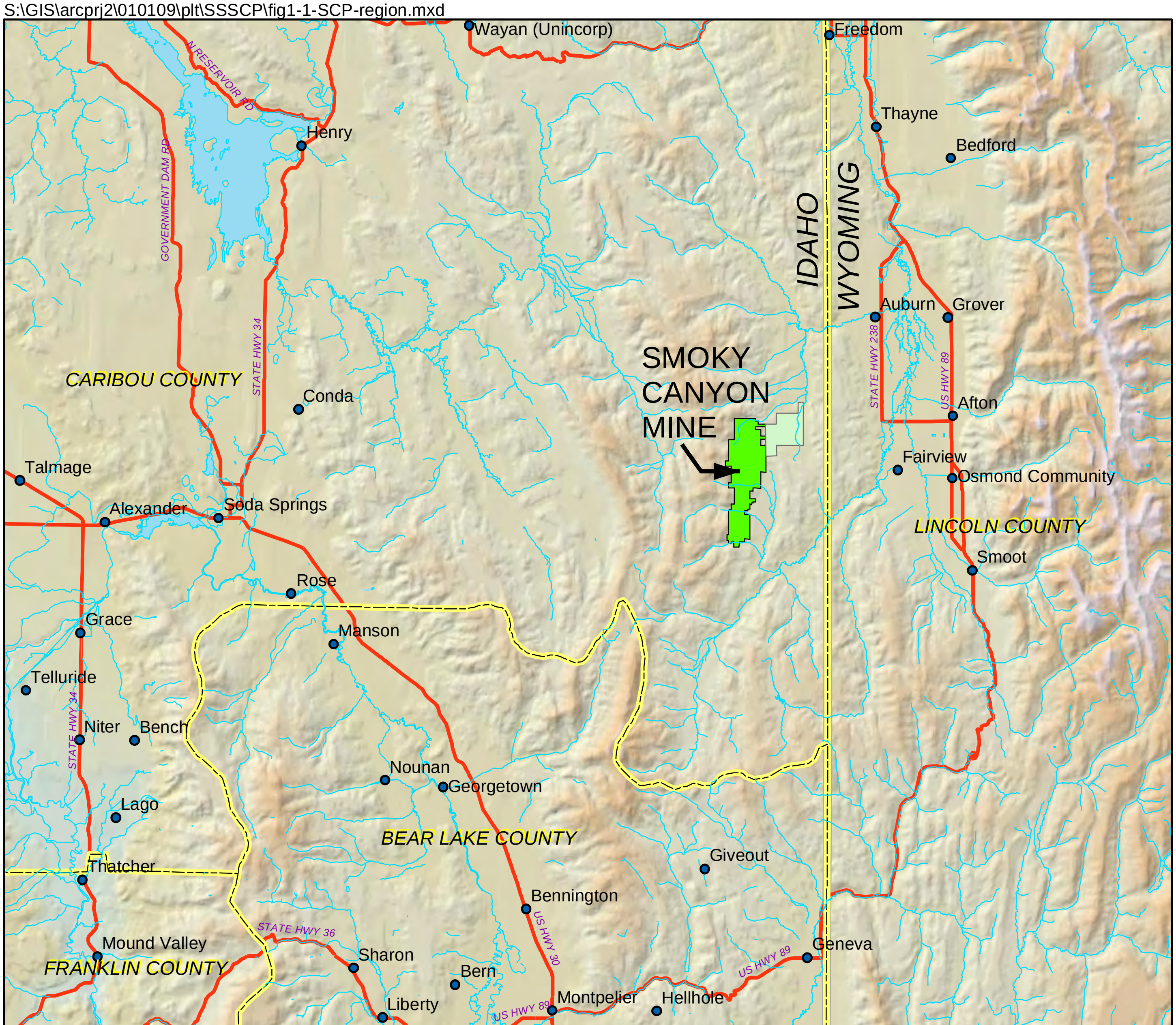


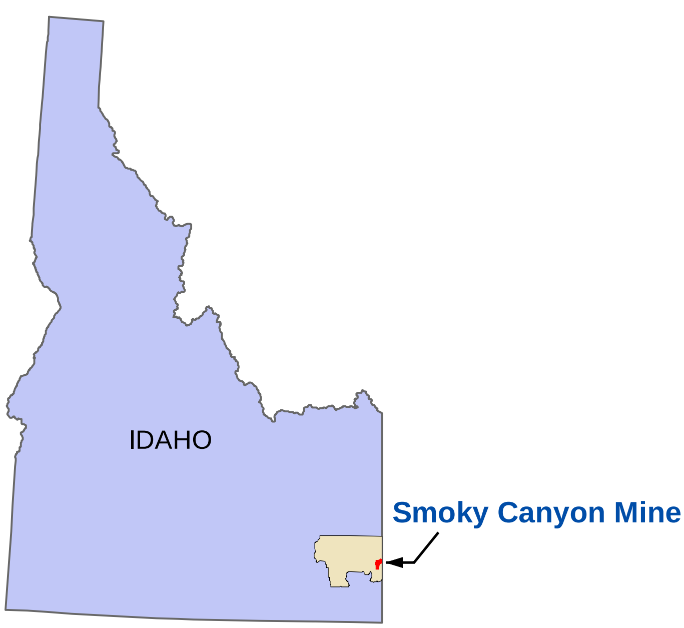


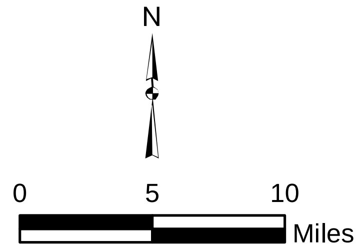


**J.R. SIMPLOT COMPANY**

SMOKY CANYON MINE

FIGURE 1

**LOCATION OF THE SMOKY CANYON MINE**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: MAY. 05, 2011 |
| REV: 0 | BY: RCR / CHK: SMC |

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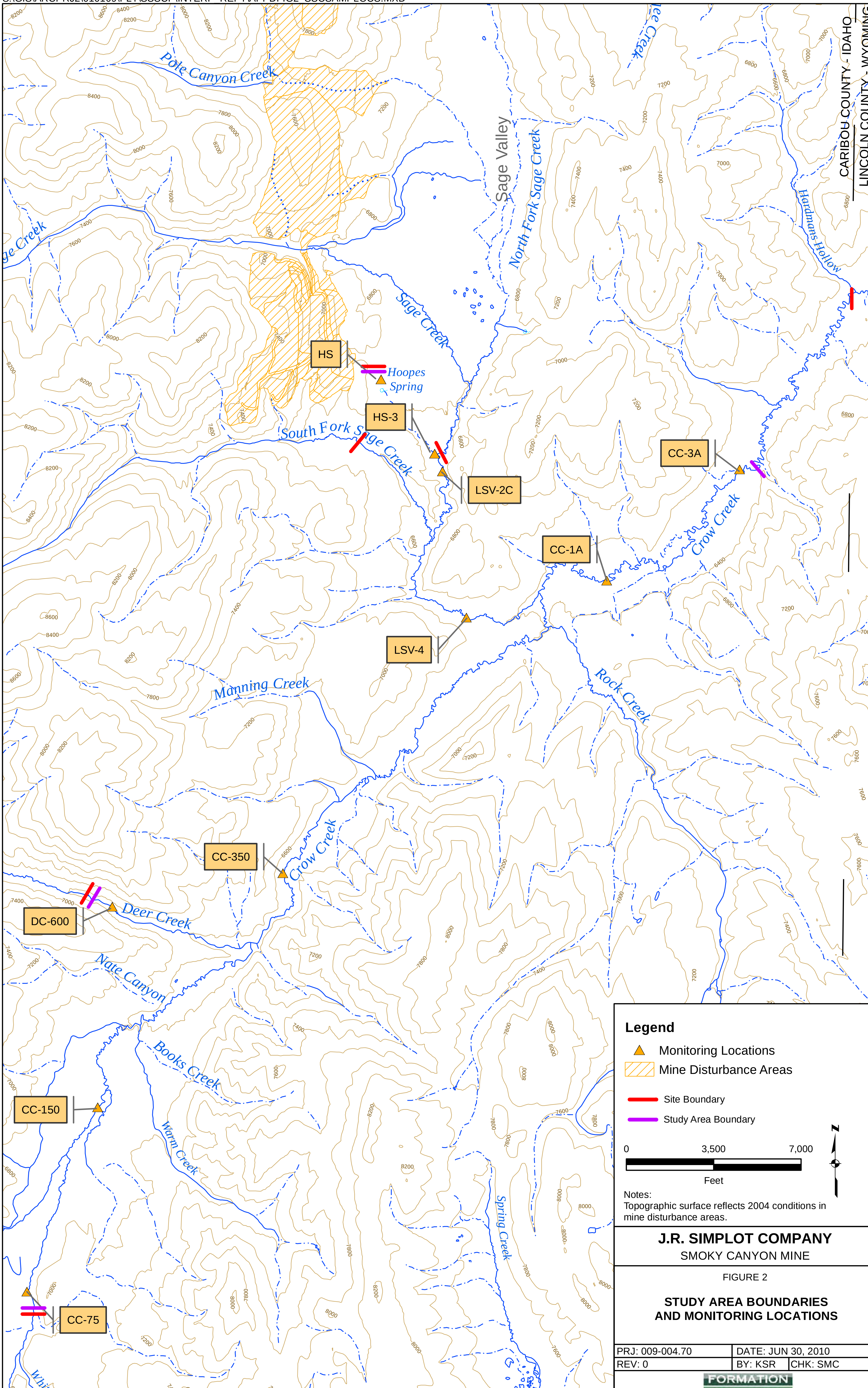


**J.R. SIMPLOT COMPANY**

SMOKY CANYON MINE

FIGURE 2

**STUDY AREA BOUNDARIES AND MONITORING LOCATIONS**

| | |
|---|---|
| PRJ: 009-004.70 | DATE: JUN 30, 2010 |
| REV: 0 | BY: KSR CHK: SMC |

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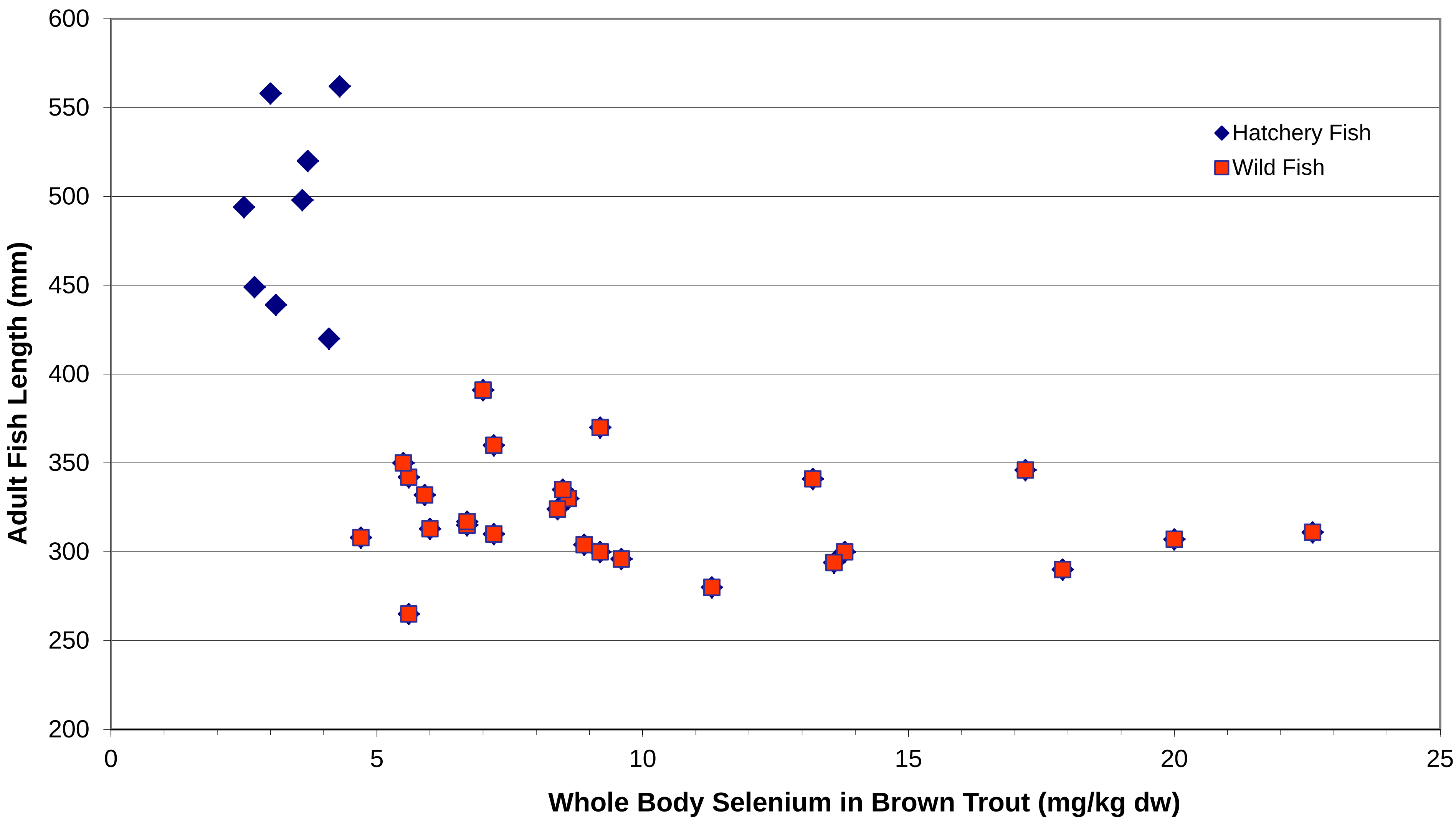


**Figure 3**
**Whole Body Selenium Concentration Versus Fish Length**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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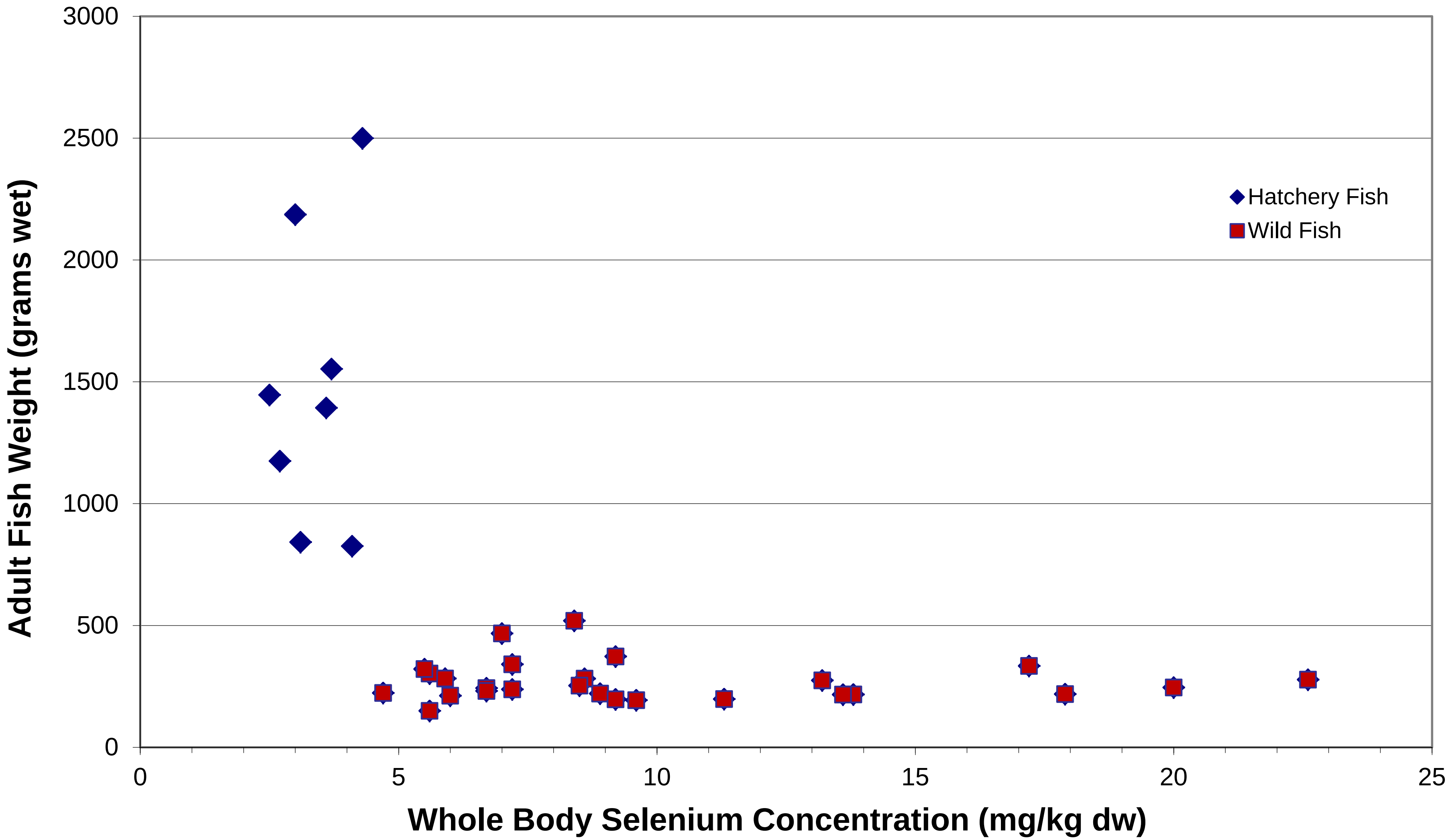


**Figure 4**
**Whole Body Selenium Concentration Versus Adult Fish Weight**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| PRJ: 0442-004-900.70 | DATE: June 2011 | |
|---|---|---|
| REV: 1 | BY: SMC | CHK: SMC |

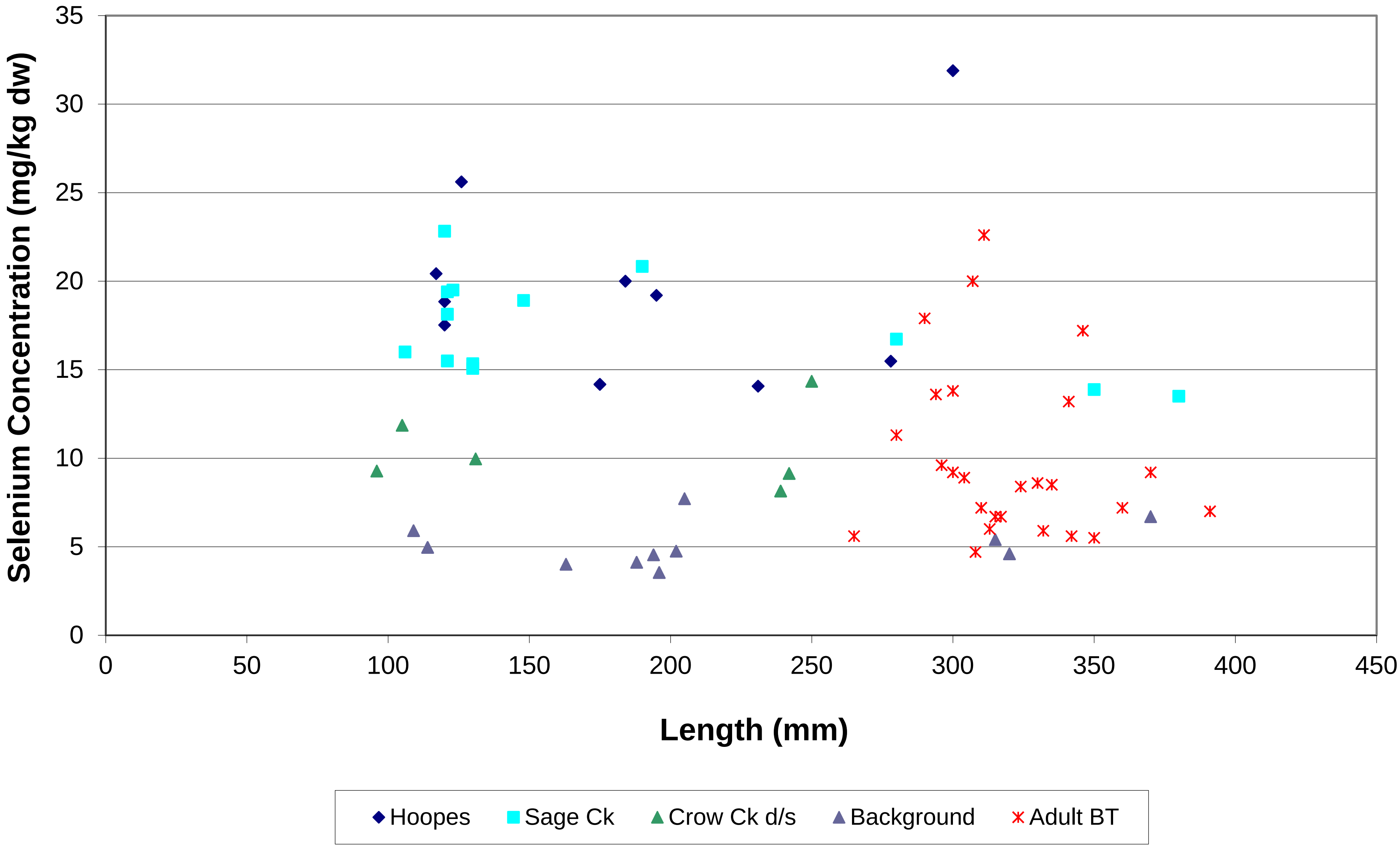


**Figure 5**
**Brown Trout Length Versus Whole Body Selenium Concentration**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 |
| REV: 1 | BY: SMC / CHK: SMC |

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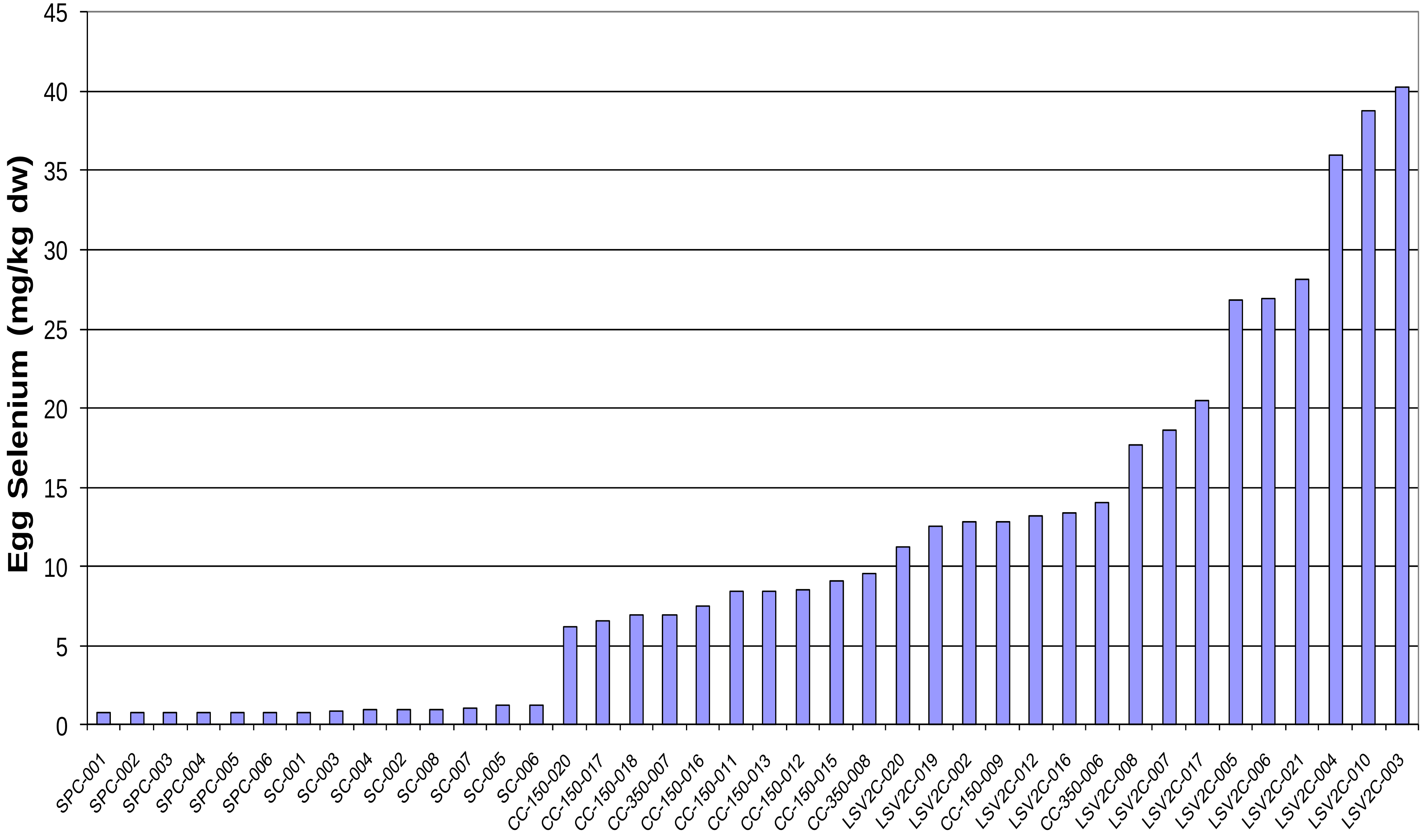


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 6**
**Brown Trout Egg Selenium Concentration by Location**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
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| REV: 1 | BY: SMC | CHK: SMC |

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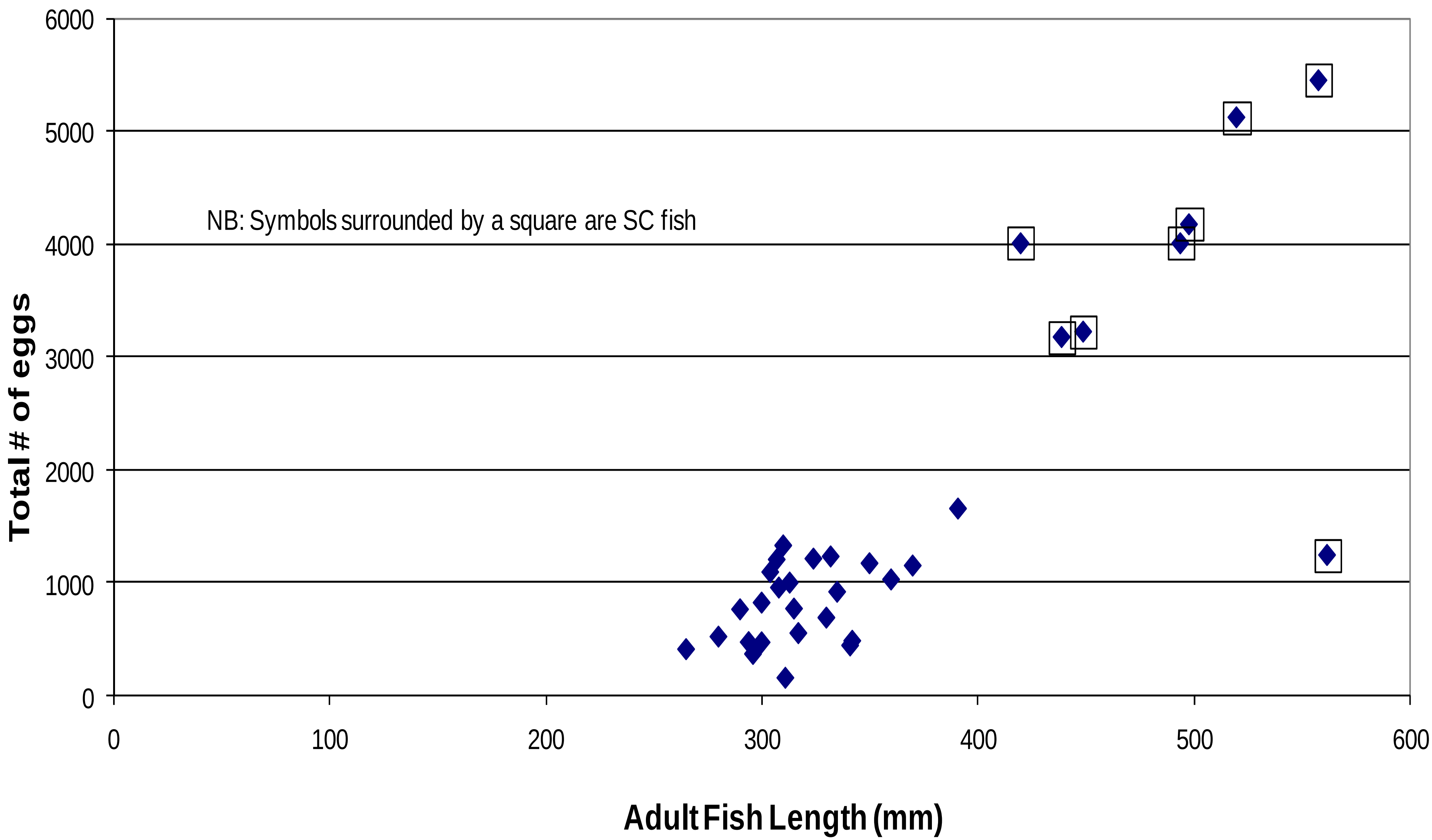


**Figure 7**
**Comparison of Adult Fish Size (Length) and the Total Number of Eggs Produced**

| | | |
|---|---|---|
| **J.R. Simplot Company** Site-Specific Selenium Criterion | | |
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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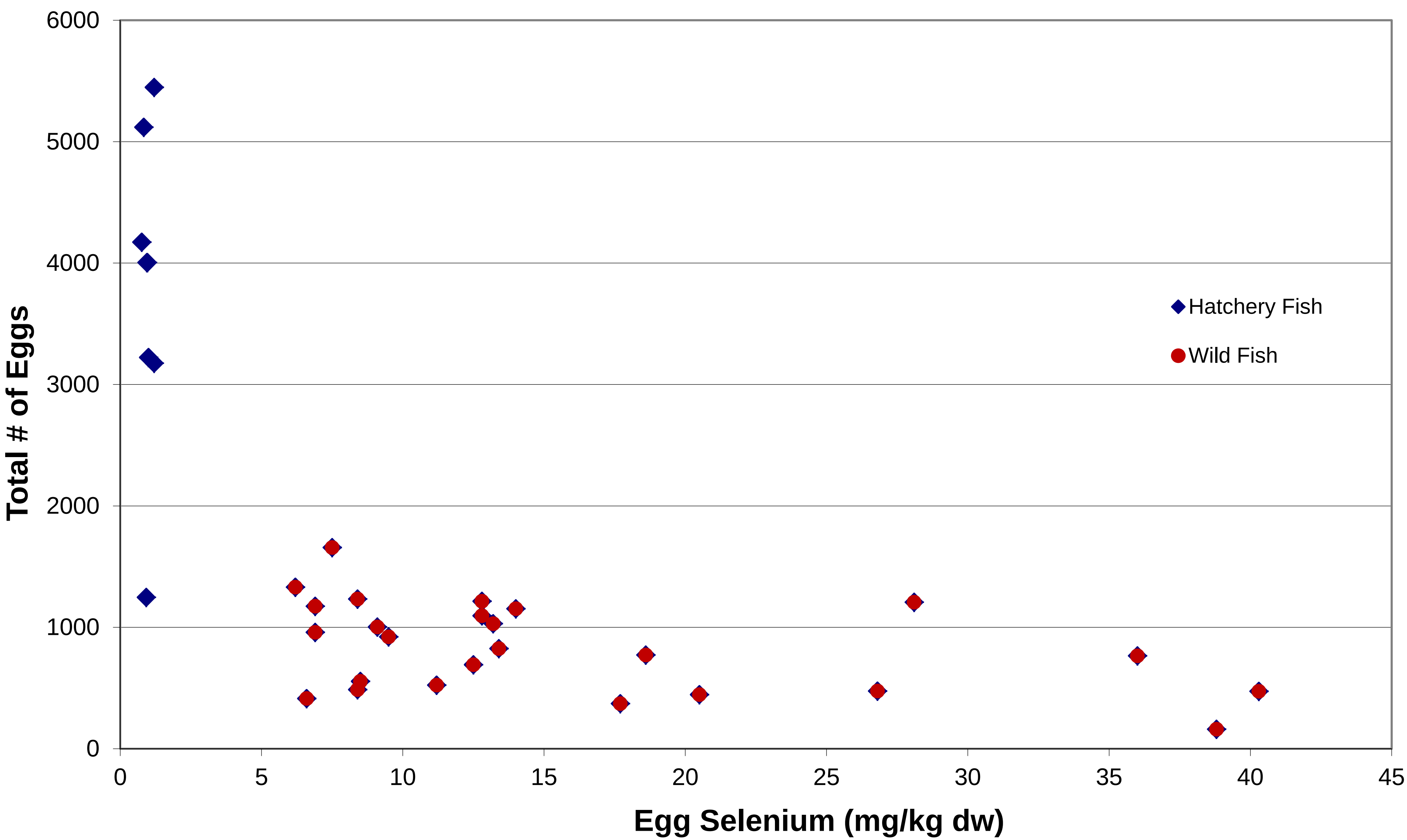


**Figure 8**
**Egg Selenium Concentration Versus Total Egg Abundance**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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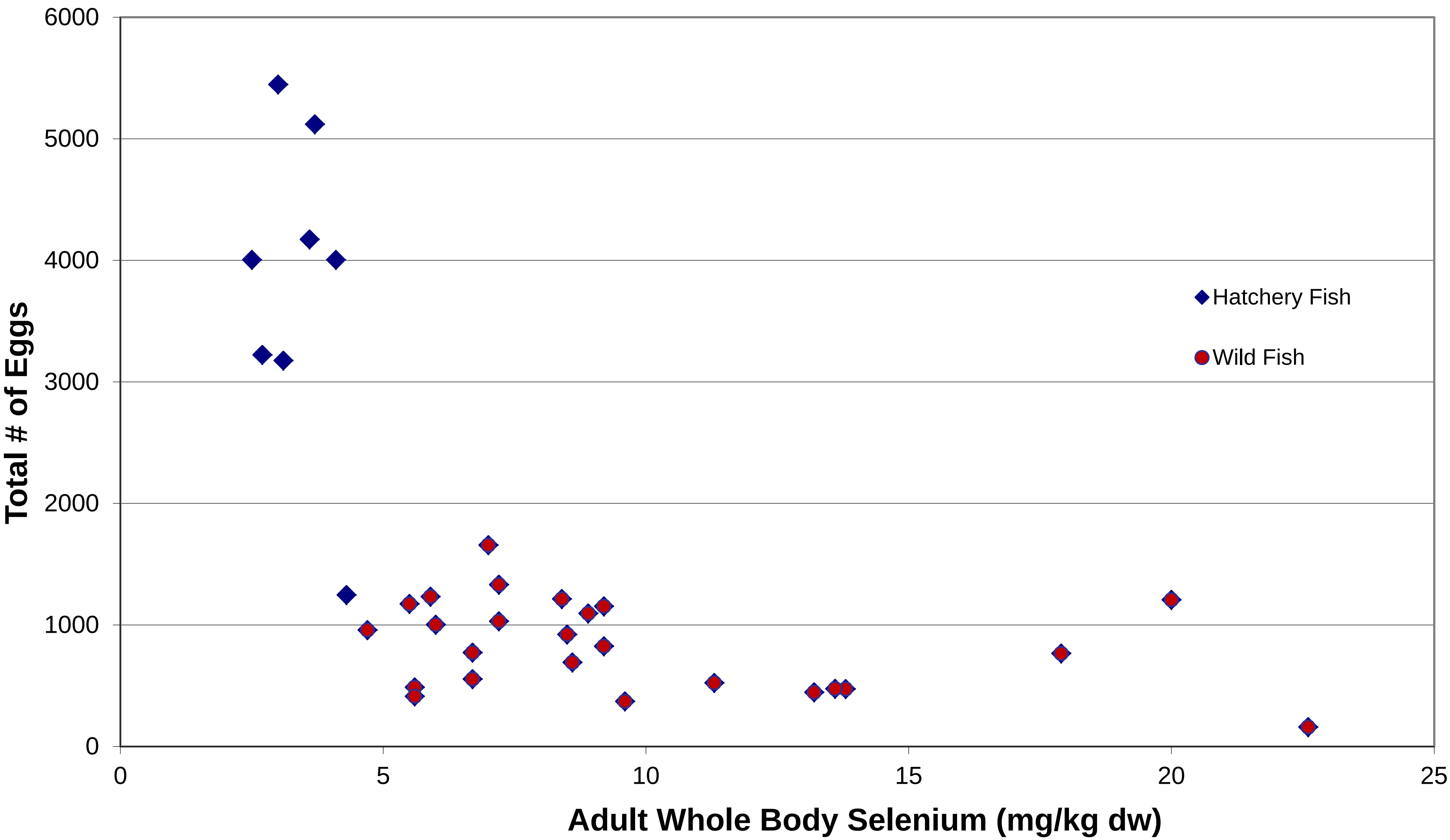


**Figure 9**
**Adult Whole Body Selenium Concentration Versus Total Egg Abundance**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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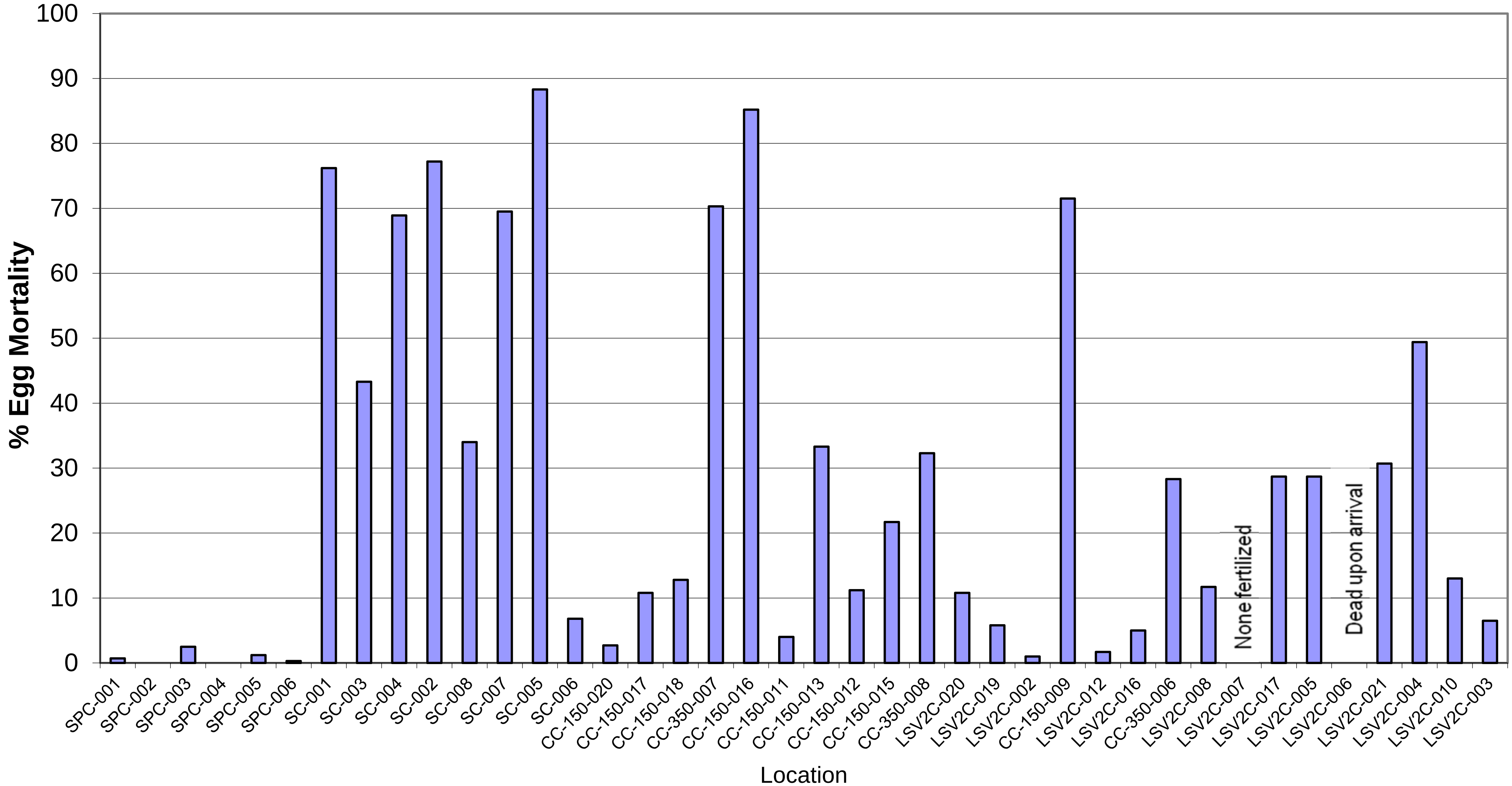


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 10**
**Percent Egg Mortality by Location**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
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| REV: 1 | BY: SMC | CHK: SMC |

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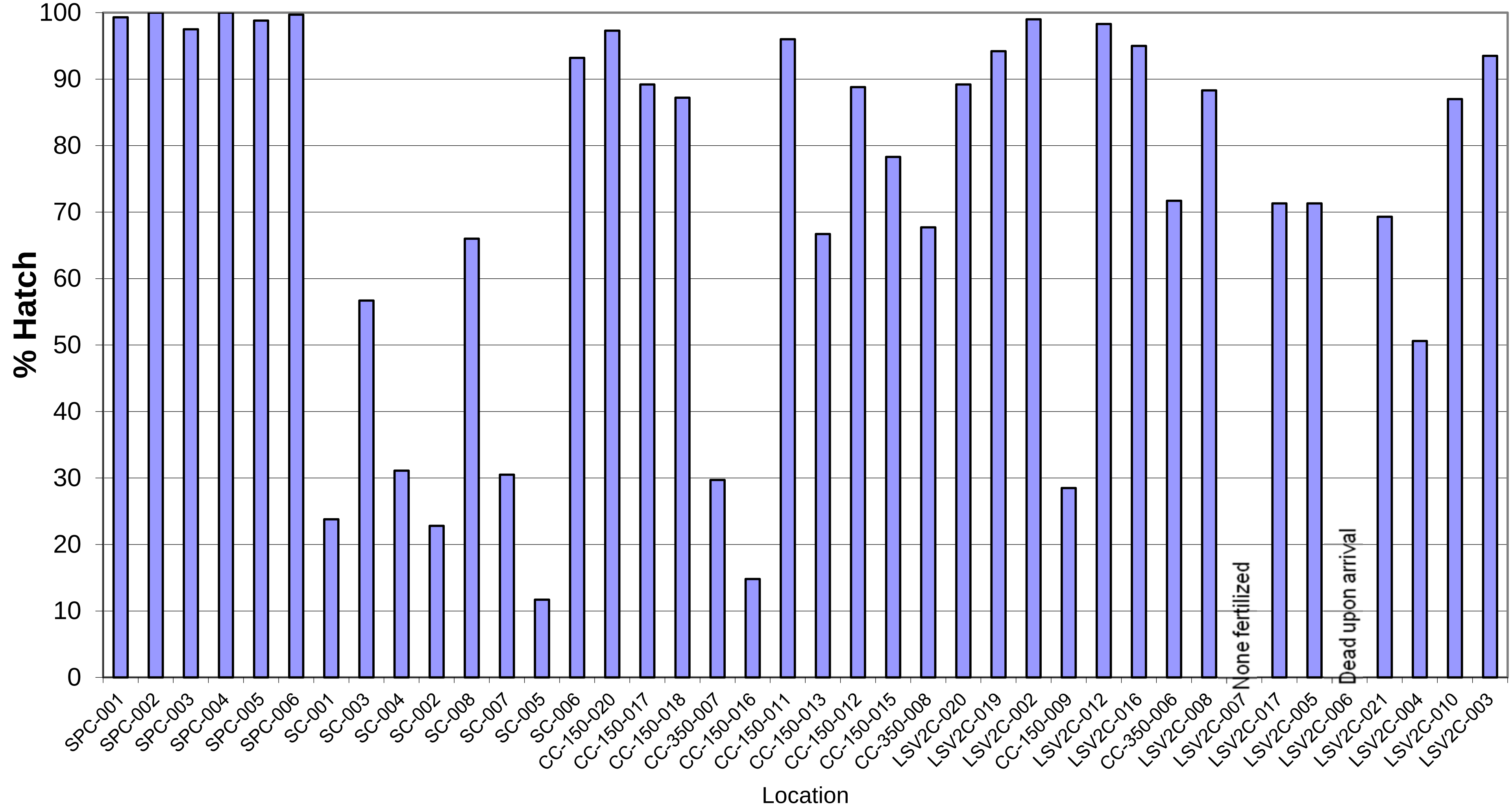


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 11**
**Percent Hatch (or Percent Survival at Hatch) of Alevins**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
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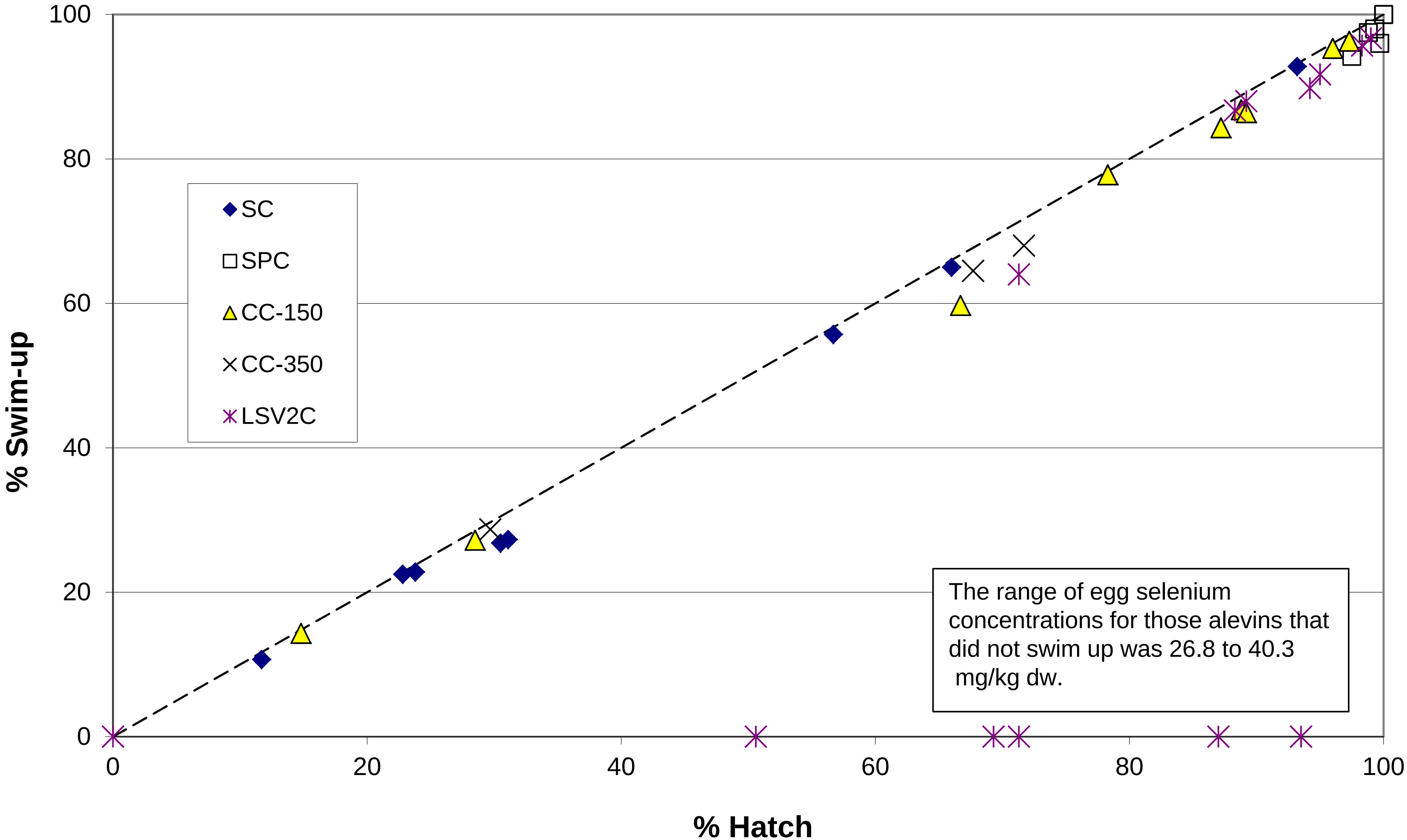


Note: the dashed line indicates a 1:1 agreement.

**Figure 12**
**Relationship Between the Percentage of Eggs that Hatched and the Percentage of Fish that Reached Swim-Up**

| | | |
|---|---|---|
| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

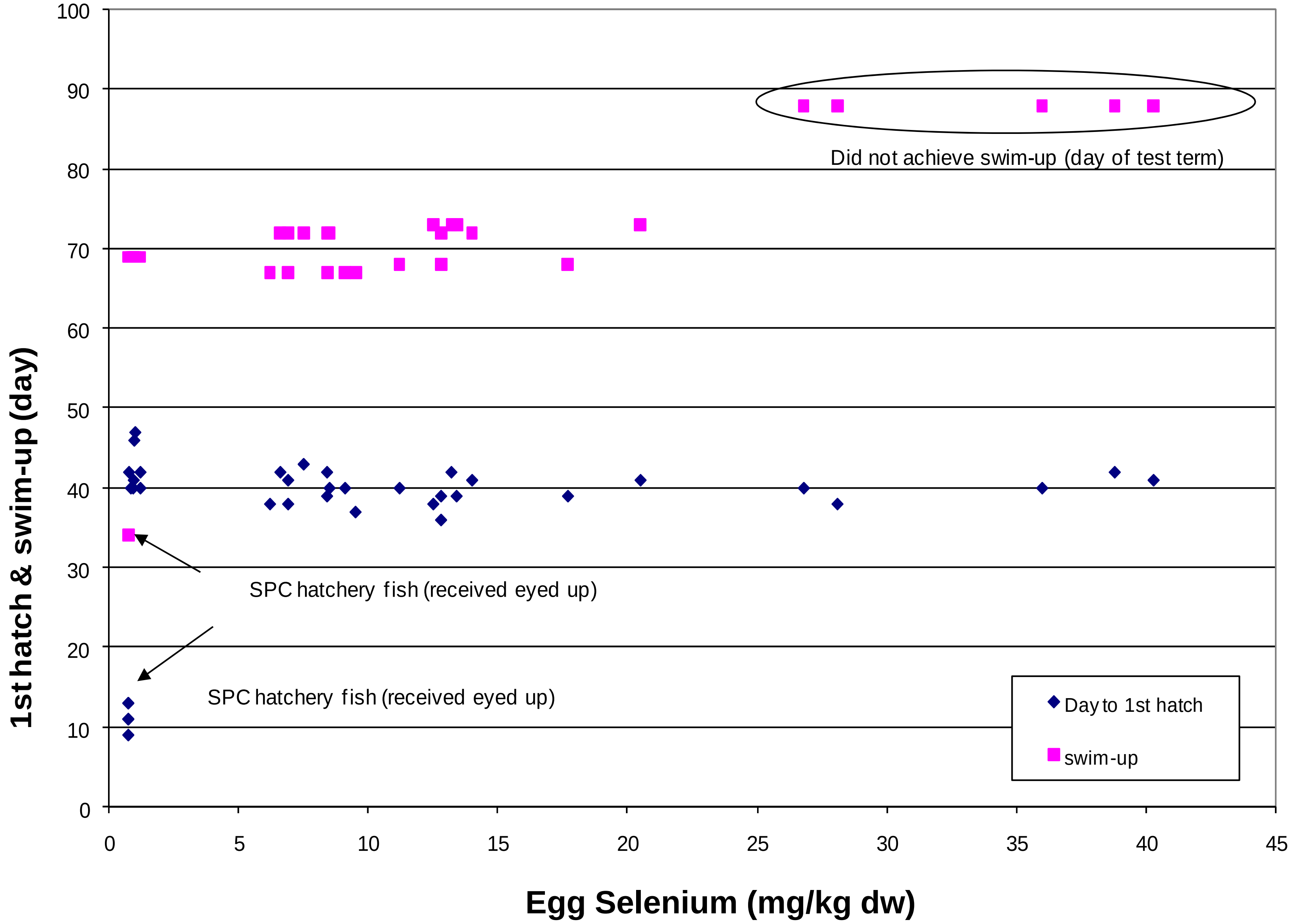


**Figure 13**
**Egg Selenium Concentration Versus**
**Day to First Hatch and Day to Swim-Up**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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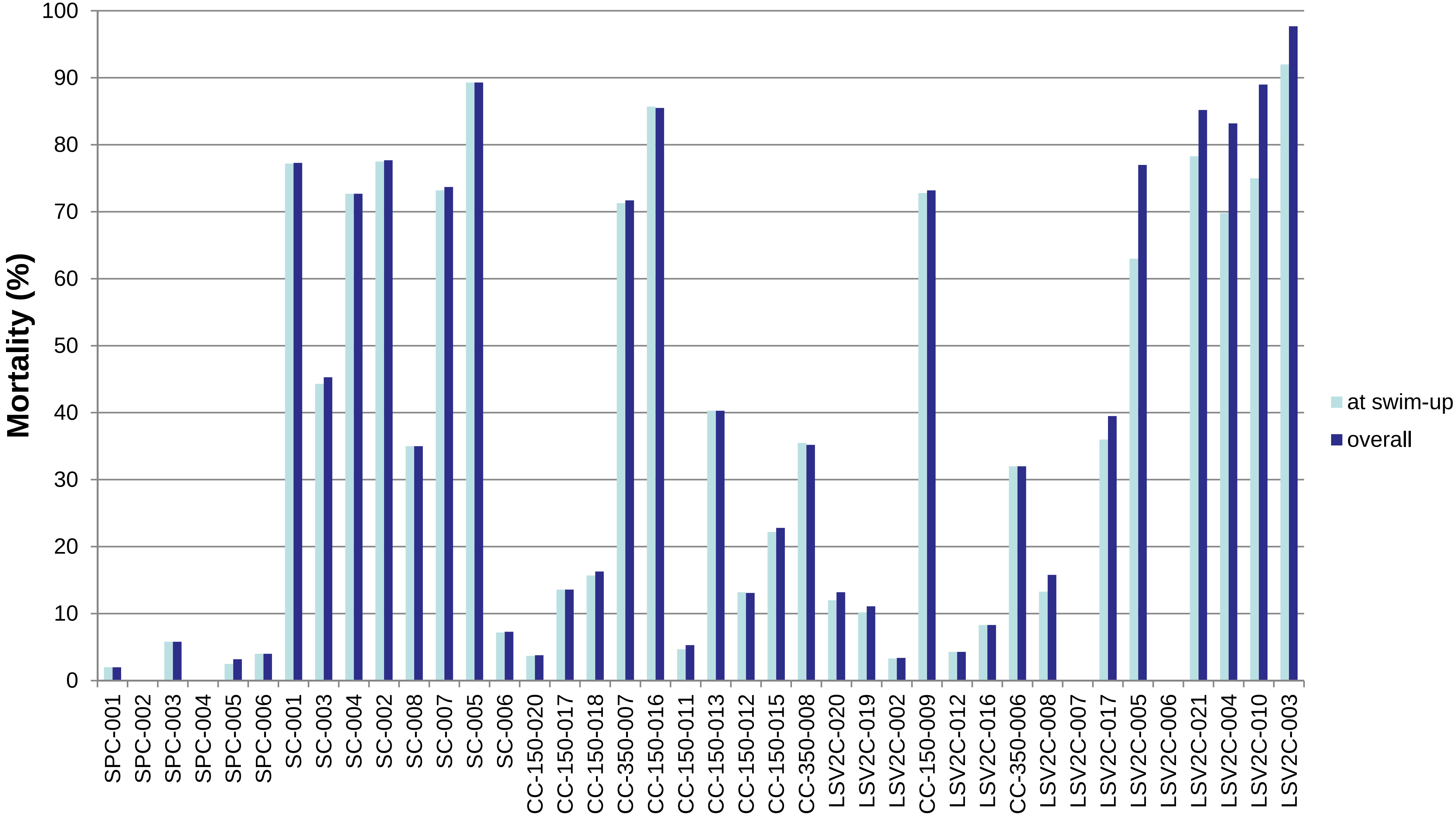


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 14**
**Fry Mortality at Swim-Up and Overall Mortality by Location**

| **J.R. Simplot Company** Site-Specific Selenium Criterion | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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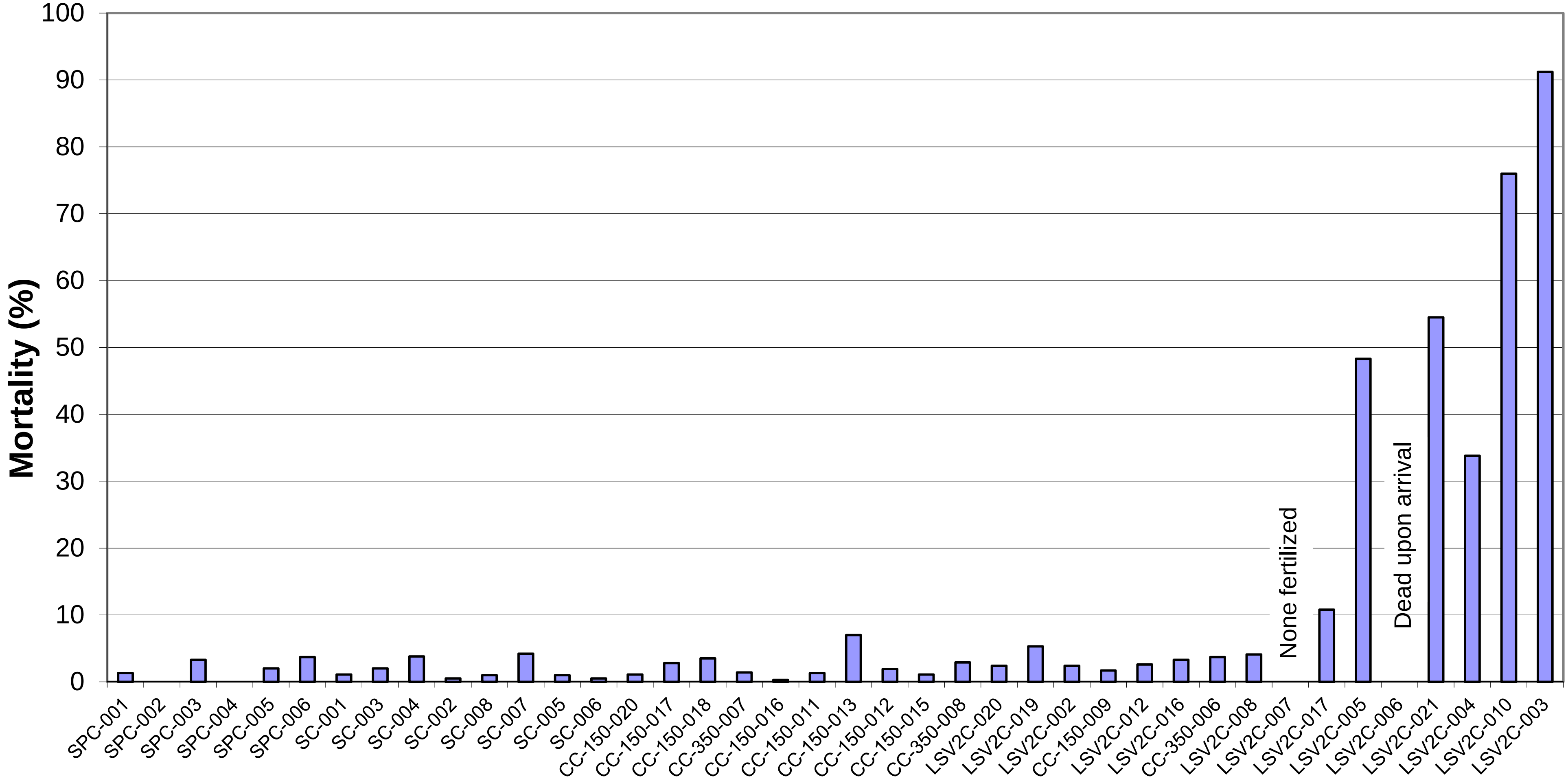


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 15**
**Percent Mortality from Hatch to Test Termination by Location**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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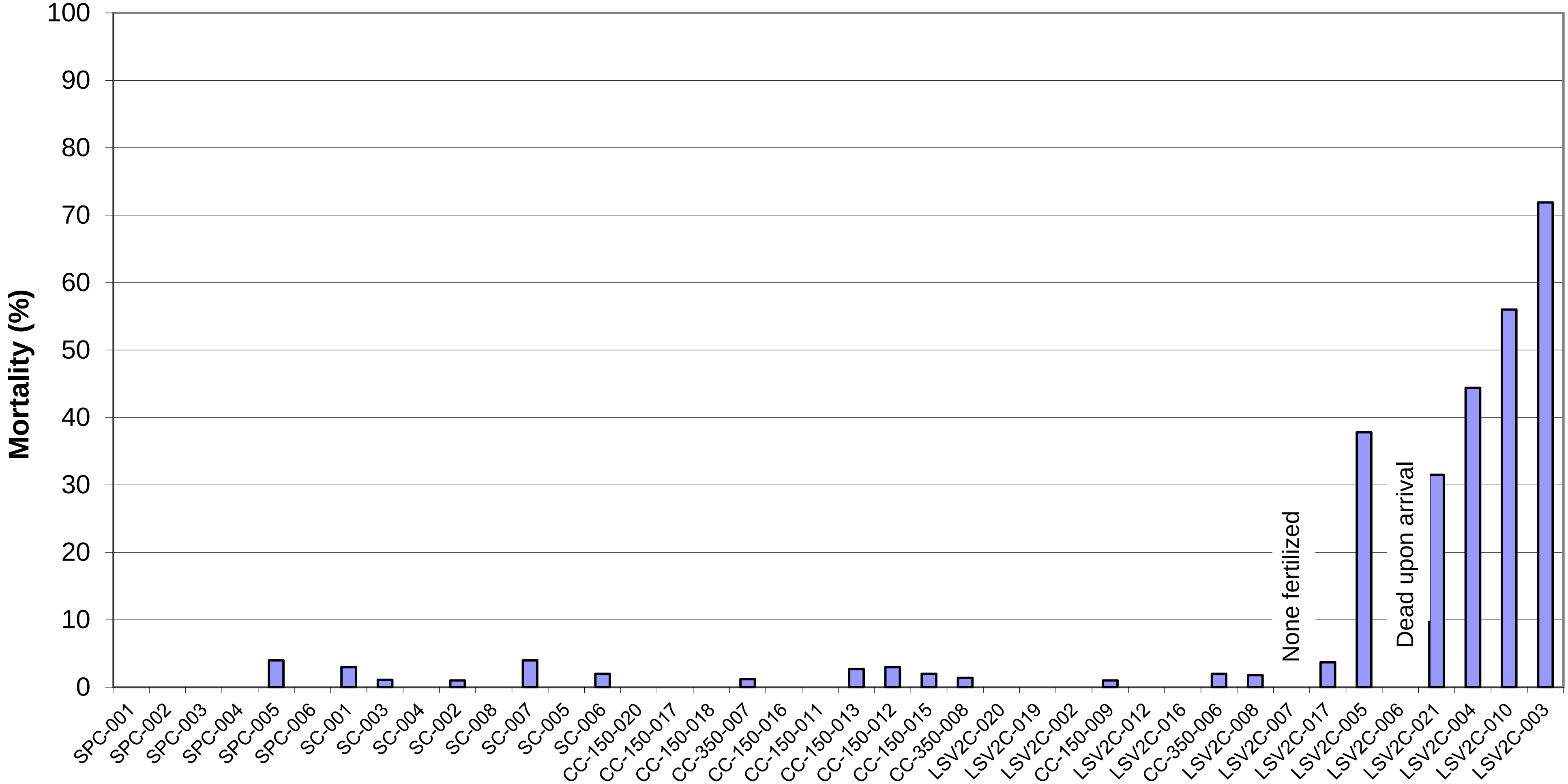


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 16**
**Percent Mortality 15-Day Post Swim-Up Feeding Trial**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 |
| REV: 1 | BY: SMC / CHK: SMC |

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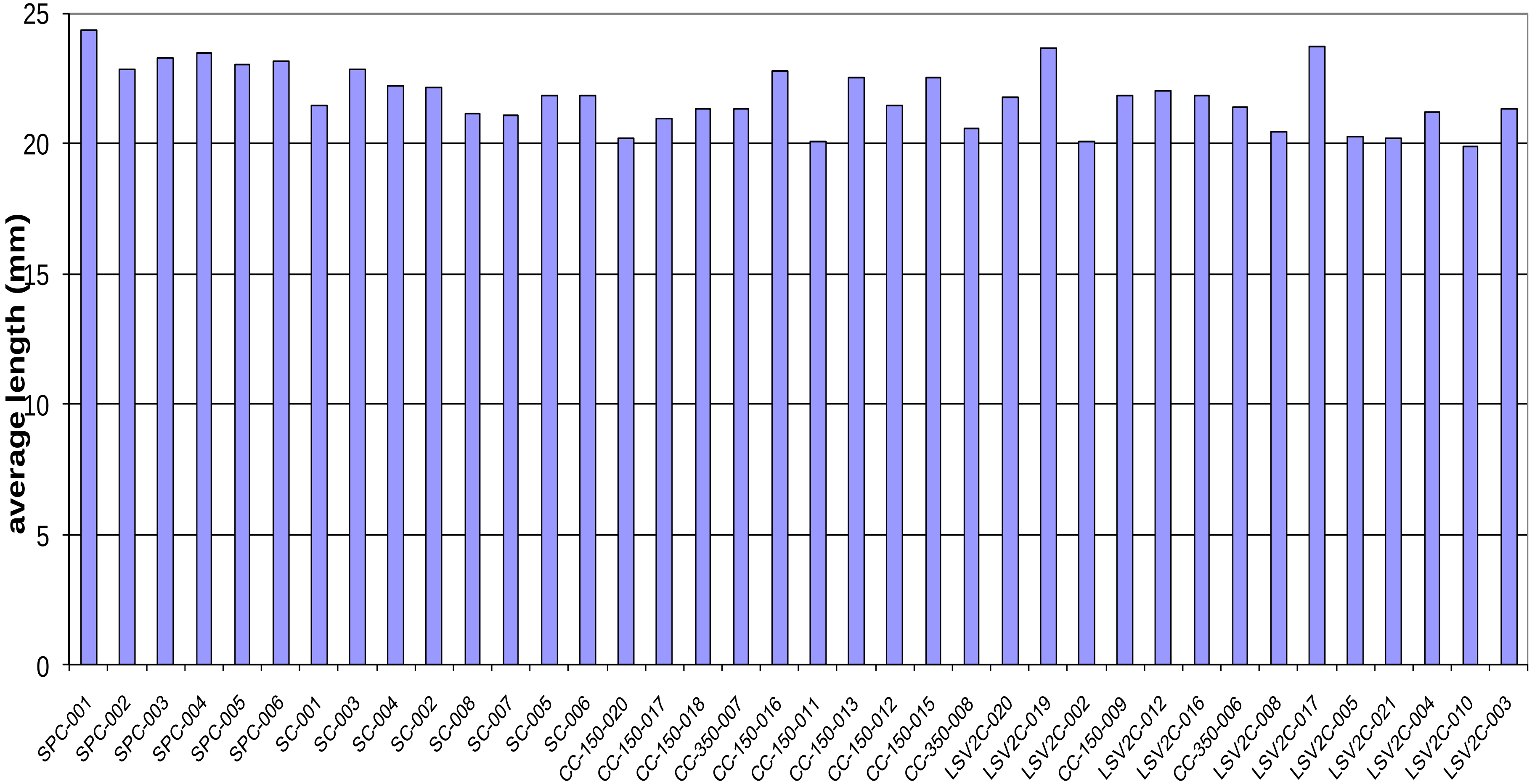


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 17**
**Brown Trout Growth based on Larval Fish Length**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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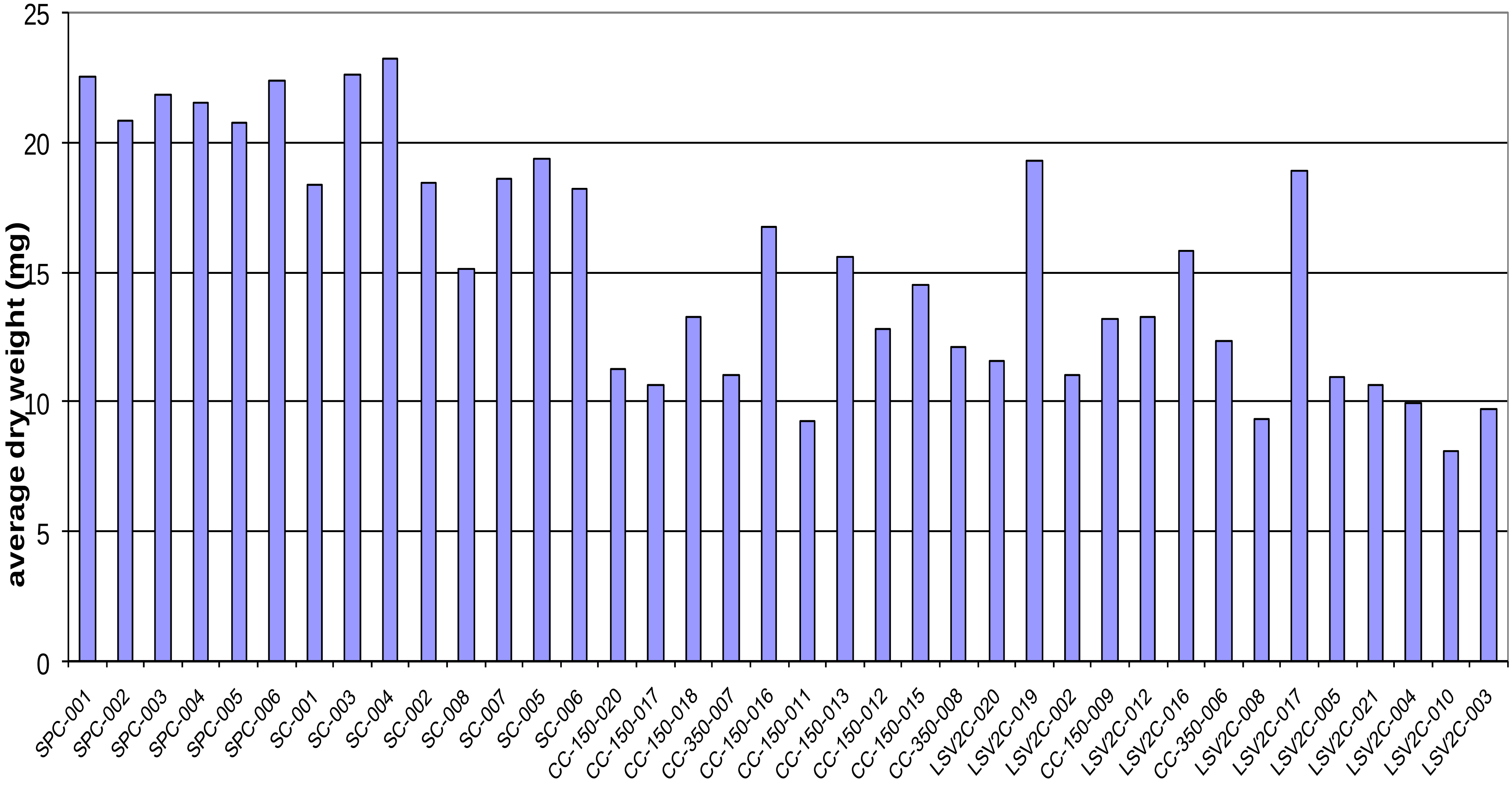


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 18**
**Brown Trout Growth based on Larval Fish Dry Weight**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
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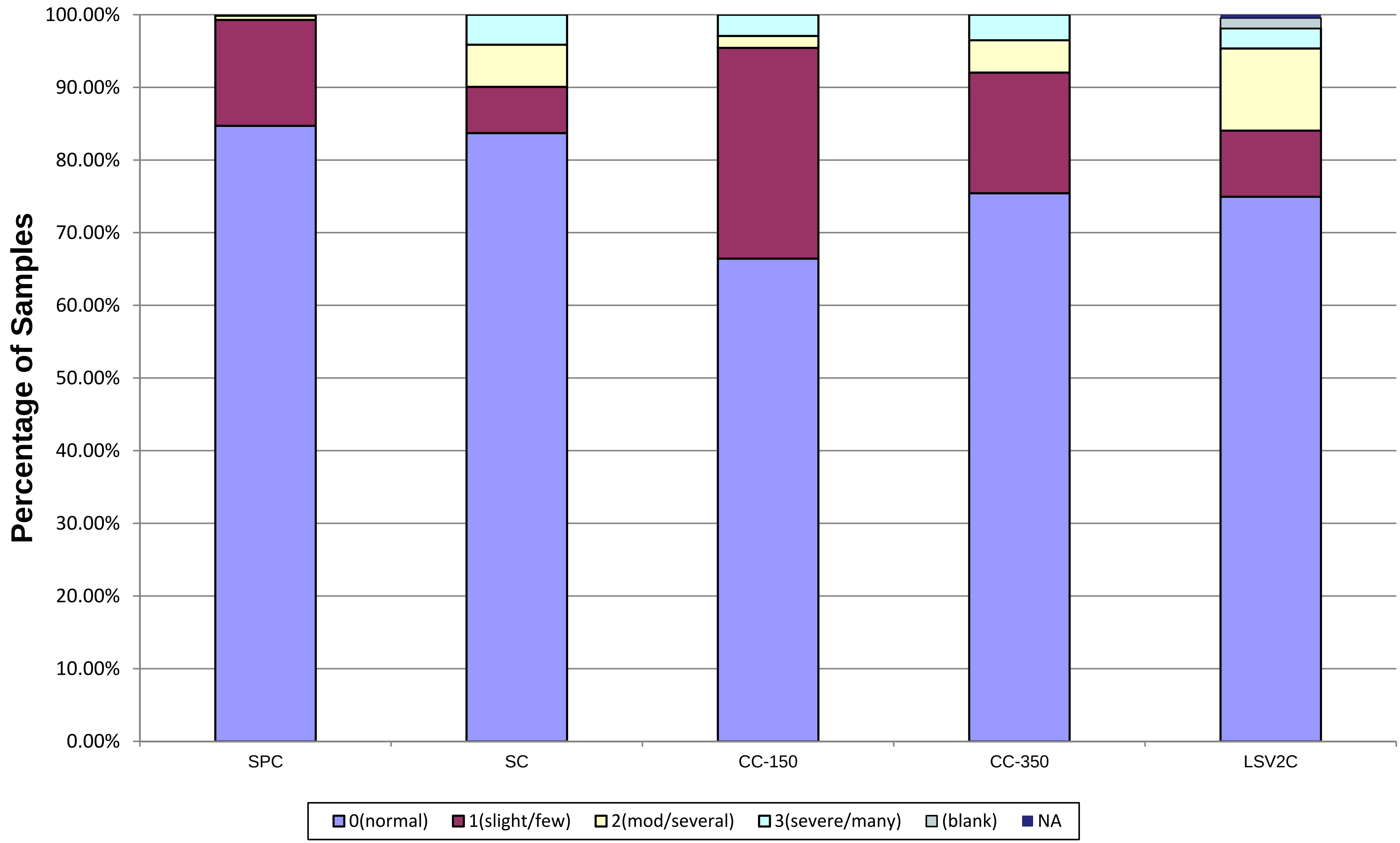


**Figure 19**
**Percent Cranio-Facial Deformities for Larval Brown Trout**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

FORMATION ENVIRONMENTAL

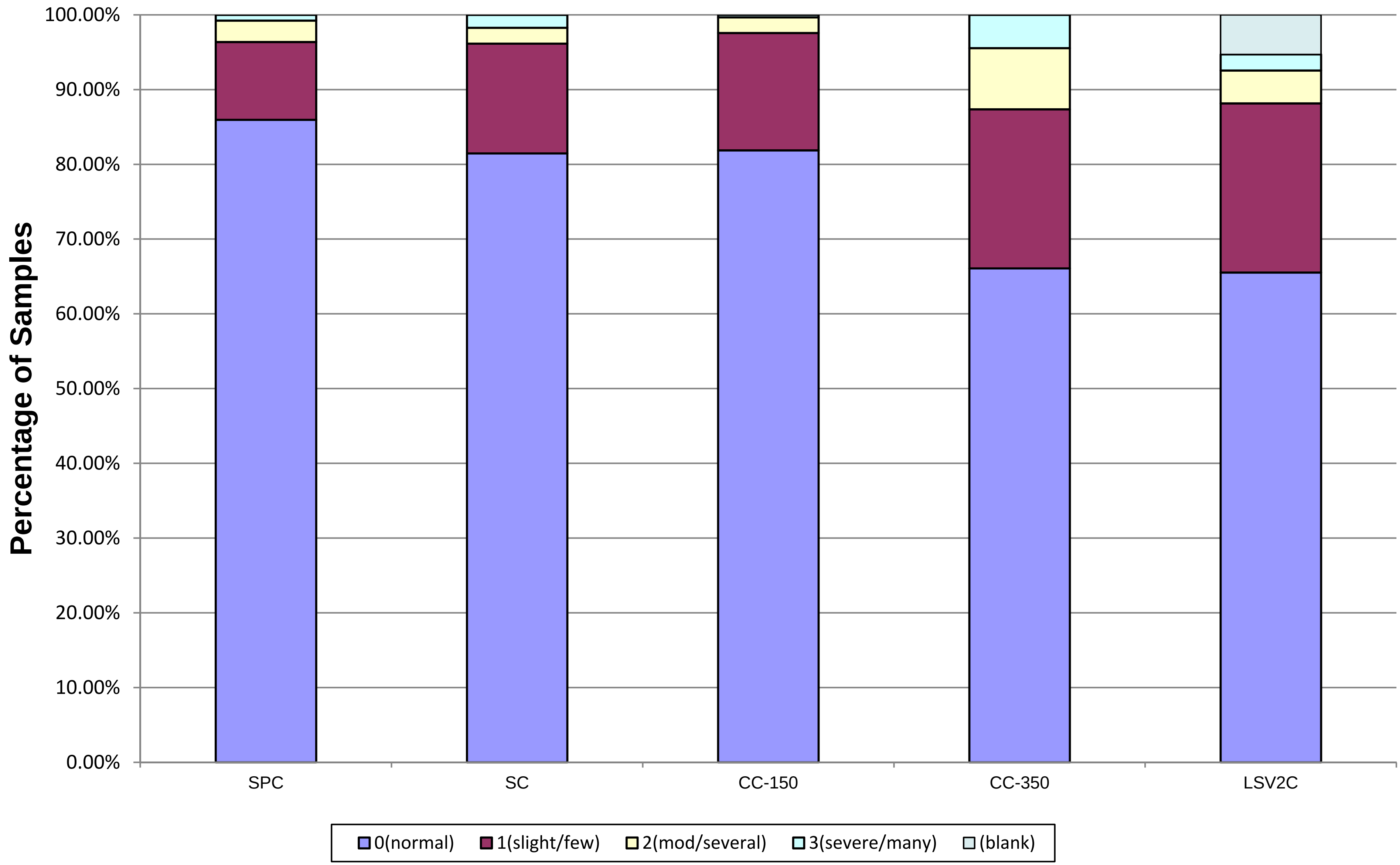


**Figure 20**
**Percent Skeletal Deformities for Larval Brown Trout**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

FORMATION ENVIRONMENTAL

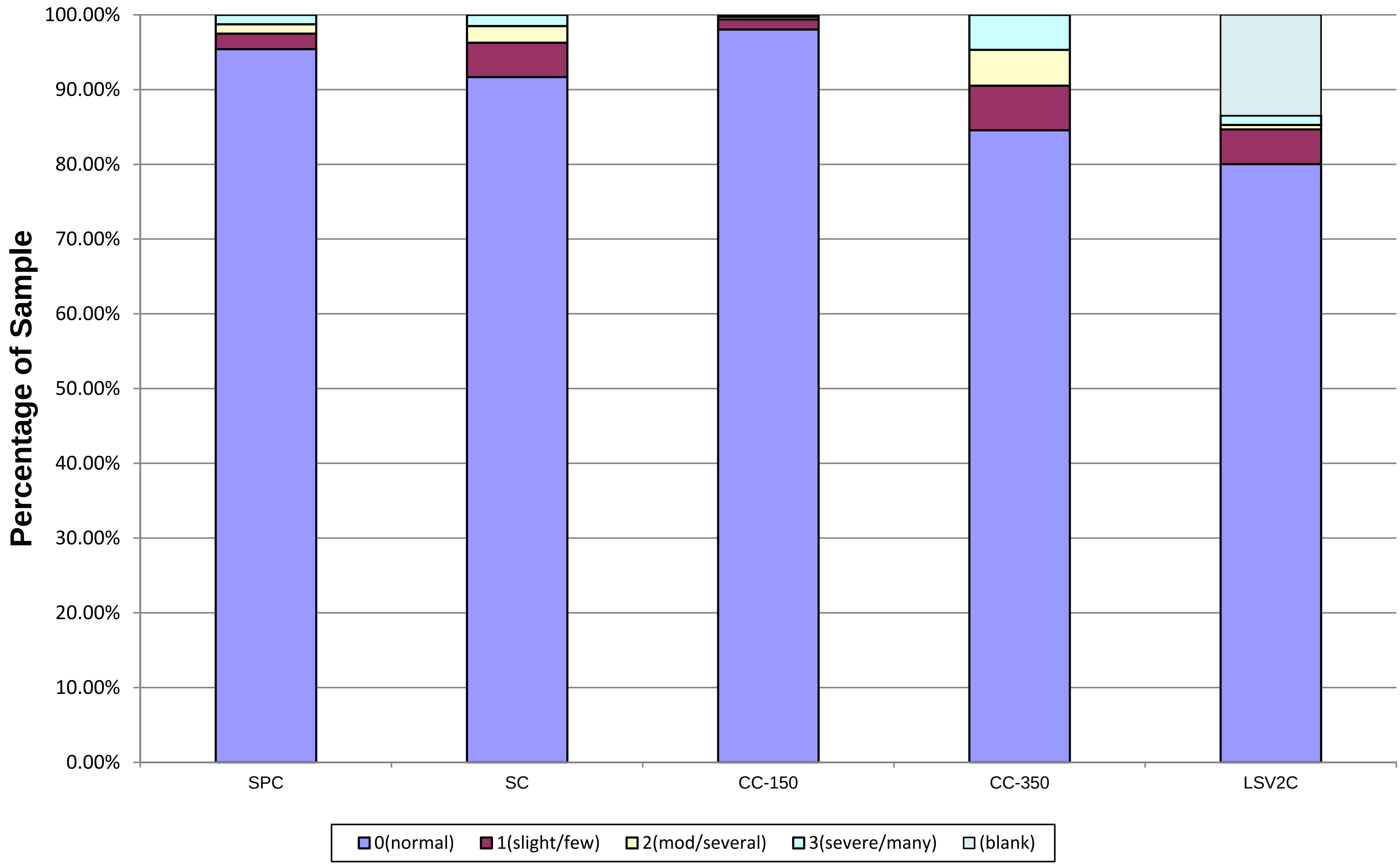


**Figure 21**
**Percent Fin of Finfold Deformities for Larval Brown Trout**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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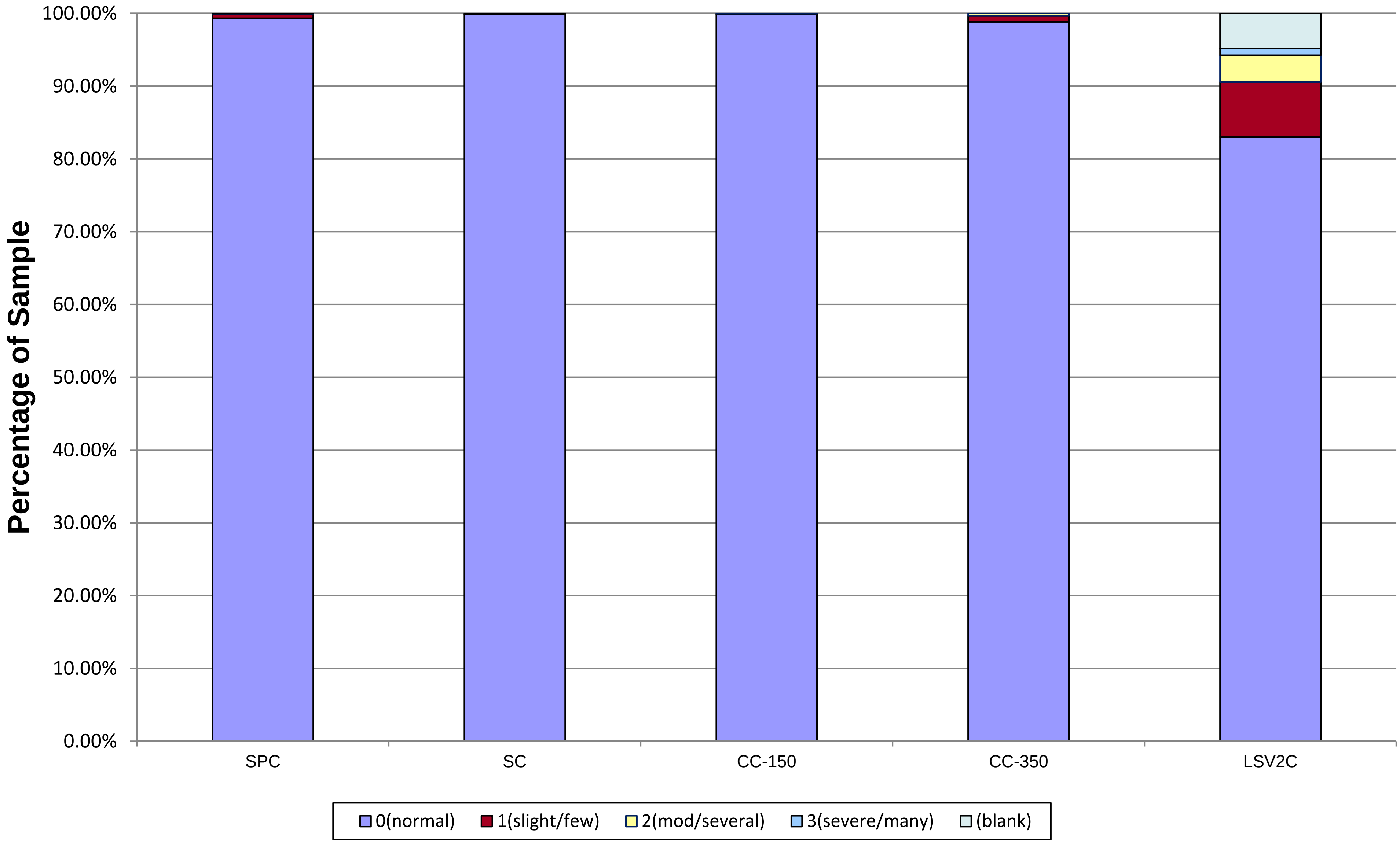


**Figure 22**
**Percent Edematous Tissue Frequency for Larval Brown Trout**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
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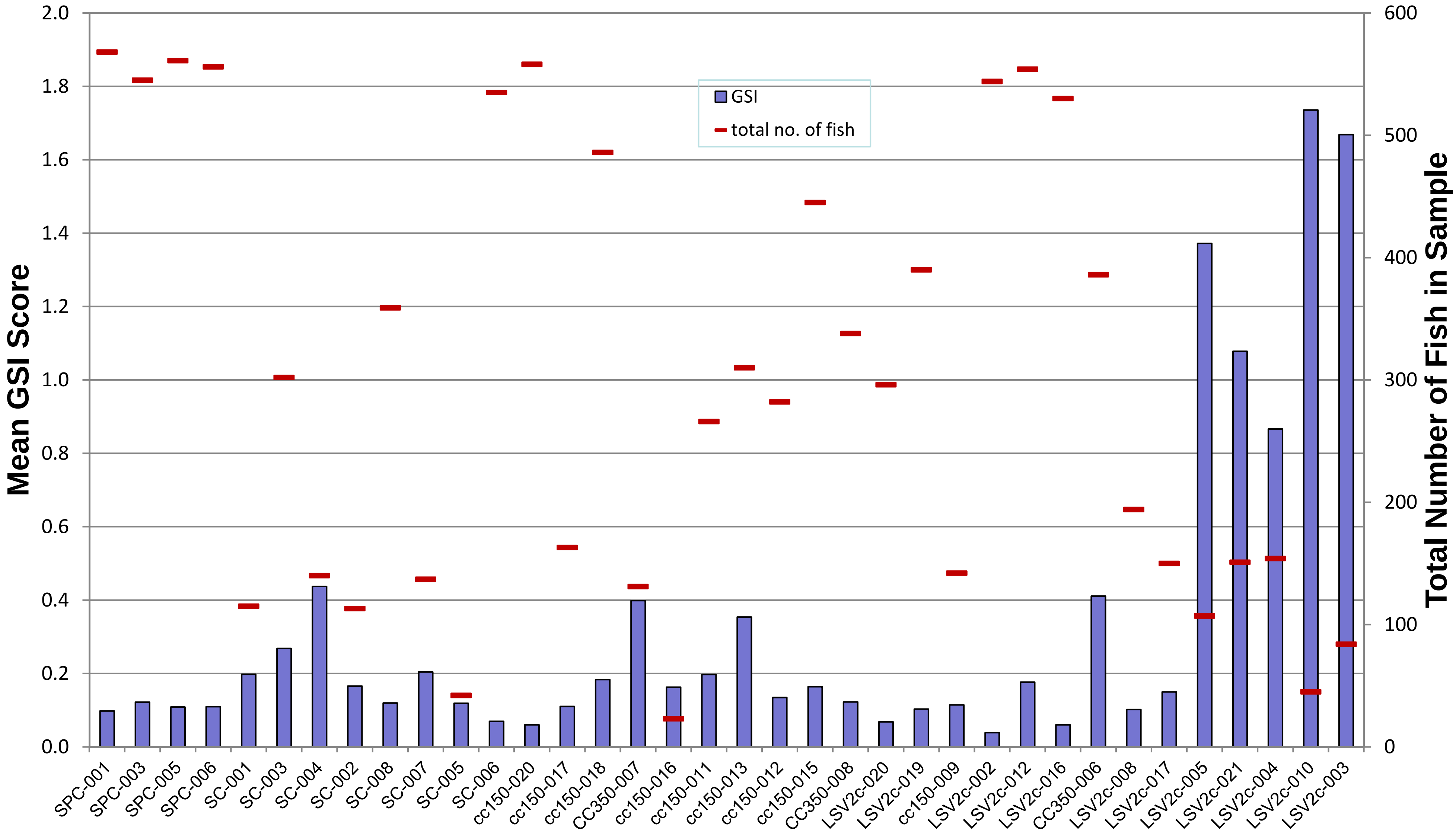


Note: The order of locations, as represented on the X axis, is in order of egg selenium concentration.

**Figure 23**
**Mean GSI Score and Total Number of Fish Evaluated by Location and Sample ID Ranked by Egg selenium Concentration**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
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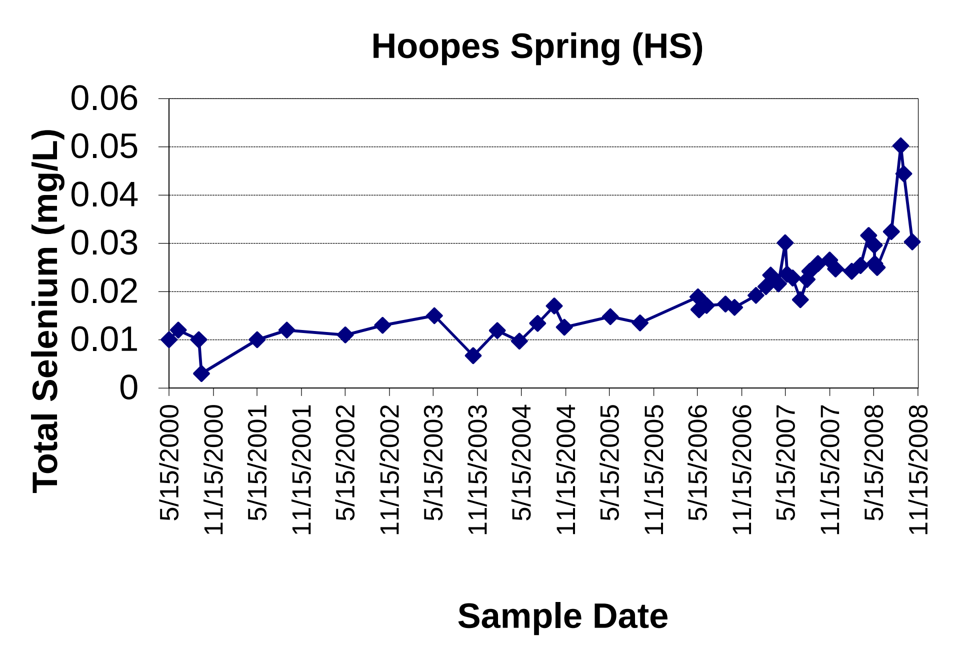


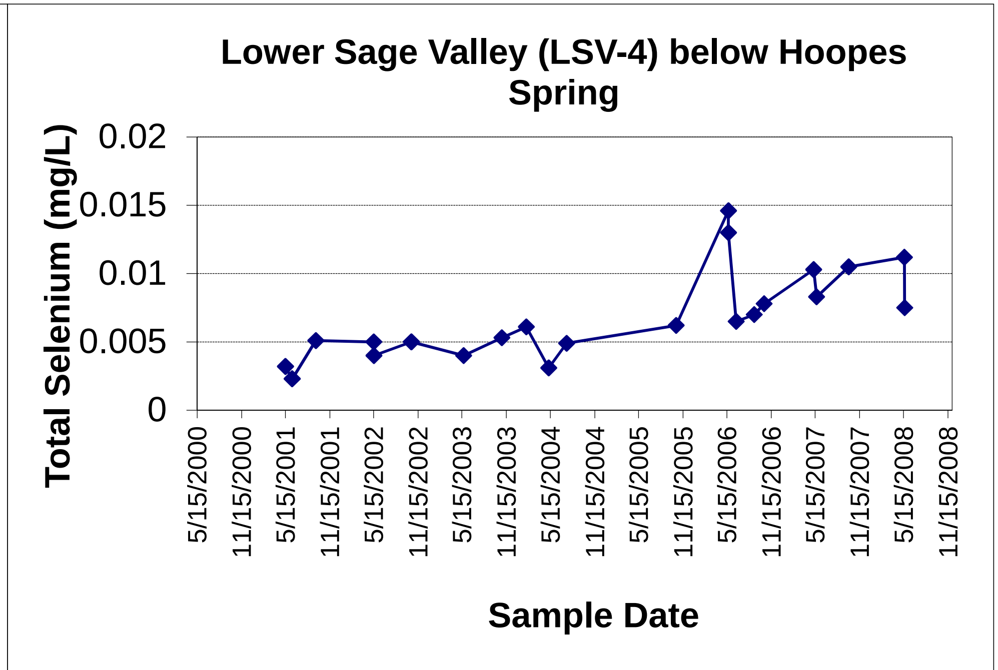


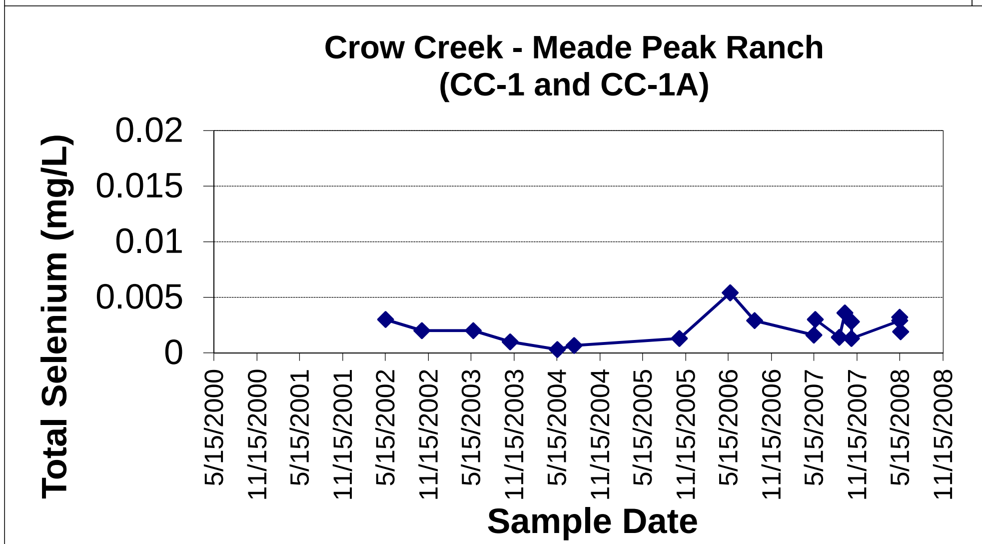


**Figure 24**
**Surface Water Selenium Concentrations**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 |
| REV: 1 | BY: SMC CHK: SMC |

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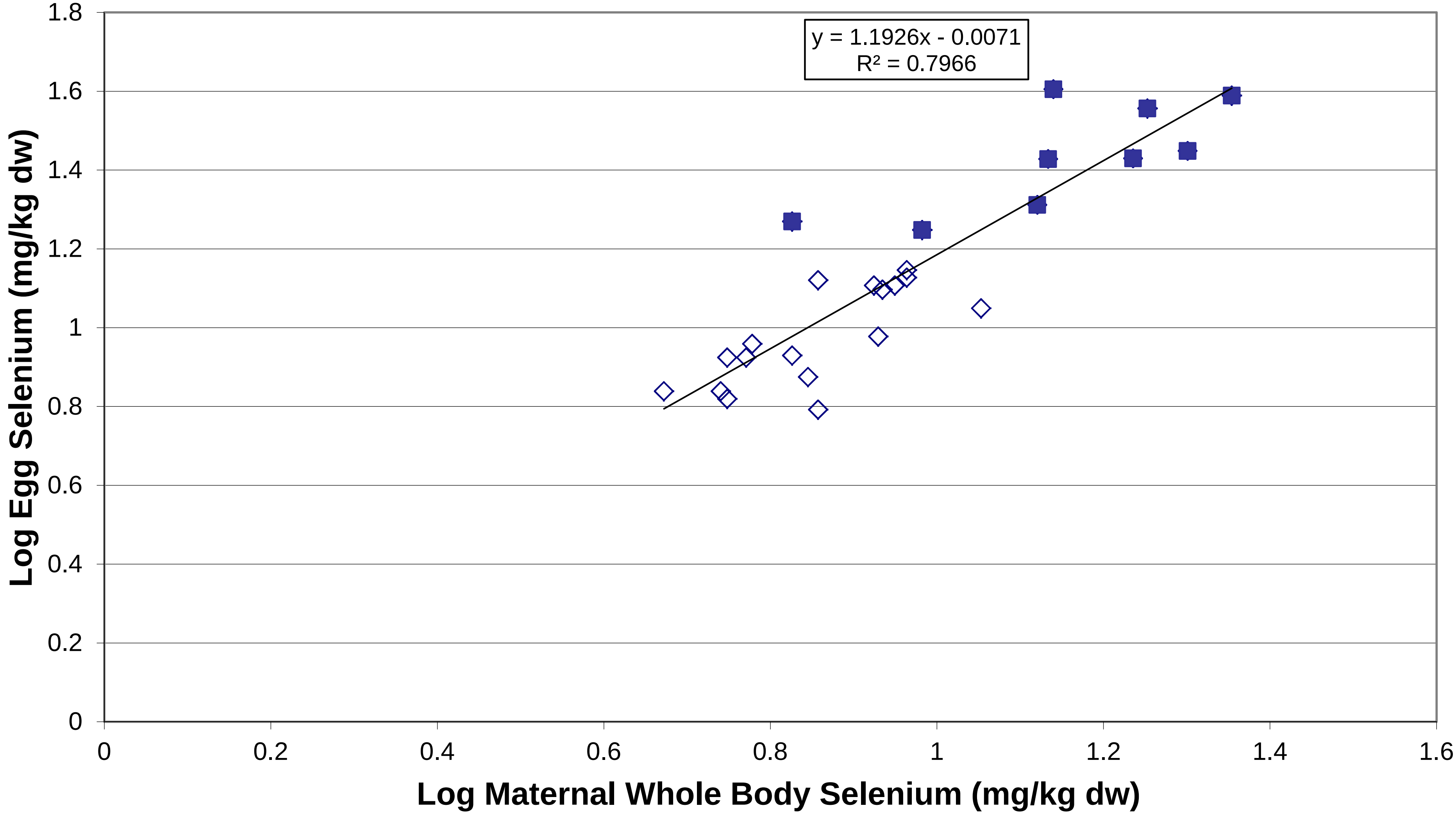


**Figure 25**
**Log Maternal Whole Body Selenium Concentration (Wild Fish) Versus Log Egg Selenium Concentrations**

| | | |
|---|---|---|
| **J.R. Simplot Company** Site-Specific Selenium Criterion | | |
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

FORMATION ENVIRONMENTAL

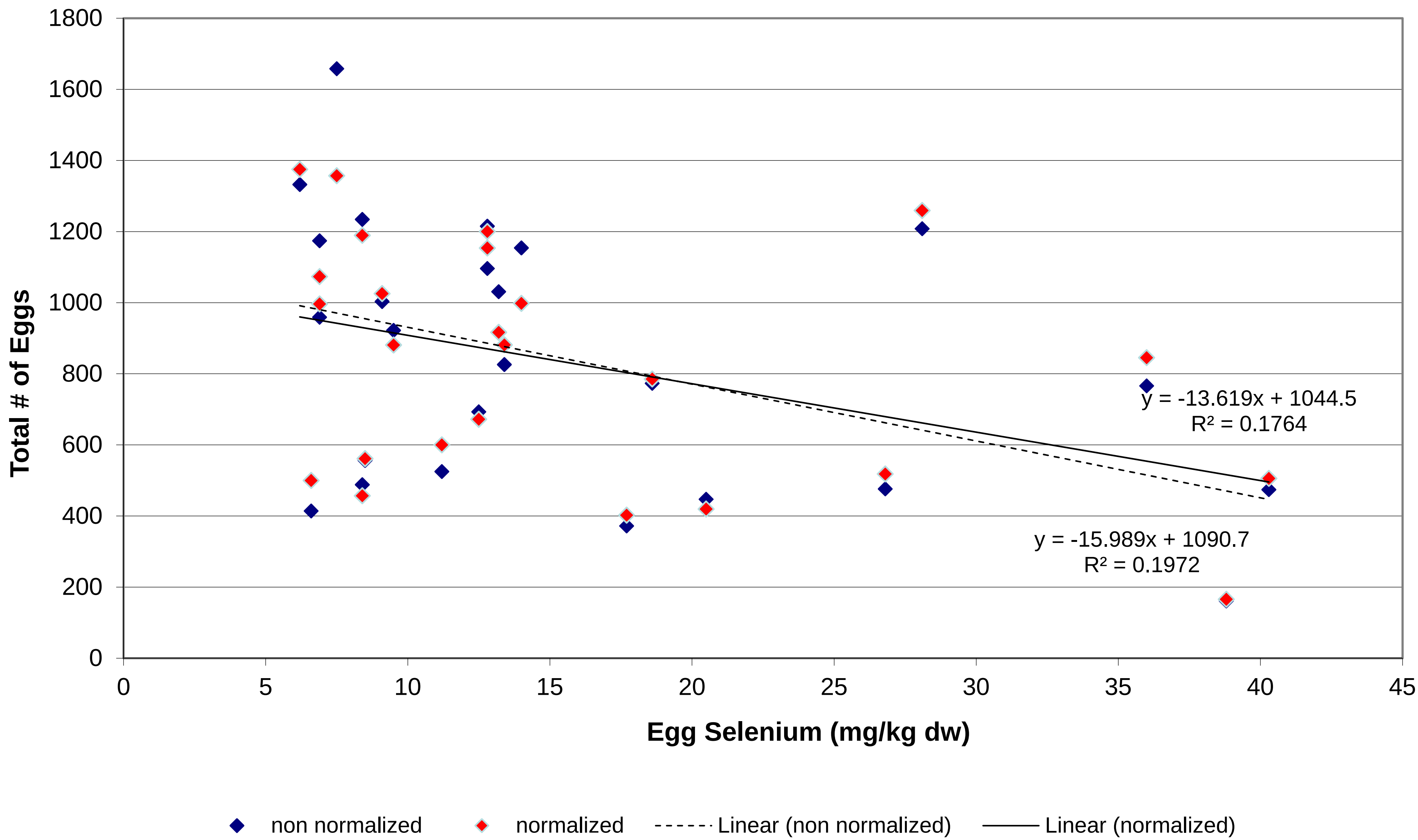


**Figure 26**
**Egg Selenium Concentration Versus**
**Total Egg Abundance from Wild Female Fish**

| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
|---|---|---|
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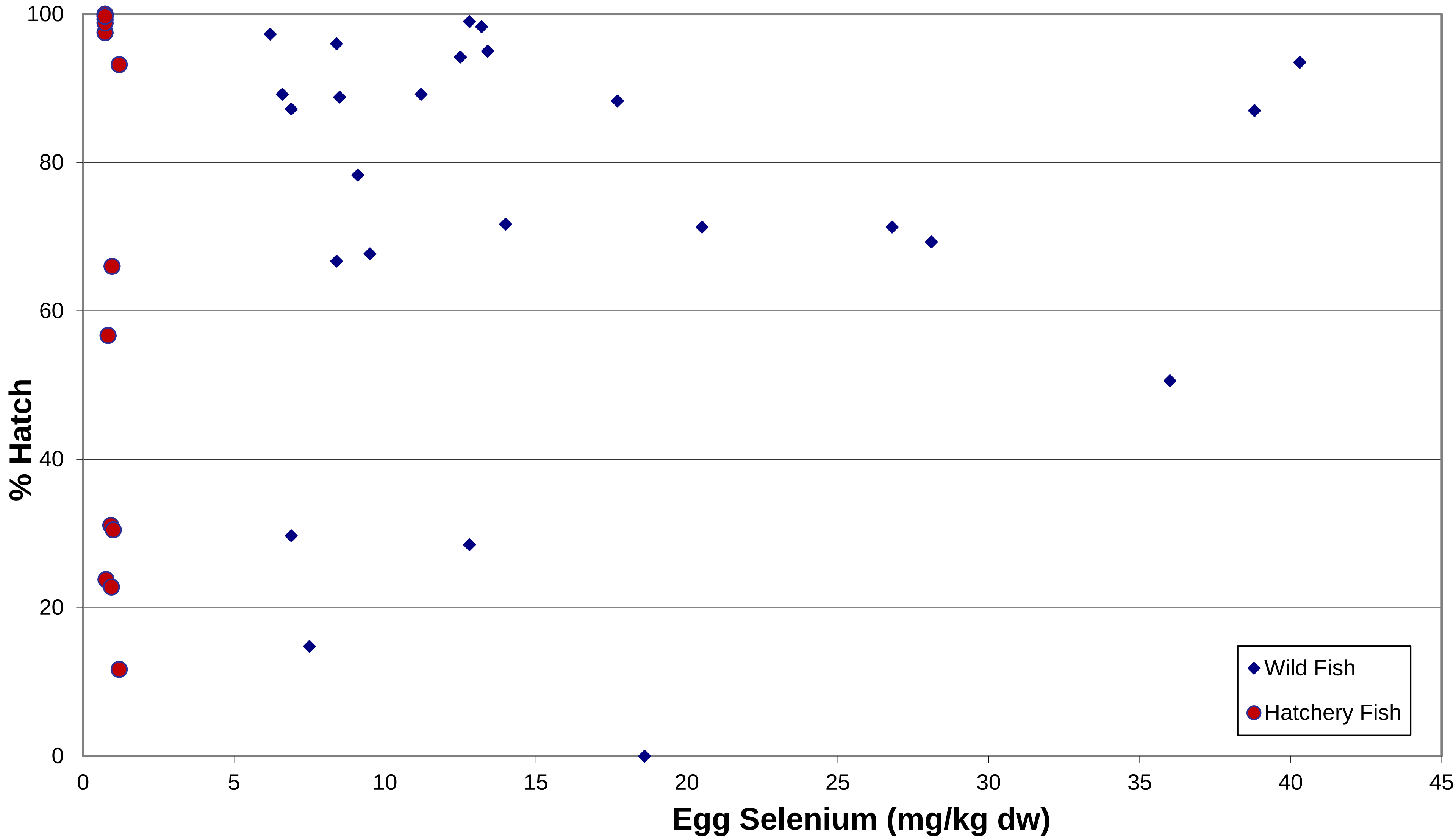


**Figure 27**
**Egg Selenium Concentration Versus**
**Percent of Brown Trout Fry that Hatched**

| | | |
|---|---|---|
| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
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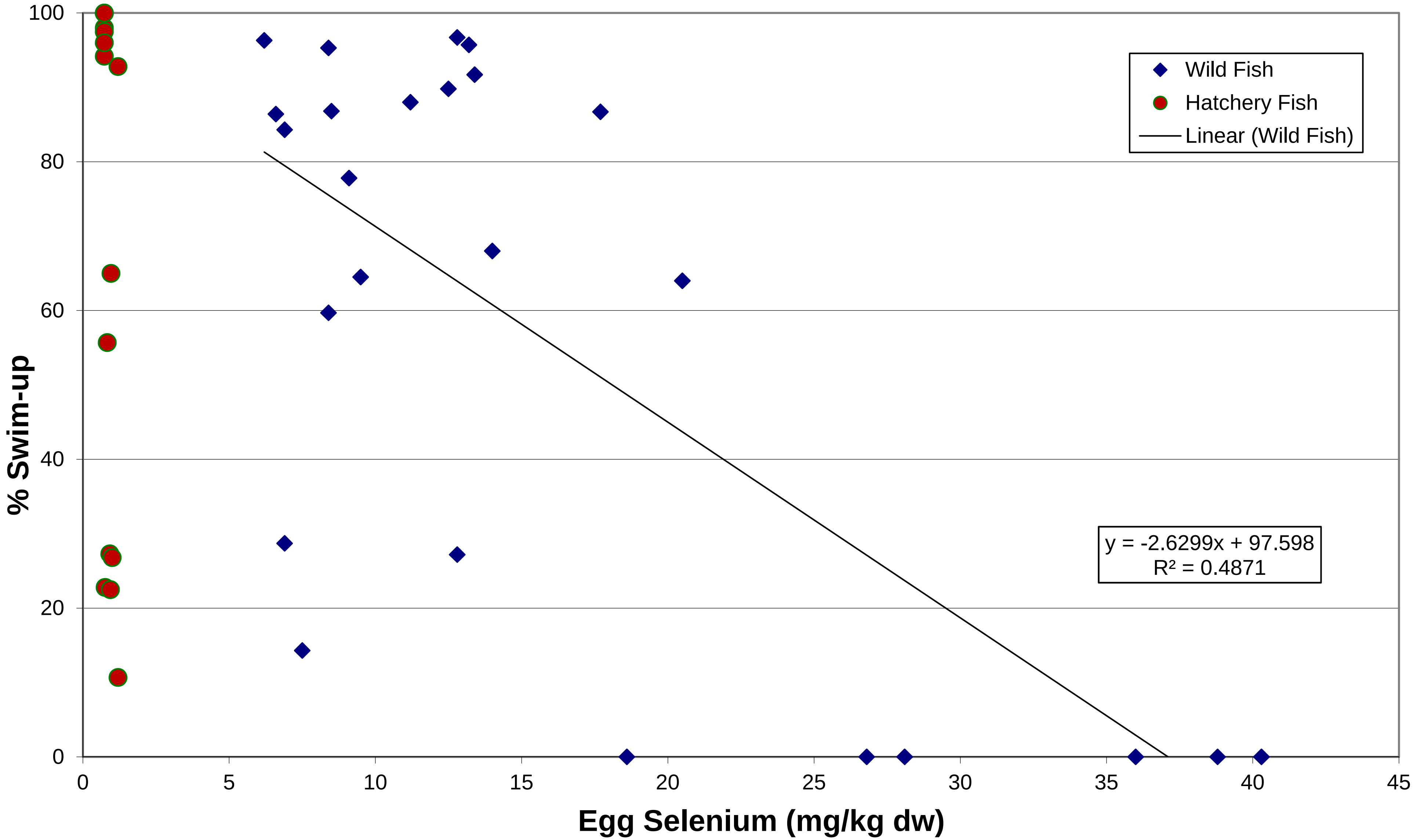


**Figure 28**
**Wild Fish Egg Selenium Concentration Versus**
**Percent of Trout Achieving Swim-Up**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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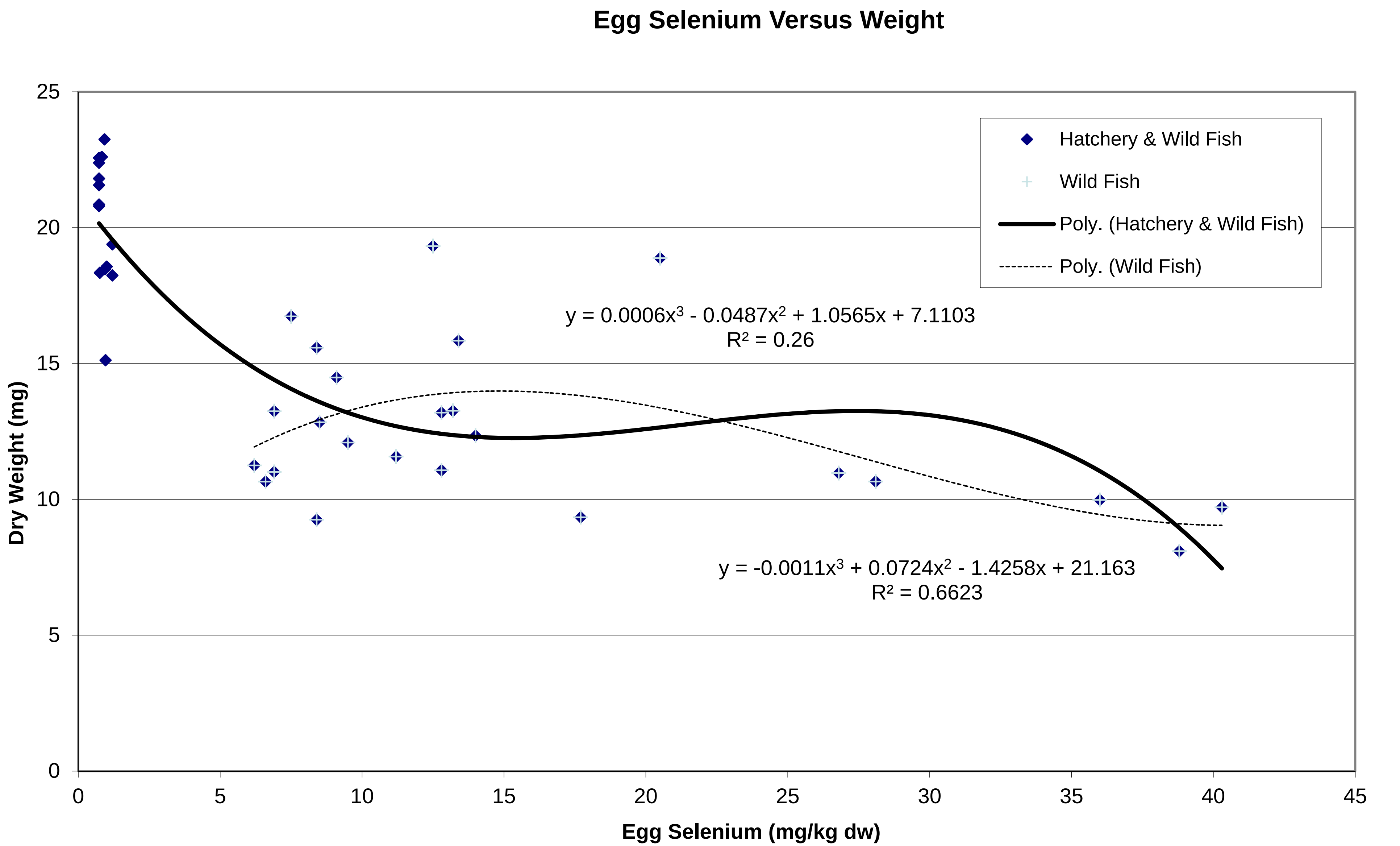


**Figure 29**
**Egg Selenium Concentration Versus Larval Fish Weight**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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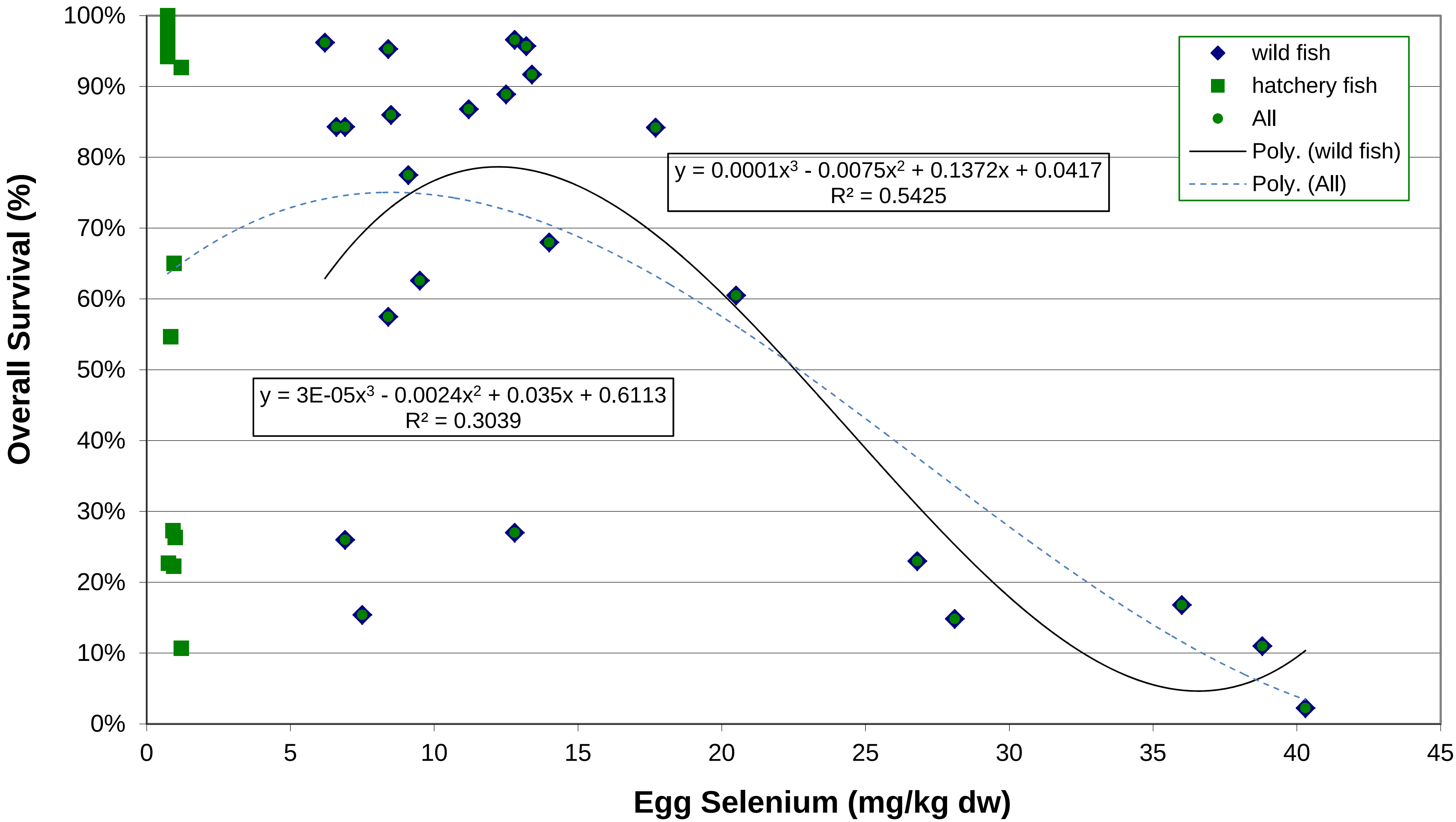


**Figure 30**
**Egg Selenium Concentration Versus Overall Percent Survival**

| | |
|---|---|
| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | |
| PRJ: 0442-004-900.70 | DATE: June 2011 |
| REV: 1 | BY: SMC / CHK: SMC |

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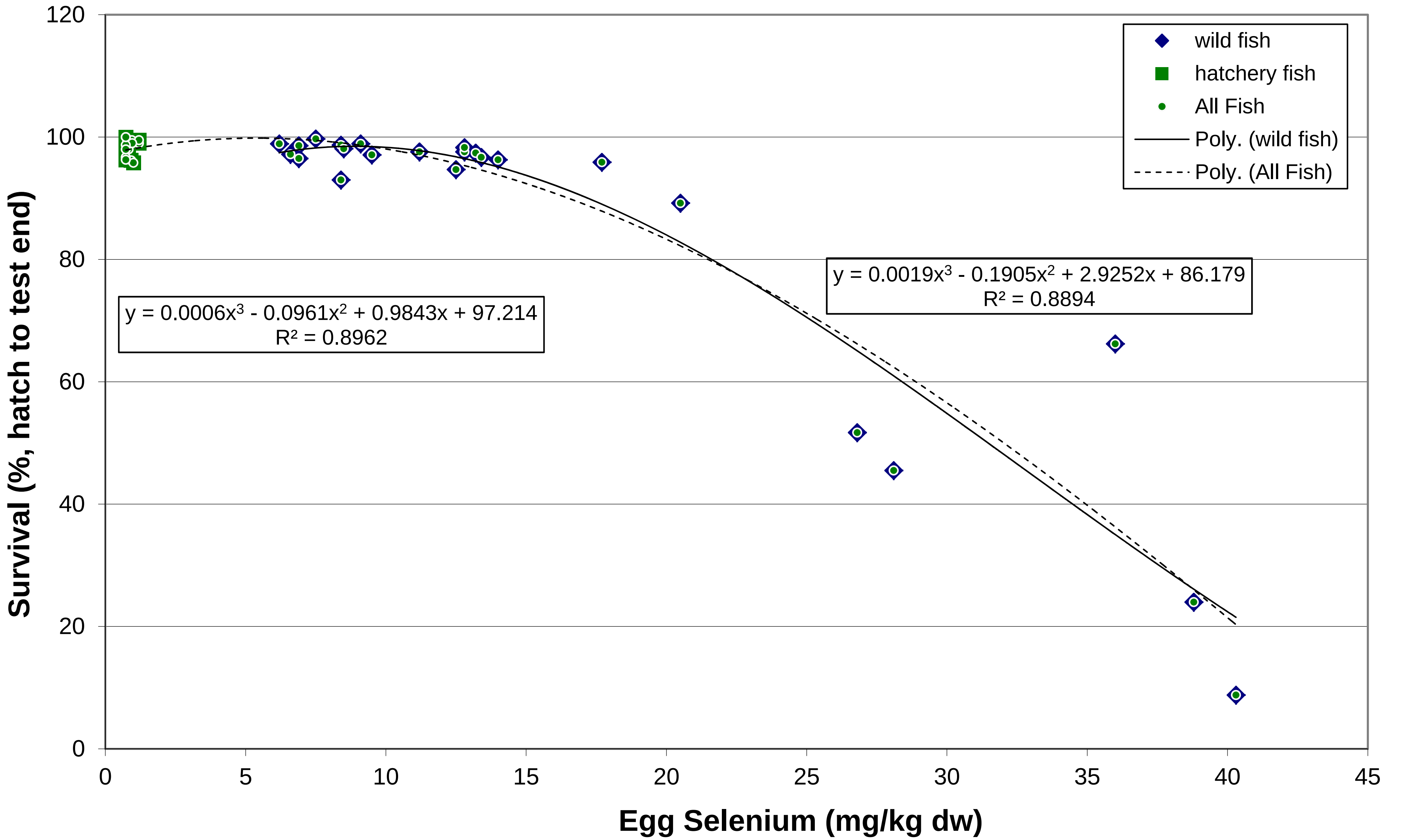


**Figure 31**
**Egg Selenium Concentration Versus**
**Percent Survival (Hatch to Test End)**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

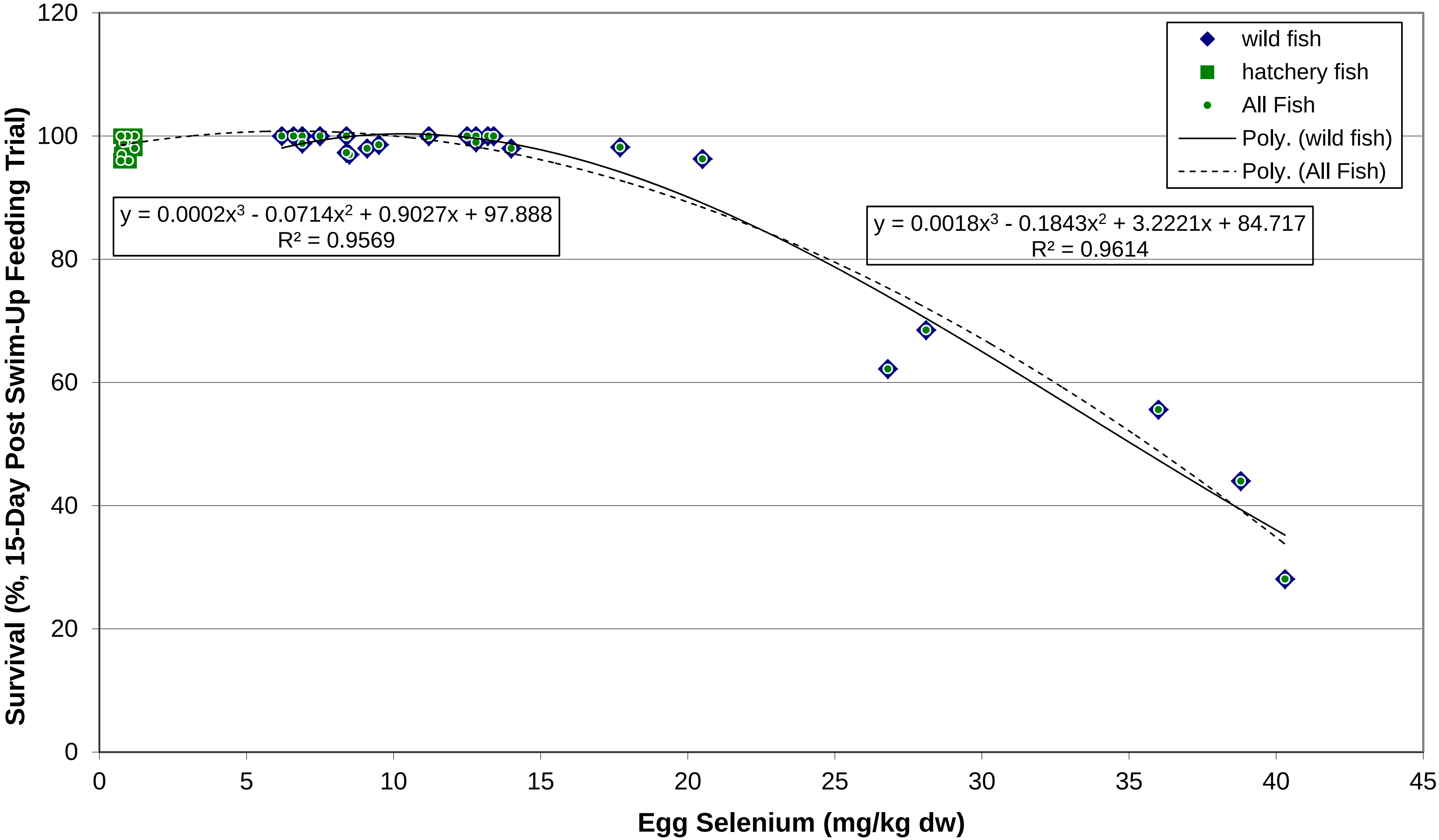


**Figure 32**
**Egg Selenium Concentration Versus**
**Percent Survival in the 15-Day Post Swim-Up Feeding Trial**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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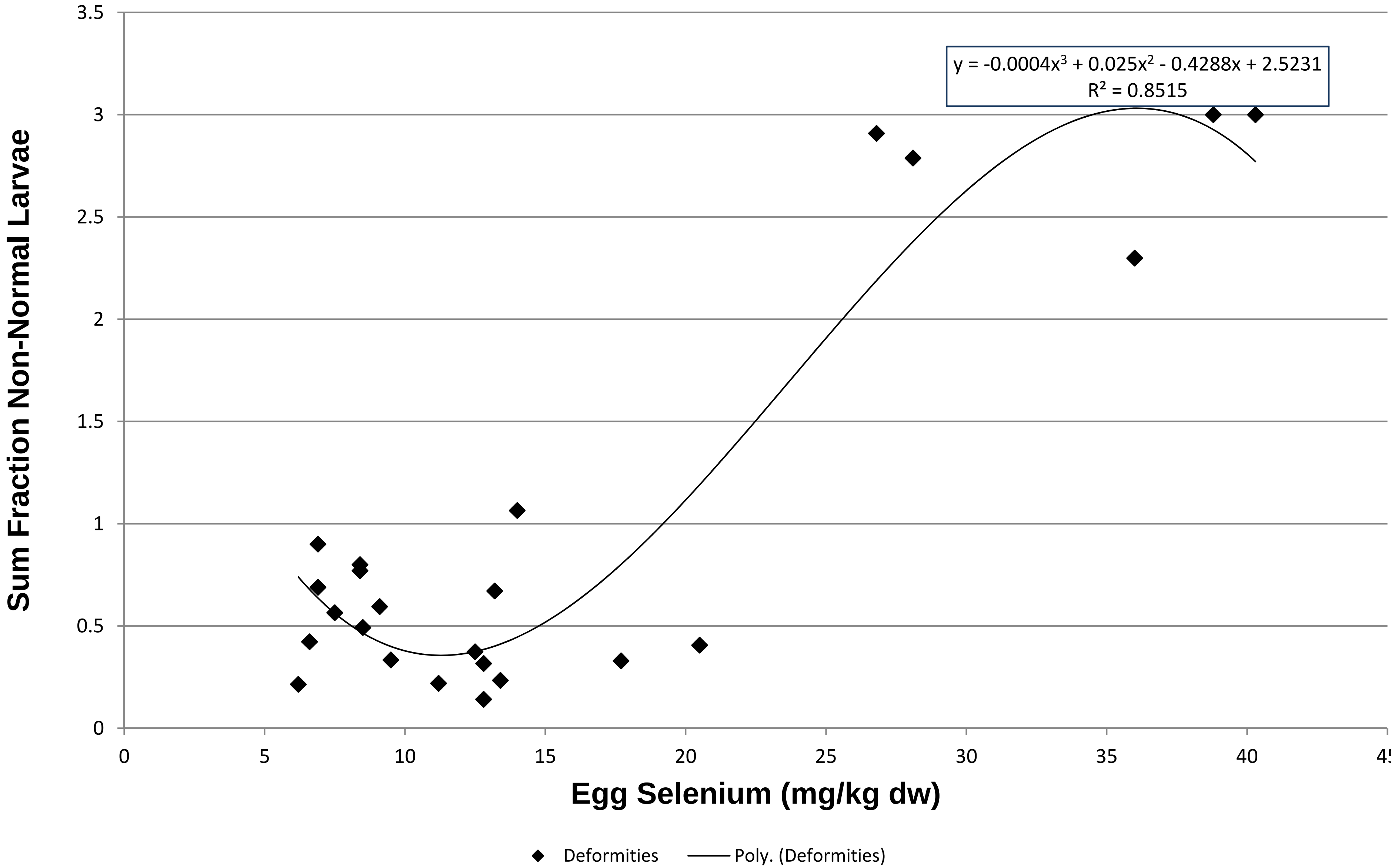


**Figure 33**
**Egg Selenium Concentration Versus**
**Sum Fraction Non-Normal Larvae**

| | | |
|---|---|---|
| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

FORMATION ENVIRONMENTAL

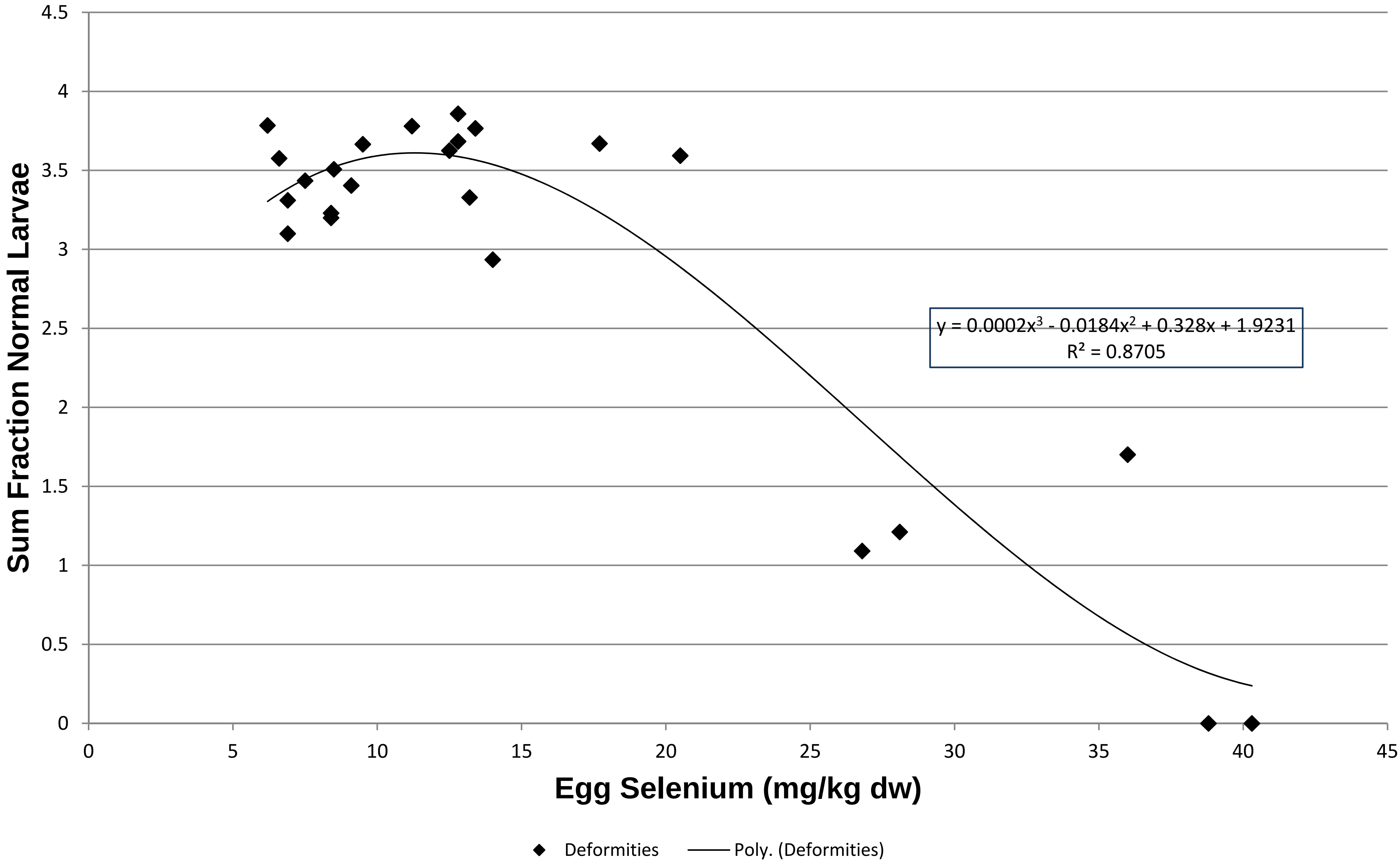


**Figure 34**
**Egg Selenium Concentration Versus**
**Sum Fraction Normal Larvae**

| | | |
|---|---|---|
| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |
| FORMATION ENVIRONMENTAL | | |

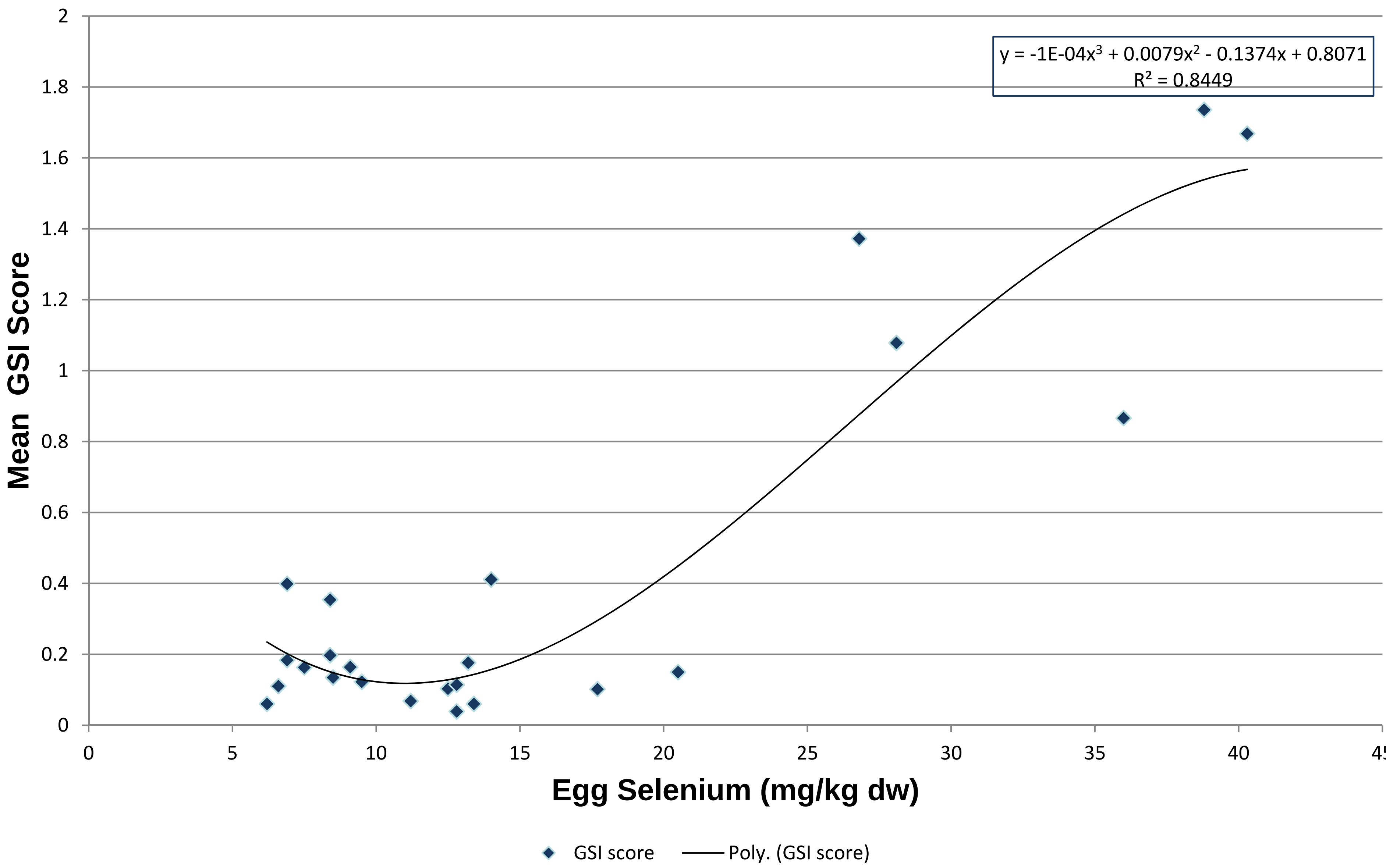


**Figure 35**
**Egg Selenium Concentration Versus**
**Mean GSI Score**

| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |
| FORMATION ENVIRONMENTAL | | |

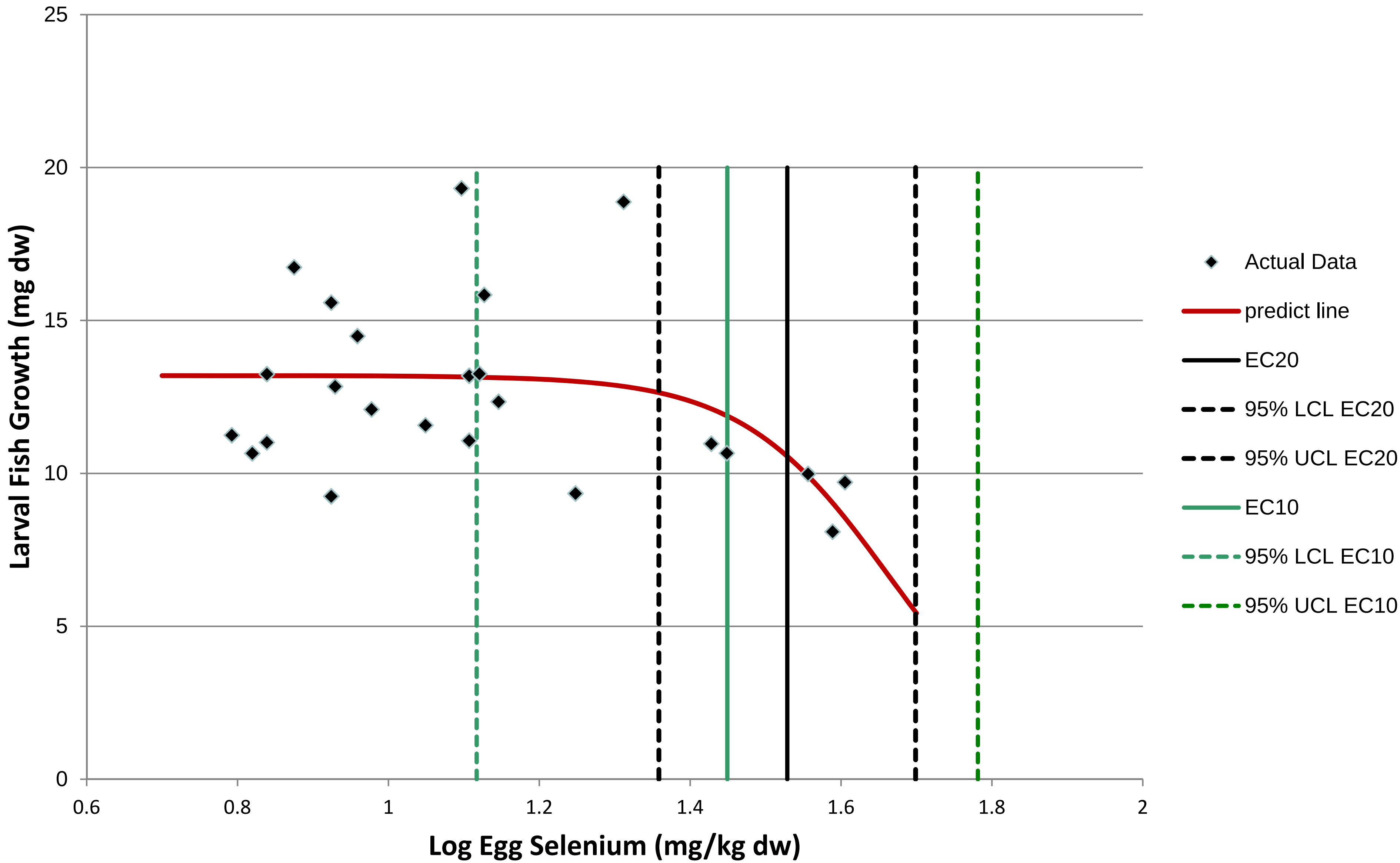


**Figure 36**
**TRAP Model**
**Egg Selenium Concentration Versus Larval Fish Growth**
**15-Day Post Swim-Up Feeding Trial**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| PRJ: 0442-004-900.70 | DATE: June 2011 | |
|---|---|---|
| REV: 1 | BY: SMC | CHK: SMC |

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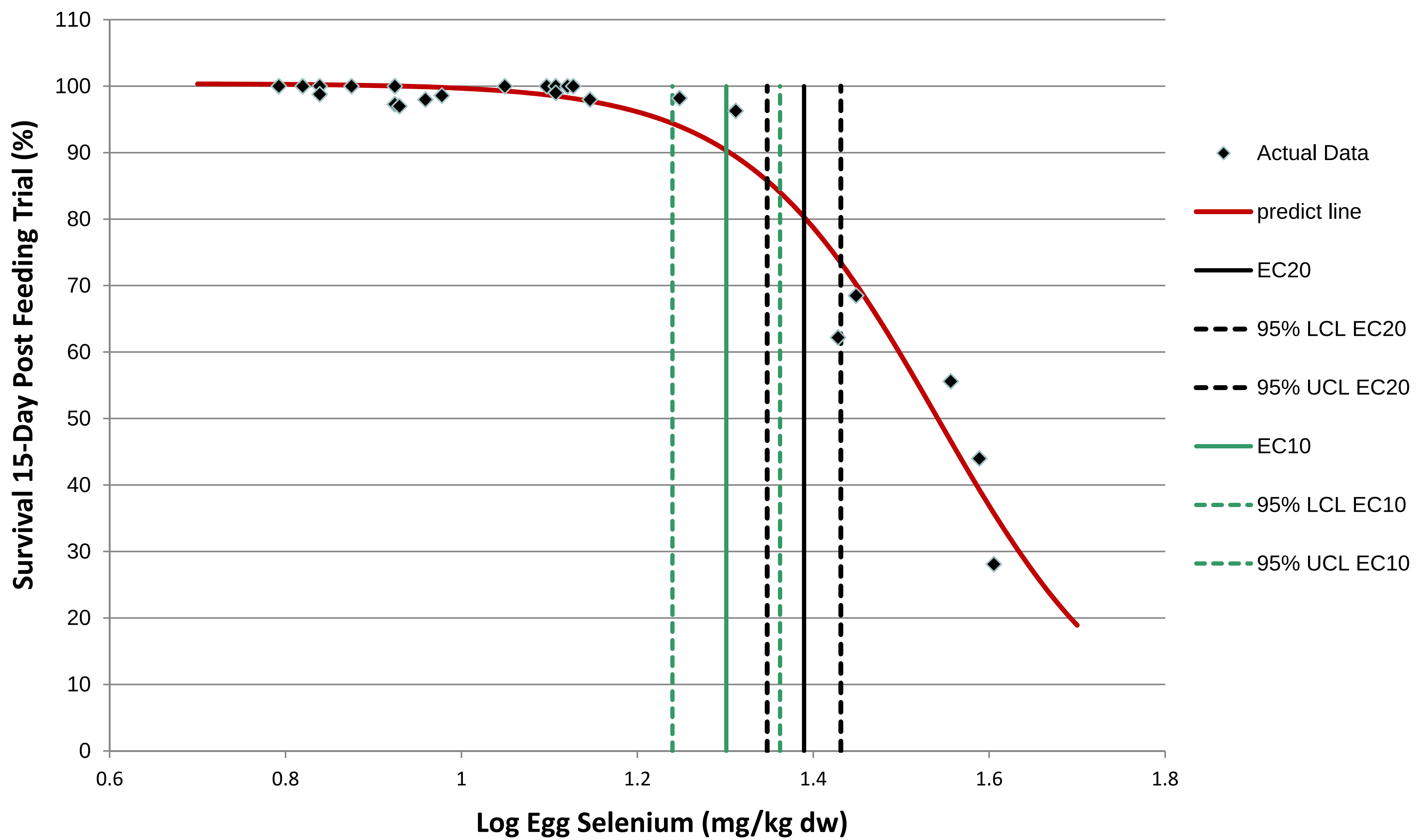


**Figure 37**
**TRAP Model**
**Egg Selenium Concentration Versus Survival**
**15-Day Post Swim-Up Feeding Trial**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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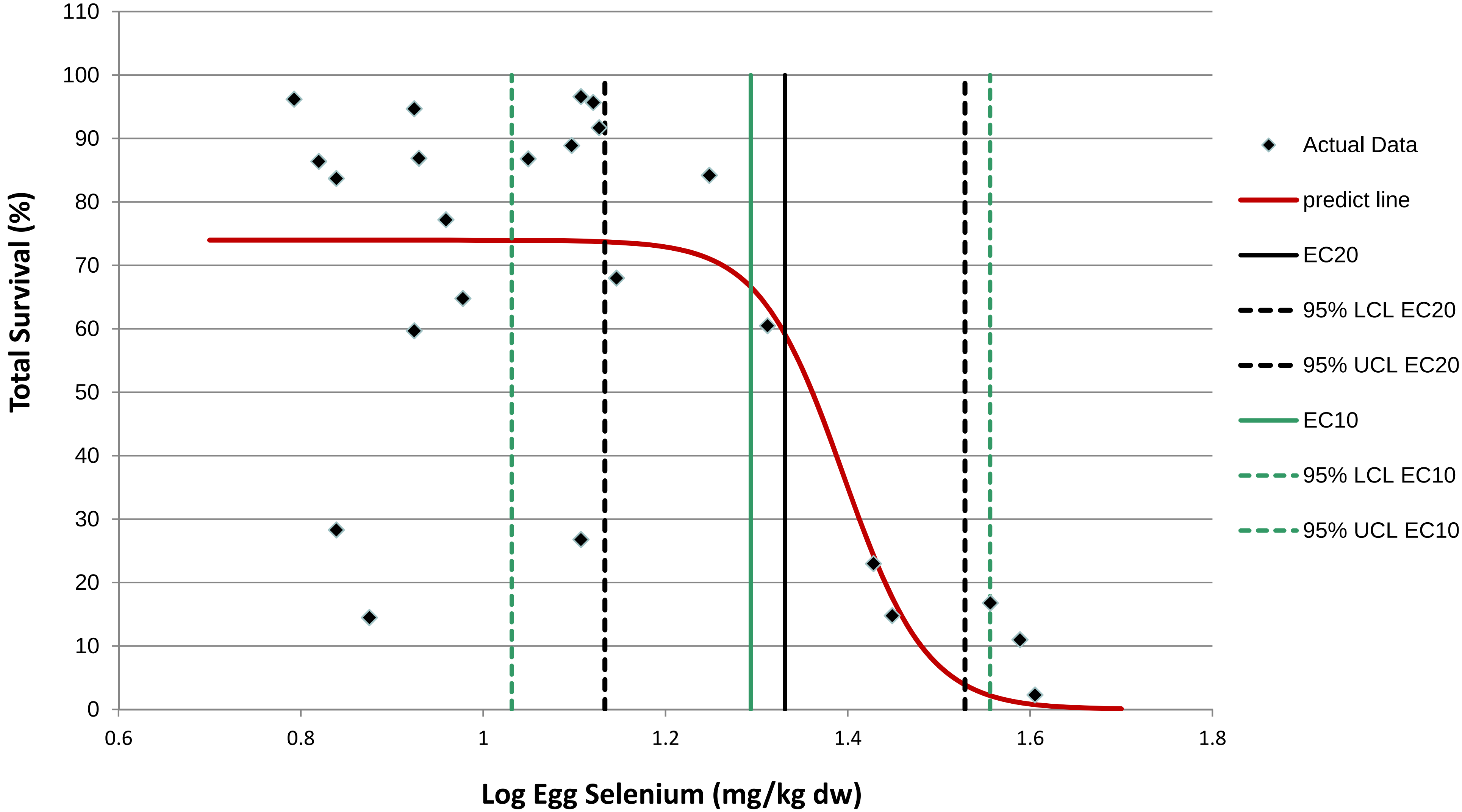


**Figure 38**
**TRAP Model**
**Egg Selenium Concentration Versus Total Survival**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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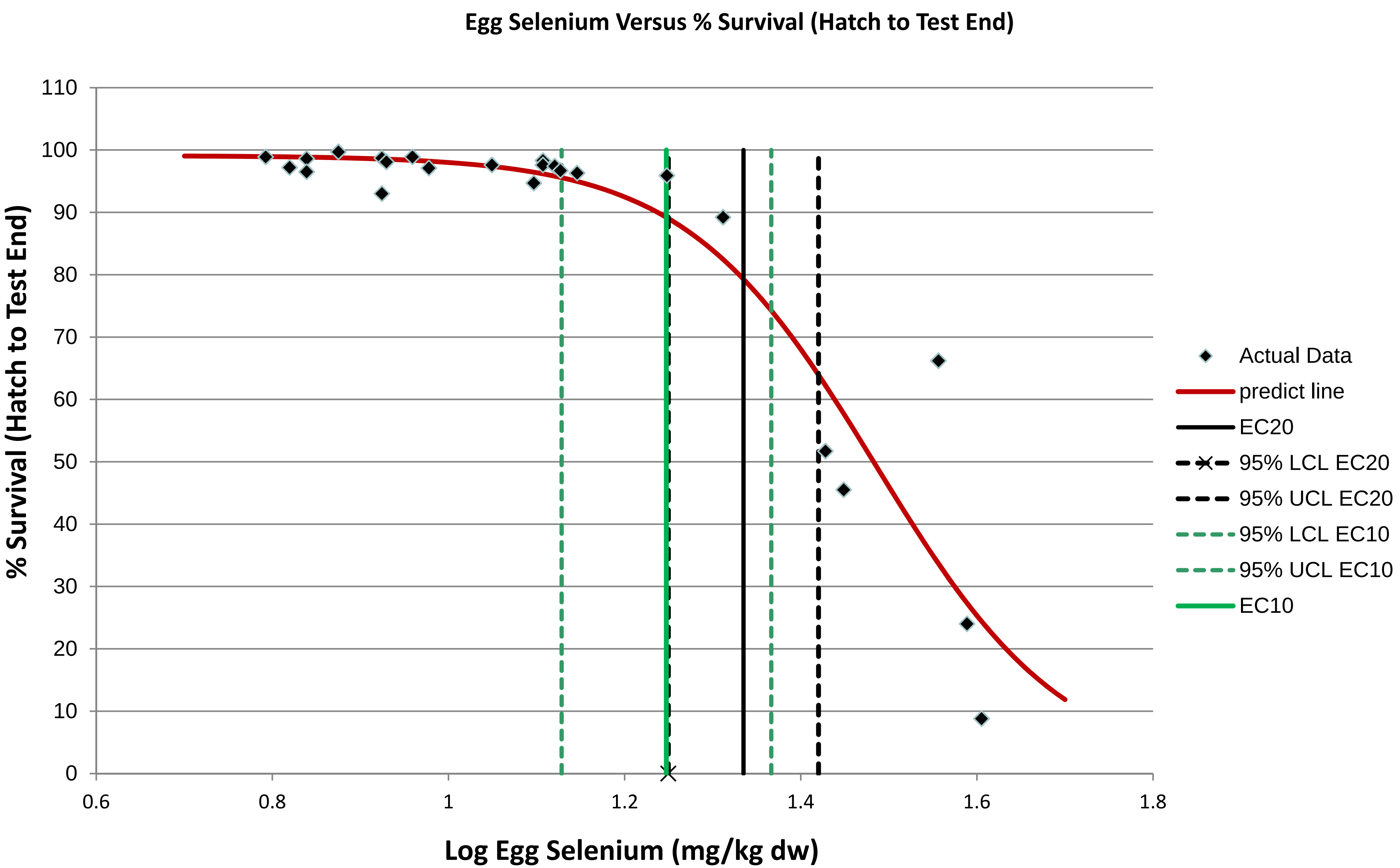


**Figure 39**
**TRAP Model**
**Egg Selenium Concentration Versus Percent Survival**
**(Hatch to Test End)**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| PRJ: 0442-004-900.70 | DATE: June 2011 | |
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| REV: 1 | BY: SMC | CHK: SMC |

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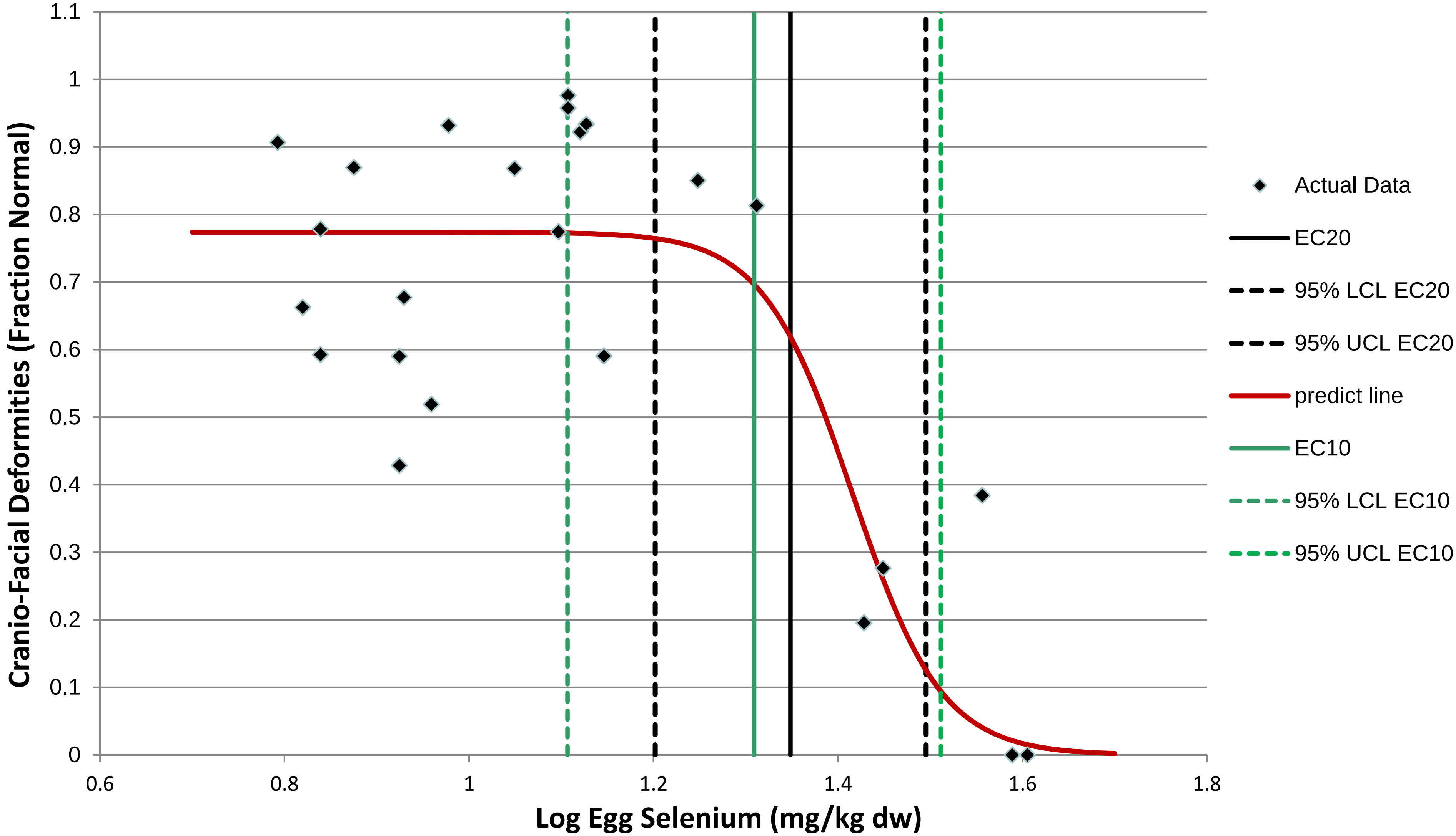


**Figure 40**
**TRAP Model**
**Egg Selenium Concentration Versus**
**Cranio-Facial Deformities (Fraction Normal)**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 |
| REV: 1 | BY: SMC CHK: SMC |

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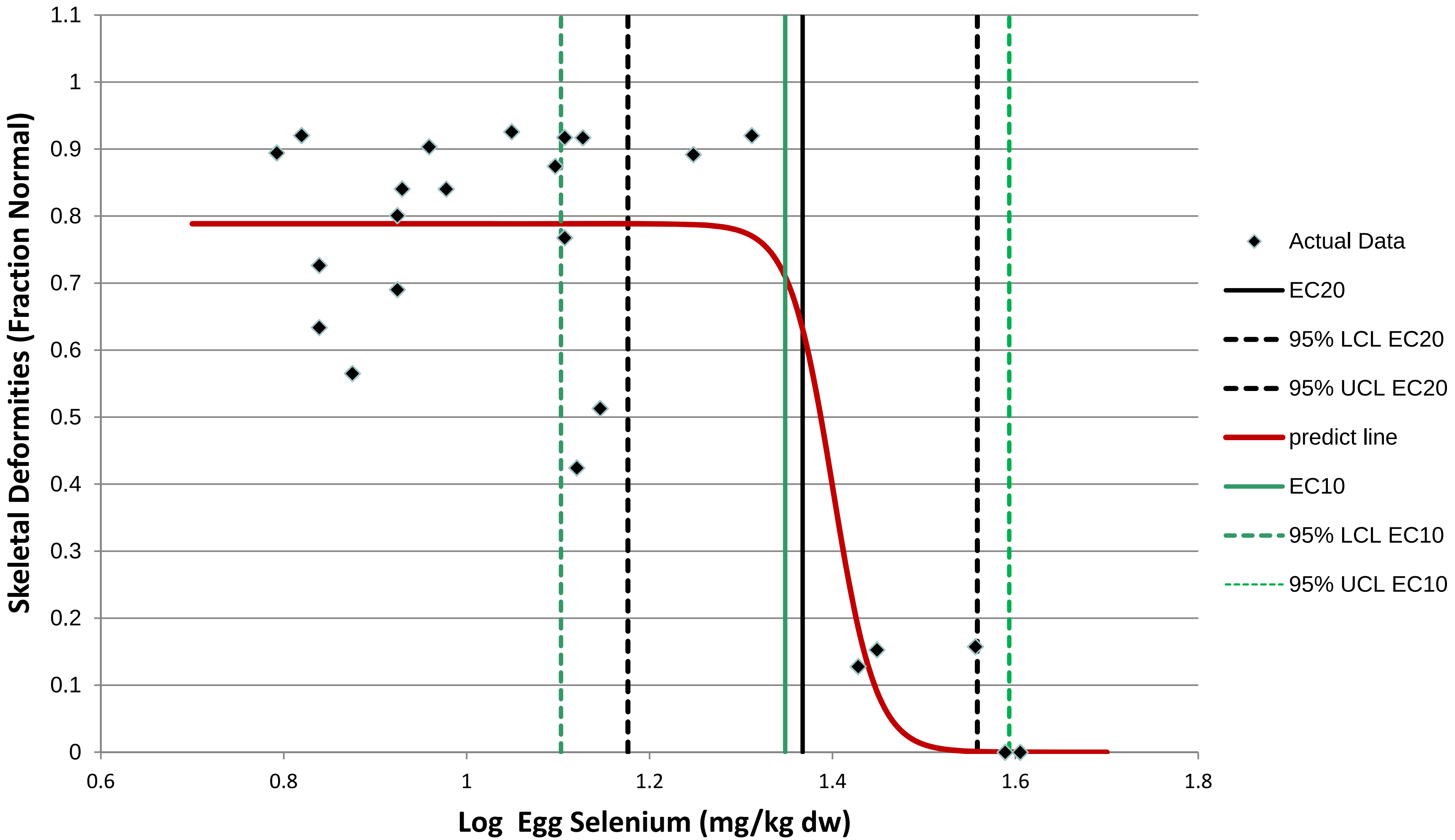


**Figure 41**
**TRAP Model**
**Egg Selenium Concentration Versus**
**Skeletal Deformities (Fraction Normal)**

| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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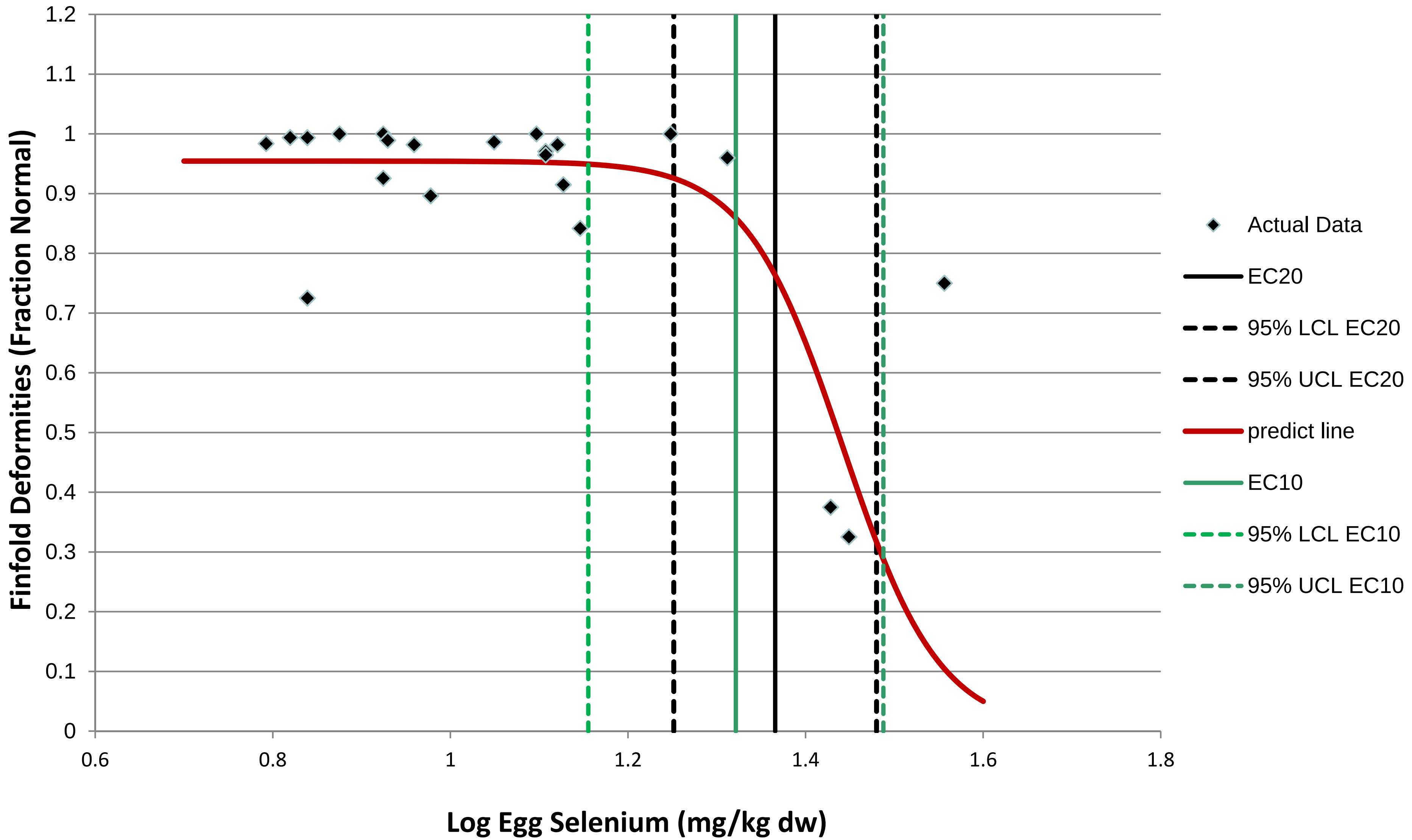


**Figure 42**
**TRAP Model**
**Egg Selenium Concentration Versus**
**Finfold Deformities (Fraction Normal)**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| PRJ: 0442-004-900.70 | DATE: June 2011 | |
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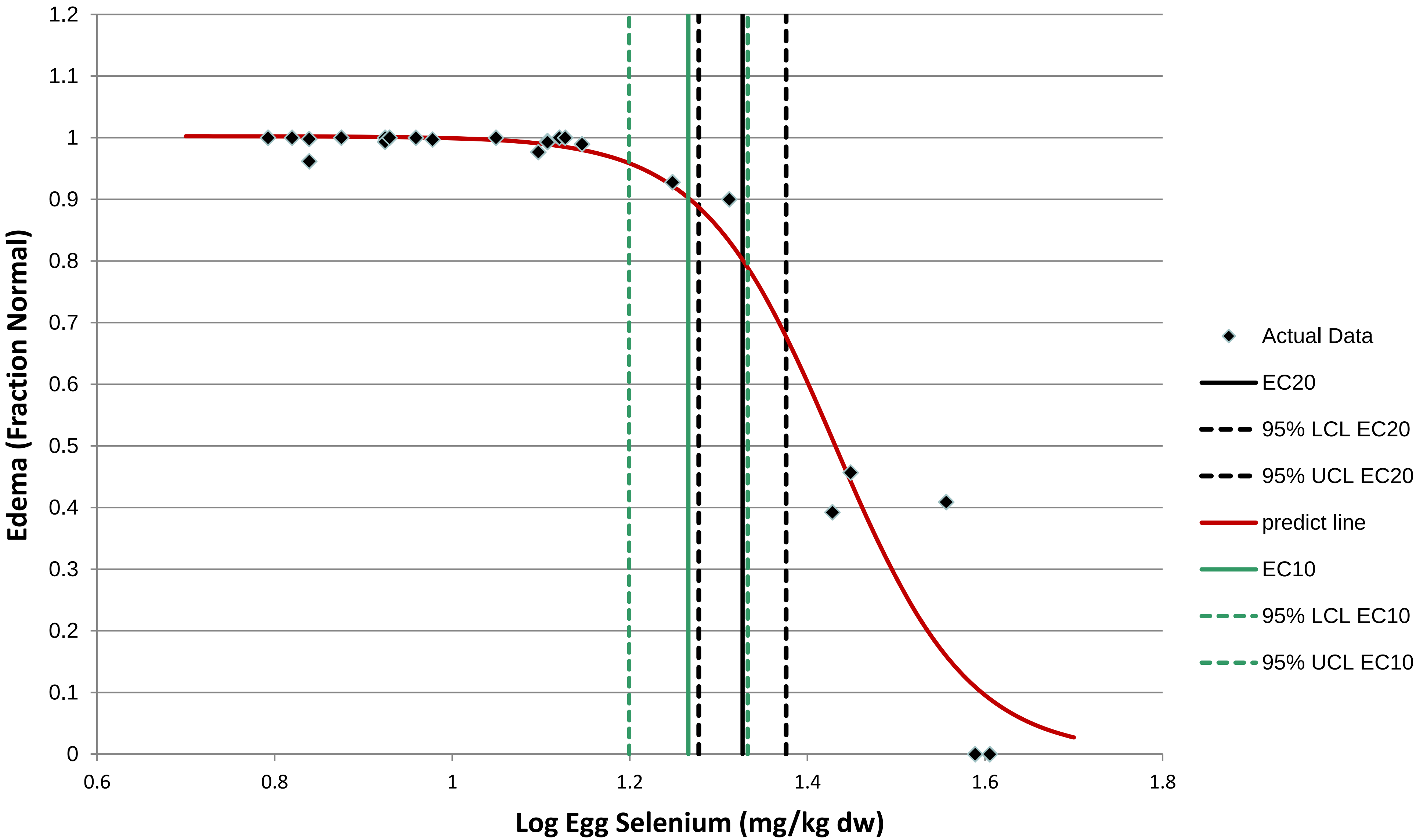


**Figure 43**
**TRAP Model**
**Egg Selenium Concentration Versus**
**Edema (Fraction Normal)**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

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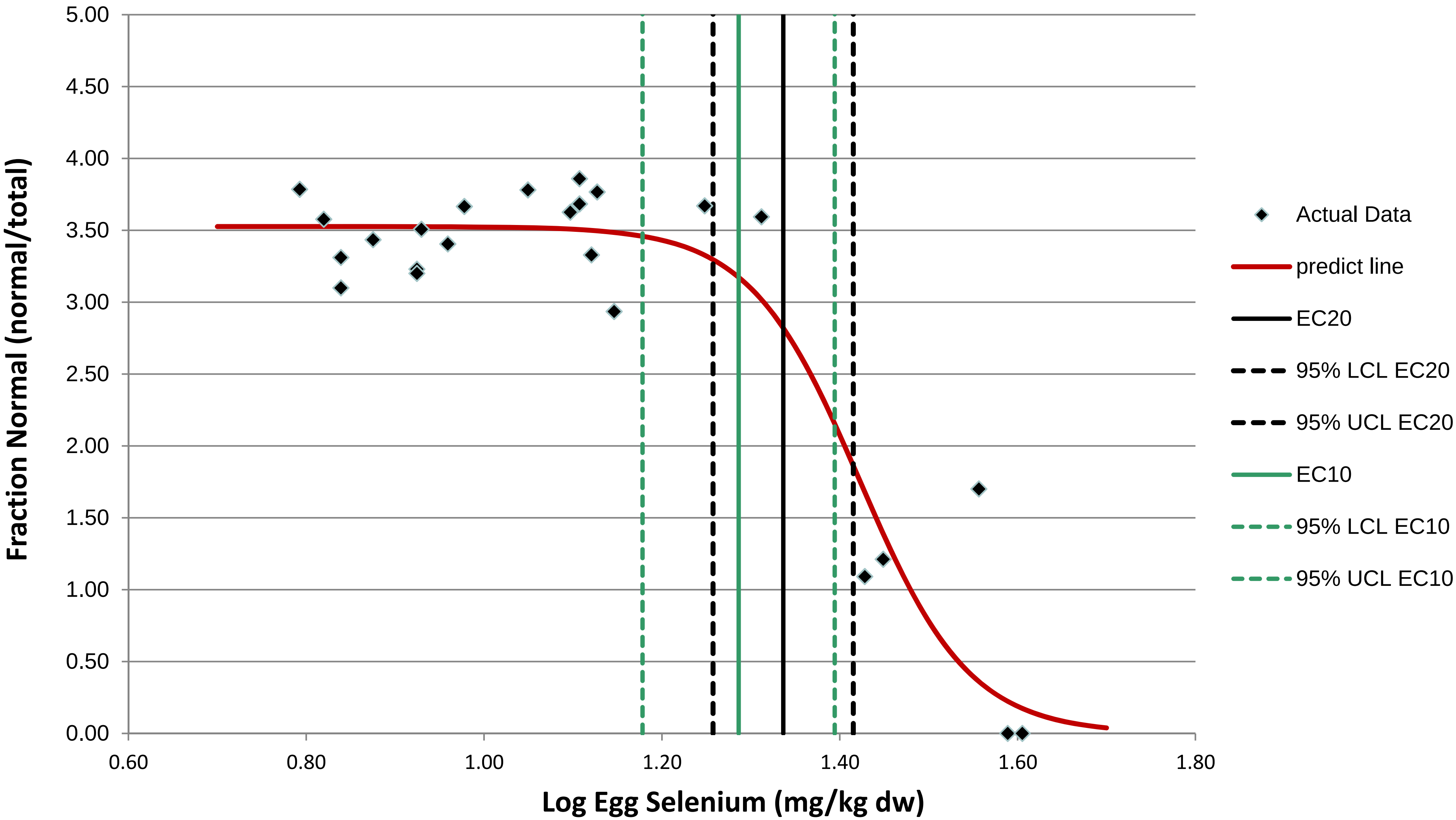


**Figure 44**
**TRAP Model**
**Egg Selenium Concentration Versus Sum Fraction Normal Fish Larvae**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

FORMATION ENVIRONMENTAL

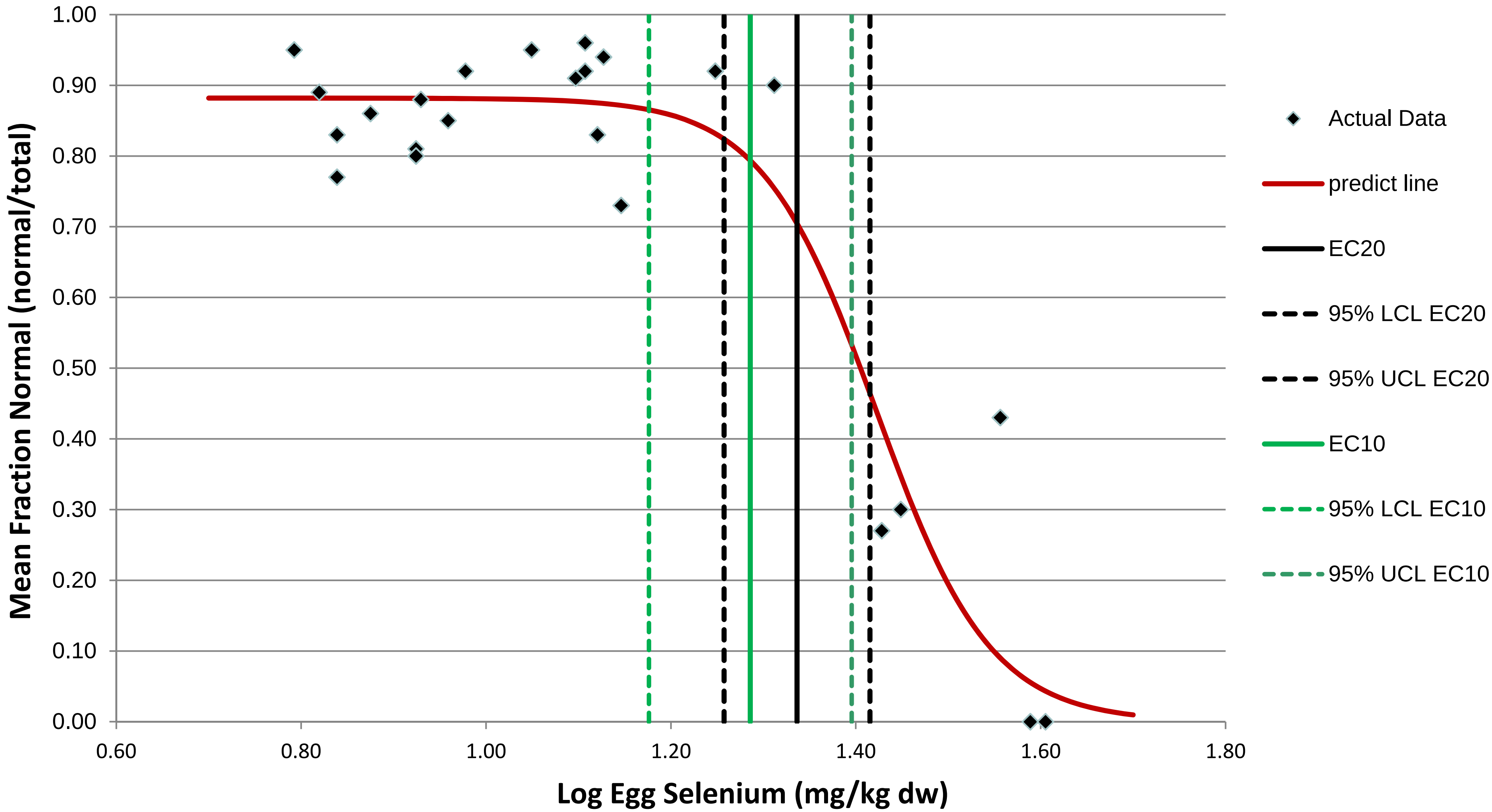


**Figure 45**
**TRAP Model**
**Egg Selenium Concentration Versus**
**Mean Fraction Normal Fish Larvae**

| **J.R. Simplot Company**<br>Site-Specific Selenium Criterion | | |
|---|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 | |
| REV: 1 | BY: SMC | CHK: SMC |

FORMATION ENVIRONMENTAL

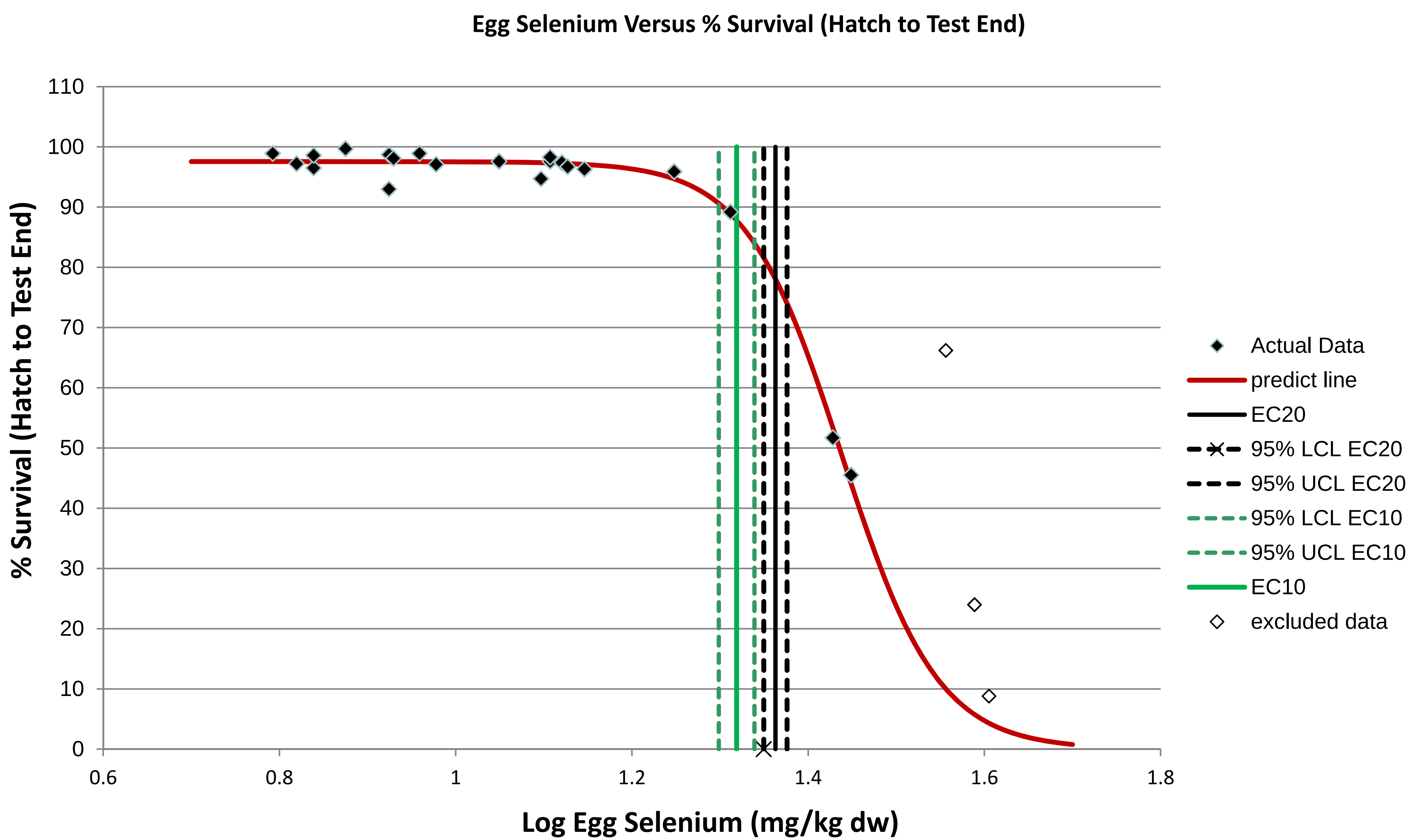


**Figure 46**
**Revised TRAP Model**
**Egg Selenium Concentration Versus**
**Percent Survival (Hatch to Test End)**

**J.R. Simplot Company**
Site-Specific Selenium Criterion

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: June 2011 |
| REV: 1 | BY: SMC / CHK: SMC |

FORMATION ENVIRONMENTAL

APPENDIX A

Data Report-Reproductive Success Study with Brown Trout *(Salmo trutta)*-ENSR

Prepared for:
**JR Simplot Company and Newfields Company, LLC.**
**Pocatello, Idaho**




# Data Report

# Reproductive Success Study with Brown Trout (*Salmo trutta*)

## Final

October 2011

ENSR | AECOM

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# 1.0 Introduction

A study of brown trout (*Salmo trutta*) reproduction was conducted by Newfields for the JR Simplot Company to evaluate the parental transfer of selenium on the potential effects to offspring. ENSR's Fort Collins Environmental Toxicology Laboratory (FECTL), Fort Collins, CO was retained to conduct the laboratory biological exposure portions of this study according to the study design plan outlined in the Technical Memorandum – Methods for Testing Adult Brown Trout Reproductive Success (Newfields 2007). An assessment of larval trout deformities was performed by Dr. Kevin Bestgen at Colorado State University's Larval Fish Laboratory, which is described in a separate document. This report presents the results / data from the laboratory portion of this work.

# 2.0 Methods

ENSR FCETL personnel joined the Newfields team during the November 2007 sampling trip and provided assistance with fish collection, egg fertilization, and transport of egg samples to the laboratory. The time sensitive nature of transporting fertilized eggs from remote areas to the laboratory required integration of laboratory and field staff in this effort and near immediate transport of the samples to the laboratory.

Hatchery fish and gametes were obtained from Saratoga National Fish Hatchery (Saratoga, WY). A second set of hatchery fish were obtained in December 2007. This second batch of hatchery fish were later obtained (as eyed-eggs) from Spring Creek Trout Hatchery (Lewistown, MT).

Photographs taken at various points during the study are included in Appendix A.

## 2.1 Spawning of Brown Trout

Fertilization techniques for hatchery fish were slightly different from those of the field collected fish because of problems encountered with the SC hatchery eggs (lower than expected survival rates of eggs). ENSR engaged various hatchery and fishery personnel for recommendations on the fertilization technique. Based on these recommendations, the field methods were altered to fertilize eggs in the field instead of bringing the individually collected gametes under oxygen back to the laboratory and mixing them to achieve fertilization.

### 2.1.1 Hatchery Trout

Hatchery fish and gametes were obtained from Saratoga National Fish Hatchery, Saratoga, WY (courtesy of Lee Bender) on October 23, 2007. Throughout this study, fish from this hatchery are identified as SC. Because hatchery fish were obtained when they were ripe, which occurred prior to when fish were spawning in the field, the initial hatchery fish were obtained approximately 3 week prior to the first field collected fish.

Fertilization techniques for the first set of hatchery fish (SC) methods described by Holm et al. (2005). Eight adult female and eight male trout were anesthetized using tricaine methanesulfonate (MS-222) and stripped by hand (similar to treatment of field fish described below). Eggs from a given female were collected directly into a cleaned plastic pan and then transferred into a plastic bag. Bags were labeled for that individual. Milt from a single male was collected directly into a small plastic bag. Bags were labeled with the individual identifications for each fish and the collection location and date. Prior to transport to the laboratory, all bags with gametes were partially filled with oxygen, sealed, double bagged, and them placed on ice (~4°C) in a cooler to keep gametes cold and out of direct sunlight. A min-max thermometer (Taylor® Digital Wireless Temperature System) was placed into the cooler with eggs to monitor temperature during transit to ENSR. The temperature range during transport of the SC eggs from Saratoga National Fish Hatchery and the FCETL was 6.1 – 9.7°C; with 9.7°C the initial reading when placed into the cooler.

After stripping, the individual adult females (n=8) from the Saratoga National hatchery were collected for determination of total length, weight, percent solids, and whole-body selenium analysis.

Sacrificed adult female trout were placed in large plastic bags, double bagged, and then stored on ice for transport to ENSR. Total length measurements were taken at ENSR prior to freezing samples for shipment to the analytical laboratory for analysis. Wet weight measurements were not measured at the laboratory but were estimated using the wet weight data from CAS and the wet weight data from the field fish (Appendix B).

Once received at ENSR's FCETL (Tuesday, October 23, 2007), eggs were maintained in coolers on ice overnight (temperature range overnight was 6-7 °C). The following day, eggs from each hatchery female were fertilized using the methods similar to those described by Holm et al. (2005; Appendix C). This method entailed placing 'green' or unfertilized eggs into a pre-cleaned plastic bowl (32 oz Rubbermaid plastic container). Milt (~1 ml, composite from all male fish) was combined with the eggs at a rate of 10 ul / 50 ml. The eggs and milt were gently stirred with a glass rod and allowed to stand for ~60 seconds. The egg/milt mixture was covered with ~100 ml of laboratory process water (i.e., hardness [~50 mg/L as $CaCO_3$] adjusted Horsetooth Reservoir water cooled to 6°C), swirled for approximately three minutes, after which 500 ml of cooled laboratory water was poured over the eggs. The eggs were allowed to water harden for approximately five minutes. After water hardening, the fertilized eggs were kept in the Rubbermaid plastic containers with lids loosely fastened, placed back into the coolers, and maintained in the dark to gradually warm up to ~10°C over the next 24-hours. On Thursday October 25, 2007, 600 eggs were collected from each batch of eggs using egg pickers and placed in prepared egg cups. Egg cups were then placed in individual test chambers. Remaining eggs not used for the test were then counted and frozen until they could be sent to Columbia Analytical Services (CAS), Inc. (Kelso, WA) for total selenium and percent solids analysis. Eggs for the SC hatchery fish were estimated using an egg counting technique developed for this purpose (Appendix C). Briefly, we counted the number of eggs for a given female that would fill a graduated cylinder to a particular volume (either 100 ml or 50 ml). Then we poured all the remaining eggs into a graduated cylinder to measure the total egg volume for that female. Using the number of eggs in either 50 or 100 ml, we determined the number of eggs in the total volume of eggs for that female. Since eggs from different females were of different size, this method was completed separately for each egg batch.

Because of low survival rates associated with the first set of hatchery eggs, a second set of hatchery eggs were obtained from Spring Creek Trout Hatchery (Lewistown, MT) on December 4, 2007. These eggs were obtained at the eyed-up stage because individual gametes were not available from Saratoga National fish hatchery or any other hatchery. These eggs served as method controls for the experimental system to ensure that we could expect acceptable survival and growth given the design. There were lower than expected survival rates for some treatments from the SC hatchery fish, which we believe were related to the fertilization and acclimation methods employed. Egg counts were not performed for the SPC eggs, as these were not obtained from individual female fish and thus not comparable with other treatments.

## 2.2 Laboratory Reproduction Tests

The temperature range for the cooler (#1) that held the trout from LSV2C (received at ENSR on November 15, 2007) was 3.4 – 8.7°C (excluding the first 10 min acclimation period). The temperature range for the second cooler that contained the remaining field eggs (received at ENSR on November 16, 2007) was 5.1 – 10.3 °C. Once back at the laboratory, eggs were allowed to slowly warm up over a 24-hour period to ~10°C (range of 6.2 – 8.4°C for cooler #1; range of 7.9 – 8.9 °C for cooler #2) prior to introduction into egg cups and test chambers. All remaining eggs were counted and frozen until they could be sent to the analytical laboratory for analysis of total selenium and solids. A list of the different locations from which fish were collected (i.e., treatments) and the individual identifications for each are provided in the table below (Table 2-1).

Table 2-1. Brown trout treatments and sample identifications for individual lots of fish eggs used in the reproductive study.

| **Saratoga NF Hatchery (SC)** | **Spring Creek Hatchery (SPC)** | **Background Se Field Location (CC-150)** | **Low Se Field Location (CC-350)** | **High Se Field Location (LSV2C)** |
|---|---|---|---|---|
| SC-001 | SPC-001 | CC-150-009 | CC-350-006 | LSV2C-002 |
| SC-002 | SPC-002 | CC-150-011 | CC-350-007 | LSV2C-003 |
| SC-003 | SPC-003 | CC-150-012 | CC-350-008 | LSV2C-004 |
| SC-004 | SPC-004 | CC-150-013 | | LSV2C-005 |
| SC-005 | SPC-005 | CC-150-015 | | LSV2C-006 |
| SC-006 | SPC-006 | CC-150-016 | | LSV2C-007 |
| SC-007 | | CC-150-017 | | LSV2C-008 |
| SC-008 | | CC-150-018 | | LSV2C-010 |
| | | CC-150-020 | | LSV2C-012 |
| | | | | LSV2C-016 |
| | | | | LSV2C-017 |
| | | | | LSV2C-019 |
| | | | | LSV2C-020 |
| | | | | LSV2C-021 |

Note: CC – Crow Creek; LSV – Lower Sage Creek

After the 24-h temperature acclimation period, a target of 600 eggs were transferred (in low ambient light) from each batch of field collected eggs using egg pickers, and placed in prepared egg cups. Egg cups were then placed in individual test chambers in the water bath. The remaining eggs for each treatment not used for the test were then counted by hand (Appendix C) and frozen until they could be sent to Columbia Analytical Services (CAS), Inc. (Kelso, WA) for total selenium and percent solids analysis.

Eggs were transferred from collection bags to egg cups in low ambient light using egg pickers. The egg cups were submersed in ~10°C water. Egg cups were constructed of polyvinyl chloride (PVC) schedule 40 pipe (approximately 5 cm ID and 3.8 cm depth) with a nitex screen bottom. Ten individual units were attached in a 2 x 5 layout design using silicon, so that each egg cup consisted of 10 individual cells (Figure 2-1). Eggs were evenly distributed into all 10 of the cells of the egg cups. For instance, the treatments initiated with 600 eggs had 60 eggs placed into each egg cup cell. While the original intent was to maintain the ten replicates for a given fish throughout the study, this was not feasible due to the water demands and space limitations. Therefore, organisms from all replicates were combined in the test chamber at hatch out.

Egg cups were hung with clips and fishing line in Sterilite® plastic test chambers (11.4 L). Each chamber was aerated for the duration of the test to maintain the dissolved oxygen concentration at sufficient levels (>60%). The volume in each test chamber was approximately 5 L maintained at the level of the top of the drain pipe which consisted of a piece of 5-mm ID glass tubing inserted through a silicone stopper which is pressed into a small hole drilled in the side of the chamber. Chambers and water volume were of sufficient size to maintain a loading rate of < 5 g of fish per L of water in each test chamber. Spent water overflowed out of the glass standpipes and into the water bath before being discharged directly to a conduit connecting both baths. This water was treated with an ultraviolet light disinfection unit prior to discharge into the laboratory waste water. After swim-up occurred, the drain openings were covered with a small piece of nylon mesh to prevent loss of organisms. In general, methods employed for this study followed ASTM (2006) standard guidance for conducting early life stage tests with fish, although modifications were made to account for study-specific hypotheses and test design criteria (e.g., number of eggs).

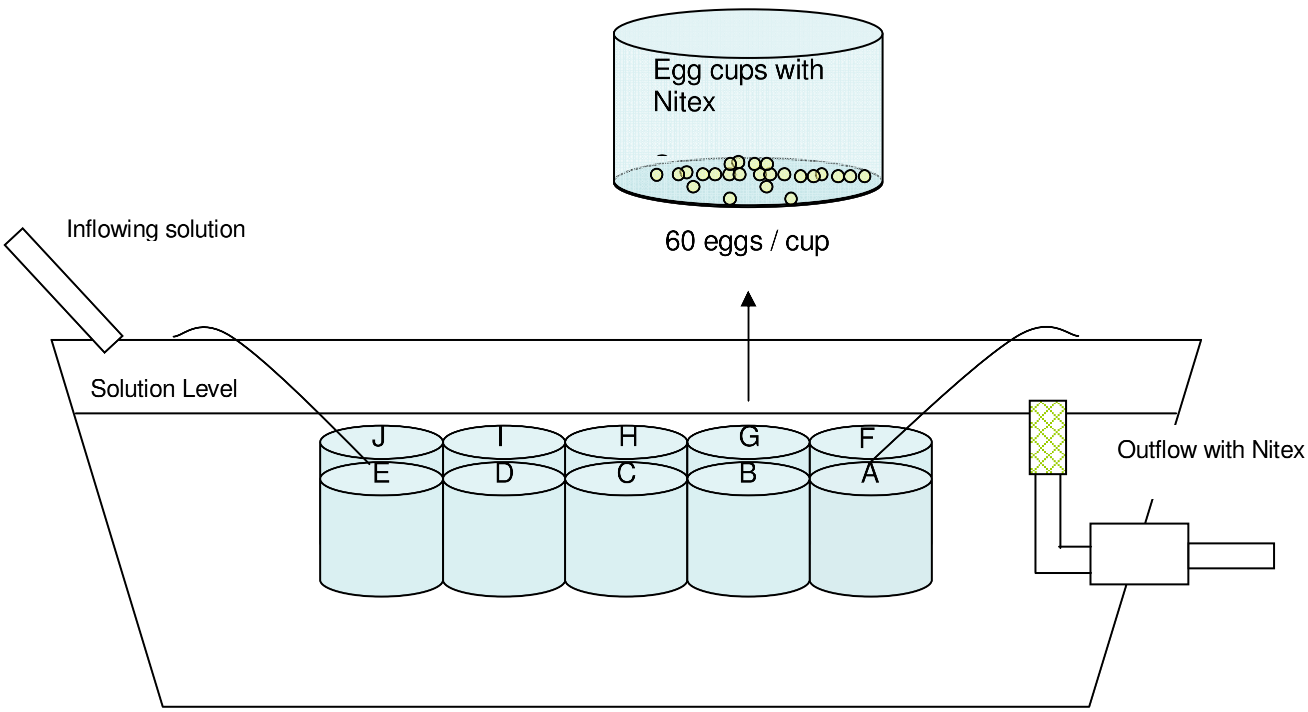



Figure 2-1. Schematic diagram of the test chamber and egg cups for brown trout reproductive study. Inset shows individual cells of egg cups (n = 10) within a chamber. Aeration tube not shown.

With the test solution volume of ~5 L and a flow rate of 20 ml/min, each test vessel received ~ 5.7 volume additions per day. Test chambers were held in two separate water baths with the temperature of the water baths controlled by chillers. Chambers were randomly placed in one of the two water baths so that each bath had an equal number of chambers (or as close as possible) from each treatment. Chambers within a given bath were then randomly placed into different locations within the water bath (Figure 2-2).

Figure 2-2. Location of egg treatments in water baths for brown trout reproductive study.

**Bath #1**

| | |
|---|---|
| HIGH002 | BK013 |
| LOW008 | SC005 |
| BKD020 | HIGH010 |
| HIGH016 | |
| HIGH021 | SPC004* |
| SPC005 | BK017 |
| | |
| | LOW006 |
| SC007 | BK011 |
| SPC001 | BK018 |
| SC008 | HIGH012 |
| SC001 | HIGH003 |

**Bath #2**

| | |
|---|---|
| SC004 | HIGH004 |
| HIGH019 | SC003 |
| HIGH008 | BK012 |
| | HIGH005 |
| SPC006 | |
| | SC006 |
| HIGH017 | BK016 |
| BK015 | BK009 |
| LOW007 | SC002 |
| | |
| SPC003 | SPC002* |
| HIGH020 | HIGH007 |

*denotes smaller test chamber (~2.5 L)
Note: BKD = CC-150, LOW = CC-350, and HIGH = LSV2C

Two smaller glass chambers (2.5 L) used previously in ELS studies were also initiated with eggs from SPC (20 eggs per egg cup / chamber, 20 ml/min flow). These two chambers were included as an additional set of performance controls to compare with SPC eggs initiated using the regular design (i.e., 600 eggs per egg cup per chamber)

The exposure chambers were housed in temperature-controlled water baths. Target temperatures in the test chambers were 10 ± 2°C. Dissolved oxygen concentrations were maintained at ≥ 60 percent of saturation (5.6 mg/L at 5,200 feet elevation and 10 °C). Embryos and fry were maintained under dim lighting (approximately 0.8 foot-candles) until swim-up occurred, after which they were held in ambient lighting (approximately 16 ft-c) with 16 hours of light per 24-hour period.

Egg cups were maintained submerged in each test chamber until all eggs hatched or were noted as dead. Originally, dead eggs were not going to be removed until after all live eggs eyed up. However, because of the observance of fungus on some of the dead eggs, dead eggs were carefully removed from the egg cups prior to the eyed up stage in some instances. The number of dead eggs removed each day was recorded for each test chamber. Eggs or embryos were considered dead if they appeared opaque and/or developed visible fungal infections. As hatching occurred, the numbers of live alevins, as well as the dead alevins (or eggs) that were removed, were recorded on a daily basis. However, because of the movement of the alevins due to their own swimming ability as well as from the movement of the water from aeration it was difficult to get an accurate count on the number of newly hatched alevins on a daily basis. Since this measurement was unreliable, it was discontinued and counts were largely based on the number of dead organisms removed from a particular chamber. When eggs hatched, alevins were gently removed to the bottom of the surrounding test chamber using a large bore glass pipette and the remaining egg shell was removed. Organisms that died as eggs or while hatching were recorded and preserved in Stockard's solution. Eggs that had the amniotic fluid (e.g., yolk) leak out just about the time of hatching were termed, 'dead while hatching' (DWH). Any organisms that were not found during the test were considered dead, except during the 15-d swim-up study. For this phase of the study, any missing organisms were considered missing and were excluded from survival analysis. Fish were considered dead if no gill movement or visible response was observed in response to gentle prodding. Egg cups were removed after all living eggs hatched. Test initiation and termination dates for each treatment are provided below (Table 2-2).

Table 2-2. Test initiation dates and termination dates for brown trout treatments in the reproduction study.

| Fish Treatment / Location | Test Initiation Date | Test Termination Date(s) |
|---|---|---|
| SC | Oct. 25, 2007 | Jan. 17, 2008 |
| SPC | Dec. 4, 2007 | Jan. 22, 2008 |
| CC-150 (BKD) | Nov. 17, 2007 | Feb. 7 & 12, 2008 |
| CC-350 (LOW) | Nov. 17, 2007 | Feb. 7 & 12, 2008 |
| LSV2C (HIGH) | Nov. 16, 2007 | Feb. 7 & 12, 2008 |

Eggs (primarily SC treatments) were treated with salt (NaCl) and, later, formalin in an attempt to reduce fungal growth. Days and type of treatment are located in Appendix D. Fungus appeared to affect the SC treatments more than later field-collected (i.e., wild) eggs and the second set of hatchery treatments as additional UV disinfection systems were incorporated at other locations prior to initiation of these other treatments.

Alevins (recently hatched young with yolk sacs) were monitored daily for mortality. Dead organisms were removed and placed in Davidson's solution. As alevins approached swim-up, trout chow was offered to the organisms to determine if they were actively feeding. The swim-up date was set based on when at least 80% of the alevins had absorbed their yolk sac and were actively feeding. At the swimup stage, organisms were thinned down to a target of 100 organisms per test chamber, preserving all the extra organisms in Davidson's solution for the deformities assessment. If there were less than 100 organisms in the test chamber then organisms were counted and left in the test chamber; however, no organisms were preserved at this stage for deformities analysis. All living larval fish were then maintained for the 15-d post swim-up stage of the study. Dead organisms were counted and removed daily, saved by placing them in Davidson's solution. Swim-up trout were started on a 4% body weight ration of salmon starter #1 (purchased from Aquatic Biosystems, Fort Collins, CO) over three feedings daily (i.e., morning, noon, evening) during the week, and at least two feedings daily on weekends. Weight of a swim-up fry was determined by sacrificing one fish out of seven hatchery treatments (SC) and determining a wet weight. The wet weight for these seven fish averaged 0.105 g; therefore, daily feeding was ~0.4 g trout chow assuming 100 fry.

At initiation of the swim-up stage the flow rate into each chamber (except the 2.5L chambers) was altered to 40 ml/min and taller stand pipes were added to adjust the total volume to ~9 L to account for loading requirements based on the anticipated growth of the organisms. Loading for the hatchery fish was < 2.5 g/L (assumes a wet wt of 0.2 g for 100 fish in 8 L of water). Once feeding started, test chambers were siphoned daily (in p.m. prior to feeding) to remove remaining food and fecal material.

At the end of the 15-d post swim-up study, all remaining organisms were sacrificed via immersion in isopropyl alcohol. A sub-set of 20 organisms was rinsed with deionized water, blotted dry and measured for standard length (tip of snout to caudal peduncle). All remaining organisms were preserved in Davidson's solution for deformities assessment.

Length measurements were taken on the day of test termination for all organisms except the SC-001 through SC-007 fish. Length measurements for these organisms were taken after a few days in isopropyl alcohol because they could not all be measured on the day of test termination. Length and wet weight measurements on 10 fish from SC-008 chamber were taken prior to storage and after storage to see if storage in alcohol altered the length measurement statistically (pre-isopropyl storage avg = 22.6 mm, post-isopropyl storage avg. = 21.2 mm, $p$ =0.0055). Because of the difference in lengths pre- and post-preservation, all remaining organisms were measured for length prior to preservation. Following length measurements, organisms were preserved in isopropyl alcohol until dry weight could be determined. For dry weight analysis, each fish was transferred to a tared weight boat and dried at 100 °C for at least 48 hours. After removal from the drying oven, the weigh boats were placed in a dessicator to prevent absorption of moisture from the air, until weighed (dry weight) to the nearest 0.01 mg.

## 2.3 Dilution Water

The dilution/control water used in this study was FCETL process water obtained from Horsetooth Reservoir. The ambient incoming water is coarse-filtered (through a sand filter and polypropylene core filters [10 and 1 micron]) to remove indigenous organisms, particulate matter, and contaminants. Water then passes through an ultraviolet light disinfection system before being stored in large holding tanks. This water is periodically analyzed for contaminants. Horsetooth Reservoir process water is very soft to soft water according to USEPA (2002), with both hardness and alkalinity typically 20 - 30 mg/L as $CaCO_3$ (Table 2-3). Background sulfate levels in unaltered Horsetooth water are ~5.0 mg/L. Ambient (unheated) laboratory Horsetooth reservoir water was metered into a large holding vessel (~100 gallons) and chilled with a counter-current cooling process to help maintain the target water temperature in the test chambers of 10°C. Water from the holding vessel was adjusted to increase the hardness and sulfate so that it would be higher than ambient levels and more similar to the field conditions (Table 2-3). Given the soft water conditions of the laboratory Horsetooth water and the volume of water used on a daily basis, it was impractical to match the water quality characteristics of the site.

Table 2-3. Water quality measurements for Horsetooth Reservoir process water (unamended) and Crow Creek Drainage.

| | Horsetooth Reservoir[1] | | Crow Creek[2] | |
|---|---|---|---|---|
| Parameter | Average | Range | Average | Range |
| Hardness (mg/L) | 33 | 26.5 – 41.8 | 171 | 129 – 220 |
| Alkalinity (mg/L) | 28.8 | 25 – 33 | 197 | 140 – 231 |
| Sodium (mg/L) | 3.5 | 2.7 – 5.5 | 3.3 | 1.0 – 6.5 |
| Potassium (mg/L) | <1 | --- | <1 | <1 – 1.8 |
| Sulfate (mg/L) | 5.6 | 3.4 – 10 | 27 | 7.5 – 48.7 |
| Chloride (mg/L) | 1.9 | 0.5 – 3.6 | 7.3 | 0.2 – 89 |
| DOC (mg/L) | 2.4 | 2.1 – 2.9 | 1.0 | 0.34 – 2.18 |

[1]Horsetooth Reservoir laboratory process water (Fort Collins, CO) from 2000 to 2004 measured at ENSR's FCETL.

[2]Crow Creek drainage as characterized by surface water from Crow Creek, Sage Creek, and Hoopes Spring surface water quality data (Newfield 2007)

Calcium sulfate ($CaSO_4.2H_2O$; Ben Franklin® Aquacal™, Plaster City, CA) and magnesium sulfate ($MgSO_4.7H_2O$; The PQ Corporation, Valley Forge, PA) were added at a ratio of 1.82:1 calcium: magnesium (molar basis) to deionized water to prepare a super hardness stock solution of ~2,000 mg/L as $CaSO_3$. This super stock was metered into the holding vessel to achieve a target hardness of ~50 mg/L as $CaCO_3$ and sulfate concentration of ~20 mg/L. Water hardness was measured daily during the study, while sulfate concentration was monitored periodically.

The super stock solution of extremely hard Horsetooth water (~2,000 mg/L hardness) was metered from two Mariotte bottles (5-gallon glass bottle) into a head tank which then was metered into the large holding vessel along with dilution water inflow. The inflow of the ambient laboratory Horsetooth water was approximately 1,400 ml/min. The super hardness stock solution was delivered into the holding vessel at a target rate of 14 ml/min. Batches of the super hard stock solution were prepared every three days and the Mariotte bottles were filled daily throughout the study. Flows on the main dilution water (unadjusted Horsetooth water) and the drip flowing from the head tank (Mariotte bottles fed this tank) were measured at least once daily throughout the study.

Water from the holding vessel, now adjusted to a water hardness of ~50 mg/L and slightly cooled, was then pumped over to a head tank set up above the dilutor panels and water baths holding all test chambers. Flows into the head boxes above each dilutor panel feeding the test chambers for that bath were maintained by providing a constant head pressure using a submersible pump from the holding vessel and an over-flow recirculating system (i.e., excess flow was returned from the head tank above the test chambers back to the 100 gal holding vessel).

Water from the head tank flowed into diluter panels constructed out of glass, silicone adhesive, and silicone stoppers. Adjusted Horsetooth process water was delivered to the test chambers through (3/8 I.D. x ½ O.D. x 1/16 thickness, inch) polyethylene tubing. The dilutor panel delivered modified Horsetooth water to up to 24 test chambers per water bath. Flow rate into each chamber was adjusted in the splitter box to deliver a target rate of 20 ml of test solution per minute to each chamber. After swim-up had occurred and the 15-d post swim-up study was underway, the flow rates were adjusted to a target of 40 ml of test solution per minute per chamber.

## 2.4 Water Chemistry

Temperature (°C), pH (s.u.), dissolved oxygen (mg/L) concentrations, and conductivity (µS/cm) were measured and recorded in one chamber for each test treatment daily. Hardness (as mg/L $CaCO_3$) was measured from the dilutor panel or from a test chamber daily during the study. Total ammonia (mg/L as N) was measured in selected test chambers (LSV2C-010, CC-150-016, and CC-350-006) once feeding was initiated. Sulfate concentration was measured from water collected from the dilutor panel or from test chambers. Determinations of waterborne sulfate concentrations were made at Paragon Analytics, Inc. (Fort Collins, Colorado, USA) using ion chromatography (EPA Method 300.0).

Water samples for total recoverable and "dissolved" selenium analyses were collected, prepared, and preserved from selected test chambers during the course of the study. Briefly, approximately 50 to 250 ml of test solution was collected for analysis of either dissolved or total selenium analysis. Aqueous analytical samples were analyzed at either Paragon Analytics Inc. or ACZ Laboratories (Steamboat Springs, CO). Dissolved selenium samples were filtered through 0.45 µm filters (GHP Acrodisc Syringe Filters, Pall Gelman Scientific, Ann Arbor, MI, USA) prior to placing in the polypropylene sample containers and preserved with 1% nitric acid. Samples were analyzed at ACZ using an ICP-MS (EPA Method 200.8) or at Paragon Analytics, Inc. using method SW3005A (ICP-OES).

Aqueous water samples were also collected at the hatchery sites (SC and SPC) for analysis of total and dissolved selenium so background levels of selenium at the hatcheries could be compared with selenium levels from other fish areas. These samples were collected in April 2008 (SC) or October 2008 (SPC) and sent to ACZ for analysis. Total recoverable and dissolved Se concentrations in the water from the Saratoga National Fish Hatchery was 1.7 µg/L, while total recoverable and dissolved Se concentrations in the water from Spring Creek hatchery was <0.1 µg/L (Appendix E).

## 2.5 Deformities Assessment

Extra fry (excluding the target of 100 fry kept for the post swim-up phase of the study) were removed and preserved in Davidson's Solution at swim-up for deformity examination. Any deformed fry were removed at this point and preserved as part of the extra fry. Upon test termination, an additional batch of fish (per treatment) were preserved similarly and saved for deformity assessment. Of the 100 organisms included in the 15-d post swim-up phase of the study, the target was to save 80 of these fry for deformity assessment (the other 20 were for length and dry weight analysis).

Dead fish and alevins were removed during the study and preserved for deformity assessment as well. However, many of these organisms did not preserve well because they were in various states of decay. Because of the poor tissue condition of these dead organisms they were not originally evaluated (i.e., necrotic tissue conditions and/or presence of fungus made analysis and observations difficult). A subsequent analysis was conducted on approximately 100 of these fish (per batch) on five samples in which there was no or little data. These additional samples were from LSV2C -003, -004, -005, -010, and -021. All samples for deformity analysis were sent to Dr. Kevin Bestgen at CSU. Data from these samples were incorporated in the deformity assessment performed.

## 2.6 Endpoints

Multiple test endpoints were utilized for this test at different times during the test. Fecundity, hatch, deformities, length, weight, survival (different times during the study), tissue concentrations (egg and whole body), and feeding success were proposed test endpoints. These endpoints were similar with those of Holm et al. 2005, Hardy 2005, and Kennedy et al. 2000 on which the test described herein was based.

Total egg production for each female was counted as a measure of fecundity. Survival was determined based on the number of surviving fish at hatch, swim-up, and at test termination compared to the number of eggs at test initiation. Percent hatch was determined as the number of live fish and alevins at day of first hatch compared to the number of eggs at test initiation. Other endpoints included day of swim-up, day of test termination, and measurements on survival larval fry at test termination (length and dry weight).

# 3.0 Results

## 3.1 Egg Analyses

The number of eggs used from a given female depended on the total number of eggs provided by that female. While the target was 600 eggs per female, certain organisms did not provide that many total eggs. Therefore, we attempted to maximize the number of eggs used in the reproduction study while leaving enough for selenium analysis. For treatments with fewer eggs (e.g., LSV2C-010), eggs were added to each replicate of the egg cup in small numbers (10 at a time) to ensure equal numbers in each replicate. Once that target number was added to each replicate egg cup cell, the number of eggs remaining was evaluated to see whether more eggs could be added to the egg cup. This process was repeated until no fewer than 61 eggs remained for Se analysis. For the field collected eggs, the most that remained was 732 eggs; however, the average number of eggs saved for Se analysis was 329. The number of eggs used in the study from a particular female, the total number of eggs the female produced, and the percent egg mortality are presented (Table 3-1).

One set of eggs were completely dead upon arrival (LSV2C-006). Because there were no viable eggs upon inspection, these eggs were not used in the reproductive study but were retained for selenium analysis. From 100 to 600 eggs were used to initiate the reproductive studies for the remaining fish sampled (Table 3-1). As mentioned, this corresponded to the total number of eggs produced by a particular female. The total number of eggs from field collected organisms ranged from 161 (LSV2C-010) to 1,658 (CC-150-016). By contrast, the range of eggs collected from the SC hatchery fish ranged from 1,248 to 5,448. The total number of eggs could not be counted individually for the SPC hatchery fish as they were previously composited from multiple females and delivered as eyed-up eggs.

Table 3-1. Estimated number of total brown trout eggs from adult female organisms used in the reproductive success study.

| Location | Sample ID | #Eggs placed in study | Total # of eggs from fish | Egg Mortality (%) |
|---|---|---|---|---|
| | SC-001 | 600 | 4,173 | 76.2 |
| | SC-002 | 600 | 4,005 | 77.2 |
| | SC-003 | 600 | 5,120 | 43.3 |
| *Hatchery Fish* | SC-004 | 600 | 1,248 | 68.9 |
| | SC-005 | 600 | 5,448 | 88.3 |
| | SC-006 | 600 | 3,176 | 6.8 |
| | SC-007 | 600 | 3,224 | 69.5 |
| | SC-008 | 600 | 4,005 | 34 |
| | SPC-001 | 600 | -- | 0.7 |
| *Second set of* | SPC-002 | 20 | -- | 0 |
| | SPC-003 | 600 | -- | 2.5 |
| *Hatchery Fish* | SPC-004 | 21 | -- | 0 |
| | SPC-005 | 600 | -- | 1.2 |
| | SPC-006 | 600 | -- | 0.3 |
| | CC-150-009 | 600 | 1,215 | 71.5 |
| | CC-150-011 | 300 | 488 | 4.0 |
| | CC-150-012 | 350 | 556 | 11.2 |
| | CC-150-013 | 600 | 1,234 | 33.3 |
| | CC-150-015 | 600 | 1,003 | 21.7 |
| | CC-150-016 | 600 | 1,658 | 85.2 |
| | CC-150-017 | 250 | 414 | 10.8 |
| Wild | CC-150-018 | 600 | 959 | 12.8 |
| | CC-150-020 | 600 | 1,332 | 2.7 |
| | CC-350-006 | 600 | 1,154 | 28.3 |
| | CC-350-007 | 600 | 1,174 | 70.3 |
| | CC-350-008 | 600 | 922 | 32.3 |
| | LSV2C-002 | 600 | 1,096 | 1.0 |
| Fish | LSV2C-003 | 400 | 474 | 6.5 |
| | LSV2C-004 | 500 | 766 | 49.4 |
| | LSV2C-005 | 300 | 476 | 28.7 |
| | LSV2C-006 | -- | -- | 100 |
| | LSV2C-007 | 500 | 773 | 100 |
| | LSV2C-008 | 300 | 372 | 11.7 |
| | LSV2C-010 | 100 | 161 | 13 |
| | LSV2C-012 | 600 | 1,031 | 1.7 |
| | LSV2C-016 | 600 | 826 | 5.0 |
| | LSV2C-017 | 300 | 447 | 28.7 |
| | LSV2C-019 | 500 | 693 | 5.8 |
| | LSV2C-020 | 400 | 525 | 10.8 |
| | LSV2C-021 | 600 | 1,208 | 30.7 |

## 3.2 Laboratory Study

### 3.2.1 Water Chemistry

The water quality parameters (pH, temperature and dissolved oxygen [DO]) monitored daily during the study were within acceptable ranges for the survival of brown trout (Table 3-2).

Table 3-2. Water hardness (avg ± SD), dissolved oxygen (low and % saturation), pH (range), temperature, and conductivity measured in each treatment during the reproductive study using brown trout (*Salmo trutta*).

| Fish Treatment | Water Hardness (mg/L) | Minimum Dissolved Oxygen (mg/L) & % Saturation | pH (s.u.) | Avg ± SD Temp (°C) | Temp. Range (°C) | Conductivity (µS/cm) |
|---|---|---|---|---|---|---|
| SC | 49.3 ± 3.2 | 7.8 / 83 | 7.4 – 7.9 | 10.1 ± 0.7 | 8.5 – 11.9 | 104 – 196 |
| SPC | 48.6 ± 3.6 | 7.5 / 80 | 7.4 – 7.9 | 10.5 ± 0.7 | 8.6 – 11.9 | 106 – 146 |
| CC-150 (BKD) | 48.4 ± 3.5 | 7.5 / 80 | 7.4 – 7.9 | 10.5 ± 0.8 | 8.7 – 12.5 | 107 – 175 |
| CC-350 (LOW) | 48.4 ± 3.5 | 7.4 / 79 | 7.5 – 7.9 | 10.6 ± 0.8 | 8.8 – 12.2 | 104 – 167 |
| LSV2C (HIGH) | 48.4 ± 3.5 | 7.1 / 76 | 7.3 – 7.8 | 10.6 ± 0.8 | 8.7 – 12.5 | 107 – 161 |

Note: At 5,200 feet elevation and 10 °C, 60% dissolved oxygen saturation is 5.63 mg/L

Alkalinity was measured at least weekly in the laboratory Horsetooth dilution water and it averaged 28.2 ± 1.4 mg/L (as $CaCO_3$) between October 25, 2007 and February 12, 2008. Ammonia was measured in select treatments (LSV2C-010, CC-150-016, and CC-350-006) during the 15-d post-swim-up feeding portion of the study and was <1.0 mg/L in all test chambers. Sulfate, measured 12 times over the course of the study, averaged 22.9 (range 17 – 27) mg/L (Appendix E). Water temperature measured in the chambers for each water bath and water hardness are presented over the course of the study (Appendix E).

Aqueous selenium measured in the hardness adjusted Horsetooth water or in specific test chambers from October 23, 2007 to February 12, 2008 were < 5 µg/L (12 total measurements; Appendix E). The only time that selenium was detected was on January 22, 2008 for a collected sample from the SPC-001 chamber (result was 9.9 µg/L). There was insufficient sample to have this value re-verified by a separate laboratory with lower detection limits.

### 3.2.2 Biological Endpoints

The day of first hatch for the SC hatchery fish ranged from 40 to 47 days, although all but two had started hatching by day 42 (Table 3-3). The second set of hatchery fish (received at the eyed up stage) hatched from nine to 13 days after receipt, while the treatment fish hatched from 36 to 43 days. The slightly lower temperatures for the SC hatchery fish likely explain the slightly longer day to first hatch.

Table 3-3. Day of first hatch, percent hatch, day of swim-up, percent swim-up, and percent survival at swim-up for brown trout fry from the reproductive success study. Eggs from the second set of hatchery fish were obtained at the eye-up stage.

| Location | Sample ID | Day of 1st hatch | % hatch[a] | Day of swim-up | % Swim-up | Survival (%) at Swim-up Stage |
|---|---|---|---|---|---|---|
| *Hatchery Fish* | SC-001 | 42 | 23.8 | 69 | 22.8 | 22.8 |
| | SC-002 | 41 | 22.8 | 69 | 22.5 | 22.5 |
| | SC-003 | 40 | 56.7 | 69 | 55.7 | 55.7 |
| | SC-004 | 40 | 31.1 | 69 | 27.3 | 27.3 |
| | SC-005 | 42 | 11.7 | 69 | 10.7 | 10.7 |
| | SC-006 | 40 | 93.2 | 69 | 92.8 | 92.8 |
| | SC-007 | 47 | 30.5 | 69 | 26.8 | 26.8 |
| | SC-008 | 46 | 66.0 | 69 | 65.0 | 65.0 |
| *Second set of Hatchery Fish* | SPC-001 | 11 | 99.3 | 34 | 98.0 | 98.0 |
| | SPC-002 | 13 | 100 | 34 | 100 | 100 |
| | SPC-003 | 11 | 97.5 | 34 | 94.2 | 94.2 |
| | SPC-004 | 13 | 100 | 34 | 100 | 100 |
| | SPC-005 | 11 | 98.8 | 34 | 97.5 | 97.5 |
| | SPC-006 | 9 | 99.7 | 34 | 96.0 | 96.0 |
| Wild Fish | CC-150-009 | 39 | 28.5 | 72 | 27.2 | 27.2 |
| | CC-150-011 | 42 | 96.0 | 67 | 95.3 | 95.3 |
| | CC-150-012 | 40 | 88.8 | 72 | 86.8 | 86.8 |
| | CC-150-013 | 39 | 66.7 | 72 | 59.7 | 59.7 |
| | CC-150-015 | 40 | 78.3 | 67 | 77.8 | 77.8 |
| | CC-150-016 | 43 | 14.8 | 72 | 14.3 | 14.3 |
| | CC-150-017 | 42 | 89.2 | 72 | 86.4 | 86.4 |
| | CC-150-018 | 41 | 87.2 | 72 | 84.3 | 84.3 |
| | CC-150-020 | 38 | 97.3 | 67 | 96.3 | 96.3 |
| | CC-350-006 | 41 | 71.7 | 72 | 68.0 | 68.0 |
| | CC-350-007 | 38 | 29.7 | 67 | 28.7 | 28.7 |
| | CC-350-008 | 37 | 67.7 | 67 | 64.5 | 64.5 |
| | LSV2C-002 | 36 | 99.0 | 68 | 96.7 | 96.7 |
| | LSV2C-003 | 41 | 93.5 | 88 | 0[b] | 8.0 |
| | LSV2C-004 | 40 | 50.6 | 88 | 0[b] | 30.2 |
| | LSV2C-005 | 40 | 71.3 | 88 | 0[b] | 37 |
| | LSV2C-006 | NA | 0.0 | --- | --- | --- |
| | LSV2C-007 | NA | 0.0 | --- | 0 | 0 |
| | LSV2C-008 | 39 | 88.3 | 68 | 86.7 | 86.7 |
| | LSV2C-010 | 42 | 87.0 | 88 | 0[b] | 25 |
| | LSV2C-012 | 42 | 98.3 | 73 | 95.7 | 95.7 |
| | LSV2C-016 | 39 | 95.0 | 73 | 91.7 | 91.7 |
| | LSV2C-017 | 41 | 71.3 | 73 | 64.0 | 64.0 |
| | LSV2C-019 | 38 | 94.2 | 73 | 89.8 | 89.8 |
| | LSV2C-020 | 40 | 89.2 | 68 | 88.0 | 88.0 |
| | LSV2C-021 | 38 | 69.3 | 88 | 0[b] | 21.7 |

[a] Percent hatch and percent survival at hatch were synonymous endpoints.
[b] Did not achieve swim-up stage before test was terminated; remaining alevins still had yolk sacs (test Day 88).

Percent hatch and percent survival at hatch were synonymous endpoints for all treatments. The percent hatch of the SC treatments was lower than anticipated, ranging from 11.7 – 93.2% (average of 42%), although this was likely due to the different fertilization technique used for the SC hatchery fish and some fungal problems. The percent hatch for the SPC hatchery fish was 97.5 – 100%, although the holding period was significantly shorter because they were received as eyed eggs. The percent hatch for the field collected eggs was typically better than the SC hatchery eggs. Eggs collected from CC-150 treatments ranged from 14.8 to 97.3%, with an average of 71.9%. Average hatch out for the eggs collected from fish at CC-350 was 56.4%, while that for the eggs from LSV2C was 83.9% (not including LSV2C-006 or -007 whose eggs were either dead upon arrival or were not fertilized). The lowest percent hatch from the LSV2C treatments was 50.6%, while the highest was 99.0%. The field organisms indicated that the change in fertilization technique resulted in a higher hatch success rate compared with the SC hatchery fish.

The day of swim-up for the SC hatchery fish was at 69 days and was 34 days for the SPC hatchery fish (Table 3-3). For the majority of the field treatments, the day of swim-up was between 67 to 73 days, regardless of the collection location. There were five treatments where the alevins did not absorb their yolk sac and reach the swim-up stage. These treatments were: LSV2C-003, LSV2C-004, LSV2C-005, LSV2C-010, and LSV2C-021. These organisms were maintained for the duration of the study and taken down on test day 88 with the last treatments that had finished the 15-d post swim-up portion of the study (Table 3-3).

The next two endpoints were very similar, the percentage of organisms that reached the swim-up stage and percent survival at the swim-up stage (i.e., on the day of swim-up). Because the fry on the day of swim-up had already absorbed their yolk sac, these values were the same for most treatments (Table 3-3). The only treatments for which these values were different were for the five in which the alevins did not reach swim-up (listed above). Survival at this point was determined for the remaining alevins and ranged between 8.0 and 37%.

The last phase of the studies consisted of the 15-d post swim-up study. The first three endpoints for this phase of the study consisted of survival in the 15-d study, total survival for the entire study, and day of test termination. For this phase, each treatment was initiated with a target of 100 of the surviving fry and maintained for 15-d to monitor growth to assess whether there were any latent effects post swim-up. All treatments were initiated with 100 fry per chamber except the following listed below. The number of organisms at initiation of this phase is listed in parenthesis:

- SC-005 (62)
- SPC-002 (20) & SPC-004 (21)
- CC-150-016 (86)
- CC-350-006 (101)
- LSV2C-003 (32), LSV2C-004 (151), LSV2C-005 (111), LSV2C-010 (25), LSV2C-016 (101), & LSV2C-021 (130)

For some of the treatments, i.e., SC-005, CC-150-016, LSV2C-003, LSV2C-004, LSV2C-005, LSV2C-010, and LSV2C-021, only this many fish (or alevins) were left alive at this point in the study. Since some of these were below the target of 100 or had not yet reached swim-up stage, they were not thinned out, but maintained all the remaining live organisms through the duration of the study. The remaining treatments mentioned were either initiated with fewer eggs (i.e., SPC-002 and SPC-004) or had an extra organism above the target number. For some of the test chambers, fry were lost during this stage of the study due to food clogging the drain pipe, resulting in an overflow of the test chamber. In calculating survival during the 15-d study and overall survival, these organisms were excluded as a technician error. Other technician errors also occurred in the study, for example during thinning when two individual fish were killed (SC-003 and SC-005). A list of the treatments that lost organisms due to an overflow of the chamber and the number lost (i.e., not recovered at the end of the study) are listed below.

- SC-003 (9) & SC-008 (10)
- CC-150-013 (26), CC-150-016 (43), CC-150-017 (33)
- CC-350-007 (20) & CC-350-008 (28)
- LSV2C-002 (16), LSV2C-008 (46), LSV2C-017 (19), LSV2C-019 (39), & LSV2C-020 (36)

Survival during the 15-d post swim-up stage was relatively high (Table 3-4). Excluding the five LSV2C treatments that had poor survival at swim-up (-003, -004, -005, -010, and -021), all other treatments had survival above 96.0%. Survival for the five mentioned LSV2C treatments ranged from 28.1% to 68.5%, indicating that only these treatments had substantial mortality at this phase of the study (Appendix F).

Day of test termination for all but the SPC treatments ranged from 82 to 88 days (Table 3-4). The SC hatchery fish were terminated on day 84, while the SPC fish were terminated on day 49. Total survival for the entire study is presented in Table 3-4. Total survival for the SC hatchery fish ranged from 10.7% to 92.7%, and ranged from 94.2% to 100% for the SPC hatchery fish.

Table 3-4. Percent survival in the 15-d post swim-up phase of the study, total survival for the entire study, and day of test termination for brown trout reproductive study.

| Location | Sample ID | Survival (%) in 15-d Post swim-up stage | Total Survival (%) | Survival (%) from Hatch until test term. | Day of test termination |
|---|---|---|---|---|---|
| | SC-001 | 97.0 | 22.7 | 98.9 | 84 |
| | SC-002 | 99.0 | 22.3 | 99.5 | 84 |
| | SC-003 | 98.9* | 54.7 | 98.0 | 84 |
| *Hatchery Fish* | SC-004 | 100 | 27.3 | 96.2 | 84 |
| | SC-005 | 100 | 10.7 | 99.0 | 84 |
| | SC-006 | 98.0 | 92.7 | 99.5 | 84 |
| | SC-007 | 96.0 | 26.3 | 95.8 | 84 |
| | SC-008 | 100* | 65.0 | 99.0 | 84 |
| | SPC-001 | 100 | 98.0 | 98.7 | 49 |
| *Second set of* | SPC-002 | 100 | 100 | 100 | 49 |
| | SPC-003 | 100 | 94.2 | 96.7 | 49 |
| *Hatchery Fish* | SPC-004 | 100 | 100 | 100 | 49 |
| | SPC-005 | 96 | 96.8 | 98.0 | 49 |
| | SPC-006 | 100 | 96.0 | 96.3 | 49 |
| | CC-150-009 | 99 | 27.0 | 98.3 | 87 |
| | CC-150-011 | 100 | 95.3 | 98.7 | 82 |
| | CC-150-012 | 97 | 86.0 | 98.1 | 87 |
| | CC-150-013 | 97.3* | 57.5 | 93.0 | 87 |
| | CC-150-015 | 98 | 77.5 | 98.9 | 82 |
| | CC-150-016 | 100* | 15.4 | 99.7 | 87 |
| | CC-150-017 | 100* | 84.3 | 97.2 | 82 |
| Wild | CC-150-018 | 100 | 84.3 | 96.5 | 87 |
| | CC-150-020 | 100 | 96.3 | 98.9 | 82 |
| | CC-350-006 | 98.0 | 67.7 | 96.3 | 87 |
| | CC-350-007 | 98.8* | 26.0 | 98.6 | 82 |
| | CC-350-008 | 98.6* | 62.6 | 97.1 | 82 |
| | LSV2C-002 | 100* | 96.6 | 97.6 | 83 |
| Fish | LSV2C-003 | 28.1 | 2.25 | 8.8 | 88 |
| | LSV2C-004 | 55.6 | 16.8 | 66.2 | 88 |
| | LSV2C-005 | 62.2 | 23.0 | 51.7 | 88 |
| | LSV2C-008 | 98.2* | 84.2 | 95.9 | 83 |
| | LSV2C-010 | 44.0 | 11.0 | 24.0 | 88 |
| | LSV2C-012 | 100 | 95.7 | 97.4 | 88 |
| | LSV2C-016 | 100 | 91.7 | 96.7 | 88 |
| | LSV2C-017 | 96.3* | 60.5 | 89.2 | 88 |
| | LSV2C-019 | 100* | 88.9 | 94.7 | 88 |
| | LSV2C-020 | 100* | 86.8 | 97.6 | 83 |
| | LSV2C-021 | 68.5 | 14.8 | 45.5 | 88 |

* - missing organisms at test termination were not included in calculation.

The range of total survival for the CC-150 treatments was 15.4% to 96.3%, that for the CC-150 treatments was 26.0% to 67.7%, and for the LSV2C treatments was 2.25% to 96.6% (Table 3-4).

For most of these treatments, there was not a substantial difference between the survival rate at swim-up and the number of organisms that hatched (Figure 3-1). For most of the treatments, the number of organisms that hatched reached the swim-up stage. One group did not hatch or swim-up

(LSV2C-007), while five groups had substantial hatch (>50%) but did not reach swim-up (as mentioned previously). Percent survival, from hatch until test termination was included in Table 3-4.

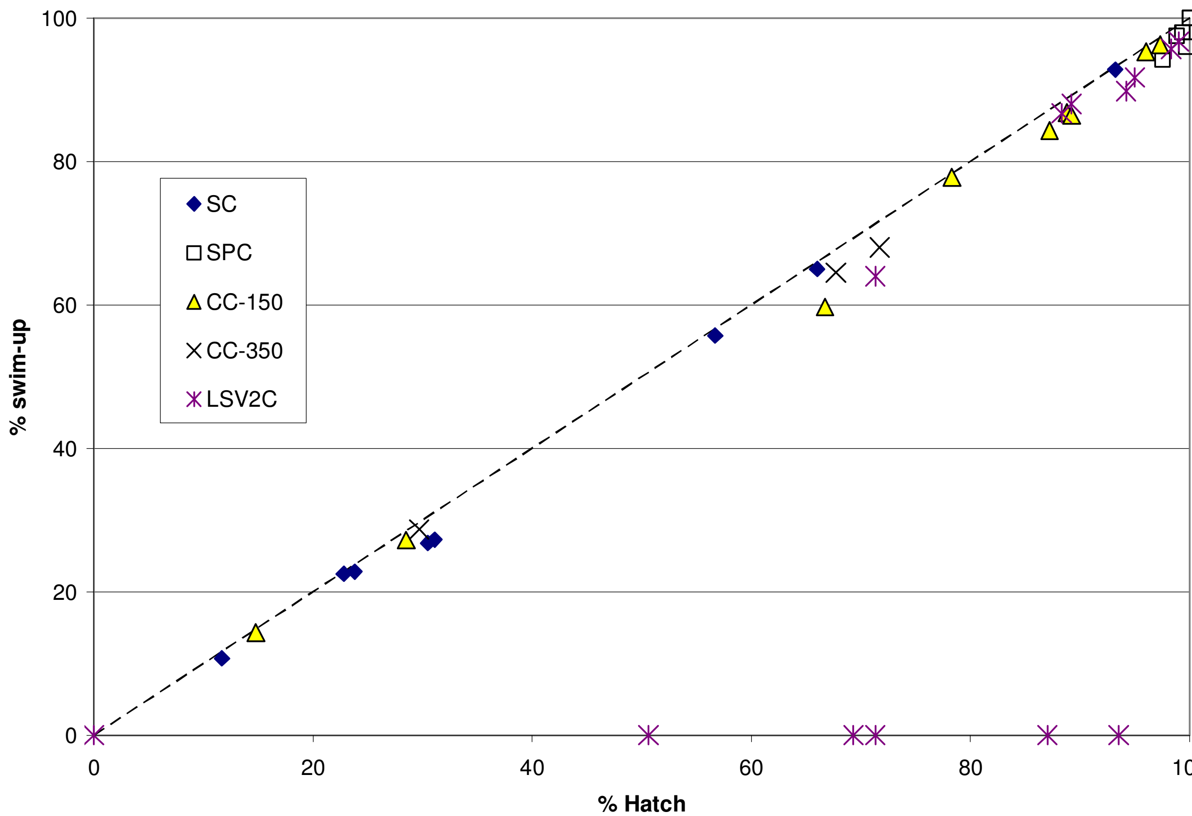



Figure 3-1. Relationship between the percentage of organisms that hatched and the percentage of organisms that reached swim-up. Note, the dashed line indicates a 1:1 agreement.

The results of length and dry weight analysis for the target of 20 organisms at the end of the 15-d post swim-up phase of the study are provided below (Table 3-5). Raw data are in Appendix G.

Table 3-5. Standard length and dry weight (avg ± SD) of larval brown trout at test termination. The number of larval fish measured for each treatment is included (*n*).

| Location | Sample ID | *n* | Average Standard Length (mm) | Average Dry Weight (mg) |
|---|---|---|---|---|
| | SC-001 | 20 | 21.4 ± 1.5 | 18.338 ± 4.3 |
| | SC-002 | 20 | 22.2 ± 0.93 | 18.470 ± 3.3 |
| | SC-003 | 20 | 22.8 ± 1.3 | 22.602 ± 4.8 |
| *Hatchery Fish* | SC-004 | 20 | 22.2 ± 1.9 | 23.246 ± 7.5 |
| | SC-005 | 20 | 21.8 ± 1.2 | 19.386 ± 4.0 |
| | SC-006 | 20 | 21.8 ± 0.83 | 18.240 ± 3.3 |
| | SC-007 | 20 | 21.0 ± 1.5 | 18.567 ± 3.9 |
| | SC-008 | 20 | 21.2 ± 1.1 | 15.118 ± 3.3 |
| | SPC-001 | 20 | 24.4 ± 2.1 | 22.564 ± 6.1 |
| *Second set of* | SPC-002 | 20 | 22.8 ± 1.5 | 20.852 ± 4.1 |
| | SPC-003 | 20 | 23.3 ± 2.1 | 21.807 ± 5.4 |
| *Hatchery Fish* | SPC-004 | 20 | 23.4 ± 2.0 | 21.564 ± 5.3 |
| | SPC-005 | 20 | 23.0 ± 1.9 | 20.792 ± 5.8 |
| | SPC-006 | 20 | 23.2 ± 1.6 | 22.386 ± 6.1 |
| | CC-150-009 | 20 | 21.8 ± 1.3 | 13.188 ± 3.2 |
| | CC-150-011 | 20 | 20.1 ± 0.85 | 9.248 ± 2.3 |
| | CC-150-012 | 20 | 21.4 ± 0.89 | 12.840 ± 2.8 |
| | CC-150-013 | 20 | 22.6 ± 1.3 | 15.582 ± 3.4 |
| | CC-150-015 | 20 | 22.6 ± 1.2 | 14.486 ± 3.2 |
| | CC-150-016 | 20 | 22.8 ± 1.2 | 16.736 ± 4.0 |
| | CC-150-017 | 20 | 21.0 ± 0.83 | 10.652 ± 2.4 |
| Wild | CC-150-018 | 20 | 21.3 ± 1.0 | 13.244 ± 3.3 |
| | CC-150-020 | 20 | 20.2 ± 1.4 | 11.248 ± 3.6 |
| | CC-350-006 | 20 | 21.4 ± 1.1 | 12.342 ± 3.1 |
| | CC-350-007 | 20 | 21.3 ± 1.3 | 11.009 ± 3.7 |
| | CC-350-008 | 20 | 20.6 ± 0.94 | 12.089 ± 3.1 |
| | LSV2C-002 | 20 | 20.1 ± 1.2 | 11.070 ± 3.2 |
| Fish | LSV2C-003 | 9 | 21.3 ± 0.71 | 9.710 ± 2.4 |
| | LSV2C-004 | 20 | 21.2 ± 0.89 | 9.979 ± 2.1 |
| | LSV2C-005 | 20 | 20.2 ± 1.1 | 10.967 ± 2.7 |
| | LSV2C-008 | 20 | 20.4 ± 0.51 | 9.342 ± 1.1 |
| | LSV2C-010 | 11 | 19.9 ± 0.83 | 8.092 ± 2.5 |
| | LSV2C-012 | 20 | 22.0 ± 0.46 | 13.256 ± 0.8 |
| | LSV2C-016 | 20 | 21.8 ± 1.5 | 15.836 ± 5.0 |
| | LSV2C-017 | 20 | 23.7 ± 1.0 | 18.878 ± 4.0 |
| | LSV2C-019 | 20 | 23.6 ± 1.4 | 19.320 ± 5.8 |
| | LSV2C-020 | 20 | 21.8 ± 1.0 | 11.574 ± 2.7 |
| | LSV2C-021 | 20 | 20.2 ± 1.5 | 10.656 ± 3.9 |

### 3.2.3 Deformity Assessment

Below is a list of the number of specimens preserved and analyzed at either swim-up or test termination for deformities (Table 3-6). The majority of fish that had died during the test were preserved but were not evaluated because of the poor state that they were end by the time death had occurred. As mentioned, a subset of these dead organisms were evaluated for deformities and included with the results of the assessment conducted on organisms that were alive when preserved.

Table 3-6. Number of brown trout fry preserved and assessed for deformities. Samples were preserved at swim-up, at test termination, or upon death. All organisms preserved at swim-up and test termination were assessed for deformities; however, only select samples from organisms that died during the study were evaluated.

| Location | Field Sample ID | Number of fish assessed that were preserved at swim-up | Number of fish assessed that were preserved at test termination | Number of fish assessed that had died during the study |
|---|---|---|---|---|
| *Hatchery Fish* | SC-001 | 38 | 77 | -- |
| | SC-002 | 34 | 79 | -- |
| | SC-003 | 233 | 69 | -- |
| | SC-004 | 60 | 80 | -- |
| | SC-005 | 0 | 42 | -- |
| | SC-006 | 457 | 78 | -- |
| | SC-007 | 61 | 76 | -- |
| | SC-008 | 289 | 70 | -- |
| *Second set of Hatchery Fish* | SPC-001 | 488 | 80 | -- |
| | SPC-002 | 0 | 0 | -- |
| | SPC-003 | 465 | 80 | -- |
| | SPC-004 | 0 | 0 | -- |
| | SPC-005 | 485 | 76 | -- |
| | SPC-006 | 476 | 80 | -- |
| Wild Fish | CC-150-009 | 62 | 80 | -- |
| | CC-150-011 | 185 | 81 | -- |
| | CC-150-012 | 204 | 77 | -- |
| | CC-150-013 | 258 | 52 | -- |
| | CC-150-015 | 367 | 78 | -- |
| | CC-150-016 | 0 | 23 | -- |
| | CC-150-017 | 116 | 47 | -- |
| | CC-150-018 | 405 | 81 | -- |
| | CC-150-020 | 478 | 80 | -- |
| | CC-350-006 | 307 | 79 | -- |
| | CC-350-007 | 72 | 59 | -- |
| | CC-350-008 | 287 | 51 | -- |
| | LSV2C-002 | 480 | 64 | -- |
| | LSV2C-003 | 0 | 0 | ~100[a] |
| | LSV2C-004 | 0 | 64 | ~100[a] |
| | LSV2C-005 | 0 | 49 | ~100[a] |
| | LSV2C-008 | 160 | 34 | -- |
| | LSV2C-010 | 0 | 0 | ~84[a] |
| | LSV2C-012 | 474 | 80 | -- |
| | LSV2C-016 | 449 | 81 | -- |
| | LSV2C-017 | 92 | 58 | -- |
| | LSV2C-019 | 349 | 41 | -- |
| | LSV2C-020 | 252 | 44 | -- |
| | LSV2C-021 | 0 | 69 | ~100 |

[a]While a subset of ~100 organisms were evaluated, scoring criteria were not always possible due to the poor physical state at preservation.

For this assessment, the scoring criteria results of the fry preserved at swim-up, the fry preserved at test termination, and the fry preserved upon death (select samples) were combined. A summary of the raw data can be found in Appendix D of the main Brown Trout report.

# 4.0 References

American Society of Testing and Materials. 2006. *Standard Guide for Conducting Early Life-stage Tests with Fishes. E1241-05*, Philadelphia, PA.

Hardy, Ronald W. 2005. Final Report: Effects of Dietary Selenium on Cutthroat Trout (*Oncorhynchus clarki*) Growth and Reproductive Performance. Prepared for Montgomery Watson Harza. December 14.

Holm, J., V. Palace, P. Siwik, G. Sterling, R. Evans, C. Baron, J. Werner, and K. Wautier. 2005. Developmental Effects of Bioaccumulated Selenium in Eggs and Larvae of Two Salmonid Species. Environmental Toxicology and Chemistry, 24(9): 2373–2381.

Kennedy, C.J., L.C. McDonald, R. Loveridge, and M.M. Strosher. 2000. The Effect of Bioaccumulated Selenium on Mortalities and Deformities in the Eggs, Larvae, and Fry of a Wild Population of Cutthroat Trout (*Oncorhynchus clarki lewisi*). Archives of Environmental Contamination and Toxicology 39:46-52.

Newfields, LLC. 2007. Technical Memorandum. Methods for Testing Adult Brown Trout Reproductive Success. Letter from S. Covington and S. Werner to D. Essig, IDEQ. Prepared for J.R. Simplot.

U.S. Environmental Protection Agency. 2002. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. Fourth Edition. EPA/821/R-02/013.

# Appendix A

## Select photographs of different phases of the brown trout reproductive study

Photo 1: Egg cups used for hatching of brown trout eggs; 10 replicates with 60 (target) eggs / replicate.

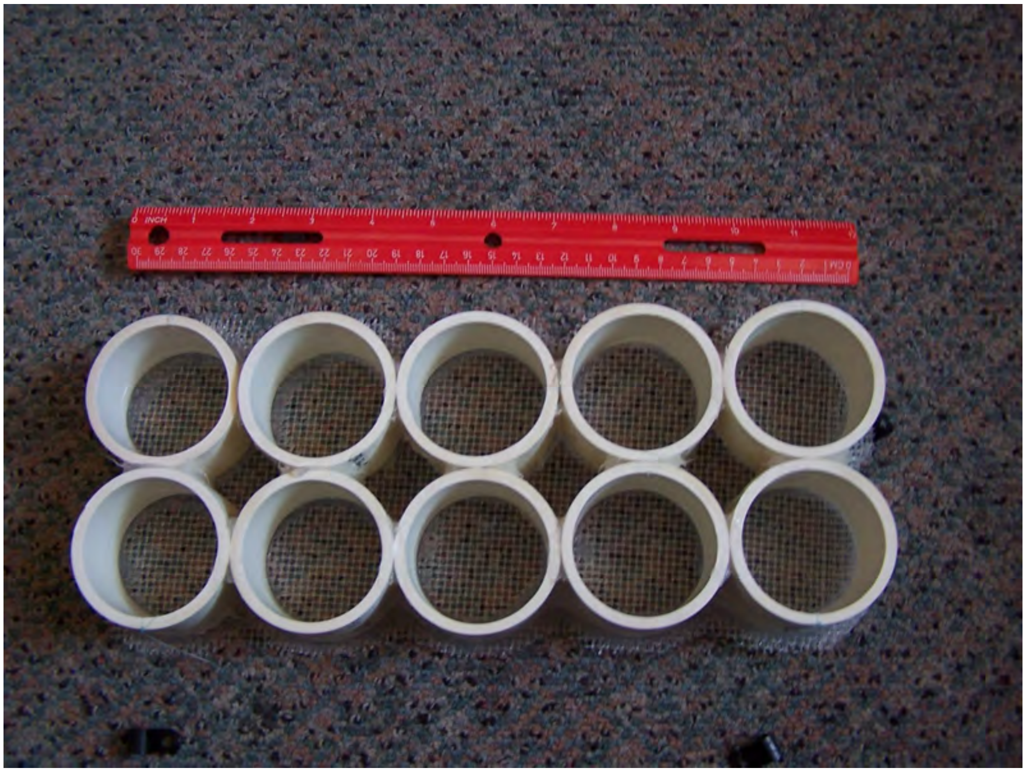


Photo 2: Egg cup with eggs at test initiation. Photo includes egg pickers, container of remaining eggs for analytical, and counter.

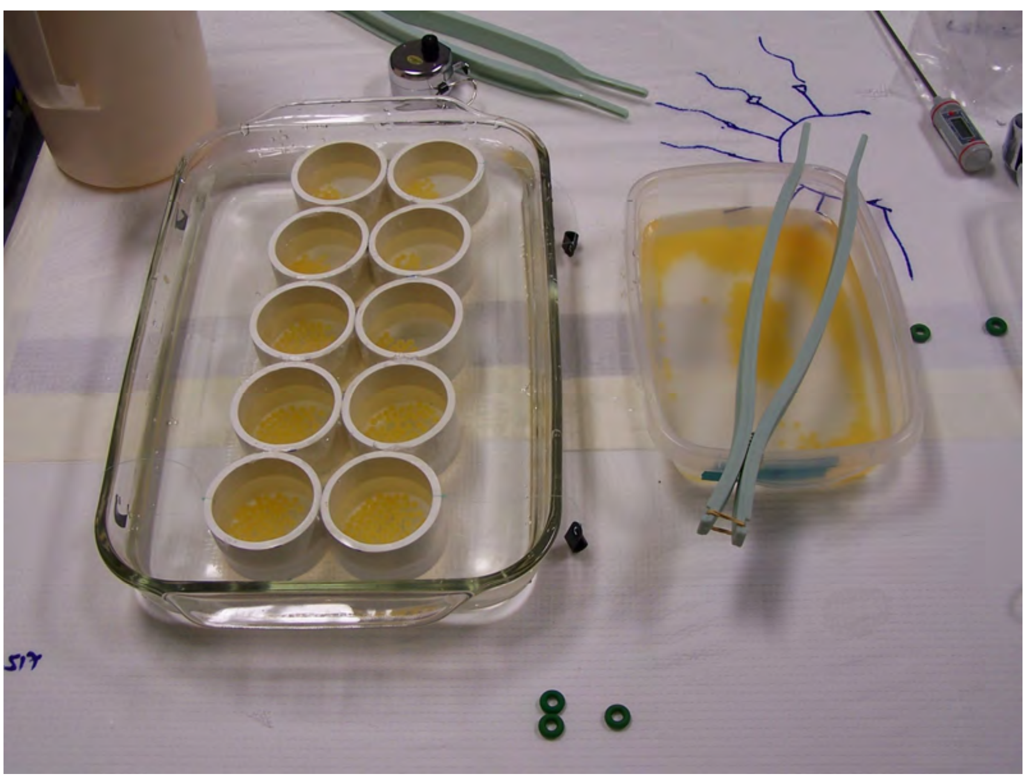


Photo 3: Eggs in egg cups for CC-350-008 brown trout eggs; 10 replicates with 60 eggs / replicate.

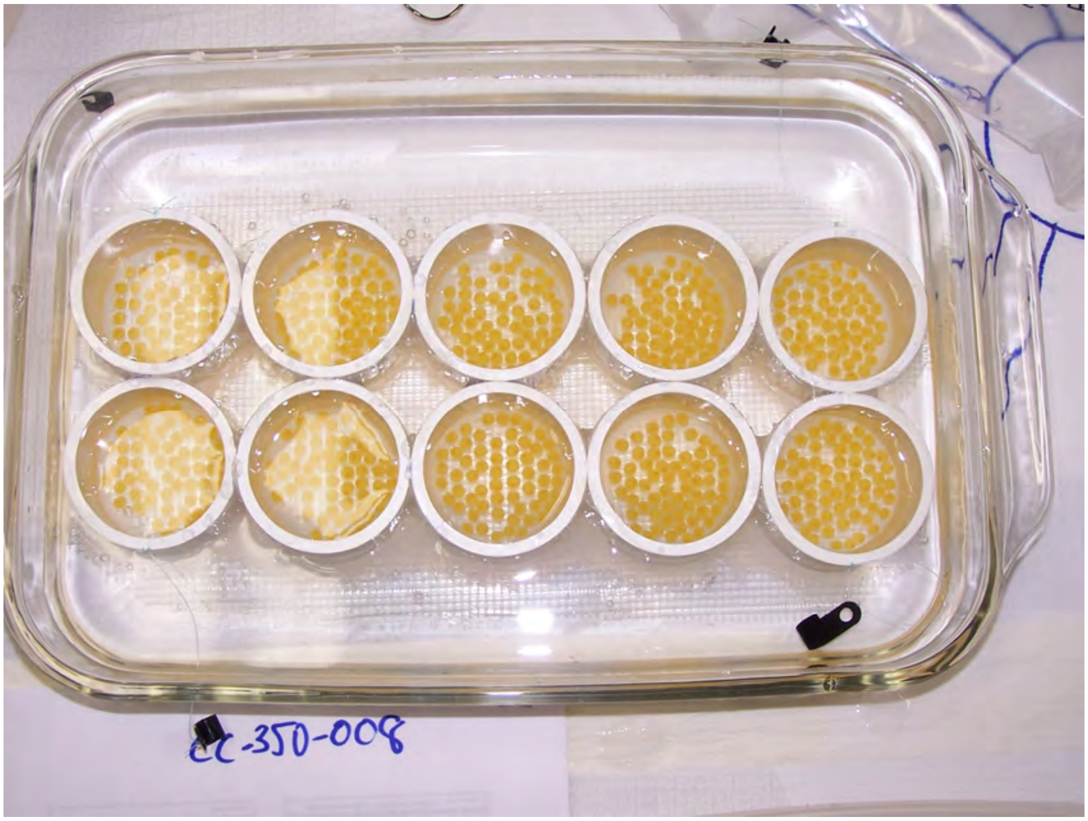



Photo 4: Close up of eggs in egg cup at test initiation.

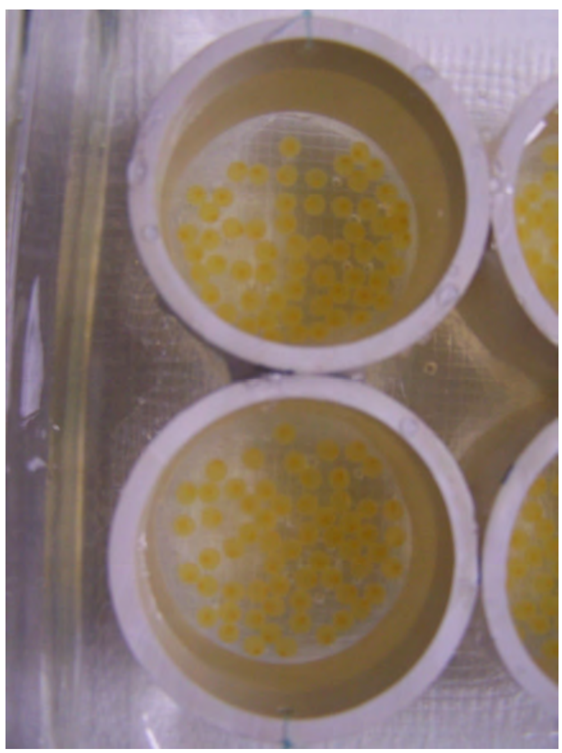


Photo 5: Water bath covered with black curtain to keep brown trout eggs in the dark during initial stage.

Photo 6: Test chambers in water bath for brown trout reproductive study during swim-up stage.

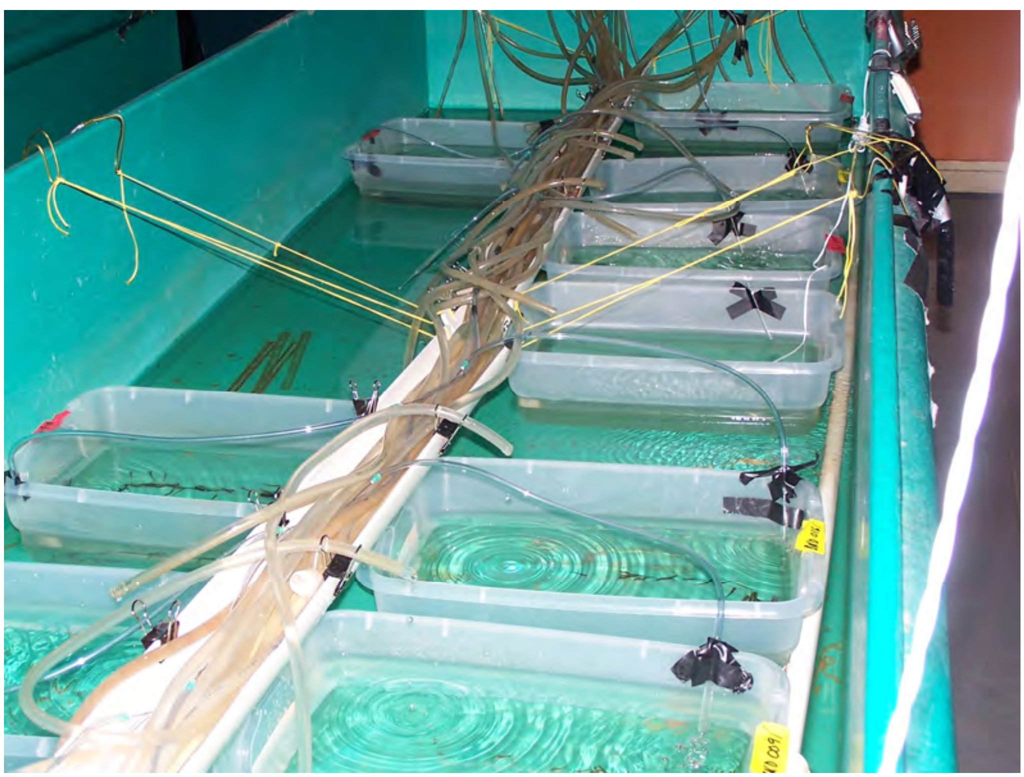


Photo 7: Dilutor panel (one of two) used to feed adjusted Horsetooth water to each testing chamber.


Photo 8: Separation of water bath into light conditions for swimup fry and dark for pre swimup yolk sac fry.

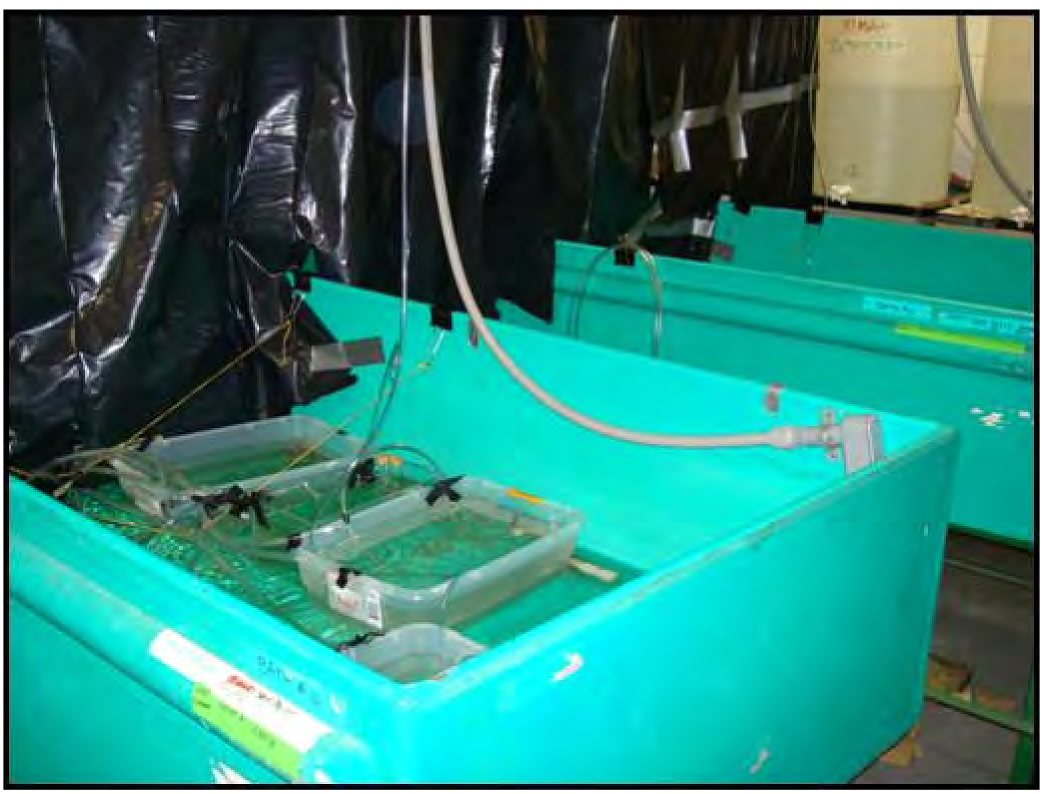


Photo 9: Brown trout fry in test chamber at swim-up (prior to thinning).

Photo 10: Brown trout fry in test chamber at swim-up (after thinning to 100 organisms).

# Appendix B

## Wet weight estimation for adult fish from Saratoga hatchery and raw data for adult fish

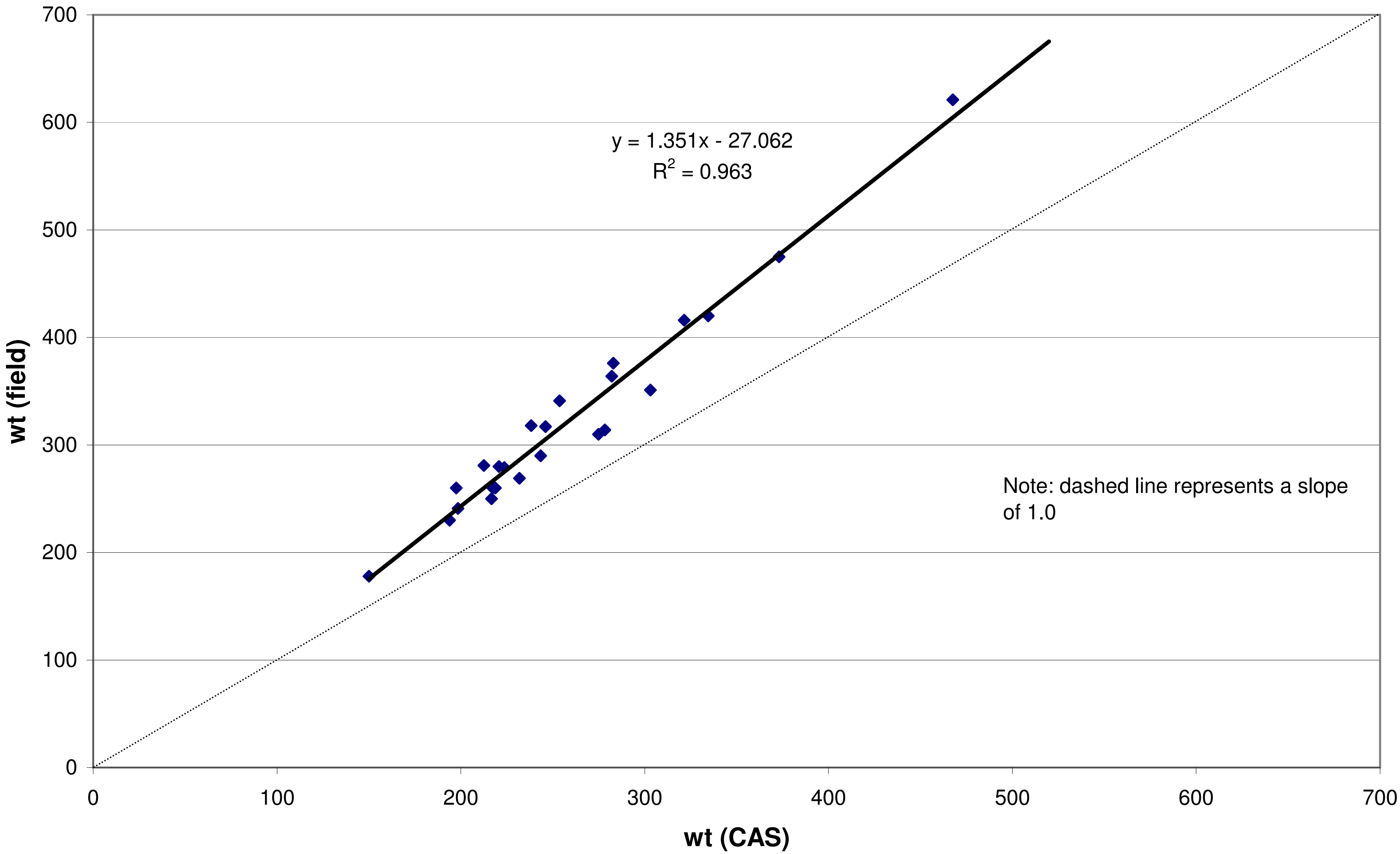
**Data from Brown trout Parental Study, 12699-001**

filename: adult data.xls

| Treatment | **Total # eggs** | Adult fish length (mm) | Adult fish weight (g) CAS | Adult fish weight (g) | | Predicted adult fish wt (g) | Se - whole body (mg/kg dw) | Se Egg (mg/kg dwt) |
|---|---|---|---|---|---|---|---|---|
| SC-001 | **4,173** | 498 | 1,393 | | | 1855.4 | 3.6 | 0.76 |
| SC-002 | **4,005** | 420 | 826 | | | 1088.9 | 4.1 | 0.94 |
| SC-003 | **5,120** | 520 | 1,553 | | | 2071.6 | 3.7 | 0.83 |
| SC-004 | **1,248** | 562 | 2,500 | | | 3350.1 | 4.3 | 0.92 |
| SC-005 | **5,448** | 558 | 2,187 | | | 2927.5 | 3 | 1.2 |
| SC-006 | **3,176** | 439 | 842 | | | 1111.0 | 3.1 | 1.2 |
| SC-007 | **3,224** | 449 | 1,175 | | | 1560.9 | 2.7 | 1 |
| SC-008 | **4,005** | 494 | 1,446 | | | 1926.9 | 2.5 | 0.96 |
| | | | | | | | | |
| SPC-001 | | | | | | | | 0.73 |
| SPC-002 | | | | | | | | 0.73 |
| SPC-003 | | | | | | | | 0.73 |
| SPC-004 | | | | | | | | 0.73 |
| SPC-005 | | | | | | | | 0.73 |
| SPC-006 | | | | | | | | 0.73 |
| | | | | | | | | |
| **High** | | | | | | | | |
| LSV2C-002 | **1,096** | 304 | 221 | 280 | | 271.2 | 8.9 | 12.8 |
| LSV2C-003 | **474** | 300 | 217 | 260 | | 266.6 | 13.8 | **40.3** |
| LSV2C-004 | **766** | 290 | 219 | 260 | | 268.6 | 17.9 | **36** |
| LSV2C-005 | **476** | 294 | 217 | 250 | | 265.6 | 13.6 | **26.8** |
| LSV2C-006 | | 346 | 335 | 420 | | 424.9 | 17.2 | 26.9 |
| LSV2C-007 | **773** | 315 | 243 | 290 | | 301.8 | 6.7 | 18.6 |
| LSV2C-008 | **372** | 296 | 194 | 230 | | 234.8 | 9.6 | 17.7 |
| LSV2C-010 | **161** | 311 | 278 | 314 | | 348.9 | 22.6 | **38.8** |
| LSV2C-012 | **1,031** | 360 | 341 | | | 433.6 | 7.2 | 13.2 |
| LSV2C-016 | **826** | 300 | 198 | 260 | | 239.8 | 9.2 | 13.4 |
| LSV2C-017 | **447** | 341 | 275 | 310 | | 344.3 | 13.2 | 20.5 |
| LSV2C-019 | **693** | 330 | 282 | 364 | | 354.0 | 8.6 | 12.5 |
| LSV2C-020 | **525** | 280 | 198 | 241 | | 241.0 | 11.3 | 11.2 |
| LSV2C-021 | **1,208** | 307 | 246 | 317 | | 305.4 | 20 | **28.1** |
| | | | | | | | | |
| | | | | | | | | |
| **Bkd** | | | | | | | | |
| CC-150-009 | **1,215** | 324 | 520 | 315 | * | 675.3 | 8.4 | 12.8 |
| CC-150-011 | **488** | 342 | 303 | 351 | | 382.4 | 5.6 | 8.4 |
| CC-150-012 | **556** | 317 | 232 | 269 | | 286.1 | 6.7 | 8.5 |
| CC-150-013 | **1,234** | 332 | 283 | 376 | | 355.1 | 5.9 | 8.4 |
| CC-150-015 | **1,003** | 313 | 213 | 281 | | 260.1 | 6 | 9.1 |
| CC-150-016 | **1,658** | 391 | 468 | 621 | | 604.7 | 7 | 7.5 |
| CC-150-017 | **414** | 265 | 150 | 178 | | 175.6 | 5.6 | 6.6 |
| CC-150-018 | **959** | 308 | 224 | 279 | | 275.0 | 4.7 | 6.9 |
| CC-150-020 | **1,332** | 310 | 238 | 318 | | 294.9 | 7.2 | 6.2 |
| | | | | | | | | |
| | | | | | | | | |
| **Low** | | | | | | | | |
| CC-350-006 | **1,154** | 370 | 373 | 475 | | 477.0 | 9.2 | 14 |
| CC-350-007 | **1,174** | 350 | 321 | 416 | | 407.3 | 5.5 | 6.9 |
| CC-350-008 | **922** | 335 | 254 | 341 | | 315.7 | 8.5 | 9.5 |
| | | | | | | | | |
| min (field) | 161 | 265 | 150 | 178 | | 176 | 4.7 | 6.2 |
| max (field) | 1658 | 391 | 520 | 621 | | 675 | 22.6 | 40.3 |

* value not included in developing wet weight estimates for SC hatchery fish

**Relationship between wet wt data of field fish from CAS and from field measurements.**



# Appendix C

# Egg counts for Saratoga hatchery fish (SC) and field collected fish

**Estimation of Brown trout eggs numeration using volume-estimating technique, 12699-001**
**October 25, 2007**
**Hatchery Eggs from Saratoga National Fish Hatchery (SNFH, Saratoga, WY)**

The number of eggs placed into each study was counted manually. For all of the treatments, the remaining number of eggs was estimated using a volume technique to develop a #egg/volume ratio for that particular female. The technique consisted of counting the number of eggs that filled a graduated cylinder to a particular volume (e.g., 50 mL) to determine the # of eggs per mL for that female. Initially we conducted two separate counts by two different staff personnel. Based on the agreement of these counted numbers for the particular volume, we subsequently only conducted counts once per female. Using this ratio, we then calculated the total number of remaining eggs for the total volume of eggs measured in a graduated cylinder. The total number of eggs used to initiate the studies (i.e., 600) was then added to the estimated number of remaining eggs to determine the total number of eggs for that particular female trout.

| Treatment | # Eggs placed in study | Count# | # eggs counted to est. #eggs/vol | Avg # eggs counted | Vol of eggs counted (ml) | Avg # eggs/mL | Total vol (ml) of remaining eggs | **Total # eggs** |
|---|---|---|---|---|---|---|---|---|
| SC-001 | 600 | 1 | 1058 | 1051 | 100 | 10.51 | 340 | **4,173** |
| | | 2 | 1044 | | 100 | | | |
| SC-002 | 600 | 1 | 570 | 567.5 | 50 | 11.35 | 300 | **4,005** |
| | | 2 | 565 | | 50 | | | |
| SC-003 | 600 | 1 | 452 | 452 | 50 | 9.04 | 500 | **5,120** |
| SC-004 | 600 | 1 | 506 | 506 | 50 | 10.12 | 64 | **1,248** |
| SC-005 | 600 | 1 | 480 | 480 | 50 | 9.6 | 505 | **5,448** |
| SC-006 | 600 | 1 | 477 | 477 | 50 | 9.54 | 270 | **3,176** |
| SC-007 | 600 | 1 | 495 | 495 | 50 | 9.9 | 265 | **3,224** |
| SC-008 | 600 | 1 | 532 | 532 | 50 | 10.64 | 320 | **4,005** |
| | | | | | | | **Avg** | **3,800** |
| | | | | | | | **Geomean** | **3,525** |
| | | | | | | | **SD** | **1,305** |
| | | | | | | | **CV** | **34%** |

**Estimation of Brown trout eggs numeration using direct counts and volume-estimation technique, 12699-001**
**November 16 & 17, 2007**
**Treatment eggs from background, low, and high treatment areas (ID)**

The number of eggs placed into each study was counted manually. For almost all of the treatments, the remaining eggs were also counted manually. When there were too many eggs to count, the number of remaining eggs were estimated using a volume technique to develop a #eggs/volume ratio for that particular female. The technique consisted of counting the number of eggs that fill a graduated cylinder to a particular volume (e.g., 50 mL) to determine the # eggs per mL for that female. Using this ratio, we then calculated the total number of remaining eggs for the total volume of eggs measured in the graduated cylinder. The total number of eggs used to initiate the studies (e.g., 600) was then added to this estimated number of remaining eggs to determine the total number of eggs for that particular female trout.

| Treatment | # Eggs placed in study | # Remaining eggs counted | # eggs counted to est. #eggs/vol | Vol of eggs counted (ml) | Avg # eggs/mL | Total vol (ml) of remaining eggs | **Total # eggs** | |
|---|---|---|---|---|---|---|---|---|
| **High** | | | | | | | | |
| LSV2C-002 | 600 | 496 | | | | | **1,096** | |
| LSV2C-003 | 400 | 74 | | | | | **474** | |
| LSV2C-004 | 500 | 266 | | | | | **766** | |
| LSV2C-005 | 300 | 176 | | | | | **476** | |
| LSV2C-006 | eggs dead / dying upon arrival (not counted) | | | | | | | |
| LSV2C-007 | 500 | 273 | | | | | **773** | |
| LSV2C-008 | 300 | 72 | | | | | **372** | |
| LSV2C-010 | 100 | 61 | | | | | **161** | |
| LSV2C-012 | 600 | 431 | | | | | **1,031** | |
| LSV2C-016 | 600 | 226 | | | | | **826** | |
| LSV2C-017 | 300 | 147 | | | | | **447** | |
| LSV2C-019 | 500 | 193 | | | | | **693** | |
| LSV2C-020 | 400 | 125 | | | | | **525** | **Avg** |
| LSV2C-021 | 600 | 608 | | | | | **1,208** | **681** |
| **Bkd** | | | | | | | | |
| CC-150-009 | 600 | 615 | | | | | **1,215** | |
| CC-150-011 | 300 | 188 | | | | | **488** | |
| CC-150-012 | 350 | 206 | | | | | **556** | |
| CC-150-013 | 600 | 634 | | | | | **1,234** | |
| CC-150-015 | 600 | 403 | | | | | **1,003** | |
| CC-150-016 | 600 | | 460 | 50 | 9.2 | 115 | **1,658** | |
| CC-150-017 | 250 | 164 | | | | | **414** | |
| CC-150-018 | 600 | 359 | | | | | **959** | **Avg** |
| CC-150-020 | 600 | 732 | | | | | **1,332** | **984** |
| **Low** | | | | | | | | |
| CC-350-006 | 600 | 554 | | | | | **1,154** | |
| CC-350-007 | 600 | 574 | | | | | **1,174** | **Avg** |
| CC-350-008 | 600 | 322 | | | | | **922** | **1,083** |

10/24/07

BT Fertilization SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

- checked temp in cooler in am
still OK - 6-7°C
Internal
- Temp range of the cooler
from Saratoga until Wed am
was 6.1 - 9.7°C
(9.7°C was initial reading taken on
10/30 before thermometer had equilibrated
in cooler)

gametes obtained on 10/23/08

Treatments
SC-001
-002
-003
-004
-005
-006
-007
-008

General
Fertilization process

1) - place eggs in plastic container (RubberMaid 32oz plastic container)
- estimate vol. using surrogate container w/ $H_2O$ (similar levels

2) Add semen (we composited semen from 6 of the 8 males, too much yellow color in those 2)
~1 ml of semen to each batch of eggs, spread around container

3) mix by gently swirling container

4) sit for ~60 sec (sometimes this time includes mixing

5) added 100 ml of 6°C HT modified water (from RBT tank)
i.e. enough to cover eggs

6) gently swirl container (w/ eggs/semen) for 3 min

7) add ~500 ml more of 6°C HT modified water to water harden

8) placed in cooler w/ ice in bottom (still in tupperware) to slowly acclimate eggs to ~10°C (over plus ice will slowly melt & temp will rise)

9) Added eggs to egg cups
10/25 & placed in water bath

Egg estimation technique

10/25/07 SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

#1 100 mL of eggs = 1058 eggs (340 mL)
1044 eggs

#2 50 mL of eggs = 570 eggs (300 mL)
565 eggs

#3 50 mL of eggs = 452 eggs (500 mL)

#4 50 mL of eggs = 506 (64 mL) eggs more yellow than orange (others more orange)

#5 50 mL of eggs = 480 eggs (505 mL)

#6 50 mL of eggs = 477 (270 mL)

#7 50 mL of eggs = 495 (265 mL)

#8 50 mL of eggs = 532 (320 mL)

Results of egg estimation technique

Tried to count using an egg counter (Marisource, Inc) but too large & eggs too large - doubled up in holes. Came up with this technique.

Measurement of Adult SC trout

SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

10/25/07 @ 1600 GJM & TD

females

| | C.P. | total length * |
|---|---|---|
| SC-001 | 428 mm | 498 mm |
| SC-002 | 360 mm | 420 mm |
| SC-003 | 440 mm | 520 mm |
| SC-004 | 470 mm | 562 mm |
| SC-005 | 475 mm | 558 mm |
| SC-006 | 365 mm | 439 mm |
| SC-007 | 385 mm | 449 mm |
| SC-008 | 411 mm | 494 mm |
| SC-001 male milt 006 | 238 mm | 290 mm |

length measurements for adult Brown trout used in reproductive study

C.P. = caudal peduncle

11/16/07

SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME: ①

1315 start placing fert eggs in ~~f~~ egg cups 60/cup = 600/test } target
RBW & KT

Measured DO in LSU2C-002 ≥ 10.0 mg/L
- rinse off eggs w/ modified HT, transfer w/ egg pickers
eggs in egg cups

| | | | | |
|---|---|---|---|---|
| | LSU2C-002 ✓ | 60 eggs each | -600 | rest to count in cooler |
| | -003 | 40 eggs each | -400 | " |
| | -004 | 50 eggs each | -500 | " |
| | -005 | 30 eggs each | -300 | |
| | -006 | eggs turned white - freeze for tissue analysis | | |
| | -007 | 50 eggs each | -500 | |
| Start small bags | -008 | 30 eggs each | -300 | |
| yellowish | -010 | 10 eggs each | 100 | 61 for tissue (161 total) |
| yellowish | -012 (eggs looked larger) | 60 eggs each | 600 | |
| yellowish | -016 | 60 ~~50~~ ~~60~~ ② eggs each | ~~500~~ 600 ② | |
| | -017 | 30 eggs each | 300 | |
| | -019 (eggs looked larger) | 50 eggs each | 500 | |
| yellowish | -020 | 40 eggs each | 400 | |
| yellowish | 021 | 60 eggs each | 600 | |

~~end @ 1800hrs~~ still need to count remaining eggs

min/max temp in cooler 6.2-8.4 during overnight equilibration

①RBW 11/16/07 E. ② RBW 10/23/08 cf: # of organisms from test indicate 600 organisms were counted at initiation

11/17/07 Cooler #2 for ID

SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

eggs collect 11/15

collected 11/15/07 @1605

1038 start placing fert eggs in egg cups
cooler min-max during equilibration period 7.9-8.9°C
all in smaller bags

| | | | |
|---|---|---|---|
| CC-350-006 – | | 60 eggs each | – 600 eggs |
| -007 | smaller eggs | 60 eggs each | – 600 eggs |
| -008 | larger eggs | 60 eggs each | 600 eggs |

11/15/07 1300

| | | | |
|---|---|---|---|
| CC-150-009 | smaller/yellowish | 60 eggs each | 600 eggs |
| -011 | few/yellowish | 30 eggs each | 300 eggs |
| -012 | /yellowish | 35 eggs each | 350 eggs |
| -013 | smaller/yellowish | 60 eggs each | 600 eggs |
| -015 | " | 60 eggs each | 600 eggs |
| -016 | larger/orangeish | 60 eggs each | 600 eggs |
| -017 | few/yellowish | 25 eggs each | 250 eggs |
| -018 | | 60 eggs each | 600 eggs |
| -020 | | 60 eggs each | 600 eggs |

ID

CC-350-006
-007
-008
low site

CC-150-009
-011
-012
-013
-015
-016
-017
-018
-020
BKD site

finished @ 1545

11/19/07 SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

| | #eggs/50mL | #mL |
|---|---|---|
| CC150-16 | 460 | 115 |
| CC150-20 | 732 (total) | — |
| CC 150-13 | 634 (total) | — |
| CC 150-09 | 615 (total) | — |
| ~~15112C① 020~~ | ~~125 (total)~~ | ~~—~~ |
| CC 150-18 | 359 (total) | — |
| CC150-12 | 206 (total) | — |
| CC150-17 | 164 (total) | — |
| CC150-15 | 403 (total) | — |
| CC150-11 | 188 (total) | — |

① gw 11/19/07 WP

11/19/07 SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

| | #eggs/50mL | #mL | |
|---|---|---|---|
| CC 350-008 | 322 (total) | — | |
| CC 350-007 | 574 (total) | — | |
| CC350-006 | 554 (total) | — | GKM |

11/19/07 SUBJECT: DAILY LOG

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME:

| | # eggs/50mL | # mL volume |
|---|---|---|
| LSV2C-020 | 125 (total) | — |
| LSV2C-021 | 608 (total) | — |
| LSV2C-012 | 431 (total) | — |
| LSV2C-017 | 147 (total) | — |
| LSV2C-016 | 226 (total) | — |
| LSV2C-002 | 496 (total) | — |
| LSV2C-019 | 193 (total) | — |
| LSV2C-008 | 72 (total) | — |
| LSV2C-007 | 273 (total) | — |
| LSV2C-003 | 74 (total) | — |
| LSV2C-004 | 266 (total) | — |
| LSV2C-010 | 161 (total) - includes eggs in chamber (only one like this) | |
| LSV2C-005 | 176 (total) | — |

# Appendix D

## Summary of fungal treatment methods for SC Hatchery eggs and field collected eggs

**Treatment of brown trout eggs for fungal control. Study # 12699-001**

Different methods were employed in order to help control fungal growth and improve overall success rate of the brown trout eggs in the reproductive study. As mentioned in the report, this primarily affected only the SC hatchery eggs because they were the first batch to get in. And additional methods were employed to reduce fungal growth with the field collected eggs (initiated Nov. 16 & 17, 2008) and the second set of hatchery eggs (initiated Dec. 4, 2007).

November 2, 2007:
1% salt (as NaCl) solution was added to SC-002 and SC-004 chambers (i.e., 50 g of NaCl was mixed with small amount of water from each test chamber until all salt was dissolved and added). Measured chloride concentration at 5,620 mg/L. Time = 1700 hrs.

Conductivity check at 1920 hrs:
SC-004 @ 12,800 $\mu S/cm^2$
SC-002 @ 11,440 $\mu S/cm^2$
Background conductivity @ 123 $\mu S/cm^2$

November 3, 2007:
Conductivity check in chambers @ 0550 hrs
SC-004 @ 1,770 $\mu S/cm^2$
SC-002 @ 2,670 $\mu S/cm^2$
Background conductivity @ 118 $\mu S/cm^2$

1% salt (as NaCl) solution was added to SC-003 (@0630 hrs) and SC-001 (@0700 hrs) chambers (i.e., 50 g of NaCl was mixed with small amount of water from each test chamber until all salt was dissolved and added).

Conductivity check in chambers @ 1620 hrs
SC-004 @ 343 $\mu S/cm^2$
SC-002 @ 602 $\mu S/cm^2$
SC-001 @ 3,660 $\mu S/cm^2$
SC-003 @ 3,830 $\mu S/cm^2$

November 6, 2007:

Installed small UV disinfection system on HT water line prior to going into 5-gallon head tank bucket above dilutor panel. This treats all water going into the study. Because there was algal / fungal growth in 5-gallon head tank, treated head tank with NaCl (189 g mixed in 5 gallons). Salt solution was allowed to flush through the dilutor and into the test chambers (SC test chambers only).

November 9, 2007:

Added 50 g of NaCl to each SC chamber because still seeing fungus (*Saprolegnia*?).

November 12, 2007:

Now that eggs were eyed up, salt treatment consisted of removing egg cups from test chamber (SC treatments) and soaking in 3% salt treatment for 1 hour, and then transferring back to cleaned test chamber. Treated drip lines with (~1,700 ppm) formalin. The formalin solution did not go into test chambers with eggs.

November 16, 2007:

A 1.5% NaCl solution (75 g NaCl) was added to 5 L water in test container for SC hatchery eggs.

November 24, 2007:

Saw some dead eggs in newly received field egg treatments. Add 190 g of NaCl to 5 gal head tank. Let it flush through dilutor and into all chambers.

November 25, 2007:

Measured conductivity @ 0800 hrs, ~200 µS/cm$^2$. Moved all SC hatchery eggs into new egg cups. Let soak in 3% NaCl solution (60 g / 2 L) for ~ 1 h while being transferred into new egg cups. Some eggs were very covered by fungus. SC005 treatment appeared to have a lot of unfertilized (non-eyed up) eggs. Cleaned (soap and water wash) SC test chambers while eggs were in NaCl soak (all SC treatments).

Treated all test chambers in bath #2 (ENSR water bath #3) with 1.5% NaCl, except SC chambers. Mixed 75 g NaCl with deionized water (Milli-Q) and poured into each chamber. 15 test chambers in all for bath #2.

Consisted of: CC-350-(LOW)-007
CC-150-(BKD)-009, -012, -015, & -016
LSV2C-(HIGH)-004, -005, -007, -008, -017, -019, & -020
SPC-(2$^{ND}$ HATCHERY)-002, -003, & -006

November 26, 2007:

Treated all test chambers in bath #1 (ENSR water bath #4) with 1.5% NaCl, except SC chambers. Mixed 75 g NaCl with deionized water (Milli-Q) and poured into each chamber. 16 test chambers in all for bath #1.

Consisted of: CC-350-(LOW)-006 & -008
CC-150-(BKD)-011, -013, -017, -018, & -020
LSV2C-(HIGH)-002, -003, -010, -012, -016, & -021
SPC-(2$^{ND}$ HATCHERY)-001, -004, & -005

Drained and cleaned large circular (trout tank) hardness mixing tank. Chambers were static for ~2 hours.

November 28, 2007:

Soaked SC treatments by placing egg cups in 3% NaCl for one hour (120 g / 4 L) in separate chamber. Removed and placed back into test chambers. Cleaned as necessary.

November 29, 2007:

After discussions with S. Covington and hatchery personnel, decided to use formalin to help minimize fungal growth on SC eggs. Treated SC-001 eggs with formalin (~1700 ppm, 6.8 ml in 4 L), by placing egg cup in separate chamber with formalin (next to original test chamber in water bath). From 1054 hrs to 1115 hrs.

Also treated with following test chambers with formalin in a similar way.

SC-002 (1124 hrs to 1140 hrs)
SC-003 (1142 hrs to 1157 hrs)
LSV2C-(HIGH)-007 (1720 hrs to 1738 hrs).

Noticed a lot of dead / dying eggs in the LSV2C-(HIGH)-007 treatment at the end of the day so decided to treat with formalin, even though it did not appear that there was fungus on these eggs[1].

November 30, 2007:

Treated the following egg treatments with formalin (~1700 ppm, as 7 ml in 4 L). Performed in secondary chamber as before, soaked for ~30 min, and returned to original chamber. Started soak at 1520 hrs, finish at 1550 hrs.

SC-001, SC-005, SC-007, SC-008 (bath #1)
SC-004, SC-002, SC-003, SC-006 (bath #2)

December 1, 2007:

Placed egg cup for SC-001 in old formalin solution (prepared on Nov. 30, but still in water bath) for 15 minutes. Returned to original test chamber.

December 2, 2007:

Treat SC-001 with formalin by mixing 8.5 ml in 200 ml water (i.e., cold hardness adjusted Horsetooth water, similar as all preps before). Poured this mixture directly into test chamber (assumes ~5L so target is ~1700 ppm). After 15 min, pur 4 L HT water into test chamber to flush out formalin.

Still seeing fungus on control eggs, try a 4% NaCl solution on 1 SC batch for 1 hour. Prepared by dissolving 200 g NaCl in 1 L of water and pouring directly into test chamber (assumes 5 L of water in chamber). Added to SC-005 @ 1340 hrs.

Treated the following test chambers with formalin (8.5 ml into test chamber for 15 minutes, followed by 4-5L flush): SC-004, SC-002, SC-006

December 3, 2007:

Observed first hatched out alevin in SC-004 and 1 egg that appeared to explode (termed 'dead while hatching').

[1] None of these eggs appeared to be fertilized and all eventually died.

No more treatments for SC test chambers.

December 5, 2007:

Added 1% NaCl (50 g NaCl, assuming 5 L water in each chamber) to all test chambers except SC treatments (-001 through -008), and SPC-002, and SPC-004 (small SPC test chambers, i.e., ~ 2.5 L chambers).

December 7, 2007:

Clean out test chambers for LSV2C-008 and -019 with soap and water and replaced in bath.

December 8, 2007:

Cleaned egg cups by brushing outside surface with toothbrush. Did not disturb eggs. After cleaning egg cup, placed egg cup into a cleaned test chamber. This was done for the following treatments.

> LSV2C-(HIGH)-017, -020, -007 (transferred few remaining eggs to a new egg cup), -005, -004, -010, -002, & -016

December 9, 2007:

Cleaned egg cups by brushing outside surface with toothbrush. Did not disturb eggs. After cleaning egg cup, placed egg cup into a cleaned test chamber. Also replaced aeration pipettes. This was done for the following treatments.

> LSV2C-(HIGH)-021, -012, & -003

December 10, 2007:

Cleaned egg cups by brushing outside surface with toothbrush. Did not disturb eggs. After cleaning egg cup, placed egg cup into a cleaned test chamber. Also replaced aeration pipettes. This was done for the following treatments.

> CC-350-(LOW)-006, -007, & -008
> CC-150-(BKD)-009, -015, & -016

December 7 – 18, 2007:

Noticed that flows on some treatments were reduced due to fouling of tubing lines (from splitter box to test chamber). Flushed out lines with hydrogen peroxide (1.5%). Test chambers were static during the flush out and either overnight or during the day (~ 8 hr) while water was allowed to flush through the tubing to waste. Also blew biofilm out of some lines, but this did not work for all chambers. This was done over a period of time because there were only a few extra tubing lines that did not directly feed a treatment. Therefore, a few were cleaned each day and allowed to flush prior to using for a test chamber.

December 31, 2007:

Egg cup for LSV2C-(HIGH)-019 was very dirty so changed out with clean egg cup.

<u>January 1, 2008</u>:

Egg cups for the following treatments were very dirty so changed out with clean egg cups:

LSV2C-(HIGH)-021, -004 & -012
CC-150-(BKD)-013 & -012
CC-350-(LOW)-006

<u>January 2, 2008</u>:

Cleaned dilutor panels (scrubbing only) to remove biofilm buildup. Test chambers were static for ~ 1 hr during this time.

<u>January 18, 2008</u>:

Exchanged test chamber for LSV2C-(HIGH)-003 with clean one due to fungal growth and high mortality.

# Appendix E

## Summary of water quality data selenium and sulfate analysis in water and selenium concentrations in eggs measure during reproductive study

**ENSR**

| | | | |
|---|---|---|---|
| Project ID: | 12699-001 | ACZ Sample ID: | ***L72820-01*** |
| Sample ID: | SPC-TOT | Date Sampled: | *10/30/08 15:10* |
| | | Date Received: | *11/04/08* |
| | | Sample Matrix: | *Ground Water* |

Inorganic Prep

| Parameter | EPA Method | Result | Qual | XQ | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| Total Recoverable Digestion | M200.2 ICP-MS | | | | | | | 11/07/08 11:28 | jws |

Metals Analysis

| Parameter | EPA Method | Result | Qual | XQ | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| Selenium, total recoverable | M200.8 ICP-MS | | U | | mg/L | 0.0001 | 0.0005 | 11/09/08 6:44 | erf |

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

# Inorganic Analytical Results

**ENSR**

| | | | |
|---|---|---|---|
| Project ID: | 12699-001 | ACZ Sample ID: | ***L72820-02*** |
| Sample ID: | SPC-DISS | Date Sampled: | *10/30/08 15:10* |
| | | Date Received: | *11/04/08* |
| | | Sample Matrix: | *Ground Water* |

Metals Analysis

| Parameter | EPA Method | Result | Qual | XQ | Units | MDL | PQL | Date | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| Selenium, dissolved | M200.8 ICP-MS | | U | | mg/L | 0.0001 | 0.0005 | 11/12/08 2:33 | erf |

# Total Recoverable SELENIUM

## Method SW6010B

## Sample Results

**Lab Name:** Paragon Analytics
**Client Name:** ENSR Consulting and Engineering
**Client Project ID:** Brown Trout 12699-001
**Work Order Number:** 0711270
**Reporting Basis:** As Received
**Prep Method:** SW3005A

**Final Volume:** 50 g
**Matrix:** WATER
**Result Units:** mg/l

| Client Sample ID | Lab ID | Date Collected | Date Prepared | Date Analyzed | Percent Moisture | Dilution Factor | Result | Reporting Limit | Flag | Sample Aliquot |
|---|---|---|---|---|---|---|---|---|---|---|
| HT + metals | 0711270-2 | 10/26/2007 | 12/04/2007 | 12/05/2007 | N/A | 1 | 0.005 | 0.005 | U | 50 g |
| Modified HT | 0711270-4 | 11/17/2007 | 12/04/2007 | 12/05/2007 | N/A | 1 | 0.005 | 0.005 | U | 50 g |
| HT + metals | 0711270-7 | 11/29/2007 | 12/04/2007 | 12/05/2007 | N/A | 1 | 0.005 | 0.005 | U | 50 g |

**Comments:**

1. ND or U = Not Detected at or above the client requested detection limit.

**Data Package ID:** *IT0711270-1*

# Total Recoverable ICP Metals

## Method SW6010B

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0712111
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

| | | | |
|---|---|---|---|
| **Field ID:** HT+ metals | **Sample Matrix:** WATER | **Prep Batch:** IP071217-2 | **Sample Aliquot:** 50 g |
| **Lab ID:** 0712111-2 | **% Moisture:** N/A | **QCBatchID:** IP071217-2-1 | **Final Volume:** 50 g |
| | **Date Collected:** 13-Dec-07 | **Run ID:** IT071218-2A1 | **Result Units:** mg/l |
| | **Date Extracted:** 17-Dec-07 | **Cleanup:** NONE | **Clean DF:** 1 |
| | **Date Analyzed:** 18-Dec-07 | **Basis:** As Received | **File Name:** 071218A. |
| | **Prep Method:** SW3005 Rev A | | |

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 7782-49-2 | SELENIUM | 1 | 0.005 | 0.005 | U | |

**Data Package ID:** *IT0712111-1*

# Total Recoverable ICP Metals

## Method SW6010B

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0801009
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

**Field ID:** HT + metals
**Lab ID:** 0801009-2

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 03-Jan-08
**Date Extracted:** 04-Jan-08
**Date Analyzed:** 07-Jan-08
**Prep Method:** SW3005 Rev A

**Prep Batch:** IP080104-3
**QCBatchID:** IP080104-3-1
**Run ID:** IT080107-2A1
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 50 g
**Final Volume:** 50 g
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 080107A.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 7782-49-2 | SELENIUM | 1 | 0.005 | 0.005 | U | |

**Data Package ID:** *IT0801009-1*

# Total Recoverable ICP Metals

## Method SW6010B
## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0801127
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

**Field ID:** HT
**Lab ID:** 0801127-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 16-Jan-08
**Date Extracted:** 17-Jan-08
**Date Analyzed:** 18-Jan-08
**Prep Method:** SW3005 Rev A

**Prep Batch:** IP080117-1
**QCBatchID:** IP080117-1-1
**Run ID:** IT080118-2A1
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 50 g
**FinalV olume:** 50 g
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 080118A.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 7782-49-2 | SELENIUM | 1 | 0.005 | 0.005 | U | |

**Data Package ID:** *IT0801127-1*

# Dissolved ICP Metals

## Method SW6010B
## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0801254
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

**Field ID:** SPC control 001
**Lab ID:** 0801254-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 22-Jan-08
**Date Extracted:** 31-Jan-08
**Date Analyzed:** 31-Jan-08
**Prep Method:** SW3005 Rev A

**Prep Batch:** IP080131-10
**QCBatchID:** IP080131-10-1
**Run ID:** IT080131-2A1
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**FinalV olume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 080131A.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 7782-49-2 | SELENIUM | 1 | 0.0099 | 0.005 | | |

**Data Package ID:** *IT0801254-1*

# Total Recoverable ICP Metals

## Method SW6010B
## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0801228
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

**Field ID:** HT+Ions &Metals
**Lab ID:** 0801228-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 28-Jan-08
**Date Extracted:** 29-Jan-08
**Date Analyzed:** 30-Jan-08
**Prep Method:** SW3005 Rev A

**Prep Batch:** IP080129-4
**QCBatchID:** IP080129-4-2
**Run ID:** IT080130-2A1
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 50 g
**FinalV olume:** 50 g
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 080130A.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 7782-49-2 | SELENIUM | 1 | 0.005 | 0.005 | U | |

**Data Package ID:** *IT0801228-1*

# Total Recoverable SELENIUM

## Method SW6010B

## Sample Results

**Lab Name:** Paragon Analytics
**Client Name:** ENSR Consulting and Engineering
**Client Project ID:** Brown Trout 12699-001
**Work Order Number:** 0802095 **FinalV olume:** 50 g
**Reporting Basis:** As Received **Matrix:** WATER
**Prep Method:** SW3005A **Result Units:** mg/l

| Client Sample ID | Lab ID | Date Collected | Date Prepared | Date Analyzed | Percent Moisture | Dilution Factor | Result | Reporting Limit | Flag | Sample Aliquot |
|---|---|---|---|---|---|---|---|---|---|---|
| HT + METALS | 0802095-2 | 02/12/2008 | 02/19/2008 | 02/20/2008 | N/A | 1 | 0.005 | 0.005 | U | 50 g |
| HIGH 003 | 0802095-3 | 02/12/2008 | 02/19/2008 | 02/20/2008 | N/A | 1 | 0.005 | 0.005 | U | 50 g |
| HIGH 010 | 0802095-4 | 02/12/2008 | 02/19/2008 | 02/20/2008 | N/A | 1 | 0.005 | 0.005 | U | 50 g |
| BKD 009 | 0802095-5 | 02/12/2008 | 02/19/2008 | 02/20/2008 | N/A | 1 | 0.005 | 0.005 | U | 50 g |

**Comments:**

1. ND or U = NotD etected at or above the clientr equested detection limit.

**Data Package ID:** *IT0802095-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0710227
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout1269 9-001

**Field ID:** HT from panel
**Lab ID:** 0710227-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 23-Oct-07
**Date Extracted:** 23-Oct-07
**Date Analyzed:** 23-Oct-07
**Prep Method:** NONE

**Prep Batch:** IC071023-1
**QCBatchID:** IC071023-1-1
**Run ID:** ic071023-1a
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**FinalV olume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 71023_020.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 17 | 1 | | |

**Data Package ID:** *ic0710227-1*

# SULFATE

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Client Name:** ENSR Consulting and Engineering
**Client Project ID:** Brown Trout 12699-001
**Work Order Number:** 0711270
**Reporting Basis:** As Received
**Prep Method:** NONE

**Final Volume:** 5 ml
**Matrix:** WATER
**Result Units:** mg/l

| Client Sample ID | Lab ID | Date Collected | Date Prepared | Date Analyzed | Percent Moisture | Dilution Factor | Result | Reporting Limit | Flag | Sample Aliquot |
|---|---|---|---|---|---|---|---|---|---|---|
| HT + Ions | 0711270-1 | 10/26/2007 | 11/30/2007 | 11/30/2007 | N/A | 1 | 26 | 1 | | 5 ml |
| Modified HT Ions | 0711270-3 | 11/17/2007 | 11/30/2007 | 11/30/2007 | N/A | 1 | 26 | 1 | | 5 ml |
| HT + Ions | 0711270-5 | 11/21/2007 | 11/30/2007 | 11/30/2007 | N/A | 1 | 24 | 1 | | 5 ml |
| HT + Ions | 0711270-6 | 11/29/2007 | 11/30/2007 | 11/30/2007 | N/A | 1 | 23 | 1 | | 5 ml |

**Comments:**

1. ND or U = Not Detected at or above the client requested detection limit.

**Data Package ID:** *ic0711270-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0711046
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout1269 9-001

**Field ID:** HT from dilutor panel
**Lab ID:** 0711046-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 01-Nov-07
**Date Extracted:** 06-Nov-07
**Date Analyzed:** 06-Nov-07
**Prep Method:** NONE

**Prep Batch:** IC071106-1
**QCBatchID:** IC071106-1-1
**Run ID:** ic071106-1a
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**FinalV olume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 71106_044.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 22 | 1 | | |

**Data Package ID:** *ic0711046-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0712041
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

**Field ID:** HT + Ions
**Lab ID:** 0712041-1

**Sample Matrix:** LIQUID
**% Moisture:** N/A
**Date Collected:** 06-Dec-07
**Date Extracted:** 10-Dec-07
**Date Analyzed:** 10-Dec-07
**Prep Method:** NONE

**Prep Batch:** IC071210-1
**QCBatchID:** IC071210-1-1
**Run ID:** ic071210-1a
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**Final Volume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 71210_023.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 27 | 1 | | |

**Data Package ID:** *ic0712041-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0712111
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

**Field ID:** HT+ Ions
**Lab ID:** 0712111-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 13-Dec-07
**Date Extracted:** 14-Dec-07
**Date Analyzed:** 14-Dec-07
**Prep Method:** NONE

**Prep Batch:** IC071214-1
**QCBatchID:** IC071214-1-1
**Run ID:** ic071214-1a
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**Final Volume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 71214_020.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 27 | 1 | | |

**Data Package ID:** *ic0712111-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0801009
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout 12699-001

**Field ID:** HT + Ions
**Lab ID:** 0801009-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 03-Jan-08
**Date Extracted:** 04-Jan-08
**Date Analyzed:** 04-Jan-08
**Prep Method:** NONE

**Prep Batch:** IC080104-1
**QCBatchID:** IC080104-1-1
**Run ID:** Ic070104-1a
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**Final Volume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 80104_069.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 22 | 1 | | |

**Data Package ID:** *ic0801009-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0801127
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout1269 9-001

| | | | |
|---|---|---|---|
| **Field ID:** HT<br>**Lab ID:** 0801127-1 | **Sample Matrix:** WATER<br>**% Moisture:** N/A<br>**Date Collected:** 16-Jan-08<br>**Date Extracted:** 17-Jan-08<br>**Date Analyzed:** 17-Jan-08<br>**Prep Method:** NONE | **Prep Batch:** IC080117-1<br>**QCBatchID:** IC080117-1-1<br>**Run ID:** ic080117-1a<br>**Cleanup:** NONE<br>**Basis:** As Received | **Sample Aliquot:** 5 ml<br>**FinalV olume:** 5 ml<br>**Result Units:** mg/l<br>**Clean DF:** 1<br>**File Name:** 80117_041. |

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 19 | 1 | | |

**Data Package ID:** *ic0801127-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0801228
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout1269 9-001

**Field ID:** HT+Ions &Metals
**Lab ID:** 0801228-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 28-Jan-08
**Date Extracted:** 30-Jan-08
**Date Analyzed:** 30-Jan-08
**Prep Method:** NONE

**Prep Batch:** IC080130-1
**QCBatchID:** IC080130-1-1
**Run ID:** ic080130-1a
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**FinalV olume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 80130_025.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 23 | 1 | | |

**Data Package ID:** *ic0801228-1*

# Ion Chromatography

## Method EPA300.0 Revision 2.1

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0802095
**Client Name:** ENSR Consulting and Engineering
**ClientProject ID:** Brown Trout1269 9-001

**Field ID:** HT + IONS
**Lab ID:** 0802095-1

**Sample Matrix:** WATER
**% Moisture:** N/A
**Date Collected:** 12-Feb-08
**Date Extracted:** 19-Feb-08
**Date Analyzed:** 20-Feb-08
**Prep Method:** NONE

**Prep Batch:** IC080219-1
**QCBatchID:** IC080219-1-1
**Run ID:** ic080219-1a
**Cleanup:** NONE
**Basis:** As Received

**Sample Aliquot:** 5 ml
**FinalV olume:** 5 ml
**Result Units:** mg/l
**Clean DF:** 1
**File Name:** 80219_062.

| CASNO | Target Analyte | Dilution Factor | Result | Reporting Limit | Result Qualifier | EPA Qualifier |
|---|---|---|---|---|---|---|
| 14808-79-8 | SULFATE | 1 | 19 | 1 | | |

**Data Package ID:** *ic0802095-1*

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

**Client:** New Fields Environmental
**Project:** Se in Tissue
**Sample Matrix:** Tissue

**Service Request:** K0712111
**Date Collected:** 10/25-11/14/07
**Date Received:** 12/21/07

Solids, Total

Prep Method: NONE
Analysis Method: Freeze Dry
Test Notes:

Units: PERCENT
Basis: Wet

| Sample Name | Lab Code | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|
| SM1007-SNFH-FT0058 | K0712111-001 | 1/10/08 | 31.2 | |
| SM1007-SNFH-FT0059 | K0712111-002 | 1/10/08 | 26.0 | |
| SM1007-SNFH-FT0060 | K0712111-003 | 1/10/08 | 31.1 | |
| SM1007-SNFH-FT0061 | K0712111-004 | 1/10/08 | 23.8 | |
| SM1007-SNFH-FT0062 | K0712111-005 | 1/10/08 | 31.0 | |
| SM1007-SNFH-FT0063 | K0712111-006 | 1/10/08 | 29.5 | |
| SM1007-SNFH-FT0064 | K0712111-007 | 1/10/08 | 27.9 | |
| SM1007-SNFH-FT0065 | K0712111-008 | 1/10/08 | 29.8 | |
| SM1107-LSV2c-FT0066 | K0712111-009 | 1/10/08 | 32.4 | |
| SM1107-LSV2c-FT0067 | K0712111-010 | 1/10/08 | 33.9 | |
| SM1107-LSV2c-FT0068 | K0712111-011 | 1/10/08 | 32.1 | |
| SM1107-LSV2c-FT0069 | K0712111-012 | 1/10/08 | 32.9 | |
| SM1107-LSV2c-FT0070 | K0712111-013 | 1/10/08 | 25.8 | |
| SM1107-LSV2c-FT0071 | K0712111-014 | 1/10/08 | 32.2 | |
| SM1107-LSV2c-FT0072 | K0712111-015 | 1/10/08 | 32.1 | |
| SM1107-LSV2c-FT0073 | K0712111-016 | 1/10/08 | 33.4 | |
| SM1107-LSV2c-FT0074 | K0712111-017 | 1/10/08 | 30.6 | |
| SM1107-LSV2c-FT0075 | K0712111-018 | 1/10/08 | 31.4 | |
| SM1107-LSV2c-FT0076 | K0712111-019 | 1/10/08 | 31.7 | |
| SM1107-LSV2c-FT0077 | K0712111-020 | 1/10/08 | 31.7 | |

**COLUMBIA ANALYTICAL SERVICES, INC.**

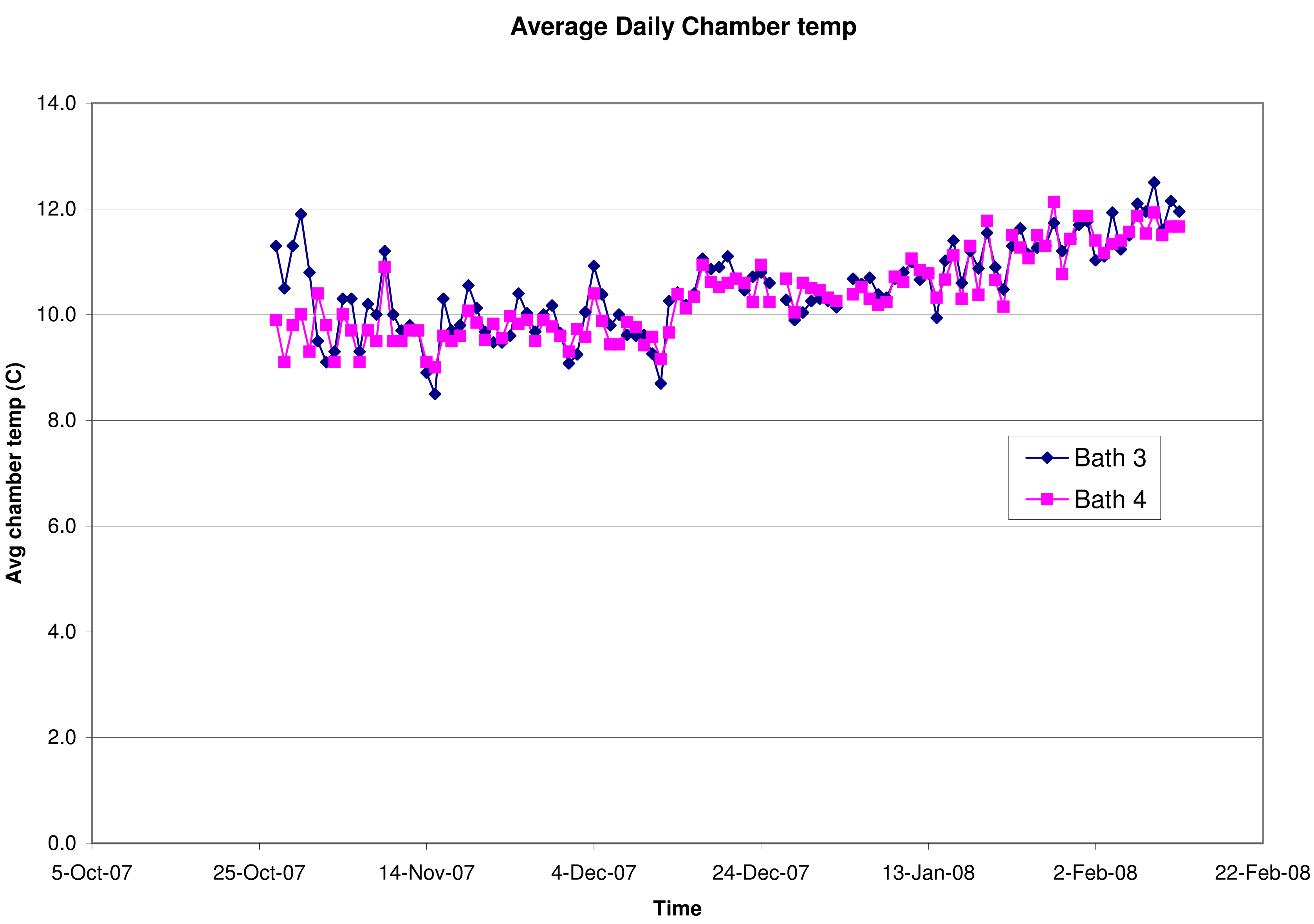
Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project:** | Se in Tissue | **Date Collected:** | 11/14-12/4/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/21/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| **Sample Name** | **Lab Code** | **Date Analyzed** | **Result** | **Result Notes** |
|---|---|---|---|---|
| SM1107-LSV2c-FT0078 | K0712111-021 | 1/10/08 | 32.6 | |
| SM1107-LSV2c-FT0079 | K0712111-022 | 1/10/08 | 33.9 | |
| SM1107-CC150-FT0080 | K0712111-023 | 1/10/08 | 31.9 | |
| SM1107-CC150-FT0081 | K0712111-024 | 1/10/08 | 30.6 | |
| SM1107-CC150-FT0082 | K0712111-025 | 1/10/08 | 30.5 | |
| SM1107-CC150-FT0083 | K0712111-026 | 1/10/08 | 30.4 | |
| SM1107-CC150-FT0084 | K0712111-027 | 1/10/08 | 31.0 | |
| SM1107-CC150-FT0085 | K0712111-028 | 1/10/08 | 32.2 | |
| SM1107-CC150-FT0086 | K0712111-029 | 1/10/08 | 32.2 | |
| SM1107-CC150-FT0087 | K0712111-030 | 1/10/08 | 33.1 | |
| SM1107-CC150-FT0088 | K0712111-031 | 1/10/08 | 31.9 | |
| SM1107-CC350-FT0089 | K0712111-032 | 1/10/08 | 29.9 | |
| SM1107-CC350-FT0090 | K0712111-033 | 1/10/08 | 31.9 | |
| SM1107-CC350-FT0091 | K0712111-034 | 1/10/08 | 33.5 | |
| SM1207-SPCFH-FT0092 | K0712111-035 | 1/10/08 | 33.2 | |



Average Daily Chamber temp
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Avg chamber temp (C)
Bath 3
Bath 4
5-Oct-07
25-Oct-07
14-Nov-07
4-Dec-07
24-Dec-07
13-Jan-08
2-Feb-08
22-Feb-08
Time

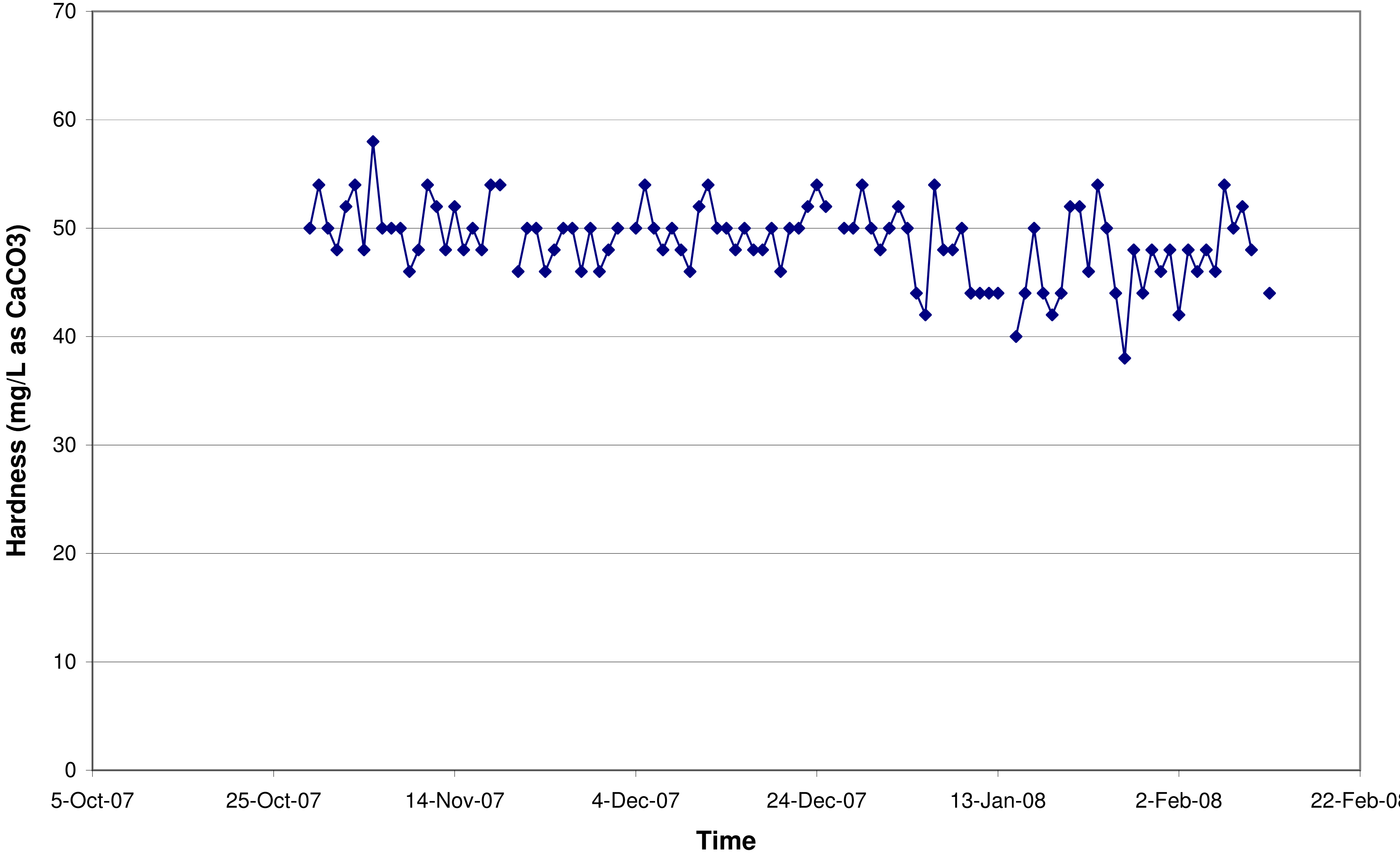
Water temperature in test chambers for Brown trout studies

**12699-001**

filename: water qual.xls

| | SC treatments | | | SPC treatments | | | CC-150 (BKD) treatments | | | CC-350 (LOW) treatments | | | LSV2C (HIGH) treatments | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water temperature (°C) | | | Water temperature (°C) | | | Water temperature (°C) | | | Water temperature (°C) | | | Water temperature (°C) | | | |
| | | Water | Water | | Water | Water | | Water | Water | | Water | Water | | Water | Water | Daily Avg Temp (°C) | |
| Date | Test Day | bath #3 | bath #4 | Test Day | bath #3 | bath #4 | Test Day | bath #3 | bath #4 | Test Day | bath #3 | bath #4 | Test Day | bath #3 | bath #4 | bath #3 | bath #4 |
| 25-Oct-07 | 0 | | | | | | | | | | | | | | | | |
| 26-Oct-07 | 1 | | | | | | | | | | | | | | | | |
| 27-Oct-07 | 2 | 11.3 | 9.9 | | | | | | | | | | | | | 11.3 | 9.9 |
| 28-Oct-07 | 3 | 10.5 | 9.1 | | | | | | | | | | | | | 10.5 | 9.1 |
| 29-Oct-07 | 4 | 11.3 | 9.8 | | | | | | | | | | | | | 11.3 | 9.8 |
| 30-Oct-07 | 5 | 11.9 | 10.0 | | | | | | | | | | | | | 11.9 | 10.0 |
| 31-Oct-07 | 6 | 10.8 | 9.3 | | | | | | | | | | | | | 10.8 | 9.3 |
| 1-Nov-07 | 7 | 9.5 | 10.4 | | | | | | | | | | | | | 9.5 | 10.4 |
| 2-Nov-07 | 8 | 9.1 | 9.8 | | | | | | | | | | | | | 9.1 | 9.8 |
| 3-Nov-07 | 9 | 9.3 | 9.1 | | | | | | | | | | | | | 9.3 | 9.1 |
| 4-Nov-07 | 10 | 10.3 | 10.0 | | | | | | | | | | | | | 10.3 | 10.0 |
| 5-Nov-07 | 11 | 10.3 | 9.7 | | | | | | | | | | | | | 10.3 | 9.7 |
| 6-Nov-07 | 12 | 9.3 | 9.1 | | | | | | | | | | | | | 9.3 | 9.1 |
| 7-Nov-07 | 13 | 10.2 | 9.7 | | | | | | | | | | | | | 10.2 | 9.7 |
| 8-Nov-07 | 14 | 10.0 | 9.5 | | | | | | | | | | | | | 10.0 | 9.5 |
| 9-Nov-07 | 15 | 11.2 | 10.9 | | | | | | | | | | | | | 11.2 | 10.9 |
| 10-Nov-07 | 16 | 10.0 | 9.5 | | | | | | | | | | | | | 10.0 | 9.5 |
| 11-Nov-07 | 17 | 9.7 | 9.5 | | | | | | | | | | | | | 9.7 | 9.5 |
| 12-Nov-07 | 18 | 9.8 | 9.7 | | | | | | | | | | | | | 9.8 | 9.7 |
| 13-Nov-07 | 19 | 9.7 | 9.7 | | | | | | | | | | | | | 9.7 | 9.7 |
| 14-Nov-07 | 20 | 8.9 | 9.1 | | | | | | | | | | | | | 8.9 | 9.1 |
| 15-Nov-07 | 21 | 8.5 | 9.0 | | | | | | | | | | | | | 8.5 | 9.0 |
| 16-Nov-07 | 22 | 10.3 | 9.6 | | | | | | | | | | 0 | 10.3 | 9.6 | 10.3 | 9.6 |
| 17-Nov-07 | 23 | 9.7 | 9.5 | | | | 0 | | | 0 | | | 1 | | | 9.7 | 9.5 |
| 18-Nov-07 | 24 | 9.8 | 9.6 | | | | 1 | | | 1 | | | 2 | | | 9.8 | 9.6 |
| 19-Nov-07 | 25 | 10.6 | 9.7 | | | | 2 | 10.3 | 10.3 | 2 | 10.8 | 10.6 | 3 | 10.5 | 9.7 | 10.6 | 10.1 |
| 20-Nov-07 | 26 | 10.2 | 9.7 | | | | 3 | 10.3 | 9.2 | 3 | 9.9 | 10.3 | 4 | 10.1 | 10.2 | 10.1 | 9.9 |
| 21-Nov-07 | 27 | 9.4 | 9.1 | | | | 4 | 9.7 | 9.5 | 4 | 9.9 | 10.2 | 5 | 9.7 | 9.3 | 9.7 | 9.5 |
| 22-Nov-07 | 28 | 9.3 | 9.4 | | | | 5 | 9.4 | 10.1 | 5 | 9.6 | 9.4 | 6 | 9.6 | 10.4 | 9.5 | 9.8 |
| 23-Nov-07 | 29 | 9.8 | 9.3 | | | | 6 | 9 | 9.8 | 6 | 9.8 | 10.3 | 7 | 9.3 | 8.8 | 9.5 | 9.6 |
| 24-Nov-07 | 30 | 9.7 | 9.3 | | | | 7 | 9.1 | 9.6 | 7 | 9.8 | 10.4 | 8 | 9.8 | 10.6 | 9.6 | 10.0 |
| 25-Nov-07 | 31 | 10.0 | 9.3 | | | | 8 | 10.7 | 10.2 | 8 | 10.4 | 9.6 | 9 | 10.5 | 10.2 | 10.4 | 9.8 |
| 26-Nov-07 | 32 | 9.8 | 9.6 | | | | 9 | 9.8 | 9.5 | 9 | 10.1 | 10.4 | 10 | 10.4 | 10.1 | 10.0 | 9.9 |
| 27-Nov-07 | 33 | 9.7 | 9.3 | | | | 10 | 9.2 | 9.4 | 10 | 9.6 | 9.3 | 11 | 10.2 | 10 | 9.7 | 9.5 |
| 28-Nov-07 | 34 | 10.3 | 9.6 | | | | 11 | 9.8 | 10.1 | 11 | 10.1 | 10.5 | 12 | 9.8 | 9.4 | 10.0 | 9.9 |
| 29-Nov-07 | 35 | 10.1 | 9.5 | | | | 12 | 9.9 | 9.7 | 12 | 10.3 | 10.4 | 13 | 10.4 | 9.5 | 10.2 | 9.8 |
| 30-Nov-07 | 36 | 9.2 | 9.4 | | | | 13 | 10.3 | 9.5 | 13 | 9.3 | 9.7 | 14 | 9.8 | 9.8 | 9.7 | 9.6 |
| 1-Dec-07 | 37 | 9.4 | 8.7 | | | | 14 | 8.7 | 9.8 | 14 | 9.1 | 9.5 | 15 | 9.1 | 9.2 | 9.1 | 9.3 |
| 2-Dec-07 | 38 | 9.1 | 9.3 | | | | 15 | 8.8 | 9.1 | 15 | 9.5 | 10.1 | 16 | 9.6 | 10.4 | 9.3 | 9.7 |
| 3-Dec-07 | 39 | 9.9 | 9.6 | | | | 16 | 10.4 | 9.9 | 16 | 10 | 9.4 | 17 | 9.9 | 9.4 | 10.1 | 9.6 |
| 4-Dec-07 | 40 | 11.2 | 10.2 | 0 | 11.3 | 10.1 | 17 | 10.3 | 10.4 | 17 | 10.8 | 10.1 | 18 | 11 | 11.2 | 10.9 | 10.4 |
| 5-Dec-07 | 41 | 10.2 | 9.4 | 1 | 10.2 | 10.1 | 18 | 10.7 | 9.5 | 18 | 10.4 | 10.3 | 19 | 10.4 | 10.1 | 10.4 | 9.9 |
| 6-Dec-07 | 42 | 9.6 | 9.7 | 2 | 9.4 | 9.4 | 19 | 9.8 | 9.3 | 19 | 10.1 | 9.5 | 20 | 10.1 | 9.3 | 9.8 | 9.4 |
| 7-Dec-07 | 43 | 10.0 | 9.3 | 3 | 10.5 | 9.3 | 20 | 9.7 | 9.3 | 20 | 10.3 | 10.1 | 21 | 9.5 | 9.2 | 10.0 | 9.4 |
| 8-Dec-07 | 44 | 10.1 | 9.8 | 4 | 9.3 | 10 | 21 | 9.1 | 9.8 | 21 | 9.8 | 9.6 | 22 | 9.8 | 10.1 | 9.6 | 9.9 |
| 9-Dec-07 | 45 | 9.7 | 9.4 | 5 | 9.3 | 9.7 | 22 | 9.7 | 10.1 | 22 | 9.7 | 9.8 | 23 | 9.6 | 9.8 | 9.6 | 9.8 |
| 10-Dec-07 | 46 | 9.7 | 9.3 | 6 | 9.8 | 9.5 | 23 | 9.9 | 9.5 | 23 | 9.6 | 9.4 | 24 | 9.1 | 9.4 | 9.6 | 9.4 |
| 11-Dec-07 | 47 | 9.8 | 9.4 | 7 | 9.2 | 9.3 | 24 | 8.9 | 9.3 | 24 | 9.1 | 9.8 | 25 | 9.3 | 10.1 | 9.3 | 9.6 |
| 12-Dec-07 | 48 | 8.5 | 9.1 | 8 | 8.6 | 9 | 25 | 8.9 | 9.5 | 25 | 8.8 | 9.1 | 26 | 8.7 | 9.1 | 8.7 | 9.2 |
| 13-Dec-07 | 49 | 10.0 | 9.6 | 9 | 10 | 9.7 | 26 | 10.5 | 9.9 | 26 | 10.4 | 9.5 | 27 | 10.4 | 9.6 | 10.3 | 9.7 |
| 14-Dec-07 | 50 | 10.7 | 10.0 | 10 | 10 | 10.2 | 27 | 10.4 | 10.1 | 27 | 10.3 | 11.1 | 28 | 10.7 | 10.5 | 10.4 | 10.4 |
| 15-Dec-07 | 51 | 10.5 | 10.3 | 11 | 9.8 | 10 | 28 | 9.7 | 10.1 | 28 | 10.4 | 10 | 29 | 10.5 | 10.2 | 10.2 | 10.1 |
| 16-Dec-07 | 52 | 10.1 | 10.5 | 12 | 10.7 | 10.1 | 29 | 10.3 | 10 | 29 | 10.4 | 11.3 | 30 | 10.5 | 9.8 | 10.4 | 10.3 |
| 17-Dec-07 | 53 | 11.3 | 10.4 | 13 | 10.8 | 10.7 | 30 | 11.3 | 11.1 | 30 | 11 | 10.4 | 31 | 10.9 | 12.1 | 11.1 | 10.9 |
| 18-Dec-07 | 54 | 11.4 | 10.1 | 14 | 10.2 | 10.3 | 31 | 10.7 | 10.3 | 31 | 11 | 11.5 | 32 | 11 | 10.9 | 10.9 | 10.6 |
| 19-Dec-07 | 55 | 11.8 | 10.2 | 15 | 11.2 | 10.3 | 32 | 9.7 | 10.3 | 32 | 11.1 | 10.9 | 33 | 10.7 | 10.9 | 10.9 | 10.5 |
| 20-Dec-07 | 56 | 11.3 | 10.6 | 16 | 10.9 | 10.6 | 33 | 11.3 | 11.2 | 33 | 11.3 | 10.4 | 34 | 10.7 | 10.2 | 11.1 | 10.6 |
| 21-Dec-07 | 57 | 10.6 | 10.6 | 17 | 10.1 | 10.4 | 34 | 11.2 | 10.6 | 34 | 10.9 | 11.4 | 35 | 10.6 | 10.4 | 10.7 | 10.7 |
| 22-Dec-07 | 58 | 10.3 | 10.5 | 18 | 10.1 | 11 | 35 | 10.9 | 10.6 | 35 | 10.9 | 11 | 36 | 10.1 | 9.9 | 10.5 | 10.6 |
| 23-Dec-07 | 59 | 10.0 | 10.5 | 19 | 11.1 | 10.3 | 36 | 10.9 | 10 | 36 | 10.9 | 10.1 | 37 | 10.7 | 10.3 | 10.7 | 10.2 |
| 24-Dec-07 | 60 | 10.9 | 10.2 | 20 | 10.6 | 10.4 | 37 | 10.9 | 11.2 | 37 | 10.9 | 11.5 | 38 | 10.7 | 11.4 | 10.8 | 10.9 |
| 25-Dec-07 | 61 | 10.2 | 10.1 | 21 | 10.9 | 10.7 | 38 | 10.9 | 10.1 | 38 | 10.8 | 10.2 | 39 | 10.2 | 10.1 | 10.6 | 10.2 |
| 26-Dec-07 | 62 | | | 22 | | | 39 | | | 39 | | | 40 | | | | |
| 27-Dec-07 | 63 | 9.8 | 10.5 | 23 | 10.4 | 10.3 | 40 | 10.2 | 10.5 | 40 | 10.3 | 11.2 | 41 | 10.7 | 10.9 | 10.3 | 10.7 |
| 28-Dec-07 | 64 | 9.7 | 10.4 | 24 | 9.7 | 9.9 | 41 | 10.2 | 10.3 | 41 | 9.9 | 9.7 | 42 | 10 | 9.9 | 9.9 | 10.0 |
| 29-Dec-07 | 65 | 10.7 | 10.7 | 25 | 9.5 | 10.4 | 42 | 9.9 | 10.4 | 42 | 10.1 | 10.8 | 43 | 10 | 10.7 | 10.0 | 10.6 |
| 30-Dec-07 | 66 | 10.5 | 11.1 | 26 | 10.4 | 10 | 43 | 10.2 | 10.5 | 43 | 10.3 | 10.2 | 44 | 9.9 | 10.7 | 10.3 | 10.5 |
| 31-Dec-07 | 67 | 10.5 | 10.8 | 27 | 9.9 | 11.1 | 44 | 10.3 | 9.6 | 44 | 10.5 | 11 | 45 | 10.3 | 9.8 | 10.3 | 10.5 |
| 1-Jan-08 | 68 | 11.1 | 10.8 | 28 | 10.3 | 10.5 | 45 | 10.3 | 9.7 | 45 | 10.1 | 10.1 | 46 | 9.5 | 10.5 | 10.3 | 10.3 |
| 2-Jan-08 | 69 | 11.1 | 10.5 | 29 | 9.8 | 9.8 | 46 | 9.9 | 9.9 | 46 | 10.2 | 10.7 | 47 | 9.7 | 10.4 | 10.1 | 10.3 |
| 3-Jan-08 | 70 | | | 30 | | | 47 | | | 47 | | | 48 | | | | |
| 4-Jan-08 | 71 | 10.7 | 10.6 | 31 | 11.1 | 10.6 | 48 | 10.6 | 10.5 | 48 | 10.5 | 9.8 | 49 | 10.5 | 10.4 | 10.7 | 10.4 |
| 5-Jan-08 | 72 | 10.9 | 11.0 | 32 | 10.9 | 10.6 | 49 | 10.3 | 10.4 | 49 | 10.2 | 10 | 50 | 10.6 | 10.6 | 10.6 | 10.5 |
| 6-Jan-08 | 73 | 11.1 | 10.6 | 33 | 10.8 | 10.9 | 50 | 10.9 | 10.4 | 50 | 10.3 | 9.8 | 51 | 10.4 | 9.8 | 10.7 | 10.3 |
| 7-Jan-08 | 74 | 10.8 | 10.5 | 34 | 10.6 | 10.5 | 51 | 10 | 9.7 | 51 | 10.2 | 9.9 | 52 | 10.3 | 10.3 | 10.4 | 10.2 |
| 8-Jan-08 | 75 | 10.7 | 10.9 | 35 | 10.9 | 10.6 | 52 | 10.3 | 9.5 | 52 | 10.2 | 9.9 | 53 | 9.5 | 10.3 | 10.3 | 10.2 |
| 9-Jan-08 | 76 | 11.1 | 11.2 | 36 | 11.1 | 11.3 | 53 | 10.2 | 11 | 53 | 10.3 | 10.1 | 54 | 10.7 | 10 | 10.7 | 10.7 |
| 10-Jan-08 | 77 | 11.4 | 11.1 | 37 | 11.1 | 10.9 | 54 | 10.7 | 10.5 | 54 | 10.7 | 10.3 | 55 | 10.1 | 10.3 | 10.8 | 10.6 |
| 11-Jan-08 | 78 | 11.3 | 11.3 | 38 | 11.4 | 11.1 | 55 | 10.6 | 10.6 | 55 | 10.8 | 11.1 | 56 | 10.9 | 11.2 | 11.0 | 11.1 |
| 12-Jan-08 | 79 | 10.9 | 11.4 | 39 | 11.3 | 11.4 | 56 | 10.1 | 11 | 56 | 10.5 | 10.2 | 57 | 10.5 | 10.2 | 10.7 | 10.8 |
| 13-Jan-08 | 80 | 11.2 | 11.3 | 40 | 11.3 | 10.7 | 57 | 10.3 | 10.7 | 57 | 10.5 | 10.3 | 58 | 10.6 | 10.9 | 10.8 | 10.8 |
| 14-Jan-08 | 81 | 10.1 | 10.9 | 41 | 9.9 | 10 | 58 | 9.9 | 10.2 | 58 | 9.7 | 10 | 59 | 10.1 | 10.5 | 9.9 | 10.3 |
| 15-Jan-08 | 82 | 11.3 | 10.9 | 42 | 11.3 | 11.1 | 59 | 10.9 | 10.3 | 59 | 10.7 | 10.3 | 60 | 10.9 | 10.7 | 11.0 | 10.7 |
| 16-Jan-08 | 83 | 11.4 | 11.1 | 43 | 11.6 | 11.6 | 60 | 11.4 | 10.7 | 60 | 11.3 | 11.3 | 61 | 11.3 | 10.9 | 11.4 | 11.1 |
| 17-Jan-08 | 84 | 10.8 | 11.1 | 44 | 11 | 10.7 | 61 | 10.3 | 10 | 61 | 10.8 | 10 | 62 | 10.1 | 9.7 | 10.6 | 10.3 |
| 18-Jan-08 | | | | 45 | 11.7 | 11.6 | 62 | 10.5 | 11.7 | 62 | 11.5 | 11.4 | 63 | 11.1 | 10.5 | 11.2 | 11.3 |
| 19-Jan-08 | | | | 46 | 11 | 10.6 | 63 | 11 | 10.7 | 63 | 11 | 10.1 | 64 | 10.5 | 10.1 | 10.9 | 10.4 |
| 20-Jan-08 | | | | 47 | 11.5 | 11.9 | 64 | 11.7 | 11.8 | 64 | 11.5 | 11.7 | 65 | 11.5 | 11.7 | 11.6 | 11.8 |
| 21-Jan-08 | | | | 48 | 11.2 | 10.7 | 65 | 10.4 | 10.3 | 65 | 11.1 | 10.7 | 66 | 10.9 | 10.9 | 10.9 | 10.7 |
| 22-Jan-08 | | | | 49 | 10.5 | 10.3 | 66 | 10.3 | 10.3 | 66 | 10.4 | 10.2 | 67 | 10.7 | 9.8 | 10.5 | 10.2 |
| 23-Jan-08 | | | | | | | 67 | 11.1 | 11.2 | 67 | 11.7 | 11.4 | 68 | 11.1 | 11.9 | 11.3 | 11.5 |
| 24-Jan-08 | | | | | | | 68 | 11.6 | 11.4 | 68 | 11.7 | 11.7 | 69 | 11.6 | 10.7 | 11.6 | 11.3 |
| 25-Jan-08 | | | | | | | 69 | 10.6 | 10.7 | 69 | 11.5 | 11.1 | 70 | 11.3 | 11.4 | 11.1 | 11.1 |
| 26-Jan-08 | | | | | | | 70 | 11 | 11.5 | 70 | 11.6 | 11.9 | 71 | 11.2 | 11.1 | 11.3 | 11.5 |
| 27-Jan-08 | | | | | | | 71 | 10.9 | 11.2 | 71 | 11.2 | 11 | 72 | 11.8 | 11.7 | 11.3 | 11.3 |
| 28-Jan-08 | | | | | | | 72 | 11.5 | 12.4 | 72 | 12.2 | 11.6 | 73 | 11.5 | 12.4 | 11.7 | 12.1 |
| 29-Jan-08 | | | | | | | 73 | 11.3 | 10.6 | 73 | 11.4 | 11.6 | 74 | 10.9 | 10.1 | 11.2 | 10.8 |
| 30-Jan-08 | | | | | | | 74 | 11 | 11.1 | 74 | 11.8 | 11.3 | 75 | 11.5 | 11.9 | 11.4 | 11.4 |
| 31-Jan-08 | | | | | | | 75 | 11.2 | 11.3 | 75 | 12 | 12 | 76 | 11.9 | 12.3 | 11.7 | 11.9 |
| 1-Feb-08 | | | | | | | 76 | 11.8 | 11.6 | 76 | 12.1 | 11.9 | 77 | 11.4 | 12.1 | 11.8 | 11.9 |
| 2-Feb-08 | | | | | | | 77 | 10.9 | 11.2 | 77 | 11.5 | 11.7 | 78 | 10.7 | 11.3 | 11.0 | 11.4 |
| 3-Feb-08 | | | | | | | 78 | 11 | 11.1 | 78 | 11.4 | 11.4 | 79 | 10.9 | 11 | 11.1 | 11.2 |
| 4-Feb-08 | | | | | | | 79 | 11.8 | 11.1 | 79 | 12.2 | 12.1 | 80 | 11.8 | 10.8 | 11.9 | 11.3 |
| 5-Feb-08 | | | | | | | 80 | 11.5 | 11.2 | 80 | 11.5 | 11.3 | 81 | 10.7 | 11.7 | 11.2 | 11.4 |
| 6-Feb-08 | | | | | | | 81 | 11.3 | 11.7 | 81 | 11.7 | 11.3 | 82 | 11.5 | 11.7 | 11.5 | 11.6 |
| 7-Feb-08 | | | | | | | 82 | 12.1 | 11.7 | 82 | | 12.1 | 83 | 12.1 | 11.8 | 12.1 | 11.9 |
| 8-Feb-08 | | | | | | | 83 | 11.8 | 11.1 | 83 | | 11.6 | 84 | 12.1 | 11.9 | 12.0 | 11.5 |
| 9-Feb-08 | | | | | | | 84 | 12.5 | 12.3 | 84 | | 11.8 | 85 | 12.5 | 11.7 | 12.5 | 11.9 |
| 10-Feb-08 | | | | | | | 85 | 11.4 | 10.9 | 85 | | 11.5 | 86 | 11.8 | 12.1 | 11.6 | 11.5 |
| 11-Feb-08 | | | | | | | 86 | 12.1 | 11.5 | 86 | | 11.8 | 87 | 12.2 | 11.7 | 12.2 | 11.7 |
| 12-Feb-08 | | | | | | | 87 | 11.9 | 11.9 | 87 | | 11.4 | 88 | 12 | 11.7 | 12.0 | 11.7 |
| Avg | | 10.1 | | | 10.5 | | | 10.5 | | | 10.6 | | | 10.6 | | | |
| Std | | 0.733 | | | 0.680 | | | 0.798 | | | 0.782 | | | 0.822 | | | |
| Min | | 8.5 | | | 8.6 | | | 8.7 | | | 8.8 | | | 8.7 | | | |
| Max | | 11.9 | | | 11.9 | | | 12.5 | | | 12.2 | | | 12.5 | | | |

Water hardness measured in dilution water during BT study



**Water hardness (mg/L) measurements in Brown trout study (12699-001)**

filename: water qual.xls

| Date | Test Day | Water hardness (mg/L) |
|---|---|---|
| 25-Oct-07 | D0 | |
| 26-Oct-07 | D1 | |
| 27-Oct-07 | D2 | |
| 28-Oct-07 | D3 | |
| 29-Oct-07 | D4 | 50 |
| 30-Oct-07 | D5 | 54 |
| 31-Oct-07 | D6 | 50 |
| 1-Nov-07 | D7 | 48 |
| 2-Nov-07 | D8 | 52 |
| 3-Nov-07 | D9 | 54 |
| 4-Nov-07 | D10 | 48 |
| 5-Nov-07 | D11 | 58 |
| 6-Nov-07 | D12 | 50 |
| 7-Nov-07 | D13 | 50 |
| 8-Nov-07 | D14 | 50 |
| 9-Nov-07 | D15 | 46 |
| 10-Nov-07 | D16 | 48 |
| 11-Nov-07 | D17 | 54 |
| 12-Nov-07 | D18 | 52 |
| 13-Nov-07 | D19 | 48 |
| 14-Nov-07 | D20 | 52 |
| 15-Nov-07 | D21 | 48 |
| 16-Nov-07 | D22 | 50 |
| 17-Nov-07 | D23 | 48 |
| 18-Nov-07 | D24 | 54 |
| 19-Nov-07 | D25 | 54 |
| 20-Nov-07 | D26 | |
| 21-Nov-07 | D27 | 46 |
| 22-Nov-07 | D28 | 50 |
| 23-Nov-07 | D29 | 50 |
| 24-Nov-07 | D30 | 46 |
| 25-Nov-07 | D31 | 48 |
| 26-Nov-07 | D32 | 50 |
| 27-Nov-07 | D33 | 50 |
| 28-Nov-07 | D34 | 46 |
| 29-Nov-07 | D35 | 50 |
| 30-Nov-07 | D36 | 46 |
| 1-Dec-07 | D37 | 48 |
| 2-Dec-07 | D38 | 50 |
| 3-Dec-07 | D39 | |
| 4-Dec-07 | D40 | 50 |
| 5-Dec-07 | D41 | 54 |
| 6-Dec-07 | D42 | 50 |
| 7-Dec-07 | D43 | 48 |
| 8-Dec-07 | D44 | 50 |
| 9-Dec-07 | D45 | 48 |
| 10-Dec-07 | D46 | 46 |
| 11-Dec-07 | D47 | 52 |
| 12-Dec-07 | D48 | 54 |
| 13-Dec-07 | D49 | 50 |
| 14-Dec-07 | D50 | 50 |
| 15-Dec-07 | D51 | 48 |
| 16-Dec-07 | D52 | 50 |
| 17-Dec-07 | D53 | 48 |
| 18-Dec-07 | D54 | 48 |
| 19-Dec-07 | D55 | 50 |
| 20-Dec-07 | D56 | 46 |
| 21-Dec-07 | D57 | 50 |
| 22-Dec-07 | D58 | 50 |
| 23-Dec-07 | D59 | 52 |
| 24-Dec-07 | D60 | 54 |
| 25-Dec-07 | D61 | 52 |

**Water hardness (mg/L) measurements in Brown trout study (12699-001)**

filename: water qual.xls

| Date | Test Day | Water hardness (mg/L) | | | | |
|---|---|---|---|---|---|---|
| 26-Dec-07 | D62 | | | | | |
| 27-Dec-07 | D63 | 50 | | | | |
| 28-Dec-07 | D64 | 50 | | | | |
| 29-Dec-07 | D65 | 54 | | | | |
| 30-Dec-07 | D66 | 50 | | | | |
| 31-Dec-07 | D67 | 48 | | | | |
| 1-Jan-08 | D68 | 50 | | | | |
| 2-Jan-08 | D69 | 52 | | | | |
| 3-Jan-08 | D70 | 50 | | | | |
| 4-Jan-08 | D71 | 44 | | | | |
| 5-Jan-08 | D72 | 42 | | | | |
| 6-Jan-08 | D73 | 54 | | | | |
| 7-Jan-08 | D74 | 48 | | | | |
| 8-Jan-08 | D75 | 48 | | | | |
| 9-Jan-08 | D76 | 50 | | | | |
| 10-Jan-08 | D77 | 44 | | | | |
| 11-Jan-08 | D78 | 44 | | | | |
| 12-Jan-08 | D79 | 44 | | | | |
| 13-Jan-08 | D80 | 44 | | | | |
| 14-Jan-08 | D81 | | | | | |
| 15-Jan-08 | D82 | 40 | **SC fish (Oct. 25 - Jan. 17)** | | | |
| 16-Jan-08 | D83 | 44 | Avg | StDev | Min | Max |
| 17-Jan-08 | D84 | 50 | 49.32 | 3.19 | 40 | 58 |
| 18-Jan-08 | | 44 | | | | |
| 19-Jan-08 | | 42 | | | | |
| 20-Jan-08 | | 44 | **SPC fish (Dec. 4 - Jan. 22)** | | | |
| 21-Jan-08 | | 52 | Avg | StDev | Min | Max |
| 22-Jan-08 | | 52 | 48.63 | 3.55 | 40 | 54 |
| 23-Jan-08 | | 46 | | | | |
| 24-Jan-08 | | 54 | | | | |
| 25-Jan-08 | | 50 | | | | |
| 26-Jan-08 | | 44 | | | | |
| 27-Jan-08 | | 38 | | | | |
| 28-Jan-08 | | 48 | | | | |
| 29-Jan-08 | | 44 | | | | |
| 30-Jan-08 | | 48 | | | | |
| 31-Jan-08 | | 46 | | | | |
| 1-Feb-08 | | 48 | | | | |
| 2-Feb-08 | | 42 | | | | |
| 3-Feb-08 | | 48 | | | | |
| 4-Feb-08 | | 46 | | | | |
| 5-Feb-08 | | 48 | | | | |
| 6-Feb-08 | | 46 | | | | |
| 7-Feb-08 | | 54 | | | | |
| 8-Feb-08 | | 50 | | | | |
| 9-Feb-08 | | 52 | | | | |
| 10-Feb-08 | | 48 | **CC-150 & CC-350 fish (Nov. 17- Feb. 12)** | | | |
| 11-Feb-08 | | | Avg | StDev | Min | Max |
| 12-Feb-08 | | 44 | 48.36 | 3.51 | 38 | 54 |
| Average (overall) | | **48.78** | | | | |
| | StDev | **3.506** | **LSV2C fish (Nov. 16- Feb. 12)** | | | |
| | Min | **38** | Avg | StDev | Min | Max |
| | Max | **58** | 48.38 | 3.49 | 38 | 54 |

# Appendix F

## Number of organisms and survival rates at different stages during the brown trout reproduction study

## Number of Organisms and Survival Rates at Different Stages During Brown Trout Reproductive Study

| | | #s at hatch | | | #s at swimup | | | | #s at test termination | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | Initial eggs | # dead alevins (hatch - su) | % hatch | % egg mortality | # preserved @ su | wet wt | 15d PSU target | % survival @ su | # preserved at end | # for wts/lengths | Dead in 15d PSU | Missing | TE | % survival (hatch-term) | % survival @ term | % survival (total) |
| SC-001 | 600 | 6 | 23.8% | 76.2% | 38 | 1 | 100 | 22.8% | 77 | 20 | 1 | | | 98.9% | 97.0% | 22.7% |
| SC-002 | 600 | 2 | 22.8% | 77.2% | 34 | 1 | 100 | 22.5% | 79 | 20 | 1 | | | 99.5% | 99.0% | 22.3% |
| SC-003 | 600 | 6 | 56.7% | 43.3% | 233 | 1 | 100 | 55.7% | 69 | 20 | 1 | 9 | 1 | 98.0% | 98.9% | 54.7% |
| SC-004 | 600 | 23 | 31.2% | 68.9% | 60 | 1 | 100 | 27.3% | 80 | 20 | 3 | | | 96.2% | 100.0% | 27.3% |
| SC-005 | 600 | 6 | 11.7% | 88.3% | 0 | 1 | 62 | 10.7% | 42 | 20 | 0 | | 1 | 99.0% | 100.0% | 10.7% |
| SC-006 | 600 | 2 | 93.2% | 6.8% | 457 | 1 | 100 | 92.8% | 78 | 20 | 1 | | | 99.5% | 98.0% | 92.7% |
| SC-007 | 600 | 22 | 30.5% | 69.5% | 61 | 1 | 100 | 26.8% | 76 | 20 | 3 | | | 95.8% | 96.0% | 26.3% |
| SC-008 | 600 | 6 | 66.0% | 34.0% | 289 | 1 | 100 | 65.0% | 70 | 20 | 0 | 10 | | 99.0% | 100.0% | 65.0% |
| | | | | | | | | | | | | | | | | |
| SPC-001 | 600 | 8 | 99.3% | 0.7% | 488 | - | 100 | 98.0% | 80 | 20 | 0 | | | 98.7% | 100.0% | 98.0% |
| SPC-002 | 20 | 0 | 100.0% | 0.0% | 0 | - | 20 | 100.0% | 0 | 20 | 0 | | | 100.0% | 100.0% | 100.0% |
| SPC-003 | 600 | 20 | 97.5% | 2.5% | 465 | - | 100 | 94.2% | 80 | 20 | 0 | | | 96.7% | 100.0% | 94.2% |
| SPC-004 | 21 | 0 | 100.0% | 0.0% | 0 | - | 21 | 100.0% | 0 | 20 | 0 | | | 100.0% | 100.0% | 100.0% |
| SPC-005 | 600 | 8 | 98.8% | 1.2% | 485 | - | 100 | 97.5% | 76 | 20 | 0 | | | 98.0% | 96.0% | 96.8% |
| SPC-006 | 600 | 22 | 99.7% | 0.3% | 476 | - | 100 | 96.0% | 80 | 20 | 0 | | | 96.3% | 100.0% | 96.0% |
| | | | | | | | | | | | | | | | | |
| LSV2C-002 | 600 | 14 | 99.0% | 1.0% | 480 | - | 100 | 96.7% | 64 | 20 | 0 | 16 | | 97.6% | 100.0% | 96.6% |
| LSV2C-003 | 400 | 342 | 93.5% | 6.5% | 0 | - | 32 | 8.0% | 0 | 9 | 23 | | | 8.8% | 28.1% | 2.25% |
| LSV2C-004 | 500 | 102 | 50.6% | 49.4% | 0 | - | 151 | 30.2% | 64 | 20 | 67 | | | 66.2% | 55.6% | 16.8% |
| LSV2C-005 | 300 | 103 | 71.3% | 28.7% | 0 | - | 111 | 37.0% | 49 | 20 | 42 | | | 51.7% | 62.2% | 23.0% |
| LSV2C-006 | - | - | - | 100.0% | - | - | - | - | - | - | - | | | - | | |
| LSV2C-007 | - | - | - | 100.0% | - | - | - | - | - | - | - | | | - | | |
| LSV2C-008 | 300 | 5 | 88.3% | 11.7% | 160 | - | 100 | 86.7% | 34 | 20 | 1 | 46 | | 95.9% | 98.2% | 84.25% |
| LSV2C-010 | 100 | 62 | 87.0% | 13.0% | 0 | - | 25 | 25.0% | 0 | 11 | 14 | | | 24.0% | 44.0% | 11.0% |
| LSV2C-012 | 600 | 16 | 98.3% | 1.7% | 474 | - | 100 | 95.7% | 80 | 20 | 0 | | | 97.4% | 100.0% | 95.7% |
| LSV2C-016 | 600 | 20 | 95.0% | 5.0% | 449 | - | 101 | 91.7% | 81 | 20 | 0 | | | 96.7% | 100.0% | 91.7% |
| LSV2C-017 | 300 | 22 | 71.3% | 28.7% | 92 | - | 100 | 64.0% | 58 | 20 | 3 | 19 | | 89.2% | 96.3% | 60.5% |
| LSV2C-019 | 500 | 22 | 94.2% | 5.8% | 349 | - | 100 | 89.8% | 41 | 20 | 0 | 39 | | 94.7% | 100.0% | 88.9% |
| LSV2C-020 | 400 | 5 | 89.3% | 10.8% | 252 | - | 100 | 88.0% | 44 | 20 | 0 | 36 | | 97.6% | 100.0% | 86.8% |
| LSV2C-021 | 600 | 286 | 69.3% | 30.7% | 0 | - | 130 | 21.7% | 69 | 20 | 41 | | | 45.5% | 68.5% | 14.8% |
| | | | | | | | | | | | | | | | | |
| CC-150-009 | 600 | 8 | 28.5% | 71.5% | 62 | - | 100 | 27.2% | 80 | 20 | 1 | | | 98.3% | 99.0% | 27.0% |
| CC-150-011 | 300 | 2 | 96.0% | 4.0% | 185 | - | 100 | 95.3% | 81 | 20 | 0 | | | 98.7% | 100.0% | 95.3% |
| CC-150-012 | 350 | 7 | 88.9% | 11.2% | 204 | - | 100 | 86.86% | 77 | 20 | 1 | | | 98.1% | 97.0% | 86.0% |
| CC-150-013 | 600 | 42 | 66.7% | 33.3% | 258 | - | 100 | 59.7% | 52 | 20 | 2 | 26 | | 93.0% | 97.3% | 57.5% |
| CC-150-015 | 600 | 3 | 78.3% | 21.7% | 367 | - | 100 | 77.8% | 78 | 20 | 0 | | | 98.9% | 98.0% | 77.5% |
| CC-150-016 | 600 | 3 | 14.8% | 85.2% | 0 | - | 86 | 14.3% | 23 | 20 | 0 | 43 | | 99.7% | 100.0% | 15.4% |
| CC-150-017 | 250 | 7 | 89.2% | 10.8% | 116 | - | 100 | 86.4% | 47 | 20 | 0 | 33 | | 97.2% | 100.0% | 84.3% |
| CC-150-018 | 600 | 17 | 87.2% | 12.8% | 405 | - | 100 | 84.3% | 81 | 20 | 0 | | | 96.5% | 100.0% | 84.3% |
| CC-150-020 | 600 | 6 | 97.3% | 2.7% | 478 | - | 100 | 96.3% | 80 | 20 | 0 | | | 98.9% | 100.0% | 96.3% |
| | | | | | | | | | | | | | | | | |
| CC-350-006 | 600 | 22 | 71.7% | 28.3% | 307 | - | 101 | 68.0% | 79 | 20 | 2 | | | 96.3% | 98.0% | 67.7% |
| CC-350-007 | 600 | 6 | 29.7% | 70.3% | 72 | - | 100 | 28.7% | 59 | 20 | 1 | 20 | | 98.6% | 98.8% | 26.0% |
| CC-350-008 | 600 | 19 | 67.7% | 32.3% | 287 | - | 100 | 64.5% | 51 | 20 | 1 | 28 | | 97.1% | 98.6% | 62.6% |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | su=swimup | | | | | | | | | | | | | | | |
| | psu=post swimup | | | | | | | | | | | | | | | |
| | TE=tech error | | | | | | | | | | | | | | | |
| | wt= weight | | | | | | | | | | | | | | | |

# Appendix G

# Length and dry weight measurements for juvenile brown trout from reproductive study

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**Saratooga Hatchery (SC)**

| | SC001 std length (mm) | SC001 dry wt (mg) | SC002 std length (mm) | SC002 dry wt (mg) | SC003 std length (mm) | SC003 dry wt (mg) | SC004 std length (mm) | SC004 dry wt (mg) | SC005 std length (mm) | SC005 dry wt (mg) | SC006 std length (mm) | SC006 dry wt (mg) | SC007 std length (mm) | SC007 dry wt (mg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | 22 | 19.540 | 22 | 21.350 | 23 | 31.120 | 24 | 31.120 | 21 | 22.060 | 23 | 16.720 | 21 | 17.800 |
| **B** | 22 | 15.090 | 22 | 15.790 | 24 | 25.330 | 25 | 30.830 | 22 | 27.190 | 21 | 16.380 | 23 | 22.410 |
| **C** | 24 | 20.700 | 22 | 19.980 | 23 | 24.970 | 23 | 25.840 | 22 | 19.060 | 22 | 13.470 | 22 | 21.110 |
| **D** | 21 | 16.590 | 24 | 25.460 | 22 | 22.620 | 23 | 25.400 | 20 | 21.700 | 22 | 17.490 | 21 | 20.520 |
| **E** | 21 | 13.980 | 22 | 17.220 | 23 | 21.020 | 24 | 21.520 | 21 | 21.240 | 21 | 22.010 | 19 | 13.590 |
| **F** | 22 | 20.420 | 23 | 16.040 | 24 | 29.480 | 21 | 20.230 | 23 | 16.820 | 21 | 22.080 | 23 | 24.160 |
| **G** | 22 | 22.900 | 22 | 17.020 | 23 | 22.110 | 24 | 29.710 | 24 | 14.990 | 21 | 21.930 | 19 | 16.610 |
| **H** | 22 | 21.730 | 22 | 20.350 | 24 | 27.300 | 24 | 32.100 | 24 | 20.370 | 22 | 22.130 | 21 | 15.700 |
| **I** | 20 | 13.810 | 23 | 23.060 | 22 | 23.290 | 25 | 37.230 | 21 | 17.150 | 22 | 17.540 | 21 | 22.550 |
| **J** | 22 | 25.660 | 24 | 19.680 | 24 | 27.870 | 21 | 19.840 | 22 | 22.680 | 22 | 14.090 | 19 | 14.220 |
| **K** | 23 | 24.510 | 23 | 21.280 | 20 | 15.390 | 21 | 21.150 | 20 | 16.660 | 21 | 10.350 | 23 | 25.370 |
| **L** | 22 | 19.070 | 21 | 15.320 | 22 | 16.570 | 22 | 22.070 | 22 | 14.030 | 24 | 19.280 | 21 | 19.080 |
| **M** | 23 | 20.790 | 23 | 23.250 | 23 | 26.610 | 22 | 23.410 | 22 | 16.350 | 21 | 16.520 | 22 | 17.730 |
| **N** | 22 | 18.700 | 21 | 14.220 | 23 | 21.800 | 22 | 24.140 | 20 | 18.100 | 22 | 22.120 | 22 | 18.810 |
| **O** | 21 | 20.200 | 22 | 15.120 | 21 | 23.220 | 22 | 24.400 | 23 | 17.730 | 23 | 20.760 | 20 | 17.210 |
| **P** | 22 | 16.030 | 21 | 20.140 | 26 | 22.730 | 19 | 8.840 | 21 | 13.540 | 21 | 19.360 | 21 | 19.450 |
| **Q** | 20 | 10.060 | 21 | 18.220 | 22 | 14.700 | 23 | 28.330 | 22 | 17.060 | 22 | 16.390 | 19 | 13.530 |
| **R** | 22 | 21.590 | 21 | 15.380 | 22 | 13.560 | 21 | 17.960 | 22 | 24.120 | 22 | 18.610 | 20 | 13.620 |
| **S** | 18 | 10.990 | 22 | 15.420 | 24 | 20.720 | 20 | 10.860 | 21 | 18.700 | 21 | 20.890 | 24 | 24.740 |
| **T** | 18 | 14.400 | 22 | 15.100 | 22 | 21.630 | 18 | 9.950 | 23 | 28.160 | 22 | 16.680 | 20 | 13.130 |
| **Avg** | 21.45 | 18.3380 | 22.15 | 18.4700 | 22.85 | 22.6020 | 22.20 | 23.2465 | 21.80 | 19.3855 | 21.80 | 18.2400 | 21.05 | 18.5670 |
| **Std** | 1.504 | 4.308 | 0.933 | 3.287 | 1.309 | 4.813 | 1.908 | 7.503 | 1.196 | 4.032 | 0.834 | 3.297 | 1.504 | 3.947 |
| **n** | 20 | | 20 | | 20 | | 20 | | 20 | | 20 | | 20 | |

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**Saratooga Hatchery (SC)**

| | SC008 std length (mm) | SC008 dry wt (mg) | SC008 (2) std length (mm) | SC008 (2) std length before isopropyl | SC008 (2) dry wt (mg) | SC008 (2) wet wt (mg) |
|---|---|---|---|---|---|---|
| **A** | 21 | 13.780 | 21 | 23 | 17.360 | 131.000 |
| **B** | 19 | 10.360 | 22 | 23 | 19.090 | 142.100 |
| **C** | 23 | 18.880 | 22 | 22 | 13.920 | 104.300 |
| **D** | 21 | 16.370 | 21 | 23 | 16.010 | 114.700 |
| **E** | 22 | 15.450 | 23 | 24 | 20.430 | 153.300 |
| **F** | 23 | 22.020 | 22 | 23 | 15.120 | 118.800 |
| **G** | 22 | 20.260 | 21 | 23 | 15.290 | 113.300 |
| **H** | 23 | 21.530 | 19 | 20 | 12.640 | 94.700 |
| **I** | 21 | 14.800 | 20 | 22 | 15.540 | 111.700 |
| **J** | 20 | 13.200 | 21 | 23 | 19.190 | 131.300 |
| **K** | 21 | 15.320 | | | | |
| **L** | 21 | 12.310 | | | | |
| **M** | 20 | 12.750 | | | | |
| **N** | 21 | 12.000 | | | | |
| **O** | 22 | 15.710 | | | | |
| **P** | 20 | 12.230 | | | | |
| **Q** | 20 | 11.200 | | | | |
| **R** | 22 | 16.320 | | | | |
| **S** | 21 | 14.630 | | | | |
| **T** | 20 | 13.250 | | | | |
| **Avg** | 21.15 | 15.1185 | 21.20 | 22.60 | 16.4590 | 121.52 |
| **Std** | 1.137 | 3.338 | 1.135 | 1.075 | 2.499 | 17.804 |
| **n** | 20 | | 10 | | 10 | |

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**Spring Creek Hatchery (SPC)**

| | SPC 001 std length (mm) | SPC 001 dry wt (mg) | SPC 002 std length (mm) | SPC 002 dry wt (mg) | SPC 003 std length (mm) | SPC 003 dry wt (mg) | SPC 004 std length (mm) | SPC 004 dry wt (mg) | SPC 005 std length (mm) | SPC 005 dry wt (mg) | SPC 006 std length (mm) | SPC 006 dry wt (mg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | 27 | 27.100 | 22 | 25.070 | 22 | 27.310 | 25 | 28.360 | 23 | 22.770 | 23 | 19.220 |
| **B** | 26 | 12.040 | 26 | 21.560 | 24 | 18.710 | 24 | 21.040 | 27 | 23.330 | 23 | 25.440 |
| **C** | 25 | 17.210 | 23 | 28.420 | 23 | 15.360 | 22 | 22.380 | 23 | 16.450 | 26 | 33.260 |
| **D** | 26 | 19.410 | 25 | 17.460 | 23 | 18.670 | 23 | 23.370 | 24 | 23.030 | 27 | 20.660 |
| **E** | 23 | 14.130 | 23 | 18.030 | 24 | 21.350 | 24 | 19.380 | 23 | 20.790 | 23 | 22.510 |
| **F** | 21 | 25.640 | 22 | 24.890 | 26 | 21.040 | 25 | 30.400 | 21 | 15.890 | 23 | 15.350 |
| **G** | 25 | 17.650 | 21 | 17.050 | 27 | 21.340 | 25 | 20.040 | 24 | 18.820 | 20 | 19.470 |
| **H** | 25 | 31.060 | 25 | 17.410 | 28 | 27.550 | 22 | 27.050 | 23 | 18.330 | 22 | 22.200 |
| **I** | 27 | 25.630 | 23 | 15.500 | 21 | 31.630 | 21 | 19.100 | 24 | 35.790 | 25 | 22.340 |
| **J** | 24 | 13.110 | 23 | 22.740 | 22 | 20.300 | 25 | 21.360 | 25 | 15.820 | 23 | 15.840 |
| **K** | 25 | 23.650 | 25 | 27.260 | 25 | 10.890 | 22 | 33.380 | 25 | 23.030 | 23 | 22.550 |
| **L** | 28 | 27.860 | 21 | 18.590 | 23 | 22.570 | 25 | 25.420 | 21 | 13.610 | 25 | 23.770 |
| **M** | 23 | 29.700 | 24 | 24.110 | 21 | 29.820 | 22 | 16.320 | 21 | 14.270 | 23 | 34.550 |
| **N** | 21 | 17.460 | 22 | 18.270 | 21 | 19.840 | 27 | 15.420 | 20 | 17.200 | 21 | 17.510 |
| **O** | 24 | 22.300 | 23 | 22.790 | 23 | 16.650 | 20 | 15.810 | 20 | 21.370 | 23 | 36.450 |
| **P** | 23 | 21.660 | 22 | 17.710 | 21 | 18.950 | 23 | 16.360 | 26 | 22.150 | 22 | 20.340 |
| **Q** | 25 | 31.230 | 22 | 14.910 | 22 | 20.000 | 27 | 16.670 | 22 | 19.210 | 22 | 20.750 |
| **R** | 21 | 31.270 | 23 | 18.280 | 21 | 30.640 | 24 | 25.100 | 22 | 15.840 | 24 | 19.890 |
| **S** | 22 | 23.150 | 20 | 20.400 | 25 | 17.920 | 22 | 14.720 | 24 | 34.000 | 22 | 22.650 |
| **T** | 26 | 20.020 | 22 | 26.580 | 24 | 25.600 | 21 | 19.590 | 22 | 24.150 | 23 | 12.960 |
| **Avg** | 24.35 | 22.5640 | 22.85 | 20.8515 | 23.30 | 21.8070 | 23.45 | 21.5635 | 23.00 | 20.7925 | 23.15 | 22.3855 |
| **Std** | 2.084 | 6.115 | 1.531 | 4.116 | 2.080 | 5.416 | 1.959 | 5.326 | 1.919 | 5.826 | 1.631 | 6.134 |
| **n** | 20 | | 20 | | 20 | | 20 | | 20 | | 20 | |

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**CC-350**

| | CC-350 006 std length (mm) | CC-350 006 dry wt (mg) | CC-350 007 std length (mm) | CC-350 007 dry wy (mg) | CC-350 008 std length (mm) | CC-350 008 dry wt (mg) |
|---|---|---|---|---|---|---|
| **A** | 23 | 13.250 | 20 | 12.130 | 22 | 9.470 |
| **B** | 20 | 11.680 | 21 | 8.570 | 21 | 10.040 |
| **C** | 22 | 10.240 | 23 | 8.040 | 21 | 8.890 |
| **D** | 20 | 14.390 | 21 | 7.700 | 22 | 17.650 |
| **E** | 22 | 14.430 | 23 | 15.750 | 21 | 11.710 |
| **F** | 22 | 9.330 | 21 | 12.850 | 19 | 17.750 |
| **G** | 22 | 16.810 | 24 | 17.980 | 22 | 10.830 |
| **H** | 20 | 8.820 | 21 | 6.890 | 20 | 9.000 |
| **I** | 23 | 17.060 | 23 | 10.410 | 20 | 14.820 |
| **J** | 20 | 16.820 | 22 | 9.170 | 21 | 8.870 |
| **K** | 21 | 8.760 | 23 | 13.370 | 19 | 10.820 |
| **L** | 20 | 9.440 | 20 | 16.580 | 20 | 10.050 |
| **M** | 20 | 14.070 | 21 | 18.080 | 22 | 9.470 |
| **N** | 22 | 10.310 | 19 | 11.150 | 20 | 11.760 |
| **O** | 21 | 17.500 | 20 | 10.740 | 20 | 13.120 |
| **P** | 23 | 10.380 | 21 | 7.660 | 20 | 9.370 |
| **Q** | 22 | 8.000 | 20 | 10.480 | 20 | 10.300 |
| **R** | 21 | 14.170 | 20 | 8.010 | 20 | 14.400 |
| **S** | 23 | 9.300 | 21 | 7.260 | 21 | 16.860 |
| **T** | 21 | 12.090 | 22 | 7.360 | 20 | 16.600 |
| **Avg** | 21.40 | 12.3425 | 21.30 | 11.0090 | 20.55 | 12.0890 |
| **Std** | 1.142 | 3.148 | 1.342 | 3.676 | 0.945 | 3.130 |
| **n** | 20 | | 20 | | 20 | |

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**CC-150**

| | CC-150 009 std length (mm) | CC-150 009 dry wt (mg) | CC-150 011 std length (mm) | CC-150 011 dry wt (mg) | CC-150 012 std length (mm) | CC-150 012 dry wt (mg) | CC-150 013 std length (mm) | CC-150 013 dry wt (mg) | CC-150 015 std length (mm) | CC-150 015 dry wt (mg) | CC-150 016 std length (mm) | CC-150 016 dry wt (mg) | CC-150 017 std length (mm) | CC-150 017 dry wt (mg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | 22 | 12.190 | 20 | 11.660 | 22 | 15.840 | 23 | 17.150 | 23 | 15.800 | 21 | 21.400 | 21 | 11.300 |
| **B** | 20 | 15.970 | 20 | 9.890 | 21 | 8.630 | 22 | 11.860 | 20 | 14.000 | 23 | 15.430 | 21 | 9.480 |
| **C** | 24 | 8.200 | 20 | 6.200 | 22 | 14.970 | 20 | 17.660 | 25 | 11.390 | 25 | 17.090 | 21 | 10.570 |
| **D** | 20 | 13.430 | 20 | 8.040 | 20 | 9.110 | 22 | 11.810 | 24 | 17.260 | 24 | 15.620 | 20 | 9.870 |
| **E** | 21 | 17.200 | 19 | 5.850 | 22 | 10.960 | 22 | 20.140 | 21 | 15.060 | 22 | 22.300 | 21 | 11.310 |
| **F** | 22 | 8.810 | 19 | 11.940 | 20 | 13.340 | 21 | 11.360 | 23 | 8.410 | 23 | 10.710 | 21 | 8.020 |
| **G** | 20 | 14.270 | 20 | 6.690 | 21 | 13.100 | 23 | 23.340 | 22 | 15.970 | 22 | 16.070 | 21 | 15.410 |
| **H** | 24 | 13.240 | 20 | 12.220 | 22 | 15.510 | 22 | 13.250 | 23 | 14.740 | 23 | 25.300 | 21 | 7.060 |
| **I** | 20 | 15.060 | 21 | 11.370 | 21 | 9.520 | 22 | 16.440 | 23 | 12.270 | 23 | 16.180 | 22 | 7.090 |
| **J** | 22 | 16.900 | 21 | 9.430 | 20 | 13.140 | 23 | 17.370 | 23 | 17.180 | 24 | 10.320 | 22 | 7.990 |
| **K** | 23 | 17.780 | 20 | 11.140 | 21 | 14.410 | 25 | 13.480 | 22 | 19.120 | 24 | 11.660 | 20 | 10.710 |
| **L** | 23 | 12.570 | 22 | 11.830 | 22 | 12.490 | 22 | 20.130 | 24 | 14.210 | 21 | 17.990 | 23 | 13.780 |
| **M** | 22 | 17.280 | 19 | 6.660 | 22 | 19.730 | 25 | 12.870 | 22 | 16.180 | 23 | 12.680 | 21 | 9.940 |
| **N** | 20 | 8.250 | 20 | 7.990 | 21 | 10.560 | 24 | 15.890 | 23 | 18.170 | 22 | 15.270 | 21 | 9.550 |
| **O** | 23 | 11.520 | 21 | 7.690 | 23 | 13.840 | 22 | 10.210 | 21 | 18.080 | 22 | 21.730 | 20 | 10.460 |
| **P** | 22 | 9.430 | 21 | 9.590 | 22 | 9.380 | 23 | 14.270 | 21 | 12.320 | 22 | 19.650 | 21 | 13.030 |
| **Q** | 23 | 17.190 | 19 | 9.150 | 21 | 15.410 | 23 | 16.330 | 22 | 13.010 | 25 | 13.090 | 20 | 11.940 |
| **R** | 22 | 11.480 | 21 | 7.540 | 21 | 14.360 | 24 | 17.700 | 23 | 15.700 | 23 | 18.080 | 20 | 8.310 |
| **S** | 22 | 13.680 | 19 | 13.410 | 22 | 10.300 | 21 | 13.790 | 24 | 6.850 | 22 | 16.990 | 20 | 14.260 |
| **T** | 22 | 9.300 | 20 | 6.680 | 23 | 12.200 | 22 | 16.600 | 22 | 14.000 | 22 | 17.160 | 22 | 12.970 |
| **Avg** | 21.85 | 13.1875 | 20.10 | 9.2485 | 21.45 | 12.8400 | 22.55 | 15.5825 | 22.55 | 14.4860 | 22.80 | 16.7360 | 20.95 | 10.6525 |
| **Std** | 1.309 | 3.254 | 0.852 | 2.335 | 0.887 | 2.822 | 1.276 | 3.367 | 1.234 | 3.152 | 1.152 | 3.987 | 0.826 | 2.382 |
| **n** | 20 | | 20 | | 20 | | 20 | | 20 | | 20 | | 20 | |

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**CC-150**

| | CC-150 018 std length (mm) | CC-150 018 dry wt (mg) | CC-150 020 std length (mm) | CC-150 020 dry wt (mg) |
|---|---|---|---|---|
| A | 21 | 16.610 | 20 | 12.040 |
| B | 20 | 14.100 | 21 | 5.700 |
| C | 22 | 16.740 | 19 | 15.550 |
| D | 20 | 10.730 | 22 | 6.790 |
| E | 19 | 5.700 | 20 | 14.280 |
| F | 22 | 14.280 | 21 | 7.590 |
| G | 23 | 15.640 | 22 | 7.050 |
| H | 22 | 13.500 | 22 | 18.360 |
| I | 20 | 16.560 | 20 | 11.320 |
| J | 20 | 11.270 | 21 | 10.960 |
| K | 21 | 10.500 | 20 | 7.690 |
| L | 22 | 12.970 | 22 | 13.100 |
| M | 22 | 8.000 | 20 | 14.180 |
| N | 22 | 13.310 | 18 | 10.600 |
| O | 22 | 18.330 | 21 | 8.360 |
| P | 21 | 8.330 | 18 | 13.110 |
| Q | 21 | 14.540 | 19 | 14.810 |
| R | 22 | 15.130 | 19 | 7.290 |
| S | 22 | 12.720 | 21 | 14.980 |
| T | 22 | 15.930 | 18 | 11.190 |
| **Avg** | 21.30 | 13.2445 | 20.20 | 11.2475 |
| **Std** | 1.031 | 3.302 | 1.361 | 3.553 |
| **n** | 20 | | 20 | |

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**LSV2C**

| | LSV2C 002 std length (mm) | LSV2C 002 dry wt (mg) | LSV2C 003 std length (mm) | LSV2C 003 dry wt (mg) | LSV2C 004 std length (mm) | LSV2C 004 dry wt (mg) | LSV2C 005 std length (mm) | LSV2C 005 dry wt (mg) | LSV2C 008 std length (mm) | LSV2C 008 dry wt (mg) | LSV2C 010 std length (mm) | LSV2C 010 dry wt (mg) | LSV2C 012 std length (mm) | LSV2C 012 dry wt (mg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | 18 | 11.850 | 22 | 11.760 | 22 | 9.620 | 19 | 7.080 | 21 | 8.870 | 20 | 8.010 | 22 | 13.810 |
| **B** | 20 | 17.480 | 20 | 7.080 | 21 | 11.310 | 21 | 12.370 | 20 | 9.980 | 20 | 6.230 | 21 | 12.540 |
| **C** | 20 | 12.730 | 21 | 7.310 | 21 | 8.910 | 19 | 7.400 | 20 | 10.300 | 20 | 10.640 | 22 | 12.370 |
| **D** | 21 | 8.140 | 22 | 8.010 | 22 | 7.600 | 23 | 11.710 | 21 | 8.950 | 21 | 6.770 | 22 | 15.000 |
| **E** | 19 | 9.720 | 21 | 12.110 | 20 | 11.960 | 20 | 10.580 | 21 | 8.370 | 20 | 7.600 | 22 | 12.700 |
| **F** | 20 | 8.020 | 21 | 7.890 | 22 | 6.700 | 20 | 7.370 | 21 | 11.420 | 21 | 7.290 | 22 | 13.280 |
| **G** | 20 | 11.680 | 21 | 9.420 | 21 | 9.520 | 20 | 16.890 | 21 | 9.490 | 19 | 9.570 | 23 | 12.550 |
| **H** | 22 | 10.130 | 22 | 9.850 | 21 | 10.130 | 20 | 8.140 | 20 | 12.150 | 21 | 14.100 | 22 | 13.390 |
| **I** | 21 | 13.820 | 22 | 13.960 | 23 | 13.810 | 21 | 15.330 | 21 | 9.710 | 19 | 7.370 | 22 | 12.400 |
| **J** | 19 | 6.820 | | | 20 | 10.720 | 19 | 10.990 | 21 | 8.670 | 19 | 4.690 | 22 | 13.470 |
| **K** | 20 | 10.440 | | | 21 | 9.640 | 20 | 13.220 | 20 | 8.420 | 19 | 6.740 | 22 | 12.810 |
| **L** | 20 | 6.510 | | | 20 | 9.310 | 20 | 9.950 | 20 | 8.510 | | | 21 | 13.450 |
| **M** | 19 | 9.840 | | | 20 | 10.450 | 19 | 10.270 | 21 | 8.760 | | | 22 | 13.460 |
| **N** | 21 | 12.090 | | | 23 | 10.990 | 21 | 11.540 | 20 | 8.670 | | | 22 | 14.100 |
| **O** | 20 | 13.280 | | | 21 | 10.670 | 19 | 12.300 | 20 | 7.920 | | | 22 | 13.530 |
| **P** | 18 | 10.030 | | | 21 | 13.330 | 21 | 13.230 | 20 | 10.230 | | | 22 | 14.940 |
| **Q** | 22 | 10.780 | | | 21 | 8.040 | 20 | 11.210 | 21 | 9.020 | | | 22 | 12.850 |
| **R** | 21 | 15.610 | | | 21 | 7.100 | 22 | 6.920 | 20 | 10.740 | | | 23 | 12.120 |
| **S** | 22 | 6.290 | | | 21 | 6.890 | 21 | 12.750 | 20 | 7.940 | | | 22 | 12.480 |
| **T** | 19 | 16.130 | | | 22 | 12.880 | 20 | 10.090 | 20 | 8.720 | | | 22 | 13.870 |
| **Avg** | 20.10 | 11.0695 | 21.33 | 9.7100 | 21.20 | 9.9790 | 20.25 | 10.9670 | 20.45 | 9.3420 | 19.91 | 8.0918 | 22.00 | 13.2560 |
| **Std** | 1.210 | 3.161 | 0.707 | 2.424 | 0.894 | 2.082 | 1.070 | 2.712 | 0.510 | 1.147 | 0.831 | 2.546 | 0.459 | 0.814 |
| **n** | 20 | | 9 | | 20 | | 20 | | 20 | | 11 | | 20 | |

**Length and dry weight data for juvenile brown trout from each treatment**
**12699-001**
filename: length & wt.xls

**LSV2C**

| | LSV2C 016 std length (mm) | LSV2C 016 dry wt (mg) | LSV2C 017 std length (mm) | LSV2C 017 dry wt (mg) | LSV2C 019 std length (mm) | LSV2C 019 dry wt (mg) | LSV2C 020 std length (mm) | LSV2C 020 dry wt (mg) | LSV2C 021 std length (mm) | LSV2C 021 dry wt (mg) |
|---|---|---|---|---|---|---|---|---|---|---|
| **A** | 22 | 17.320 | 24 | 25.130 | 23 | 26.560 | 21 | 13.920 | 22 | 8.320 |
| **B** | 19 | 15.730 | 23 | 20.260 | 25 | 23.350 | 21 | 12.980 | 23 | 8.500 |
| **C** | 22 | 16.060 | 23 | 15.130 | 23 | 21.680 | 21 | 10.990 | 19 | 10.380 |
| **D** | 25 | 14.700 | 23 | 24.680 | 24 | 18.840 | 23 | 7.890 | 20 | 10.280 |
| **E** | 22 | 9.710 | 23 | 17.080 | 23 | 25.970 | 21 | 10.270 | 20 | 9.960 |
| **F** | 23 | 17.160 | 23 | 21.450 | 21 | 15.450 | 23 | 8.570 | 20 | 16.840 |
| **G** | 23 | 16.230 | 25 | 13.590 | 25 | 13.100 | 22 | 8.090 | 19 | 7.710 |
| **H** | 22 | 12.390 | 23 | 19.750 | 23 | 10.410 | 22 | 8.660 | 20 | 10.690 |
| **I** | 20 | 24.040 | 23 | 17.630 | 23 | 17.300 | 21 | 13.900 | 22 | 15.690 |
| **J** | 20 | 11.710 | 24 | 21.390 | 26 | 19.830 | 22 | 9.790 | 21 | 4.550 |
| **K** | 22 | 27.380 | 24 | 24.930 | 23 | 13.690 | 21 | 15.120 | 18 | 11.960 |
| **L** | 22 | 14.060 | 24 | 18.110 | 22 | 23.830 | 21 | 9.360 | 19 | 12.530 |
| **M** | 21 | 9.310 | 25 | 15.480 | 22 | 10.580 | 21 | 16.620 | 20 | 10.470 |
| **N** | 21 | 21.020 | 24 | 17.330 | 26 | 33.340 | 24 | 14.030 | 21 | 5.950 |
| **O** | 24 | 18.480 | 23 | 19.570 | 24 | 18.080 | 21 | 9.520 | 18 | 5.510 |
| **P** | 21 | 18.270 | 25 | 16.470 | 24 | 23.380 | 21 | 14.690 | 23 | 13.280 |
| **Q** | 23 | 12.900 | 24 | 9.940 | 24 | 17.950 | 22 | 12.750 | 19 | 9.940 |
| **R** | 23 | 7.430 | 21 | 17.680 | 26 | 21.150 | 22 | 14.230 | 21 | 18.350 |
| **S** | 20 | 20.420 | 25 | 23.820 | 22 | 14.510 | 21 | 9.250 | 19 | 16.000 |
| **T** | 21 | 12.390 | 25 | 18.130 | 24 | 17.390 | 24 | 10.840 | 20 | 6.210 |
| **Avg** | 21.80 | 15.8355 | 23.70 | 18.8775 | 23.65 | 19.3195 | 21.75 | 11.5735 | 20.20 | 10.6560 |
| **Std** | 1.473 | 4.974 | 1.031 | 3.966 | 1.424 | 5.764 | 1.020 | 2.701 | 1.473 | 3.901 |
| **n** | 20 | | 20 | | 20 | | 20 | | 20 | |

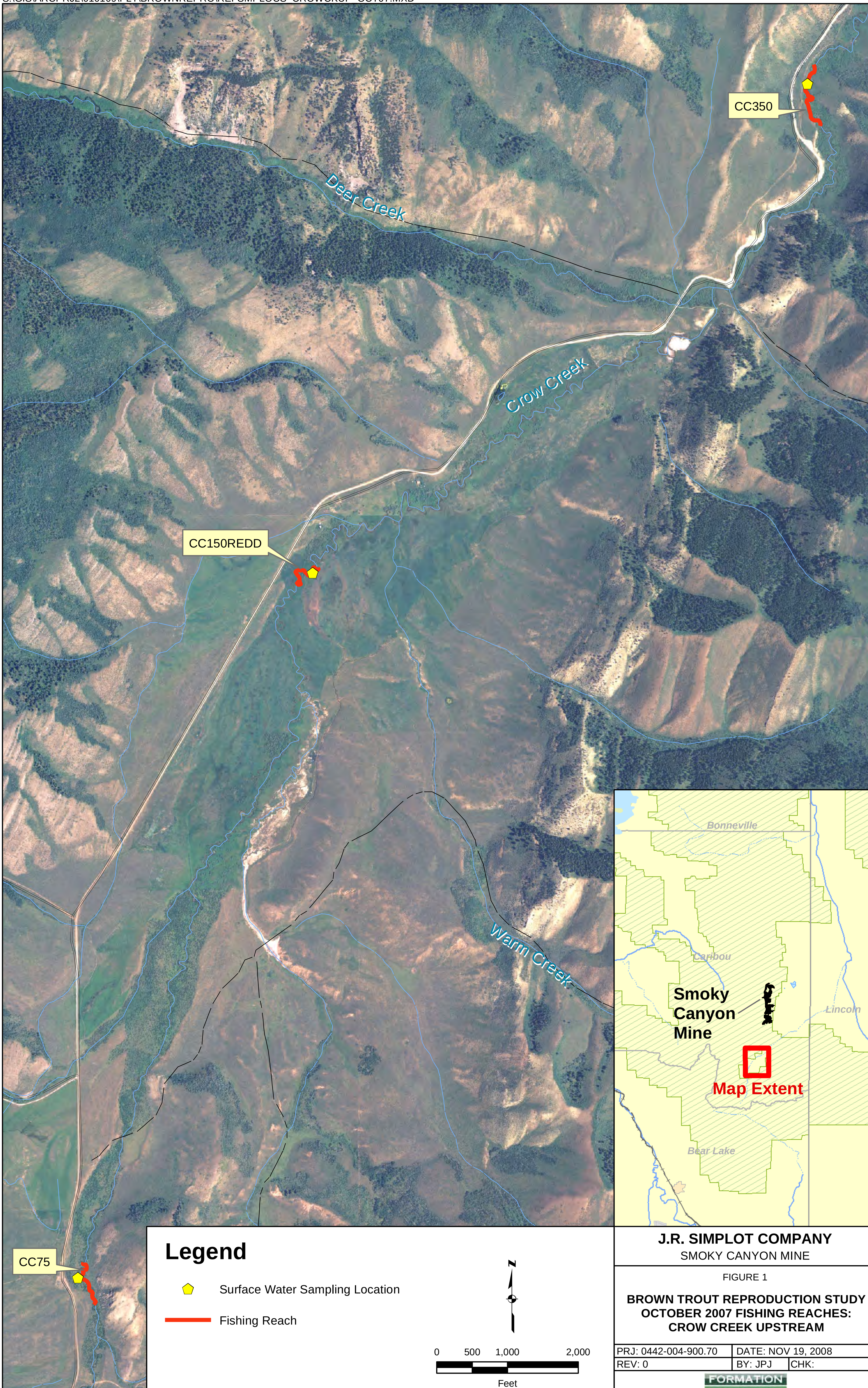
**Average length and weight of brown trout (*Salmo trutta*) at test termination.**
**12699-001-300**
Note: each value represents the average of ~20 individual fish
filename: length & wt.xls

| | avg std length (mm) | avg dry wt (mg) | avg std length before Isopropyl | avg wet wt (mg) | Grand Avg std length | Grand avg dry wt (mg) | |
|---|---|---|---|---|---|---|---|
| **Saratoga Hatchery** | | | | | | | |
| SC-001 | 21.45 | 18.338 | | | | | (measured after storage in isopropyl) |
| SC-002 | 22.15 | 18.470 | | | | | (measured after storage in isopropyl) |
| SC-003 | 22.85 | 22.602 | | | | | (measured after storage in isopropyl) |
| SC-004 | 22.20 | 23.247 | | | | | (measured after storage in isopropyl) |
| SC-005 | 21.80 | 19.386 | | | | | (measured after storage in isopropyl) |
| SC-006 | 21.80 | 18.240 | | | | | (measured after storage in isopropyl) |
| SC-007 | 21.05 | 18.567 | | | | | (measured after storage in isopropyl) |
| SC-008 | 21.15 | 15.119 | | | 21.81 | 19.2459 | (measured after storage in isopropyl) |
| SC-008 (2) | 21.20 | 16.459 | 22.60 | 121.52 | | | (measured prior to storage in isopropyl) |
| | | | | | | | (all other fish measured prior to storage in isopropyl) |
| **Spring Creek Hatchery** | | | | | | | |
| SPC-001 | 24.35 | 22.564 | | | | | |
| SPC-002 | 22.85 | 20.852 | | | | | |
| SPC-003 | 23.30 | 21.807 | | | | | |
| SPC-004 | 23.45 | 21.564 | | | | | |
| SPC-005 | 23.00 | 20.793 | | | | | |
| SPC-006 | 23.15 | 22.385 | | | 23.35 | 21.6607 | |
| | | | | | | | |
| **High** | | | | | | | |
| LSV2C-002 | 20.10 | 11.069 | | | | | |
| LSV2C-003 | 21.33 | 9.710 | | | | | |
| LSV2C-004 | 21.20 | 9.979 | | | | | |
| LSV2C-005 | 20.25 | 10.967 | | | | | |
| LSV2C-006 | | | | | | | |
| LSV2C-007 | | | | | | | |
| LSV2C-008 | 20.45 | 9.342 | | | | | |
| LSV2C-010 | 19.91 | 8.092 | | | | | |
| LSV2C-012 | 22.00 | 13.256 | | | | | |
| LSV2C-016 | 21.80 | 15.835 | | | | | |
| LSV2C-017 | 23.70 | 18.878 | | | | | |
| LSV2C-019 | 23.65 | 19.320 | | | | | |
| LSV2C-020 | 21.75 | 11.574 | | | | | |
| LSV2C-021 | 20.20 | 10.656 | | | 21.36 | 12.3898 | |
| | | | | | | | |
| **Bkd** | | | | | | | |
| CC-150-009 | 21.85 | 13.188 | | | | | |
| CC-150-011 | 20.10 | 9.249 | | | | | |
| CC-150-012 | 21.45 | 12.840 | | | | | |
| CC-150-013 | 22.55 | 15.583 | | | | | |
| CC-150-015 | 22.55 | 14.486 | | | | | |
| CC-150-016 | 22.80 | 16.736 | | | | | |
| CC-150-017 | 20.95 | 10.652 | | | | | |
| CC-150-018 | 21.30 | 13.245 | | | | | |
| CC-150-020 | 20.20 | 11.248 | | | 21.53 | 13.0250 | |
| | | | | | | | |
| **Low** | | | | | | | |
| CC-350-006 | 21.40 | 12.343 | | | | | |
| CC-350-007 | 21.30 | 11.009 | | | | | |
| CC-350-008 | 20.55 | 12.089 | | | 21.08 | 11.8135 | |

APPENDIX B

Detail Figures for Locations where Brown Trout were Collected

S:\GIS\ARCPRJ2\010109\PLT\BROWNREPRO\REFSMPLOCS_CROWCKUP_OCT07.MXD




## Legend

Surface Water Sampling Location

Fishing Reach

0 500 1,000 2,000

Feet

**J.R. SIMPLOT COMPANY**

SMOKY CANYON MINE

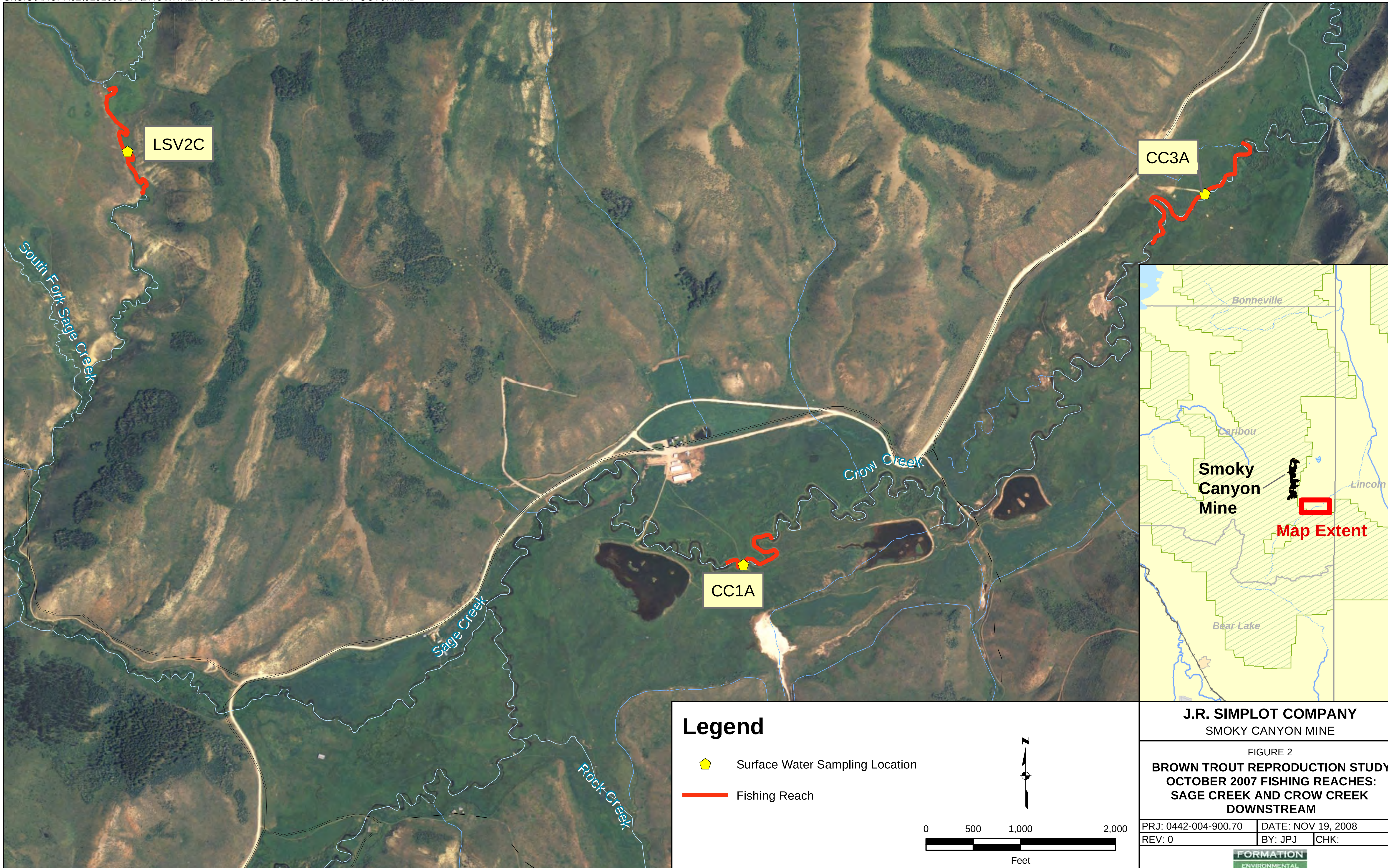
FIGURE 1

**BROWN TROUT REPRODUCTION STUDY**
**OCTOBER 2007 FISHING REACHES:**
**CROW CREEK UPSTREAM**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: NOV 19, 2008 |
| REV: 0 | BY: JPJ CHK: |

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010109\PLT\BROWNREPRO\REFSMPLOCS_CROWCKDN_OCT07.MXD



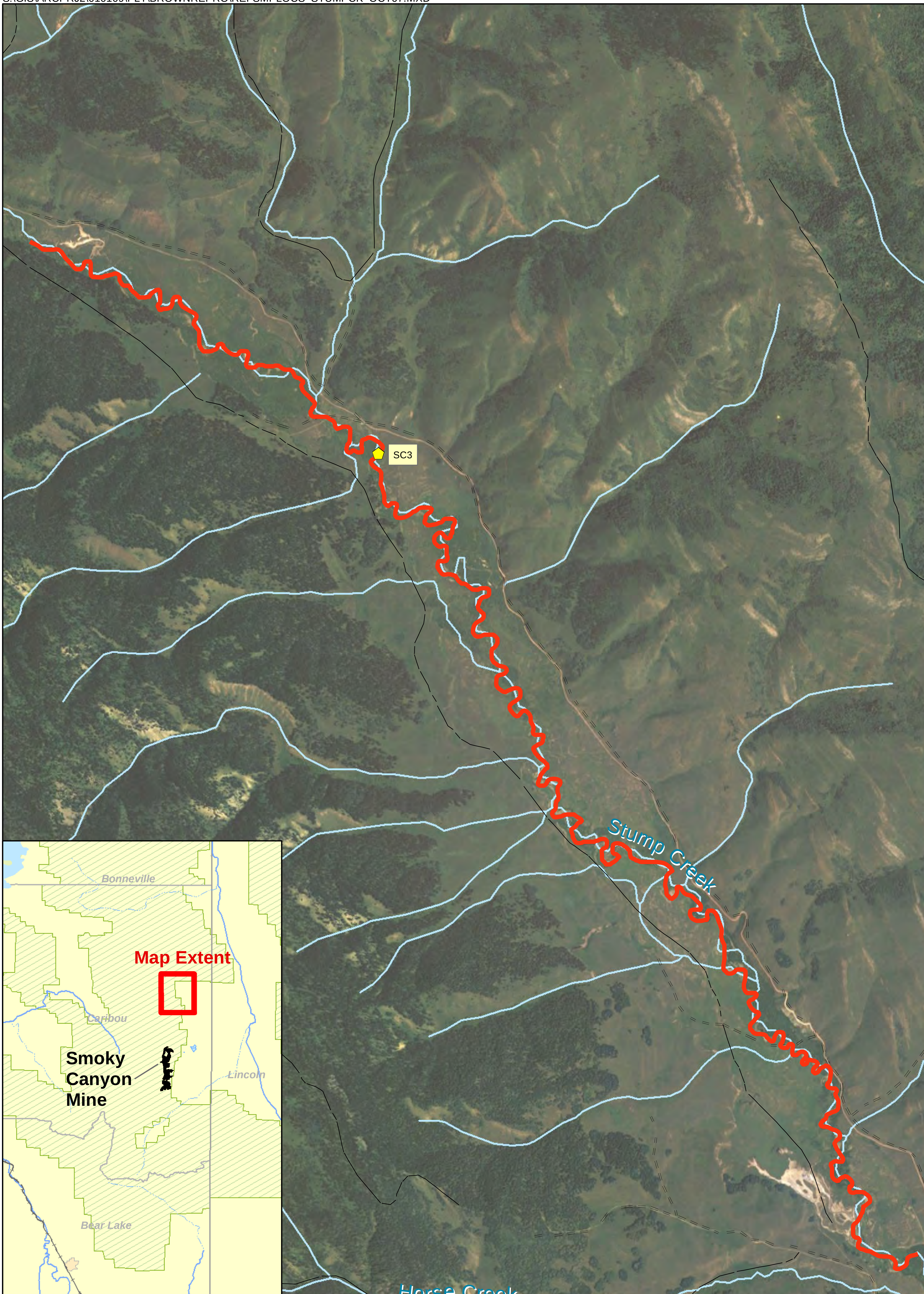

**J.R. SIMPLOT COMPANY**
SMOKY CANYON MINE

FIGURE 2

**BROWN TROUT REPRODUCTION STUDY OCTOBER 2007 FISHING REACHES: SAGE CREEK AND CROW CREEK DOWNSTREAM**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: NOV 19, 2008 |
| REV: 0 | BY: JPJ CHK: |

S:\GIS\ARCPRJ2\010109\PLT\BROWNREPRO\REFSMPLOCS_STUMPCK_OCT07.MXD




**J.R. SIMPLOT COMPANY**
SMOKY CANYON MINE

FIGURE 3

**BROWN TROUT REPRODUCTION STUDY OCTOBER 2007 FISHING REACHES: STUMP CREEK**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: NOV 19, 2008 |
| REV: 0 | BY: JPJ CHK: |

FORMATION ENVIRONMENTAL

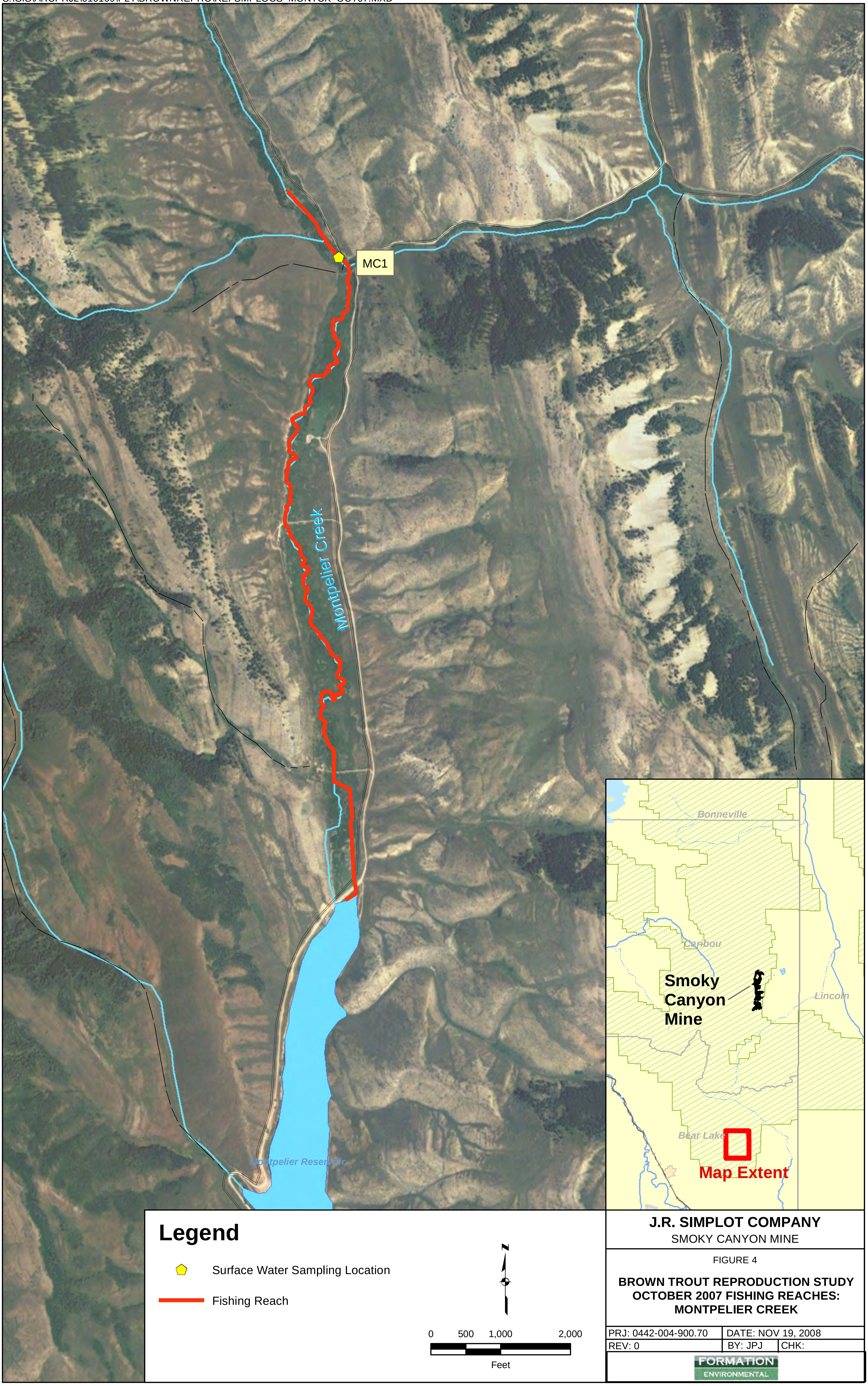
## Legend

Surface Water Sampling Location

Fishing Reach

0 500 1,000 2,000
Feet

S:\GIS\ARCPRJ2\010109\PLT\BROWNREPRO\REFSMPLOCS_MONTCK_OCT07.MXD

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SMOKY CANYON MINE

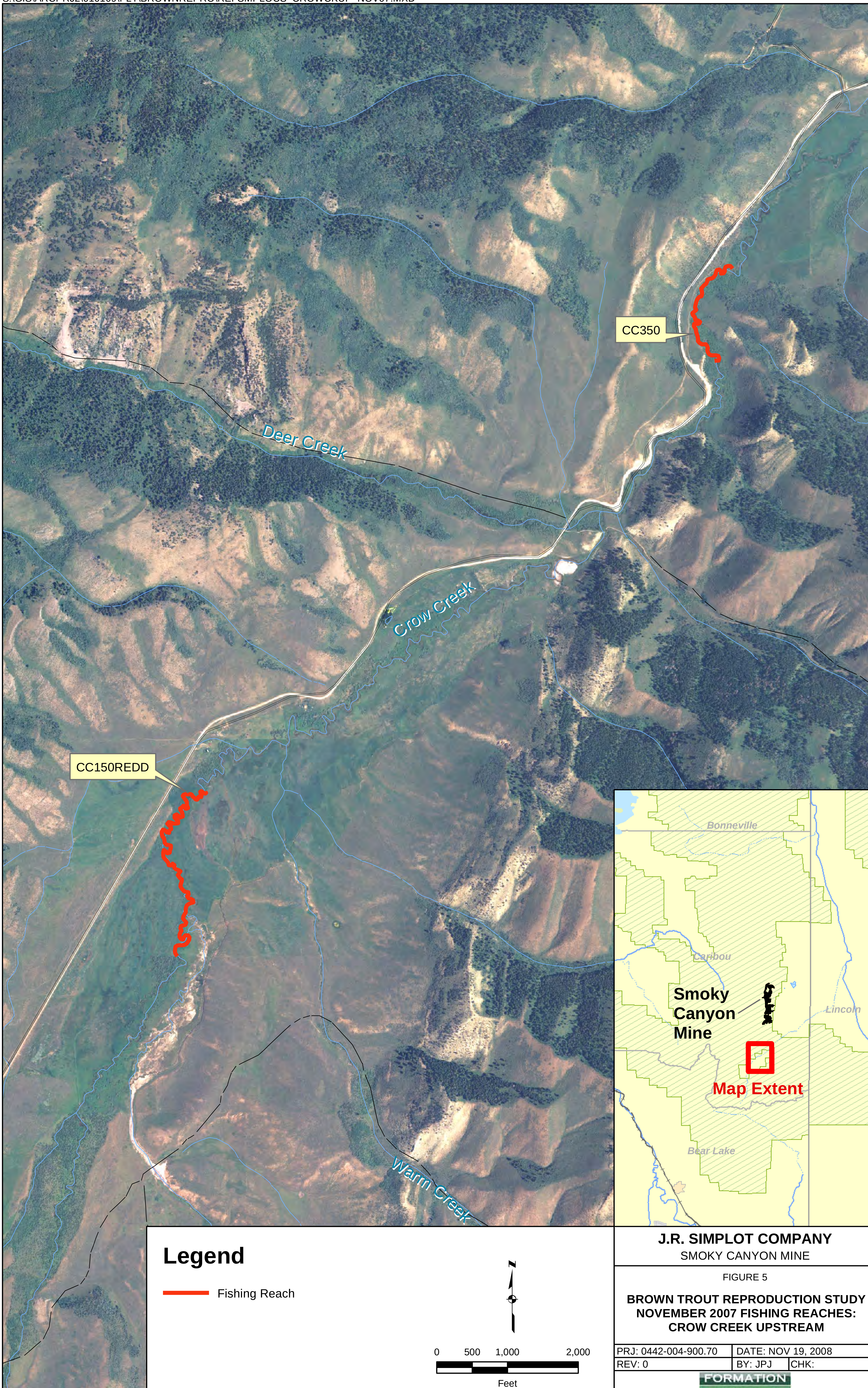
FIGURE 4

**BROWN TROUT REPRODUCTION STUDY OCTOBER 2007 FISHING REACHES: MONTPELIER CREEK**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: NOV 19, 2008 |
| REV: 0 | BY: JPJ CHK: |

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010109\PLT\BROWNREPRO\REFSMPLOCS_CROWCKUP_NOV07.MXD




## Legend

Fishing Reach

**J.R. SIMPLOT COMPANY**
SMOKY CANYON MINE

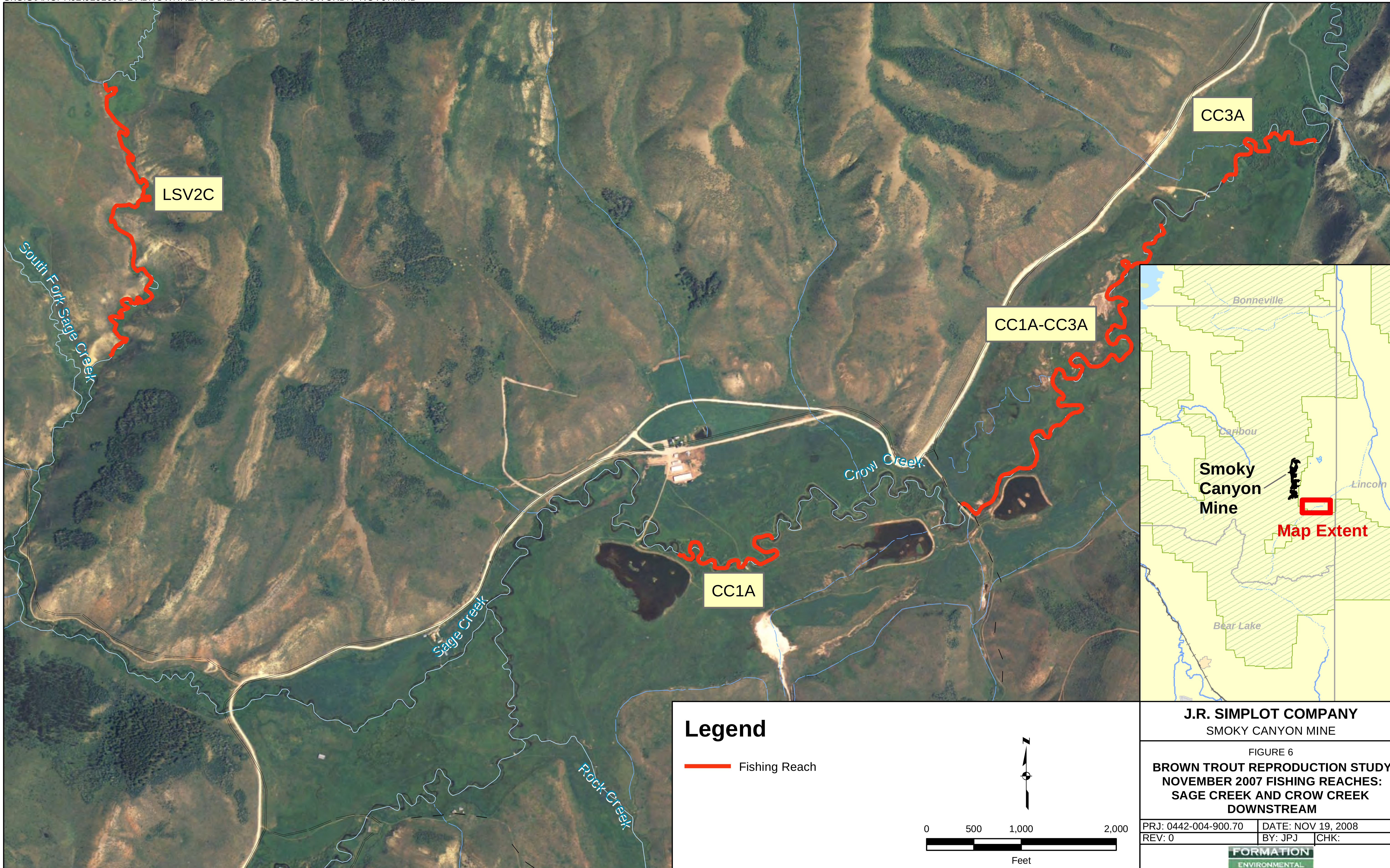
FIGURE 5

**BROWN TROUT REPRODUCTION STUDY NOVEMBER 2007 FISHING REACHES: CROW CREEK UPSTREAM**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: NOV 19, 2008 |
| REV: 0 | BY: JPJ CHK: |

FORMATION ENVIRONMENTAL

S:\GIS\ARCPRJ2\010109\PLT\BROWNREPRO\REFSMPLOCS_CROWCKDN_NOV07.MXD




**J.R. SIMPLOT COMPANY**
SMOKY CANYON MINE

FIGURE 6
**BROWN TROUT REPRODUCTION STUDY NOVEMBER 2007 FISHING REACHES: SAGE CREEK AND CROW CREEK DOWNSTREAM**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: NOV 19, 2008 |
| REV: 0 | BY: JPJ CHK: |

FORMATION ENVIRONMENTAL

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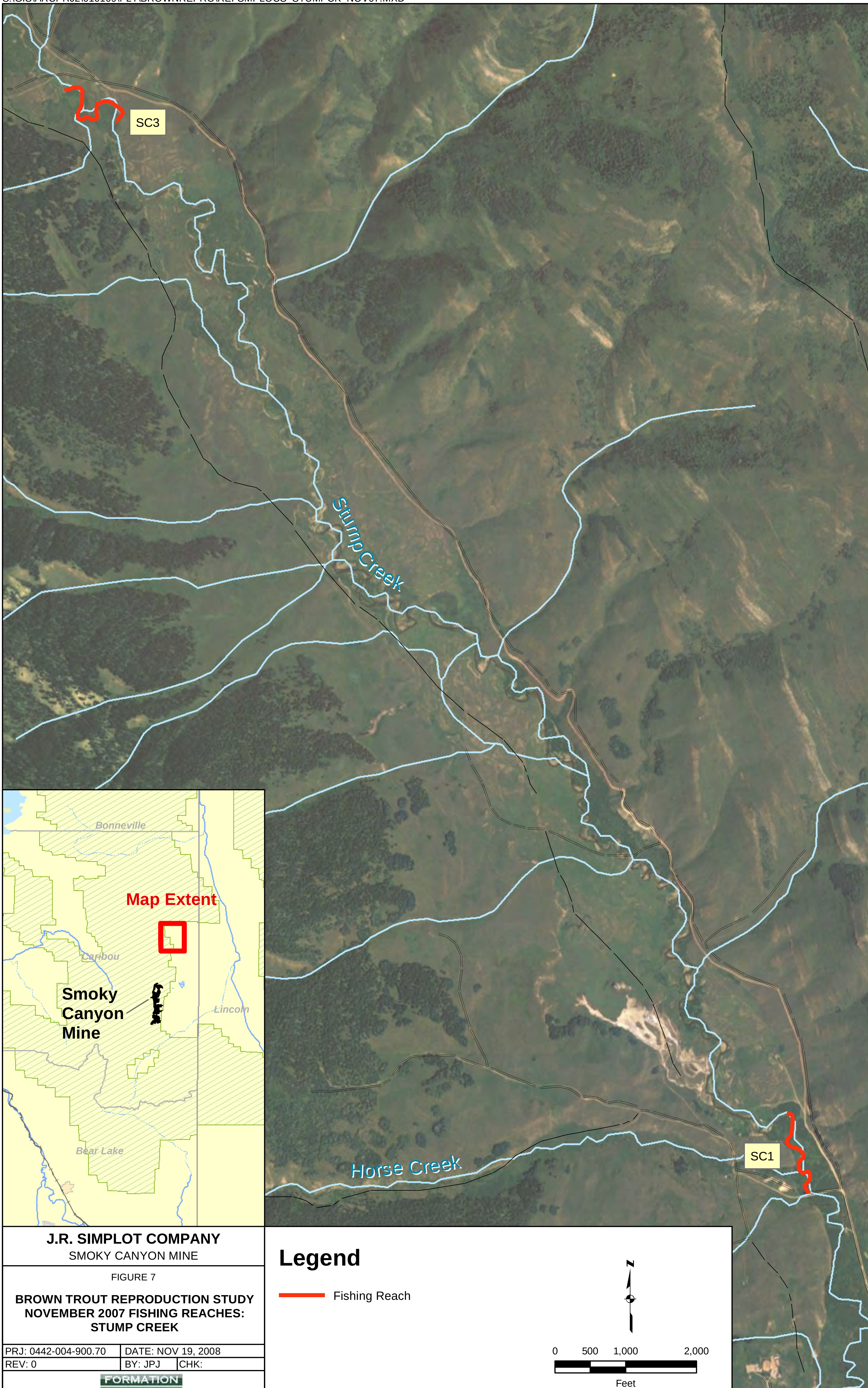



**J.R. SIMPLOT COMPANY**
SMOKY CANYON MINE

FIGURE 7

**BROWN TROUT REPRODUCTION STUDY NOVEMBER 2007 FISHING REACHES: STUMP CREEK**

| | |
|---|---|
| PRJ: 0442-004-900.70 | DATE: NOV 19, 2008 |
| REV: 0 | BY: JPJ CHK: |

FORMATION ENVIRONMENTAL

# APPENDIX C

Photographs of example deformities and Summary of the Deformity Rankings for Each Sample-CSU

*Deformity Assessment*

The general scoring criteria were adopted from Holm et al. (2003) and included assessments of craniofacial deformities, mostly of the head, eyes, and jaw, vertebral deformities, fin deformities, and edema. The original publication showed pictures of some deformities but others, particularly the intermediate categories were not illustrated or were poorly described. More specific definitions for each of the assessment categories were developed to give better repeatability and consistency across studies, and to aid others in learning the range of deformities possible.

Deformities in each of the categories described above were given a score from 0-3, with 0 being a normal condition and 3 being the most deformed. Some range finding was conducted over the first several samples to find background and severe levels of deformities in each category. Initial samples were rescored as necessary to bring them into compliance with the standards that were used throughout the assessment. In the second batch of fish analyzed (~100 from 5 LSV2C sites), it was not always possible to score each fish for each category due to the condition of the organism. Therefore, in several cases no scoring was possible.

The protocol for assessing damage was to place several fish, head to the left, in a Petri dish and examine them under a dissecting microscope and 10X magnification. The lateral side was examined for spinal deformities (lordosis, kyphosis), appearance of the eye, head and snout shape, edema, and fin deformities. The fish was turned ventrally to look for mouth deformities and further spinal deformities (scoliosis), turned laterally again for the same criteria as the other side, and then dorsally for issues associated with eyes, head size, spinal deformities.

Craniofacial deformities included shortening of the jaw, snout, and missing or poorly developed eye or eyes, and head shape abnormalities. A slightly shortened lower jaw (<= 1 lip width) received a 1, a shortened jaw = 2 lip widths or a slightly shortened and slightly disfigured jaw = 2, and a flat lower jaw or much disfigured (non-functional) jaw = 3. An assessment of fish independent of this study revealed that other brown trout of the same size and developmental state did not have the slight deformity that was assessed as CF =1 for the jaw (J). Thus, the CF = 1 score where the J was concerned were deemed real. A slightly blunted snout (about 50% eye diameter, usually is > than that) = 1, very blunt or flat = 2, deformed or bulbous = 3. Eye deformities were scored as one eye blind or poorly pigmented or poorly developed =1, both poorly developed = 2, both blind = 3. Skulls that were slightly bulbous (1/3 > normal) = 1, moderately bulbous (2/3 > normal) = 2, and bulbous (1x or > than normal) = 3. Usually factors occurred together so a combination of two “1” conditions = 2, three “1” conditions = 3, or a 1 and a 2 = 3, and so on. For example, a deformed jaw and a blind eye = 2, two blind eyes = 2, but a badly deformed jaw (= 2 alone) plus a blind eye (= 1 alone), = 3.

Skeletal deformities included any deformity of the vertebrae or spines. A slight bend of less than 45 degrees (but > than body width off of straight) or a minor body constriction (e.g. a tight rubber band about the body effect) was given a score of 1, 2 slight bends or constrictions anywhere, or bend of > 45-90 degrees was scored a 2, and multi-directional bends > 90 degrees were given a 3. Bends caused by skeletal deformities were usually detectable from normal bending of the body during preservation (these fish were usually well preserved, very straight) by presence of a slight or greater bump below the surface of the epidermis on the outside of the bend. However, some fish with SD = 1 had just a very slight bend in the range the deformity described but could be due to preservation or the poor condition of the fish. This was sometimes especially true in larger fish, which may be more muscular and undergo stronger contraction during preservation and thus, bend slightly. A score "CF = 1" was a slight deformity, if at all. The scores of SD = 1 involving kyphosis or lordosis were deemed real because that is an unusual preservation deformity. Also, samples BKD 015 SU (i.e., extra fry from CC-150-015 at swim-up), LOW 008 SU (i.e., extra fry from CC-350-008 at swim-up), and SC 003 SU (i.e., extra fry from SC-003 at swim-up) were re-examined; most fish were very straight so some samples with higher SD scores (e.g., PSU samples) were determined accurate. Thin fish difficult to score, and often looked like they were underfed or starving.

Fin deformities included variation in fin or finfold morphology and a slightly smaller or missing fin (in thin fish, the adipose fin was often absent, indicating fat absorption, not uncommon and scored 1) or one with a bend or incomplete ray development (in older fish) was given a 1, 2 fins damaged or malformed = 2, and > 2 fins malformed or if fins were missing (except adipose) was = 3. Often fins were malformed associated with vertebral deformities that did not permit proper development. Folded finfolds as a result of preservation were not counted.

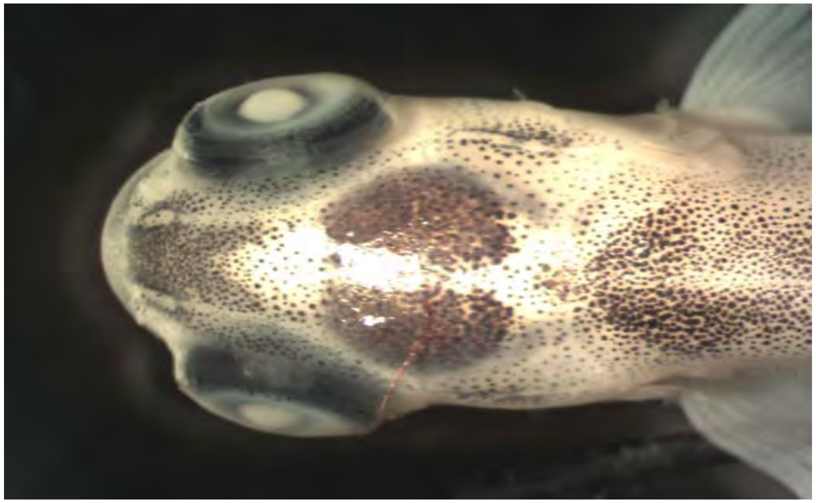
Edema was not originally scheduled for assessment because it was thought sometimes not a teratogenic effect and may be transitory as fish develop. However, it was assessed because it was common in one early sample and not others, and because it was considered a condition that could affect emergence, mobility, and other factors that may limit survival of fish in the wild. Edema was detected by an obvious swelling and fluid buildup, usually abdominally, and ventrally, which often displaced the gut, and was usually clear fluid that was slightly soft when touched with a blunt probe. The yolk, which was present in some quantity in some study specimens, also created some swelling but was typically yellowish, opaque, and small, and hard to the touch in preservation. Slight edema = 1 was for a fish with up to 1X swelling of the normal body width or depth, up to 2x = 2, and > 2x = 3.

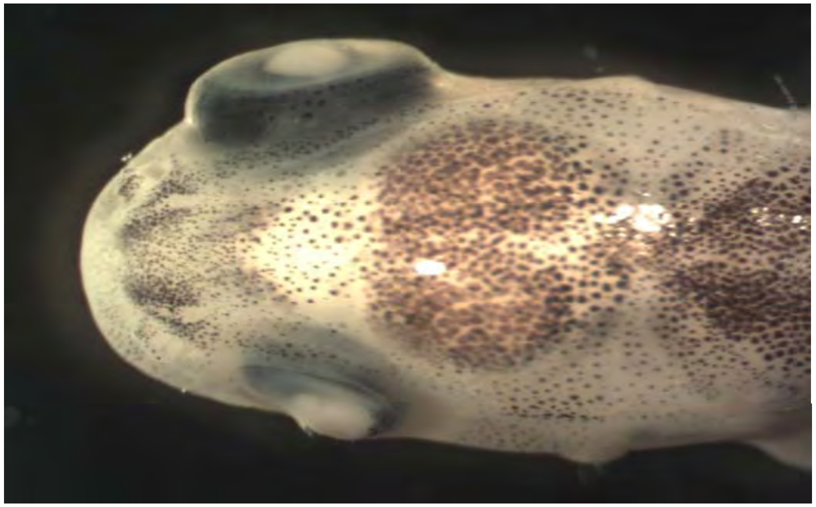
A sample of 50 fish and a sample of 30 fish were scored twice, the same fish for each batch but not necessarily the same order. This sample was characterized by a low incidence of fin deformities (slow development) and a high incidence of jaw deformities and blindness (SC 003 SU). Those cranio-facial traits are difficult to score because they are additive, and subjective as to severity. Thus, the results may be a conservative view of what score replicability should be like for other traits in other samples that are easier to score.

Replicability of frequency of cranio-facial abnormalities was high among assessments at 50 and 52% in the first sample of 50 fish, and identical frequencies of 46.7 % in each assessment for the sample of 30 fish. The cumulative sums of the scores were also quite close, but reflecting variability in scoring for all three categories of severity in each sample. Replicability of fin ray development assessments for both frequency and the sum of the scores was identical in both samples.

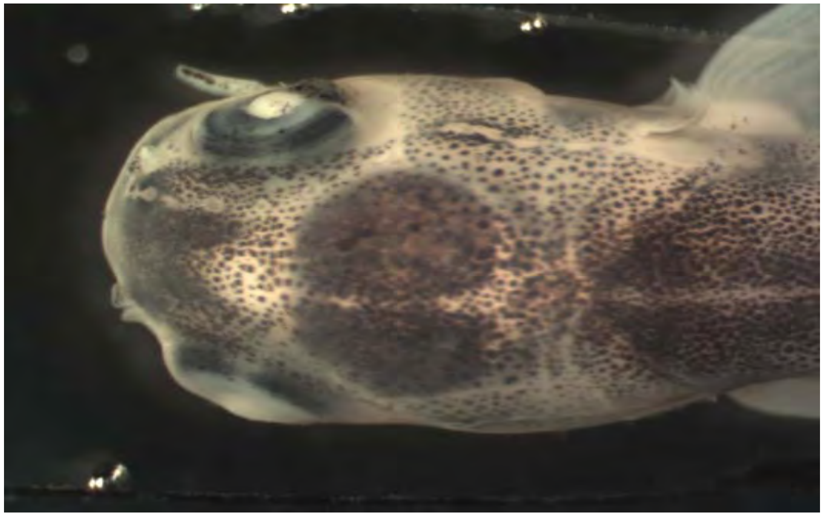
Below we have included photographs of each of the deformities assessed described above, demonstrating scoring values of 0 – 3 for each of the deformities.

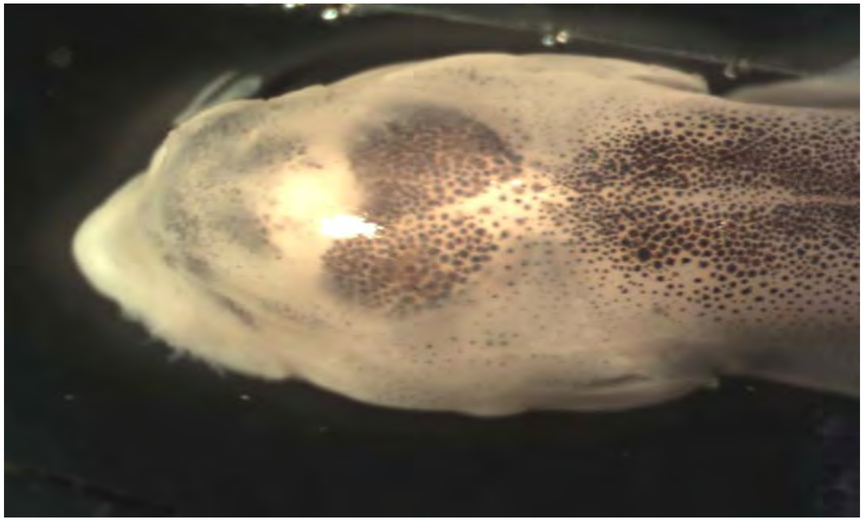
Photos 1 and 2: Example of normal brown trout eyes (left) and an example of a cranio-facial eye deformity with a score of 1 (right).



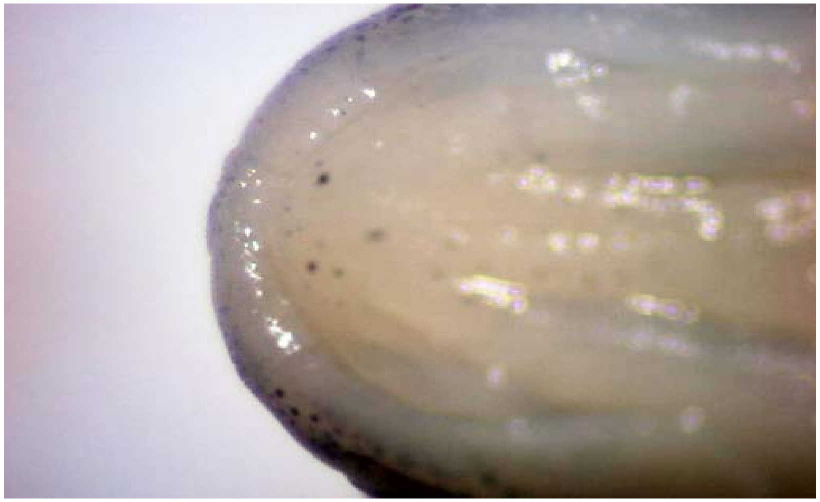


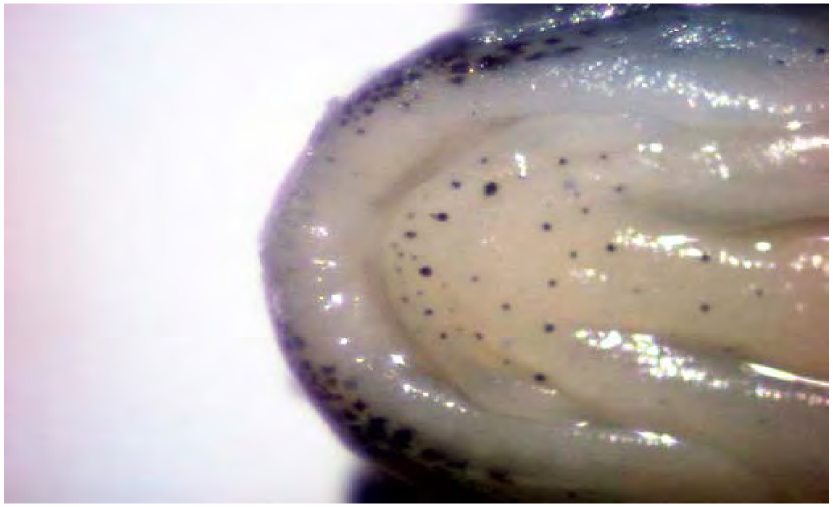
Photos 3 and 4: Examples of cranio-facial eye deformities with a score of 3 (both).



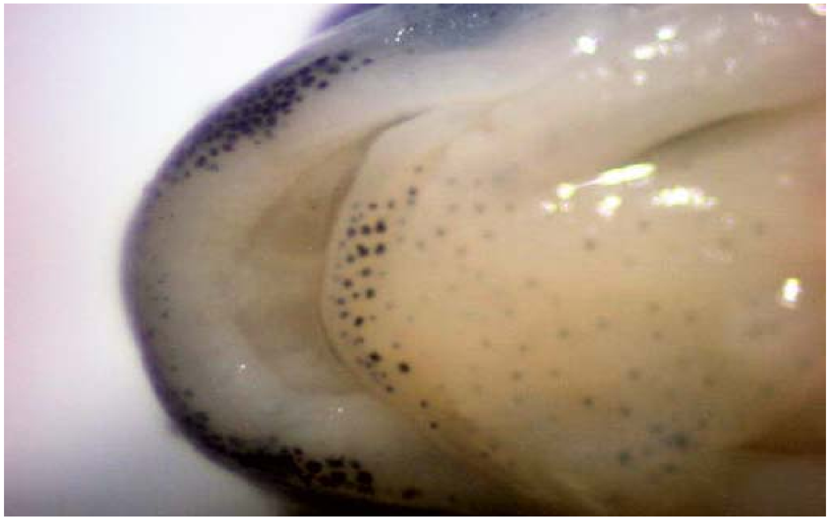


Photos 1 and 2: Example of a normal brown trout jaw (left) and an example of a cranio-facial jaw deformity with a score of 1 (right).





Photos 3 and 4: Example of a cranio-facial jaw deformity with a score of 2 (left ) and 3 (right).



Photos 1 and 2: Example of a healthy brown trout fish (left) and an example of the spinal deformity constriction with a score of 1 (right).

Photo 3: Example of the spinal deformity constriction with a score of 1.

Photos 1 and 2: Example of a healthy brown trout fish (left) and an example of the skeletal deformity kyphosis with a score of 1 (right).

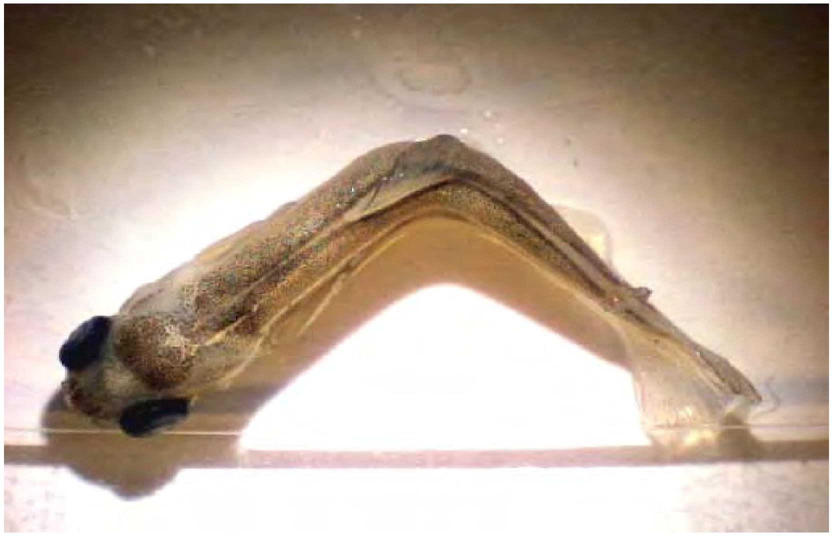
Photos 3 and 4: Example of the skeletal deformity kyphosis with a score of 2 (left ) and 3 (right).

Photos 1 and 2: Example of a healthy brown trout fish (left) and an example of the skeletal deformity lordosis with a score of 1 (right).

Photos 3 and 4: Example of the skeletal deformity lordosis with a score of 2 (left ) and 3 (right).

Photos 1 and 2: Example of a healthy brown trout fish (left) and an example of the spinal deformity scoliosis with a score of 1 (right).

Photos 3 and 4: Example of the spinal deformity scoliosis with a score of 2 (left ) and 3 (right).



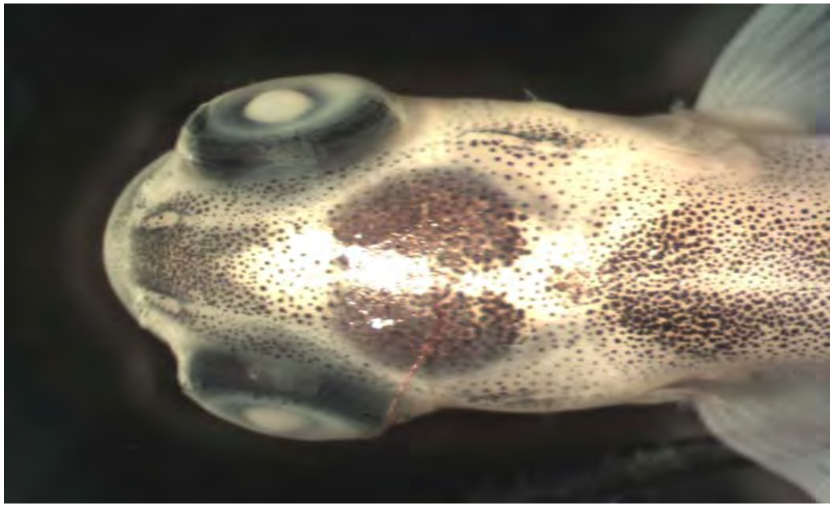
Photos 1 and 2: Example of a healthy brown trout fish (left) and an example of a fin deformity with a score of 1 (right).

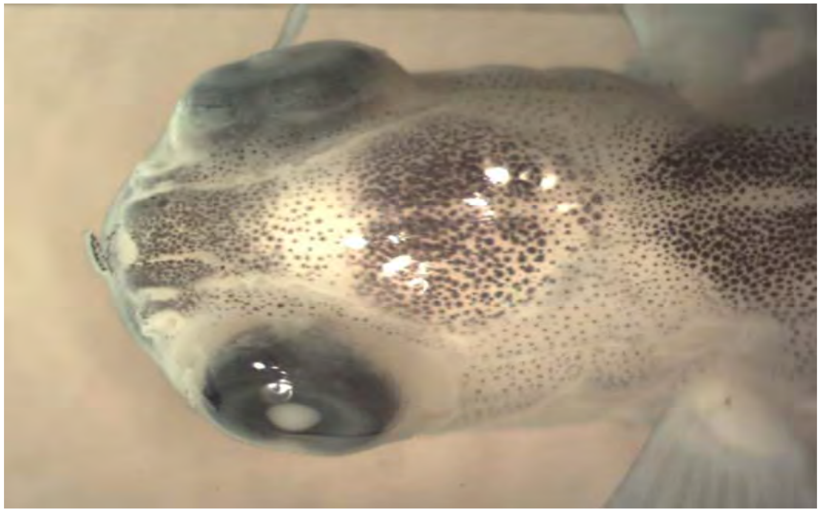
Photos 3 and 4: Example of a fin deformity with a score of 2 (left ) and 3 (right).

Photos 1 and 2: Example of a healthy brown trout fish (left) and an example of abdominal edema with a score of 1 (right).

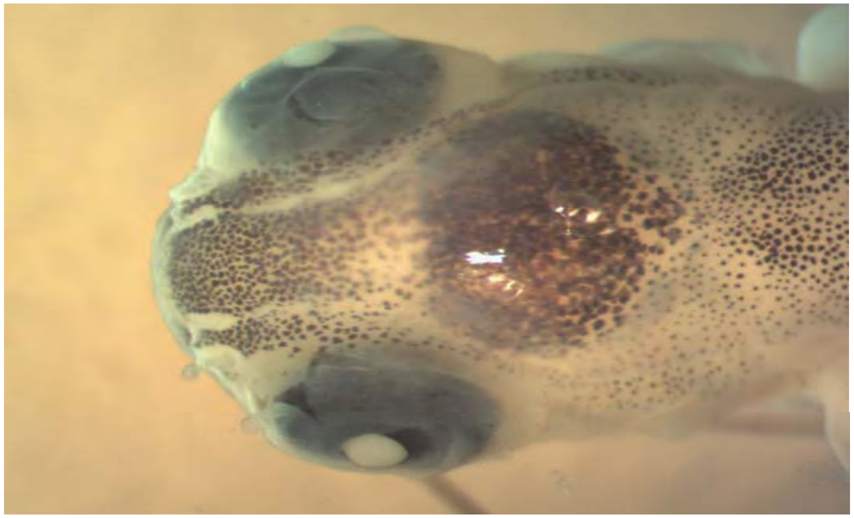
Photos 3 and 4: Examples of abdominal edema with a score of 2 (left ) and 3 (right).

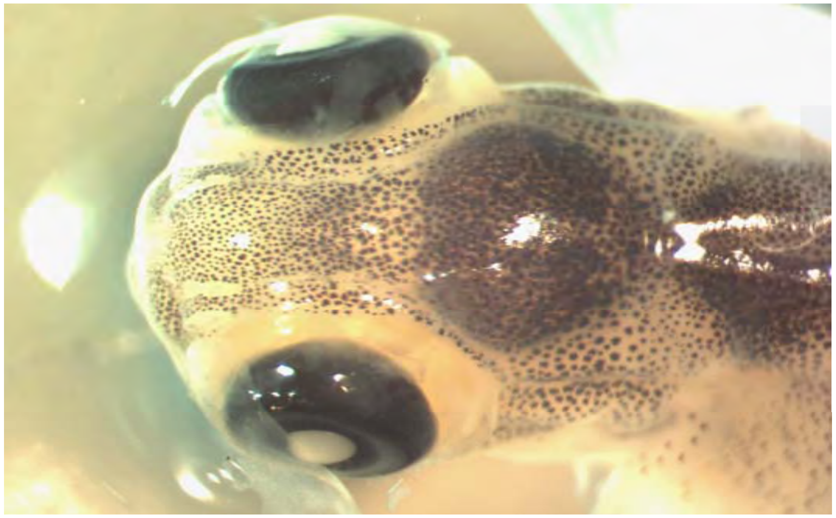
Photos 1 and 2: Example of a healthy brown trout fish (left) and an example of cranial edema with a score of 1 (right).





Photos 3 and 4: Example of cranial edema with a score of 2 (left ) and 3 (right).





Photos 1 and 2: Examples of brown trout with unusual deformities (both having two heads).

Photos 3 and 4: Examples of unusual deformities.

**Deformity assessment of fry preserved after death during the BT parental study.**

filename: LSV2C def data.xls

0 (normal)
1 (slight/few)
2 (mod/several)
3 (severe/many)

CF = craniofacial deformities
SD = vertebral deformities
FD = fin deformities
ED = edema

Counts

| CF | | | | | | | Total |
|---|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total | assessed |
| LSV2C | 003 | 0 | 3 | 83 | 12 | 98 | 98 |
| | 004 | 0 | 6 | 80 | 15 | 101 | 101 |
| | 005 | 0 | 14 | 66 | 9 | 89 | 89 |
| | 010 | 0 | 16 | 55 | 0 | 71 | 71 |
| | 021 | 0 | 2 | 53 | 46 | 101 | 101 |

| CF | | | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total |
| LSV2C | 003 | 0.0% | 3.1% | 84.7% | 12.24% | 100% |
| | 004 | | 5.9% | 79.2% | 14.85% | 100% |
| | 005 | | 15.7% | 74.2% | 10.11% | 100% |
| | 010 | | 22.5% | 77.5% | 0.00% | 100% |
| | 021 | | 2.0% | 52.5% | 45.54% | 100% |

| SD | | | | | | | Total |
|---|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total | assessed |
| LSV2C | 003 | 0 | 56 | 20 | 6 | 82 | 82 |
| | 004 | 0 | 47 | 13 | 4 | 64 | 64 |
| | 005 | 0 | 28 | 16 | 40 | 84 | 84 |
| | 010 | 0 | 30 | 16 | 7 | 53 | 53 |
| | 021 | 0 | 35 | 19 | 8 | 62 | 62 |

| SD | | | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total |
| LSV2C | 003 | 0.0% | 68.3% | 24.4% | 7.32% | 100% |
| | 004 | | 73.4% | 20.3% | 6.25% | 100% |
| | 005 | | 33.3% | 19.0% | 47.62% | 100% |
| | 010 | | 56.6% | 30.2% | 13.21% | 100% |
| | 021 | | 56.5% | 30.6% | 12.90% | 100% |

| FD | | | | | | | Total |
|---|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total | assessed |
| LSV2C | 003 | | | | | 0 | 0 |
| | 004 | | 1 | | | 1 | 1 |
| | 005 | 0 | 13 | 7 | 35 | 55 | 55 |
| | 010 | | | | | 0 | 0 |
| | 021 | 0 | 9 | 5 | 0 | 14 | 14 |

| FD | | | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total |
| LSV2C | 003 | | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| | 004 | | 100.0% | 0.0% | 0.00% | 100% |
| | 005 | | 23.6% | 12.7% | 63.64% | 100% |
| | 010 | | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| | 021 | | 64.3% | 35.7% | 0.00% | 100% |

| ED | | | | | | | Total |
|---|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total | assessed |
| LSV2C | 003 | 0 | 47 | 30 | 7 | 84 | 84 |
| | 004 | 0 | 57 | 28 | 6 | 91 | 91 |
| | 005 | 0 | 40 | 13 | 5 | 58 | 58 |
| | 010 | 0 | 16 | 19 | 10 | 45 | 45 |
| | 021 | 0 | 62 | 19 | 1 | 82 | 82 |

| ED | | | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample | 0 | 1 | 2 | 3 | Grand Total |
| LSV2C | 003 | | 56.0% | 35.7% | 8.33% | 100% |
| | 004 | | 62.6% | 30.8% | 6.59% | 100% |
| | 005 | | 69.0% | 22.4% | 8.62% | 100% |
| | 010 | | 35.6% | 42.2% | 22.22% | 100% |
| | 021 | | 75.6% | 23.2% | 1.22% | 100% |

Note: scoring criteria were not possible for all organisms due to the poor physical condtion of some samples. For these samples, no value was included.
No organisms scored a "0" on any of the different assessments (i.e., CF, SD, FD, ED)

**Deformity assessment results for brown trout in reproductive success study**

Vaues represent the number of fish (at swimup and at test termination) in each scoring criterion (i.e., 0 - 3).
See below for a definition of scoring criteria.
filename: deformity data.xls

| Count of Fish # | | **Craniofacial Deformities (CF)** | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample ID | 0 | 1 | 2 | 3 | Grand Total |
| CC-150 | 009 | 136 | 1 | 2 | 3 | 142 |
| | 011 | 114 | 150 | 2 | | 266 |
| | 012 | 191 | 86 | 4 | 1 | 282 |
| | 013 | 183 | 31 | 28 | 68 | 310 |
| | 015 | 231 | 207 | 5 | 2 | 445 |
| | 016 | 20 | 2 | | 1 | 23 |
| | 017 | 108 | 54 | 1 | | 163 |
| | 018 | 288 | 193 | 2 | 3 | 486 |
| | 020 | 506 | 52 | | | 558 |
| CC-150 Total | | 1777 | 776 | 44 | 78 | 2675 |
| CC-350 | 006 | 228 | 122 | 22 | 14 | 386 |
| | 007 | 102 | 12 | 11 | 6 | 131 |
| | 008 | 315 | 8 | 5 | 10 | 338 |
| CC-350 Total | | 645 | 142 | 38 | 30 | 855 |
| LSV2C | 002 | 531 | 13 | | | 544 |
| | 003 | | 3 | 83 | 12 | 98 |
| | 004 | 63 | 6 | 80 | 15 | 164 |
| | 005 | 27 | 27 | 75 | 9 | 138 |
| | 008 | 165 | 24 | 5 | | 194 |
| | 010 | | 16 | 55 | | 71 |
| | 012 | 511 | 39 | 3 | 1 | 554 |
| | 016 | 495 | 34 | 1 | | 530 |
| | 017 | 122 | 16 | 10 | 2 | 150 |
| | 019 | 302 | 79 | 8 | 1 | 390 |
| | 020 | 257 | 36 | 3 | | 296 |
| | 021 | 47 | 13 | 57 | 53 | 170 |
| LSV2C Total | | 2520 | 306 | 380 | 93 | 3299 |
| SC | 001 | 96 | 14 | 4 | 1 | 115 |
| | 002 | 104 | 6 | 1 | 2 | 113 |
| | 003 | 174 | 37 | 55 | 36 | 302 |
| | 004 | 69 | 26 | 26 | 19 | 140 |
| | 005 | 39 | 3 | | | 42 |
| | 006 | 519 | 2 | 6 | 8 | 535 |
| | 007 | 119 | 11 | 6 | 1 | 137 |
| | 008 | 339 | 12 | 3 | 5 | 359 |
| SC Total | | 1459 | 111 | 101 | 72 | 1743 |
| SPC | 001 | 490 | 75 | 2 | 1 | 568 |
| | 003 | 448 | 91 | 6 | | 545 |
| | 005 | 476 | 82 | 2 | 1 | 561 |
| | 006 | 475 | 77 | 3 | 1 | 556 |
| SPC Total | | 1889 | 325 | 13 | 3 | 2230 |
| Grand Total | | 8290 | 1619 | 239 | 194 | 10342 |

Craniofacial deformities included shortening of the jaw, snout, and missing or poorly developed eye or eyes, and head shape abnormailities. A slightly shortened lower jaw (<= 1 lip width) received a 1, a shortened jaw = 2 lip widths or a slightly shortened and slightly disfigured jaw = 2, and a flat lower jaw or much disfigured (non-functional) jaw = 3. An assessment of fish independent of this study revealed that other brown trout of the same size and developmental state did not have the slight deformity that was assessed as CF =1 for the jaw (J). Thus, the CF = 1 score where the J was concerned were deemed real. A slightly blunted snout (about 50% eye diameter, usually is > than that) = 1, very blunt or flat = 2, deformed or bulbous = 3. Eye deformities were scored as one eye blind or poorly pigmented or poorly developed =1, both poorly developed = 2, both blind = 3. Skulls that were slightly bulbous (1/3 > normal) = 1, moderately bulbous (2/3 > normal) = 2, and bulbous (1x or > than normal) = 3. Usually factors occurred together so a combination of two “1” conditions = 2, three “1” conditions = 3, or a 1 and a 2 = 3, and so on. For example, a deformed jaw and a blind eye = 2, two blind eyes = 2, but a badly deformed jaw (= 2 alone) plus a blind eye (= 1 alone), = 3.

**Deformity assessment results for brown trout in reproductive success study**

Vaues represent the number of fish (at swimup and at test termination) in each scoring criterion (i.e., 0 - 3).
See below for a definition of scoring criteria.
filename: deformity data.xls

| Count of Fish # | | Skeletal Deformities (SD) | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample ID | 0 | 1 | 2 | 3 | Grand Total |
| CC-150 | 009 | 109 | 28 | 3 | 2 | 142 |
| | 011 | 213 | 50 | 3 | | 266 |
| | 012 | 237 | 42 | 3 | | 282 |
| | 013 | 214 | 81 | 11 | 4 | 310 |
| | 015 | 402 | 33 | 8 | 2 | 445 |
| | 016 | 13 | 10 | | | 23 |
| | 017 | 150 | 11 | 2 | | 163 |
| | 018 | 353 | 121 | 11 | 1 | 486 |
| | 020 | 499 | 44 | 15 | | 558 |
| CC-150 Total | | 2190 | 420 | 56 | 9 | 2675 |
| CC-350 | 006 | 198 | 117 | 43 | 28 | 386 |
| | 007 | 83 | 22 | 20 | 6 | 131 |
| | 008 | 284 | 43 | 7 | 4 | 338 |
| CC-350 Total | | 565 | 182 | 70 | 38 | 855 |
| LSV2C | 002 | 499 | 38 | 7 | | 544 |
| | 003 | | 56 | 20 | 6 | 82 |
| | 004 | 20 | 83 | 20 | 4 | 127 |
| | 005 | 17 | 44 | 29 | 43 | 133 |
| | 008 | 173 | 19 | 2 | | 194 |
| | 010 | | 30 | 16 | 7 | 53 |
| | 012 | 235 | 306 | 13 | | 554 |
| | 016 | 486 | 41 | 3 | | 530 |
| | 017 | 138 | 10 | | 2 | 150 |
| | 019 | 341 | 46 | 2 | 1 | 390 |
| | 020 | 274 | 17 | 4 | 1 | 296 |
| | 021 | 20 | 71 | 32 | 8 | 131 |
| LSV2C Total | | 2203 | 761 | 148 | 72 | 3184 |
| SC | 001 | 79 | 28 | 7 | 1 | 115 |
| | 002 | 75 | 32 | 3 | 3 | 113 |
| | 003 | 260 | 39 | 3 | | 302 |
| | 004 | 99 | 28 | 6 | 7 | 140 |
| | 005 | 25 | 17 | | | 42 |
| | 006 | 486 | 42 | 6 | 1 | 535 |
| | 007 | 105 | 23 | 4 | 5 | 137 |
| | 008 | 291 | 47 | 8 | 13 | 359 |
| SC Total | | 1420 | 256 | 37 | 30 | 1743 |
| SPC | 001 | 493 | 62 | 9 | 4 | 568 |
| | 003 | 457 | 64 | 21 | 3 | 545 |
| | 005 | 479 | 65 | 12 | 5 | 561 |
| | 006 | 488 | 41 | 22 | 5 | 556 |
| SPC Total | | 1917 | 232 | 64 | 17 | 2230 |
| Grand Total | | 8295 | 1655 | 291 | 101 | 10342 |

Skeletal deformities included any deformity of the vertebrae or spines. A slight bend of less than 45 degrees (but > than body width off of straight) or a minor body constriction (e.g. a tight rubberband about the body effect) was given a score of 1, 2 slight bends or constrictions anywhere, or bend of > 45-90 degrees was scored a 2, and multi-directional bends > 90 degrees were given a 3. Bends caused by skeletal deformities were usually detectable from normal bending of the body during preservation (these fish were usually well preserved, very straight) by presence of a slight or greater bump below the surface of the epidermis on the outside of the bend. However, some fish with SD = 1 had just a very slight bend in the range the deformity described but could be due to preservation or the poor condition of the fish. This was sometimes especially true in larger fish, which may be more muscular and undergo stronger contraction during preservation and thus, bend slightly. A score “CF = 1” was a slight deformity, if at all. The scores of SD = 1 involving kyphosis or lordosis were deemed real because that is an unusual preservation deformity. Some samples were re-examined; most fish were very straight so some samples with higher SD scores (e.g., PSU samples) were determined accurate.

**Deformity assessment results for brown trout in reproductive success study**

Vaues represent the number of fish (at swimup and at test termination) in each scoring criterion (i.e., 0 - 3).
See below for a definition of scoring criteria.

filename: deformity data.xls

| Count of Fish # | | Fin Deformities (FD) | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample ID | 0 | 1 | 2 | 3 | Grand Total |
| CC-150 | 009 | 137 | 2 | 1 | 2 | 142 |
| | 011 | 266 | | | | 266 |
| | 012 | 279 | 1 | | 2 | 282 |
| | 013 | 287 | 17 | 4 | 2 | 310 |
| | 015 | 437 | 3 | 4 | 1 | 445 |
| | 016 | 23 | | | | 23 |
| | 017 | 162 | 1 | | | 163 |
| | 018 | 483 | 3 | | | 486 |
| | 020 | 549 | 9 | | | 558 |
| CC-150 Total | | 2623 | 36 | 9 | 7 | 2675 |
| CC-350 | 006 | 325 | 16 | 16 | 29 | 386 |
| | 007 | 95 | 10 | 18 | 8 | 131 |
| | 008 | 303 | 25 | 7 | 3 | 338 |
| CC-350 Total | | 723 | 51 | 41 | 40 | 855 |
| LSV2C | 002 | 528 | 15 | 1 | | 544 |
| | 003 | | | | | 0 |
| | 004 | 48 | 15 | 1 | | 64 |
| | 005 | 39 | 17 | 11 | 37 | 104 |
| | 008 | 194 | | | | 194 |
| | 010 | | | | | 0 |
| | 012 | 544 | 9 | 1 | | 554 |
| | 016 | 485 | 45 | | | 530 |
| | 017 | 144 | 4 | | 2 | 150 |
| | 019 | 390 | | | | 390 |
| | 020 | 292 | | 1 | 3 | 296 |
| | 021 | 27 | 51 | 5 | | 83 |
| LSV2C Total | | 2691 | 156 | 20 | 42 | 2909 |
| SC | 001 | 102 | 7 | 5 | 1 | 115 |
| | 002 | 103 | 6 | 4 | | 113 |
| | 003 | 280 | 21 | | 1 | 302 |
| | 004 | 113 | 10 | 13 | 4 | 140 |
| | 005 | 42 | | | | 42 |
| | 006 | 501 | 21 | 7 | 6 | 535 |
| | 007 | 114 | 11 | 7 | 5 | 137 |
| | 008 | 343 | 4 | 3 | 9 | 359 |
| SC Total | | 1598 | 80 | 39 | 26 | 1743 |
| SPC | 001 | 542 | 11 | 10 | 5 | 568 |
| | 003 | 524 | 8 | 7 | 6 | 545 |
| | 005 | 533 | 16 | 4 | 8 | 561 |
| | 006 | 529 | 11 | 7 | 9 | 556 |
| SPC Total | | 2128 | 46 | 28 | 28 | 2230 |
| Grand Total | | 9763 | 346 | 125 | 108 | 10342 |

Fin deformities included variation in fin or finfold morphology and a slightly smaller or missing fin (in thin fish, the adipose fin was often absent, indicating fat absorption, not uncommon and scored 1) or one with a bend or incomplete ray development (in older fish) was given a 1, 2 fins damaged or malformed = 2, and > 2 fins malformed or if fins were missing (except adipose) was = 3.  Often fins were malformed associated with vertebral deformities that did not permit proper development.  Folded finfolds as a result of preservation were not counted.

**Deformity assessment results for brown trout in reproductive success study**

Vaues represent the number of fish (at swimup and at test termination) in each scoring criterion (i.e., 0 - 3).
See below for a definition of scoring criteria.
filename: deformity data.xls

| Count of Fish # | | Edema Deformities (ED) | | | | |
|---|---|---|---|---|---|---|
| Location | Field Sample ID | 0 | 1 | 2 | 3 | Grand Total |
| CC-150 | 009 | 141 | 1 | | | 142 |
| | 011 | 266 | | | | 266 |
| | 012 | 282 | | | | 282 |
| | 013 | 308 | 2 | | | 310 |
| | 015 | 445 | | | | 445 |
| | 016 | 23 | | | | 23 |
| | 017 | 163 | | | | 163 |
| | 018 | 485 | | 1 | | 486 |
| | 020 | 558 | | | | 558 |
| CC-150 Total | | 2671 | 3 | 1 | | 2675 |
| CC-350 | 006 | 382 | 3 | 1 | | 386 |
| | 007 | 126 | 3 | 2 | | 131 |
| | 008 | 337 | 1 | | | 338 |
| CC-350 Total | | 845 | 7 | 3 | | 855 |
| LSV2C | 002 | 541 | 3 | | | 544 |
| | 003 | | 47 | 30 | 7 | 84 |
| | 004 | 63 | 57 | 28 | 6 | 154 |
| | 005 | 42 | 46 | 14 | 5 | 107 |
| | 008 | 180 | 6 | 8 | | 194 |
| | 010 | | 16 | 19 | 10 | 45 |
| | 012 | 554 | | | | 554 |
| | 016 | 530 | | | | 530 |
| | 017 | 135 | 9 | 5 | 1 | 150 |
| | 019 | 381 | 8 | 1 | | 390 |
| | 020 | 296 | | | | 296 |
| | 021 | 69 | 62 | 19 | 1 | 151 |
| LSV2C Total | | 2791 | 254 | 124 | 30 | 3199 |
| SC | 001 | 114 | 1 | | | 115 |
| | 002 | 113 | | | | 113 |
| | 003 | 302 | | | | 302 |
| | 004 | 139 | 1 | | | 140 |
| | 005 | 42 | | | | 42 |
| | 006 | 534 | 1 | | | 535 |
| | 007 | 137 | | | | 137 |
| | 008 | 359 | | | | 359 |
| SC Total | | 1740 | 3 | | | 1743 |
| SPC | 001 | 565 | 3 | | | 568 |
| | 003 | 539 | 4 | 2 | | 545 |
| | 005 | 558 | 3 | | | 561 |
| | 006 | 553 | 1 | 1 | 1 | 556 |
| SPC Total | | 2215 | 11 | 3 | 1 | 2230 |
| Grand Total | | 10262 | 56 | 22 | 2 | 10342 |

Edema was not originally scheduled for assessment because it was thought sometimes not a teratogenic effect and may be transitory as fish develop. However, it was assessed because it was common in one early sample and not others, and because it was thought a condition that could affect emergence, mobility, and other factors that may limit survival of fish in the wild. Edema was detected by an obvious swelling and fluid buildup, usually abdominally, and ventrally, which often displaced the gut, and was usually clear fluid that was slightly soft when touched with a blunt probe. The yolk, which was present in some quantity in some study specimens, also created some swelling but was typically yellowish, opaque, and small, and hard to the touch in preservation. Slight edema = 1 was for a fish with up to 1X swelling of the normal body width or depth, up to 2x = 2, and > 2x = 3.

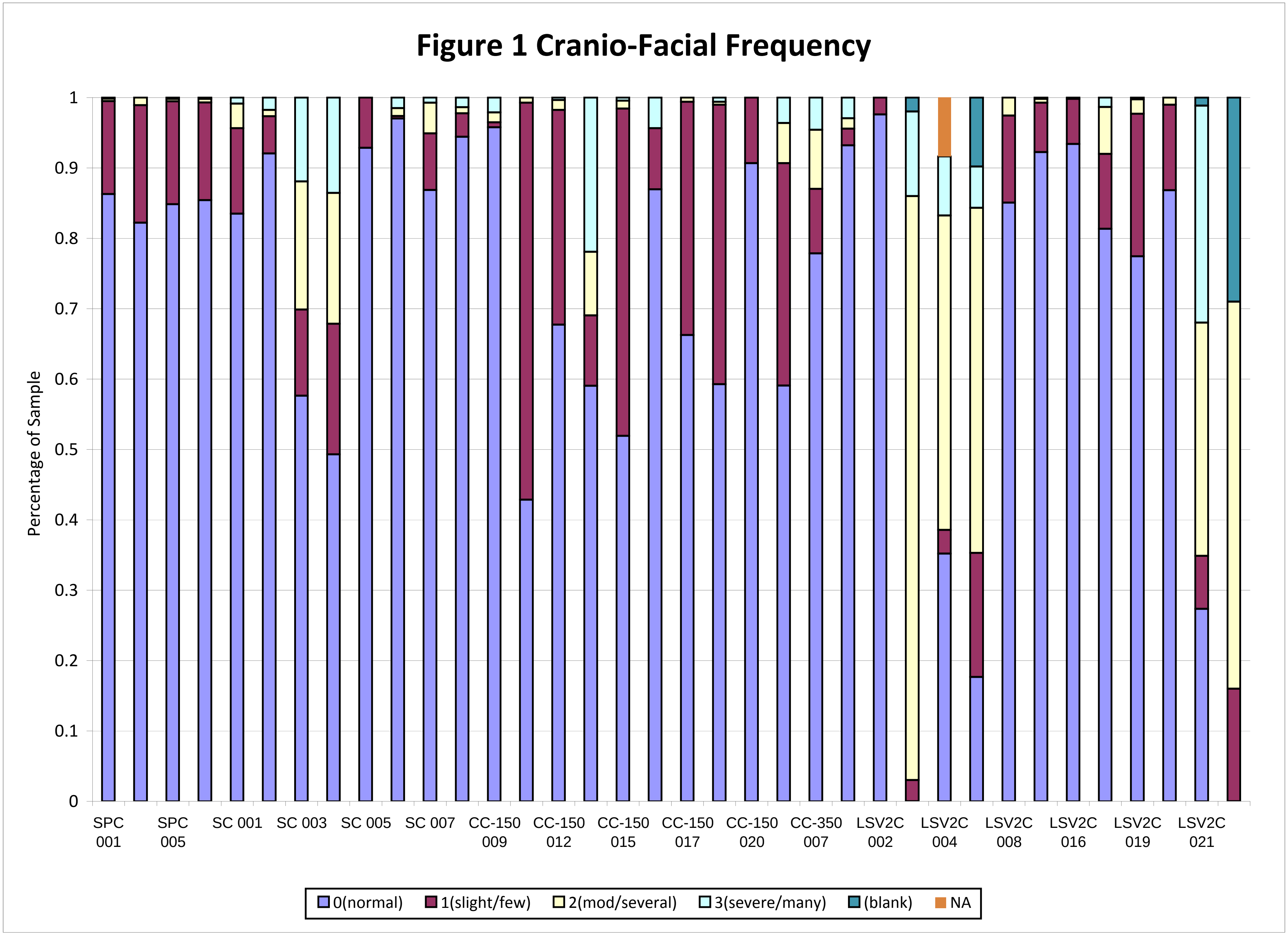
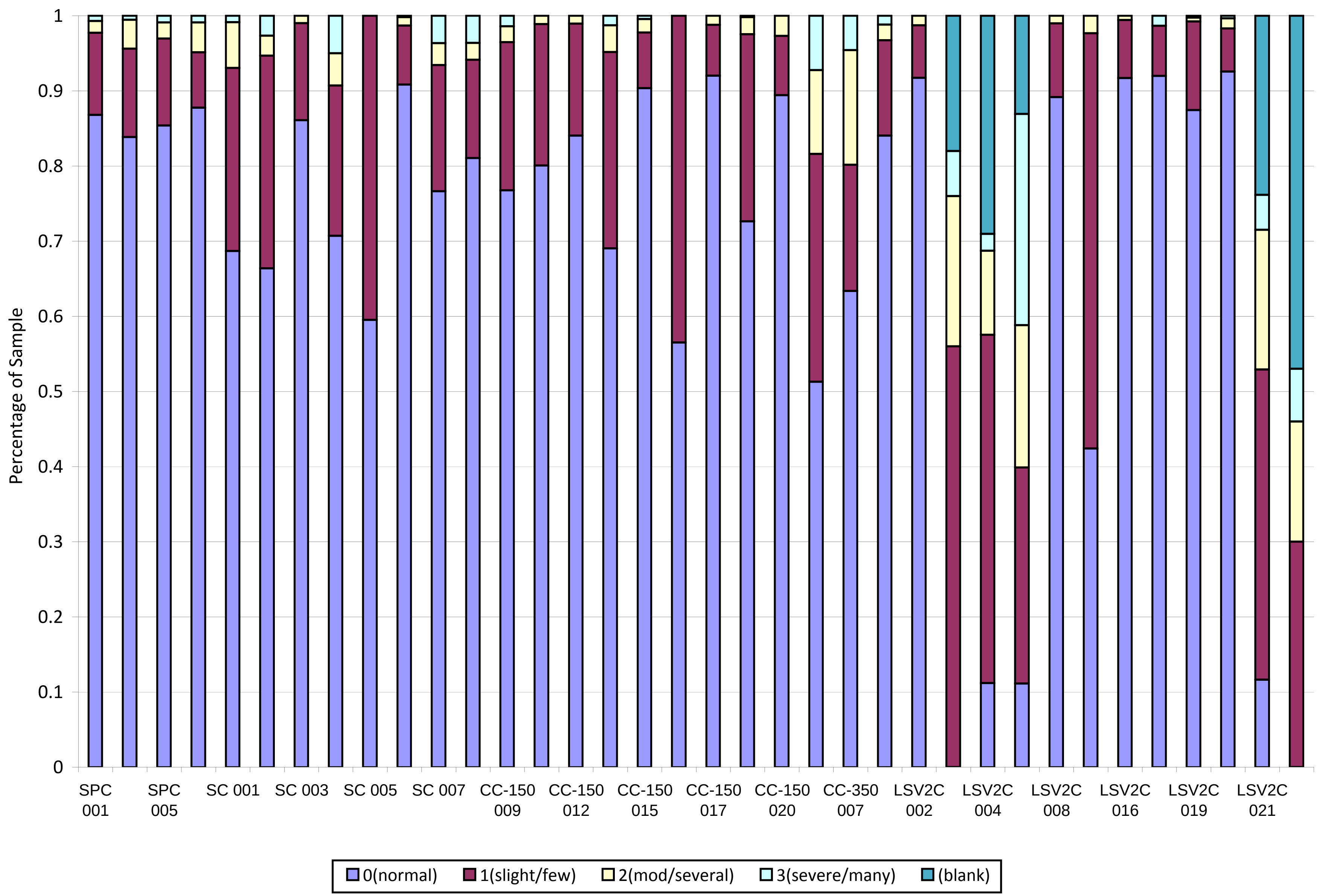


Figure 1 Cranio-Facial Frequency
Percentage of Sample
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SPC 001
SPC 005
SC 001
SC 003
SC 005
SC 007
CC-150 009
CC-150 012
CC-150 015
CC-150 017
CC-150 020
CC-350 007
LSV2C 002
LSV2C 004
LSV2C 008
LSV2C 016
LSV2C 019
LSV2C 021
0(normal)
1(slight/few)
2(mod/several)
3(severe/many)
(blank)
NA

# Figure 2 Skeletal Deformity Frequency



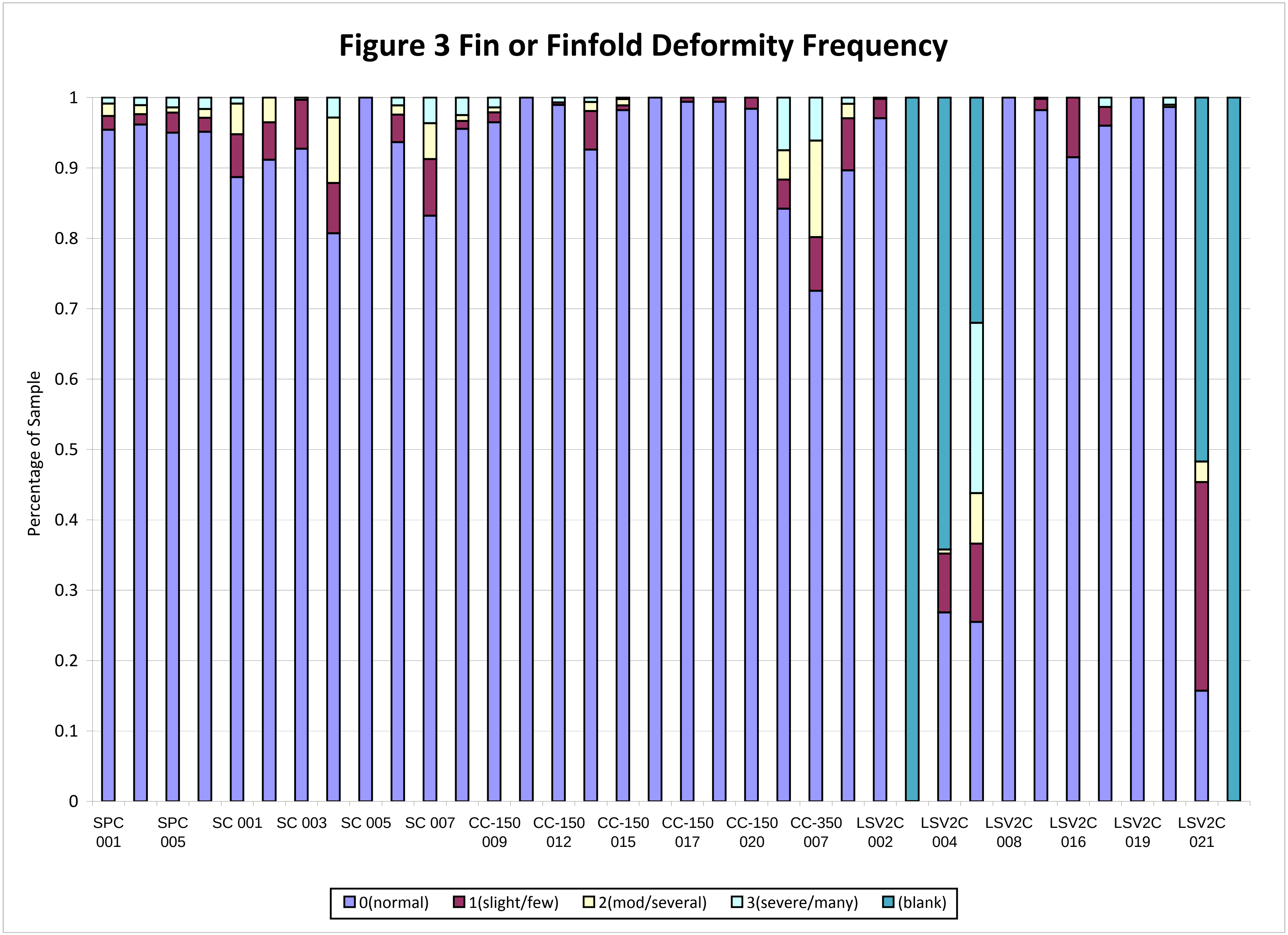


Figure 3 Fin or Finfold Deformity Frequency
Percentage of Sample
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SPC 001
SPC 005
SC 001
SC 003
SC 005
SC 007
CC-150 009
CC-150 012
CC-150 015
CC-150 017
CC-150 020
CC-350 007
LSV2C 002
LSV2C 004
LSV2C 008
LSV2C 016
LSV2C 019
LSV2C 021
0(normal)
1(slight/few)
2(mod/several)
3(severe/many)
(blank)

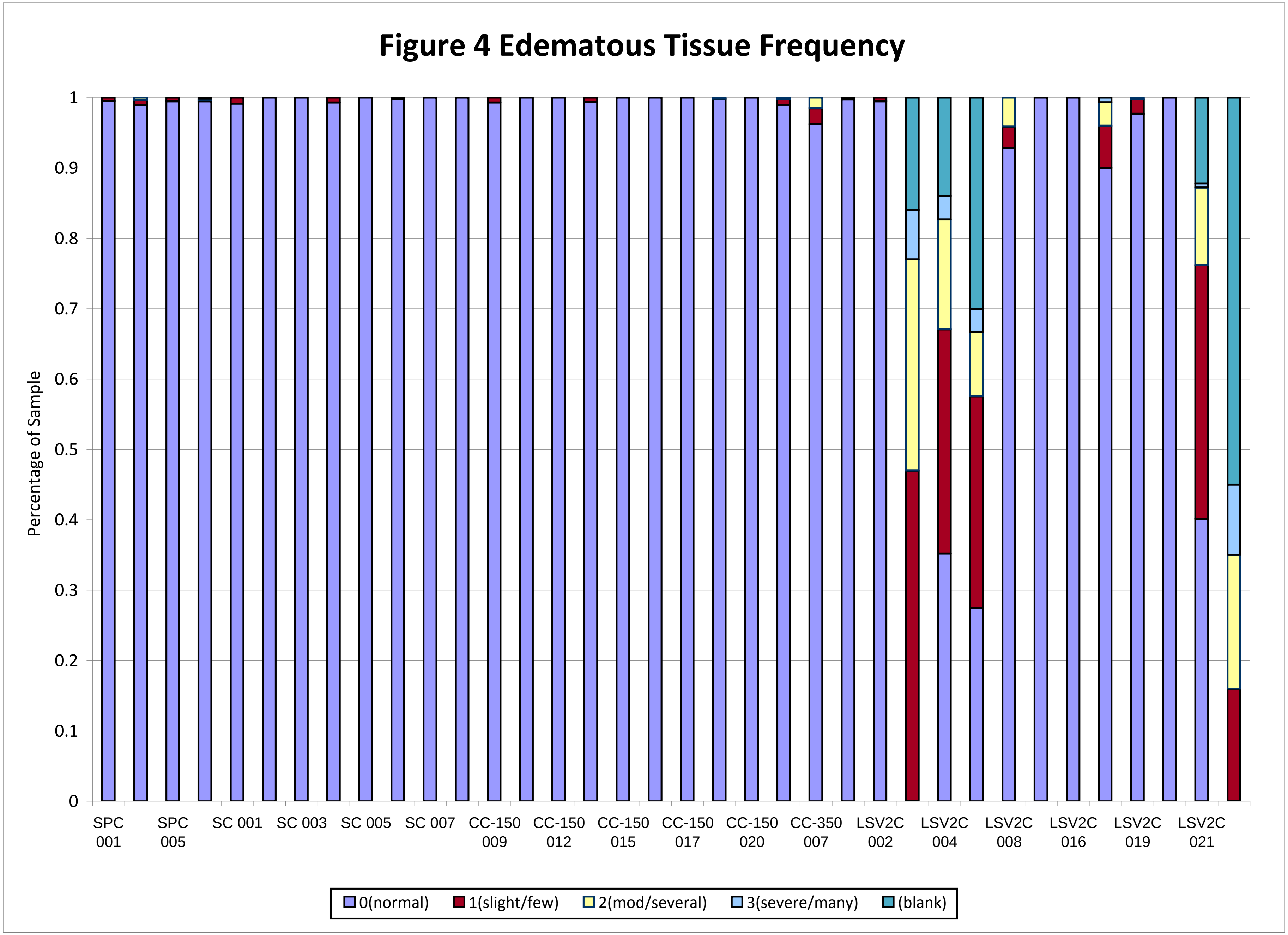


Figure 4 Edematous Tissue Frequency
Percentage of Sample
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
SPC 001
SPC 005
SC 001
SC 003
SC 005
SC 007
CC-150 009
CC-150 012
CC-150 015
CC-150 017
CC-150 020
CC-350 007
LSV2C 002
LSV2C 004
LSV2C 008
LSV2C 016
LSV2C 019
LSV2C 021
0(normal)
1(slight/few)
2(mod/several)
3(severe/many)
(blank)

# APPENDIX D
Brown Trout Whole Body and Egg Tissue Selenium Analytical Data

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

January 23, 2008 Analytical Report for Service Request No: K0711481

Kathy Tegtmeyer
New Fields Environmental
4720 Walnut St., Suite 200
Boulder, CO 80301

**RE: Se in Tissue**

Dear Kathy:

Enclosed are the results of the samples submitted to our laboratory on December 07, 2007. For your reference, these analyses have been assigned our service request number K0711481.

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 3316. You may also contact me via Email at JChristian@caslab.com.

Respectfully submitted,

**Columbia Analytical Services, Inc.**

Jeff Christian
Laboratory Director

JC/lb



NELAP Accredited ACIL Seal of Excellence Award 100% Recycled

## 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:** | New Fields Environmental | **Service Request No.:** | K0711481 |
| **Project:** | Tissue - Se | **Date Received:** | 12/7/07 |
| **Sample Matrix:** | Tissue | | |

## 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

Tissue samples were received for analysis at Columbia Analytical Services on 12/7/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored frozen at –20°C upon receipt at the laboratory.

### Total Metals

**General Comments:**
The samples were homogenized, then freeze-dried to determine moisture and to allow complete homogenization of the dry material. The dried material was milled to a fine meal, and then sub-sampled for digestion. A thorough digestion was performed prior to instrumental analysis to convert all Selenium species to Selenate. Prior to hydride formation, the valence was adjusted by reduction to Selenite.

No anomalies associated with the analysis of these samples were observed.

**Approved by** ______________________ **Date** 1/22/08

# Chain of Custody Documentation

# Chain of Custody Page 1 of 3

NEWFIELDS

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679

**Project Contact** Sean Covington/Kathy Tegtmeyer **PO** 0442-004-900.70
**Courier/Airbill:**
**Shipped to:** Columbia Analytical Services, Inc.
1317 South 13th Ave
Kelso, WA 98626
**Telephone:** (360) 430-7733

COC tkp# 40006

**COC #:**

| Sample ID | Sample Date | Sample Time | Matrix | Tot/ Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|
| SM1007-cc1a-FT0012 | 10/30/2007 | | Fish Tissue | | Selenium, % Solids | Dry Ice | | |
| SM1007-cc150-FT0013 | 10/30/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0014 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0015 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0016 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0017 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0018 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0019 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0020 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0021 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0022 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0023 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0024 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0025 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0026 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0027 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0028 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0029 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |

**Sampler Signature:** [signature]

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| [signature] | 12/6/07 1600 | [signature] CAS | 12/7/07 0920 |
| | | | |
| | | | |

LAB USE ONLY—Sample condition on Receipt

28 total

# Chain of Custody Page 2 of 3

**NEWFIELDS**

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679

**Project Contact** Sean Covington/Kathy Tegtmeyer **PO** 0442-004-900.70

**Courier/Airbill:**

**Shipped to:** Columbia Analytical Services, Inc.
1317 South 13th Ave
Kelso, WA 98626

**Telephone:** (360) 430-7733

**COC #:**

| Sample ID | Sample Date | Sample Time | Matrix | Tot/ Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|
| SM1107-LSV2c-FT0030 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0031 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0032 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-LSV2c-FT0033 | 11/14/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0034 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0035 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0036 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0037 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0038 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0039 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0040 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0041 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC150-FT0042 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC350-FT0043 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC350-FT0044 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1107-CC350-FT0045 | 11/15/2007 | | Fish Tissue | | Selenium, % Solids | | | |
| SM1007-cc1a-FT0046 | 10/30/2007 | | Eggs | | Selenium, % Solids | | | |
| SM1007-cc150-FT0047 | 10/30/2007 | | Eggs | | Selenium, % Solids | | | |

**Sampler Signature:** [signature]

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| [signature] | 12/6/07 @ 1600 | [signature] CAS | 12/7/07 0920 |
| | | | |
| | | | |

LAB USE ONLY — Sample condition on Receipt

# Chain of Custody Page 3 of 3

NEWFIELDS

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679

**Project Contact** Sean Covington/Kathy Tegtmeyer **PO** 0442-004-900.70
**Courier/Airbill:**
**Shipped to:** Columbia Analytical Services, Inc.
1317 South 13th Ave
Kelso, WA 98626
**Telephone:** (360) 430-7733

**COC #:**

| Sample ID | Sample Date | Sample Time | Matrix | Tot/ Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|
| SM1107-LSV2c-FT0048 | 11/14/2007 | | Eggs | | Selenium, % Solids | Dry ice | | |
| SM1107-LSV2c-FT0049 | 11/14/2007 | | Eggs | | Selenium, % Solids | ↓ | | |
| | | | | | | | | |

**Total Number of ~~Containers~~ Samples:** 38 **Individual Lines Reflect Single Containers, Except for Aqueous Analyses Assigned as Laboratory QC**

Sampler Signature:

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| | 12/6/07 @ 1600 | CAS | 12/7/07 0920 |
| | | | |
| | | | |

LAB USE ONLY—Sample condition on Receipt

PC JC

# Columbia Analytical Services, Inc.
## Cooler Receipt and Preservation Form

Client / Project: ENSR Service Request K07 11481

Received: 12/7/07 Opened: 12/7/07 By: LM

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 / front 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):** -6.0 (Dry Ice)
   **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* Baggies.
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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
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*Additional Notes, Discrepancies, & Resolutions:*

***Page 1 of:*** 1 2

# Total Solids

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project:** | Se in Tissue | **Date Collected:** | 10/30-11/14/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/7/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| Sample Name | Lab Code | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|
| SM1007-cc1a-FT0012 | K0711481-001 | 12/18/07 | 24.8 | |
| SM1007-cc150-FT0013 | K0711481-002 | 12/18/07 | 24.8 | |
| SM1107-LSV2c-FT0014 | K0711481-003 | 12/18/07 | 21.9 | |
| SM1107-LSV2c-FT0015 | K0711481-004 | 12/18/07 | 21.5 | |
| SM1107-LSV2c-FT0016 | K0711481-005 | 12/18/07 | 22.1 | |
| SM1107-LSV2c-FT0017 | K0711481-006 | 12/18/07 | 21.8 | |
| SM1107-LSV2c-FT0018 | K0711481-007 | 12/18/07 | 21.8 | |
| SM1107-LSV2c-FT0019 | K0711481-008 | 12/18/07 | 22.8 | |
| SM1107-LSV2c-FT0020 | K0711481-009 | 12/18/07 | 23.1 | |
| SM1107-LSV2c-FT0021 | K0711481-010 | 12/18/07 | 22.5 | |
| SM1107-LSV2c-FT0022 | K0711481-011 | 12/18/07 | 22.0 | |
| SM1107-LSV2c-FT0023 | K0711481-012 | 12/18/07 | 21.6 | |
| SM1107-LSV2c-FT0024 | K0711481-013 | 12/18/07 | 24.2 | |
| SM1107-LSV2c-FT0025 | K0711481-014 | 12/18/07 | 23.2 | |
| SM1107-LSV2c-FT0026 | K0711481-015 | 12/18/07 | 22.3 | |
| SM1107-LSV2c-FT0027 | K0711481-016 | 12/18/07 | 20.3 | |
| SM1107-LSV2c-FT0028 | K0711481-017 | 12/18/07 | 23.6 | |
| SM1107-LSV2c-FT0029 | K0711481-018 | 12/18/07 | 22.1 | |
| SM1107-LSV2c-FT0030 | K0711481-019 | 12/18/07 | 21.8 | |
| SM1107-LSV2c-FT0031 | K0711481-020 | 12/18/07 | 23.2 | |

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project:** | Se in Tissue | **Date Collected:** | 10/30-11/15/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/07/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| **Sample Name** | **Lab Code** | **Date Analyzed** | **Result** | **Result Notes** |
|---|---|---|---|---|
| SM1107-LSV2c-FT0032 | K0711481-021 | 12/18/07 | 21.1 | |
| SM1107-LSV2c-FT0033 | K0711481-022 | 12/18/07 | 23.0 | |
| SM1107-CC150-FT0034 | K0711481-023 | 12/18/07 | 22.6 | |
| SM1107-CC150-FT0035 | K0711481-024 | 12/18/07 | 23.9 | |
| SM1107-CC150-FT0036 | K0711481-025 | 12/18/07 | 21.7 | |
| SM1107-CC150-FT0037 | K0711481-026 | 12/18/07 | 23.1 | |
| SM1107-CC150-FT0038 | K0711481-027 | 12/18/07 | 22.7 | |
| SM1107-CC150-FT0039 | K0711481-028 | 12/18/07 | 23.6 | |
| SM1107-CC150-FT0040 | K0711481-029 | 12/18/07 | 22.8 | |
| SM1107-CC150-FT0041 | K0711481-030 | 12/18/07 | 23.2 | |
| SM1107-CC150-FT0042 | K0711481-031 | 12/18/07 | 23.8 | |
| SM1107-CC350-FT0043 | K0711481-032 | 12/18/07 | 22.5 | |
| SM1107-CC350-FT0044 | K0711481-033 | 12/18/07 | 23.1 | |
| SM1107-CC350-FT0045 | K0711481-034 | 12/18/07 | 23.1 | |
| SM1007-cc1a-FT0046 | K0711481-035 | 12/18/07 | 37.6 | |
| SM1007-cc150-FT0047 | K0711481-036 | 12/18/07 | 37.4 | |
| SM1107-LSV2c-FT0048 | K0711481-037 | 12/18/07 | 35.7 | |
| SM1107-LSV2c-FT0049 | K0711481-038 | 12/18/07 | 36.6 | |

# COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** New Fields Environmental
**Project:** Se in Tissue
**Sample Matrix:** Tissue

**Service Request:** K0711481
**Date Collected:** 10/30/07
**Date Received:** 12/7/07
**Date Extracted:** NA
**Date Analyzed:** 12/18/07

Duplicate Summary
Total Metals

Sample Name: SM1007-cc1a-FT0012
Lab Code: K0711481-001D
Test Notes:

Units: PERCENT
Basis: Wet

| Analyte | Prep Method | Analysis Method | Sample Result | Duplicate Sample Result | Average | Relative Percent Difference | Result Notes |
|---|---|---|---|---|---|---|---|
| Solids, Total | NA | Freeze Dry | 24.8 | 24.9 | 24.8 | <1 | |

## COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project:** | Se in Tissue | **Date Collected:** | 11/14/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/7/07 |
| | | **Date Extracted:** | NA |
| | | **Date Analyzed:** | 12/18/07 |

Duplicate Summary
Total Metals

| | | | |
|---|---|---|---|
| Sample Name: | SM1107-LSV2c-FT0032 | Units: | PERCENT |
| Lab Code: | K0711481-021D | Basis: | Wet |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | Sample Result | Duplicate Sample Result | Average | Relative Percent Difference | Result Notes |
|---|---|---|---|---|---|---|---|
| Solids, Total | NA | Freeze Dry | 21.1 | 21.2 | 21.2 | <1 | |

Service Request #: K0711481

Analysis For: Freeze Dried Solids

Analytical Batch
KA0628221

| Lab Code | Wet Weight (g) | Tare (g) | Tare + Dry Wt.(g) | Dry Weight (g) | % Total Solids |
|---|---|---|---|---|---|
| K0711481-01 | 30.186 | 78.713 | 86.206 | 7.493 | 24.8 |
| -01D | 32.467 | 78.921 | 87.001 | 8.08 | 24.9 |
| -02 | 37.444 | 78.723 | 87.996 | 9.273 | 24.8 |
| -03 | 29.822 | 78.753 | 85.294 | 6.541 | 21.9 |
| -04 | 28.337 | 79.158 | 85.237 | 6.079 | 21.5 |
| -05 | 30.778 | 78.876 | 85.689 | 6.813 | 22.1 |
| -06 | 32.211 | 79.460 | 86.491 | 7.031 | 21.8 |
| -07 | 34.266 | 78.594 | 86.049 | 7.455 | 21.8 |
| -08 | 33.956 | 78.963 | 86.717 | 7.754 | 22.8 |
| -09 | 35.812 | 79.412 | 87.700 | 8.288 | 23.1 |
| -10 | 28.284 | 78.290 | 84.641 | 6.351 | 22.5 |
| -11 | 28.990 | 78.280 | 84.661 | 6.381 | 22.0 |
| -12 | 33.570 | 78.608 | 85.859 | 7.251 | 21.6 |
| -13 | 33.902 | 79.190 | 87.387 | 8.197 | 24.2 |
| -14 | 47.593 | 78.729 | 89.781 | 11.052 | 23.2 |
| -15 | 34.997 | 78.714 | 86.520 | 7.806 | 22.3 |
| -16 | 32.483 | 78.909 | 85.494 | 6.585 | 20.3 |
| -17 | 29.263 | 78.646 | 85.557 | 6.911 | 23.6 |
| -18 | 34.264 | 78.984 | 86.548 | 7.564 | 22.1 |
| -19 | 30.841 | 78.977 | 85.690 | 6.713 | 21.8 |
| -20 | 28.779 | 78.756 | 85.443 | 6.687 | 23.2 |
| -21 | 36.282 | 78.444 | 86.112 | 7.668 | 21.1 |
| -21D | 33.294 | 78.652 | 85.695 | 7.043 | 21.2 |
| -22 | 37.247 | 78.545 | 87.101 | 8.556 | 23.0 |
| -23 | 34.495 | 79.450 | 87.254 | 7.804 | 22.6 |
| -24 | 30.931 | 79.094 | 86.481 | 7.387 | 23.9 |
| -25 | 31.641 | 78.946 | 85.798 | 6.852 | 21.7 |

Time In : 11:00a.m. 12/19/07 Time Out: 9:30a.m. 12/21/07

Comments: Balance 21-B

$\bar{x}$ = RPD =

| | |
|---|---|
| Analyst: Angela Black | Date: 12/18/07 |
| Reviewed By: | Date: 1/2/07 |

FREZ-DRY

Service Request #: K0711481

Analysis For: Freeze Dried Solids

| Lab Code | Wet Weight (g) | Tare (g) | Tare + Dry Wt.(g) | Dry Weight (g) | % Total Solids |
|---|---|---|---|---|---|
| K0711481-26 | 31.278 | 79.200 | 86.435 | 7.235 | 23.1 |
| -27 | 28.103 | 79.015 | 85.383 | 6.368 | 22.7 |
| -28 | 55.995 | 79.197 | 92.386 | 13.189 | 23.6 |
| -29 | 29.973 | 78.387 | 85.224 | 6.837 | 22.8 |
| -30 | 34.664 | 79.229 | 87.263 | 8.034 | 23.2 |
| -31 | 35.317 | 79.119 | 87.535 | 8.416 | 23.8 |
| -32 | 34.918 | 78.697 | 86.559 | 7.862 | 22.5 |
| -33 | 37.535 | 78.483 | 87.144 | 8.661 | 23.1 |
| -34 | 30.933 | 79.299 | 86.434 | 7.135 | 23.1 |
| -35 | 19.819 | 78.872 | 86.321 | 7.449 | 37.6 |
| -36 | 26.681 | 79.117 | 89.107 | 9.99 | 37.4 |
| -37 | 31.659 | 79.083 | 90.401 | 11.318 | 35.7 |
| -38 | 25.621 | 79.332 | 88.705 | 9.373 | 36.6 |
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AB 12/18/07

Time In : 11:00a.m. 12/19/07 Time Out: 9:30a.m. 12/21/07

Comments: Balance 21-B

$\bar{x}$ = RPD =

| | |
|---|---|
| Analyst: Angela Brack | Date: 12/18/07 |
| Reviewed By: [illegible] | Date: 1/2/07 |

FREZ-DRY

Columbia Analytical Services, Inc.

| Sample Number(s): As Listed | Service Request Number(s): K0711481 |
|---|---|

## TISSUE COMPOSITION DATA

| Laboratory ID | Weight (g) | Tare (g) | | | Matrix | Length | |
|---|---|---|---|---|---|---|---|
| K0711481-01 | 272.76 | 279.58 | | | whole body fish | | |
| -02 | 358.05 | 281.05 | | | | | |
| -03 | 308.05 | 276.46 | | | | | |
| -04 | 220.77 | 276.79 | | | | | |
| -05 | 217.35 | 282.46 | | | | | |
| -06 | 218.83 | 279.83 | | | | | |
| -07 | 216.64 | 278.64 | | | | | |
| -08 | 334.56 | 279.38 | | | | | |
| -09 | 243.40 | 276.88 | | | | | |
| -10 | 193.82 | 278.08 | | | | | |
| -11 | 278.27 | 276.75 | | | | | |
| -12 | 346.76 | 283.03 | | | | | |
| -13 | 340.97 | 276.85 | | | | | |
| -14 | 396.10 | 277.26 | | | | | |
| Jar 1 -15 | 376.68 ~~376.68~~ | 278.48 | ~~275.85~~ AB 12/19/07 | | | | |
| -16 | 250.09 | 277.02 | | | | | |
| -17 | 197.54 | 276.82 | | | | | |
| -18 | 274.87 | 278.39 | | | | | |
| -19 | 416.32 | 281.68 | | | | | |
| -20 | 282.09 | 276.40 | | | | | |
| -21 | 198.44 | 276.52 | | | | | |
| -22 | 246.07 | 276.76 | | | | | |
| -23 | 519.87 | 276.38 | | | | | |
| -24 | 303.07 | 276.76 | | | | | |
| -25 | 231.80 | 282.70 | | | | | |

Comments: K0711481-026 had a tag identifier attached, clipped it off and put back in bag. balance 23

| Analyst: Angela Brack / [signature] | Date: 12/18/07 |
|---|---|
| Reviewed: [signature] | Date: 1/2/07 |

R:\ICP\misc\digforms\TISSUEBENCHSHT

**Columbia Analytical Services, Inc.**

Sample Number(s): As Listed

Service Request Number(s):

## TISSUE COMPOSITION DATA

| Laboratory ID | Weight (g) | Tare (g) | | | Matrix | Length | |
|---|---|---|---|---|---|---|---|
| K0711481-26 | 282.90 | 277.00 | | | whole body fish | | |
| -27 | 212.53 | 277.51 | | | | | |
| -28 | 467.62 | 282.51 | | | | | |
| -29 | 149.99 | 276.78 | | | | | |
| -30 | 223.62 | 277.04 | | | | | |
| -31 | 238.32 | 276.65 | | | | | |
| -32 | 373.09 | 276.53 | | | | | |
| -33 | ~~278.27~~ 331.42 | 278.27 | | | | | |
| -34 | 255.68 | 276.35 | | | | | |
| 35 | 20.15 | 276.47 | | | | | |
| 36 | 92.68 | 276.22 | | | eggs | | |
| -37 | 87.11 | 279.51 | | | | | |
| -38 | 107.89 | 276.87 | | | | | |
| -15 | 196.68 | 275.87 | | | | | |

AB 12/18/07

Comments: Balance - 23

Analyst: Angela Brack / Eric R Wit — Date: 12/18/07

Reviewed: — Date: 1/2/07

R:\ICP\misc\digforms\TISSUEBENCHSHT

# Metals

# Columbia Analytical Services

- Cover Page -
## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project Name:** Se in Tissue
**Project No.:**

**Service Request:** K0711481

| Sample Name: | Lab Code: |
|---|---|
| SM1007-cc1a-FT0012 | K0711481-001 |
| SM1007-cc1a-FT0012D | K0711481-001D |
| SM1007-cc1a-FT0012S | K0711481-001S |
| SM1007-cc150-FT0013 | K0711481-002 |
| SM1107-LSV2c-FT0014 | K0711481-003 |
| SM1107-LSV2c-FT0015 | K0711481-004 |
| SM1107-LSV2c-FT0016 | K0711481-005 |
| SM1107-LSV2c-FT0017 | K0711481-006 |
| SM1107-LSV2c-FT0018 | K0711481-007 |
| SM1107-LSV2c-FT0019 | K0711481-008 |
| SM1107-LSV2c-FT0020 | K0711481-009 |
| SM1107-LSV2c-FT0021 | K0711481-010 |
| SM1107-LSV2c-FT0022 | K0711481-011 |
| SM1107-LSV2c-FT0023 | K0711481-012 |
| SM1107-LSV2c-FT0024 | K0711481-013 |
| SM1107-LSV2c-FT0025 | K0711481-014 |
| SM1107-LSV2c-FT0026 | K0711481-015 |
| SM1107-LSV2c-FT0027 | K0711481-016 |
| SM1107-LSV2c-FT0028 | K0711481-017 |
| SM1107-LSV2c-FT0029 | K0711481-018 |
| SM1107-LSV2c-FT0030 | K0711481-019 |
| SM1107-LSV2c-FT0031 | K0711481-020 |
| SM1107-LSV2c-FT0032 | K0711481-021 |
| SM1107-LSV2c-FT0032D | K0711481-021D |
| SM1107-LSV2c-FT0032S | K0711481-021S |
| SM1107-LSV2c-FT0033 | K0711481-022 |
| SM1107-CC150-FT0034 | K0711481-023 |
| SM1107-CC150-FT0035 | K0711481-024 |
| SM1107-CC150-FT0036 | K0711481-025 |
| SM1107-CC150-FT0037 | K0711481-026 |
| SM1107-CC150-FT0038 | K0711481-027 |
| SM1107-CC150-FT0039 | K0711481-028 |
| SM1107-CC150-FT0040 | K0711481-029 |
| SM1107-CC150-FT0041 | K0711481-030 |
| SM1107-CC150-FT0042 | K0711481-031 |
| SM1107-CC350-FT0043 | K0711481-032 |
| SM1107-CC350-FT0044 | K0711481-033 |
| SM1107-CC350-FT0045 | K0711481-034 |
| SM1007-cc1a-FT0046 | K0711481-035 |

**Comments:**

**Approved By:** [signature]   **Date:** 1/22/08

# Columbia Analytical Services

## - Cover Page -
## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project Name:** Se in Tissue
**Project No.:**

**Service Request:** K0711481

| Sample Name: | Lab Code: |
|---|---|
| SM1007-cc150-FT0047 | K0711481-036 |
| SM1107-LSV2c-FT0048 | K0711481-037 |
| SM1107-LSV2c-FT0049 | K0711481-038 |
| Method Blank | K0711481-MB1 |
| Method Blank | K0711481-MB2 |

**Comments:**

**Approved By:** [signature] **Date:** 1/22/08

# Metals

**- 1 -**

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 10/30/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-cc1a-FT0012
**Lab Code:** K0711481-001

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.46 | 0.09 | 10.0 | 12/28/07 | 01/07/08 | 8.7 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 10/30/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1007-cc150-FT0013 **Lab Code:** K0711481-002

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 5.4 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0014 **Lab Code:** K0711481-003

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 1.0 | 0.20 | 20.0 | 12/28/07 | 01/07/08 | 21.4 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0015 **Lab Code:** K0711481-004

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.50 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 8.9 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0016 **Lab Code:** K0711481-005

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.49 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 13.8 | | |

Comments:

# Metals

**- 1 -**

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0017 **Lab Code:** K0711481-006

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.87 | 0.17 | 20.0 | 12/28/07 | 01/07/08 | 17.9 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0018 **Lab Code:** K0711481-007

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 13.6 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0019 **Lab Code:** K0711481-008

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.84 | 0.17 | 20.0 | 12/28/07 | 01/07/08 | 17.2 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0020 **Lab Code:** K0711481-009

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 6.7 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0021 **Lab Code:** K0711481-010

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 9.6 | | |

Comments:

## Metals

**- 1 -**

**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0022 **Lab Code:** K0711481-011

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.92 | 0.18 | 20.0 | 12/28/07 | 01/07/08 | 22.6 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0023 **Lab Code:** K0711481-012

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.47 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 13.2 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental

**Project No.:** NA

**Project Name:** Se in Tissue

**Matrix:** TISSUE

**Service Request:** K0711481

**Date Collected:** 11/14/07

**Date Received:** 12/7/07

**Units:** mg/Kg

**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0024 **Lab Code:** K0711481-013

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.50 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 7.2 | | |

Comments:

## Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0025 **Lab Code:** K0711481-014

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.94 | 0.19 | 20.0 | 12/28/07 | 01/07/08 | 23.8 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0026 **Lab Code:** K0711481-015

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 6.2 | | |

Comments:

## Metals

- 1 -
### INORGANIC ANALYSIS DATA PACKAGE

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0027 **Lab Code:** K0711481-016

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.97 | 0.19 | 20.0 | 12/28/07 | 01/07/08 | 18.9 | | |

Comments:

## Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0028 **Lab Code:** K0711481-017

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 9.2 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0029
**Lab Code:** K0711481-018

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/07/08 | 13.2 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0030 **Lab Code:** K0711481-019

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.99 | 0.20 | 20.0 | 12/28/07 | 01/07/08 | 17.3 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0031
**Lab Code:** K0711481-020

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.47 | 0.09 | 10.0 | 12/28/07 | 01/07/08 | 8.6 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0032 **Lab Code:** K0711481-021

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 11.3 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0033 **Lab Code:** K0711481-022

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.97 | 0.19 | 20.0 | 12/28/07 | 01/21/08 | 20.0 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/15/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0034 **Lab Code:** K0711481-023

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.50 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 8.4 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/15/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-CC150-FT0035 **Lab Code:** K0711481-024

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 5.6 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/15/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-CC150-FT0036 **Lab Code:** K0711481-025

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.47 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 6.7 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/15/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0037 **Lab Code:** K0711481-026

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.49 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 5.9 | | |

Comments:

# Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental

**Service Request:** K0711481

**Project No.:** NA

**Date Collected:** 11/15/07

**Project Name:** Se in Tissue

**Date Received:** 12/7/07

**Matrix:** TISSUE

**Units:** mg/Kg

**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0038

**Lab Code:** K0711481-027

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.46 | 0.09 | 10.0 | 12/28/07 | 01/21/08 | 6.0 | | |

Comments:

## Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/15/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0039 **Lab Code:** K0711481-028

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.47 | 0.09 | 10.0 | 12/28/07 | 01/21/08 | 7.0 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental

**Project No.:** NA

**Project Name:** Se in Tissue

**Matrix:** TISSUE

**Service Request:** K0711481

**Date Collected:** 11/15/07

**Date Received:** 12/7/07

**Units:** mg/Kg

**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0040 **Lab Code:** K0711481-029

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 5.6 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/15/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0041 **Lab Code:** K0711481-030

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.44 | 0.09 | 10.0 | 12/28/07 | 01/21/08 | 4.7 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/15/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0042 **Lab Code:** K0711481-031

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 7.2 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 11/15/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC350-FT0043
**Lab Code:** K0711481-032

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.49 | 0.10 | 10.0 | 12/28/07 | 01/21/08 | 9.2 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/15/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-CC350-FT0044 **Lab Code:** K0711481-033

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.47 | 0.09 | 10.0 | 12/28/07 | 01/21/08 | 5.5 | | |

Comments:

## Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/15/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC350-FT0045 **Lab Code:** K0711481-034

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.42 | 0.08 | 10.0 | 12/28/07 | 01/21/08 | 8.5 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:** 10/30/07
**Project Name:** Se in Tissue
**Date Received:** 12/7/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-cc1a-FT0046
**Lab Code:** K0711481-035

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.82 | 0.17 | 20.0 | 12/28/07 | 01/21/08 | 19.0 | | |

Comments:

# Metals

- 1 -
## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 10/30/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-cc150-FT0047 **Lab Code:** K0711481-036

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.43 | 0.09 | 10.0 | 12/28/07 | 01/21/08 | 10.8 | | |

Comments:

# Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711481 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/7/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0048 **Lab Code:** K0711481-037

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 2.0 | 0.40 | 40.0 | 12/28/07 | 01/21/08 | 44.7 | | |

Comments:

# Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711481
**Date Collected:** 11/14/07
**Date Received:** 12/7/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0049 **Lab Code:** K0711481-038

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 2.0 | 0.40 | 40.0 | 12/28/07 | 01/21/08 | 41.2 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:**
**Project Name:** Se in Tissue
**Date Received:**
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** Method Blank
**Lab Code:** K0711481-MB1

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.10 | 0.02 | 2.0 | 12/28/07 | 01/07/08 | 0.02 | U | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711481
**Project No.:** NA
**Date Collected:**
**Project Name:** Se in Tissue
**Date Received:**
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** Method Blank
**Lab Code:** K0711481-MB2

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.10 | 0.02 | 2.0 | 12/28/07 | 01/21/08 | 0.02 | U | |

Comments:

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental  **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**ICV Source:** Inorganic Ventures  **CCV Source:** CAS MIXED

**Concentration Units:** ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | 10.0 | 9.94 | 99 | 10.0 | 9.71 | 97 | 9.30 | 93 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**ICV Source:** Inorganic Ventures **CCV Source:** CAS MIXED

**Concentration Units:** ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **True** | **Found** | **%R(1)** | **True** | **Found** | **%R(1)** | **Found** | **%R(1)** | **Method** |
| Selenium | | | | 10.0 | 10.04 | 100 | 10.21 | 102 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| Analyte | Initial Calibration | | | Continuing Calibration | | | | | Method |
|---|---|---|---|---|---|---|---|---|---|
| | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | |
| Selenium | | | | 10.0 | 10.00 | 100 | | | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **True** | **Found** | **%R(1)** | **True** | **Found** | **%R(1)** | **Found** | **%R(1)** | **Method** |
| Selenium | 10.0 | 9.47 | 95 | 10.0 | 9.61 | 96 | 9.61 | 96 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 9.71 | 97 | 9.85 | 98 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 9.68 | 97 | | | 7742 |

# Metals
## - 2b -
## CRDL STANDARD FOR AA AND ICP

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

Concentration Units: ug/L

| Analyte | CRDL Standard for AA | | | CRDL Standard for ICP | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | | | Final | |
| | True | Found | %R | True | Found | %R | Found | %R |
| Selenium | 0.5 | 0.59 | 118.0 | | | | | |

# Metals
- 2b -
## CRDL STANDARD FOR AA AND ICP

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

Concentration Units: ug/L

| Analyte | CRDL Standard for AA | | | CRDL Standard for ICP | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | | | Final | |
| | True | Found | %R | True | Found | %R | Found | %R |
| Selenium | 0.5 | 0.64 | 128.0 | | | | | |

# Metals

-3-

## BLANKS

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 7742 |

# Metals

-3-

BLANKS

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | | | 0.1 | U | 0.1 | U | | | 7742 |

# Metals

-3-

## BLANKS

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 0.2 | B | 0.1 | U | 0.1 | B | 0.2 | B | 7742 |

# Metals

-3-

BLANKS

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | | | 0.2 | B | 0.2 | B | | | 7742 |

# Metals

- 5A -

## SPIKE SAMPLE RECOVERY

**Client:** New Fields Environmental  **Service Request:** K0711481

**Project No.:** NA  **Units:** MG/KG

**Project Name:** Se in Tissue  **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1007-cc1a-FT0012S  **Lab Code:** K0711481-001S

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 65 - 124 | 29.7 | | 8.7 | | 24.27 | 86.5 | | 7742 |

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

# Metals
- 5A -

## SPIKE SAMPLE RECOVERY

Client: New Fields Environmental  Service Request: K0711481

Project No.: NA  Units: MG/KG

Project Name: Se in Tissue  Basis: DRY

Matrix: TISSUE

Sample Name: SM1107-LSV2c-FT0032S  Lab Code: K0711481-021S

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 65 - 124 | 39.4 | | 11.3 | | 25.00 | 112.4 | | 7742 |

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

# Metals

- 6 -

## DUPLICATES

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA **Units:** MG/KG

**Project Name:** Se in Tissue **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1007-cc1a-FT0012D **Lab Code:** K0711481-001D

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | Method |
|---|---|---|---|---|---|---|---|---|
| Selenium | 30 | 8.7 | | 8.1 | | 7.1 | | 7742 |

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

# Metals

- 6 -

## DUPLICATES

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA **Units:** MG/KG

**Project Name:** Se in Tissue **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1107-LSV2c-FT0032D **Lab Code:** K0711481-021D

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | Method |
|---|---|---|---|---|---|---|---|---|
| Selenium | 30 | 11.3 | | 11.4 | | 0.9 | | 7742 |

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

# Metals

-7-

## LABORATORY CONTROL SAMPLE

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Aqueous LCS Source:** **Solid LCS Source:** NRCC DOLT 3

| Analyte | Aqueous (ug/L) | | | Solid (mg/kg) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | True | Found | %R | True | Found | C | Limits | | %R |
| Selenium | | | | 7.06 | 8.1 | | 5.26 | 9.05 | 114.7 |

# Metals

-7-

## LABORATORY CONTROL SAMPLE

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Aqueous LCS Source:** **Solid LCS Source:** NRCC DOLT 3

| Analyte | Aqueous (ug/L) | | | Solid (mg/kg) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | True | Found | %R | True | Found | C | Limits | | %R |
| Selenium | | | | 7.06 | 6.6 | | 5.26 | 9.05 | 93.5 |

# Metals

- 10 -

## DETECTION LIMITS

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**ICP/ICP-MS ID #:**

**GFAA ID #:** K-FLAA-02 **AA ID #:**

| Analyte | Wave-length (nm) | Back-ground | MRL ug/L | MDL ug/L | M |
|---|---|---|---|---|---|
| Selenium | | | 0.5 | 0.1 | F |

Comments:

# Metals
-13-
## PREPARATION LOG

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Method:** F

| Sample ID | Preparation Date | Initial Volume | Final Volume (mL) |
|---|---|---|---|
| K0711481-001 | 12/28/07 | 0.2180 | 20.0 |
| K0711481-001D | 12/28/07 | 0.2080 | 20.0 |
| K0711481-001S | 12/28/07 | 0.2060 | 20.0 |
| K0711481-002 | 12/28/07 | 0.2080 | 20.0 |
| K0711481-003 | 12/28/07 | 0.2010 | 20.0 |
| K0711481-004 | 12/28/07 | 0.2010 | 20.0 |
| K0711481-005 | 12/28/07 | 0.2040 | 20.0 |
| K0711481-006 | 12/28/07 | 0.2310 | 20.0 |
| K0711481-007 | 12/28/07 | 0.2090 | 20.0 |
| K0711481-008 | 12/28/07 | 0.2390 | 20.0 |
| K0711481-009 | 12/28/07 | 0.2100 | 20.0 |
| K0711481-010 | 12/28/07 | 0.2070 | 20.0 |
| K0711481-011 | 12/28/07 | 0.2180 | 20.0 |
| K0711481-012 | 12/28/07 | 0.2110 | 20.0 |
| K0711481-013 | 12/28/07 | 0.2010 | 20.0 |
| K0711481-014 | 12/28/07 | 0.2140 | 20.0 |
| K0711481-015 | 12/28/07 | 0.2070 | 20.0 |
| K0711481-016 | 12/28/07 | 0.2070 | 20.0 |
| K0711481-017 | 12/28/07 | 0.2100 | 20.0 |
| K0711481-018 | 12/28/07 | 0.2070 | 20.0 |
| K0711481-019 | 12/28/07 | 0.2030 | 20.0 |
| K0711481-020 | 12/28/07 | 0.2130 | 20.0 |
| K0711481-MB1 | 12/28/07 | 0.2000 | 20.0 |
| LCSS DOLT | 12/28/07 | 0.2000 | 20.0 |

# Metals
-13-
## PREPARATION LOG

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Method:** F

| Sample ID | Preparation Date | Initial Volume | Final Volume (mL) |
|---|---|---|---|
| K0711481-021 | 12/28/07 | 0.2080 | 20.0 |
| K0711481-021D | 12/28/07 | 0.2090 | 20.0 |
| K0711481-021S | 12/28/07 | 0.2000 | 20.0 |
| K0711481-022 | 12/28/07 | 0.2060 | 20.0 |
| K0711481-023 | 12/28/07 | 0.2020 | 20.0 |
| K0711481-024 | 12/28/07 | 0.2090 | 20.0 |
| K0711481-025 | 12/28/07 | 0.2110 | 20.0 |
| K0711481-026 | 12/28/07 | 0.2030 | 20.0 |
| K0711481-027 | 12/28/07 | 0.2160 | 20.0 |
| K0711481-028 | 12/28/07 | 0.2140 | 20.0 |
| K0711481-029 | 12/28/07 | 0.2070 | 20.0 |
| K0711481-030 | 12/28/07 | 0.2270 | 20.0 |
| K0711481-031 | 12/28/07 | 0.2100 | 20.0 |
| K0711481-032 | 12/28/07 | 0.2050 | 20.0 |
| K0711481-033 | 12/28/07 | 0.2150 | 20.0 |
| K0711481-034 | 12/28/07 | 0.2370 | 20.0 |
| K0711481-035 | 12/28/07 | 0.2430 | 20.0 |
| K0711481-036 | 12/28/07 | 0.2320 | 20.0 |
| K0711481-037 | 12/28/07 | 0.2000 | 20.0 |
| K0711481-038 | 12/28/07 | 0.2010 | 20.0 |
| K0711481-MB2 | 12/28/07 | 0.2000 | 20.0 |
| LCSS DOLT2 | 12/28/07 | 0.2070 | 20.0 |

*Columbia Analytical Services*

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 1/7/08 **End Date:** 1/7/08

| Sample No. | 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 |
| CAL BLK | 1 | 08:52 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| STD 0.5 | 1 | 08:54 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| STD 1.0 | 1 | 08:56 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| STD 5.0 | 1 | 08:59 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| STD 10.0 | 1 | 09:01 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| STD 15.0 | 1 | 09:04 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ICV1 | 1 | 09:06 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ICB1 | 1 | 09:08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| CRA | 1 | 09:11 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| CCV1 | 1 | 09:13 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| CCB1 | 1 | 09:15 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-MB1 | 2 | 09:18 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ZLCSS DOLT | 20 | 09:20 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K0711481-001 | 10 | 09:22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-001D | 10 | 09:25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-001S | 40 | 09:27 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-002 | 10 | 09:29 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ZK0711481-003 | 10 | 09:32 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K0711481-004 | 10 | 09:35 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-005 | 10 | 09:37 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ZK0711481-006 | 10 | 09:40 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CCV2 | 1 | 09:42 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| CCB2 | 1 | 09:45 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-007 | 10 | 09:47 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ZK0711481-008 | 10 | 09:49 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K0711481-009 | 10 | 09:52 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-010 | 10 | 09:55 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ZK0711481-011 | 10 | 09:57 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| K0711481-012 | 10 | 10:00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| K0711481-013 | 10 | 10:02 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |  |  |  |  |  |  |
| ZK0711481-014 | 10 | 10:05 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ZK0711481-015 | 10 | 10:08 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 1/7/08 **End Date:** 1/7/08

| Sample No. | 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 |
| ZK0711481-016 | 10 | 10:10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV3 | 1 | 10:13 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB3 | 1 | 10:15 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-017 | 10 | 10:18 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-018 | 10 | 10:20 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZK0711481-019 | 10 | 10:23 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0711481-020 | 10 | 10:26 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-001A | 10 | 10:28 | 1125. | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV4 | 1 | 10:30 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB4 | 1 | 10:33 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZLCSS DOLT | 10 | 10:35 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0711481-003 | 20 | 10:38 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-006 | 20 | 10:40 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-008 | 20 | 10:43 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-011 | 20 | 10:45 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-014 | 20 | 10:48 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-015 | 10 | 10:50 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-016 | 20 | 10:53 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-019 | 20 | 10:55 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCSS DOLT | 40 | 10:58 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV5 | 1 | 11:00 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB5 | 1 | 11:03 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

*Columbia Analytical Services*

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 1/21/08 **End Date:** 1/21/08

| Sample No. | 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 |
| CAL BLK | 1 | 09:44 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 0.5 | 1 | 09:46 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 1.0 | 1 | 09:48 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 5.0 | 1 | 09:51 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 10.0 | 1 | 09:53 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 15.0 | 1 | 09:55 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICV2 | 1 | 09:58 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICB2 | 1 | 10:00 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CRA2 | 1 | 10:03 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV1 | 1 | 10:05 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB1 | 1 | 10:07 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-MB2 | 2 | 10:10 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCSS DOLT2 | 20 | 10:12 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-021 | 10 | 10:14 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-021D | 10 | 10:16 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-021S | 40 | 10:19 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZK0711481-022 | 10 | 10:21 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0711481-023 | 10 | 10:24 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-024 | 10 | 10:27 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-025 | 10 | 10:29 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-026 | 10 | 10:31 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV2 | 1 | 10:34 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB2 | 1 | 10:36 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-027 | 10 | 10:38 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-028 | 10 | 10:41 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-029 | 10 | 10:43 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-030 | 10 | 10:45 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-031 | 10 | 10:48 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-032 | 10 | 10:50 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-033 | 10 | 10:52 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-034 | 10 | 10:55 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZK0711481-035 | 10 | 10:57 | | | | | | | | | | | | | | | | | | | | | | | | | |

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

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0711481

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 1/21/08 **End Date:** 1/21/08

| Sample No. | D/F | Time | % R | AL | SB | AS | BA | BE | CD | CA | CR | CO | CU | FE | PB | MG | MN | HG | NI | K | SE | AG | NA | TL | V | ZN | CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| K0711481-036 | 10 | 11:00 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV3 | 1 | 11:02 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB3 | 1 | 11:05 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-037 | 10 | 11:07 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZK0711481-038 | 10 | 11:10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0711481-021A | 10 | 11:13 | 1031. | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV4 | 1 | 11:16 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB4 | 1 | 11:18 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-022 | 20 | 11:21 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-035 | 20 | 11:23 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-037 | 40 | 11:25 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711481-038 | 40 | 11:28 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV5 | 1 | 11:30 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB5 | 1 | 11:33 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

Columbia Analytical Services
Metals Tissue Digestion Sheet

Service Request Number(s) : K0711481 1-20

Star Lims Run No.: 120083 | Analysis for : ICP ICP-MS GFAA

Method : Tissue | other: Se hydride

| Sample | Initial Weight (g) | freeze Dry | Wet | Final Volume (ml) | Matrix |
|---|---|---|---|---|---|
| PB | | | X | 20mls | 15% HNO3 |
| Dolt | 0.200 | | | | |
| K0711481-01 | 0.218 | X | | | |
| -01D | 0.208 | | | | |
| -01S | 0.206 | | | | |
| -02 | 0.208 | | | | |
| -03 | 0.201 | | | | |
| -04 | 0.201 | | | | |
| -05 | 0.204 | | | | |
| -06 | 0.231 | | | | |
| -07 | 0.209 | | | | |
| -08 | 0.239 | | | | |
| -09 | 0.210 | | | | |
| -10 | 0.207 | | | | |
| -11 | 0.218 | | | | |
| -12 | 0.211 | | | | |
| -13 | 0.201 | | | | |
| -14 | 0.214 | | | | |
| -15 | 0.207 | | | | |
| -16 | 0.207 | | | | |
| -17 | 0.210 | | | | |
| -18 | 0.207 | | | | |
| -19 | 0.203 | | | | |
| -20 | 0.213 | | | | |
| | | AB | 12/28/07 | | |

Time Digestion Started: 4:15p.m 12/28/07 Oven Temp: 105°C

Lot # Acids Used: HNO3 MS10-81-C

LCS: Dorm-2, Dolt-3

Time Digestion Ended: 10:30a.m. 1/2/08

Oven Temp: 108°C

Balance I.D.: 21-B

QCP CICV-1, MET1-59-H, ___________ mls. added
QCP CICV-2, MET1-59-I, ___________ mls. added
QCP CICV-3, MET1-59-J, ___________ mls. Added
SS6, MET1-62-A, ___________ mls. Added

SPIKE INFO
SS1-MET1-61-R, 0.3 mls added
SS5-MET1-61-P, 0.05 mls added
SS6-MET1-62-A, 0.05 mls added
Additional spikes: ___________

Comments: ___________

Analyst Angela Black Date 12/28/07
Reviewer Date 1/2/07

TissueDig.xls
12/13/2007

## METALS SPIKE FORM

Service Request # K071148l 1-20
Q.C. Sample # K071148l-1

Circle type of digest: GFAA ICP FAA ICP-MS Other:______ Initials / Date: AB / 12/28/07
Circle type of sample: Soil Water Misc. Sludge Oil Other: Tissue

| Solution Name | Element | mls of 1000ppm Solution | Final Volume | Source | Lot# | Exp. Date | Solution Conc. mg/L | Enter mls Added | |
|---|---|---|---|---|---|---|---|---|---|
| SS1-MET1-61-R | HNO3 | 50.0 | 1000ml | JT Baker | E17044 | - | - | 0.3 | Expires:3/7/08 |
| | Al | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Ag | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Ba | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Be | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Cd | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Co | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Cr | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 20 | | |
| | Cu | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 25 | | |
| | Fe | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 100 | | |
| | Pb | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Mn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Ni | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Sb | 50* | 1000ml | MET1-53-A | 619312 | 3/7/2008 | 50 | | |
| | V | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Zn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| SS4-MET1-62-J | HNO3 | 25.0 | 500ml | JT BAKER | A48046 | - | - | | Expires:2/1/08 |
| | As | 2.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 4 | | |
| | Cd | 2.0 | 500ml | MET1-57-M | Z-CD02004 | 7/1/2008 | 4 | | |
| | Pb | 2.0 | 500ml | MET1-57-R | A2-PB02135 | 7/1/2008 | 4 | | |
| | Se | 2.0 | 500ml | MET1-57-K | Z-SE01120 | 7/1/2008 | 4 | | |
| | Tl | 2.0 | 500ml | MET1-54-M | Z-TL01097 | 2/1/2008 | 4 | | |
| | Cu | 2.0 | 500ml | MET1-55-O | Z-CU02084 | 5/1/2008 | 4 | | |
| SS5-MET1-61-P | HNO3 | 25.0 | 500ml | JT BAKER | E17044 | - | - | 0.05 | Expires:2/1/08 |
| | As | 50.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 100 | | |
| | Se | 50.0 | 500ml | MET1-59-C | Z-SE01120 | 8/1/2008 | 100 | | |
| | Tl | 50.0 | 500ml | MET1-54-M | Z-TL01097 | 2/1/2008 | 100 | | |
| SS6-MET1-62-A | HNO3 | 25 | 500ml | JT BAKER | E27027 | - | - | 0.05 | Expires: 2/1/08 |
| | B | 50 | 500ml | MET1-59-A | 715006 | 1/2/2009 | 100 | | |
| | Mo | 50 | 500ml | MET1-54-K | Z-MO02012 | 2/1/2008 | 100 | | |
| GFLCSW (MET1-60-A) | HNO3 | 10.0 | 1000ml | JT BAKER | E01042 | - | - | | Expires: 3/1/08 |
| | As, Pb, Se, Tl | 5.0 | 1000ml | QCP-CICV-3 | Z-CICP19048 | 3/1/2008 | 2.5 | | |
| | Cd | - | - | QCP-CICV-3 | Z-CICP19048 | 3/1/2008 | 1.25 | | |
| | Cu | 2.5 | 1000ml | MET-55-O | Z-CU0284 | 5/1/2008 | 2.5 | | |
| QCP-CICV-1 (MET1-59-H) | Ca, Mg, Na, K | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 2500 | | Expires:9/1/08 |
| | Al, Ba | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 1000 | | |
| | Fe | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 500 | | |
| | Co, Mn, Ni, V, Zn | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 250 | | |
| | Cu, Ag | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 125 | | |
| | Cr | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 100 | | |
| | Be | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 25 | | |
| QCP-CICV-2 (MET1-59-I) | Sb | no dilution | - | IV | Z-CICP19033 | 9/1/2008 | 500 | | Expires: 9/1/08 |
| QCP-CICV-3 (MET1-59-J) | As, Pb, Se, Tl | no dilution | - | IV | Z-CICP19048 | 9/1/2008 | 500 | | Expires: 9/1/08 |
| | Cd | no dilution | - | IV | Z-CICP19048 | 9/1/2008 | 250 | | |

* Denotes volume of 1000 ppm stock standard.

| Element | mls of | ppm | Source | Lot# / Lab Code | Exp. Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Columbia Analytical Services
Metals Tissue Digestion Sheet

Service Request Number(s) : K0711481 (21-38)

Star Lims Run No.: 606684

Analysis for : ICP ICP-MS GFAA

Method : Tissue

other: Se hydride

| Sample | Initial Weight (g) | freeze Dry | Wet | Final Volume (ml) | Matrix |
|---|---|---|---|---|---|
| PB | | | X | 20ml | 15% HNO3 |
| Dolt | 0.207 | | ↓ | | |
| K0711481-21 | 0.208 | X | | | |
| -21D | 0.209 | | | | |
| -21S | 0.200 | | | | |
| -22 | 0.206 | | | | |
| -23 | 0.202 | | | | |
| -24 | 0.209 | | | | |
| -25 | 0.211 | | | | |
| -26 | 0.203 | | | | |
| -27 | 0.216 | | | | |
| -28 | 0.214 | | | | |
| -29 | 0.207 | | | | |
| -30 | 0.227 | | | | |
| -31 | 0.210 | | | | |
| -32 | 0.205 | | | | |
| -33 | 0.215 | | | | |
| -34 | 0.231 | | | | |
| -35 | 0.243 | | | | |
| -36 | 0.232 | | | | |
| -37 | 0.200 | | | | |
| -38 | 0.201 | X | | ↓ | ↓ |
| | | | | | |
| | | AB 12/28/07 | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Time Digestion Started: 4:15p.m. 12/28/07 Oven Temp: 105°C

Time Digestion Ended: 10:30a.m. 1/2/08

Lot # Acids Used: HNO3 H810-81-C

Oven Temp: 108°C

LCS: Dorm-2, Dolt-3

Balance I.D.: 21-B

QCP CICV-1, MET1-59-H, ___________ mls. added
QCP CICV-2, MET1-59-I, ___________ mls. added
QCP CICV-3, MET1-59-J, ___________mls. Added
SS6, MET1-62-A, ___________mls. Added

SPIKE INFO
SS1-MET1-61-R, 0.3 mls added
SS5-MET1-61-P, 0.05 mls added
SS6-MET1-62-A, 0.05 mls added
Additional spikes:
Comments:

Analyst Angela Black Date 12/28/07
Reviewer Z Date 1/2/07

TissueDig.xls
12/13/2007

METALS SPIKE FORM

Service Request # K0711481 21-38
Q.C. Sample # K0711481-21

Circle type of digest: GFAA ICP FAA ICP-MS Other:________ Initials / Date: AB / 02/28/07
Circle type of sample: Soil Water Misc. Sludge Oil Other: Tissue

| Solution Name | Element | mls of 1000ppm Solution | Final Volume | Source | Lot# | Exp. Date | Solution Conc. mg/L | Enter mls Added | |
|---|---|---|---|---|---|---|---|---|---|
| SS1-MET1-61-R | HNO3 | 50.0 | 1000ml | JT Baker | E17044 | - | - | 0.3 | Expires:3/7/08 |
| | Al | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Ag | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Ba | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Be | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Cd | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Co | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Cr | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 20 | | |
| | Cu | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 25 | | |
| | Fe | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 100 | | |
| | Pb | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Mn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Ni | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Sb | 50* | 1000ml | MET1-53-A | 619312 | 3/7/2008 | 50 | | |
| | V | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Zn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| SS4-MET1-62-J | HNO3 | 25.0 | 500ml | JT BAKER | A48046 | - | - | | Expires:2/1/08 |
| | As | 2.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 4 | | |
| | Cd | 2.0 | 500ml | MET1-57-M | Z-CD02004 | 7/1/2008 | 4 | | |
| | Pb | 2.0 | 500ml | MET1-57-R | A2-PB02135 | 7/1/2008 | 4 | | |
| | Se | 2.0 | 500ml | MET1-57-K | Z-SE01120 | 7/1/2008 | 4 | | |
| | Tl | 2.0 | 500ml | MET1-54-M | Z-TL01097 | 2/1/2008 | 4 | | |
| | Cu | 2.0 | 500ml | MET1-55-O | Z-CU02084 | 5/1/2008 | 4 | | |
| SS5-MET1-61-P | HNO3 | 25.0 | 500ml | JT BAKER | E17044 | - | - | 0.05 | Expires:2/1/08 |
| | As | 50.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 100 | | |
| | Se | 50.0 | 500ml | MET1-59-C | Z-SE01120 | 8/1/2008 | 100 | | |
| | Tl | 50.0 | 500ml | MET1-54-M | Z-TL01097 | 2/1/2008 | 100 | | |
| SS6-MET1-62-A | HNO3 | 25 | 500ml | JT BAKER | E27027 | - | - | 0.05 | Expires: 2/1/08 |
| | B | 50 | 500ml | MET1-59-A | 715006 | 1/2/2009 | 100 | | |
| | Mo | 50 | 500ml | MET1-54-K | Z-MO02012 | 2/1/2008 | 100 | | |
| GFLCSW (MET1-60-A) | HNO3 | 10.0 | 1000ml | JT BAKER | E01042 | - | - | | Expires: 3/1/08 |
| | As, Pb, Se, Tl | 5.0 | 1000ml | QCP-CICV-3 | Z-CICP19048 | 3/1/2008 | 2.5 | | |
| | Cd | - | - | QCP-CICV-3 | Z-CICP19048 | 3/1/2008 | 1.25 | | |
| | Cu | 2.5 | 1000ml | MET-55-O | Z-CU0284 | 5/1/2008 | 2.5 | | |
| QCP-CICV-1 (MET1-59-H) | Ca, Mg, Na, K | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 2500 | | Expires:9/1/08 |
| | Al, Ba | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 1000 | | |
| | Fe | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 500 | | |
| | Co, Mn, Ni, V, Zn | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 250 | | |
| | Cu, Ag | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 125 | | |
| | Cr | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 100 | | |
| | Be | no dilution | - | IV | AZ-MEB236021 | 9/1/2008 | 25 | | |
| QCP-CICV-2 (MET1-59-I) | Sb | no dilution | - | IV | Z-CICP19033 | 9/1/2008 | 500 | | Expires: 9/1/08 |
| QCP-CICV-3 (MET1-59-J) | As, Pb, Se, Tl | no dilution | - | IV | Z-CICP19048 | 9/1/2008 | 500 | | Expires: 9/1/08 |
| | Cd | no dilution | - | IV | Z-CICP19048 | 9/1/2008 | 250 | | |

* Denotes volume of 1000 ppm stock standard.

| Element | mls of | ppm | Source | Lot# / Lab Code | Exp. Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Element Analyzed _Se Hydride_ Instrument _K-FLAA-2_
Service Request # _K11481 # 1-20_

Batch QC SR's #

Calibration Std. _AA1-8-A_
Starlims # _103600_
Run # _010708-Se_

# Hydride Data Review Form

| | Yes | No | NA |
|---|---|---|---|
| 1 ICV within 10% of true Value | X | | |
| 2. Calibration data included | X | | |
| 3. CCV's in control | X | | |
| 4. CCB's and/or ICB's below MRL | X | | |
| 5. All reported Results within Cal. Range | X | | |
| 6. All Calculations are Correct | X | | |

Comments

Primary Reviewed by _[signature]_ Date _1/7/08_

Secondary Reviewed by _JDB_ Date _1/7/08_

**COLUMBIA ANALYTICAL SERVICES, INC.**
**GFAA Run Log**

| **Method:** (Circle Method Used)<br>7742 7062<br>Other:____________<br>Element: As Se ____ | **Service Request # :** |
|---|---|

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ICV | - | 9.940 | 99% | |
| ICB | - | 0.000 | | |
| CRA | - | 0.592 | 118% | |
| CCV | - | 9.711 | 97% | |
| CCB | - | -0.037 | | |
| K0711481-MB | 1/2 | 0.068 | | |
| ~~DOLT K0711481~~ | ~~1/2+1/10~~ | ~~1.403~~ | | Rerun |
| K0711481-001 | 1/2+1/5 | 9.429 | | |
| K0711481-001D | 1/2+1/5 | 8.441 | | |
| K0711481-001S | 1/2+1/20 | 7.650 | 85% | 1/7/08 |
| K0711481-002 | 1/2+1/5 | 5.626 | | |
| ~~K0711481-003~~ | ~~1/2+1/5~~ | ~~16.616~~ | | Rerun |
| K0711481-004 | 1/2+1/5 | 8.952 | | |
| K0711481-005 | 1/2+1/5 | 14.026 | | |
| ~~K0711481-006~~ | ~~1/2+1/5~~ | ~~16.242~~ | | Rerun |
| CCV | - | 9.302 | 93% | |
| CCB | - | -0.003 | | |
| K0711481-007 | 1/2+1/5 | 14.193 | | |
| ~~K0711481-008~~ | ~~1/2+1/5~~ | ~~15.685~~ | | Rerun |
| K0711481-009 | 1/2+1/5 | 7.051 | | |
| K0711481-010 | 1/2+1/5 | 9.902 | | |
| ~~K0711481-011~~ | ~~1/2+1/5~~ | ~~18.565~~ | | Rerun |
| K0711481-012 | 1/2+1/5 | 13.904 | | 1/7/08 |
| K0711481-013 | 1/2+1/5 | 7.194 | | |
| ~~K0711481-014~~ | ~~1/2+1/5~~ | ~~19.219~~ | | Rerun |
| ~~K0711481-015~~ | ~~1/2+1/5~~ | ~~8.995~~ | | Rerun |
| ~~K0711481-016~~ | ~~1/2+1/5~~ | ~~17.827~~ | | Rerun |
| CCV | - | 10.039 | 100% | |
| CCB | - | 0.002 | | |
| K0711481-017 | 1/2+1/5 | 9.638 | | |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (80-120%) | 73.0mg/kg (61-142%) | 1000ppb (80-120%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| Dena Jus | 1/7/08 | 1 |



R:\ICP\MISC\HG1631\1631 Run Log

**COLUMBIA ANALYTICAL SERVICES, INC.**
**GFAA Run Log**

| | |
|---|---|
| **Method:** (Circle Method Used)<br>7742 7062<br>Other:____________<br>Element: As Se | **Service Request # :** |

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| K0711481-018 | 1/2+1/5 | 13.694 | | |
| ~~K0711481-019~~ | ~~1/2+1/5~~ | ~~16.423~~ | | Rerun |
| K0711481-020 | 1/2+1/5 | 9.186 | | |
| K0711481-001A | 1/2+1/5 | 12.804 | 113% | Post Spike = 3 ppb |
| CCV | - | 10.211 | 102% | |
| CCB | - | -0.006 | | |
| ~~LCSS DOLT~~ | ~~1/2+1/5~~ | ~~4.160~~ | | Rerun |
| K0711481-003 1/10 | 1/2+1/10 | 10.742 | | |
| K0711481-006 1/10 | 1/2+1/10 | 10.348 | | |
| K0711481-008 1/10 | 1/2+1/10 | 10.261 | | 1/7/08 |
| K0711481-0011 1/10 | 1/2+1/10 | 12.309 | | |
| K0711481-014 1/10 | 1/2+1/10 | 12.746 | | |
| K0711481-015 1/5 | 1/2+1/5 | 6.413 | | |
| K0711481-016 1/10 | 1/2+1/10 | 9.765 | | |
| K0711481-019 1/10 | 1/2+1/10 | 8.767 | | |
| LCSS DOLT | 1/2+1/20 | 2.014 | 118% | |
| CCV | - | 10.002 | 100% | |
| CCB | - | -0.014 | | |
| ~~LCSS DOLT 1/10~~ | ~~1/2+1/10~~ | ~~2.960~~ | | |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (80-120%) | 73.0mg/kg (61-142%) | 1000ppb (80-120%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| Dena Just | 1/7/08 | 2 |



R:\ICP\MISC\HG1631\1631 Run Log

**Analysis Begun**

**Logged In Analyst: ACQMET10** **Technique: AA FIAS-Flame**
**Spectrometer Model: AAnalyst 200, S/N 200S5061701 Autosampler Model: AS-90**

**Sample Information File: C:\data-AA\ACQMET10\Sample Information\010708-Se.sif**
**Batch ID: 010708-Se**
**Results Data Set: 010708-Se**
**Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb**

**Sequence No.: 1** **Autosampler Location: 1**
**Sample ID: Cal Blk** **Date Collected: 1/7/2008 8:52:14 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: Cal Blk**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.00] | 0.006 | 0.020 | 0.006 | | | 08:52:35 | Yes |
| 2 | | [0.00] | 0.004 | 0.016 | 0.004 | | | 08:53:13 | Yes |
| 3 | | [0.00] | 0.004 | 0.003 | 0.004 | | | 08:53:47 | Yes |
| Mean: | | [0.00] | 0.005 | | | | | | |
| SD: | | 0.00 | 0.0010 | | | | | | |
| %RSD: | | 0.00 | 21.83 | | | | | | |

Auto-zero performed.

**Sequence No.: 2** **Autosampler Location: 2**
**Sample ID: Std 0.5** **Date Collected: 1/7/2008 8:54:35 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 0.5**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.5] | 0.008 | 0.050 | 0.012 | | | 08:54:57 | Yes |
| 2 | | [0.5] | 0.009 | 0.059 | 0.014 | | | 08:55:31 | Yes |
| 3 | | [0.5] | 0.010 | 0.060 | 0.014 | | | 08:56:05 | Yes |
| Mean: | | [0.5] | 0.009 | | | | | | |
| SD: | | 0.0 | 0.0010 | | | | | | |
| %RSD: | | 0.0 | 10.93 | | | | | | |

Standard number 1 applied. [0.5]
Correlation Coef.: 1.000000 Slope: 0.01782 Intercept: 0.00000

**Sequence No.: 3** **Autosampler Location: 3**
**Sample ID: Std 1.0** **Date Collected: 1/7/2008 8:56:55 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 1.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [1.0] | 0.016 | 0.088 | 0.020 | | | 08:57:17 | Yes |
| 2 | | [1.0] | 0.014 | 0.084 | 0.019 | | | 08:57:51 | Yes |
| 3 | | [1.0] | 0.015 | 0.084 | 0.020 | | | 08:58:26 | Yes |
| Mean: | | [1.0] | 0.015 | | | | | | |
| SD: | | 0.0 | 0.0008 | | | | | | |
| %RSD: | | 0.0 | 5.19 | | | | | | |

Standard number 2 applied. [1.0]
Correlation Coef.: 0.972198 Slope: 0.01560 Intercept: 0.00000

**Sequence No.: 4** **Autosampler Location: 4**

**Sample ID:** Std 5.0    **Date Collected:** 1/7/2008 8:59:16 AM
**Analyst:**    **Data Type:** Original

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**Replicate Data: Std 5.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [5.0] | 0.075 | 0.382 | 0.079 | | | 08:59:38 | Yes |
| 2 | | [5.0] | 0.075 | 0.382 | 0.080 | | | 09:00:13 | Yes |
| 3 | | [5.0] | 0.075 | 0.376 | 0.080 | | | 09:00:47 | Yes |
| Mean: | | [5.0] | 0.075 | | | | | | |
| SD: | | 0.0 | 0.0003 | | | | | | |
| %RSD: | | 0.0 | 0.44 | | | | | | |

Standard number 3 applied. [5.0]
Correlation Coef.: 0.999642    Slope: 0.01504    Intercept: 0.00000

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**Sequence No.:** 5    **Autosampler Location:** 5
**Sample ID:** Std 10.0    **Date Collected:** 1/7/2008 9:01:38 AM
**Analyst:**    **Data Type:** Original

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**Replicate Data: Std 10.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [10.0] | 0.143 | 0.732 | 0.148 | | | 09:02:01 | Yes |
| 2 | | [10.0] | 0.142 | 0.702 | 0.147 | | | 09:02:36 | Yes |
| 3 | | [10.0] | 0.141 | 0.731 | 0.145 | | | 09:03:10 | Yes |
| Mean: | | [10.0] | 0.142 | | | | | | |
| SD: | | 0.0 | 0.0014 | | | | | | |
| %RSD: | | 0.0 | 0.98 | | | | | | |

Standard number 4 applied. [10.0]
Correlation Coef.: 0.999341    Slope: 0.01439    Intercept: 0.00000

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**Sequence No.:** 6    **Autosampler Location:** 6
**Sample ID:** Std 15.0    **Date Collected:** 1/7/2008 9:04:01 AM
**Analyst:**    **Data Type:** Original

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**Replicate Data: Std 15.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [15.0] | 0.226 | 1.120 | 0.230 | | | 09:04:25 | Yes |
| 2 | | [15.0] | 0.226 | 1.103 | 0.230 | | | 09:04:59 | Yes |
| 3 | | [15.0] | 0.226 | 1.101 | 0.231 | | | 09:05:33 | Yes |
| Mean: | | [15.0] | 0.226 | | | | | | |
| SD: | | 0.0 | 0.0004 | | | | | | |
| %RSD: | | 0.0 | 0.16 | | | | | | |

Standard number 5 applied. [15.0]
Correlation Coef.: 0.999215    Slope: 0.01483    Intercept: 0.00000
The calibration curve may not be linear.

---

**Calibration data for Se 196.03**    **Equation: Linear Through Zero**

| ID | Mean Signal (Abs) | Entered Conc. ug/L | Calculated Conc. ug/L | Standard Deviation | %RSD |
|---|---|---|---|---|---|
| Cal Blk | 0.0000 | 0 | 0.000 | 0.00 | 21.8 |
| Std 0.5 | 0.0089 | 0.5 | 0.601 | 0.00 | 10.9 |
| Std 1.0 | 0.0149 | 1.0 | 1.008 | 0.00 | 5.2 |
| Std 5.0 | 0.0750 | 5.0 | 5.061 | 0.00 | 0.4 |
| Std 10.0 | 0.1421 | 10.0 | 9.587 | 0.00 | 1.0 |
| Std 15.0 | 0.2259 | 15.0 | 15.235 | 0.00 | 0.2 |

Correlation Coef.: 0.999215    Slope: 0.01483    Intercept: 0.00000

Sequence No.: 7
Sample ID: ICV
Analyst:

Autosampler Location: 7
Date Collected: 1/7/2008 9:06:25 AM
Data Type: Original

Replicate Data: ICV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.912 | 9.912 | 0.147 | 0.745 | 0.151 | | | 09:06:49 | Yes |
| 2 | 10.01 | 10.01 | 0.148 | 0.721 | 0.153 | | | 09:07:24 | Yes |
| 3 | 9.896 | 9.896 | 0.147 | 0.729 | 0.151 | | | 09:07:58 | Yes |
| Mean: | 9.940 | 9.940 | 0.147 | | | | | | |
| SD: | 0.064 | 0.064 | 0.0009 | | | | | | |
| %RSD: | 0.644 | 0.644 | 0.64 | | | | | | |

QC value within limits for Se 196.03 Recovery = 99.40%
All analyte(s) passed QC.

Sequence No.: 8
Sample ID: ICB
Analyst:

Autosampler Location: 1
Date Collected: 1/7/2008 9:08:50 AM
Data Type: Original

Replicate Data: ICB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.069 | 0.069 | 0.001 | 0.026 | 0.006 | | | 09:09:11 | Yes |
| 2 | 0.012 | 0.012 | 0.000 | 0.025 | 0.005 | | | 09:09:45 | Yes |
| 3 | -0.081 | -0.081 | -0.001 | 0.006 | 0.003 | | | 09:10:19 | Yes |
| Mean: | 0.000 | 0.000 | -0.000 | | | | | | |
| SD: | 0.076 | 0.076 | 0.0011 | | | | | | |
| %RSD: | >999.9% | >999.9% | >999.9% | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 9
Sample ID: CRA
Analyst:

Autosampler Location: 2
Date Collected: 1/7/2008 9:11:07 AM
Data Type: Original

Replicate Data: CRA

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.704 | 0.704 | 0.010 | 0.067 | 0.015 | | | 09:11:29 | Yes |
| 2 | 0.565 | 0.565 | 0.008 | 0.046 | 0.013 | | | 09:12:03 | Yes |
| 3 | 0.506 | 0.506 | 0.008 | 0.063 | 0.012 | | | 09:12:37 | Yes |
| Mean: | 0.592 | 0.592 | 0.009 | | | | | | |
| SD: | 0.101 | 0.101 | 0.0015 | | | | | | |
| %RSD: | 17.15 | 17.15 | 17.15 | | | | | | |

QC value within limits for Se 196.03 Recovery = 118.38%
All analyte(s) passed QC.

Sequence No.: 10
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 1/7/2008 9:13:27 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.774 | 9.774 | 0.145 | 0.728 | 0.149 | | | 09:13:50 | Yes |
| 2 | 9.543 | 9.543 | 0.141 | 0.730 | 0.146 | | | 09:14:25 | Yes |
| 3 | 9.816 | 9.816 | 0.146 | 0.740 | 0.150 | | | 09:14:59 | Yes |
| Mean: | 9.711 | 9.711 | 0.144 | | | | | | |

SD: 0.148 0.148 0.0022
%RSD: 1.519 1.519 1.52
QC value within limits for Se 196.03 Recovery = 97.11%
All analyte(s) passed QC.

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**Sequence No.: 11** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 1/7/2008 9:15:50 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.025 | 0.025 | 0.000 | 0.016 | 0.005 | | | 09:16:11 | Yes |
| 2 | -0.034 | -0.034 | -0.000 | 0.020 | 0.004 | | | 09:16:45 | Yes |
| 3 | -0.101 | -0.101 | -0.001 | 0.002 | 0.003 | | | 09:17:20 | Yes |
| Mean: | -0.037 | -0.037 | -0.001 | | | | | | |
| SD: | 0.063 | 0.063 | 0.0009 | | | | | | |
| %RSD: | 171.3 | 171.3 | 171.30 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

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**Sequence No.: 12** **Autosampler Location: 9**
**Sample ID: K0711481-MB** **Date Collected: 1/7/2008 9:18:09 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0711481-MB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.012 | -0.012 | -0.000 | 0.012 | 0.004 | | | 09:18:31 | Yes |
| 2 | 0.125 | 0.125 | 0.002 | 0.019 | 0.006 | | | 09:19:05 | Yes |
| 3 | 0.090 | 0.090 | 0.001 | 0.021 | 0.006 | | | 09:19:39 | Yes |
| Mean: | 0.068 | 0.068 | 0.001 | | | | | | |
| SD: | 0.071 | 0.071 | 0.0011 | | | | | | |
| %RSD: | 105.0 | 105.0 | 104.99 | | | | | | |

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**Sequence No.: 13** **Autosampler Location: 10**
**Sample ID: DOLT K0711481** **Date Collected: 1/7/2008 9:20:28 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: DOLT K0711481**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.434 | 1.434 | 0.021 | 0.120 | 0.026 | | | 09:20:50 | Yes |
| 2 | 1.374 | 1.374 | 0.020 | 0.118 | 0.025 | | | 09:21:26 | Yes |
| 3 | 1.402 | 1.402 | 0.021 | 0.116 | 0.025 | | | 09:22:00 | Yes |
| Mean: | 1.403 | 1.403 | 0.021 | | | | | | |
| SD: | 0.030 | 0.030 | 0.0004 | | | | | | |
| %RSD: | 2.129 | 2.129 | 2.13 | | | | | | |

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**Sequence No.: 14** **Autosampler Location: 11**
**Sample ID: K0711481-001** **Date Collected: 1/7/2008 9:22:50 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0711481-001**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.331 | 9.331 | 0.138 | 0.691 | 0.143 | | | 09:23:12 | Yes |
| 2 | 9.422 | 9.422 | 0.140 | 0.695 | 0.144 | | | 09:23:47 | Yes |
| 3 | 9.533 | 9.533 | 0.141 | 0.705 | 0.146 | | | 09:24:20 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 9.429 | 9.429 | 0.140 |
| SD: | 0.101 | 0.101 | 0.0015 |
| %RSD: | 1.075 | 1.075 | 1.07 |

**Sequence No.: 15** **Autosampler Location: 12**
**Sample ID: K0711481-001D** **Date Collected: 1/7/2008 9:25:10 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-001D**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.415 | 8.415 | 0.125 | 0.627 | 0.129 | | | 09:25:32 | Yes |
| 2 | 8.543 | 8.543 | 0.127 | 0.626 | 0.131 | | | 09:26:06 | Yes |
| 3 | 8.367 | 8.367 | 0.124 | 0.621 | 0.129 | | | 09:26:41 | Yes |
| Mean: | 8.441 | 8.441 | 0.125 | | | | | | |
| SD: | 0.091 | 0.091 | 0.0014 | | | | | | |
| %RSD: | 1.079 | 1.079 | 1.08 | | | | | | |

**Sequence No.: 16** **Autosampler Location: 13**
**Sample ID: K0711481-001S** **Date Collected: 1/7/2008 9:27:31 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-001S**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.477 | 7.477 | 0.111 | 0.536 | 0.115 | | | 09:27:54 | Yes |
| 2 | 7.611 | 7.611 | 0.113 | 0.549 | 0.117 | | | 09:28:29 | Yes |
| 3 | 7.861 | 7.861 | 0.117 | 0.564 | 0.121 | | | 09:29:03 | Yes |
| Mean: | 7.650 | 7.650 | 0.113 | | | | | | |
| SD: | 0.195 | 0.195 | 0.0029 | | | | | | |
| %RSD: | 2.553 | 2.553 | 2.55 | | | | | | |

**Sequence No.: 17** **Autosampler Location: 14**
**Sample ID: K0711481-002** **Date Collected: 1/7/2008 9:29:54 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-002**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.671 | 5.671 | 0.084 | 0.431 | 0.089 | | | 09:30:18 | Yes |
| 2 | 5.567 | 5.567 | 0.083 | 0.414 | 0.087 | | | 09:30:53 | Yes |
| 3 | 5.639 | 5.639 | 0.084 | 0.417 | 0.088 | | | 09:31:26 | Yes |
| Mean: | 5.626 | 5.626 | 0.083 | | | | | | |
| SD: | 0.053 | 0.053 | 0.0008 | | | | | | |
| %RSD: | 0.943 | 0.943 | 0.94 | | | | | | |

**Sequence No.: 18** **Autosampler Location: 15**
**Sample ID: K0711481-003** **Date Collected: 1/7/2008 9:32:18 AM**
**Analyst:** **Data Type: Original**

1/17/08

**Replicate Data: K0711481-003**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 16.47 | 16.47 | 0.244 | 1.238 | 0.249 | | | 09:32:42 | Yes |
| 2 | 16.61 | 16.61 | 0.246 | 1.213 | 0.251 | | | 09:33:18 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 16.76 | 16.76 | 0.249 | 1.243 | 0.253 | | | 09:33:53 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 16.62 | 16.62 | 0.246 | | | | | | |

| | | | |
|---|---|---|---|
| SD: | 0.146 | 0.146 | 0.0022 |
| %RSD: | 0.877 | 0.877 | 0.88 |

Sample concentration is greater than that of the highest standard.

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**Sequence No.: 19** **Autosampler Location: 16**
**Sample ID: K0711481-004** **Date Collected: 1/7/2008 9:35:18 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-004**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.941 | 8.941 | 0.133 | 0.665 | 0.137 | | | 09:35:42 | Yes |
| 2 | 8.887 | 8.887 | 0.132 | 0.651 | 0.136 | | | 09:36:16 | Yes |
| 3 | 9.027 | 9.027 | 0.134 | 0.661 | 0.138 | | | 09:36:50 | Yes |
| Mean: | 8.952 | 8.952 | 0.133 | | | | | | |
| SD: | 0.071 | 0.071 | 0.0011 | | | | | | |
| %RSD: | 0.791 | 0.791 | 0.79 | | | | | | |

---

**Sequence No.: 20** **Autosampler Location: 17**
**Sample ID: K0711481-005** **Date Collected: 1/7/2008 9:37:43 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-005**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.98 | 13.98 | 0.207 | 1.042 | 0.212 | | | 09:38:04 | Yes |
| 2 | 14.23 | 14.23 | 0.211 | 1.031 | 0.216 | | | 09:38:39 | Yes |
| 3 | 13.87 | 13.87 | 0.206 | 1.029 | 0.210 | | | 09:39:13 | Yes |
| Mean: | 14.03 | 14.03 | 0.208 | | | | | | |
| SD: | 0.187 | 0.187 | 0.0028 | | | | | | |
| %RSD: | 1.336 | 1.336 | 1.34 | | | | | | |

---

**Sequence No.: 21** **Autosampler Location: 18**
**Sample ID: K0711481-006** **Date Collected: 1/7/2008 9:40:03 AM**
**Analyst:** **Data Type: Original**

1/7/08

**Replicate Data: K0711481-006**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 16.29 | 16.29 | 0.242 | 1.202 | 0.246 | | | 09:40:24 | Yes |
| 2 | 16.20 | 16.20 | 0.240 | 1.195 | 0.245 | | | 09:40:58 | Yes |
| 3 | 16.24 | 16.24 | 0.241 | 1.192 | 0.245 | | | 09:41:33 | Yes |
| Mean: | 16.24 | 16.24 | 0.241 | | | | | | |
| SD: | 0.047 | 0.047 | 0.0007 | | | | | | |
| %RSD: | 0.288 | 0.288 | 0.29 | | | | | | |

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**Sequence No.: 22** **Autosampler Location: 5**
**Sample ID: CCV** **Date Collected: 1/7/2008 9:42:56 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: CCV**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.102 | 9.102 | 0.135 | 0.681 | 0.139 | | | 09:43:21 | Yes |
| 2 | 9.466 | 9.466 | 0.140 | 0.699 | 0.145 | | | 09:43:55 | Yes |
| 3 | 9.339 | 9.339 | 0.138 | 0.694 | 0.143 | | | 09:44:30 | Yes |
| Mean: | 9.302 | 9.302 | 0.138 | | | | | | |
| SD: | 0.185 | 0.185 | 0.0027 | | | | | | |
| %RSD: | 1.984 | 1.984 | 1.98 | | | | | | |

QC value within limits for Se 196.03 Recovery = 93.02%
All analyte(s) passed QC.

Sequence No.: 23
Sample ID: CCB
Analyst:

Autosampler Location: 1
Date Collected: 1/7/2008 9:45:21 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.011 | -0.011 | -0.000 | 0.013 | 0.004 | | | 09:45:43 | Yes |
| 2 | 0.124 | 0.124 | 0.002 | 0.027 | 0.006 | | | 09:46:17 | Yes |
| 3 | -0.122 | -0.122 | -0.002 | -0.004 | 0.003 | | | 09:46:51 | Yes |
| Mean: | -0.003 | -0.003 | -0.000 | | | | | | |
| SD: | 0.123 | 0.123 | 0.0018 | | | | | | |
| %RSD: | >999.9% | >999.9% | >999.9% | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 24
Sample ID: K0711481-007
Analyst:

Autosampler Location: 19
Date Collected: 1/7/2008 9:47:40 AM
Data Type: Original

Replicate Data: K0711481-007

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.03 | 14.03 | 0.208 | 1.044 | 0.213 | | | 09:48:01 | Yes |
| 2 | 14.39 | 14.39 | 0.213 | 1.045 | 0.218 | | | 09:48:36 | Yes |
| 3 | 14.16 | 14.16 | 0.210 | 1.043 | 0.214 | | | 09:49:10 | Yes |
| Mean: | 14.19 | 14.19 | 0.210 | | | | | | |
| SD: | 0.179 | 0.179 | 0.0027 | | | | | | |
| %RSD: | 1.260 | 1.260 | 1.26 | | | | | | |

Sequence No.: 25
Sample ID: K0711481-008
Analyst:

Autosampler Location: 20
Date Collected: 1/7/2008 9:49:59 AM
Data Type: Original

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Replicate Data: K0711481-008

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15.86 | 15.86 | 0.235 | 1.156 | 0.240 | | | 09:50:21 | Yes |
| 2 | 15.64 | 15.64 | 0.232 | 1.120 | 0.236 | | | 09:50:55 | Yes |
| 3 | 15.56 | 15.56 | 0.231 | 1.150 | 0.235 | | | 09:51:29 | Yes |
| Mean: | 15.68 | 15.68 | 0.233 | | | | | | |
| SD: | 0.156 | 0.156 | 0.0023 | | | | | | |
| %RSD: | 0.991 | 0.991 | 0.99 | | | | | | |

Sequence No.: 26
Sample ID: K0711481-009
Analyst:

Autosampler Location: 21
Date Collected: 1/7/2008 9:52:53 AM
Data Type: Original

Replicate Data: K0711481-009

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.123 | 7.123 | 0.106 | 0.527 | 0.110 | | | 09:53:15 | Yes |
| 2 | 6.946 | 6.946 | 0.103 | 0.515 | 0.108 | | | 09:53:49 | Yes |
| 3 | 7.085 | 7.085 | 0.105 | 0.517 | 0.110 | | | 09:54:24 | Yes |
| Mean: | 7.051 | 7.051 | 0.105 | | | | | | |
| SD: | 0.093 | 0.093 | 0.0014 | | | | | | |

%RSD: 1.321   1.321   1.32

---

Sequence No.: 27
Sample ID: K0711481-010
Analyst:

Autosampler Location: 22
Date Collected: 1/7/2008 9:55:13 AM
Data Type: Original

Replicate Data: K0711481-010

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.900 | 9.900 | 0.147 | 0.745 | 0.151 | | | 09:55:35 | Yes |
| 2 | 9.902 | 9.902 | 0.147 | 0.738 | 0.151 | | | 09:56:09 | Yes |
| 3 | 9.905 | 9.905 | 0.147 | 0.729 | 0.151 | | | 09:56:44 | Yes |
| Mean: | 9.902 | 9.902 | 0.147 | | | | | | |
| SD: | 0.002 | 0.002 | 0.0000 | | | | | | |
| %RSD: | 0.024 | 0.024 | 0.02 | | | | | | |

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Sequence No.: 28
Sample ID: K0711481-011
Analyst:

A 1/7/08

Autosampler Location: 23
Date Collected: 1/7/2008 9:57:34 AM
Data Type: Original

Replicate Data: K0711481-011

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 18.79 | 18.79 | 0.279 | 1.373 | 0.283 | | | 09:57:55 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 18.38 | 18.38 | 0.273 | 1.371 | 0.277 | | | 09:58:30 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 18.52 | 18.52 | 0.275 | 1.355 | 0.279 | | | 09:59:04 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 18.57 | 18.57 | 0.275 | | | | | | |
| SD: | 0.210 | 0.210 | 0.0031 | | | | | | |
| %RSD: | 1.130 | 1.130 | 1.13 | | | | | | |

Sample concentration is greater than that of the highest standard.

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Sequence No.: 29
Sample ID: K0711481-012
Analyst:

Autosampler Location: 24
Date Collected: 1/7/2008 10:00:28 AM
Data Type: Original

Replicate Data: K0711481-012

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.05 | 14.05 | 0.208 | 1.044 | 0.213 | | | 10:00:50 | Yes |
| 2 | 13.76 | 13.76 | 0.204 | 1.021 | 0.209 | | | 10:01:24 | Yes |
| 3 | 13.91 | 13.91 | 0.206 | 1.021 | 0.211 | | | 10:01:58 | Yes |
| Mean: | 13.90 | 13.90 | 0.206 | | | | | | |
| SD: | 0.143 | 0.143 | 0.0021 | | | | | | |
| %RSD: | 1.032 | 1.032 | 1.03 | | | | | | |

---

Sequence No.: 30
Sample ID: K0711481-013
Analyst:

Autosampler Location: 25
Date Collected: 1/7/2008 10:02:48 AM
Data Type: Original

Replicate Data: K0711481-013

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.166 | 7.166 | 0.106 | 0.515 | 0.111 | | | 10:03:12 | Yes |
| 2 | 7.162 | 7.162 | 0.106 | 0.519 | 0.111 | | | 10:03:47 | Yes |
| 3 | 7.253 | 7.253 | 0.108 | 0.527 | 0.112 | | | 10:04:21 | Yes |
| Mean: | 7.194 | 7.194 | 0.107 | | | | | | |

| | | | |
|---|---|---|---|
| SD: | 0.051 | 0.051 | 0.0008 |
| %RSD: | 0.712 | 0.712 | 0.71 |

Sequence No.: 31 Autosampler Location: 26
Sample ID: K0711481-014 Date Collected: 1/7/2008 10:05:12 AM
Analyst: Data Type: Original

Replicate Data: K0711481-014

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 19.21 | 19.21 | 0.285 | 1.441 | 0.289 | | | 10:05:34 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 19.48 | 19.48 | 0.289 | 1.434 | 0.293 | | | 10:06:08 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 18.97 | 18.97 | 0.281 | 1.420 | 0.286 | | | 10:06:42 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 19.22 | 19.22 | 0.285 | | | | | | |
| SD: | 0.253 | 0.253 | 0.0037 | | | | | | |
| %RSD: | 1.315 | 1.315 | 1.32 | | | | | | |

Sample concentration is greater than that of the highest standard.

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Sequence No.: 32 Autosampler Location: 27
Sample ID: K0711481-015 Date Collected: 1/7/2008 10:08:06 AM
Analyst: Data Type: Original

Replicate Data: K0711481-015

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.646 | 5.646 | 0.084 | 0.406 | 0.088 | | | 10:08:29 | Yes |
| 2 | 5.570 | 5.570 | 0.083 | 0.412 | 0.087 | | | 10:09:04 | Yes |
| 3 | 15.77 | 15.77 | 0.234 | 2.499 | 0.238 | | | 10:09:38 | Yes |
| Mean: | 8.995 | 8.995 | 0.133 | | | | | | |
| SD: | 5.866 | 5.866 | 0.0870 | | | | | | |
| %RSD: | 65.22 | 65.22 | 65.22 | | | | | | |

Sequence No.: 33 Autosampler Location: 28
Sample ID: K0711481-016 Date Collected: 1/7/2008 10:10:29 AM
Analyst: Data Type: Original

Replicate Data: K0711481-016

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 16.55 | 16.55 | 0.245 | 1.196 | 0.250 | | | 10:10:52 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 18.24 | 18.24 | 0.270 | 1.312 | 0.275 | | | 10:11:26 | Yes |
| Changing BOC | | | | | | | | | |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 18.69 | 18.69 | 0.277 | 1.390 | 0.282 | | | 10:12:00 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 17.83 | 17.83 | 0.264 | | | | | | |
| SD: | 1.128 | 1.128 | 0.0167 | | | | | | |
| %RSD: | 6.327 | 6.327 | 6.33 | | | | | | |

Changing BOC
Sample concentration is greater than that of the highest standard.

Sequence No.: 34 Autosampler Location: 5
Sample ID: CCV Date Collected: 1/7/2008 10:13:26 AM
Analyst: Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.07 | 10.07 | 0.149 | 0.759 | 0.154 | | | 10:13:49 | Yes |
| 2 | 10.06 | 10.06 | 0.149 | 0.722 | 0.154 | | | 10:14:23 | Yes |
| 3 | 9.994 | 9.994 | 0.148 | 0.678 | 0.153 | | | 10:14:58 | Yes |
| Mean: | 10.04 | 10.04 | 0.149 | | | | | | |
| SD: | 0.040 | 0.040 | 0.0006 | | | | | | |
| %RSD: | 0.396 | 0.396 | 0.40 | | | | | | |

QC value within limits for Se 196.03 Recovery = 100.39%
All analyte(s) passed QC.

Sequence No.: 35
Sample ID: CCB
Analyst:
Autosampler Location: 1
Date Collected: 1/7/2008 10:15:51 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.089 | 0.089 | 0.001 | 0.015 | 0.006 | | | 10:16:12 | Yes |
| 2 | -0.005 | -0.005 | -0.000 | 0.017 | 0.004 | | | 10:16:47 | Yes |
| 3 | -0.078 | -0.078 | -0.001 | -0.001 | 0.003 | | | 10:17:23 | Yes |
| Mean: | 0.002 | 0.002 | 0.000 | | | | | | |
| SD: | 0.084 | 0.084 | 0.0012 | | | | | | |
| %RSD: | >999.9% | >999.9% | >999.9% | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 36
Sample ID: K0711481-017
Analyst:
Autosampler Location: 29
Date Collected: 1/7/2008 10:18:13 AM
Data Type: Original

Replicate Data: K0711481-017

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.714 | 9.714 | 0.144 | 0.715 | 0.149 | | | 10:18:37 | Yes |
| 2 | 9.637 | 9.637 | 0.143 | 0.713 | 0.147 | | | 10:19:12 | Yes |
| 3 | 9.564 | 9.564 | 0.142 | 0.701 | 0.146 | | | 10:19:47 | Yes |
| Mean: | 9.638 | 9.638 | 0.143 | | | | | | |
| SD: | 0.075 | 0.075 | 0.0011 | | | | | | |
| %RSD: | 0.778 | 0.778 | 0.78 | | | | | | |

Sequence No.: 37
Sample ID: K0711481-018
Analyst:
Autosampler Location: 30
Date Collected: 1/7/2008 10:20:40 AM
Data Type: Original

Replicate Data: K0711481-018

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.62 | 13.62 | 0.202 | 0.987 | 0.207 | | | 10:21:04 | Yes |
| 2 | 13.50 | 13.50 | 0.200 | 0.997 | 0.205 | | | 10:21:38 | Yes |
| 3 | 13.96 | 13.96 | 0.207 | 0.992 | 0.212 | | | 10:22:12 | Yes |
| Mean: | 13.69 | 13.69 | 0.203 | | | | | | |
| SD: | 0.237 | 0.237 | 0.0035 | | | | | | |
| %RSD: | 1.733 | 1.733 | 1.73 | | | | | | |

Sequence No.: 38
Sample ID: K0711481-019
Analyst:
Autosampler Location: 31
Date Collected: 1/7/2008 10:23:05 AM
Data Type: Original

Replicate Data: K0711481-019

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 16.40 | 16.40 | 0.243 | 1.219 | 0.248 | | | 10:23:29 | Yes |
| 2 | 16.44 | 16.44 | 0.244 | 1.209 | 0.248 | | | 10:24:04 | Yes |
| 3 | 16.42 | 16.42 | 0.243 | 1.198 | 0.248 | | | 10:24:38 | Yes |
| Mean: | 16.42 | 16.42 | 0.244 | | | | | | |
| SD: | 0.019 | 0.019 | 0.0003 | | | | | | |
| %RSD: | 0.116 | 0.116 | 0.12 | | | | | | |

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Sequence No.: 39
Sample ID: K0711481-020
Analyst:
Autosampler Location: 32
Date Collected: 1/7/2008 10:26:05 AM
Data Type: Original

Replicate Data: K0711481-020

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.247 | 9.247 | 0.137 | 0.669 | 0.142 | | | 10:26:26 | Yes |
| 2 | 9.192 | 9.192 | 0.136 | 0.643 | 0.141 | | | 10:27:00 | Yes |
| 3 | 9.120 | 9.120 | 0.135 | 0.656 | 0.140 | | | 10:27:35 | Yes |
| Mean: | 9.186 | 9.186 | 0.136 | | | | | | |
| SD: | 0.063 | 0.063 | 0.0009 | | | | | | |
| %RSD: | 0.690 | 0.690 | 0.69 | | | | | | |

Sequence No.: 40
Sample ID: K0711481-001A
Analyst:
Autosampler Location: 33
Date Collected: 1/7/2008 10:28:23 AM
Data Type: Original

Replicate Data: K0711481-001A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.80 | 12.80 | 0.190 | 0.966 | 0.194 | | | 10:28:43 | Yes |
| 2 | 12.78 | 12.78 | 0.189 | 0.914 | 0.194 | | | 10:29:18 | Yes |
| 3 | 12.83 | 12.83 | 0.190 | 1.150 | 0.195 | | | 10:29:53 | Yes |
| Mean: | 12.80 | 12.80 | 0.190 | | | | | | |
| SD: | 0.025 | 0.025 | 0.0004 | | | | | | |
| %RSD: | 0.196 | 0.196 | 0.20 | | | | | | |

Sequence No.: 41
Sample ID: CCV
Analyst:
Autosampler Location: 5
Date Collected: 1/7/2008 10:30:42 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.18 | 10.18 | 0.151 | 0.742 | 0.155 | | | 10:31:05 | Yes |
| 2 | 10.35 | 10.35 | 0.154 | 0.775 | 0.158 | | | 10:31:40 | Yes |
| 3 | 10.10 | 10.10 | 0.150 | 0.687 | 0.154 | | | 10:32:14 | Yes |
| Mean: | 10.21 | 10.21 | 0.151 | | | | | | |
| SD: | 0.129 | 0.129 | 0.0019 | | | | | | |
| %RSD: | 1.260 | 1.260 | 1.26 | | | | | | |

QC value within limits for Se 196.03 Recovery = 102.11%
All analyte(s) passed QC.

Sequence No.: 42
Sample ID: CCB
Analyst:
Autosampler Location: 1
Date Collected: 1/7/2008 10:33:06 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.043 | 0.043 | 0.001 | 0.021 | 0.005 | | | 10:33:29 | Yes |
| 2 | -0.038 | -0.038 | -0.001 | 0.020 | 0.004 | | | 10:34:03 | Yes |
| 3 | -0.024 | -0.024 | -0.000 | 0.010 | 0.004 | | | 10:34:38 | Yes |
| Mean: | -0.006 | -0.006 | -0.000 | | | | | | |
| SD: | 0.044 | 0.044 | 0.0006 | | | | | | |
| %RSD: | 691.3 | 691.3 | 691.29 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

==========

**Analysis Begun**

**Logged In Analyst: ACQMET10** **Technique: AA FIAS-Flame**
**Spectrometer Model: AAnalyst 200, S/N 200S5061701** **Autosampler Model: AS-90**

**Sample Information File: C:\data-AA\ACQMET10\Sample Information\010708-Se.sif**
**Batch ID: 010708-Se**
**Results Data Set: 010708-Se**
**Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb**

==========

**Sequence No.: 43** **Autosampler Location:**
**Sample ID: LCSS DOLT** **Date Collected: 1/7/2008 10:35:50 AM**
**Analyst:** **Data Type: Original**

1/7/08

Replicate Data: LCSS DOLT

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.131 | 4.131 | 0.061 | 0.331 | 0.066 | | | 10:36:06 | Yes |
| 2 | 4.242 | 4.242 | 0.063 | 0.306 | 0.067 | | | 10:36:41 | Yes |
| 3 | 4.108 | 4.108 | 0.061 | 0.320 | 0.065 | | | 10:37:15 | Yes |
| Mean: | 4.160 | 4.160 | 0.062 | | | | | | |
| SD: | 0.072 | 0.072 | 0.0011 | | | | | | |
| %RSD: | 1.732 | 1.732 | 1.73 | | | | | | |

==========

**Sequence No.: 44** **Autosampler Location:**
**Sample ID: K0711481-003 1/10** **Date Collected: 1/7/2008 10:38:15 AM**
**Analyst:** **Data Type: Original**

Replicate Data: K0711481-003 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.95 | 10.95 | 0.162 | 0.784 | 0.167 | | | 10:38:31 | Yes |
| 2 | 10.69 | 10.69 | 0.158 | 0.768 | 0.163 | | | 10:39:06 | Yes |
| 3 | 10.59 | 10.59 | 0.157 | 0.767 | 0.162 | | | 10:39:40 | Yes |
| Mean: | 10.74 | 10.74 | 0.159 | | | | | | |
| SD: | 0.187 | 0.187 | 0.0028 | | | | | | |
| %RSD: | 1.738 | 1.738 | 1.74 | | | | | | |

==========

**Sequence No.: 45** **Autosampler Location:**
**Sample ID: K0711481-006 1/10** **Date Collected: 1/7/2008 10:40:37 AM**
**Analyst:** **Data Type: Original**

Replicate Data: K0711481-006 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.48 | 10.48 | 0.155 | 0.748 | 0.160 | | | 10:40:53 | Yes |
| 2 | 10.26 | 10.26 | 0.152 | 0.742 | 0.157 | | | 10:41:28 | Yes |
| 3 | 10.31 | 10.31 | 0.153 | 0.735 | 0.157 | | | 10:42:03 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 10.35 | 10.35 | 0.153 |
| SD: | 0.115 | 0.115 | 0.0017 |
| %RSD: | 1.116 | 1.116 | 1.12 |

**Sequence No.: 46** **Autosampler Location:**
**Sample ID: K0711481-008 1/10** **Date Collected: 1/7/2008 10:43:09 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-008 1/10**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.806 | 9.806 | 0.145 | 0.750 | 0.150 | | | 10:43:28 | Yes |
| 2 | 10.83 | 10.83 | 0.161 | 0.733 | 0.165 | | | 10:44:02 | Yes |
| 3 | 10.15 | 10.15 | 0.150 | 0.733 | 0.155 | | | 10:44:37 | Yes |
| Mean: | 10.26 | 10.26 | 0.152 | | | | | | |
| SD: | 0.522 | 0.522 | 0.0077 | | | | | | |
| %RSD: | 5.086 | 5.086 | 5.09 | | | | | | |

**Sequence No.: 47** **Autosampler Location:**
**Sample ID: K0711481-0011 1/10** **Date Collected: 1/7/2008 10:45:38 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-0011 1/10**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.53 | 12.53 | 0.186 | 0.889 | 0.190 | | | 10:45:54 | Yes |
| 2 | 12.07 | 12.07 | 0.179 | 0.801 | 0.184 | | | 10:46:28 | Yes |
| 3 | 12.33 | 12.33 | 0.183 | 0.876 | 0.187 | | | 10:47:02 | Yes |
| Mean: | 12.31 | 12.31 | 0.183 | | | | | | |
| SD: | 0.228 | 0.228 | 0.0034 | | | | | | |
| %RSD: | 1.856 | 1.856 | 1.86 | | | | | | |

**Sequence No.: 48** **Autosampler Location:**
**Sample ID: K0711481-014 1/10** **Date Collected: 1/7/2008 10:48:03 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-014 1/10**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.69 | 12.69 | 0.188 | 0.926 | 0.193 | | | 10:48:20 | Yes |
| 2 | 13.03 | 13.03 | 0.193 | 0.928 | 0.198 | | | 10:48:55 | Yes |
| 3 | 12.52 | 12.52 | 0.186 | 0.903 | 0.190 | | | 10:49:29 | Yes |
| Mean: | 12.75 | 12.75 | 0.189 | | | | | | |
| SD: | 0.263 | 0.263 | 0.0039 | | | | | | |
| %RSD: | 2.064 | 2.064 | 2.06 | | | | | | |

**Sequence No.: 49** **Autosampler Location:**
**Sample ID: K0711481-015 1/5** **Date Collected: 1/7/2008 10:50:26 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-015 1/5**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.414 | 6.414 | 0.095 | 0.485 | 0.100 | | | 10:50:42 | Yes |
| 2 | 6.389 | 6.389 | 0.095 | 0.476 | 0.099 | | | 10:51:17 | Yes |
| 3 | 6.436 | 6.436 | 0.095 | 0.468 | 0.100 | | | 10:51:52 | Yes |
| Mean: | 6.413 | 6.413 | 0.095 | | | | | | |
| SD: | 0.024 | 0.024 | 0.0004 | | | | | | |
| %RSD: | 0.369 | 0.369 | 0.37 | | | | | | |

Sequence No.: 50
Sample ID: K0711481-016 1/10
Analyst:

Autosampler Location:
Date Collected: 1/7/2008 10:53:00 AM
Data Type: Original

Replicate Data: K0711481-016 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.716 | 9.716 | 0.144 | 0.711 | 0.149 | | | 10:53:16 | Yes |
| 2 | 9.886 | 9.886 | 0.147 | 0.710 | 0.151 | | | 10:53:51 | Yes |
| 3 | 9.693 | 9.693 | 0.144 | 0.693 | 0.148 | | | 10:54:25 | Yes |
| Mean: | 9.765 | 9.765 | 0.145 | | | | | | |
| SD: | 0.105 | 0.105 | 0.0016 | | | | | | |
| %RSD: | 1.079 | 1.079 | 1.08 | | | | | | |

Sequence No.: 51
Sample ID: K0711481-019 1/10
Analyst:

Autosampler Location:
Date Collected: 1/7/2008 10:55:25 AM
Data Type: Original

Replicate Data: K0711481-019 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.911 | 8.911 | 0.132 | 0.647 | 0.137 | | | 10:55:42 | Yes |
| 2 | 8.667 | 8.667 | 0.129 | 0.615 | 0.133 | | | 10:56:17 | Yes |
| 3 | 8.723 | 8.723 | 0.129 | 0.621 | 0.134 | | | 10:56:51 | Yes |
| Mean: | 8.767 | 8.767 | 0.130 | | | | | | |
| SD: | 0.128 | 0.128 | 0.0019 | | | | | | |
| %RSD: | 1.461 | 1.461 | 1.46 | | | | | | |

Sequence No.: 52
Sample ID: LCSS DOLT
Analyst:

Autosampler Location:
Date Collected: 1/7/2008 10:58:20 AM
Data Type: Original

Replicate Data: LCSS DOLT

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.040 | 2.040 | 0.030 | 0.174 | 0.035 | | | 10:58:36 | Yes |
| 2 | 1.954 | 1.954 | 0.029 | 0.144 | 0.034 | | | 10:59:11 | Yes |
| 3 | 2.048 | 2.048 | 0.030 | 0.152 | 0.035 | | | 10:59:45 | Yes |
| Mean: | 2.014 | 2.014 | 0.030 | | | | | | |
| SD: | 0.052 | 0.052 | 0.0008 | | | | | | |
| %RSD: | 2.601 | 2.601 | 2.60 | | | | | | |

Sequence No.: 53
Sample ID: CCV
Analyst:

Autosampler Location:
Date Collected: 1/7/2008 11:00:45 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.961 | 9.961 | 0.148 | 0.732 | 0.152 | | | 11:01:01 | Yes |
| 2 | 10.01 | 10.01 | 0.148 | 0.730 | 0.153 | | | 11:01:36 | Yes |
| 3 | 10.04 | 10.04 | 0.149 | 0.724 | 0.153 | | | 11:02:10 | Yes |
| Mean: | 10.00 | 10.00 | 0.148 | | | | | | |
| SD: | 0.038 | 0.038 | 0.0006 | | | | | | |
| %RSD: | 0.382 | 0.382 | 0.38 | | | | | | |

Sequence No.: 54

Autosampler Location:

Sample ID: CCB
Analyst:

Date Collected: 1/7/2008 11:03:05 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.026 | 0.026 | 0.000 | 0.018 | 0.005 | | | 11:03:21 | Yes |
| 2 | -0.053 | -0.053 | -0.001 | 0.014 | 0.004 | | | 11:03:56 | Yes |
| 3 | -0.014 | -0.014 | -0.000 | 0.017 | 0.004 | | | 11:04:30 | Yes |
| Mean: | -0.014 | -0.014 | -0.000 | | | | | | |
| SD: | 0.040 | 0.040 | 0.0006 | | | | | | |
| %RSD: | 286.7 | 286.7 | 286.74 | | | | | | |

Sequence No.: 55
Sample ID: ~~LCSS~~ DOLT 1/10
Analyst:

Autosampler Location:
Date Collected: 1/7/2008 11:05:29 AM
Data Type: Original

1/7/08

Replicate Data: LCSS DOLT 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.971 | 2.971 | 0.044 | 0.247 | 0.049 | | | 11:05:45 | Yes |
| 2 | 2.881 | 2.881 | 0.043 | 0.218 | 0.047 | | | 11:06:19 | Yes |
| 3 | 3.028 | 3.028 | 0.045 | 0.239 | 0.049 | | | 11:06:53 | Yes |
| Mean: | 2.960 | 2.960 | 0.044 | | | | | | |
| SD: | 0.074 | 0.074 | 0.0011 | | | | | | |
| %RSD: | 2.503 | 2.503 | 2.50 | | | | | | |

Element Analyzed Se Hydride Instrument K-FLAA-2

Service Request # K11481

Batch QC SR's #

Calibration Std. AA1-8-A

Starlims # 104630

Run # 012108-Se

# Hydride Data Review Form

| | | Yes | No | NA |
|---|---|---|---|---|
| 1 | ICV within 10% of true Value | X | | |
| 2. | Calibration data included | X | | |
| 3. | CCV's in control | X | | |
| 4. | CCB's and/or ICB's below MRL | X | | |
| 5. | All reported Results within Cal. Range | X | | |
| 6. | All Calculations are Correct | X | | |

Comments

Primary Reviewed by d Date 1/21/08

Secondary Reviewed by JDB Date 1/21/08

COLUMBIA ANALYTICAL SERVICES, INC.
GFAA Run Log

| **Method:** (Circle Method Used) 7742 7062 Other:______ Element: As Se ______ | **Service Request # :** |
|---|---|

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ICV | - | 9.466 | 95% | |
| ICB | - | 0.171 | | |
| CRA | - | 0.638 | 128% | |
| CCV | - | 9.609 | 96% | |
| CCB | - | 0.072 | | |
| K0711481-MB | 1/2 | -0.079 | | |
| LCSS DOLT | 1/2+1/10 | 3.393 | 96% | |
| K0711481-021 | 1/2+1/5 | 11.708 | | |
| K0711481-021D | 1/2+1/5 | 11.880 | | |
| K0711481-021S | 1/2+1/20 | 9.848 | 111% | A 1/21/08 |
| ~~K0711481-022~~ | ~~1/2+1/5~~ | ~~17.901~~ | | Rerun |
| K0711481-023 | 1/2+1/5 | 8.439 | | |
| K0711481-024 | 1/2+1/5 | 5.894 | | |
| K0711481-025 | 1/2+1/5 | 7.036 | | |
| K0711481-026 | 1/2+1/5 | 6.022 | | |
| CCV | - | 9.613 | 96% | |
| CCB | - | 0.107 | | |
| K0711481-027 | 1/2+1/5 | 6.511 | | |
| K0711481-028 | 1/2+1/5 | 7.509 | | |
| K0711481-029 | 1/2+1/5 | 5.800 | | |
| K0711481-030 | 1/2+1/5 | 5.329 | | |
| K0711481-031 | 1/2+1/5 | 7.542 | | |
| K0711481-032 | 1/2+1/5 | 9.471 | | |
| K0711481-033 | 1/2+1/5 | 5.860 | | |
| K0711481-034 | 1/2+1/5 | 10.014 | | |
| ~~K0711481-035~~ | ~~1/2+1/5~~ | ~~20.014~~ | | Rerun A 1/21/08 |
| K0711481-036 | 1/2+1/5 | 12.483 | | |
| CCV | - | 9.709 | 97% | |
| CCB | - | 0.181 | | |
| ~~K0711481-037~~ | ~~1/2+1/5~~ | ~~31.523~~ | | Rerun |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| Jena Jurk | 1/21/08 | 1 |



R:\ICP\MISC\HG1631\1631 Run Log

**COLUMBIA ANALYTICAL SERVICES, INC.**
**GFAA Run Log**

| | |
|---|---|
| **Method:** (Circle Method Used)<br>7742 7062<br>Other:____________<br>Element: As Se ____ | **Service Request # :** |

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ~~K0711481-038~~ | ~~1/2+1/5~~ | ~~29.518~~ | | 1/21/08 Rerun |
| K0711481-021A | 1/2+1/5 | 14.801 | 103% | Post Spike = 3 ppb |
| CCV | - | 9.845 | 98% | |
| CCB | - | 0.211 | | |
| K0711481-022 1/10 | 1/2+1/10 | 10.281 | | |
| K0711481-035 1/10 | 1/2+1/10 | 11.565 | | |
| K0711481-037 1/20 | 1/2+1/20 | 11.181 | | |
| K0711481-038 1/20 | 1/2+1/20 | 10.351 | | |
| CCV | - | 9.683 | 97% | |
| CCB | - | 0.151 | | |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| [signature] | 1/21/08 | 2 |



R:\ICP\MISC\HG1631\1631 Run Log

==========================================================================================

Analysis Begun

Logged In Analyst: ACQMET10                                  Technique: AA FIAS-Flame
Spectrometer Model: AAnalyst 200, S/N 200S5061701 Autosampler Model: AS-90

Sample Information File: C:\data-AA\ACQMET10\Sample Information\012108-Se.sif
Batch ID: 012108-Se
Results Data Set: 012108-Se
Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb

==========================================================================================

Sequence No.: 1                                  Autosampler Location: 1
Sample ID: Cal Blk                                  Date Collected: 1/21/2008 9:44:01 AM
Analyst:                                  Data Type: Original

------------------------------------------------------------------------------------------

Replicate Data: Cal Blk

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.00] | 0.005 | 0.023 | 0.005 | | | 09:44:22 | Yes |
| 2 | | [0.00] | 0.005 | 0.021 | 0.005 | | | 09:44:57 | Yes |
| 3 | | [0.00] | 0.005 | 0.022 | 0.005 | | | 09:45:31 | Yes |
| Mean: | | [0.00] | 0.005 | | | | | | |
| SD: | | 0.00 | 0.0003 | | | | | | |
| %RSD: | | 0.00 | 4.95 | | | | | | |

Auto-zero performed.

==========================================================================================

Sequence No.: 2                                  Autosampler Location: 2
Sample ID: Std 0.5                                  Date Collected: 1/21/2008 9:46:24 AM
Analyst:                                  Data Type: Original

------------------------------------------------------------------------------------------

Replicate Data: Std 0.5

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.5] | 0.008 | 0.047 | 0.013 | | | 09:46:45 | Yes |
| 2 | | [0.5] | 0.008 | 0.059 | 0.013 | | | 09:47:20 | Yes |
| 3 | | [0.5] | 0.008 | 0.059 | 0.013 | | | 09:47:54 | Yes |
| Mean: | | [0.5] | 0.008 | | | | | | |
| SD: | | 0.0 | 0.0002 | | | | | | |
| %RSD: | | 0.0 | 2.63 | | | | | | |

Standard number 1 applied. [0.5]
Correlation Coef.: 1.000000    Slope: 0.01558    Intercept: 0.00000

==========================================================================================

Sequence No.: 3                                  Autosampler Location: 3
Sample ID: Std 1.0                                  Date Collected: 1/21/2008 9:48:44 AM
Analyst:                                  Data Type: Original

------------------------------------------------------------------------------------------

Replicate Data: Std 1.0

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [1.0] | 0.014 | 0.103 | 0.019 | | | 09:49:06 | Yes |
| 2 | | [1.0] | 0.013 | 0.088 | 0.018 | | | 09:49:40 | Yes |
| 3 | | [1.0] | 0.013 | 0.083 | 0.018 | | | 09:50:14 | Yes |
| Mean: | | [1.0] | 0.014 | | | | | | |
| SD: | | 0.0 | 0.0004 | | | | | | |
| %RSD: | | 0.0 | 2.64 | | | | | | |

Standard number 2 applied. [1.0]
Correlation Coef.: 0.982398    Slope: 0.01398    Intercept: 0.00000

==========================================================================================

Sequence No.: 4                                  Autosampler Location: 4

**Sample ID: Std 5.0** **Date Collected: 1/21/2008 9:51:04 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 5.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [5.0] | 0.062 | 0.352 | 0.067 | | | 09:51:26 | Yes |
| 2 | | [5.0] | 0.062 | 0.331 | 0.067 | | | 09:52:04 | Yes |
| 3 | | [5.0] | 0.064 | 0.360 | 0.069 | | | 09:52:38 | Yes |
| Mean: | | [5.0] | 0.062 | | | | | | |
| SD: | | 0.0 | 0.0016 | | | | | | |
| %RSD: | | 0.0 | 2.60 | | | | | | |

Standard number 3 applied. [5.0]
Correlation Coef.: 0.999135 Slope: 0.01257 Intercept: 0.00000

**Sequence No.: 5** **Autosampler Location: 5**
**Sample ID: Std 10.0** **Date Collected: 1/21/2008 9:53:29 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 10.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [10.0] | 0.147 | 0.936 | 0.152 | | | 09:53:52 | Yes |
| 2 | | [10.0] | 0.123 | 0.657 | 0.128 | | | 09:54:25 | Yes |
| 3 | | [10.0] | 0.124 | 0.676 | 0.129 | | | 09:55:00 | Yes |
| Mean: | | [10.0] | 0.132 | | | | | | |
| SD: | | 0.0 | 0.0137 | | | | | | |
| %RSD: | | 0.0 | 10.43 | | | | | | |

Standard number 4 applied. [10.0]
Correlation Coef.: 0.999467 Slope: 0.01304 Intercept: 0.00000

**Sequence No.: 6** **Autosampler Location: 6**
**Sample ID: Std 15.0** **Date Collected: 1/21/2008 9:55:51 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 15.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [15.0] | 0.206 | 1.094 | 0.211 | | | 09:56:14 | Yes |
| 2 | | [15.0] | 0.200 | 1.039 | 0.205 | | | 09:56:48 | Yes |
| 3 | | [15.0] | 0.199 | 1.037 | 0.204 | | | 09:57:23 | Yes |
| Mean: | | [15.0] | 0.202 | | | | | | |
| SD: | | 0.0 | 0.0041 | | | | | | |
| %RSD: | | 0.0 | 2.04 | | | | | | |

Standard number 5 applied. [15.0]
Correlation Coef.: 0.999548 Slope: 0.01330 Intercept: 0.00000
The calibration curve may not be linear.

**Calibration data for Se 196.03** **Equation: Linear Through Zero**

| ID | Mean Signal (Abs) | Entered Conc. ug/L | Calculated Conc. ug/L | Standard Deviation | %RSD |
|---|---|---|---|---|---|
| Cal Blk | 0.0000 | 0 | 0.000 | 0.00 | 4.9 |
| Std 0.5 | 0.0078 | 0.5 | 0.586 | 0.00 | 2.6 |
| Std 1.0 | 0.0135 | 1.0 | 1.017 | 0.00 | 2.6 |
| Std 5.0 | 0.0625 | 5.0 | 4.697 | 0.00 | 2.6 |
| Std 10.0 | 0.1315 | 10.0 | 9.889 | 0.01 | 10.4 |
| Std 15.0 | 0.2016 | 15.0 | 15.162 | 0.00 | 2.0 |

Correlation Coef.: 0.999548 Slope: 0.01330 Intercept: 0.00000

Sequence No.: 7
Sample ID: ICV
Analyst:

Autosampler Location: 7
Date Collected: 1/21/2008 9:58:14 AM
Data Type: Original

Replicate Data: ICV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.637 | 9.637 | 0.128 | 0.714 | 0.133 | | | 09:58:38 | Yes |
| 2 | 9.305 | 9.305 | 0.124 | 0.664 | 0.129 | | | 09:59:13 | Yes |
| 3 | 9.457 | 9.457 | 0.126 | 0.676 | 0.131 | | | 09:59:47 | Yes |
| Mean: | 9.466 | 9.466 | 0.126 | | | | | | |
| SD: | 0.166 | 0.166 | 0.0022 | | | | | | |
| %RSD: | 1.757 | 1.757 | 1.76 | | | | | | |

QC value within limits for Se 196.03 Recovery = 94.66%
All analyte(s) passed QC.

Sequence No.: 8
Sample ID: ICB
Analyst:

Autosampler Location: 1
Date Collected: 1/21/2008 10:00:39 AM
Data Type: Original

Replicate Data: ICB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.210 | 0.210 | 0.003 | 0.028 | 0.008 | | | 10:01:00 | Yes |
| 2 | 0.203 | 0.203 | 0.003 | 0.025 | 0.008 | | | 10:01:36 | Yes |
| 3 | 0.099 | 0.099 | 0.001 | 0.026 | 0.006 | | | 10:02:11 | Yes |
| Mean: | 0.171 | 0.171 | 0.002 | | | | | | |
| SD: | 0.062 | 0.062 | 0.0008 | | | | | | |
| %RSD: | 36.37 | 36.37 | 36.37 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 9
Sample ID: CRA
Analyst:

Autosampler Location: 2
Date Collected: 1/21/2008 10:03:00 AM
Data Type: Original

Replicate Data: CRA

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.628 | 0.628 | 0.008 | 0.060 | 0.013 | | | 10:03:22 | Yes |
| 2 | 0.590 | 0.590 | 0.008 | 0.054 | 0.013 | | | 10:03:56 | Yes |
| 3 | 0.696 | 0.696 | 0.009 | 0.063 | 0.014 | | | 10:04:30 | Yes |
| Mean: | 0.638 | 0.638 | 0.008 | | | | | | |
| SD: | 0.054 | 0.054 | 0.0007 | | | | | | |
| %RSD: | 8.423 | 8.423 | 8.42 | | | | | | |

QC value within limits for Se 196.03 Recovery = 127.67%
All analyte(s) passed QC.

Sequence No.: 10
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 1/21/2008 10:05:19 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.838 | 9.838 | 0.131 | 0.721 | 0.136 | | | 10:05:42 | Yes |
| 2 | 9.571 | 9.571 | 0.127 | 0.672 | 0.132 | | | 10:06:16 | Yes |
| 3 | 9.417 | 9.417 | 0.125 | 0.690 | 0.130 | | | 10:06:51 | Yes |
| Mean: | 9.609 | 9.609 | 0.128 | | | | | | |

| | | | |
|---|---|---|---|
| SD: | 0.213 | 0.213 | 0.0028 |
| %RSD: | 2.220 | 2.220 | 2.22 |

QC value within limits for Se 196.03 Recovery = 96.09%
All analyte(s) passed QC.

=====

**Sequence No.: 11** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 1/21/2008 10:07:41 AM**
**Analyst:** **Data Type: Original**

-----

**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.227 | 0.227 | 0.003 | 0.033 | 0.008 | | | 10:08:02 | Yes |
| 2 | -0.010 | -0.010 | -0.000 | -0.002 | 0.005 | | | 10:08:37 | Yes |
| 3 | 0.001 | 0.001 | 0.000 | 0.005 | 0.005 | | | 10:09:11 | Yes |
| Mean: | 0.072 | 0.072 | 0.001 | | | | | | |
| SD: | 0.134 | 0.134 | 0.0018 | | | | | | |
| %RSD: | 184.7 | 184.7 | 184.70 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

=====

**Sequence No.: 12** **Autosampler Location: 9**
**Sample ID: K0711481-MB** **Date Collected: 1/21/2008 10:10:00 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0711481-MB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.085 | -0.085 | -0.001 | 0.013 | 0.004 | | | 10:10:21 | Yes |
| 2 | -0.030 | -0.030 | -0.000 | 0.017 | 0.005 | | | 10:10:55 | Yes |
| 3 | -0.122 | -0.122 | -0.002 | 0.008 | 0.003 | | | 10:11:29 | Yes |
| Mean: | -0.079 | -0.079 | -0.001 | | | | | | |
| SD: | 0.046 | 0.046 | 0.0006 | | | | | | |
| %RSD: | 58.45 | 58.45 | 58.45 | | | | | | |

=====

**Sequence No.: 13** **Autosampler Location: 10**
**Sample ID: LCSS DOLT** **Date Collected: 1/21/2008 10:12:18 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: LCSS DOLT**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.475 | 3.475 | 0.046 | 0.254 | 0.051 | | | 10:12:40 | Yes |
| 2 | 3.319 | 3.319 | 0.044 | 0.239 | 0.049 | | | 10:13:15 | Yes |
| 3 | 3.385 | 3.385 | 0.045 | 0.239 | 0.050 | | | 10:13:49 | Yes |
| Mean: | 3.393 | 3.393 | 0.045 | | | | | | |
| SD: | 0.078 | 0.078 | 0.0010 | | | | | | |
| %RSD: | 2.308 | 2.308 | 2.31 | | | | | | |

=====

**Sequence No.: 14** **Autosampler Location: 11**
**Sample ID: K0711481-021** **Date Collected: 1/21/2008 10:14:38 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0711481-021**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.85 | 11.85 | 0.158 | 0.834 | 0.163 | | | 10:15:00 | Yes |
| 2 | 11.66 | 11.66 | 0.155 | 0.804 | 0.160 | | | 10:15:35 | Yes |
| 3 | 11.62 | 11.62 | 0.155 | 0.806 | 0.160 | | | 10:16:09 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 11.71 | 11.71 | 0.156 |
| SD: | 0.122 | 0.122 | 0.0016 |
| %RSD: | 1.039 | 1.039 | 1.04 |

**Sequence No.: 15** **Autosampler Location: 12**
**Sample ID: K0711481-021D** **Date Collected: 1/21/2008 10:16:59 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-021D**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.06 | 12.06 | 0.160 | 0.846 | 0.166 | | | 10:17:21 | Yes |
| 2 | 11.89 | 11.89 | 0.158 | 0.813 | 0.163 | | | 10:17:56 | Yes |
| 3 | 11.69 | 11.69 | 0.155 | 0.815 | 0.161 | | | 10:18:30 | Yes |
| Mean: | 11.88 | 11.88 | 0.158 | | | | | | |
| SD: | 0.189 | 0.189 | 0.0025 | | | | | | |
| %RSD: | 1.587 | 1.587 | 1.59 | | | | | | |

**Sequence No.: 16** **Autosampler Location: 13**
**Sample ID: K0711481-021S** **Date Collected: 1/21/2008 10:19:20 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-021S**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.777 | 9.777 | 0.130 | 0.685 | 0.135 | | | 10:19:43 | Yes |
| 2 | 9.859 | 9.859 | 0.131 | 0.684 | 0.136 | | | 10:20:17 | Yes |
| 3 | 9.909 | 9.909 | 0.132 | 0.673 | 0.137 | | | 10:20:52 | Yes |
| Mean: | 9.848 | 9.848 | 0.131 | | | | | | |
| SD: | 0.067 | 0.067 | 0.0009 | | | | | | |
| %RSD: | 0.678 | 0.678 | 0.68 | | | | | | |

**Sequence No.: 17** **Autosampler Location: 14**
**Sample ID: K0711481-022** **Date Collected: 1/21/2008 10:21:42 AM**
**Analyst:** **Data Type: Original**

A 1/21/08

**Replicate Data: K0711481-022**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 18.12 | 18.12 | 0.241 | 1.254 | 0.246 | | | 10:22:08 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 17.83 | 17.83 | 0.237 | 1.211 | 0.242 | | | 10:22:43 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 17.75 | 17.75 | 0.236 | 1.219 | 0.241 | | | 10:23:17 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 17.90 | 17.90 | 0.238 | | | | | | |
| SD: | 0.196 | 0.196 | 0.0026 | | | | | | |
| %RSD: | 1.093 | 1.093 | 1.09 | | | | | | |

Sample concentration is greater than that of the highest standard.

**Sequence No.: 18** **Autosampler Location: 15**
**Sample ID: K0711481-023** **Date Collected: 1/21/2008 10:24:42 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-023**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.394 | 8.394 | 0.112 | 0.602 | 0.117 | | | 10:25:06 | Yes |
| 2 | 8.603 | 8.603 | 0.114 | 0.584 | 0.119 | | | 10:25:41 | Yes |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 8.321 | 8.321 | 0.111 | 0.586 | 0.116 | | | 10:26:15 | Yes |
| Mean: | 8.439 | 8.439 | 0.112 | | | | | | |
| SD: | 0.146 | 0.146 | 0.0019 | | | | | | |
| %RSD: | 1.730 | 1.730 | 1.73 | | | | | | |

**Sequence No.: 19** **Autosampler Location: 16**
**Sample ID: K0711481-024** **Date Collected: 1/21/2008 10:27:08 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-024**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.947 | 5.947 | 0.079 | 0.428 | 0.084 | | | 10:27:32 | Yes |
| 2 | 5.877 | 5.877 | 0.078 | 0.424 | 0.083 | | | 10:28:06 | Yes |
| 3 | 5.859 | 5.859 | 0.078 | 0.405 | 0.083 | | | 10:28:41 | Yes |
| Mean: | 5.894 | 5.894 | 0.078 | | | | | | |
| SD: | 0.046 | 0.046 | 0.0006 | | | | | | |
| %RSD: | 0.788 | 0.788 | 0.79 | | | | | | |

**Sequence No.: 20** **Autosampler Location: 17**
**Sample ID: K0711481-025** **Date Collected: 1/21/2008 10:29:32 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-025**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.328 | 6.328 | 0.084 | 0.603 | 0.089 | | | 10:29:53 | Yes |
| 2 | 7.454 | 7.454 | 0.099 | 0.519 | 0.104 | | | 10:30:28 | Yes |
| 3 | 7.325 | 7.325 | 0.097 | 0.509 | 0.102 | | | 10:31:03 | Yes |
| Mean: | 7.036 | 7.036 | 0.094 | | | | | | |
| SD: | 0.616 | 0.616 | 0.0082 | | | | | | |
| %RSD: | 8.762 | 8.762 | 8.76 | | | | | | |

**Sequence No.: 21** **Autosampler Location: 18**
**Sample ID: K0711481-026** **Date Collected: 1/21/2008 10:31:54 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-026**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.039 | 6.039 | 0.080 | 0.421 | 0.085 | | | 10:32:15 | Yes |
| 2 | 6.190 | 6.190 | 0.082 | 0.449 | 0.087 | | | 10:32:49 | Yes |
| 3 | 5.838 | 5.838 | 0.078 | 0.378 | 0.083 | | | 10:33:24 | Yes |
| Mean: | 6.022 | 6.022 | 0.080 | | | | | | |
| SD: | 0.177 | 0.177 | 0.0024 | | | | | | |
| %RSD: | 2.935 | 2.935 | 2.94 | | | | | | |

**Sequence No.: 22** **Autosampler Location: 5**
**Sample ID: CCV** **Date Collected: 1/21/2008 10:34:13 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: CCV**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.770 | 9.770 | 0.130 | 0.724 | 0.135 | | | 10:34:36 | Yes |
| 2 | 9.453 | 9.453 | 0.126 | 0.694 | 0.131 | | | 10:35:10 | Yes |
| 3 | 9.614 | 9.614 | 0.128 | 0.691 | 0.133 | | | 10:35:44 | Yes |
| Mean: | 9.613 | 9.613 | 0.128 | | | | | | |
| SD: | 0.158 | 0.158 | 0.0021 | | | | | | |

%RSD: 1.649 1.649 1.65
QC value within limits for Se 196.03 Recovery = 96.13%
All analyte(s) passed QC.

================================================================

**Sequence No.: 23** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 1/21/2008 10:36:36 AM**
**Analyst:** **Data Type: Original**

----------------------------------------------------------------

**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.173 | 0.173 | 0.002 | 0.043 | 0.007 | | | 10:36:57 | Yes |
| 2 | 0.124 | 0.124 | 0.002 | 0.032 | 0.007 | | | 10:37:31 | Yes |
| 3 | 0.023 | 0.023 | 0.000 | 0.014 | 0.005 | | | 10:38:05 | Yes |
| Mean: | 0.107 | 0.107 | 0.001 | | | | | | |
| SD: | 0.076 | 0.076 | 0.0010 | | | | | | |
| %RSD: | 71.56 | 71.56 | 71.56 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

================================================================

**Sequence No.: 24** **Autosampler Location: 19**
**Sample ID: K0711481-027** **Date Collected: 1/21/2008 10:38:54 AM**
**Analyst:** **Data Type: Original**

----------------------------------------------------------------

**Replicate Data: K0711481-027**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.551 | 6.551 | 0.087 | 0.460 | 0.092 | | | 10:39:16 | Yes |
| 2 | 6.476 | 6.476 | 0.086 | 0.450 | 0.091 | | | 10:39:50 | Yes |
| 3 | 6.504 | 6.504 | 0.087 | 0.452 | 0.092 | | | 10:40:24 | Yes |
| Mean: | 6.511 | 6.511 | 0.087 | | | | | | |
| SD: | 0.038 | 0.038 | 0.0005 | | | | | | |
| %RSD: | 0.579 | 0.579 | 0.58 | | | | | | |

================================================================

**Sequence No.: 25** **Autosampler Location: 20**
**Sample ID: K0711481-028** **Date Collected: 1/21/2008 10:41:14 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0711481-028**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.436 | 7.436 | 0.099 | 0.529 | 0.104 | | | 10:41:35 | Yes |
| 2 | 7.784 | 7.784 | 0.104 | 0.537 | 0.109 | | | 10:42:09 | Yes |
| 3 | 7.306 | 7.306 | 0.097 | 0.503 | 0.102 | | | 10:42:43 | Yes |
| Mean: | 7.509 | 7.509 | 0.100 | | | | | | |
| SD: | 0.247 | 0.247 | 0.0033 | | | | | | |
| %RSD: | 3.296 | 3.296 | 3.30 | | | | | | |

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**Sequence No.: 26** **Autosampler Location: 21**
**Sample ID: K0711481-029** **Date Collected: 1/21/2008 10:43:33 AM**
**Analyst:** **Data Type: Original**

----------------------------------------------------------------

**Replicate Data: K0711481-029**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.967 | 5.967 | 0.079 | 0.424 | 0.084 | | | 10:43:54 | Yes |
| 2 | 5.664 | 5.664 | 0.075 | 0.404 | 0.080 | | | 10:44:28 | Yes |
| 3 | 5.769 | 5.769 | 0.077 | 0.415 | 0.082 | | | 10:45:02 | Yes |
| Mean: | 5.800 | 5.800 | 0.077 | | | | | | |

| | | | |
|---|---|---|---|
| SD: | 0.154 | 0.154 | 0.0020 |
| %RSD: | 2.651 | 2.651 | 2.65 |

**Sequence No.: 27** **Autosampler Location: 22**
**Sample ID: K0711481-030** **Date Collected: 1/21/2008 10:45:52 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-030**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.495 | 5.495 | 0.073 | 0.387 | 0.078 | | | 10:46:14 | Yes |
| 2 | 5.324 | 5.324 | 0.071 | 0.378 | 0.076 | | | 10:46:48 | Yes |
| 3 | 5.168 | 5.168 | 0.069 | 0.368 | 0.074 | | | 10:47:23 | Yes |
| Mean: | 5.329 | 5.329 | 0.071 | | | | | | |
| SD: | 0.164 | 0.164 | 0.0022 | | | | | | |
| %RSD: | 3.068 | 3.068 | 3.07 | | | | | | |

**Sequence No.: 28** **Autosampler Location: 23**
**Sample ID: K0711481-031** **Date Collected: 1/21/2008 10:48:12 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-031**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.535 | 8.535 | 0.114 | 0.634 | 0.119 | | | 10:48:34 | Yes |
| 2 | 7.162 | 7.162 | 0.095 | 0.480 | 0.100 | | | 10:49:09 | Yes |
| 3 | 6.928 | 6.928 | 0.092 | 0.485 | 0.097 | | | 10:49:43 | Yes |
| Mean: | 7.542 | 7.542 | 0.100 | | | | | | |
| SD: | 0.868 | 0.868 | 0.0115 | | | | | | |
| %RSD: | 11.51 | 11.51 | 11.51 | | | | | | |

**Sequence No.: 29** **Autosampler Location: 24**
**Sample ID: K0711481-032** **Date Collected: 1/21/2008 10:50:33 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-032**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.716 | 9.716 | 0.129 | 0.687 | 0.134 | | | 10:50:55 | Yes |
| 2 | 8.675 | 8.675 | 0.115 | 0.659 | 0.120 | | | 10:51:30 | Yes |
| 3 | 10.02 | 10.02 | 0.133 | 0.687 | 0.138 | | | 10:52:05 | Yes |
| Mean: | 9.471 | 9.471 | 0.126 | | | | | | |
| SD: | 0.706 | 0.706 | 0.0094 | | | | | | |
| %RSD: | 7.453 | 7.453 | 7.45 | | | | | | |

**Sequence No.: 30** **Autosampler Location: 25**
**Sample ID: K0711481-033** **Date Collected: 1/21/2008 10:52:55 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-033**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.767 | 5.767 | 0.077 | 0.415 | 0.082 | | | 10:53:18 | Yes |
| 2 | 6.430 | 6.430 | 0.086 | 0.402 | 0.091 | | | 10:53:52 | Yes |
| 3 | 5.382 | 5.382 | 0.072 | 0.373 | 0.077 | | | 10:54:26 | Yes |
| Mean: | 5.860 | 5.860 | 0.078 | | | | | | |
| SD: | 0.530 | 0.530 | 0.0070 | | | | | | |
| %RSD: | 9.045 | 9.045 | 9.05 | | | | | | |

Sequence No.: 31
Sample ID: K0711481-034
Analyst:
Autosampler Location: 26
Date Collected: 1/21/2008 10:55:17 AM
Data Type: Original

Replicate Data: K0711481-034

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.11 | 10.11 | 0.134 | 0.708 | 0.140 | | | 10:55:40 | Yes |
| 2 | 10.08 | 10.08 | 0.134 | 0.696 | 0.139 | | | 10:56:14 | Yes |
| 3 | 9.846 | 9.846 | 0.131 | 0.677 | 0.136 | | | 10:56:49 | Yes |
| Mean: | 10.01 | 10.01 | 0.133 | | | | | | |
| SD: | 0.147 | 0.147 | 0.0019 | | | | | | |
| %RSD: | 1.463 | 1.463 | 1.46 | | | | | | |

Sequence No.: 32
Sample ID: K0711481-035
Analyst:
Autosampler Location: 27
Date Collected: 1/21/2008 10:57:40 AM
Data Type: Original

1/21/08

Replicate Data: K0711481-035

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 20.12 | 20.12 | 0.268 | 1.445 | 0.273 | | | 10:58:03 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 19.75 | 19.75 | 0.263 | 1.415 | 0.268 | | | 10:58:38 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 20.18 | 20.18 | 0.268 | 1.410 | 0.273 | | | 10:59:12 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 20.01 | 20.01 | 0.266 | | | | | | |
| SD: | 0.231 | 0.231 | 0.0031 | | | | | | |
| %RSD: | 1.156 | 1.156 | 1.16 | | | | | | |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |

Sequence No.: 33
Sample ID: K0711481-036
Analyst:
Autosampler Location: 28
Date Collected: 1/21/2008 11:00:36 AM
Data Type: Original

Replicate Data: K0711481-036

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.58 | 12.58 | 0.167 | 0.914 | 0.172 | | | 11:00:59 | Yes |
| 2 | 12.41 | 12.41 | 0.165 | 0.881 | 0.170 | | | 11:01:33 | Yes |
| 3 | 12.46 | 12.46 | 0.166 | 0.887 | 0.171 | | | 11:02:07 | Yes |
| Mean: | 12.48 | 12.48 | 0.166 | | | | | | |
| SD: | 0.090 | 0.090 | 0.0012 | | | | | | |
| %RSD: | 0.719 | 0.719 | 0.72 | | | | | | |

Sequence No.: 34
Sample ID: CCV
Analyst:
Autosampler Location: 5
Date Collected: 1/21/2008 11:02:59 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.916 | 9.916 | 0.132 | 0.728 | 0.137 | | | 11:03:22 | Yes |
| 2 | 9.667 | 9.667 | 0.129 | 0.694 | 0.134 | | | 11:03:56 | Yes |
| 3 | 9.543 | 9.543 | 0.127 | 0.683 | 0.132 | | | 11:04:30 | Yes |
| Mean: | 9.709 | 9.709 | 0.129 | | | | | | |
| SD: | 0.190 | 0.190 | 0.0025 | | | | | | |
| %RSD: | 1.960 | 1.960 | 1.96 | | | | | | |

QC value within limits for Se 196.03 Recovery = 97.09%
All analyte(s) passed QC.

**Sequence No.: 35** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 1/21/2008 11:05:22 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.208 | 0.208 | 0.003 | 0.029 | 0.008 | | | 11:05:42 | Yes |
| 2 | 0.221 | 0.221 | 0.003 | 0.032 | 0.008 | | | 11:06:17 | Yes |
| 3 | 0.114 | 0.114 | 0.002 | 0.036 | 0.007 | | | 11:06:53 | Yes |
| Mean: | 0.181 | 0.181 | 0.002 | | | | | | |
| SD: | 0.059 | 0.059 | 0.0008 | | | | | | |
| %RSD: | 32.44 | 32.44 | 32.44 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

**Sequence No.: 36** **Autosampler Location: 29**
**Sample ID: K0711481-037** **Date Collected: 1/21/2008 11:07:42 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-037**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 31.64 | 31.64 | 0.421 | 2.259 | 0.426 | | | 11:08:06 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 31.07 | 31.07 | 0.413 | 2.215 | 0.418 | | | 11:08:40 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 31.86 | 31.86 | 0.424 | 2.263 | 0.429 | | | 11:09:14 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 31.52 | 31.52 | 0.419 | | | | | | |
| SD: | 0.412 | 0.412 | 0.0055 | | | | | | |
| %RSD: | 1.307 | 1.307 | 1.31 | | | | | | |

Sample concentration is greater than that of the highest standard.

**Sequence No.: 37** ∤ 1/21/08 **Autosampler Location: 30**
**Sample ID: K0711481-038** **Date Collected: 1/21/2008 11:10:39 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711481-038**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 29.96 | 29.96 | 0.398 | 2.133 | 0.404 | | | 11:11:03 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 29.50 | 29.50 | 0.392 | 2.081 | 0.397 | | | 11:11:37 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 29.10 | 29.10 | 0.387 | 2.053 | 0.392 | | | 11:12:11 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 29.52 | 29.52 | 0.393 | | | | | | |
| SD: | 0.433 | 0.433 | 0.0058 | | | | | | |
| %RSD: | 1.465 | 1.465 | 1.47 | | | | | | |

Sample concentration is greater than that of the highest standard.

**Sequence No.: 38** **Autosampler Location: 31**
**Sample ID: K0711481-021A** **Date Collected: 1/21/2008 11:13:37 AM**
**Analyst:** **Data Type: Original**

Replicate Data: K0711481-021A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15.05 | 15.05 | 0.200 | 1.052 | 0.205 | | | 11:14:01 | Yes |
| 2 | 14.81 | 14.81 | 0.197 | 1.004 | 0.202 | | | 11:14:36 | Yes |
| 3 | 14.55 | 14.55 | 0.193 | 1.008 | 0.199 | | | 11:15:10 | Yes |
| Mean: | 14.80 | 14.80 | 0.197 | | | | | | |
| SD: | 0.249 | 0.249 | 0.0033 | | | | | | |
| %RSD: | 1.681 | 1.681 | 1.68 | | | | | | |

================================================================================

Sequence No.: 39 Autosampler Location: 5
Sample ID: CCV Date Collected: 1/21/2008 11:16:02 AM
Analyst: Data Type: Original

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Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.05 | 10.05 | 0.134 | 0.730 | 0.139 | | | 11:16:25 | Yes |
| 2 | 9.833 | 9.833 | 0.131 | 0.696 | 0.136 | | | 11:16:59 | Yes |
| 3 | 9.652 | 9.652 | 0.128 | 0.692 | 0.133 | | | 11:17:34 | Yes |
| Mean: | 9.845 | 9.845 | 0.131 | | | | | | |
| SD: | 0.199 | 0.199 | 0.0027 | | | | | | |
| %RSD: | 2.026 | 2.026 | 2.03 | | | | | | |

QC value within limits for Se 196.03 Recovery = 98.45%
All analyte(s) passed QC.

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Sequence No.: 40 Autosampler Location: 1
Sample ID: CCB Date Collected: 1/21/2008 11:18:26 AM
Analyst: Data Type: Original

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Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.303 | 0.303 | 0.004 | 0.051 | 0.009 | | | 11:18:47 | Yes |
| 2 | 0.273 | 0.273 | 0.004 | 0.034 | 0.009 | | | 11:19:21 | Yes |
| 3 | 0.057 | 0.057 | 0.001 | 0.025 | 0.006 | | | 11:19:55 | Yes |
| Mean: | 0.211 | 0.211 | 0.003 | | | | | | |
| SD: | 0.134 | 0.134 | 0.0018 | | | | | | |
| %RSD: | 63.72 | 63.72 | 63.72 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

================================================================================

**Analysis Begun**

Logged In Analyst: ACQMET10 Technique: AA FIAS-Flame
Spectrometer Model: AAnalyst 200, S/N 200S5061701 Autosampler Model: AS-90

Sample Information File: C:\data-AA\ACQMET10\Sample Information\012108-Se.sif
Batch ID: 012108-Se
Results Data Set: 012108-Se
Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb

================================================================================

Sequence No.: 41 Autosampler Location:
Sample ID: K0711481-022 1/10 Date Collected: 1/21/2008 11:21:07 AM
Analyst: Data Type: Original

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Replicate Data: K0711481-022 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.53 | 10.53 | 0.140 | 0.715 | 0.145 | | | 11:21:23 | Yes |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 10.23 | 10.23 | 0.136 | 0.691 | 0.141 | | | 11:21:57 | Yes |
| 3 | 10.08 | 10.08 | 0.134 | 0.691 | 0.139 | | | 11:22:31 | Yes |
| Mean: | 10.28 | 10.28 | 0.137 | | | | | | |
| SD: | 0.230 | 0.230 | 0.0031 | | | | | | |
| %RSD: | 2.240 | 2.240 | 2.24 | | | | | | |

Sequence No.: 42
Sample ID: K0711481-035 1/10
Analyst:
Autosampler Location:
Date Collected: 1/21/2008 11:23:33 AM
Data Type: Original

Replicate Data: K0711481-035 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.74 | 11.74 | 0.156 | 0.828 | 0.161 | | | 11:23:49 | Yes |
| 2 | 11.55 | 11.55 | 0.154 | 0.798 | 0.159 | | | 11:24:24 | Yes |
| 3 | 11.41 | 11.41 | 0.152 | 0.797 | 0.157 | | | 11:24:59 | Yes |
| Mean: | 11.56 | 11.56 | 0.154 | | | | | | |
| SD: | 0.166 | 0.166 | 0.0022 | | | | | | |
| %RSD: | 1.436 | 1.436 | 1.44 | | | | | | |

Sequence No.: 43
Sample ID: K0711481-037 1/20
Analyst:
Autosampler Location:
Date Collected: 1/21/2008 11:25:59 AM
Data Type: Original

Replicate Data: K0711481-037 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.39 | 11.39 | 0.151 | 0.804 | 0.157 | | | 11:26:15 | Yes |
| 2 | 11.05 | 11.05 | 0.147 | 0.768 | 0.152 | | | 11:26:50 | Yes |
| 3 | 11.10 | 11.10 | 0.148 | 0.756 | 0.153 | | | 11:27:24 | Yes |
| Mean: | 11.18 | 11.18 | 0.149 | | | | | | |
| SD: | 0.181 | 0.181 | 0.0024 | | | | | | |
| %RSD: | 1.615 | 1.615 | 1.61 | | | | | | |

Sequence No.: 44
Sample ID: K0711481-038 1/20
Analyst:
Autosampler Location:
Date Collected: 1/21/2008 11:28:26 AM
Data Type: Original

Replicate Data: K0711481-038 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.24 | 10.24 | 0.136 | 0.722 | 0.141 | | | 11:28:43 | Yes |
| 2 | 10.16 | 10.16 | 0.135 | 0.689 | 0.140 | | | 11:29:17 | Yes |
| 3 | 10.66 | 10.66 | 0.142 | 0.687 | 0.147 | | | 11:29:51 | Yes |
| Mean: | 10.35 | 10.35 | 0.138 | | | | | | |
| SD: | 0.267 | 0.267 | 0.0035 | | | | | | |
| %RSD: | 2.579 | 2.579 | 2.58 | | | | | | |

Sequence No.: 45
Sample ID: CCV
Analyst:
Autosampler Location:
Date Collected: 1/21/2008 11:30:52 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.861 | 9.861 | 0.131 | 0.727 | 0.136 | | | 11:31:08 | Yes |
| 2 | 9.529 | 9.529 | 0.127 | 0.691 | 0.132 | | | 11:31:42 | Yes |
| 3 | 9.660 | 9.660 | 0.128 | 0.684 | 0.134 | | | 11:32:17 | Yes |
| Mean: | 9.683 | 9.683 | 0.129 | | | | | | |

| | | | |
|---|---|---|---|
| SD: | 0.168 | 0.168 | 0.0022 |
| %RSD: | 1.730 | 1.730 | 1.73 |

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**Sequence No.: 46**
**Sample ID: CCB**
**Analyst:**

**Autosampler Location:**
**Date Collected: 1/21/2008 11:33:18 AM**
**Data Type: Original**

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**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.145 | 0.145 | 0.002 | 0.028 | 0.007 | | | 11:33:35 | Yes |
| 2 | 0.146 | 0.146 | 0.002 | 0.030 | 0.007 | | | 11:34:09 | Yes |
| 3 | 0.163 | 0.163 | 0.002 | 0.025 | 0.007 | | | 11:34:43 | Yes |
| Mean: | 0.151 | 0.151 | 0.002 | | | | | | |
| SD: | 0.010 | 0.010 | 0.0001 | | | | | | |
| %RSD: | 6.722 | 6.722 | 6.72 | | | | | | |

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

January 20, 2008 Analytical Report for Service Request No: K0711649

Kathy Tegtmeyer
New Fields Environmental
4720 Walnut St., Suite 200
Boulder, CO 80301

**RE: Se in Tissue**

Dear Kathy:

Enclosed are the results of the samples submitted to our laboratory on December 12, 2007. For your reference, these analyses have been assigned our service request number K0711649.

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 3316. You may also contact me via Email at JChristian@caslab.com.

Respectfully submitted,

**Columbia Analytical Services, Inc.**

Jeff Christian
Laboratory Director

JC/lb



NELAP Accredited ACIL Seal of Excellence Award 100% Recycled

## 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) | - |

MEMBER ACIL

nelac

# Case Narrative

**COLUMBIA ANALYTICAL SERVICES, INC.**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request No.:** | K0711649 |
| **Project:** | Tissue - Se | **Date Received:** | 12/12/07 |
| **Sample Matrix:** | Tissue | | |

## 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

Tissue samples were received for analysis at Columbia Analytical Services on 12/12/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored frozen at –20°C upon receipt at the laboratory.

### Total Metals

**General Comments:**
The samples were freeze-dried to determine moisture and to allow complete homogenization of the dry material. The dried material was milled to a fine meal, and then sub-sampled for digestion. A thorough digestion was performed prior to instrumental analysis to convert all Selenium species to Selenate. Prior to hydride formation, the valence was adjusted by reduction to Selenite.

No anomalies associated with the analysis of these samples were observed.

**Approved by** ________ **Date** 1/18/08

**Chain of Custody Documentation**

# Chain of Custody Page of

NEWFIELDS

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679

**Project Contact** Sean Covington/Kathy Tegtmeyer **PO** 0442-004-900.70
**Courier/Airbill:**
**Shipped to:** Columbia Analytical Services, Inc.
1317 South 13th Ave
Kelso, WA 98626
**Telephone:** (360) 430-7733

COC Tape # 40066
Intact: Y/N

**COC #:**

| Sample ID | Sample Date | Sample Time | Matrix | Tot/ Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|
| SM1007-SNFH-FT0050 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0051 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0052 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0053 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0054 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0055 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0056 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0057 | 10/25/2007 | | Fish Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| | | | | | | | | |

**Total Number of Containers:** 8 **Individual Lines Reflect Single Containers, Except for Aqueous Analyses Assigned as Laboratory QC**

**Sampler Signature:** [signature]

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| [signature] | 12/11/07 @ 1515 | Tracy Black CAS | 12/12/07 1030 |
| | | | |
| | | | |

LAB USE ONLY — Sample condition on Receipt

PC JC

# Columbia Analytical Services, Inc.
## Cooler Receipt and Preservation Form

Client / Project: ENSR Service Request K07 11649

Received: 12-12-07 Opened: 12-12-07 By: PD

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? Front
   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: 7924 7001 7231 NA Y N
5. **Temperature of cooler(s) upon receipt (°C):** -17.3
   **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* Dry Ice
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:*

***Page 1 of:*** 1 2

# Total Solids

# COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711649 |
| **Project:** | Se in Tissue | **Date Collected:** | 10/25/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/12/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| **Sample Name** | **Lab Code** | **Date Analyzed** | **Result** | **Result Notes** |
|---|---|---|---|---|
| SM1007-SNFH-FT0050 | K0711649-001 | 12/27/08 | 29.7 | |
| SM1007-SNFH-FT0051 | K0711649-002 | 12/27/08 | 26.0 | |
| SM1007-SNFH-FT0052 | K0711649-003 | 12/27/08 | 31.7 | |
| SM1007-SNFH-FT0053 | K0711649-004 | 12/27/08 | 32.3 | |
| SM1007-SNFH-FT0054 | K0711649-005 | 12/27/08 | 32.1 | |
| SM1007-SNFH-FT0055 | K0711649-006 | 12/27/08 | 27.6 | |
| SM1007-SNFH-FT0056 | K0711649-007 | 12/27/08 | 32.0 | |
| SM1007-SNFH-FT0057 | K0711649-008 | 12/27/08 | 32.8 | |

## COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0711649 |
| **Project:** | Se in Tissue | **Date Collected:** | 10/25/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/12/07 |
| | | **Date Extracted:** | NA |
| | | **Date Analyzed:** | 12/27/08 |

Duplicate Summary
Total Metals

| | | | |
|---|---|---|---|
| Sample Name: | SM1007-SNFH-FT0050 | Units: | PERCENT |
| Lab Code: | K0711649-001D | Basis: | Wet |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | Sample Result | Duplicate Sample Result | Average | Relative Percent Difference | Result Notes |
|---|---|---|---|---|---|---|---|
| Solids, Total | NA | Freeze Dry | 29.7 | 30.3 | 30.0 | 2 | |

Service Request #: KO711649

Analysis For: Freeze Dried Solids

Extr/Prep Batch
KP0613321

| Lab Code | Wet Weight (g) | Tare (g) | Tare + Dry Wt.(g) | Dry Weight (g) | % Total Solids |
|---|---|---|---|---|---|
| KO711649-01 | 25.150 | 78.810 | 86.268 | 7.458 | 29.7 |
| -01D | 23.630 | 79.400 | 86.555 | 7.155 | 30.3 |
| -02 | 24.378 | 78.938 | 85.286 | 6.348 | 26.0 |
| -03 | 23.331 | 78.509 | 85.895 | 7.386 | 31.7 |
| -04 | 23.314 | 78.618 | 86.155 | 7.537 | 32.3 |
| -05 | 24.616 | 78.407 | 86.306 | 7.899 | 32.1 |
| -06 | 22.450 | 79.103 | 85.295 | 6.192 | 27.6 |
| -07 | 23.480 | 79.136 | 86.652 | 7.516 | 32.0 |
| -08 | 23.573 | 79.143 | 86.884 | 7.741 | 32.8 |

LAB 12/27/07

Time In : 4:00p.m 12/31/07 Time Out: 9:00a.m. 1/2/08

Comments: Balance 21-B

x̄ = RPD =

| | | | |
|---|---|---|---|
| Analyst: | Angela Black | Date: | 12-27-07 |
| Reviewed By: | | Date: | 1/9/08 |

FREZ-DRY

| Sample Number(s): As Listed | Service Request Number(s): K0711649 |
|---|---|

## TISSUE COMPOSITION DATA

| Laboratory ID | Weight (g) | Tare (g) | | | Matrix | Length | |
|---|---|---|---|---|---|---|---|
| K0711649-01 (1) | 820.34 | 470.98 | | | Whole body fish | | |
| -01 (2) | 573.07 | 468.88 | | | | | |
| -02 | 826.00 | 470.75 | | | | | |
| -03 (1) | 814.27 | 479.24 | | | | | |
| -03 (2) | 739.17 | 477.41 | | | | | |
| -04 (1) | 888.06 | 478.65 | | | | | |
| -04 (2) | 822.69 | 477.74 | | | | | |
| -04 (3) | 789.00 | 485.36 | | | | | |
| -05 (1) | 824.07 | 471.08 | | | | | |
| -05 (2) | 834.73 | 486.42 | | | | | |
| -05 (3) | 528.17 | 486.71 | | | | | |
| -06 | 842.38 | 470.53 | | | | | |
| -07 (1) | 713.20 | 479.15 | | | | | |
| -07 (2) | 462.17 | 485.80 | | | | | |
| -08 (1) | 828.11 | 479.25 | | | | | |
| -08 (2) | 618.22 | 484.78 | | | | | |

UAB 12/27/07

Comments:

| Analyst: [signature] / Angela Brack | Date: 12-27-07 |
|---|---|
| Reviewed: [signature] | Date: 1/9/08 |

R:\ICP\misc\digforms\TISSUEBENCHSHT

# Metals

# Columbia Analytical Services

- Cover Page -
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project Name:** Se in Tissue
**Project No.:**

**Service Request:** K0711649

| Sample Name: | Lab Code: |
|---|---|
| SM1007-SNFH-FT0050 | K0711649-001 |
| SM1007-SNFH-FT0050D | K0711649-001D |
| SM1007-SNFH-FT0050S | K0711649-001S |
| SM1007-SNFH-FT0051 | K0711649-002 |
| SM1007-SNFH-FT0052 | K0711649-003 |
| SM1007-SNFH-FT0053 | K0711649-004 |
| SM1007-SNFH-FT0054 | K0711649-005 |
| SM1007-SNFH-FT0055 | K0711649-006 |
| SM1007-SNFH-FT0056 | K0711649-007 |
| SM1007-SNFH-FT0057 | K0711649-008 |
| Method Blank | K0711649-MB |

**Comments:**

**Approved By:** ________________ **Date:** 1/18/08

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711649
**Date Collected:** 10/25/07
**Date Received:** 12/12/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0050 **Lab Code:** K0711649-001

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.38 | 0.08 | 8.0 | 01/07/08 | 01/18/08 | 3.6 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0711649
**Project No.:** NA
**Date Collected:** 10/25/07
**Project Name:** Se in Tissue
**Date Received:** 12/12/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0051 **Lab Code:** K0711649-002

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.38 | 0.08 | 8.0 | 01/07/08 | 01/18/08 | 4.1 | | |

Comments:

## Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0711649
**Project No.:** NA
**Date Collected:** 10/25/07
**Project Name:** Se in Tissue
**Date Received:** 12/12/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0052 **Lab Code:** K0711649-003

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.40 | 0.08 | 8.0 | 01/07/08 | 01/18/08 | 3.7 | | |

Comments:

# Metals

- 1 -
## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711649
**Date Collected:** 10/25/07
**Date Received:** 12/12/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0053 **Lab Code:** K0711649-004

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.35 | 0.07 | 8.0 | 01/07/08 | 01/18/08 | 4.3 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711649
**Date Collected:** 10/25/07
**Date Received:** 12/12/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0054 **Lab Code:** K0711649-005

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.31 | 0.06 | 8.0 | 01/07/08 | 01/18/08 | 3.0 | | |

Comments:

## Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711649
**Date Collected:** 10/25/07
**Date Received:** 12/12/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0055 **Lab Code:** K0711649-006

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.38 | 0.08 | 8.0 | 01/07/08 | 01/18/08 | 3.1 | | |

Comments:

## Metals

- 1 -

### INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711649
**Date Collected:** 10/25/07
**Date Received:** 12/12/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0056 **Lab Code:** K0711649-007

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.39 | 0.08 | 8.0 | 01/07/08 | 01/18/08 | 2.7 | | |

Comments:

# Metals

- 1 -
## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711649
**Date Collected:** 10/25/07
**Date Received:** 12/12/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0057
**Lab Code:** K0711649-008

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.39 | 0.08 | 8.0 | 01/07/08 | 01/18/08 | 2.5 | | |

Comments:

## Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0711649
**Date Collected:**
**Date Received:**
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** Method Blank **Lab Code:** K0711649-MB

| Analyte | Analysis Method | MRL | MDL | Dil. Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.10 | 0.02 | 2.0 | 01/07/08 | 01/18/08 | 0.06 | B | |

**% Solids:** 100.0

Comments:

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | 10.0 | 9.52 | 95 | 10.0 | 9.83 | 98 | 9.58 | 96 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 9.16 | 92 | 9.37 | 94 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**ICV Source:** Inorganic Ventures **CCV Source:** CAS MIXED

**Concentration Units:** ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Analyte** | **True** | **Found** | **%R(1)** | **True** | **Found** | **%R(1)** | **Found** | **%R(1)** | **Method** |
| Selenium | | | | 10.0 | 9.46 | 95 | | | 7742 |

# Metals
- 2b -
## CRDL STANDARD FOR AA AND ICP

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

Concentration Units: ug/L

| Analyte | CRDL Standard for AA | | | CRDL Standard for ICP Initial | | | Final | |
|---|---|---|---|---|---|---|---|---|
| | True | Found | %R | True | Found | %R | Found | %R |
| Selenium | 0.5 | 0.67 | 134.0 | | | | | |

# Metals

-3-

## BLANKS

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 0.3 | B | 0.2 | B | 0.3 | B | 0.1 | B | 7742 |

# Metals

-3-

## BLANKS

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | | | 0.3 | B | 0.2 | B | | | 7742 |

# Metals

- 5A -

## SPIKE SAMPLE RECOVERY

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA **Units:** MG/KG

**Project Name:** Se in Tissue **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1007-SNFH-FT0050S **Lab Code:** K0711649-001S

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 65 - 124 | 16.9 | | 3.6 | | 15.09 | 88.1 | | 7742 |

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

# Metals

- 6 -

## DUPLICATES

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA **Units:** MG/KG

**Project Name:** Se in Tissue **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1007-SNFH-FT0050D **Lab Code:** K0711649-001D

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | Method |
|---|---|---|---|---|---|---|---|---|
| Selenium | 30 | 3.6 | | 3.8 | | 5.4 | | 7742 |

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

# Metals

-7-

## LABORATORY CONTROL SAMPLE

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**Aqueous LCS Source:** **Solid LCS Source:**

| Analyte | Aqueous (ug/L) | | | Solid (mg/kg) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | True | Found | %R | True | Found | C | Limits | | %R |
| Selenium | | | | 7.06 | 6.00 | | 75.5 | 128 | 85 |

# Metals

- 10 -

## DETECTION LIMITS

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**ICP/ICP-MS ID #:**

**GFAA ID #:** K-FLAA-02 **AA ID #:**

| Analyte | Wave-length (nm) | Back-ground | MRL ug/L | MDL ug/L | M |
|---|---|---|---|---|---|
| Selenium | | | 0.5 | 0.1 | F |

Comments:

Form X - IN

# Metals
-13-
## PREPARATION LOG

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**Method:** F

| Sample ID | Preparation Date | Initial Volume | Final Volume (mL) |
|---|---|---|---|
| K0711649-001 | 1/7/08 | 0.3150 | 30.0 |
| K0711649-001D | 1/7/08 | 0.3270 | 30.0 |
| K0711649-001S | 1/7/08 | 0.3320 | 30.0 |
| K0711649-002 | 1/7/08 | 0.3180 | 30.0 |
| K0711649-003 | 1/7/08 | 0.3040 | 30.0 |
| K0711649-004 | 1/7/08 | 0.3440 | 30.0 |
| K0711649-005 | 1/7/08 | 0.3830 | 30.0 |
| K0711649-006 | 1/7/08 | 0.3160 | 30.0 |
| K0711649-007 | 1/7/08 | 0.3110 | 30.0 |
| K0711649-008 | 1/7/08 | 0.3080 | 30.0 |
| K0711649-MB | 1/7/08 | 0.3000 | 30.0 |
| LCSS | 1/7/08 | 0.31 | 30.0 |

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 01/18/08 **End Date:** 01/18/08

| Sample No. | 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 |
| ZZZZZZ | 1 | 09:20 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:22 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:25 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:27 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:29 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:32 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:34 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:37 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 09:40 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CAL BLK | 1 | 09:42 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 0.5 | 1 | 09:45 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 1.0 | 1 | 09:47 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 5.0 | 1 | 09:49 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 10.0 | 1 | 09:52 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 15.0 | 1 | 09:54 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICV1 | 1 | 09:56 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICB1 | 1 | 09:59 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CRA | 1 | 10:01 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV1 | 1 | 10:04 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB1 | 1 | 10:06 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 1 | 10:08 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 1 | 10:11 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV2 | 1 | 10:13 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB2 | 1 | 10:15 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-MB | 2 | 10:23 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCSS | 20 | 10:25 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-001 | 8 | 10:28 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-001D | 8 | 10:31 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-001S | 40 | 10:33 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-002 | 8 | 10:36 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-003 | 8 | 10:39 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-004 | 8 | 10:41 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0711649

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 1/18/08 **End Date:** 1/18/08

| Sample No. | 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 |
| K0711649-005 | 8 | 10:44 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-006 | 8 | 10:46 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV3 | 1 | 10:49 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB3 | 1 | 10:51 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-007 | 8 | 10:54 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0711649-008 | 8 | 10:57 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 8 | 10:59 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:15 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:17 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:20 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:22 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:25 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:28 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:30 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV4 | 1 | 12:33 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB4 | 1 | 12:35 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 8 | 12:37 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:40 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 8 | 12:42 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV5 | 1 | 12:45 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB5 | 1 | 12:47 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

Columbia Analytical Services
Metals Tissue Digestion Sheet

Service Request Number(s) : K0711649 redigest

Star Lims Run No.:

Method : Tissue

Analysis for : ICP ICP-MS GFAA

other: Se hydride

| Sample | Initial Weight (g) | freeze Dry | Wet | Final Volume (ml) | Matrix |
|---|---|---|---|---|---|
| PB | | | X | 50mls | 15% HNO3 |
| Dolt | 0.311 | | I | | |
| K0711649-01 | 0.315 | X | | | |
| -01D | 0.327 | | | | |
| -01S | 0.332 | | | | |
| -02 | 0.318 | | | | |
| -03 | 0.304 | | | | |
| -04 | 0.344 | | | | |
| -05 | 0.383 | | | | |
| -06 | 0.316 | | | | |
| -07 | 0.311 | | | | |
| -08 | 0.308 | | | | |

AB 1/16/08

**Time Digestion Started:** 4:20pm 1/16/08 **Oven Temp:** 102°C

**Time Digestion Ended:** 7:00a.m. 1/18/08

**Lot # Acids Used: HNO3** MS11-64-C

**Oven Temp:** 103°C

**LCS: Dorm-2, Dolt-3**

**Balance I.D.:** loaner

**QCP CICV-1, MET1-63-A, __________ mls. added**
**QCP CICV-2, MET1-63-B, __________ mls. added**
**QCP CICV-3, MET1-59-J, __________ mls. Added**
**SS6, MET1-62-A, __________ mls. Added**

**SPIKE INFO**
**SS1-MET1-61-R,** 0.3 **mls added**
**SS5-MET1-61-P,** 0.05 **mls added**
**SS6-MET1-62-A,** 0.05 **mls added**
**Additional spikes:**
**Comments:**

| | | | |
|---|---|---|---|
| **Analyst** | Angela Black | **Date** | 1/16/08 |
| **Reviewer** | EMA | **Date** | 1/18/08 |

TissueDig.xls
1/7/2008

**METALS SPIKE FORM**

Service Request # K0711049 redigest

Q.C. Sample # K0711049-1

Circle type of digest: GFAA ICP FAA ICP-MS Other:________ Initials / Date: AB 1/16/08

Circle type of sample: Soil Water Misc. Sludge Oil Other: Tissue

| Solution Name | Element | mls of 1000ppm Solution | Final Volume | Source | Lot# | Exp. Date | Solution Conc. mg/L | Enter mls Added | |
|---|---|---|---|---|---|---|---|---|---|
| SS1-MET1-61-R | HNO3 | 50.0 | 1000ml | JT Baker | E17044 | - | - | 0.3 | Expires:3/7/08 |
| | Al | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Ag | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Ba | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Be | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Cd | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Co | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Cr | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 20 | | |
| | Cu | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 25 | | |
| | Fe | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 100 | | |
| | Pb | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Mn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Ni | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Sb | 50* | 1000ml | MET1-53-A | 619312 | 3/7/2008 | 50 | | |
| | V | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Zn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| SS4-MET1-62-J | HNO3 | 25.0 | 500ml | JT BAKER | A48046 | - | - | | Expires:2/1/08 |
| | As | 2.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 4 | | |
| | Cd | 2.0 | 500ml | MET1-57-M | Z-CD02004 | 7/1/2008 | 4 | | |
| | Pb | 2.0 | 500ml | MET1-57-R | A2-PB02135 | 7/1/2008 | 4 | | |
| | Se | 2.0 | 500ml | MET1-57-K | Z-SE01120 | 7/1/2008 | 4 | | |
| | Tl | 2.0 | 500ml | MET1-54-M | Z-TL01097 | 2/1/2008 | 4 | | |
| | Cu | 2.0 | 500ml | MET1-55-O | Z-CU02084 | 5/1/2008 | 4 | | |
| SS5-MET1-61-P | HNO3 | 25.0 | 500ml | JT BAKER | E17044 | - | - | 0.05 | Expires:2/1/08 |
| | As | 50.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 100 | | |
| | Se | 50.0 | 500ml | MET1-59-C | Z-SE01120 | 8/1/2008 | 100 | | |
| | Tl | 50.0 | 500ml | MET1-54-M | Z-TL01097 | 2/1/2008 | 100 | | |
| SS6-MET1-62-A | HNO3 | 25 | 500ml | JT BAKER | E27027 | - | - | 0.05 | Expires: 2/1/08 |
| | B | 50 | 500ml | MET1-59-A | 715006 | 1/2/2009 | 100 | | |
| | Mo | 50 | 500ml | MET1-54-K | Z-MO02012 | 2/1/2008 | 100 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| GFLCSW | HNO3 | 10.0 | 1000ml | JT BAKER | E01042 | - | - | | Expires: 3/1/08 |
| (MET1-60-A) | As, Pb, Se, Tl | 5.0 | 1000ml | QCP-CICV-3 | Z-CICPI9048 | 3/1/2008 | 2.5 | | |
| | Cd | - | - | QCP-CICV-3 | Z-CICPI9048 | 3/1/2008 | 1.25 | | |
| | Cu | 2.5 | 1000ml | MET-55-O | Z-CU0284 | 5/1/2008 | 2.5 | | |
| QCP-CICV-1 | Ca, Mg, Na, K | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 2500 | | Expires:1/1/09 |
| (MET1-63-A) | Al, Ba | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 1000 | | |
| | Fe | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 500 | | |
| | Co, Mn, Ni, V, Zn | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 250 | | |
| | Cu, Ag | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 125 | | |
| | Cr | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 100 | | |
| | Be | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 25 | | |
| QCP-CICV-2 (MET1-63-B) | Sb | no dilution | - | IV | Z-CICP19033 | 1/1/2009 | 500 | | Expires: 1/1/09 |
| QCP-CICV-3 | As, Pb, Se, Tl | no dilution | - | IV | Z-CICP19048 | 9/1/2008 | 500 | | Expires: 9/1/08 |
| (MET1-59-J) | Cd | no dilution | - | IV | Z-CICP19048 | 9/1/2008 | 250 | | |

* Denotes volume of 1000 ppm stock standard.

| Element | mls of | ppm | Source | Lot# / Lab Code | Exp. Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Element Analyzed Se Hydride Instrument K-FLAA-2
Service Request # K11649

Batch QC SR's #

Calibration Std. AA1-8-A
Starlims # 104556
Run # 011808-Se

# Hydride Data Review Form

| | Yes | No | NA |
|---|---|---|---|
| 1 ICV within 10% of true Value | X | | |
| 2. Calibration data included | X | | |
| 3. CCV's in control | X | | |
| 4. CCB's and/or ICB's below MRL | X | | |
| 5. All reported Results within Cal. Range | X | | |
| 6 All Calculations are Correct | X | | |

Comments
Sample quantified via single point MSA.

Primary Reviewed by [signature] Date 1/18/08
Secondary Reviewed by JPB Date 1/18/08

**COLUMBIA ANALYTICAL SERVICES, INC.**
**GFAA Run Log**

| | |
|---|---|
| **Method:** (Circle Method Used)<br>7742 7062<br>Other:__________<br>Element: As Se ____ | **Service Request # :** |

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ICV | - | 9.517 | 95% | |
| ICB | - | 0.281 | | |
| CRA | - | 0.671 | 134% | |
| CCV | - | 9.829 | 98% | |
| CCB | - | 0.207 | | |
| ~~K0711649-001~~ | ~~1/2~~ | ~~7.153~~ | | A 1/18/08 Rerun |
| ~~K0711649-001A~~ | ~~1/2~~ | ~~8.646~~ | | Rerun |
| CCV | - | 9.581 | 96% | |
| CCB | - | 0.301 | | |
| K0711649-MB | 1/2 | 0.310 | | |
| LCSS DOLT 1/20 | 1/2+1/10 | 3.000 | 85% | |
| K0711649-001 1/4 | 1/2+1/4 | 2.085 | | X= 4.681 |
| K0711649-001D 1/4 | 1/2+1/4 | 2.267 | | X= 5.159 |
| K0711649-001S 1/20 | 1/2+1/20 | 3.720 | | X= 4.688 |
| K0711649-002 1/4 | 1/2+1/4 | 2.355 | | X= 5.462 |
| K0711649-003 1/4 | 1/2+1/4 | 2.085 | | X= 4.652 |
| K0711649-004 1/4 | 1/2+1/4 | 2.485 | | X= 6.091 |
| K0711649-005 1/4 | 1/2+1/4 | 2.143 | | X= 4.771 |
| K0711649-006 1/4 | 1/2+1/4 | 2.100 | | X= 4.129 |
| CCV | - | 9.158 | 92% | |
| CCB | - | 0.129 | | |
| K0711649-007 1/4 | 1/2+1/4 | 1.783 | | X= 3.439 |
| K0711649-008 1/4 | 1/2+1/4 | 1.765 | | A 1/18/08 X= 3.209 |
| ~~K0711649-001A 1/4~~ | ~~1/2+1/4~~ | ~~2.590~~ | | Rerun |
| K0711649-001A 1/4 | 1/2+1/4 | 4.312 | 45% | |
| K0711649-001DA 1/4 | 1/2+1/4 | 4.464 | 44% | |
| K0711649-001SA 1/20 | 1/2+1/20 | 7.688 | 79% | |
| K0711649-002A 1/4 | 1/2+1/4 | 4.511 | 43% | |
| K0711649-003A 1/4 | 1/2+1/4 | 4.326 | 45% | |
| K0711649-004A 1/4 | 1/2+1/4 | 4.525 | 41% | |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| Dena Jurt | 1/18/08 | 1 |



R:\ICP\MISC\HG1631\1631 Run Log

**COLUMBIA ANALYTICAL SERVICES, INC.**

**GFAA Run Log**

| **Method:** (Circle Method Used) | **Service Request # :** |
|---|---|
| 7742 7062 | |
| Other:_________ | |
| Element: As Se ____ | |

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| K0711649-05A 1/4 | 1/2+1/4 | 4.389 | 45% | |
| CCV | - | 9.370 | 94% | |
| CCB | - | 0.269 | | |
| K0711649-006A 1/4 | 1/2+1/4 | 4.643 | 51% | |
| K0711649-007A 1/4 | 1/2+1/4 | 4.375 | 52% | |
| K0711649-008A 1/4 | 1/2+1/4 | 4.515 | 55% | |
| CCV | - | 9.456 | 95% | |
| CCB | - | 0.239 | | |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| Dena Jones | 1/18/08 | 2 |



R:\ICP\MISC\HG1631\1631 Run Log

Analysis Begun

Logged In Analyst: ACQMET10                    Technique: AA FIAS-Flame
Spectrometer Model: AAnalyst 200, S/N 200S5061701 Autosampler Model: AS-90

Sample Information File: C:\data-AA\ACQMET10\Sample Information\011808-Se.sif
Batch ID: 011808-Se
Results Data Set: 011808-Se
Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb

Sequence No.: 1                    Autosampler Location: 1
Sample ID: Cal Blk                    Date Collected: 1/18/2008 9:42:47 AM
Analyst:                    Data Type: Original

Replicate Data: Cal Blk

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.00] | 0.004 | 0.003 | 0.004 | | | 09:43:08 | Yes |
| 2 | | [0.00] | 0.006 | 0.018 | 0.006 | | | 09:43:42 | Yes |
| 3 | | [0.00] | 0.005 | 0.017 | 0.005 | | | 09:44:17 | Yes |
| Mean: | | [0.00] | 0.005 | | | | | | |
| SD: | | 0.00 | 0.0010 | | | | | | |
| %RSD: | | 0.00 | 19.96 | | | | | | |

Auto-zero performed.

Sequence No.: 2                    Autosampler Location: 2
Sample ID: Std 0.5                    Date Collected: 1/18/2008 9:45:06 AM
Analyst:                    Data Type: Original

Replicate Data: Std 0.5

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.5] | 0.007 | 0.033 | 0.011 | | | 09:45:28 | Yes |
| 2 | | [0.5] | 0.007 | 0.052 | 0.012 | | | 09:46:02 | Yes |
| 3 | | [0.5] | 0.008 | 0.057 | 0.013 | | | 09:46:36 | Yes |
| Mean: | | [0.5] | 0.007 | | | | | | |
| SD: | | 0.0 | 0.0010 | | | | | | |
| %RSD: | | 0.0 | 13.27 | | | | | | |

Standard number 1 applied. [0.5]
Correlation Coef.: 1.000000    Slope: 0.01434    Intercept: 0.00000

Sequence No.: 3                    Autosampler Location: 3
Sample ID: Std 1.0                    Date Collected: 1/18/2008 9:47:26 AM
Analyst:                    Data Type: Original

Replicate Data: Std 1.0

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [1.0] | 0.013 | 0.076 | 0.018 | | | 09:47:48 | Yes |
| 2 | | [1.0] | 0.013 | 0.078 | 0.018 | | | 09:48:23 | Yes |
| 3 | | [1.0] | 0.013 | 0.073 | 0.018 | | | 09:48:57 | Yes |
| Mean: | | [1.0] | 0.013 | | | | | | |
| SD: | | 0.0 | 0.0004 | | | | | | |
| %RSD: | | 0.0 | 2.85 | | | | | | |

Standard number 2 applied. [1.0]
Correlation Coef.: 0.990199    Slope: 0.01320    Intercept: 0.00000

Sequence No.: 4                    Autosampler Location: 4

**Sample ID: Std 5.0** **Date Collected: 1/18/2008 9:49:47 AM**
**Analyst:** **Data Type: Original**

---

**Replicate Data: Std 5.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [5.0] | 0.070 | 0.380 | 0.075 | | | 09:50:10 | Yes |
| 2 | | [5.0] | 0.067 | 0.347 | 0.072 | | | 09:50:44 | Yes |
| 3 | | [5.0] | 0.066 | 0.354 | 0.071 | | | 09:51:19 | Yes |
| Mean: | | [5.0] | 0.068 | | | | | | |
| SD: | | 0.0 | 0.0023 | | | | | | |
| %RSD: | | 0.0 | 3.36 | | | | | | |

Standard number 3 applied. [5.0]
Correlation Coef.: 0.999873 Slope: 0.01350 Intercept: 0.00000

---

**Sequence No.: 5** **Autosampler Location: 5**
**Sample ID: Std 10.0** **Date Collected: 1/18/2008 9:52:10 AM**
**Analyst:** **Data Type: Original**

---

**Replicate Data: Std 10.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [10.0] | 0.121 | 0.669 | 0.125 | | | 09:52:33 | Yes |
| 2 | | [10.0] | 0.114 | 0.614 | 0.119 | | | 09:53:07 | Yes |
| 3 | | [10.0] | 0.121 | 0.655 | 0.126 | | | 09:53:42 | Yes |
| Mean: | | [10.0] | 0.119 | | | | | | |
| SD: | | 0.0 | 0.0039 | | | | | | |
| %RSD: | | 0.0 | 3.28 | | | | | | |

Standard number 4 applied. [10.0]
Correlation Coef.: 0.996782 Slope: 0.01224 Intercept: 0.00000

---

**Sequence No.: 6** **Autosampler Location: 6**
**Sample ID: Std 15.0** **Date Collected: 1/18/2008 9:54:33 AM**
**Analyst:** **Data Type: Original**

---

**Replicate Data: Std 15.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [15.0] | 0.185 | 1.004 | 0.190 | | | 09:54:56 | Yes |
| 2 | | [15.0] | 0.178 | 0.950 | 0.183 | | | 09:55:31 | Yes |
| 3 | | [15.0] | 0.178 | 0.957 | 0.183 | | | 09:56:06 | Yes |
| Mean: | | [15.0] | 0.181 | | | | | | |
| SD: | | 0.0 | 0.0043 | | | | | | |
| %RSD: | | 0.0 | 2.39 | | | | | | |

Standard number 5 applied. [15.0]
Correlation Coef.: 0.998698 Slope: 0.01211 Intercept: 0.00000
The calibration curve may not be linear.

---

**Calibration data for Se 196.03** **Equation: Linear Through Zero**

| ID | Mean Signal (Abs) | Entered Conc. ug/L | Calculated Conc. ug/L | Standard Deviation | %RSD |
|---|---|---|---|---|---|
| Cal Blk | 0.0000 | 0 | 0.000 | 0.00 | 20.0 |
| Std 0.5 | 0.0072 | 0.5 | 0.592 | 0.00 | 13.3 |
| Std 1.0 | 0.0129 | 1.0 | 1.064 | 0.00 | 2.8 |
| Std 5.0 | 0.0676 | 5.0 | 5.580 | 0.00 | 3.4 |
| Std 10.0 | 0.1187 | 10.0 | 9.799 | 0.00 | 3.3 |
| Std 15.0 | 0.1805 | 15.0 | 14.907 | 0.00 | 2.4 |

Correlation Coef.: 0.998698 Slope: 0.01211 Intercept: 0.00000

Sequence No.: 7
Sample ID: ICV
Analyst:

Autosampler Location: 7
Date Collected: 1/18/2008 9:56:58 AM
Data Type: Original

Replicate Data: ICV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.849 | 9.849 | 0.119 | 0.669 | 0.124 | | | 09:57:22 | Yes |
| 2 | 9.405 | 9.405 | 0.114 | 0.618 | 0.119 | | | 09:57:56 | Yes |
| 3 | 9.296 | 9.296 | 0.113 | 0.610 | 0.117 | | | 09:58:30 | Yes |
| Mean: | 9.517 | 9.517 | 0.115 | | | | | | |
| SD: | 0.293 | 0.293 | 0.0036 | | | | | | |
| %RSD: | 3.080 | 3.080 | 3.08 | | | | | | |

QC value within limits for Se 196.03 Recovery = 95.17%
All analyte(s) passed QC.

Sequence No.: 8
Sample ID: ICB
Analyst:

Autosampler Location: 1
Date Collected: 1/18/2008 9:59:22 AM
Data Type: Original

Replicate Data: ICB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.259 | 0.259 | 0.003 | 0.037 | 0.008 | | | 09:59:44 | Yes |
| 2 | 0.403 | 0.403 | 0.005 | 0.044 | 0.010 | | | 10:00:18 | Yes |
| 3 | 0.182 | 0.182 | 0.002 | 0.029 | 0.007 | | | 10:00:52 | Yes |
| Mean: | 0.281 | 0.281 | 0.003 | | | | | | |
| SD: | 0.112 | 0.112 | 0.0014 | | | | | | |
| %RSD: | 39.86 | 39.86 | 39.86 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 9
Sample ID: CRA
Analyst:

Autosampler Location: 2
Date Collected: 1/18/2008 10:01:41 AM
Data Type: Original

Replicate Data: CRA

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.617 | 0.617 | 0.007 | 0.047 | 0.012 | | | 10:02:03 | Yes |
| 2 | 0.693 | 0.693 | 0.008 | 0.059 | 0.013 | | | 10:02:38 | Yes |
| 3 | 0.704 | 0.704 | 0.009 | 0.060 | 0.013 | | | 10:03:12 | Yes |
| Mean: | 0.671 | 0.671 | 0.008 | | | | | | |
| SD: | 0.047 | 0.047 | 0.0006 | | | | | | |
| %RSD: | 7.032 | 7.032 | 7.03 | | | | | | |

QC value within limits for Se 196.03 Recovery = 134.26%
All analyte(s) passed QC.

Sequence No.: 10
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 1/18/2008 10:04:01 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.58 | 10.58 | 0.128 | 0.701 | 0.133 | | | 10:04:24 | Yes |
| 2 | 9.438 | 9.438 | 0.114 | 0.624 | 0.119 | | | 10:04:58 | Yes |
| 3 | 9.472 | 9.472 | 0.115 | 0.618 | 0.120 | | | 10:05:32 | Yes |
| Mean: | 9.829 | 9.829 | 0.119 | | | | | | |

```
SD:    0.648       0.648      0.0078
%RSD:  6.590       6.590      6.59
   QC value within limits for Se 196.03  Recovery = 98.29%
All analyte(s) passed QC.
```

Sequence No.: 11
Sample ID: CCB
Analyst:
Autosampler Location: 1
Date Collected: 1/18/2008 10:06:23 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.266 | 0.266 | 0.003 | 0.038 | 0.008 | | | 10:06:44 | Yes |
| 2 | 0.205 | 0.205 | 0.002 | 0.018 | 0.007 | | | 10:07:18 | Yes |
| 3 | 0.152 | 0.152 | 0.002 | 0.029 | 0.007 | | | 10:07:53 | Yes |
| Mean: | 0.207 | 0.207 | 0.003 | | | | | | |
| SD: | 0.057 | 0.057 | 0.0007 | | | | | | |
| %RSD: | 27.56 | 27.56 | 27.56 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 12
Sample ID: K0711649-001
Analyst:
Autosampler Location: 9
Date Collected: 1/18/2008 10:08:42 AM
Data Type: Original

Replicate Data: K0711649-001

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.017 | 7.017 | 0.085 | 0.406 | 0.090 | | | 10:09:03 | Yes |
| 2 | 7.264 | 7.264 | 0.088 | 0.417 | 0.093 | | | 10:09:37 | Yes |
| 3 | 7.178 | 7.178 | 0.087 | 0.408 | 0.092 | | | 10:10:11 | Yes |
| Mean: | 7.153 | 7.153 | 0.087 | | | | | | |
| SD: | 0.125 | 0.125 | 0.0015 | | | | | | |
| %RSD: | 1.748 | 1.748 | 1.75 | | | | | | |

# 1/18/08

Sequence No.: 13
Sample ID: K0711649-001A
Analyst:
Autosampler Location: 10
Date Collected: 1/18/2008 10:11:00 AM
Data Type: Original

Replicate Data: K0711649-001A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.850 | 8.850 | 0.107 | 0.549 | 0.112 | | | 10:11:22 | Yes |
| 2 | 8.468 | 8.468 | 0.103 | 0.516 | 0.107 | | | 10:11:56 | Yes |
| 3 | 8.619 | 8.619 | 0.104 | 0.523 | 0.109 | | | 10:12:30 | Yes |
| Mean: | 8.646 | 8.646 | 0.105 | | | | | | |
| SD: | 0.192 | 0.192 | 0.0023 | | | | | | |
| %RSD: | 2.222 | 2.222 | 2.22 | | | | | | |

Sequence No.: 14
Sample ID: CCV
Analyst:
Autosampler Location: 5
Date Collected: 1/18/2008 10:13:20 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.860 | 9.860 | 0.119 | 0.657 | 0.124 | | | 10:13:42 | Yes |
| 2 | 9.352 | 9.352 | 0.113 | 0.633 | 0.118 | | | 10:14:17 | Yes |
| 3 | 9.531 | 9.531 | 0.115 | 0.639 | 0.120 | | | 10:14:51 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 9.581 | 9.581 | 0.116 |
| SD: | 0.258 | 0.258 | 0.0031 |
| %RSD: | 2.693 | 2.693 | 2.69 |

QC value within limits for Se 196.03 Recovery = 95.81%
All analyte(s) passed QC.

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**Sequence No.: 15** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 1/18/2008 10:15:42 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.319 | 0.319 | 0.004 | 0.036 | 0.009 | | | 10:16:03 | Yes |
| 2 | 0.290 | 0.290 | 0.004 | 0.041 | 0.008 | | | 10:16:37 | Yes |
| 3 | 0.295 | 0.295 | 0.004 | 0.033 | 0.008 | | | 10:17:11 | Yes |
| Mean: | 0.301 | 0.301 | 0.004 | | | | | | |
| SD: | 0.015 | 0.015 | 0.0002 | | | | | | |
| %RSD: | 5.108 | 5.108 | 5.11 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

==========

**Analysis Begun**

**Logged In Analyst: ACQMET10** **Technique: AA FIAS-Flame**
**Spectrometer Model: AAnalyst 200, S/N 200S5061701** **Autosampler Model: AS-90**

**Sample Information File: C:\data-AA\ACQMET10\Sample Information\011808-Se.sif**
**Batch ID: 011808-Se**
**Results Data Set: 011808-Se**
**Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb**

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**Sequence No.: 16** **Autosampler Location:**
**Sample ID: K0711649-MB** **Date Collected: 1/18/2008 10:23:32 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0711649-MB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.282 | 0.282 | 0.003 | 0.031 | 0.008 | | | 10:23:48 | Yes |
| 2 | 0.340 | 0.340 | 0.004 | 0.031 | 0.009 | | | 10:24:22 | Yes |
| 3 | 0.307 | 0.307 | 0.004 | 0.032 | 0.009 | | | 10:24:56 | Yes |
| Mean: | 0.310 | 0.310 | 0.004 | | | | | | |
| SD: | 0.029 | 0.029 | 0.0004 | | | | | | |
| %RSD: | 9.456 | 9.456 | 9.46 | | | | | | |

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**Sequence No.: 17** **Autosampler Location:**
**Sample ID: LCSS DOLT 1/20** **Date Collected: 1/18/2008 10:25:53 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: LCSS DOLT 1/20**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.069 | 3.069 | 0.037 | 0.235 | 0.042 | | | 10:26:09 | Yes |
| 2 | 2.994 | 2.994 | 0.036 | 0.197 | 0.041 | | | 10:26:43 | Yes |
| 3 | 2.938 | 2.938 | 0.036 | 0.213 | 0.040 | | | 10:27:17 | Yes |
| Mean: | 3.000 | 3.000 | 0.036 | | | | | | |
| SD: | 0.065 | 0.065 | 0.0008 | | | | | | |
| %RSD: | 2.178 | 2.178 | 2.18 | | | | | | |

Sequence No.: 18
Sample ID: K0711649-001 1/4
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 10:28:34 AM
Data Type: Original

Replicate Data: K0711649-001 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.094 | 2.094 | 0.025 | 0.146 | 0.030 | | | 10:28:51 | Yes |
| 2 | 2.006 | 2.006 | 0.024 | 0.132 | 0.029 | | | 10:29:25 | Yes |
| 3 | 2.156 | 2.156 | 0.026 | 0.148 | 0.031 | | | 10:29:59 | Yes |
| Mean: | 2.085 | 2.085 | 0.025 | | | | | | |
| SD: | 0.076 | 0.076 | 0.0009 | | | | | | |
| %RSD: | 3.626 | 3.626 | 3.63 | | | | | | |

Sequence No.: 19
Sample ID: K0711649-001D 1/4
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 10:31:07 AM
Data Type: Original

Replicate Data: K0711649-001D 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.213 | 2.213 | 0.027 | 0.147 | 0.032 | | | 10:31:23 | Yes |
| 2 | 2.241 | 2.241 | 0.027 | 0.153 | 0.032 | | | 10:31:57 | Yes |
| 3 | 2.346 | 2.346 | 0.028 | 0.153 | 0.033 | | | 10:32:31 | Yes |
| Mean: | 2.267 | 2.267 | 0.027 | | | | | | |
| SD: | 0.070 | 0.070 | 0.0008 | | | | | | |
| %RSD: | 3.094 | 3.094 | 3.09 | | | | | | |

Sequence No.: 20
Sample ID: K0711649-001S 1/20
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 10:33:47 AM
Data Type: Original

Replicate Data: K0711649-001S 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.782 | 3.782 | 0.046 | 0.269 | 0.051 | | | 10:34:03 | Yes |
| 2 | 3.741 | 3.741 | 0.045 | 0.256 | 0.050 | | | 10:34:38 | Yes |
| 3 | 3.636 | 3.636 | 0.044 | 0.257 | 0.049 | | | 10:35:12 | Yes |
| Mean: | 3.720 | 3.720 | 0.045 | | | | | | |
| SD: | 0.076 | 0.076 | 0.0009 | | | | | | |
| %RSD: | 2.030 | 2.030 | 2.03 | | | | | | |

Sequence No.: 21
Sample ID: K0711649-002 1/4
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 10:36:43 AM
Data Type: Original

Replicate Data: K0711649-002 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.321 | 2.321 | 0.028 | 0.144 | 0.033 | | | 10:36:59 | Yes |
| 2 | 2.387 | 2.387 | 0.029 | 0.157 | 0.034 | | | 10:37:34 | Yes |
| 3 | 2.358 | 2.358 | 0.029 | 0.157 | 0.033 | | | 10:38:08 | Yes |
| Mean: | 2.355 | 2.355 | 0.029 | | | | | | |
| SD: | 0.033 | 0.033 | 0.0004 | | | | | | |
| %RSD: | 1.401 | 1.401 | 1.40 | | | | | | |

Sequence No.: 22
Sample ID: K0711649-003 1/4

Autosampler Location:
Date Collected: 1/18/2008 10:39:19 AM

Analyst: Data Type: Original

Replicate Data: K0711649-003 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.146 | 2.146 | 0.026 | 0.142 | 0.031 | | | 10:39:35 | Yes |
| 2 | 2.163 | 2.163 | 0.026 | 0.143 | 0.031 | | | 10:40:09 | Yes |
| 3 | 1.946 | 1.946 | 0.024 | 0.104 | 0.028 | | | 10:40:44 | Yes |
| Mean: | 2.085 | 2.085 | 0.025 | | | | | | |
| SD: | 0.121 | 0.121 | 0.0015 | | | | | | |
| %RSD: | 5.787 | 5.787 | 5.79 | | | | | | |

Sequence No.: 23 Autosampler Location:
Sample ID: K0711649-004 1/4 Date Collected: 1/18/2008 10:41:52 AM
Analyst: Data Type: Original

Replicate Data: K0711649-004 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.520 | 2.520 | 0.031 | 0.176 | 0.035 | | | 10:42:08 | Yes |
| 2 | 2.363 | 2.363 | 0.029 | 0.158 | 0.033 | | | 10:42:42 | Yes |
| 3 | 2.574 | 2.574 | 0.031 | 0.165 | 0.036 | | | 10:43:16 | Yes |
| Mean: | 2.485 | 2.485 | 0.030 | | | | | | |
| SD: | 0.109 | 0.109 | 0.0013 | | | | | | |
| %RSD: | 4.405 | 4.405 | 4.41 | | | | | | |

Sequence No.: 24 Autosampler Location:
Sample ID: K0711649-005 1/4 Date Collected: 1/18/2008 10:44:24 AM
Analyst: Data Type: Original

Replicate Data: K0711649-005 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.134 | 2.134 | 0.026 | 0.135 | 0.031 | | | 10:44:40 | Yes |
| 2 | 2.103 | 2.103 | 0.025 | 0.125 | 0.030 | | | 10:45:15 | Yes |
| 3 | 2.192 | 2.192 | 0.027 | 0.138 | 0.031 | | | 10:45:51 | Yes |
| Mean: | 2.143 | 2.143 | 0.026 | | | | | | |
| SD: | 0.045 | 0.045 | 0.0005 | | | | | | |
| %RSD: | 2.102 | 2.102 | 2.10 | | | | | | |

Sequence No.: 25 Autosampler Location:
Sample ID: K0711649-006 1/4 Date Collected: 1/18/2008 10:46:55 AM
Analyst: Data Type: Original

Replicate Data: K0711649-006 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.166 | 2.166 | 0.026 | 0.136 | 0.031 | | | 10:47:12 | Yes |
| 2 | 2.146 | 2.146 | 0.026 | 0.155 | 0.031 | | | 10:47:47 | Yes |
| 3 | 1.988 | 1.988 | 0.024 | 0.108 | 0.029 | | | 10:48:22 | Yes |
| Mean: | 2.100 | 2.100 | 0.025 | | | | | | |
| SD: | 0.098 | 0.098 | 0.0012 | | | | | | |
| %RSD: | 4.653 | 4.653 | 4.65 | | | | | | |

Sequence No.: 26 Autosampler Location:
Sample ID: CCV Date Collected: 1/18/2008 10:49:31 AM
Analyst: Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.456 | 9.456 | 0.115 | 0.620 | 0.119 | | | 10:49:48 | Yes |
| 2 | 9.030 | 9.030 | 0.109 | 0.601 | 0.114 | | | 10:50:22 | Yes |
| 3 | 8.989 | 8.989 | 0.109 | 0.591 | 0.114 | | | 10:50:57 | Yes |
| Mean: | 9.158 | 9.158 | 0.111 | | | | | | |
| SD: | 0.259 | 0.259 | 0.0031 | | | | | | |
| %RSD: | 2.824 | 2.824 | 2.82 | | | | | | |

Sequence No.: 27
Sample ID: CCB
Analyst:
Autosampler Location:
Date Collected: 1/18/2008 10:51:58 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.141 | 0.141 | 0.002 | 0.016 | 0.007 | | | 10:52:14 | Yes |
| 2 | 0.216 | 0.216 | 0.003 | 0.036 | 0.007 | | | 10:52:48 | Yes |
| 3 | 0.029 | 0.029 | 0.000 | 0.008 | 0.005 | | | 10:53:23 | Yes |
| Mean: | 0.129 | 0.129 | 0.002 | | | | | | |
| SD: | 0.094 | 0.094 | 0.0011 | | | | | | |
| %RSD: | 73.15 | 73.15 | 73.15 | | | | | | |

Sequence No.: 28
Sample ID: K0711649-007 1/4
Analyst:
Autosampler Location:
Date Collected: 1/18/2008 10:54:34 AM
Data Type: Original

Replicate Data: K0711649-007 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.719 | 1.719 | 0.021 | 0.097 | 0.026 | | | 10:54:50 | Yes |
| 2 | 1.807 | 1.807 | 0.022 | 0.119 | 0.027 | | | 10:55:25 | Yes |
| 3 | 1.823 | 1.823 | 0.022 | 0.121 | 0.027 | | | 10:55:59 | Yes |
| Mean: | 1.783 | 1.783 | 0.022 | | | | | | |
| SD: | 0.056 | 0.056 | 0.0007 | | | | | | |
| %RSD: | 3.158 | 3.158 | 3.16 | | | | | | |

Sequence No.: 29
Sample ID: K0711649-008 1/4
Analyst:
Autosampler Location:
Date Collected: 1/18/2008 10:57:03 AM
Data Type: Original

Replicate Data: K0711649-008 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.842 | 1.842 | 0.022 | 0.128 | 0.027 | | | 10:57:20 | Yes |
| 2 | 1.787 | 1.787 | 0.022 | 0.128 | 0.027 | | | 10:57:54 | Yes |
| 3 | 1.667 | 1.667 | 0.020 | 0.094 | 0.025 | | | 10:58:29 | Yes |
| Mean: | 1.765 | 1.765 | 0.021 | | | | | | |
| SD: | 0.090 | 0.090 | 0.0011 | | | | | | |
| %RSD: | 5.075 | 5.075 | 5.08 | | | | | | |

Sequence No.: 30
Sample ID: K0711649-001A 1/4
Analyst:
Autosampler Location:
Date Collected: 1/18/2008 10:59:37 AM
Data Type: Original

JL 1/18/08

Replicate Data: K0711649-001A 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.499 | 2.499 | 0.030 | 0.183 | 0.035 | | | 10:59:53 | Yes |
| 2 | 2.567 | 2.567 | 0.031 | 0.185 | 0.036 | | | 11:00:27 | Yes |
| 3 | 2.704 | 2.704 | 0.033 | 0.208 | 0.038 | | | 11:01:00 | Yes |
| Mean: | 2.590 | 2.590 | 0.031 | | | | | | |
| SD: | 0.105 | 0.105 | 0.0013 | | | | | | |
| %RSD: | 4.040 | 4.040 | 4.04 | | | | | | |

1/18/08

================================================================================

**Sequence No.: 31** **Autosampler Location:**
**Sample ID: K0711649-001A 1/4** **Date Collected: 1/18/2008 12:15:14 PM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0711649-001A 1/4**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.382 | 4.382 | 0.053 | 0.341 | 0.058 | | | 12:15:32 | Yes |
| 2 | 4.216 | 4.216 | 0.051 | 0.318 | 0.056 | | | 12:16:07 | Yes |
| 3 | 4.339 | 4.339 | 0.053 | 0.333 | 0.057 | | | 12:16:42 | Yes |
| Mean: | 4.312 | 4.312 | 0.052 | | | | | | |
| SD: | 0.086 | 0.086 | 0.0010 | | | | | | |
| %RSD: | 2.000 | 2.000 | 2.00 | | | | | | |

================================================================================

**Sequence No.: 32** **Autosampler Location:**
**Sample ID: K0711649-001DA 1/4** **Date Collected: 1/18/2008 12:17:46 PM**
**Analyst:** **Data Type: Original**

--------------------------------------------------------------------------------

**Replicate Data: K0711649-001DA 1/4**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.669 | 4.669 | 0.057 | 0.365 | 0.061 | | | 12:18:03 | Yes |
| 2 | 4.318 | 4.318 | 0.052 | 0.326 | 0.057 | | | 12:18:39 | Yes |
| 3 | 4.407 | 4.407 | 0.053 | 0.327 | 0.058 | | | 12:19:14 | Yes |
| Mean: | 4.464 | 4.464 | 0.054 | | | | | | |
| SD: | 0.182 | 0.182 | 0.0022 | | | | | | |
| %RSD: | 4.086 | 4.086 | 4.09 | | | | | | |

================================================================================

**Sequence No.: 33** **Autosampler Location:**
**Sample ID: K0711649-001SA 1/20** **Date Collected: 1/18/2008 12:20:17 PM**
**Analyst:** **Data Type: Original**

--------------------------------------------------------------------------------

**Replicate Data: K0711649-001SA 1/20**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.027 | 8.027 | 0.097 | 0.579 | 0.102 | | | 12:20:34 | Yes |
| 2 | 7.435 | 7.435 | 0.090 | 0.543 | 0.095 | | | 12:21:09 | Yes |
| 3 | 7.603 | 7.603 | 0.092 | 0.530 | 0.097 | | | 12:21:44 | Yes |
| Mean: | 7.688 | 7.688 | 0.093 | | | | | | |
| SD: | 0.305 | 0.305 | 0.0037 | | | | | | |
| %RSD: | 3.971 | 3.971 | 3.97 | | | | | | |

================================================================================

**Sequence No.: 34** **Autosampler Location:**
**Sample ID: K0711649-002A 1/4** **Date Collected: 1/18/2008 12:22:48 PM**
**Analyst:** **Data Type: Original**

--------------------------------------------------------------------------------

**Replicate Data: K0711649-002A 1/4**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.602 | 4.602 | 0.056 | 0.357 | 0.061 | | | 12:23:04 | Yes |
| 2 | 4.506 | 4.506 | 0.055 | 0.338 | 0.059 | | | 12:23:39 | Yes |
| 3 | 4.423 | 4.423 | 0.054 | 0.332 | 0.058 | | | 12:24:14 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 4.511 | 4.511 | 0.055 |
| SD: | 0.090 | 0.090 | 0.0011 |
| %RSD: | 1.989 | 1.989 | 1.99 |

**Sequence No.: 35** **Autosampler Location:**
**Sample ID: K0711649-003A 1/4** **Date Collected: 1/18/2008 12:25:17 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711649-003A 1/4**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.400 | 4.400 | 0.053 | 0.339 | 0.058 | | | 12:25:33 | Yes |
| 2 | 4.278 | 4.278 | 0.052 | 0.318 | 0.057 | | | 12:26:08 | Yes |
| 3 | 4.299 | 4.299 | 0.052 | 0.313 | 0.057 | | | 12:26:42 | Yes |
| Mean: | 4.326 | 4.326 | 0.052 | | | | | | |
| SD: | 0.065 | 0.065 | 0.0008 | | | | | | |
| %RSD: | 1.509 | 1.509 | 1.51 | | | | | | |

**Sequence No.: 36** **Autosampler Location:**
**Sample ID: K0711649-004A 1/4** **Date Collected: 1/18/2008 12:28:02 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711649-004A 1/4**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.596 | 4.596 | 0.056 | 0.350 | 0.061 | | | 12:28:18 | Yes |
| 2 | 4.530 | 4.530 | 0.055 | 0.344 | 0.060 | | | 12:28:53 | Yes |
| 3 | 4.447 | 4.447 | 0.054 | 0.330 | 0.059 | | | 12:29:27 | Yes |
| Mean: | 4.525 | 4.525 | 0.055 | | | | | | |
| SD: | 0.075 | 0.075 | 0.0009 | | | | | | |
| %RSD: | 1.656 | 1.656 | 1.66 | | | | | | |

**Sequence No.: 37** **Autosampler Location:**
**Sample ID: K0711649-05A 1/4** **Date Collected: 1/18/2008 12:30:31 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0711649-05A 1/4**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.387 | 4.387 | 0.053 | 0.333 | 0.058 | | | 12:30:48 | Yes |
| 2 | 4.289 | 4.289 | 0.052 | 0.314 | 0.057 | | | 12:31:22 | Yes |
| 3 | 4.490 | 4.490 | 0.054 | 0.322 | 0.059 | | | 12:31:57 | Yes |
| Mean: | 4.389 | 4.389 | 0.053 | | | | | | |
| SD: | 0.100 | 0.100 | 0.0012 | | | | | | |
| %RSD: | 2.289 | 2.289 | 2.29 | | | | | | |

**Sequence No.: 38** **Autosampler Location:**
**Sample ID: CCV** **Date Collected: 1/18/2008 12:33:06 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: CCV**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.843 | 9.843 | 0.119 | 0.667 | 0.124 | | | 12:33:22 | Yes |
| 2 | 9.178 | 9.178 | 0.111 | 0.634 | 0.116 | | | 12:33:57 | Yes |
| 3 | 9.090 | 9.090 | 0.110 | 0.633 | 0.115 | | | 12:34:31 | Yes |
| Mean: | 9.370 | 9.370 | 0.113 | | | | | | |
| SD: | 0.412 | 0.412 | 0.0050 | | | | | | |
| %RSD: | 4.395 | 4.395 | 4.39 | | | | | | |

Sequence No.: 39
Sample ID: CCB
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 12:35:31 PM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.251 | 0.251 | 0.003 | 0.041 | 0.008 | | | 12:35:47 | Yes |
| 2 | 0.277 | 0.277 | 0.003 | 0.039 | 0.008 | | | 12:36:22 | Yes |
| 3 | 0.280 | 0.280 | 0.003 | 0.040 | 0.008 | | | 12:36:56 | Yes |
| Mean: | 0.269 | 0.269 | 0.003 | | | | | | |
| SD: | 0.016 | 0.016 | 0.0002 | | | | | | |
| %RSD: | 5.828 | 5.828 | 5.83 | | | | | | |

Sequence No.: 40
Sample ID: K0711649-006A 1/4
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 12:37:54 PM
Data Type: Original

Replicate Data: K0711649-006A 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.796 | 4.796 | 0.058 | 0.357 | 0.063 | | | 12:38:10 | Yes |
| 2 | 4.517 | 4.517 | 0.055 | 0.335 | 0.060 | | | 12:38:44 | Yes |
| 3 | 4.616 | 4.616 | 0.056 | 0.337 | 0.061 | | | 12:39:19 | Yes |
| Mean: | 4.643 | 4.643 | 0.056 | | | | | | |
| SD: | 0.142 | 0.142 | 0.0017 | | | | | | |
| %RSD: | 3.054 | 3.054 | 3.05 | | | | | | |

Sequence No.: 41
Sample ID: K0711649-007A 1/4
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 12:40:15 PM
Data Type: Original

Replicate Data: K0711649-007A 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.411 | 4.411 | 0.053 | 0.330 | 0.058 | | | 12:40:32 | Yes |
| 2 | 4.382 | 4.382 | 0.053 | 0.338 | 0.058 | | | 12:41:06 | Yes |
| 3 | 4.332 | 4.332 | 0.052 | 0.322 | 0.057 | | | 12:41:40 | Yes |
| Mean: | 4.375 | 4.375 | 0.053 | | | | | | |
| SD: | 0.040 | 0.040 | 0.0005 | | | | | | |
| %RSD: | 0.923 | 0.923 | 0.92 | | | | | | |

Sequence No.: 42
Sample ID: K0711649-008A 1/4
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 12:42:39 PM
Data Type: Original

Replicate Data: K0711649-008A 1/4

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.745 | 4.745 | 0.057 | 0.371 | 0.062 | | | 12:42:55 | Yes |
| 2 | 4.438 | 4.438 | 0.054 | 0.323 | 0.059 | | | 12:43:29 | Yes |
| 3 | 4.361 | 4.361 | 0.053 | 0.334 | 0.058 | | | 12:44:02 | Yes |
| Mean: | 4.515 | 4.515 | 0.055 | | | | | | |
| SD: | 0.203 | 0.203 | 0.0025 | | | | | | |
| %RSD: | 4.501 | 4.501 | 4.50 | | | | | | |

Sequence No.: 43

Autosampler Location:

Sample ID: CCV
Analyst:

Date Collected: 1/18/2008 12:45:17 PM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.739 | 9.739 | 0.118 | 0.669 | 0.123 | | | 12:45:32 | Yes |
| 2 | 9.227 | 9.227 | 0.112 | 0.631 | 0.117 | | | 12:46:04 | Yes |
| 3 | 9.401 | 9.401 | 0.114 | 0.636 | 0.119 | | | 12:46:37 | Yes |
| Mean: | 9.456 | 9.456 | 0.115 | | | | | | |
| SD: | 0.261 | 0.261 | 0.0032 | | | | | | |
| %RSD: | 2.755 | 2.755 | 2.75 | | | | | | |

Sequence No.: 44
Sample ID: CCB
Analyst:

Autosampler Location:
Date Collected: 1/18/2008 12:47:30 PM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.317 | 0.317 | 0.004 | 0.049 | 0.009 | | | 12:47:46 | Yes |
| 2 | 0.247 | 0.247 | 0.003 | 0.033 | 0.008 | | | 12:48:18 | Yes |
| 3 | 0.154 | 0.154 | 0.002 | 0.013 | 0.007 | | | 12:48:51 | Yes |
| Mean: | 0.239 | 0.239 | 0.003 | | | | | | |
| SD: | 0.081 | 0.081 | 0.0010 | | | | | | |
| %RSD: | 34.03 | 34.03 | 34.03 | | | | | | |

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

February 7, 2008 Analytical Report for Service Request No: K0712111

Kathy Tegtmeyer
New Fields Environmental
4720 Walnut St., Suite 200
Boulder, CO 80301

**RE: Se in Tissue**

Dear Kathy:

Enclosed are the results of the samples submitted to our laboratory on December 21, 2007. For your reference, these analyses have been assigned our service request number K0712111.

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 3316. You may also contact me via Email at JChristian@caslab.com.

Respectfully submitted,

**Columbia Analytical Services, Inc.**

Jeff Christian
Laboratory Director

JC/lb



NELAP Accredited ACIL Seal of Excellence Award 100% Recycled

## 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) | - |

MEMBER ACIL

nelac

# Case Narrative

**COLUMBIA ANALYTICAL SERVICES, INC.**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request No.:** | K0712111 |
| **Project:** | Tissue - Se | **Date Received:** | 1/21/07 |
| **Sample Matrix:** | Tissue | | |

## 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

Tissue samples were received for analysis at Columbia Analytical Services on 1/21/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored frozen at −20°C upon receipt at the laboratory.

### Total Metals

**General Comments:**
The samples were freeze-dried to determine moisture and to allow complete homogenization of the dry material. The dried material was milled to a fine meal, and then sub-sampled for digestion. A thorough digestion was performed prior to instrumental analysis to convert all Selenium species to Selenate. Prior to hydride formation, the valence was adjusted by reduction to Selenite.

No anomalies associated with the analysis of these samples were observed.

**Approved by** [signature] **Date** 2/8/08

# Chain of Custody Documentation

# Chain of Custody

Page 1 of 3

NEWFIELDS

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679

**Project Contact** Sean Covington/Kathy Tegtmeyer **PO** 0442-004-900.70

**Courier/Airbill:**

**Shipped to:** Columbia Analytical Services, Inc.
1317 South 13th Ave
Kelso, WA 98626

**Telephone:** (360) 430-7733

CoC Tape # 40312

**COC #:** K0712411

| Sample ID | Sample Date | Sample Time | Matrix | Tot/ Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|
| SM1007-SNFH-FT0058 | 10/25/2007 | 1200 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0059 | 10/25/2007 | 1200 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0060 | 10/25/2007 | 1345 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0061 | 10/25/2007 | 1415 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0062 | 10/25/2007 | 1410 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0063 | 10/25/2007 | 1430 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0064 | 10/25/2007 | 1535 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1007-SNFH-FT0065 | 10/25/2007 | 1540 | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0066 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0067 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0068 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0069 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0070 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0071 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0072 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0073 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0074 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0075 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |

Sampler Signature: [signature]

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| [signature] | 12/20/07 @ 1500 | [signature] | 12/21/07 1200 |

LAB USE ONLY—Sample condition on Receipt

# Chain of Custody Page 2 of 3

NEWFIELDS

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679

**Project Contact** Sean Covington/Kathy Tegtmeyer **PO** 0442-004-900.70

**Courier/Airbill:**

**Shipped to:** Columbia Analytical Services, Inc.
1317 South 13th Ave
Kelso, WA 98626

**Telephone:** (360) 430-7733

Coz tape # 40312

**COC #:** K0712111

| Sample ID | Sample Date | Sample Time | Matrix | Tot/ Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|
| SM1107-LSV2c-FT0076 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0077 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0078 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-LSV2c-FT0079 | 11/14/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0080 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0081 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0082 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0083 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0084 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0085 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0086 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0087 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC150-FT0088 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC350-FT0089 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC350-FT0090 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1107-CC350-FT0091 | 11/15/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |
| SM1207-SPCFH-FT0092 | 12/4/2007 | | Egg Tissue | Tot | Selenium, % Solids | Dry Ice | | |

Sampler Signature: [signature]

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| [signature] | 12/20/07 e 1500 | [signature] | 12/21/07 1200 |

LAB USE ONLY -- Sample condition on Receipt

# Chain of Custody Page 3 of 3

NEWFIELDS

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679

**Project Contact** Sean Covington/Kathy Tegtmeyer **PO** 0442-004-900.70

**Courier/Airbill:**

**Shipped to:** Columbia Analytical Services, Inc.
1317 South 13th Ave
Kelso, WA 98626

**Telephone:** (360) 430-7733

**COC #:** K0712111

| Sample ID | Sample Date | Sample Time | Matrix | Tot/ Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|

**Total Number of Containers:** 35 **Individual Lines Reflect Single Containers, Except for Aqueous Analyses Assigned as Laboratory QC**

Sampler Signature:

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| | 12/20/07 c 1500 | | 12/21/07 1200 |
| | | | |
| | | | |

LAB USE ONLY—Sample condition on Receipt

# Columbia Analytical Services, Inc.
## Cooler Receipt and Preservation Form

PC JCules

Client / Project: New fields Service Request K07 12111

Received: 12-21-2007 Opened: 12-21-2007 By: DJ

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? Front
   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: 7904 1025 9599 NA Y N
5. **Temperature of cooler(s) upon receipt (°C):** -8.4
   **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* Dry Ice
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
    **Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?** **NA** Y N
16. Was Cl2/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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

*litional Notes, Discrepancies, & Resolutions:*

*Page 1 of:* 1 2

# Total Solids

# COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project:** | Se in Tissue | **Date Collected:** | 10/25-11/14/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/21/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| Sample Name | Lab Code | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|
| SM1007-SNFH-FT0058 | K0712111-001 | 1/10/08 | 31.2 | |
| SM1007-SNFH-FT0059 | K0712111-002 | 1/10/08 | 26.0 | |
| SM1007-SNFH-FT0060 | K0712111-003 | 1/10/08 | 31.1 | |
| SM1007-SNFH-FT0061 | K0712111-004 | 1/10/08 | 23.8 | |
| SM1007-SNFH-FT0062 | K0712111-005 | 1/10/08 | 31.0 | |
| SM1007-SNFH-FT0063 | K0712111-006 | 1/10/08 | 29.5 | |
| SM1007-SNFH-FT0064 | K0712111-007 | 1/10/08 | 27.9 | |
| SM1007-SNFH-FT0065 | K0712111-008 | 1/10/08 | 29.8 | |
| SM1107-LSV2c-FT0066 | K0712111-009 | 1/10/08 | 32.4 | |
| SM1107-LSV2c-FT0067 | K0712111-010 | 1/10/08 | 33.9 | |
| SM1107-LSV2c-FT0068 | K0712111-011 | 1/10/08 | 32.1 | |
| SM1107-LSV2c-FT0069 | K0712111-012 | 1/10/08 | 32.9 | |
| SM1107-LSV2c-FT0070 | K0712111-013 | 1/10/08 | 25.8 | |
| SM1107-LSV2c-FT0071 | K0712111-014 | 1/10/08 | 32.2 | |
| SM1107-LSV2c-FT0072 | K0712111-015 | 1/10/08 | 32.1 | |
| SM1107-LSV2c-FT0073 | K0712111-016 | 1/10/08 | 33.4 | |
| SM1107-LSV2c-FT0074 | K0712111-017 | 1/10/08 | 30.6 | |
| SM1107-LSV2c-FT0075 | K0712111-018 | 1/10/08 | 31.4 | |
| SM1107-LSV2c-FT0076 | K0712111-019 | 1/10/08 | 31.7 | |
| SM1107-LSV2c-FT0077 | K0712111-020 | 1/10/08 | 31.7 | |

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project:** | Se in Tissue | **Date Collected:** | 11/14-12/4/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/21/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| Sample Name | Lab Code | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|
| SM1107-LSV2c-FT0078 | K0712111-021 | 1/10/08 | 32.6 | |
| SM1107-LSV2c-FT0079 | K0712111-022 | 1/10/08 | 33.9 | |
| SM1107-CC150-FT0080 | K0712111-023 | 1/10/08 | 31.9 | |
| SM1107-CC150-FT0081 | K0712111-024 | 1/10/08 | 30.6 | |
| SM1107-CC150-FT0082 | K0712111-025 | 1/10/08 | 30.5 | |
| SM1107-CC150-FT0083 | K0712111-026 | 1/10/08 | 30.4 | |
| SM1107-CC150-FT0084 | K0712111-027 | 1/10/08 | 31.0 | |
| SM1107-CC150-FT0085 | K0712111-028 | 1/10/08 | 32.2 | |
| SM1107-CC150-FT0086 | K0712111-029 | 1/10/08 | 32.2 | |
| SM1107-CC150-FT0087 | K0712111-030 | 1/10/08 | 33.1 | |
| SM1107-CC150-FT0088 | K0712111-031 | 1/10/08 | 31.9 | |
| SM1107-CC350-FT0089 | K0712111-032 | 1/10/08 | 29.9 | |
| SM1107-CC350-FT0090 | K0712111-033 | 1/10/08 | 31.9 | |
| SM1107-CC350-FT0091 | K0712111-034 | 1/10/08 | 33.5 | |
| SM1207-SPCFH-FT0092 | K0712111-035 | 1/10/08 | 33.2 | |

**COLUMBIA ANALYTICAL SERVICES, INC.**

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project:** | Se in Tissue | **Date Collected:** | 10/25/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/21/07 |
| | | **Date Extracted:** | NA |
| | | **Date Analyzed:** | 1/10/08 |

Duplicate Summary
Total Metals

| | | | |
|---|---|---|---|
| Sample Name: | SM1007-SNFH-FT0058 | Units: | PERCENT |
| Lab Code: | K0712111-001D | Basis: | Wet |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | Sample Result | Duplicate Sample Result | Average | Relative Percent Difference | Result Notes |
|---|---|---|---|---|---|---|---|
| Solids, Total | NA | Freeze Dry | 31.2 | 28.3 | 29.8 | 10 | |

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project:** | Se in Tissue | **Date Collected:** | 11/14/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 12/21/07 |
| | | **Date Extracted:** | NA |
| | | **Date Analyzed:** | 1/10/08 |

Duplicate Summary
Total Metals

| | | | |
|---|---|---|---|
| Sample Name: | SM1107-LSV2c-FT0070 | Units: | PERCENT |
| Lab Code: | K0712111-013D | Basis: | Wet |
| Test Notes: | | | |

| Analyte | Prep Method | Analysis Method | Sample Result | Duplicate Sample Result | Average | Relative Percent Difference | Result Notes |
|---|---|---|---|---|---|---|---|
| Solids, Total | NA | Freeze Dry | 25.8 | 29.1 | 27.4 | 12 | |

Service Request #: K0712111

Analysis For: Freeze Dried Solids

Analytical Batch
KA0628234

| Lab Code | Wet Weight (g) | Tare (g) | Tare + Dry Wt.(g) | Dry Weight (g) | % Total Solids |
|---|---|---|---|---|---|
| K0712111-001 | 24.59 | 81.87 | 89.53 | 7.66 | 31.2 |
| EW 1-11-08 ~~-002~~ | ~~24.62~~ | ~~81.38~~ | ~~88.39~~ EW 1-14-08 | ~~6.96~~ | AB 1/14/08 |
| -001D | 24.62 | 81.93 | 88.89 ~~88.34~~ | 6.96 | 28.3 |
| -002 | 24.68 | 81.93 | 88.34 | 6.41 | 26.0 |
| -003 | 24.51 | 81.83 | 89.45 | 7.62 | 31.1 |
| -004 | 24.37 | 81.86 | 87.67 | 5.81 | 23.8 |
| -005 | 24.00 | 81.96 | 89.40 | 7.44 | 31.0 |
| -006 | 23.56 | 81.91 | 88.86 | 6.95 | 29.5 |
| -007 | 23.69 | 81.97 | 88.59 | 6.62 | 27.9 |
| -008 | 24.95 | 82.06 | 89.49 | 7.43 | 29.8 |
| -009 | 23.13 | 81.73 | 89.23 | 7.50 | 32.4 |
| -010 | 4.33 | 81.18 | 82.65 | 1.47 | 33.9 |
| -011 | 15.12 | 81.84 | 86.70 | 4.86 | 32.1 |
| -012 | 10.18 | 81.31 | 84.66 | 3.35 | 32.9 |
| -013 | 24.93 | 81.87 | 88.30 | 6.43 | 25.8 |
| -013D | 24.87 | 81.30 | 88.54 | 7.24 | 29.1 |
| -014 | 14.89 | 82.00 | 86.80 | 4.80 | 32.2 |
| -015 | 4.58 | 81.04 | 82.51 | 1.47 | 32.1 |
| -016 | 3.32 | 81.46 | 82.57 | 1.11 | 33.4 |
| -017 | 24.15 | 81.75 | 89.14 | 7.39 | 30.6 |
| -018 | 14.73 | 81.93 | 86.56 | 4.63 | 31.4 |
| -019 | 9.73 | 81.04 | 84.12 | 3.08 | 31.7 |
| -020 | 17.79 | 81.38 | 87.02 | 5.64 | 31.7 |
| -021 | 8.09 | 81.79 | 84.43 | 2.64 | 32.6 |
| -022 | 23.47 | 81.39 | 89.35 | 7.96 | 33.9 |
| -023 | 24.44 | 81.18 | 88.97 | 7.79 | 31.9 |
| -024 | 10.48 | 82.02 | 85.23 | 3.21 | 30.6 |

Time In: 4:00p.m. 1/11/08 Time Out: 9:00a.m. 1/14/08

Comments:

Balance 23

$\bar{x}$ = RPD =

| | |
|---|---|
| Analyst: [signature] | Date: 1/10/08 |
| Reviewed By: [signature] | Date: 1/30/08 |

FREZ-DRY

Service Request #: K0712111

Analysis For: Freeze Dried Solids

| Lab Code | Wet Weight (g) | Tare (g) | Tare + Dry Wt.(g) | Dry Weight (g) | % Total Solids |
|---|---|---|---|---|---|
| K0712111-025 | 11.12 | 81.54 | 84.93 | 3.39 | 30.5 |
| -026 | 24.64 | 81.47 | 88.95 | 7.48 | 30.4 |
| -027 | 22.47 | 82.05 | 89.01 | 6.96 | 31.0 |
| -028 | 24.77 | 81.97 | 89.95 | 7.98 | 32.2 |
| -029 | 8.30 | 82.24 | EW 1/10/08 ~~87.52~~ 84.91 | 2.67 | 32.2 |
| -030 | 18.36 | 81.45 | 87.52 | 6.07 | 33.1 |
| -031 | 23.00 | 82.01 | 89.35 | 7.34 | 31.9 |
| -032 | 24.74 | 82.08 | 89.47 | 7.39 | 29.9 |
| -033 | 23.64 | 81.54 | 89.07 | 7.53 | 31.9 |
| -034 | 21.06 | 82.06 | 89.11 | 7.05 | 33.5 |
| -035 | 24.60 | 81.31 | 89.47 | 8.16 | 33.2 |

EW 1/10/08

Time In : 

Time Out: 

Comments:

$\bar{x}$ = 

RPD =

| | |
|---|---|
| Analyst: [signature] | Date: 1/10/08 |
| Reviewed By: [signature] | Date: 1/30/08 |

Columbia Analytical Services, Inc.

| Sample Number(s): As Listed | Service Request Number(s): K0712111 |
|---|---|

## TISSUE COMPOSITION DATA

| Laboratory ID | Weight (g) | Tare (g) | | | Matrix | Length | |
|---|---|---|---|---|---|---|---|
| K0712111-01 | ~~256.10~~ 248.57 | 275.57 | | | fish eggs | | |
| -02 | 237.34 | 275.95 | | | | | |
| -03 | ~~638.05~~ 362.50 | 275.55 | | | | | |
| -04 | 41.79 | 275.68 | | | | | |
| -05 | 359.85 | 275.49 | | | | | |
| -06 | 186.99 | 275.83 | | | | | |
| -07 | 196.20 | 275.91 | | | | | |
| -08 | 238.70 | 275.34 | | | | | |
| -09 | 25.28 | 275.09 | | | | | |
| -10 | 5.15 | 275.02 | | | | | |
| -11 | 15.62 | 275.91 | | | | | |
| -12 | 10.69 | 274.79 | | | | | |
| -13 | 125.82 | 276.96 | | | | | |
| -14 | 15.40 | 277.09 | | | | | |
| -15 | 4.88 | 276.85 | | | | | |
| -16 | 3.58 | 276.31 | | | | | |
| -17 | 38.11 | 277.22 | | | | | |
| -18 | 15.09 | 277.03 | | | | | |
| -19 | 10.09 | 276.73 | | | | | |
| -20 | 18.17 | 276.45 | | | | | |
| -21 | 8.58 | 276.35 | | | | | |
| -22 | 28.87 | 276.76 | | | | | |
| -23 | 33.31 | 277.00 | | | | | |
| -24 | 11.15 | 276.74 | | | | | |
| -25 | 11.59 | 278.02 | | | | | |

Comments:

| Analyst: [signature] | Date: 1/10/08 |
|---|---|
| Reviewed: [signature] | Date: 1/30/08 |

Columbia Analytical Services, Inc.

| Sample Number(s): As Listed | Service Request Number(s): K0712111 |
|---|---|

## TISSUE COMPOSITION DATA

| Laboratory ID | Weight (g) | Tare (g) | | | Matrix | Length | |
|---|---|---|---|---|---|---|---|
| K0712111-26 | 42.58 | 277.17 | | | fish eggs | | |
| -27 | 23.04 | 278.07 | | | | | |
| -28 | 79.49 | 278.23 | | | | | |
| -29 | 8.72 | 277.73 | | | | | |
| -30 | 18.85 | 278.29 | | | | | |
| -31 | 37.67 | 278.18 | | | | | |
| -32 | 38.69 | 278.33 | | | | | |
| -33 | 30.08 | 277.28 | | | | | |
| -34 | 21.74 | 278.25 | | | | | |
| -35 | 68.60 | 277.40 | | | | | |

EW 1/10/08

Comments:

| Analyst: [signature] | Date: 1-10-08 |
|---|---|
| Reviewed: [signature] | Date: 1/30/08 |

R:\ICP\misc\digforms\TISSUEBENCHSHT

# Metals

# Columbia Analytical Services

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project Name:** Se in Tissue
**Project No.:**

**Service Request:** K0712111

| Sample Name: | Lab Code: |
|---|---|
| SM1007-SNFH-FT0058 | K0712111-001 |
| SM1007-SNFH-FT0058D | K0712111-001D |
| SM1007-SNFH-FT0058S | K0712111-001S |
| SM1007-SNFH-FT0059 | K0712111-002 |
| SM1007-SNFH-FT0060 | K0712111-003 |
| SM1007-SNFH-FT0061 | K0712111-004 |
| SM1007-SNFH-FT0062 | K0712111-005 |
| SM1007-SNFH-FT0063 | K0712111-006 |
| SM1007-SNFH-FT0064 | K0712111-007 |
| SM1007-SNFH-FT0065 | K0712111-008 |
| SM1107-LSV2c-FT0066 | K0712111-009 |
| SM1107-LSV2c-FT0067 | K0712111-010 |
| SM1107-LSV2c-FT0068 | K0712111-011 |
| SM1107-LSV2c-FT0069 | K0712111-012 |
| SM1107-LSV2c-FT0070 | K0712111-013 |
| SM1107-LSV2c-FT0071 | K0712111-014 |
| SM1107-LSV2c-FT0072 | K0712111-015 |
| SM1107-LSV2c-FT0073 | K0712111-016 |
| SM1107-LSV2c-FT0074 | K0712111-017 |
| SM1107-LSV2c-FT0075 | K0712111-018 |
| SM1107-LSV2c-FT0076 | K0712111-019 |
| SM1107-LSV2c-FT0077 | K0712111-020 |
| SM1107-LSV2c-FT0078 | K0712111-021 |
| SM1107-LSV2c-FT0079 | K0712111-022 |
| SM1107-LSV2c-FT0079D | K0712111-022D |
| SM1107-LSV2c-FT0079S | K0712111-022S |
| SM1107-CC150-FT0080 | K0712111-023 |
| SM1107-CC150-FT0081 | K0712111-024 |
| SM1107-CC150-FT0082 | K0712111-025 |
| SM1107-CC150-FT0083 | K0712111-026 |
| SM1107-CC150-FT0084 | K0712111-027 |
| SM1107-CC150-FT0085 | K0712111-028 |
| SM1107-CC150-FT0086 | K0712111-029 |
| SM1107-CC150-FT0087 | K0712111-030 |
| SM1107-CC150-FT0088 | K0712111-031 |
| SM1107-CC350-FT0089 | K0712111-032 |
| SM1107-CC350-FT0090 | K0712111-033 |
| SM1107-CC350-FT0091 | K0712111-034 |
| SM1207-SPCFH-FT0092 | K0712111-035 |

**Comments:**

**Approved By:** _______________ **Date:** 2/7/08

# Columbia Analytical Services

**- Cover Page -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project Name:** Se in Tissue
**Project No.:**

**Service Request:** K0712111

| Sample Name: | Lab Code: |
|---|---|
| Method Blank | K0712111-MB |
| Method Blank | K0712111-MB2 |

**Comments:**

**Approved By:** ______________________ **Date:** ______________________

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 10/25/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0058 **Lab Code:** K0712111-001

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.17 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 0.76 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 10/25/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0059 **Lab Code:** K0712111-002

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.19 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 0.94 | | |

Comments:

# Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 10/25/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0060
**Lab Code:** K0712111-003

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.19 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 0.83 | | |

Comments:

## Metals

- 1 -

### INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 10/25/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0061
**Lab Code:** K0712111-004

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.19 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 0.92 | | |

Comments:

## Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 10/25/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0062 **Lab Code:** K0712111-005

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.20 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 1.2 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 10/25/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0063 **Lab Code:** K0712111-006

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.19 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 1.2 | | |

Comments:

## Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 10/25/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0064
**Lab Code:** K0712111-007

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.19 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 1.0 | | |

Comments:

# Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental

**Project No.:** NA

**Project Name:** Se in Tissue

**Matrix:** TISSUE

**Service Request:** K0712111

**Date Collected:** 10/25/07

**Date Received:** 12/21/07

**Units:** mg/Kg

**Basis:** DRY

**Sample Name:** SM1007-SNFH-FT0065 **Lab Code:** K0712111-008

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.19 | 0.04 | 4.0 | 01/28/08 | 02/05/08 | 0.96 | | |

Comments:

## Metals

- 1 -

### INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/14/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0066 **Lab Code:** K0712111-009

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.46 | 0.09 | 10.0 | 01/28/08 | 02/05/08 | 12.8 | | |

Comments:

## Metals

- 1 -

### INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/14/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0067 **Lab Code:** K0712111-010

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 1.8 | 0.35 | 40.0 | 01/28/08 | 02/05/08 | 40.3 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/14/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0068 **Lab Code:** K0712111-011

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 1.7 | 0.35 | 40.0 | 01/28/08 | 02/05/08 | 36.0 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/14/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0069 **Lab Code:** K0712111-012

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.98 | 0.20 | 20.0 | 01/28/08 | 02/05/08 | 26.8 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0070
**Lab Code:** K0712111-013

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.90 | 0.18 | 20.0 | 01/28/08 | 02/05/08 | 26.9 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/21/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0071 **Lab Code:** K0712111-014

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.88 | 0.18 | 20.0 | 01/28/08 | 02/05/08 | 18.6 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0072 **Lab Code:** K0712111-015

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.95 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 17.7 | | |

Comments:

# Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/14/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0073 **Lab Code:** K0712111-016

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 1.9 | 0.39 | 40.0 | 01/28/08 | 02/05/08 | 38.8 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0074 **Lab Code:** K0712111-017

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.98 | 0.20 | 20.0 | 01/28/08 | 02/05/08 | 13.2 | | |

Comments:

## Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0075 **Lab Code:** K0712111-018

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.96 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 13.4 | | |

Comments:

## Metals

- 1 -

### INORGANIC ANALYSIS DATA PACKAGE

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project No.:** | NA | **Date Collected:** | 11/14/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/21/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-LSV2c-FT0076 **Lab Code:** K0712111-019

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.89 | 0.18 | 20.0 | 01/28/08 | 02/05/08 | 20.5 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0077 **Lab Code:** K0712111-020

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.96 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 12.5 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/14/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0078 **Lab Code:** K0712111-021

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.86 | 0.17 | 20.0 | 01/28/08 | 02/05/08 | 11.2 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/14/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-LSV2c-FT0079 **Lab Code:** K0712111-022

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 1.7 | 0.34 | 40.0 | 01/28/08 | 02/05/08 | 28.1 | | |

Comments:

# Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/15/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0080 **Lab Code:** K0712111-023

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.47 | 0.09 | 10.0 | 01/28/08 | 02/05/08 | 12.8 | | |

Comments:

## Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project No.:** | NA | **Date Collected:** | 11/15/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/21/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-CC150-FT0081 **Lab Code:** K0712111-024

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.93 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 8.4 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project No.:** | NA | **Date Collected:** | 11/15/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/21/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-CC150-FT0082 **Lab Code:** K0712111-025

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.97 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 8.5 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/15/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0083
**Lab Code:** K0712111-026

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.88 | 0.18 | 20.0 | 01/28/08 | 02/05/08 | 8.4 | | |

Comments:

# Metals

- 1 -
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/15/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0084 **Lab Code:** K0712111-027

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.94 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 9.1 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/15/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0085 **Lab Code:** K0712111-028

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.97 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 7.5 | | |

Comments:

# Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/15/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0086
**Lab Code:** K0712111-029

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.83 | 0.17 | 20.0 | 01/28/08 | 02/05/08 | 6.6 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/15/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0087 **Lab Code:** K0712111-030

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.96 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 6.9 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 11/15/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC150-FT0088 **Lab Code:** K0712111-031

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.83 | 0.17 | 20.0 | 01/28/08 | 02/05/08 | 6.2 | | |

Comments:

# Metals

- 1 -
## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:** 11/15/07
**Project Name:** Se in Tissue
**Date Received:** 12/21/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1107-CC350-FT0089
**Lab Code:** K0712111-032

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.96 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 14.0 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project No.:** | NA | **Date Collected:** | 11/15/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/21/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-CC350-FT0090 **Lab Code:** K0712111-033

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.88 | 0.18 | 20.0 | 01/28/08 | 02/05/08 | 6.9 | | |

Comments:

## Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0712111 |
| **Project No.:** | NA | **Date Collected:** | 11/15/07 |
| **Project Name:** | Se in Tissue | **Date Received:** | 12/21/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1107-CC350-FT0091 **Lab Code:** K0712111-034

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.94 | 0.19 | 20.0 | 01/28/08 | 02/05/08 | 9.5 | | |

Comments:

# Metals

- 1 -
## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** Se in Tissue
**Matrix:** TISSUE

**Service Request:** K0712111
**Date Collected:** 12/4/07
**Date Received:** 12/21/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1207-SPCFH-FT0092 **Lab Code:** K0712111-035

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.10 | 0.02 | 2.0 | 01/28/08 | 02/05/08 | 0.73 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental

**Project No.:** NA

**Project Name:** Se in Tissue

**Matrix:** TISSUE

**Service Request:** K0712111

**Date Collected:**

**Date Received:**

**Units:** mg/Kg

**Basis:** DRY

**Sample Name:** Method Blank

**Lab Code:** K0712111-MB

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.10 | 0.02 | 2.0 | 01/28/08 | 02/05/08 | 0.02 | U | |

Comments:

# Metals

- 1 -

**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0712111
**Project No.:** NA
**Date Collected:**
**Project Name:** Se in Tissue
**Date Received:**
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** Method Blank
**Lab Code:** K0712111-MB2

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.10 | 0.02 | 2.0 | 01/28/08 | 02/05/08 | 0.02 | U | |

Comments:

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | 10.0 | 9.74 | 97 | 10.0 | 9.85 | 98 | 10.04 | 100 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 10.11 | 101 | 10.04 | 100 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 9.68 | 97 | 10.10 | 101 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 9.91 | 99 | 10.45 | 104 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 10.02 | 100 | | | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R (1) | True | Found | %R (1) | Found | %R (1) | Method |
| Selenium | 10.0 | 10.03 | 100 | 10.0 | 10.23 | 102 | 10.42 | 104 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 10.28 | 103 | | | 7742 |

# Metals
- 2b -
## CRDL STANDARD FOR AA AND ICP

**Client:** New Fields Environmental  **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

Concentration Units: ug/L

| Analyte | CRDL Standard for AA | | | CRDL Standard for ICP | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | | | Final | |
| | True | Found | %R | True | Found | %R | Found | %R |
| Selenium | 0.5 | 0.54 | 108.0 | | | | | |

# Metals
- 2b -
## CRDL STANDARD FOR AA AND ICP

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

Concentration Units: ug/L

| Analyte | CRDL Standard for AA | | | CRDL Standard for ICP Initial | | | Final | |
|---|---|---|---|---|---|---|---|---|
| | True | Found | %R | True | Found | %R | Found | %R |
| Selenium | 0.5 | 0.54 | 108.0 | | | | | |

# Metals

- 3 -

## BLANKS

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 7742 |

# Metals

-3-

**BLANKS**

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | | | 0.2 | B | 0.1 | U | 0.1 | U | 7742 |

# Metals

-3-

## BLANKS

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | | | 0.1 | U | 0.1 | U | 0.1 | U | 7742 |

# Metals
- 3 -

## BLANKS

**Client:** New Fields Environmental  **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 7742 |

# Metals
- 5A -

## SPIKE SAMPLE RECOVERY

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA **Units:** MG/KG

**Project Name:** Se in Tissue **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1007-SNFH-FT0058S **Lab Code:** K0712111-001S

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 65 - 124 | 13.4 | | 0.76 | | 16.32 | 77.5 | | 7742 |

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

# Metals

- 5A -

## SPIKE SAMPLE RECOVERY

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA **Units:** MG/KG

**Project Name:** Se in Tissue **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1107-LSV2c-FT0079S **Lab Code:** K0712111-022S

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 65 - 124 | 44.3 | | 28.1 | | 16.32 | 99.3 | | 7742 |

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

# Metals

- 5B -

## POST SPIKE SAMPLE RECOVERY

**Client:** New Fields Environmental

**Service Request:** K0712111

**Project No.:** NA

**Units:** UG/L

**Project Name:** Se in Tissue

**Basis:** DRY

**Matrix:** WATER

**Sample Name:** SM1107-LSV2c-FT0068A

**Lab Code:** K0712111-011A

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 75-125 | 13.66 | | 10.45 | | 3.0 | 107 | | 7742 |

# Metals
**- 5B -**

**POST SPIKE SAMPLE RECOVERY**

**Client:** New Fields Environmental  **Service Request:** K0712111

**Project No.:** NA  **Units:** UG/L

**Project Name:** Se in Tissue  **Basis:** DRY

**Matrix:** WATER

**Sample Name:** SM1107-LSV2c-FT0079A  **Lab Code:** K0712111-022A

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 75-125 | 11.36 | | 8.32 | | 3.0 | 101.3 | | 7742 |

# Metals

- 6 -

## DUPLICATES

**Client:** New Fields Environmental

**Service Request:** K0712111

**Project No.:** NA

**Units:** MG/KG

**Project Name:** Se in Tissue

**Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1007-SNFH-FT0058D **Lab Code:** K0712111-001D

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | Method |
|---|---|---|---|---|---|---|---|---|
| Selenium | | 0.76 | | 0.80 | | 5.1 | | 7742 |

**An empty field in the Control Limit column indicates the control limit is not applicable.**

# Metals

- 6 -

## DUPLICATES

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA **Units:** MG/KG

**Project Name:** Se in Tissue **Basis:** DRY

**Matrix:** TISSUE

**Sample Name:** SM1107-LSV2c-FT0079D **Lab Code:** K0712111-022D

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | Method |
|---|---|---|---|---|---|---|---|---|
| Selenium | 30 | 28.1 | | 30.2 | | 7.2 | | 7742 |

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

# Metals

-7-

## LABORATORY CONTROL SAMPLE

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Aqueous LCS Source:** **Solid LCS Source:** NRCC DOLT 3

| Analyte | Aqueous (ug/L) | | | Solid (mg/kg) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | True | Found | %R | True | Found | C | Limits | | %R |
| Selenium | | | | 7.06 | 7.9 | | 5.26 | 9.05 | 111.9 |

# Metals

- 7 -

## LABORATORY CONTROL SAMPLE

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Aqueous LCS Source:** **Solid LCS Source:** NRCC DOLT 3

| Analyte | Aqueous (ug/L) | | | Solid (mg/kg) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | True | Found | %R | True | Found | C | Limits | | %R |
| Selenium | | | | 7.06 | 8.1 | | 5.26 | 9.05 | 114.7 |

# Metals
- 10 -
## DETECTION LIMITS

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**ICP/ICP-MS ID #:**

**GFAA ID #:** K-FLAA-02 **AA ID #:**

| Analyte | Wave-length (nm) | Back-ground | MRL ug/L | MDL ug/L | M |
|---|---|---|---|---|---|
| Selenium | | | 0.5 | 0.1 | F |

Comments:

# Metals
-13-
## PREPARATION LOG

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Method:** F

| Sample ID | Preparation Date | Initial Volume | Final Volume (mL) |
|---|---|---|---|
| K0712111-001 | 1/28/08 | 0.3470 | 30.0 |
| K0712111-001D | 1/28/08 | 0.3050 | 30.0 |
| K0712111-001S | 1/28/08 | 0.3070 | 30.0 |
| K0712111-002 | 1/28/08 | 0.3230 | 30.0 |
| K0712111-003 | 1/28/08 | 0.3180 | 30.0 |
| K0712111-004 | 1/28/08 | 0.3150 | 30.0 |
| K0712111-005 | 1/28/08 | 0.3020 | 30.0 |
| K0712111-006 | 1/28/08 | 0.3200 | 30.0 |
| K0712111-007 | 1/28/08 | 0.3090 | 30.0 |
| K0712111-008 | 1/28/08 | 0.3100 | 30.0 |
| K0712111-009 | 1/28/08 | 0.3280 | 30.0 |
| K0712111-010 | 1/28/08 | 0.3400 | 30.0 |
| K0712111-011 | 1/28/08 | 0.3480 | 30.0 |
| K0712111-012 | 1/28/08 | 0.3050 | 30.0 |
| K0712111-013 | 1/28/08 | 0.3330 | 30.0 |
| K0712111-014 | 1/28/08 | 0.3410 | 30.0 |
| K0712111-015 | 1/28/08 | 0.3150 | 30.0 |
| K0712111-016 | 1/28/08 | 0.3100 | 30.0 |
| K0712111-017 | 1/28/08 | 0.3070 | 30.0 |
| K0712111-018 | 1/28/08 | 0.3140 | 30.0 |
| K0712111-019 | 1/28/08 | 0.3390 | 30.0 |
| K0712111-020 | 1/28/08 | 0.3120 | 30.0 |
| K0712111-MB | 1/28/08 | 0.3000 | 30.0 |
| LCSS DOLT | 1/28/08 | 0.3420 | 30.0 |

# Metals
-13-
## PREPARATION LOG

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Method:** F

| Sample ID | Preparation Date | Initial Volume | Final Volume (mL) |
|---|---|---|---|
| K0712111-021 | 1/28/08 | 0.3500 | 30.0 |
| K0712111-022 | 1/28/08 | 0.3550 | 30.0 |
| K0712111-022D | 1/28/08 | 0.3390 | 30.0 |
| K0712111-022S | 1/28/08 | 0.3070 | 30.0 |
| K0712111-023 | 1/28/08 | 0.3200 | 30.0 |
| K0712111-024 | 1/28/08 | 0.3220 | 30.0 |
| K0712111-025 | 1/28/08 | 0.3100 | 30.0 |
| K0712111-026 | 1/28/08 | 0.3400 | 30.0 |
| K0712111-027 | 1/28/08 | 0.3210 | 30.0 |
| K0712111-028 | 1/28/08 | 0.3090 | 30.0 |
| K0712111-029 | 1/28/08 | 0.3620 | 30.0 |
| K0712111-030 | 1/28/08 | 0.3120 | 30.0 |
| K0712111-031 | 1/28/08 | 0.3620 | 30.0 |
| K0712111-032 | 1/28/08 | 0.3120 | 30.0 |
| K0712111-033 | 1/28/08 | 0.3430 | 30.0 |
| K0712111-034 | 1/28/08 | 0.3190 | 30.0 |
| K0712111-035 | 1/28/08 | 0.3020 | 30.0 |
| K0712111-MB2 | 1/28/08 | 0.3000 | 30.0 |
| LCSS DOLT2 | 1/28/08 | 0.3390 | 30.0 |

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 2/5/08 **End Date:** 2/5/08

| Sample No. | 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 |
| CAL BLK | 1 | 09:35 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 0.5 | 1 | 09:38 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 1.0 | 1 | 09:40 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 5.0 | 1 | 09:42 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 10.0 | 1 | 09:45 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 15.0 | 1 | 09:47 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICV1 | 1 | 09:49 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICB1 | 1 | 09:52 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CRA | 1 | 09:54 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV1 | 1 | 09:57 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB1 | 1 | 09:59 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-MB | 2 | 10:01 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 10:04 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 10 | 10:06 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 10 | 10:08 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-001S | 40 | 10:11 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-002 | 4 | 10:13 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-003 | 4 | 10:15 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 4 | 10:18 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-005 | 4 | 10:20 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-006 | 4 | 10:22 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV2 | 1 | 10:25 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB2 | 1 | 10:27 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-007 | 4 | 10:29 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-008 | 4 | 10:32 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-009 | 10 | 10:34 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 10 | 10:36 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 10 | 10:39 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-012 | 20 | 10:42 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-013 | 20 | 10:45 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-014 | 20 | 10:47 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-015 | 20 | 10:49 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 2/5/08 **End Date:** 2/5/08

| Sample No. | 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 |
| ZZZZZZ | 20 | 10:52 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV3 | 1 | 10:55 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB3 | 1 | 10:57 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-017 | 20 | 10:59 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-018 | 20 | 11:02 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-019 | 20 | 11:04 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-020 | 20 | 11:07 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-MB2 | 2 | 11:09 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 11:11 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-021 | 20 | 11:14 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-022 | 40 | 11:16 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-022D | 40 | 11:18 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-022S | 40 | 11:20 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV4 | 1 | 11:23 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB4 | 1 | 11:25 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-023 | 10 | 11:27 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-024 | 20 | 11:30 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-025 | 20 | 11:32 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-026 | 20 | 11:35 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-027 | 20 | 11:37 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-028 | 20 | 11:39 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-029 | 20 | 11:42 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-030 | 20 | 11:44 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-031 | 20 | 11:47 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-032 | 20 | 11:49 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV5 | 1 | 11:51 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB5 | 1 | 11:54 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 11:56 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-034 | 20 | 11:58 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 12:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 4 | 12:03 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-022A | 40 | 12:05 | 101.3 | | | | | | | | | | | | | | | | | | X | | | | | | |

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

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 2/5/08 **End Date:** 2/5/08

| Sample No. | 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 |
| CCV6 | 1 | 12:07 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB6 | 1 | 12:10 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 40 | 12:14 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 40 | 12:17 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-001 | 4 | 12:20 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-001D | 4 | 12:22 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-004 | 4 | 12:24 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 12:27 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 20 | 12:30 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-016 | 40 | 12:32 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 12:35 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-035 | 2 | 12:37 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV7 | 1 | 12:40 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB7 | 1 | 12:42 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 40 | 13:03 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-033 | 20 | 13:06 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 13:08 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-011 | 40 | 13:11 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0712111-010 | 40 | 13:13 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 13:16 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 20 | 13:19 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 40 | 13:24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV8 | 1 | 13:27 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB8 | 1 | 13:29 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 10 | 13:32 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 40 | 13:35 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 40 | 13:44 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0712111-011A | 40 | 14:14 | 42.7 | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV9 | 1 | 14:16 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB9 | 1 | 14:19 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0712111

**Project No.:** NA

**Project Name:** Se in Tissue

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 2/5/08 **End Date:** 2/5/08

| Sample No. | 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 |
| CAL BLK | 1 | 16:32 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 0.5 | 1 | 16:34 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 1.0 | 1 | 16:36 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 5.0 | 1 | 16:39 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 10.0 | 1 | 16:41 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 15.0 | 1 | 16:43 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICV6 | 1 | 16:46 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICB5 | 1 | 16:48 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CRA | 1 | 16:51 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV1 | 1 | 16:53 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB1 | 1 | 16:55 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCSS DOLT | 20 | 16:58 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 20 | 17:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| CCV2 | 1 | 17:02 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB2 | 1 | 17:05 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCSS DOLT2 | 20 | 17:09 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV3 | 1 | 17:12 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB3 | 1 | 17:18 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

Columbia Analytical Services
Metals Tissue Digestion Sheet

Service Request Number(s) : K0712111 1-20

Star Lims Run No.: 61844

Analysis for : ICP ICP-MS GFAA

Method : Tissue

other: Se hydride

| Sample | Initial Weight (g) | freeze Dry | Wet | Final Volume (ml) | Matrix |
|---|---|---|---|---|---|
| PB | | | X | 30mls | 15% HNO3 |
| Dolt | 0.342 | | | | |
| ~~Dorm~~ | | | | | |
| K0712111-01 | 0.347 | X | | | |
| -01D | 0.305 | | | | |
| -02 | 0.323 | | | | |
| -03 | 0.318 | | | | |
| -04 | 0.315 | | | | |
| -05 | 0.302 | | | | |
| -06 | 0.320 | | | | |
| -07 | 0.309 | | | | |
| -08 | 0.310 | | | | |
| -09 | 0.328 | | | | |
| -10 | 0.340 | | | | |
| -11 | 0.348 | | | | |
| -12 | 0.305 | | | | |
| -13 | 0.333 | | | | |
| -14 | 0.341 | | | | |
| -15 | 0.315 | | | | |
| -16 | 0.310 | | | | |
| -17 | 0.307 | | | | |
| -18 | 0.314 | | | | |
| -19 | 0.339 | | | | |
| -20 | 0.312 | | | | |
| -01S | 0.307 | | | | |
| | | | AB 1/28/08 | | |

AB 1/25/08

Time Digestion Started: 4:00pm 1/28/08 Oven Temp: 105°C

Time Digestion Ended: 7:00a.m. 1/30/08

Lot # Acids Used: HNO3 MS11-64-C

Oven Temp: 107°C

LCS: Dorm-2, Dolt-3

Balance I.D.: loaner

QCP CICV-1, MET1-63-A, ___________ mls. added
QCP CICV-2, MET1-63-B, ___________ mls. added
QCP CICV-3, MET1-59-J, ___________ mls. Added
SS6, MET1-62-A, ___________ mls. Added

SPIKE INFO
SS1-MET1-61-R, 0.3 mls added
SS5-MET1-61-P, 0.05 mls added
SS6-MET1-62-A, 0.05 mls added
Additional spikes: ___________
Comments: ___________

| | |
|---|---|
| Analyst Angela Brack | Date 1/28/08 |
| Reviewer [signature] | Date 1/30/08 |

TissueDig.xls
1/7/2008

**METALS SPIKE FORM**

Service Request # K0711211-20

Q.C. Sample # K071211

Circle type of digest: GFAA ICP FAA ICP-MS Other: ______ Initials / Date: ABS 1/28/08

Circle type of sample: Soil Water Misc. Sludge Oil Other: TISSUE

| Solution Name | Element | mls of 1000ppm Solution | Final Volume | Source | Lot# | Exp. Date | Solution Conc. mg/L | Enter mls Added | |
|---|---|---|---|---|---|---|---|---|---|
| SS1-MET1-61-R | HNO3 | 50.0 | 1000ml | JT Baker | E17044 | - | - | 0.3 | Expires:3/7/08 |
| | Al | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Ag | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Ba | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Be | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Cd | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Co | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Cr | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 20 | | |
| | Cu | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 25 | | |
| | Fe | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 100 | | |
| | Pb | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Mn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Ni | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Sb | 50* | 1000ml | MET1-53-A | 619312 | 3/7/2008 | 50 | | |
| | V | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Zn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| SS4-MET1-63-D | HNO3 | 25.0 | 500ml | JT BAKER | E27027 | - | - | | Expires:7/1/08 |
| | As | 2.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 4 | | |
| | Cd | 2.0 | 500ml | MET1-57-M | Z-CD02004 | 7/1/2008 | 4 | | |
| | Pb | 2.0 | 500ml | MET1-57-R | A2-PB02135 | 7/1/2008 | 4 | | |
| | Se | 2.0 | 500ml | MET1-57-K | Z-SE01120 | 7/1/2008 | 4 | | |
| | Tl | 2.0 | 500ml | MET1-59-B | 704313 | 1/2/2009 | 4 | | |
| | Cu | 2.0 | 500ml | MET1-62-G | 726801 | 6/3/2009 | 4 | | |
| SS5-MET1-63-E | HNO3 | 25.0 | 500ml | JT BAKER | E27027 | - | - | 0.05 | Expires:7/1/08 |
| | As | 50.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 100 | | |
| | Se | 50.0 | 500ml | MET1-59-C | Z-SE01120 | 8/1/2008 | 100 | | |
| | Tl | 50.0 | 500ml | MET1-59-B | 704313 | 1/2/2009 | 100 | | |
| SS6-MET1-63-F | HNO3 | 25 | 500ml | JT BAKER | E27027 | - | - | 0.05 | Expires: 9/26/08 |
| | B | 50 | 500ml | MET1-59-A | 715006 | 1/2/2009 | 100 | | |
| | Mo | 50 | 500ml | MET1-55-C | 705726 | 9/26/2008 | 100 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| GFLCSW (MET1-60-A) | HNO3 | 10.0 | 1000ml | JT BAKER | E01042 | - | - | | Expires: 3/1/08 |
| | As, Pb, Se, Tl | 5.0 | 1000ml | QCP-CICV-3 | Z-CICPI9048 | 3/1/2008 | 2.5 | | |
| | Cd | - | - | QCP-CICV-3 | Z-CICPI9048 | 3/1/2008 | 1.25 | | |
| | Cu | 2.5 | 1000ml | MET-55-O | Z-CU0284 | 5/1/2008 | 2.5 | | |
| QCP-CICV-1 (MET1-63-A) | Ca, Mg, Na, K | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 2500 | | Expires:1/1/09 |
| | Al, Ba | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 1000 | | |
| | Fe | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 500 | | |
| | Co, Mn, Ni, V, Zn | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 250 | | |
| | Cu, Ag | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 125 | | |
| | Cr | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 100 | | |
| | Be | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 25 | | |
| QCP-CICV-2 (MET1-63-B) | Sb | no dilution | - | IV | Z-CICP19033 | 1/1/2009 | 500 | | Expires: 1/1/09 |
| QCP-CICV-3 (MET1-63-C) | As, Pb, Se, Tl | no dilution | - | IV | Z-CICP19048 | 1/1/2009 | 500 | | Expires: 1/1/09 |
| | Cd | no dilution | - | IV | Z-CICP19048 | 1/1/2009 | 250 | | |

* Denotes volume of 1000 ppm stock standard.

| Element | mls of | ppm | Source | Lot# / Lab Code | Exp. Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Columbia Analytical Services
Metals Tissue Digestion Sheet

Service Request Number(s) : K0712111 21-35

| | | | |
|---|---|---|---|
| Star Lims Run No.: | 101845 | Analysis for : ICP · ICP-MS GFAA | |
| Method : Tissue | | other: Se hydride | |

| Sample | Initial Weight (g) | freeze Dry | Wet | Final Volume (ml) | Matrix |
|---|---|---|---|---|---|
| PB | | | X | 30mls. | 15% HNO3 |
| Dolt | 0.339 | | | | |
| K0712111-21 | 0.350 | X | | | |
| -22 | 0.355 | | | | |
| -22D | 0.339 | | | | |
| -22S | 0.307 | | | | |
| -23 | 0.320 | | | | |
| -24 | 0.322 | | | | |
| -25 | 0.310 | | | | |
| -26 | 0.340 | | | | |
| -27 | 0.321 | | | | |
| -28 | 0.309 | | | | |
| -29 | 0.362 | | | | |
| -30 | 0.312 | | | | |
| -31 | 0.362 | | | | |
| -32 | 0.312 | | | | |
| -33 | 0.343 | | | | |
| -34 | 0.319 | | | | |
| -35 | 0.302 | | | | |
| | | | | | |

AB 1/28/08

**Time Digestion Started:** 4:00p.m. 1/28/08 **Oven Temp:** 105°C
**Time Digestion Ended:** ______
**Lot # Acids Used: HNO3** MS11-64-C
**Oven Temp:** ______

**LCS: Dorm-2, Dolt-3**
**Balance I.D.:** loaner

**QCP CICV-1, MET1-63-A,** ________ **mls. added**
**QCP CICV-2, MET1-63-B,** ________ **mls. added**
**QCP CICV-3, MET1-59-J,** ________ **mls. Added**
**SS6, MET1-62-A,** ________ **mls. Added**

**SPIKE INFO**
**SS1-MET1-61-R,** 0.3 **mls added**
**SS5-MET1-61-P,** 0.05 **mls added**
**SS6-MET1-62-A,** 0.05 **mls added**
**Additional spikes:** ______
**Comments:** ______

| | |
|---|---|
| **Analyst** Angela Brack | **Date** 1/28/08 |
| **Reviewer** [signature] | **Date** 1/30/08 |

TissueDig.xls
1/7/2008

## METALS SPIKE FORM

Service Request # K071211 (21-35)
Q.C. Sample # K071211-22

Circle type of digest: GFAA ICP FAA ICP-MS Other:______ Initials / Date: AB , 1/28/08
Circle type of sample: Soil Water Misc. Sludge Oil Other: TISSUE

| Solution Name | Element | mls of 1000ppm Solution | Final Volume | Source | Lot# | Exp. Date | Solution Conc. mg/L | Enter mls Added | |
|---|---|---|---|---|---|---|---|---|---|
| SS1-MET1-61-R | HNO3 | 50.0 | 1000ml | JT Baker | E17044 | - | - | 0.3 | Expires:3/7/08 |
| | Al | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Ag | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Ba | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 200 | | |
| | Be | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Cd | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 5 | | |
| | Co | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Cr | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 20 | | |
| | Cu | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 25 | | |
| | Fe | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 100 | | |
| | Pb | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Mn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Ni | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Sb | 50* | 1000ml | MET1-53-A | 619312 | 3/7/2008 | 50 | | |
| | V | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| | Zn | 100 | 1000ml | MET1-60-J | A2-MEB246032 | 10/1/2008 | 50 | | |
| SS4-MET1-63-D | HNO3 | 25.0 | 500ml | JT BAKER | E27027 | - | - | | Expires:7/1/08 |
| | As | 2.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 4 | | |
| | Cd | 2.0 | 500ml | MET1-57-M | Z-CD02004 | 7/1/2008 | 4 | | |
| | Pb | 2.0 | 500ml | MET1-57-R | A2-PB02135 | 7/1/2008 | 4 | | |
| | Se | 2.0 | 500ml | MET1-57-K | Z-SE01120 | 7/1/2008 | 4 | | |
| | Tl | 2.0 | 500ml | MET1-59-B | 704313 | 1/2/2009 | 4 | | |
| | Cu | 2.0 | 500ml | MET1-62-G | 726801 | 6/3/2009 | 4 | | |
| SS5-MET1-63-E | HNO3 | 25.0 | 500ml | JT BAKER | E27027 | - | - | 0.05 | Expires:7/1/08 |
| | As | 50.0 | 500ml | MET1-57-Z | Z-AS02032 | 7/1/2008 | 100 | | |
| | Se | 50.0 | 500ml | MET1-59-C | Z-SE01120 | 8/1/2008 | 100 | | |
| | Tl | 50.0 | 500ml | MET1-59-B | 704313 | 1/2/2009 | 100 | | |
| SS6-MET1-63-F | HNO3 | 25 | 500ml | JT BAKER | E27027 | - | - | 0.05 | Expires: 9/26/08 |
| | B | 50 | 500ml | MET1-59-A | 715006 | 1/2/2009 | 100 | | |
| | Mo | 50 | 500ml | MET1-55-C | 705726 | 9/26/2008 | 100 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| GFLCSW (MET1-60-A) | HNO3 | 10.0 | 1000ml | JT BAKER | E01042 | - | - | | Expires: 3/1/08 |
| | As, Pb, Se, Tl | 5.0 | 1000ml | QCP-CICV-3 | Z-CICPI9048 | 3/1/2008 | 2.5 | | |
| | Cd | - | - | QCP-CICV-3 | Z-CICPI9048 | 3/1/2008 | 1.25 | | |
| | Cu | 2.5 | 1000ml | MET-55-O | Z-CU0284 | 5/1/2008 | 2.5 | | |
| QCP-CICV-1 (MET1-63-A) | Ca, Mg, Na, K | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 2500 | | Expires:1/1/09 |
| | Al, Ba | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 1000 | | |
| | Fe | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 500 | | |
| | Co, Mn, Ni, V, Zn | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 250 | | |
| | Cu, Ag | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 125 | | |
| | Cr | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 100 | | |
| | Be | no dilution | - | IV | A2-MEB236021 | 1/1/2009 | 25 | | |
| QCP-CICV-2 (MET1-63-B) | Sb | no dilution | - | IV | Z-CICP19033 | 1/1/2009 | 500 | | Expires: 1/1/09 |
| QCP-CICV-3 (MET1-63-C) | As, Pb, Se, Tl | no dilution | - | IV | Z-CICP19048 | 1/1/2009 | 500 | | Expires: 1/1/09 |
| | Cd | no dilution | - | IV | Z-CICP19048 | 1/1/2009 | 250 | | |

* Denotes volume of 1000 ppm stock standard.

| Element | mls of | ppm | Source | Lot# / Lab Code | Exp. Date |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Element Analyzed Se Hydride Instrument K-FLAA-2
Service Request # K0712111

Batch QC SR's #

Calibration Std. AA1-8-A
Starlims # 105967
Run # 020508-Se

# Hydride Data Review Form

| | Yes | No | NA |
|---|---|---|---|
| 1 ICV within 10% of true Value | X | | |
| 2. Calibration data included | X | | |
| 3. CCV's in control | X | | |
| 4. CCB's and/or ICB's below MRL | X | | |
| 5. All reported Results within Cal. Range | X | | |
| 6. All Calculations are Correct | X | | |

Comments

Primary Reviewed by ___ Date 2/6/08

Secondary Reviewed by JDB Date 2/6/08

**COLUMBIA ANALYTICAL SERVICES, INC.**
**GFAA Run Log**

| **Method:** (Circle Method Used) | **Service Request # :** |
|---|---|
| 7742 7062 | |
| ~~Other:~~______ | |
| Element: As Se | |

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ICV | - | 9.736 | 97% | |
| ICB | - | 0.032 | | |
| CRA | - | 0.539 | 108% | |
| CCV | - | 9.855 | 99% | |
| CCB | - | 0.011 | | |
| K0712111-MB | 1/2 | -0.101 | | |
| ~~DOLT K0712111~~ | ~~1/2+1/10~~ | ~~1.984~~ | | Rerun on 2nd run |
| ~~K0712111-001~~ | ~~1/2+1/5~~ | ~~1.385~~ | | Rerun |
| ~~K0712111-001D~~ | ~~1/2+1/5~~ | ~~1.231~~ | | Rerun |
| K0712111-001S | 1/2+1/20 | 3.416 | 77% | |
| K0712111-002 | 1/2+1/2 | 2.532 | | |
| K0712111-003 | 1/2+1/2 | 2.190 | | A 2/6/08 |
| ~~K0712111-004~~ | ~~1/2+1/2~~ | ~~3.592~~ | | Rerun |
| K0712111-005 | 1/2+1/2 | 3.095 | | |
| K0712111-006 | 1/2+1/2 | 3.318 | | |
| CCV | - | 10.039 | 100% | |
| CCB | - | 0.030 | | |
| K0712111-007 | 1/2+1/2 | 2.575 | | |
| K0712111-008 | 1/2+1/2 | 2.470 | | |
| K0712111-009 | 1/2+1/5 | 13.997 | | |
| ~~K0712111-010~~ | ~~1/2+1/5~~ | ~~26.684~~ | | Rerun |
| ~~K0712111-011~~ | ~~1/2+1/5~~ | ~~27.366~~ | | Rerun |
| K0712111-012 | 1/2+1/10 | 13.623 | | |
| K0712111-013 | 1/2+1/10 | 14.930 | | A 2/6/08 |
| K0712111-014 | 1/2+1/10 | 10.543 | | |
| K0712111-015 | 1/2+1/10 | 9.311 | | |
| ~~K0712111-016~~ | ~~1/2+1/10~~ | ~~16.828~~ | | Rerun |
| CCV | - | 10.114 | 101% | |
| CCB | - | -0.006 | | |
| K0712111-017 | 1/2+1/10 | 6.771 | | |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| Dena Just | 2/6/08 | 1 |



R:\ICP\MISC\HG1631\1631 Run Log

COLUMBIA ANALYTICAL SERVICES, INC.
GFAA Run Log

| Method: (Circle Method Used) 7742 7062 Other:______ Element: As Se | Service Request # : |
|---|---|

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| K0712111-018 | 1/2+1/10 | 7.023 | | |
| K0712111-019 | 1/2+1/10 | 11.593 | | |
| K0712111-020 | 1/2+1/10 | 6.491 | | |
| K0712111-MB | 1/2 | -0.033 | | AZ 2/6/08 |
| ~~DOLT K0712111~~ | ~~1/2+1/10~~ | ~~1.784~~ | | Rerun on 2nd run |
| K0712111-021 | 1/2+1/10 | 6.558 | | |
| K0712111-022 | 1/2+1/20 | 8.324 | | |
| K0712111-022D | 1/2+1/20 | 8.542 | | |
| K0712111-022S | 1/2+1/20 | 11.338 | 72% | |
| CCV | - | 10.037 | 100% | |
| CCB | - | 0.241 | | |
| K0712111-023 | 1/2+1/5 | 13.617 | | |
| K0712111-024 | 1/2+1/10 | 4.528 | | |
| K0712111-025 | 1/2+1/10 | 4.382 | | |
| K0712111-026 | 1/2+1/10 | 4.751 | | |
| K0712111-027 | 1/2+1/10 | 4.869 | | |
| K0712111-028 | 1/2+1/10 | 3.842 | | |
| K0712111-029 | 1/2+1/10 | 3.979 | | |
| K0712111-030 | 1/2+1/10 | 3.566 | | |
| K0712111-031 | 1/2+1/10 | 3.720 | | |
| K0712111-032 | 1/2+1/10 | 7.260 | | |
| CCV | - | 9.678 | 97% | |
| CCB | - | -0.008 | | |
| ~~K0712111-033~~ | ~~1/2+1/10~~ | ~~5.032~~ | | AZ 2/6/08 Rerun |
| K0712111-034 | 1/2+1/10 | 5.026 | | |
| ~~K0712111-035~~ | ~~1/2+1/10~~ | ~~0.636~~ | | Rerun |
| ~~K0712111-001A~~ | ~~1/2+1/2~~ | ~~4.788~~ | | Rerun |
| K0712111-022A | 1/2+1/20 | 11.362 | 101% | Post Spike = 3 ppb |
| CCV | - | 10.096 | 101% | |
| CCB | - | 0.039 | | |

| True Values/QC Limits: | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| Analyst | Date: | Page Number: |
|---|---|---|
| Dena Jus | 2/6/08 | 2 |



R:\ICP\MISC\HG1631\1631 Run Log

## COLUMBIA ANALYTICAL SERVICES, INC.
### GFAA Run Log

| **Method:** (Circle Method Used)<br>7742 7062<br>Other:<br>Element: As Se | **Service Request # :** |
|---|---|

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ~~DOLT K0712111 1/40~~ | ~~1/2+1/20~~ | ~~1.215~~ | | See 2nd run |
| ~~DOLT K0712111 1/40~~ | ~~1/2+1/20~~ | ~~1.149~~ | | See 2nd run |
| K0712111-001 1/2 | 1/2+1/2 | 2.189 | | |
| K0712111-001D 1/2 | 1/2+1/2 | 2.022 | | |
| K0712111-004 1/2 | 1/2+1/2 | 2.427 | | 2/6/08 |
| ~~K0712111-010 1/10~~ | ~~1/2+1/10~~ | ~~19.362~~ | | Rerun |
| ~~K0712111-011 1/10~~ | ~~1/2+1/10~~ | ~~17.222~~ | | Rerun |
| K0712111-016 1/20 | 1/2+1/20 | 10.034 | | |
| ~~K0712111-033 1/10~~ | ~~1/2+1/10~~ | ~~4.908~~ | | Rerun |
| K0712111-035 | 1/2 | 3.696 | | |
| CCV | - | 9.911 | 99% | |
| CCB | - | 0.011 | | |
| ~~K0712111-0016A 1/20~~ | ~~1/2+1/20~~ | ~~12.404~~ | | Rerun |
| K0712111-033 1/10 | 1/2+1/10 | 3.923 | | |
| ~~K0712111-010 1/20~~ | ~~1/2+1/10~~ | ~~16.898~~ | | 2/7/08 |
| K0712111-011 1/20 | 1/2+1/20 | 10.452 | | |
| K0712111-010 1/20 | 1/2+1/20 | 11.413 | | |
| ~~DOLT K0712111 1/20~~ | ~~1/2+1/10~~ | ~~2.316~~ | | See 2nd run |
| ~~DOLT K0712111~~ | ~~1/2+1/10~~ | ~~2.085~~ | | See 2nd run |
| ~~K0712111-016A 1/20~~ | ~~1/2+1/20~~ | ~~12.154~~ | | Rerun |
| CCV | - | 10.445 | 104% | 2/6/08 |
| CCB | - | 0.073 | | |
| ~~DOLT K0712111 1/10~~ | ~~1/2+1/5~~ | ~~2.889~~ | | See 2nd run |
| ~~K0712111-011 1/20~~ | ~~1/2+1/20~~ | ~~12.375~~ | | Rerun |
| ~~K0712111-011A 1/20~~ | ~~1/2+1/20~~ | ~~12.836~~ | | Rerun |
| K0712111-011A 1/20 | 1/2+1/20 | 13.665 | 107% | Post Spike = 3 ppb |
| CCV | - | 10.022 | 100% | |
| CCB | - | -0.085 | | |
| | | | | |
| | | | | |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| [signature] | 2/6/08 | 3 |



R:\ICP\MISC\HG1631\1631 Run Log

Analysis Begun

Logged In Analyst: ACQMET10 Technique: AA FIAS-Flame
Spectrometer Model: AAnalyst 200, S/N 200S5061701 Autosampler Model: AS-90

Sample Information File: C:\data-AA\ACQMET10\Sample Information\020508-Se.sif
Batch ID: 020508-Se
Results Data Set: 020508-Se
Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb

Sequence No.: 1 Autosampler Location: 1
Sample ID: Cal Blk Date Collected: 2/5/2008 9:35:50 AM
Analyst: Data Type: Original

Replicate Data: Cal Blk

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.00] | 0.005 | 0.020 | 0.005 | | | 09:36:11 | Yes |
| 2 | | [0.00] | 0.005 | 0.015 | 0.005 | | | 09:36:46 | Yes |
| 3 | | [0.00] | 0.005 | 0.019 | 0.005 | | | 09:37:22 | Yes |
| Mean: | | [0.00] | 0.005 | | | | | | |
| SD: | | 0.00 | 0.0003 | | | | | | |
| %RSD: | | 0.00 | 6.91 | | | | | | |

Auto-zero performed.

Sequence No.: 2 Autosampler Location: 2
Sample ID: Std 0.5 Date Collected: 2/5/2008 9:38:11 AM
Analyst: Data Type: Original

Replicate Data: Std 0.5

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.5] | 0.008 | 0.049 | 0.013 | | | 09:38:32 | Yes |
| 2 | | [0.5] | 0.007 | 0.052 | 0.012 | | | 09:39:07 | Yes |
| 3 | | [0.5] | 0.007 | 0.047 | 0.012 | | | 09:39:41 | Yes |
| Mean: | | [0.5] | 0.007 | | | | | | |
| SD: | | 0.0 | 0.0002 | | | | | | |
| %RSD: | | 0.0 | 2.31 | | | | | | |

Standard number 1 applied. [0.5]
Correlation Coef.: 1.000000 Slope: 0.01491 Intercept: 0.00000

Sequence No.: 3 Autosampler Location: 3
Sample ID: Std 1.0 Date Collected: 2/5/2008 9:40:30 AM
Analyst: Data Type: Original

Replicate Data: Std 1.0

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [1.0] | 0.014 | 0.086 | 0.019 | | | 09:40:52 | Yes |
| 2 | | [1.0] | 0.013 | 0.083 | 0.018 | | | 09:41:27 | Yes |
| 3 | | [1.0] | 0.014 | 0.079 | 0.019 | | | 09:42:01 | Yes |
| Mean: | | [1.0] | 0.014 | | | | | | |
| SD: | | 0.0 | 0.0004 | | | | | | |
| %RSD: | | 0.0 | 2.99 | | | | | | |

Standard number 2 applied. [1.0]
Correlation Coef.: 0.992881 Slope: 0.01388 Intercept: 0.00000

Sequence No.: 4 Autosampler Location: 4

Sample ID: Std 5.0 Date Collected: 2/5/2008 9:42:51 AM
Analyst: Data Type: Original

**Replicate Data: Std 5.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [5.0] | 0.072 | 0.355 | 0.077 | | | 09:43:14 | Yes |
| 2 | | [5.0] | 0.071 | 0.348 | 0.076 | | | 09:43:48 | Yes |
| 3 | | [5.0] | 0.071 | 0.350 | 0.076 | | | 09:44:23 | Yes |
| Mean: | | [5.0] | 0.071 | | | | | | |
| SD: | | 0.0 | 0.0006 | | | | | | |
| %RSD: | | 0.0 | 0.91 | | | | | | |

Standard number 3 applied. [5.0]
Correlation Coef.: 0.999891 Slope: 0.01425 Intercept: 0.00000

Sequence No.: 5 Autosampler Location: 5
Sample ID: Std 10.0 Date Collected: 2/5/2008 9:45:13 AM
Analyst: Data Type: Original

**Replicate Data: Std 10.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [10.0] | 0.139 | 0.690 | 0.144 | | | 09:45:35 | Yes |
| 2 | | [10.0] | 0.139 | 0.681 | 0.144 | | | 09:46:10 | Yes |
| 3 | | [10.0] | 0.142 | 0.689 | 0.147 | | | 09:46:44 | Yes |
| Mean: | | [10.0] | 0.140 | | | | | | |
| SD: | | 0.0 | 0.0016 | | | | | | |
| %RSD: | | 0.0 | 1.15 | | | | | | |

Standard number 4 applied. [10.0]
Correlation Coef.: 0.999915 Slope: 0.01405 Intercept: 0.00000

Sequence No.: 6 Autosampler Location: 6
Sample ID: Std 15.0 Date Collected: 2/5/2008 9:47:35 AM
Analyst: Data Type: Original

**Replicate Data: Std 15.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [15.0] | 0.215 | 0.939 | 0.220 | | | 09:47:58 | Yes |
| Changing BOC | | | | | | | | | |
| 2 | | [15.0] | 0.225 | 1.064 | 0.230 | | | 09:48:33 | Yes |
| 3 | | [15.0] | 0.222 | 1.031 | 0.227 | | | 09:49:07 | Yes |
| Mean: | | [15.0] | 0.221 | | | | | | |
| SD: | | 0.0 | 0.0051 | | | | | | |
| %RSD: | | 0.0 | 2.32 | | | | | | |

Standard number 5 applied. [15.0]
Correlation Coef.: 0.999417 Slope: 0.01448 Intercept: 0.00000
Changing BOC

**Calibration data for Se 196.03** Equation: Linear Through Zero

| ID | Mean Signal (Abs) | Entered Conc. ug/L | Calculated Conc. ug/L | Standard Deviation | %RSD |
|---|---|---|---|---|---|
| Cal Blk | 0.0000 | 0 | 0.000 | 0.00 | 6.9 |
| Std 0.5 | 0.0075 | 0.5 | 0.515 | 0.00 | 2.3 |
| Std 1.0 | 0.0136 | 1.0 | 0.940 | 0.00 | 3.0 |
| Std 5.0 | 0.0714 | 5.0 | 4.929 | 0.00 | 0.9 |
| Std 10.0 | 0.1399 | 10.0 | 9.665 | 0.00 | 1.2 |
| Std 15.0 | 0.2206 | 15.0 | 15.239 | 0.01 | 2.3 |

Correlation Coef.: 0.999417 Slope: 0.01448 Intercept: 0.00000

Sequence No.: 7
Sample ID: ICV
Analyst:

Autosampler Location: 7
Date Collected: 2/5/2008 9:49:59 AM
Data Type: Original

Replicate Data: ICV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.770 | 9.770 | 0.141 | 0.707 | 0.146 | | | 09:50:23 | Yes |
| 2 | 9.927 | 9.927 | 0.144 | 0.700 | 0.149 | | | 09:50:57 | Yes |
| 3 | 9.510 | 9.510 | 0.138 | 0.674 | 0.143 | | | 09:51:32 | Yes |
| Mean: | 9.736 | 9.736 | 0.141 | | | | | | |
| SD: | 0.211 | 0.211 | 0.0030 | | | | | | |
| %RSD: | 2.163 | 2.163 | 2.16 | | | | | | |

QC value within limits for Se 196.03 Recovery = 97.36%
All analyte(s) passed QC.

Sequence No.: 8
Sample ID: ICB
Analyst:

Autosampler Location: 1
Date Collected: 2/5/2008 9:52:24 AM
Data Type: Original

Replicate Data: ICB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.078 | 0.078 | 0.001 | 0.025 | 0.006 | | | 09:52:45 | Yes |
| 2 | 0.044 | 0.044 | 0.001 | 0.021 | 0.006 | | | 09:53:19 | Yes |
| 3 | -0.025 | -0.025 | -0.000 | 0.015 | 0.005 | | | 09:53:53 | Yes |
| Mean: | 0.032 | 0.032 | 0.000 | | | | | | |
| SD: | 0.053 | 0.053 | 0.0008 | | | | | | |
| %RSD: | 163.8 | 163.8 | 163.85 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 9
Sample ID: CRA
Analyst:

Autosampler Location: 2
Date Collected: 2/5/2008 9:54:42 AM
Data Type: Original

Replicate Data: CRA

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.549 | 0.549 | 0.008 | 0.051 | 0.013 | | | 09:55:04 | Yes |
| 2 | 0.500 | 0.500 | 0.007 | 0.043 | 0.012 | | | 09:55:38 | Yes |
| 3 | 0.566 | 0.566 | 0.008 | 0.056 | 0.013 | | | 09:56:12 | Yes |
| Mean: | 0.539 | 0.539 | 0.008 | | | | | | |
| SD: | 0.034 | 0.034 | 0.0005 | | | | | | |
| %RSD: | 6.354 | 6.354 | 6.35 | | | | | | |

QC value within limits for Se 196.03 Recovery = 107.74%
All analyte(s) passed QC.

Sequence No.: 10
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 2/5/2008 9:57:01 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.891 | 9.891 | 0.143 | 0.708 | 0.148 | | | 09:57:24 | Yes |
| 2 | 9.861 | 9.861 | 0.143 | 0.695 | 0.148 | | | 09:57:58 | Yes |
| 3 | 9.812 | 9.812 | 0.142 | 0.692 | 0.147 | | | 09:58:32 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 9.855 | 9.855 | 0.143 |
| SD: | 0.040 | 0.040 | 0.0006 |
| %RSD: | 0.408 | 0.408 | 0.41 |

QC value within limits for Se 196.03 Recovery = 98.55%
All analyte(s) passed QC.

**Sequence No.: 11**
**Sample ID: CCB**
**Analyst:**

**Autosampler Location: 1**
**Date Collected: 2/5/2008 9:59:23 AM**
**Data Type: Original**

**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.046 | 0.046 | 0.001 | 0.021 | 0.006 | | | 09:59:44 | Yes |
| 2 | 0.001 | 0.001 | 0.000 | 0.017 | 0.005 | | | 10:00:18 | Yes |
| 3 | -0.014 | -0.014 | -0.000 | 0.014 | 0.005 | | | 10:00:52 | Yes |
| Mean: | 0.011 | 0.011 | 0.000 | | | | | | |
| SD: | 0.031 | 0.031 | 0.0005 | | | | | | |
| %RSD: | 286.9 | 286.9 | 286.93 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

**Sequence No.: 12**
**Sample ID: K0712111-MB**
**Analyst:**

**Autosampler Location: 9**
**Date Collected: 2/5/2008 10:01:41 AM**
**Data Type: Original**

**Replicate Data: K0712111-MB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.073 | -0.073 | -0.001 | 0.012 | 0.004 | | | 10:02:02 | Yes |
| 2 | -0.125 | -0.125 | -0.002 | -0.003 | 0.003 | | | 10:02:36 | Yes |
| 3 | -0.106 | -0.106 | -0.002 | 0.009 | 0.003 | | | 10:03:10 | Yes |
| Mean: | -0.101 | -0.101 | -0.001 | | | | | | |
| SD: | 0.026 | 0.026 | 0.0004 | | | | | | |
| %RSD: | 26.06 | 26.06 | 26.06 | | | | | | |

**Sequence No.: 13**
**Sample ID: DOLT K0712111**
**Analyst:**

**Autosampler Location: 10**
**Date Collected: 2/5/2008 10:04:00 AM**
**Data Type: Original**

**Replicate Data: DOLT K0712111**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.889 | 1.889 | 0.027 | 0.110 | 0.032 | | | 10:04:21 | Yes |
| 2 | 2.054 | 2.054 | 0.030 | 0.168 | 0.035 | | | 10:04:55 | Yes |
| 3 | 2.009 | 2.009 | 0.029 | 0.168 | 0.034 | | | 10:05:29 | Yes |
| Mean: | 1.984 | 1.984 | 0.029 | | | | | | |
| SD: | 0.085 | 0.085 | 0.0012 | | | | | | |
| %RSD: | 4.300 | 4.300 | 4.30 | | | | | | |

**Sequence No.: 14**
**Sample ID: K0712111-001**
**Analyst:**

**Autosampler Location: 11**
**Date Collected: 2/5/2008 10:06:19 AM**
**Data Type: Original**

2/6/08

**Replicate Data: K0712111-001**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.442 | 1.442 | 0.021 | 0.121 | 0.026 | | | 10:06:41 | Yes |
| 2 | 1.346 | 1.346 | 0.019 | 0.113 | 0.024 | | | 10:07:15 | Yes |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 1.367 | 1.367 | 0.020 | 0.112 | 0.025 | | | 10:07:50 | Yes |
| Mean: | 1.385 | 1.385 | 0.020 | | | | | | |
| SD: | 0.050 | 0.050 | 0.0007 | | | | | | |
| %RSD: | 3.634 | 3.634 | 3.63 | | | | | | |

A 2/6/08

**Sequence No.: 15**
**Sample ID: K0712111-001D**
**Analyst:**
**Autosampler Location: 12**
**Date Collected: 2/5/2008 10:08:40 AM**
**Data Type: Original**

**Replicate Data: K0712111-001D**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.222 | 1.222 | 0.018 | 0.104 | 0.023 | | | 10:09:03 | Yes |
| 2 | 1.185 | 1.185 | 0.017 | 0.093 | 0.022 | | | 10:09:37 | Yes |
| 3 | 1.287 | 1.287 | 0.019 | 0.103 | 0.024 | | | 10:10:11 | Yes |
| Mean: | 1.231 | 1.231 | 0.018 | | | | | | |
| SD: | 0.052 | 0.052 | 0.0007 | | | | | | |
| %RSD: | 4.204 | 4.204 | 4.20 | | | | | | |

**Sequence No.: 16**
**Sample ID: K0712111-001S**
**Analyst:**
**Autosampler Location: 13**
**Date Collected: 2/5/2008 10:11:01 AM**
**Data Type: Original**

**Replicate Data: K0712111-001S**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.414 | 3.414 | 0.049 | 0.258 | 0.054 | | | 10:11:24 | Yes |
| 2 | 3.413 | 3.413 | 0.049 | 0.260 | 0.054 | | | 10:11:59 | Yes |
| 3 | 3.421 | 3.421 | 0.050 | 0.250 | 0.054 | | | 10:12:34 | Yes |
| Mean: | 3.416 | 3.416 | 0.049 | | | | | | |
| SD: | 0.004 | 0.004 | 0.0001 | | | | | | |
| %RSD: | 0.130 | 0.130 | 0.13 | | | | | | |

**Sequence No.: 17**
**Sample ID: K0712111-002**
**Analyst:**
**Autosampler Location: 14**
**Date Collected: 2/5/2008 10:13:26 AM**
**Data Type: Original**

**Replicate Data: K0712111-002**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.566 | 2.566 | 0.037 | 0.218 | 0.042 | | | 10:13:49 | Yes |
| 2 | 2.503 | 2.503 | 0.036 | 0.210 | 0.041 | | | 10:14:24 | Yes |
| 3 | 2.527 | 2.527 | 0.037 | 0.209 | 0.042 | | | 10:14:58 | Yes |
| Mean: | 2.532 | 2.532 | 0.037 | | | | | | |
| SD: | 0.032 | 0.032 | 0.0005 | | | | | | |
| %RSD: | 1.256 | 1.256 | 1.26 | | | | | | |

**Sequence No.: 18**
**Sample ID: K0712111-003**
**Analyst:**
**Autosampler Location: 15**
**Date Collected: 2/5/2008 10:15:50 AM**
**Data Type: Original**

**Replicate Data: K0712111-003**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.226 | 2.226 | 0.032 | 0.193 | 0.037 | | | 10:16:14 | Yes |
| 2 | 2.212 | 2.212 | 0.032 | 0.195 | 0.037 | | | 10:16:48 | Yes |
| 3 | 2.131 | 2.131 | 0.031 | 0.180 | 0.036 | | | 10:17:22 | Yes |
| Mean: | 2.190 | 2.190 | 0.032 | | | | | | |
| SD: | 0.051 | 0.051 | 0.0007 | | | | | | |

%RSD: 2.337 2.337 2.34

Sequence No.: 19
Sample ID: K0712111-004
Analyst:

Autosampler Location: 16
Date Collected: 2/5/2008 10:18:14 AM
Data Type: Original

X 2/6/08

Replicate Data: K0712111-004

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.693 | 2.693 | 0.039 | 0.287 | 0.044 | | | 10:18:38 | Yes |
| 2 | 4.094 | 4.094 | 0.059 | 0.312 | 0.064 | | | 10:19:13 | Yes |
| 3 | 3.989 | 3.989 | 0.058 | 0.312 | 0.063 | | | 10:19:47 | Yes |
| Mean: | 3.592 | 3.592 | 0.052 | | | | | | |
| SD: | 0.781 | 0.781 | 0.0113 | | | | | | |
| %RSD: | 21.74 | 21.74 | 21.74 | | | | | | |

Sequence No.: 20
Sample ID: K0712111-005
Analyst:

Autosampler Location: 17
Date Collected: 2/5/2008 10:20:40 AM
Data Type: Original

Replicate Data: K0712111-005

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.179 | 3.179 | 0.046 | 0.273 | 0.051 | | | 10:21:00 | Yes |
| 2 | 3.059 | 3.059 | 0.044 | 0.254 | 0.049 | | | 10:21:35 | Yes |
| 3 | 3.048 | 3.048 | 0.044 | 0.251 | 0.049 | | | 10:22:09 | Yes |
| Mean: | 3.095 | 3.095 | 0.045 | | | | | | |
| SD: | 0.072 | 0.072 | 0.0010 | | | | | | |
| %RSD: | 2.341 | 2.341 | 2.34 | | | | | | |

Sequence No.: 21
Sample ID: K0712111-006
Analyst:

Autosampler Location: 18
Date Collected: 2/5/2008 10:22:57 AM
Data Type: Original

Replicate Data: K0712111-006

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.369 | 3.369 | 0.049 | 0.275 | 0.054 | | | 10:23:18 | Yes |
| 2 | 3.311 | 3.311 | 0.048 | 0.263 | 0.053 | | | 10:23:52 | Yes |
| 3 | 3.275 | 3.275 | 0.047 | 0.262 | 0.052 | | | 10:24:27 | Yes |
| Mean: | 3.318 | 3.318 | 0.048 | | | | | | |
| SD: | 0.048 | 0.048 | 0.0007 | | | | | | |
| %RSD: | 1.433 | 1.433 | 1.43 | | | | | | |

Sequence No.: 22
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 2/5/2008 10:25:16 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.04 | 10.04 | 0.145 | 0.704 | 0.150 | | | 10:25:39 | Yes |
| 2 | 9.969 | 9.969 | 0.144 | 0.693 | 0.149 | | | 10:26:13 | Yes |
| 3 | 10.10 | 10.10 | 0.146 | 0.713 | 0.151 | | | 10:26:49 | Yes |
| Mean: | 10.04 | 10.04 | 0.145 | | | | | | |
| SD: | 0.068 | 0.068 | 0.0010 | | | | | | |
| %RSD: | 0.676 | 0.676 | 0.68 | | | | | | |

QC value within limits for Se 196.03 Recovery = 100.39%
All analyte(s) passed QC.

Sequence No.: 23
Sample ID: CCB
Analyst:

Autosampler Location: 1
Date Collected: 2/5/2008 10:27:40 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.073 | 0.073 | 0.001 | 0.027 | 0.006 | | | 10:28:01 | Yes |
| 2 | 0.044 | 0.044 | 0.001 | 0.022 | 0.006 | | | 10:28:35 | Yes |
| 3 | -0.026 | -0.026 | -0.000 | 0.023 | 0.005 | | | 10:29:10 | Yes |
| Mean: | 0.030 | 0.030 | 0.000 | | | | | | |
| SD: | 0.051 | 0.051 | 0.0007 | | | | | | |
| %RSD: | 169.1 | 169.1 | 169.13 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 24
Sample ID: K0712111-007
Analyst:

Autosampler Location: 19
Date Collected: 2/5/2008 10:29:58 AM
Data Type: Original

Replicate Data: K0712111-007

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.645 | 2.645 | 0.038 | 0.229 | 0.043 | | | 10:30:19 | Yes |
| 2 | 2.541 | 2.541 | 0.037 | 0.217 | 0.042 | | | 10:30:53 | Yes |
| 3 | 2.540 | 2.540 | 0.037 | 0.209 | 0.042 | | | 10:31:28 | Yes |
| Mean: | 2.575 | 2.575 | 0.037 | | | | | | |
| SD: | 0.061 | 0.061 | 0.0009 | | | | | | |
| %RSD: | 2.357 | 2.357 | 2.36 | | | | | | |

Sequence No.: 25
Sample ID: K0712111-008
Analyst:

Autosampler Location: 20
Date Collected: 2/5/2008 10:32:17 AM
Data Type: Original

Replicate Data: K0712111-008

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.482 | 2.482 | 0.036 | 0.211 | 0.041 | | | 10:32:39 | Yes |
| 2 | 2.442 | 2.442 | 0.035 | 0.201 | 0.040 | | | 10:33:12 | Yes |
| 3 | 2.487 | 2.487 | 0.036 | 0.193 | 0.041 | | | 10:33:47 | Yes |
| Mean: | 2.470 | 2.470 | 0.036 | | | | | | |
| SD: | 0.025 | 0.025 | 0.0004 | | | | | | |
| %RSD: | 1.012 | 1.012 | 1.01 | | | | | | |

Sequence No.: 26
Sample ID: K0712111-009
Analyst:

Autosampler Location: 21
Date Collected: 2/5/2008 10:34:36 AM
Data Type: Original

Replicate Data: K0712111-009

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.95 | 13.95 | 0.202 | 1.036 | 0.207 | | | 10:34:58 | Yes |
| 2 | 13.87 | 13.87 | 0.201 | 1.036 | 0.206 | | | 10:35:32 | Yes |
| 3 | 14.17 | 14.17 | 0.205 | 1.036 | 0.210 | | | 10:36:06 | Yes |
| Mean: | 14.00 | 14.00 | 0.203 | | | | | | |
| SD: | 0.159 | 0.159 | 0.0023 | | | | | | |
| %RSD: | 1.134 | 1.134 | 1.13 | | | | | | |

Sequence No.: 27
Sample ID: K0712111-010
Analyst:

Autosampler Location: 22
Date Collected: 2/5/2008 10:36:57 AM
Data Type: Original

Replicate Data: K0712111-010

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 26.60 | 26.60 | 0.385 | 2.023 | 0.390 | | | 10:37:19 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 26.80 | 26.80 | 0.388 | 2.011 | 0.393 | | | 10:37:53 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 26.65 | 26.65 | 0.386 | 1.983 | 0.391 | | | 10:38:28 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 26.68 | 26.68 | 0.386 | | | | | | |
| SD: | 0.105 | 0.105 | 0.0015 | | | | | | |
| %RSD: | 0.392 | 0.392 | 0.39 | | | | | | |

Sample concentration is greater than that of the highest standard.

Sequence No.: 28
Sample ID: K0712111-011
Analyst:

Autosampler Location: 23
Date Collected: 2/5/2008 10:39:52 AM
Data Type: Original

K 2/14/08
d 2/8/08

Replicate Data: K0712111-011

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 25.51 | 25.51 | 0.369 | 1.881 | 0.374 | | | 10:40:14 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 29.48 | 29.48 | 0.427 | 2.783 | 0.432 | | | 10:40:48 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 27.11 | 27.11 | 0.392 | 1.964 | 0.397 | | | 10:41:22 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 27.37 | 27.37 | 0.396 | | | | | | |
| SD: | 1.994 | 1.994 | 0.0289 | | | | | | |
| %RSD: | 7.287 | 7.287 | 7.29 | | | | | | |

Sample concentration is greater than that of the highest standard.

Sequence No.: 29
Sample ID: K0712111-012
Analyst:

Autosampler Location: 24
Date Collected: 2/5/2008 10:42:45 AM
Data Type: Original

Replicate Data: K0712111-012

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.20 | 14.20 | 0.205 | 0.980 | 0.210 | | | 10:43:08 | Yes |
| 2 | 13.28 | 13.28 | 0.192 | 0.931 | 0.197 | | | 10:43:42 | Yes |
| 3 | 13.39 | 13.39 | 0.194 | 0.935 | 0.199 | | | 10:44:16 | Yes |
| Mean: | 13.62 | 13.62 | 0.197 | | | | | | |
| SD: | 0.499 | 0.499 | 0.0072 | | | | | | |
| %RSD: | 3.664 | 3.664 | 3.66 | | | | | | |

Sequence No.: 30
Sample ID: K0712111-013
Analyst:

Autosampler Location: 25
Date Collected: 2/5/2008 10:45:07 AM
Data Type: Original

Replicate Data: K0712111-013

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15.08 | 15.08 | 0.218 | 1.055 | 0.223 | | | 10:45:30 | Yes |
| 2 | 14.90 | 14.90 | 0.216 | 1.043 | 0.221 | | | 10:46:04 | Yes |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 14.82 | 14.82 | 0.215 | 1.031 | 0.219 | | | 10:46:38 | Yes |
| Mean: | 14.93 | 14.93 | 0.216 | | | | | | |
| SD: | 0.133 | 0.133 | 0.0019 | | | | | | |
| %RSD: | 0.892 | 0.892 | 0.89 | | | | | | |

Sequence No.: 31
Sample ID: K0712111-014
Analyst:

Autosampler Location: 26
Date Collected: 2/5/2008 10:47:29 AM
Data Type: Original

Replicate Data: K0712111-014

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.21 | 10.21 | 0.148 | 0.720 | 0.153 | | | 10:47:52 | Yes |
| 2 | 10.82 | 10.82 | 0.157 | 0.735 | 0.162 | | | 10:48:27 | Yes |
| 3 | 10.60 | 10.60 | 0.153 | 0.738 | 0.158 | | | 10:49:01 | Yes |
| Mean: | 10.54 | 10.54 | 0.153 | | | | | | |
| SD: | 0.311 | 0.311 | 0.0045 | | | | | | |
| %RSD: | 2.953 | 2.953 | 2.95 | | | | | | |

Sequence No.: 32
Sample ID: K0712111-015
Analyst:

Autosampler Location: 27
Date Collected: 2/5/2008 10:49:51 AM
Data Type: Original

Replicate Data: K0712111-015

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.407 | 9.407 | 0.136 | 0.620 | 0.141 | | | 10:50:14 | Yes |
| 2 | 9.360 | 9.360 | 0.136 | 0.649 | 0.140 | | | 10:50:49 | Yes |
| 3 | 9.167 | 9.167 | 0.133 | 0.640 | 0.138 | | | 10:51:23 | Yes |
| Mean: | 9.311 | 9.311 | 0.135 | | | | | | |
| SD: | 0.127 | 0.127 | 0.0018 | | | | | | |
| %RSD: | 1.366 | 1.366 | 1.37 | | | | | | |

Sequence No.: 33
Sample ID: K0712111-016
Analyst:

Autosampler Location: 28
Date Collected: 2/5/2008 10:52:14 AM
Data Type: Original

2/6/08

Replicate Data: K0712111-016

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 16.96 | 16.96 | 0.246 | 1.189 | 0.251 | | | 10:52:37 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 16.76 | 16.76 | 0.243 | 1.169 | 0.248 | | | 10:53:11 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 16.76 | 16.76 | 0.243 | 1.152 | 0.248 | | | 10:53:46 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 16.83 | 16.83 | 0.244 | | | | | | |
| SD: | 0.118 | 0.118 | 0.0017 | | | | | | |
| %RSD: | 0.703 | 0.703 | 0.70 | | | | | | |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |

Sequence No.: 34
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 2/5/2008 10:55:11 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.06 | 10.06 | 0.146 | 0.734 | 0.151 | | | 10:55:34 | Yes |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 10.17 | 10.17 | 0.147 | 0.711 | 0.152 | | | 10:56:08 | Yes |
| 3 | 10.11 | 10.11 | 0.146 | 0.712 | 0.151 | | | 10:56:42 | Yes |
| Mean: | 10.11 | 10.11 | 0.146 | | | | | | |
| SD: | 0.059 | 0.059 | 0.0009 | | | | | | |
| %RSD: | 0.583 | 0.583 | 0.58 | | | | | | |

QC value within limits for Se 196.03 Recovery = 101.14%
All analyte(s) passed QC.

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**Sequence No.: 35** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 2/5/2008 10:57:34 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.050 | 0.050 | 0.001 | 0.017 | 0.006 | | | 10:57:55 | Yes |
| 2 | -0.016 | -0.016 | -0.000 | 0.019 | 0.005 | | | 10:58:29 | Yes |
| 3 | -0.052 | -0.052 | -0.001 | 0.008 | 0.004 | | | 10:59:03 | Yes |
| Mean: | -0.006 | -0.006 | -0.000 | | | | | | |
| SD: | 0.051 | 0.051 | 0.0007 | | | | | | |
| %RSD: | 849.3 | 849.3 | 849.34 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

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**Sequence No.: 36** **Autosampler Location: 29**
**Sample ID: K0712111-017** **Date Collected: 2/5/2008 10:59:51 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0712111-017**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.854 | 6.854 | 0.099 | 0.485 | 0.104 | | | 11:00:15 | Yes |
| 2 | 6.695 | 6.695 | 0.097 | 0.469 | 0.102 | | | 11:00:49 | Yes |
| 3 | 6.762 | 6.762 | 0.098 | 0.480 | 0.103 | | | 11:01:24 | Yes |
| Mean: | 6.771 | 6.771 | 0.098 | | | | | | |
| SD: | 0.080 | 0.080 | 0.0012 | | | | | | |
| %RSD: | 1.179 | 1.179 | 1.18 | | | | | | |

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**Sequence No.: 37** **Autosampler Location: 30**
**Sample ID: K0712111-018** **Date Collected: 2/5/2008 11:02:16 AM**
**Analyst:** **Data Type: Original**

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**Replicate Data: K0712111-018**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.100 | 7.100 | 0.103 | 0.506 | 0.108 | | | 11:02:40 | Yes |
| 2 | 6.912 | 6.912 | 0.100 | 0.492 | 0.105 | | | 11:03:14 | Yes |
| 3 | 7.059 | 7.059 | 0.102 | 0.492 | 0.107 | | | 11:03:49 | Yes |
| Mean: | 7.023 | 7.023 | 0.102 | | | | | | |
| SD: | 0.099 | 0.099 | 0.0014 | | | | | | |
| %RSD: | 1.409 | 1.409 | 1.41 | | | | | | |

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**Sequence No.: 38** **Autosampler Location: 31**
**Sample ID: K0712111-019** **Date Collected: 2/5/2008 11:04:40 AM**
**Analyst:** **Data Type: Original**

------------------------------------------------------------------------------------------

**Replicate Data: K0712111-019**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.49 | 11.49 | 0.166 | 0.825 | 0.171 | | | 11:05:04 | Yes |
| 2 | 11.39 | 11.39 | 0.165 | 0.800 | 0.170 | | | 11:05:39 | Yes |
| 3 | 11.90 | 11.90 | 0.172 | 0.818 | 0.177 | | | 11:06:13 | Yes |
| Mean: | 11.59 | 11.59 | 0.168 | | | | | | |
| SD: | 0.268 | 0.268 | 0.0039 | | | | | | |
| %RSD: | 2.312 | 2.312 | 2.31 | | | | | | |

**Sequence No.: 39** **Autosampler Location: 32**
**Sample ID: K0712111-020** **Date Collected: 2/5/2008 11:07:06 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0712111-020**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.453 | 6.453 | 0.093 | 0.468 | 0.098 | | | 11:07:28 | Yes |
| 2 | 6.530 | 6.530 | 0.095 | 0.463 | 0.099 | | | 11:08:03 | Yes |
| 3 | 6.491 | 6.491 | 0.094 | 0.451 | 0.099 | | | 11:08:37 | Yes |
| Mean: | 6.491 | 6.491 | 0.094 | | | | | | |
| SD: | 0.039 | 0.039 | 0.0006 | | | | | | |
| %RSD: | 0.594 | 0.594 | 0.59 | | | | | | |

**Sequence No.: 40** **Autosampler Location: 33**
**Sample ID: K0712111-MB** **Date Collected: 2/5/2008 11:09:26 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0712111-MB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.040 | -0.040 | -0.001 | 0.008 | 0.004 | | | 11:09:46 | Yes |
| 2 | -0.051 | -0.051 | -0.001 | 0.017 | 0.004 | | | 11:10:20 | Yes |
| 3 | -0.008 | -0.008 | -0.000 | 0.015 | 0.005 | | | 11:10:54 | Yes |
| Mean: | -0.033 | -0.033 | -0.000 | | | | | | |
| SD: | 0.023 | 0.023 | 0.0003 | | | | | | |
| %RSD: | 68.64 | 68.64 | 68.64 | | | | | | |

**Sequence No.: 41** **Autosampler Location: 34**
**Sample ID: ~~DOLT~~ K0712111** **Date Collected: 2/5/2008 11:11:43 AM**
**Analyst:** **Data Type: Original**

‡ 2/6/08

**Replicate Data: DOLT K0712111**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.797 | 1.797 | 0.026 | 0.149 | 0.031 | | | 11:12:03 | Yes |
| 2 | 1.819 | 1.819 | 0.026 | 0.146 | 0.031 | | | 11:12:37 | Yes |
| 3 | 1.735 | 1.735 | 0.025 | 0.141 | 0.030 | | | 11:13:12 | Yes |
| Mean: | 1.784 | 1.784 | 0.026 | | | | | | |
| SD: | 0.043 | 0.043 | 0.0006 | | | | | | |
| %RSD: | 2.433 | 2.433 | 2.43 | | | | | | |

**Sequence No.: 42** **Autosampler Location: 35**
**Sample ID: K0712111-021** **Date Collected: 2/5/2008 11:14:00 AM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0712111-021**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.634 | 6.634 | 0.096 | 0.468 | 0.101 | | | 11:14:21 | Yes |
| 2 | 6.493 | 6.493 | 0.094 | 0.456 | 0.099 | | | 11:14:55 | Yes |
| 3 | 6.546 | 6.546 | 0.095 | 0.454 | 0.100 | | | 11:15:30 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 6.558 | 6.558 | 0.095 |
| SD: | 0.071 | 0.071 | 0.0010 |
| %RSD: | 1.088 | 1.088 | 1.09 |

Sequence No.: 43 Autosampler Location: 36
Sample ID: K0712111-022 Date Collected: 2/5/2008 11:16:18 AM
Analyst: Data Type: Original

Replicate Data: K0712111-022

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.062 | 8.062 | 0.117 | 0.736 | 0.122 | | | 11:16:39 | Yes |
| 2 | 8.202 | 8.202 | 0.119 | 0.504 | 0.124 | | | 11:17:14 | Yes |
| 3 | 8.708 | 8.708 | 0.126 | 0.519 | 0.131 | | | 11:17:48 | Yes |
| Mean: | 8.324 | 8.324 | 0.120 | | | | | | |
| SD: | 0.340 | 0.340 | 0.0049 | | | | | | |
| %RSD: | 4.088 | 4.088 | 4.09 | | | | | | |

Sequence No.: 44 Autosampler Location: 37
Sample ID: K0712111-022D Date Collected: 2/5/2008 11:18:36 AM
Analyst: Data Type: Original

Replicate Data: K0712111-022D

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.433 | 8.433 | 0.122 | 0.536 | 0.127 | | | 11:18:58 | Yes |
| 2 | 8.814 | 8.814 | 0.128 | 0.596 | 0.133 | | | 11:19:32 | Yes |
| 3 | 8.378 | 8.378 | 0.121 | 0.579 | 0.126 | | | 11:20:07 | Yes |
| Mean: | 8.542 | 8.542 | 0.124 | | | | | | |
| SD: | 0.237 | 0.237 | 0.0034 | | | | | | |
| %RSD: | 2.780 | 2.780 | 2.78 | | | | | | |

Sequence No.: 45 Autosampler Location: 38
Sample ID: K0712111-022S Date Collected: 2/5/2008 11:20:56 AM
Analyst: Data Type: Original

Replicate Data: K0712111-022S

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.35 | 11.35 | 0.164 | 0.784 | 0.169 | | | 11:21:18 | Yes |
| 2 | 11.44 | 11.44 | 0.166 | 0.790 | 0.171 | | | 11:21:52 | Yes |
| 3 | 11.23 | 11.23 | 0.163 | 0.780 | 0.167 | | | 11:22:26 | Yes |
| Mean: | 11.34 | 11.34 | 0.164 | | | | | | |
| SD: | 0.105 | 0.105 | 0.0015 | | | | | | |
| %RSD: | 0.924 | 0.924 | 0.92 | | | | | | |

Sequence No.: 46 Autosampler Location: 5
Sample ID: CCV Date Collected: 2/5/2008 11:23:16 AM
Analyst: Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.935 | 9.935 | 0.144 | 0.729 | 0.149 | | | 11:23:39 | Yes |
| 2 | 10.08 | 10.08 | 0.146 | 0.717 | 0.151 | | | 11:24:14 | Yes |
| 3 | 10.09 | 10.09 | 0.146 | 0.727 | 0.151 | | | 11:24:48 | Yes |
| Mean: | 10.04 | 10.04 | 0.145 | | | | | | |
| SD: | 0.088 | 0.088 | 0.0013 | | | | | | |
| %RSD: | 0.879 | 0.879 | 0.88 | | | | | | |

QC value within limits for Se 196.03 Recovery = 100.37%
All analyte(s) passed QC.

Sequence No.: 47
Sample ID: CCB
Analyst:
Autosampler Location: 1
Date Collected: 2/5/2008 11:25:39 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.068 | 0.068 | 0.001 | 0.021 | 0.006 | | | 11:26:00 | Yes |
| 2 | 0.025 | 0.025 | 0.000 | 0.010 | 0.005 | | | 11:26:34 | Yes |
| 3 | 0.631 | 0.631 | 0.009 | 0.105 | 0.014 | | | 11:27:08 | Yes |
| Mean: | 0.241 | 0.241 | 0.003 | | | | | | |
| SD: | 0.338 | 0.338 | 0.0049 | | | | | | |
| %RSD: | 140.0 | 140.0 | 139.96 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 48
Sample ID: K0712111-023
Analyst:
Autosampler Location: 39
Date Collected: 2/5/2008 11:27:57 AM
Data Type: Original

Replicate Data: K0712111-023

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.51 | 13.51 | 0.196 | 1.026 | 0.200 | | | 11:28:19 | Yes |
| 2 | 13.78 | 13.78 | 0.199 | 1.022 | 0.204 | | | 11:28:53 | Yes |
| 3 | 13.57 | 13.57 | 0.196 | 0.953 | 0.201 | | | 11:29:27 | Yes |
| Mean: | 13.62 | 13.62 | 0.197 | | | | | | |
| SD: | 0.141 | 0.141 | 0.0020 | | | | | | |
| %RSD: | 1.035 | 1.035 | 1.03 | | | | | | |

Sequence No.: 49
Sample ID: K0712111-024
Analyst:
Autosampler Location: 40
Date Collected: 2/5/2008 11:30:17 AM
Data Type: Original

Replicate Data: K0712111-024

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.631 | 4.631 | 0.067 | 0.358 | 0.072 | | | 11:30:40 | Yes |
| 2 | 4.502 | 4.502 | 0.065 | 0.336 | 0.070 | | | 11:31:14 | Yes |
| 3 | 4.453 | 4.453 | 0.064 | 0.326 | 0.069 | | | 11:31:49 | Yes |
| Mean: | 4.528 | 4.528 | 0.066 | | | | | | |
| SD: | 0.092 | 0.092 | 0.0013 | | | | | | |
| %RSD: | 2.027 | 2.027 | 2.03 | | | | | | |

Sequence No.: 50
Sample ID: K0712111-025
Analyst:
Autosampler Location: 41
Date Collected: 2/5/2008 11:32:39 AM
Data Type: Original

Replicate Data: K0712111-025

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.514 | 4.514 | 0.065 | 0.333 | 0.070 | | | 11:33:02 | Yes |
| 2 | 4.423 | 4.423 | 0.064 | 0.320 | 0.069 | | | 11:33:36 | Yes |
| 3 | 4.210 | 4.210 | 0.061 | 0.289 | 0.066 | | | 11:34:11 | Yes |
| Mean: | 4.382 | 4.382 | 0.063 | | | | | | |
| SD: | 0.156 | 0.156 | 0.0023 | | | | | | |

%RSD: 3.566 3.566 3.57

Sequence No.: 51
Sample ID: K0712111-026
Analyst:

Autosampler Location: 42
Date Collected: 2/5/2008 11:35:00 AM
Data Type: Original

Replicate Data: K0712111-026

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.719 | 4.719 | 0.068 | 0.353 | 0.073 | | | 11:35:23 | Yes |
| 2 | 4.781 | 4.781 | 0.069 | 0.350 | 0.074 | | | 11:35:57 | Yes |
| 3 | 4.753 | 4.753 | 0.069 | 0.350 | 0.074 | | | 11:36:32 | Yes |
| Mean: | 4.751 | 4.751 | 0.069 | | | | | | |
| SD: | 0.031 | 0.031 | 0.0005 | | | | | | |
| %RSD: | 0.657 | 0.657 | 0.66 | | | | | | |

Sequence No.: 52
Sample ID: K0712111-027
Analyst:

Autosampler Location: 43
Date Collected: 2/5/2008 11:37:25 AM
Data Type: Original

Replicate Data: K0712111-027

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.929 | 4.929 | 0.071 | 0.352 | 0.076 | | | 11:37:47 | Yes |
| 2 | 4.865 | 4.865 | 0.070 | 0.350 | 0.075 | | | 11:38:22 | Yes |
| 3 | 4.813 | 4.813 | 0.070 | 0.335 | 0.075 | | | 11:38:56 | Yes |
| Mean: | 4.869 | 4.869 | 0.070 | | | | | | |
| SD: | 0.058 | 0.058 | 0.0008 | | | | | | |
| %RSD: | 1.194 | 1.194 | 1.19 | | | | | | |

Sequence No.: 53
Sample ID: K0712111-028
Analyst:

Autosampler Location: 44
Date Collected: 2/5/2008 11:39:47 AM
Data Type: Original

Replicate Data: K0712111-028

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.851 | 3.851 | 0.056 | 0.280 | 0.061 | | | 11:40:10 | Yes |
| 2 | 3.863 | 3.863 | 0.056 | 0.273 | 0.061 | | | 11:40:44 | Yes |
| 3 | 3.810 | 3.810 | 0.055 | 0.281 | 0.060 | | | 11:41:19 | Yes |
| Mean: | 3.842 | 3.842 | 0.056 | | | | | | |
| SD: | 0.028 | 0.028 | 0.0004 | | | | | | |
| %RSD: | 0.725 | 0.725 | 0.73 | | | | | | |

Sequence No.: 54
Sample ID: K0712111-029
Analyst:

Autosampler Location: 45
Date Collected: 2/5/2008 11:42:10 AM
Data Type: Original

Replicate Data: K0712111-029

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.012 | 4.012 | 0.058 | 0.295 | 0.063 | | | 11:42:35 | Yes |
| 2 | 3.987 | 3.987 | 0.058 | 0.291 | 0.063 | | | 11:43:10 | Yes |
| 3 | 3.937 | 3.937 | 0.057 | 0.288 | 0.062 | | | 11:43:44 | Yes |
| Mean: | 3.979 | 3.979 | 0.058 | | | | | | |
| SD: | 0.038 | 0.038 | 0.0006 | | | | | | |
| %RSD: | 0.959 | 0.959 | 0.96 | | | | | | |

Sequence No.: 55
Sample ID: K0712111-030
Analyst:

Autosampler Location: 46
Date Collected: 2/5/2008 11:44:35 AM
Data Type: Original

Replicate Data: K0712111-030

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.570 | 3.570 | 0.052 | 0.263 | 0.057 | | | 11:44:59 | Yes |
| 2 | 3.679 | 3.679 | 0.053 | 0.272 | 0.058 | | | 11:45:34 | Yes |
| 3 | 3.449 | 3.449 | 0.050 | 0.256 | 0.055 | | | 11:46:08 | Yes |
| Mean: | 3.566 | 3.566 | 0.052 | | | | | | |
| SD: | 0.115 | 0.115 | 0.0017 | | | | | | |
| %RSD: | 3.228 | 3.228 | 3.23 | | | | | | |

Sequence No.: 56
Sample ID: K0712111-031
Analyst:

Autosampler Location: 47
Date Collected: 2/5/2008 11:47:00 AM
Data Type: Original

Replicate Data: K0712111-031

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.714 | 3.714 | 0.054 | 0.290 | 0.059 | | | 11:47:24 | Yes |
| 2 | 3.710 | 3.710 | 0.054 | 0.275 | 0.059 | | | 11:47:58 | Yes |
| 3 | 3.737 | 3.737 | 0.054 | 0.272 | 0.059 | | | 11:48:33 | Yes |
| Mean: | 3.720 | 3.720 | 0.054 | | | | | | |
| SD: | 0.015 | 0.015 | 0.0002 | | | | | | |
| %RSD: | 0.399 | 0.399 | 0.40 | | | | | | |

Sequence No.: 57
Sample ID: K0712111-032
Analyst:

Autosampler Location: 48
Date Collected: 2/5/2008 11:49:24 AM
Data Type: Original

Replicate Data: K0712111-032

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.293 | 7.293 | 0.106 | 0.525 | 0.111 | | | 11:49:45 | Yes |
| 2 | 7.261 | 7.261 | 0.105 | 0.512 | 0.110 | | | 11:50:19 | Yes |
| 3 | 7.225 | 7.225 | 0.105 | 0.511 | 0.110 | | | 11:50:54 | Yes |
| Mean: | 7.260 | 7.260 | 0.105 | | | | | | |
| SD: | 0.034 | 0.034 | 0.0005 | | | | | | |
| %RSD: | 0.468 | 0.468 | 0.47 | | | | | | |

Sequence No.: 58
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 2/5/2008 11:51:42 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.649 | 9.649 | 0.140 | 0.696 | 0.145 | | | 11:52:05 | Yes |
| 2 | 9.777 | 9.777 | 0.142 | 0.682 | 0.146 | | | 11:52:39 | Yes |
| 3 | 9.608 | 9.608 | 0.139 | 0.689 | 0.144 | | | 11:53:14 | Yes |
| Mean: | 9.678 | 9.678 | 0.140 | | | | | | |
| SD: | 0.088 | 0.088 | 0.0013 | | | | | | |
| %RSD: | 0.911 | 0.911 | 0.91 | | | | | | |

QC value within limits for Se 196.03 Recovery = 96.78%
All analyte(s) passed QC.

Sequence No.: 59

Autosampler Location: 1

Sample ID: CCB
Analyst:

Date Collected: 2/5/2008 11:54:05 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.023 | 0.023 | 0.000 | 0.023 | 0.005 | | | 11:54:26 | Yes |
| 2 | 0.008 | 0.008 | 0.000 | 0.026 | 0.005 | | | 11:55:00 | Yes |
| 3 | -0.055 | -0.055 | -0.001 | 0.013 | 0.004 | | | 11:55:34 | Yes |
| Mean: | -0.008 | -0.008 | -0.000 | | | | | | |
| SD: | 0.042 | 0.042 | 0.0006 | | | | | | |
| %RSD: | 509.2 | 509.2 | 509.23 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 60
Sample ID: K0712111-033
Analyst:

Autosampler Location: 49
Date Collected: 2/5/2008 11:56:23 AM
Data Type: Original

A 2/6/08

Replicate Data: K0712111-033

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.468 | 9.468 | 0.137 | 0.486 | 0.142 | | | 11:56:44 | Yes |
| 2 | 1.032 | 1.032 | 0.015 | -0.484 | 0.020 | | | 11:57:18 | Yes |
| Changing BOC | | | | | | | | | |
| 3 | 4.595 | 4.595 | 0.067 | 0.308 | 0.071 | | | 11:57:53 | Yes |
| Mean: | 5.032 | 5.032 | 0.073 | | | | | | |
| SD: | 4.235 | 4.235 | 0.0613 | | | | | | |
| %RSD: | 84.17 | 84.17 | 84.17 | | | | | | |

Changing BOC

Sequence No.: 61
Sample ID: K0712111-034
Analyst:

Autosampler Location: 50
Date Collected: 2/5/2008 11:58:41 AM
Data Type: Original

Replicate Data: K0712111-034

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.975 | 4.975 | 0.072 | 0.331 | 0.077 | | | 11:59:02 | Yes |
| 2 | 4.986 | 4.986 | 0.072 | 0.312 | 0.077 | | | 11:59:36 | Yes |
| 3 | 5.117 | 5.117 | 0.074 | 0.352 | 0.079 | | | 12:00:10 | Yes |
| Mean: | 5.026 | 5.026 | 0.073 | | | | | | |
| SD: | 0.079 | 0.079 | 0.0011 | | | | | | |
| %RSD: | 1.577 | 1.577 | 1.58 | | | | | | |

Sequence No.: 62
Sample ID: K0712111-035
Analyst:

Autosampler Location: 51
Date Collected: 2/5/2008 12:00:59 PM
Data Type: Original

A 2/6/08

Replicate Data: K0712111-035

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.742 | 0.742 | 0.011 | 0.072 | 0.016 | | | 12:01:20 | Yes |
| 2 | 0.582 | 0.582 | 0.008 | 0.053 | 0.013 | | | 12:01:54 | Yes |
| 3 | 0.584 | 0.584 | 0.008 | 0.064 | 0.013 | | | 12:02:28 | Yes |
| Mean: | 0.636 | 0.636 | 0.009 | | | | | | |
| SD: | 0.092 | 0.092 | 0.0013 | | | | | | |
| %RSD: | 14.41 | 14.41 | 14.41 | | | | | | |

Sequence No.: 63
Sample ID: K0712111-001A
Analyst:

Autosampler Location: 52
Date Collected: 2/5/2008 12:03:17 PM
Data Type: Original

A 2/6/08

Replicate Data: K0712111-001A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.743 | 4.743 | 0.069 | 0.387 | 0.074 | | | 12:03:38 | Yes |
| 2 | 4.689 | 4.689 | 0.068 | 0.365 | 0.073 | | | 12:04:12 | Yes |
| 3 | 4.932 | 4.932 | 0.071 | 0.387 | 0.076 | | | 12:04:46 | Yes |
| Mean: | 4.788 | 4.788 | 0.069 | | | | | | |
| SD: | 0.127 | 0.127 | 0.0018 | | | | | | |
| %RSD: | 2.660 | 2.660 | 2.66 | | | | | | |

Sequence No.: 64
Sample ID: K0712111-022A
Analyst:

Autosampler Location: 53
Date Collected: 2/5/2008 12:05:35 PM
Data Type: Original

Replicate Data: K0712111-022A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.94 | 10.94 | 0.158 | 0.767 | 0.163 | | | 12:05:56 | Yes |
| 2 | 11.00 | 11.00 | 0.159 | 0.766 | 0.164 | | | 12:06:30 | Yes |
| 3 | 12.15 | 12.15 | 0.176 | 0.780 | 0.181 | | | 12:07:05 | Yes |
| Mean: | 11.36 | 11.36 | 0.164 | | | | | | |
| SD: | 0.686 | 0.686 | 0.0099 | | | | | | |
| %RSD: | 6.037 | 6.037 | 6.04 | | | | | | |

Sequence No.: 65
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 2/5/2008 12:07:55 PM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.05 | 10.05 | 0.145 | 0.733 | 0.150 | | | 12:08:18 | Yes |
| 2 | 10.39 | 10.39 | 0.150 | 0.731 | 0.155 | | | 12:08:51 | Yes |
| 3 | 9.847 | 9.847 | 0.143 | 0.724 | 0.147 | | | 12:09:26 | Yes |
| Mean: | 10.10 | 10.10 | 0.146 | | | | | | |
| SD: | 0.276 | 0.276 | 0.0040 | | | | | | |
| %RSD: | 2.734 | 2.734 | 2.73 | | | | | | |

QC value within limits for Se 196.03 Recovery = 100.96%
All analyte(s) passed QC.

Sequence No.: 66
Sample ID: CCB
Analyst:

Autosampler Location: 1
Date Collected: 2/5/2008 12:10:17 PM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.094 | 0.094 | 0.001 | 0.026 | 0.006 | | | 12:10:38 | Yes |
| 2 | 0.011 | 0.011 | 0.000 | 0.017 | 0.005 | | | 12:11:12 | Yes |
| 3 | 0.012 | 0.012 | 0.000 | 0.020 | 0.005 | | | 12:11:46 | Yes |
| Mean: | 0.039 | 0.039 | 0.001 | | | | | | |
| SD: | 0.048 | 0.048 | 0.0007 | | | | | | |
| %RSD: | 121.8 | 121.8 | 121.83 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Analysis Begun

Logged In Analyst: ACQMET10 Technique: AA FIAS-Flame
Spectrometer Model: AAnalyst 200, S/N 200S5061701 Autosampler Model: AS-90

Sample Information File: C:\data-AA\ACQMET10\Sample Information\020508-Se.sif
Batch ID: 020508-Se
Results Data Set: 020508-Se
Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb

Sequence No.: 67 Autosampler Location:
Sample ID: DOLT K0712111 1/40 Date Collected: 2/5/2008 12:14:41 PM
Analyst: Data Type: Original

Replicate Data: DOLT K0712111 1/40

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.259 | 1.259 | 0.018 | 0.115 | 0.023 | | | 12:14:57 | Yes |
| 2 | 1.194 | 1.194 | 0.017 | 0.102 | 0.022 | | | 12:15:31 | Yes |
| 3 | 1.192 | 1.192 | 0.017 | 0.100 | 0.022 | | | 12:16:05 | Yes |
| Mean: | 1.215 | 1.215 | 0.018 | | | | | | |
| SD: | 0.038 | 0.038 | 0.0006 | | | | | | |
| %RSD: | 3.130 | 3.130 | 3.13 | | | | | | |

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Sequence No.: 68 Autosampler Location:
Sample ID: DOLT K0712111 1/40 Date Collected: 2/5/2008 12:17:30 PM
Analyst: Data Type: Original

Replicate Data: DOLT K0712111 1/40

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.193 | 1.193 | 0.017 | 0.104 | 0.022 | | | 12:17:46 | Yes |
| 2 | 1.120 | 1.120 | 0.016 | 0.099 | 0.021 | | | 12:18:21 | Yes |
| 3 | 1.133 | 1.133 | 0.016 | 0.097 | 0.021 | | | 12:18:55 | Yes |
| Mean: | 1.149 | 1.149 | 0.017 | | | | | | |
| SD: | 0.039 | 0.039 | 0.0006 | | | | | | |
| %RSD: | 3.399 | 3.399 | 3.40 | | | | | | |

Sequence No.: 69 Autosampler Location:
Sample ID: K0712111-001 1/2 Date Collected: 2/5/2008 12:20:07 PM
Analyst: Data Type: Original

Replicate Data: K0712111-001 1/2

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.185 | 2.185 | 0.032 | 0.189 | 0.037 | | | 12:20:24 | Yes |
| 2 | 2.211 | 2.211 | 0.032 | 0.194 | 0.037 | | | 12:20:58 | Yes |
| 3 | 2.173 | 2.173 | 0.031 | 0.180 | 0.036 | | | 12:21:32 | Yes |
| Mean: | 2.189 | 2.189 | 0.032 | | | | | | |
| SD: | 0.020 | 0.020 | 0.0003 | | | | | | |
| %RSD: | 0.897 | 0.897 | 0.90 | | | | | | |

Sequence No.: 70 Autosampler Location:
Sample ID: K0712111-001D 1/2 Date Collected: 2/5/2008 12:22:26 PM
Analyst: Data Type: Original

Replicate Data: K0712111-001D 1/2

Repl SampleConc StndConc BlnkCorr Peak Peak Bkgnd Bkgnd Time Peak

| # | ug/L | ug/L | Signal | Area | Height | Area | Height | | Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.999 | 1.999 | 0.029 | 0.168 | 0.034 | | | 12:22:42 | Yes |
| 2 | 2.039 | 2.039 | 0.030 | 0.170 | 0.034 | | | 12:23:16 | Yes |
| 3 | 2.029 | 2.029 | 0.029 | 0.174 | 0.034 | | | 12:23:50 | Yes |
| Mean: | 2.022 | 2.022 | 0.029 | | | | | | |
| SD: | 0.020 | 0.020 | 0.0003 | | | | | | |
| %RSD: | 1.010 | 1.010 | 1.01 | | | | | | |

**Sequence No.: 71** **Autosampler Location:**
**Sample ID: K0712111-004 1/2** **Date Collected: 2/5/2008 12:24:59 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0712111-004 1/2**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.505 | 2.505 | 0.036 | 0.206 | 0.041 | | | 12:25:15 | Yes |
| 2 | 2.383 | 2.383 | 0.035 | 0.201 | 0.039 | | | 12:25:50 | Yes |
| 3 | 2.392 | 2.392 | 0.035 | 0.198 | 0.040 | | | 12:26:25 | Yes |
| Mean: | 2.427 | 2.427 | 0.035 | | | | | | |
| SD: | 0.068 | 0.068 | 0.0010 | | | | | | |
| %RSD: | 2.794 | 2.794 | 2.79 | | | | | | |

**Sequence No.: 72** **Autosampler Location:**
**Sample ID: K0712111-010 1/10** **Date Collected: 2/5/2008 12:27:23 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0712111-010 1/10**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 17.40 | 17.40 | 0.252 | 1.241 | 0.257 | | | 12:27:39 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 17.51 | 17.51 | 0.253 | 1.256 | 0.258 | | | 12:28:14 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 23.17 | 23.17 | 0.335 | 1.995 | 0.340 | | | 12:28:48 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 19.36 | 19.36 | 0.280 | | | | | | |
| SD: | 3.301 | 3.301 | 0.0478 | | | | | | |
| %RSD: | 17.05 | 17.05 | 17.05 | | | | | | |

Sample concentration is greater than that of the highest standard.

**Sequence No.: 73** K 2/6/08 **Autosampler Location:**
**Sample ID: K0712111-011 1/10** **Date Collected: 2/5/2008 12:30:16 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: K0712111-011 1/10**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 17.22 | 17.22 | 0.249 | 1.168 | 0.254 | | | 12:30:32 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 17.15 | 17.15 | 0.248 | 1.219 | 0.253 | | | 12:31:07 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 17.30 | 17.30 | 0.250 | 1.211 | 0.255 | | | 12:31:42 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 17.22 | 17.22 | 0.249 | | | | | | |
| SD: | 0.076 | 0.076 | 0.0011 | | | | | | |
| %RSD: | 0.443 | 0.443 | 0.44 | | | | | | |

Sample concentration is greater than that of the highest standard.

**Sequence No.: 74** **Autosampler Location:**
**Sample ID: K0712111-016 1/20** **Date Collected: 2/5/2008 12:32:53 PM**

Analyst: Data Type: Original

Replicate Data: K0712111-016 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.03 | 10.03 | 0.145 | 0.699 | 0.150 | | | 12:33:10 | Yes |
| 2 | 10.05 | 10.05 | 0.145 | 0.692 | 0.150 | | | 12:33:44 | Yes |
| 3 | 10.02 | 10.02 | 0.145 | 0.680 | 0.150 | | | 12:34:18 | Yes |
| Mean: | 10.03 | 10.03 | 0.145 | | | | | | |
| SD: | 0.015 | 0.015 | 0.0002 | | | | | | |
| %RSD: | 0.153 | 0.153 | 0.15 | | | | | | |

Sequence No.: 75 Autosampler Location:
Sample ID: K0712111-033 1/10 Date Collected: 2/5/2008 12:35:17 PM
Analyst: Data Type: Original

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Replicate Data: K0712111-033 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.066 | 4.066 | 0.059 | 0.297 | 0.064 | | | 12:35:33 | Yes |
| 2 | 5.678 | 5.678 | 0.082 | 0.545 | 0.087 | | | 12:36:07 | Yes |
| 3 | 4.981 | 4.981 | 0.072 | 0.325 | 0.077 | | | 12:36:42 | Yes |
| Mean: | 4.908 | 4.908 | 0.071 | | | | | | |
| SD: | 0.809 | 0.809 | 0.0117 | | | | | | |
| %RSD: | 16.48 | 16.48 | 16.48 | | | | | | |

Sequence No.: 76 Autosampler Location:
Sample ID: K0712111-035 Date Collected: 2/5/2008 12:37:40 PM
Analyst: Data Type: Original

Replicate Data: K0712111-035

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.664 | 3.664 | 0.053 | 0.316 | 0.058 | | | 12:37:57 | Yes |
| 2 | 3.704 | 3.704 | 0.054 | 0.271 | 0.059 | | | 12:38:31 | Yes |
| 3 | 3.721 | 3.721 | 0.054 | 0.306 | 0.059 | | | 12:39:05 | Yes |
| Mean: | 3.696 | 3.696 | 0.054 | | | | | | |
| SD: | 0.029 | 0.029 | 0.0004 | | | | | | |
| %RSD: | 0.786 | 0.786 | 0.79 | | | | | | |

Sequence No.: 77 Autosampler Location:
Sample ID: CCV Date Collected: 2/5/2008 12:40:05 PM
Analyst: Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.569 | 9.569 | 0.139 | 0.683 | 0.143 | | | 12:40:21 | Yes |
| 2 | 10.35 | 10.35 | 0.150 | 0.699 | 0.155 | | | 12:40:56 | Yes |
| 3 | 9.816 | 9.816 | 0.142 | 0.707 | 0.147 | | | 12:41:30 | Yes |
| Mean: | 9.911 | 9.911 | 0.143 | | | | | | |
| SD: | 0.399 | 0.399 | 0.0058 | | | | | | |
| %RSD: | 4.024 | 4.024 | 4.02 | | | | | | |

Sequence No.: 78 Autosampler Location:
Sample ID: CCB Date Collected: 2/5/2008 12:42:27 PM
Analyst: Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.062 | 0.062 | 0.001 | 0.020 | 0.006 | | | 12:42:43 | Yes |
| 2 | 0.007 | 0.007 | 0.000 | 0.018 | 0.005 | | | 12:43:17 | Yes |
| 3 | -0.036 | -0.036 | -0.001 | 0.017 | 0.004 | | | 12:43:52 | Yes |
| Mean: | 0.011 | 0.011 | 0.000 | | | | | | |
| SD: | 0.049 | 0.049 | 0.0007 | | | | | | |
| %RSD: | 439.1 | 439.1 | 439.14 | | | | | | |

Sequence No.: 79 Autosampler Location:
Sample ID: K0712111-0016A 1/20 Date Collected: 2/5/2008 1:03:20 PM
Analyst: Data Type: Original

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Replicate Data: K0712111-0016A 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.40 | 12.40 | 0.179 | 0.851 | 0.184 | | | 13:03:37 | Yes |
| 2 | 12.68 | 12.68 | 0.184 | 0.852 | 0.188 | | | 13:04:11 | Yes |
| 3 | 12.13 | 12.13 | 0.176 | 0.848 | 0.181 | | | 13:04:46 | Yes |
| Mean: | 12.40 | 12.40 | 0.180 | | | | | | |
| SD: | 0.273 | 0.273 | 0.0039 | | | | | | |
| %RSD: | 2.199 | 2.199 | 2.20 | | | | | | |

Sequence No.: 80 Autosampler Location:
Sample ID: K0712111-033 1/10 Date Collected: 2/5/2008 1:06:05 PM
Analyst: Data Type: Original

Replicate Data: K0712111-033 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.018 | 4.018 | 0.058 | 0.300 | 0.063 | | | 13:06:21 | Yes |
| 2 | 3.843 | 3.843 | 0.056 | 0.283 | 0.061 | | | 13:06:56 | Yes |
| 3 | 3.910 | 3.910 | 0.057 | 0.281 | 0.062 | | | 13:07:32 | Yes |
| Mean: | 3.923 | 3.923 | 0.057 | | | | | | |
| SD: | 0.089 | 0.089 | 0.0013 | | | | | | |
| %RSD: | 2.256 | 2.256 | 2.26 | | | | | | |

Sequence No.: 81 Autosampler Location:
Sample ID: K0712111-010 1/20 Date Collected: 2/5/2008 1:08:54 PM
Analyst: Data Type: Original

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Replicate Data: K0712111-010 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 17.04 | 17.04 | 0.247 | 1.258 | 0.252 | | | 13:09:10 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 2 | 16.74 | 16.74 | 0.242 | 1.235 | 0.247 | | | 13:09:45 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| 3 | 16.92 | 16.92 | 0.245 | 1.371 | 0.250 | | | 13:10:19 | Yes |
| Sample concentration is greater than that of the highest standard. | | | | | | | | | |
| Mean: | 16.90 | 16.90 | 0.245 | | | | | | |
| SD: | 0.149 | 0.149 | 0.0022 | | | | | | |
| %RSD: | 0.880 | 0.880 | 0.88 | | | | | | |

Sample concentration is greater than that of the highest standard.

Sequence No.: 82 Autosampler Location:
Sample ID: K0712111-011 1/20 Date Collected: 2/5/2008 1:11:29 PM
Analyst: Data Type: Original

Replicate Data: K0712111-011 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.63 | 10.63 | 0.154 | 0.738 | 0.159 | | | 13:11:45 | Yes |
| 2 | 10.40 | 10.40 | 0.151 | 0.729 | 0.155 | | | 13:12:20 | Yes |
| 3 | 10.32 | 10.32 | 0.149 | 0.717 | 0.154 | | | 13:12:54 | Yes |
| Mean: | 10.45 | 10.45 | 0.151 | | | | | | |
| SD: | 0.162 | 0.162 | 0.0023 | | | | | | |
| %RSD: | 1.549 | 1.549 | 1.55 | | | | | | |

Sequence No.: 83 Autosampler Location:
Sample ID: K0712111-010 1/20 Date Collected: 2/5/2008 1:13:54 PM
Analyst: Data Type: Original

Replicate Data: K0712111-010 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.37 | 11.37 | 0.165 | 0.810 | 0.170 | | | 13:14:10 | Yes |
| 2 | 11.40 | 11.40 | 0.165 | 0.940 | 0.170 | | | 13:14:45 | Yes |
| 3 | 11.46 | 11.46 | 0.166 | 0.799 | 0.171 | | | 13:15:19 | Yes |
| Mean: | 11.41 | 11.41 | 0.165 | | | | | | |
| SD: | 0.045 | 0.045 | 0.0007 | | | | | | |
| %RSD: | 0.395 | 0.395 | 0.39 | | | | | | |

Sequence No.: 84 Autosampler Location:
Sample ID: DOLT K0712111 1/20 Date Collected: 2/5/2008 1:16:31 PM
Analyst: Data Type: Original

Replicate Data: DOLT K0712111 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.313 | 2.313 | 0.033 | 0.176 | 0.038 | | | 13:16:48 | Yes |
| 2 | 2.358 | 2.358 | 0.034 | 0.205 | 0.039 | | | 13:17:22 | Yes |
| 3 | 2.278 | 2.278 | 0.033 | 0.188 | 0.038 | | | 13:17:57 | Yes |
| Mean: | 2.316 | 2.316 | 0.034 | | | | | | |
| SD: | 0.040 | 0.040 | 0.0006 | | | | | | |
| %RSD: | 1.747 | 1.747 | 1.75 | | | | | | |

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Sequence No.: 85 Autosampler Location:
Sample ID: DOLT K0712111 Date Collected: 2/5/2008 1:19:01 PM
Analyst: Data Type: Original

Replicate Data: DOLT K0712111

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.153 | 2.153 | 0.031 | 0.190 | 0.036 | | | 13:19:17 | Yes |
| 2 | 2.074 | 2.074 | 0.030 | 0.181 | 0.035 | | | 13:19:51 | Yes |
| 3 | 2.029 | 2.029 | 0.029 | 0.173 | 0.034 | | | 13:20:25 | Yes |
| Mean: | 2.085 | 2.085 | 0.030 | | | | | | |
| SD: | 0.062 | 0.062 | 0.0009 | | | | | | |
| %RSD: | 2.990 | 2.990 | 2.99 | | | | | | |

Sequence No.: 86 Autosampler Location:
Sample ID: K0712111-016A 1/20 Date Collected: 2/5/2008 1:24:36 PM
Analyst: Data Type: Original

Replicate Data: K0712111-016A 1/20

Repl SampleConc StndConc BlnkCorr Peak Peak Bkgnd Bkgnd Time Peak

| # | ug/L | ug/L | Signal | Area | Height | Area | Height | | Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.37 | 12.37 | 0.179 | 0.855 | 0.184 | | | 13:24:52 | Yes |
| 2 | 11.71 | 11.71 | 0.169 | 0.824 | 0.174 | | | 13:25:27 | Yes |
| 3 | 12.39 | 12.39 | 0.179 | 0.870 | 0.184 | | | 13:26:01 | Yes |
| Mean: | 12.15 | 12.15 | 0.176 | | | | | | |
| SD: | 0.389 | 0.389 | 0.0056 | | | | | | |
| %RSD: | 3.203 | 3.203 | 3.20 | | | | | | |

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Sequence No.: 87
Sample ID: CCV
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 1:27:03 PM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.07 | 10.07 | 0.146 | 0.744 | 0.151 | | | 13:27:20 | Yes |
| 2 | 10.39 | 10.39 | 0.150 | 0.738 | 0.155 | | | 13:27:55 | Yes |
| 3 | 10.88 | 10.88 | 0.157 | 0.770 | 0.162 | | | 13:28:30 | Yes |
| Mean: | 10.45 | 10.45 | 0.151 | | | | | | |
| SD: | 0.408 | 0.408 | 0.0059 | | | | | | |
| %RSD: | 3.902 | 3.902 | 3.90 | | | | | | |

Sequence No.: 88
Sample ID: CCB
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 1:29:26 PM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.280 | 0.280 | 0.004 | 0.070 | 0.009 | | | 13:29:42 | Yes |
| 2 | 0.012 | 0.012 | 0.000 | 0.011 | 0.005 | | | 13:30:16 | Yes |
| 3 | -0.074 | -0.074 | -0.001 | 0.003 | 0.004 | | | 13:30:51 | Yes |
| Mean: | 0.073 | 0.073 | 0.001 | | | | | | |
| SD: | 0.184 | 0.184 | 0.0027 | | | | | | |
| %RSD: | 253.7 | 253.7 | 253.68 | | | | | | |

Sequence No.: 89
Sample ID: DOLT K0712111 1/10
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 1:32:52 PM
Data Type: Original

A 2/6/08

Replicate Data: DOLT K0712111 1/10

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.848 | 2.848 | 0.041 | 0.255 | 0.046 | | | 13:33:08 | Yes |
| 2 | 2.872 | 2.872 | 0.042 | 0.239 | 0.047 | | | 13:33:42 | Yes |
| 3 | 2.947 | 2.947 | 0.043 | 0.249 | 0.048 | | | 13:34:16 | Yes |
| Mean: | 2.889 | 2.889 | 0.042 | | | | | | |
| SD: | 0.052 | 0.052 | 0.0007 | | | | | | |
| %RSD: | 1.791 | 1.791 | 1.79 | | | | | | |

Sequence No.: 90
Sample ID: K0712111-011 1/20
Analyst:

A 2/6/08

Autosampler Location:
Date Collected: 2/5/2008 1:35:30 PM
Data Type: Original

Replicate Data: K0712111-011 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.08 | 12.08 | 0.175 | 0.854 | 0.180 | | | 13:35:46 | Yes |
| 2 | 12.32 | 12.32 | 0.178 | 0.879 | 0.183 | | | 13:36:21 | Yes |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 12.73 | 12.73 | 0.184 | 0.870 | 0.189 | | | 13:36:55 | Yes |
| Mean: | 12.38 | 12.38 | 0.179 | | | | | | |
| SD: | 0.326 | 0.326 | 0.0047 | | | | | | |
| %RSD: | 2.638 | 2.638 | 2.64 | | | | | | |

2/6/08

Sequence No.: 91
Sample ID: K0712111-011A 1/20
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 1:44:59 PM
Data Type: Original

Replicate Data: K0712111-011A 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.16 | 13.16 | 0.190 | 0.883 | 0.195 | | | 13:45:15 | Yes |
| 2 | 12.79 | 12.79 | 0.185 | 0.872 | 0.190 | | | 13:45:49 | Yes |
| 3 | 12.56 | 12.56 | 0.182 | 0.879 | 0.187 | | | 13:46:23 | Yes |
| Mean: | 12.84 | 12.84 | 0.186 | | | | | | |
| SD: | 0.299 | 0.299 | 0.0043 | | | | | | |
| %RSD: | 2.326 | 2.326 | 2.33 | | | | | | |

Sequence No.: 92
Sample ID: K0712111-011A 1/20
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 2:14:00 PM
Data Type: Original

Replicate Data: K0712111-011A 1/20

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 13.44 | 13.44 | 0.195 | 0.922 | 0.199 | | | 14:14:17 | Yes |
| 2 | 13.77 | 13.77 | 0.199 | 0.940 | 0.204 | | | 14:14:51 | Yes |
| 3 | 13.78 | 13.78 | 0.200 | 0.945 | 0.204 | | | 14:15:25 | Yes |
| Mean: | 13.66 | 13.66 | 0.198 | | | | | | |
| SD: | 0.196 | 0.196 | 0.0028 | | | | | | |
| %RSD: | 1.436 | 1.436 | 1.44 | | | | | | |

Sequence No.: 93
Sample ID: CCV
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 2:16:30 PM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.20 | 10.20 | 0.148 | 0.751 | 0.153 | | | 14:16:46 | Yes |
| 2 | 10.10 | 10.10 | 0.146 | 0.701 | 0.151 | | | 14:17:21 | Yes |
| 3 | 9.761 | 9.761 | 0.141 | 0.709 | 0.146 | | | 14:17:55 | Yes |
| Mean: | 10.02 | 10.02 | 0.145 | | | | | | |
| SD: | 0.232 | 0.232 | 0.0034 | | | | | | |
| %RSD: | 2.312 | 2.312 | 2.31 | | | | | | |

Sequence No.: 94
Sample ID: CCB
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 2:19:09 PM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.054 | -0.054 | -0.001 | 0.020 | 0.004 | | | 14:19:25 | Yes |
| 2 | -0.051 | -0.051 | -0.001 | 0.025 | 0.004 | | | 14:19:59 | Yes |
| 3 | -0.149 | -0.149 | -0.002 | 0.008 | 0.003 | | | 14:20:34 | Yes |
| Mean: | -0.085 | -0.085 | -0.001 | | | | | | |
| SD: | 0.056 | 0.056 | 0.0008 | | | | | | |

| | | | |
|---|---|---|---|
| %RSD: | 65.92 | 65.92 | 65.92 |

# Service Request Summary

**Folder #:** **K0712111**
Client Name: New Fields Environmental
Project Name: Se in Tissue
Project Number:

**Report To:** Kathy Tegtmeyer
New Fields Environmental
4720 Walnut St., Suite 200
Boulder, CO 80301
Phone Number: 303-442-0267 Ext. 1006
Cell Number:
Fax Number:
E-mail: ktegtmeyer@newfields.com

Project Chemist: Jeff Christian
Originating Lab: KELSO
Logged By: FADAIR
Date Received: 12/21/2007
Internal Due Date: 01/13/2008
QAPP: LAB QAP
Qualifier Set: CAS Standard
Formset: CAS Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC

35 - 1 each-Plastic Bag Ziplock Unpreserved
35 - 16 oz-Glass Jar WM CLEAR Teflon Liner Unpreserved

**Location:** K-Yukon-04

| | | | | Metals | | |
|---|---|---|---|---|---|---|
| **CAS Samp No.** | **Client Samp No.** | **Matrix** | **Collected** | Frz Dry/ Frz Dry | Homogen/ Homogen | Se T/ 7742 |
| K0712111-001 | SM1007-SNFH-FT0058 | Tissue | 10/25/07 1200 | V | V | V |
| K0712111-002 | SM1007-SNFH-FT0059 | Tissue | 10/25/07 1200 | V | V | V |
| K0712111-003 | SM1007-SNFH-FT0060 | Tissue | 10/25/07 1345 | V | V | V |
| K0712111-004 | SM1007-SNFH-FT0061 | Tissue | 10/25/07 1415 | V | V | V |
| K0712111-005 | SM1007-SNFH-FT0062 | Tissue | 10/25/07 1410 | V | V | V |
| K0712111-006 | SM1007-SNFH-FT0063 | Tissue | 10/25/07 1430 | V | V | V |
| K0712111-007 | SM1007-SNFH-FT0064 | Tissue | 10/25/07 1535 | V | V | V |
| K0712111-008 | SM1007-SNFH-FT0065 | Tissue | 10/25/07 1540 | V | V | V |
| K0712111-009 | SM1107-LSV2c-FT0066 | Tissue | 11/14/07 | V | V | V |
| K0712111-010 | SM1107-LSV2c-FT0067 | Tissue | 11/14/07 | V | V | V |
| K0712111-011 | SM1107-LSV2c-FT0068 | Tissue | 11/14/07 | V | V | V |
| K0712111-012 | SM1107-LSV2c-FT0069 | Tissue | 11/14/07 | V | V | V |
| K0712111-013 | SM1107-LSV2c-FT0070 | Tissue | 11/14/07 | V | V | V |
| K0712111-014 | SM1107-LSV2c-FT0071 | Tissue | 11/14/07 | V | V | V |
| K0712111-015 | SM1107-LSV2c-FT0072 | Tissue | 11/14/07 | V | V | V |
| K0712111-016 | SM1107-LSV2c-FT0073 | Tissue | 11/14/07 | V | V | V |
| K0712111-017 | SM1107-LSV2c-FT0074 | Tissue | 11/14/07 | V | V | V |
| K0712111-018 | SM1107-LSV2c-FT0075 | Tissue | 11/14/07 | V | V | V |
| K0712111-019 | SM1107-LSV2c-FT0076 | Tissue | 11/14/07 | V | V | V |
| K0712111-020 | SM1107-LSV2c-FT0077 | Tissue | 11/14/07 | V | V | V |
| K0712111-021 | SM1107-LSV2c-FT0078 | Tissue | 11/14/07 | V | V | V |
| K0712111-022 | SM1107-LSV2c-FT0079 | Tissue | 11/14/07 | V | V | V |
| K0712111-023 | SM1107-CC150-FT0080 | Tissue | 11/15/07 | V | V | V |
| K0712111-024 | SM1107-CC150-FT0081 | Tissue | 11/15/07 | V | V | V |

122

# Service Request Summary

**Folder #:** **K0712111**
Client Name: New Fields Environmental
Project Name: Se in Tissue
Project Number:

**Report To:** Kathy Tegtmeyer
New Fields Environmental
4720 Walnut St., Suite 200
Boulder, CO 80301

Phone Number: 303-442-0267 Ext. 1006
Cell Number:
Fax Number:
E-mail: ktegtmeyer@newfields.com

Project Chemist: Jeff Christian
Originating Lab: KELSO
Logged By: FADAIR
Date Received: 12/21/2007
Internal Due Date: 01/13/2008
QAPP: LAB QAP
Qualifier Set: CAS Standard
Formset: CAS Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC

35 - 1 each-Plastic Bag Ziplock Unpreserved
35 - 16 oz-Glass Jar WM CLEAR Teflon Liner Unpreserved

**Location:** K-Yukon-04

| | | | | Metals | | |
|---|---|---|---|---|---|---|
| | | | | Frz Dry/ Frz Dry | Homogen/ Homogen | Se T/ 7742 |
| K0712111-025 | SM1107-CC150-FT0082 | Tissue | 11/15/07 | V | V | V |
| K0712111-026 | SM1107-CC150-FT0083 | Tissue | 11/15/07 | V | V | V |
| K0712111-027 | SM1107-CC150-FT0084 | Tissue | 11/15/07 | V | V | V |
| K0712111-028 | SM1107-CC150-FT0085 | Tissue | 11/15/07 | V | V | V |
| K0712111-029 | SM1107-CC150-FT0086 | Tissue | 11/15/07 | V | V | V |
| K0712111-030 | SM1107-CC150-FT0087 | Tissue | 11/15/07 | V | V | V |
| K0712111-031 | SM1107-CC150-FT0088 | Tissue | 11/15/07 | V | V | V |
| K0712111-032 | SM1107-CC350-FT0089 | Tissue | 11/15/07 | V | V | V |
| K0712111-033 | SM1107-CC350-FT0090 | Tissue | 11/15/07 | V | V | V |
| K0712111-034 | SM1107-CC350-FT0091 | Tissue | 11/15/07 | V | V | V |
| K0712111-035 | SM1207-SPCFH-FT0092 | Tissue | 12/4/07 | V | V | V |

Element Analyzed Se Hydride Instrument K-FLAA-2
Service Request # K0712111

Batch QC SR's #

Calibration Std. AA1-8-A
Starlims #
Run # 06014-Se

Analytical Batch
KA0630252

# Hydride Data Review Form

| | Yes | No | NA |
|---|---|---|---|
| 1 ICV within 10% of true Value | X | | |
| 2. Calibration data included | X | | |
| 3. CCV's in control | X | | |
| 4. CCB's and/or ICB's below MRL | X | | |
| 5. All reported Results within Cal. Range | X | | |
| 6. All Calculations are Correct | X | | |

Comments

Primary Reviewed by [signature] Date 2/6/08

Secondary Reviewed by JDB Date 2/6/08

**COLUMBIA ANALYTICAL SERVICES, INC.**
**GFAA Run Log**

| | |
|---|---|
| **Method:** (Circle Method Used)<br>7742 7062<br>Other:<br>Element: As Se | **Service Request # :** |

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ICV | - | 10.034 | 100% | |
| ICB | - | 0.091 | | |
| CRA | - | 0.540 | 108% | |
| CCV | - | 10.234 | 102% | |
| CCB | - | 0.051 | | |
| LCS-DOLT K0712111 (1) | 1/2+1/10 | 4.332 | 112% | |
| ~~LCS-DOLT K0712111 (2)~~ | ~~1/2+1/10~~ | ~~5.730~~ | | Rerun |
| CCV | | 10.418 | 104% | |
| CCB | | 0.054 | | |
| LCS-DOLT K0712111 (2) | 1/2x 1/10 | 4.393 | 114% | |
| CCV | | 10.275 | 103% | |
| CCB | | 0.040 | | |
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| True Values/QC Limits: | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (65-122%) | 73.0mg/kg (61-142%) | 1000ppb (65-124%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| John D Baird | 2/6/08 | 1 |



R:\ICP\MISC\HG1631\1631 Run Log

==========================================================================================

**Analysis Begun**

**Logged In Analyst: ACQMET10** **Technique: AA FIAS-Flame**
**Spectrometer Model: AAnalyst 200, S/N 200S5061701** **Autosampler Model: AS-90**

**Sample Information File: C:\data-AA\ACQMET10\Sample Information\020508-Se2.sif**
**Batch ID: 020508-Se2**
**Results Data Set: 060614-Se**
**Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb**

==========================================================================================

**Sequence No.: 1** **Autosampler Location: 1**
**Sample ID: Cal Blk** **Date Collected: 2/5/2008 4:32:09 PM**
**Analyst:** **Data Type: Original**

------------------------------------------------------------------------------------------

**Replicate Data: Cal Blk**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.00] | 0.005 | 0.020 | 0.005 | | | 16:32:30 | Yes |
| 2 | | [0.00] | 0.006 | 0.018 | 0.006 | | | 16:33:05 | Yes |
| 3 | | [0.00] | 0.005 | 0.020 | 0.005 | | | 16:33:39 | Yes |
| Mean: | | [0.00] | 0.005 | | | | | | |
| SD: | | 0.00 | 0.0004 | | | | | | |
| %RSD: | | 0.00 | 8.60 | | | | | | |

Auto-zero performed.

==========================================================================================

**Sequence No.: 2** **Autosampler Location: 2**
**Sample ID: Std 0.5** **Date Collected: 2/5/2008 4:34:29 PM**
**Analyst:** **Data Type: Original**

------------------------------------------------------------------------------------------

**Replicate Data: Std 0.5**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.5] | 0.007 | 0.059 | 0.012 | | | 16:34:51 | Yes |
| 2 | | [0.5] | 0.007 | 0.048 | 0.012 | | | 16:35:24 | Yes |
| 3 | | [0.5] | 0.008 | 0.057 | 0.013 | | | 16:35:59 | Yes |
| Mean: | | [0.5] | 0.007 | | | | | | |
| SD: | | 0.0 | 0.0003 | | | | | | |
| %RSD: | | 0.0 | 3.46 | | | | | | |

Standard number 1 applied. [0.5]
Correlation Coef.: 1.000000 Slope: 0.01455 Intercept: 0.00000

==========================================================================================

**Sequence No.: 3** **Autosampler Location: 3**
**Sample ID: Std 1.0** **Date Collected: 2/5/2008 4:36:49 PM**
**Analyst:** **Data Type: Original**

------------------------------------------------------------------------------------------

**Replicate Data: Std 1.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [1.0] | 0.015 | 0.092 | 0.020 | | | 16:37:11 | Yes |
| 2 | | [1.0] | 0.014 | 0.086 | 0.019 | | | 16:37:45 | Yes |
| 3 | | [1.0] | 0.013 | 0.083 | 0.019 | | | 16:38:19 | Yes |
| Mean: | | [1.0] | 0.014 | | | | | | |
| SD: | | 0.0 | 0.0007 | | | | | | |
| %RSD: | | 0.0 | 4.70 | | | | | | |

Standard number 2 applied. [1.0]
Correlation Coef.: 0.999050 Slope: 0.01416 Intercept: 0.00000

==========================================================================================

**Sequence No.: 4** **Autosampler Location: 4**

**Sample ID: Std 5.0** **Date Collected: 2/5/2008 4:39:08 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 5.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [5.0] | 0.072 | 0.374 | 0.077 | | | 16:39:31 | Yes |
| 2 | | [5.0] | 0.070 | 0.365 | 0.075 | | | 16:40:05 | Yes |
| 3 | | [5.0] | 0.071 | 0.372 | 0.077 | | | 16:40:40 | Yes |
| Mean: | | [5.0] | 0.071 | | | | | | |
| SD: | | 0.0 | 0.0010 | | | | | | |
| %RSD: | | 0.0 | 1.42 | | | | | | |

Standard number 3 applied. [5.0]
Correlation Coef.: 0.999990 Slope: 0.01421 Intercept: 0.00000

**Sequence No.: 5** **Autosampler Location: 5**
**Sample ID: Std 10.0** **Date Collected: 2/5/2008 4:41:30 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 10.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [10.0] | 0.137 | 0.722 | 0.143 | | | 16:41:53 | Yes |
| 2 | | [10.0] | 0.136 | 0.707 | 0.141 | | | 16:42:27 | Yes |
| 3 | | [10.0] | 0.138 | 0.702 | 0.143 | | | 16:43:01 | Yes |
| Mean: | | [10.0] | 0.137 | | | | | | |
| SD: | | 0.0 | 0.0011 | | | | | | |
| %RSD: | | 0.0 | 0.77 | | | | | | |

Standard number 4 applied. [10.0]
Correlation Coef.: 0.999771 Slope: 0.01382 Intercept: 0.00000

**Sequence No.: 6** **Autosampler Location: 6**
**Sample ID: Std 15.0** **Date Collected: 2/5/2008 4:43:53 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: Std 15.0**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [15.0] | 0.194 | 1.045 | 0.199 | | | 16:44:16 | Yes |
| 2 | | [15.0] | 0.191 | 1.001 | 0.196 | | | 16:44:50 | Yes |
| 3 | | [15.0] | 0.196 | 1.006 | 0.201 | | | 16:45:24 | Yes |
| Mean: | | [15.0] | 0.194 | | | | | | |
| SD: | | 0.0 | 0.0024 | | | | | | |
| %RSD: | | 0.0 | 1.23 | | | | | | |

Standard number 5 applied. [15.0]
Correlation Coef.: 0.998645 Slope: 0.01325 Intercept: 0.00000
The calibration curve may not be linear.

**Calibration data for Se 196.03** **Equation: Linear Through Zero**

| ID | Mean Signal (Abs) | Entered Conc. ug/L | Calculated Conc. ug/L | Standard Deviation | %RSD |
|---|---|---|---|---|---|
| Cal Blk | 0.0000 | 0 | 0.000 | 0.00 | 8.6 |
| Std 0.5 | 0.0073 | 0.5 | 0.549 | 0.00 | 3.5 |
| Std 1.0 | 0.0141 | 1.0 | 1.061 | 0.00 | 4.7 |
| Std 5.0 | 0.0711 | 5.0 | 5.363 | 0.00 | 1.4 |
| Std 10.0 | 0.1372 | 10.0 | 10.353 | 0.00 | 0.8 |
| Std 15.0 | 0.1936 | 15.0 | 14.611 | 0.00 | 1.2 |

Correlation Coef.: 0.998645 Slope: 0.01325 Intercept: 0.00000

Sequence No.: 7 Autosampler Location: 7
Sample ID: ICV Date Collected: 2/5/2008 4:46:16 PM
Analyst: Data Type: Original

Replicate Data: ICV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.18 | 10.18 | 0.135 | 0.712 | 0.140 | | | 16:46:40 | Yes |
| 2 | 9.926 | 9.926 | 0.132 | 0.694 | 0.137 | | | 16:47:14 | Yes |
| 3 | 9.999 | 9.999 | 0.132 | 0.687 | 0.138 | | | 16:47:50 | Yes |
| Mean: | 10.03 | 10.03 | 0.133 | | | | | | |
| SD: | 0.129 | 0.129 | 0.0017 | | | | | | |
| %RSD: | 1.287 | 1.287 | 1.29 | | | | | | |

QC value within limits for Se 196.03 Recovery = 100.34%
All analyte(s) passed QC.

Sequence No.: 8 Autosampler Location: 1
Sample ID: ICB Date Collected: 2/5/2008 4:48:42 PM
Analyst: Data Type: Original

Replicate Data: ICB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.098 | 0.098 | 0.001 | 0.020 | 0.007 | | | 16:49:03 | Yes |
| 2 | 0.102 | 0.102 | 0.001 | 0.025 | 0.007 | | | 16:49:37 | Yes |
| 3 | 0.073 | 0.073 | 0.001 | 0.032 | 0.006 | | | 16:50:11 | Yes |
| Mean: | 0.091 | 0.091 | 0.001 | | | | | | |
| SD: | 0.016 | 0.016 | 0.0002 | | | | | | |
| %RSD: | 17.25 | 17.25 | 17.25 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 9 Autosampler Location: 2
Sample ID: CRA Date Collected: 2/5/2008 4:51:01 PM
Analyst: Data Type: Original

Replicate Data: CRA

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.522 | 0.522 | 0.007 | 0.052 | 0.012 | | | 16:51:22 | Yes |
| 2 | 0.587 | 0.587 | 0.008 | 0.061 | 0.013 | | | 16:51:56 | Yes |
| 3 | 0.512 | 0.512 | 0.007 | 0.058 | 0.012 | | | 16:52:30 | Yes |
| Mean: | 0.540 | 0.540 | 0.007 | | | | | | |
| SD: | 0.041 | 0.041 | 0.0005 | | | | | | |
| %RSD: | 7.514 | 7.514 | 7.51 | | | | | | |

QC value within limits for Se 196.03 Recovery = 108.02%
All analyte(s) passed QC.

Sequence No.: 10 Autosampler Location: 5
Sample ID: CCV Date Collected: 2/5/2008 4:53:20 PM
Analyst: Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.35 | 10.35 | 0.137 | 0.720 | 0.142 | | | 16:53:43 | Yes |
| 2 | 10.06 | 10.06 | 0.133 | 0.702 | 0.139 | | | 16:54:17 | Yes |
| 3 | 10.29 | 10.29 | 0.136 | 0.708 | 0.142 | | | 16:54:52 | Yes |
| Mean: | 10.23 | 10.23 | 0.136 | | | | | | |

SD: 0.150 0.150 0.0020
%RSD: 1.467 1.467 1.47
QC value within limits for Se 196.03 Recovery = 102.34%
All analyte(s) passed QC.

Sequence No.: 11 Autosampler Location: 1
Sample ID: CCB Date Collected: 2/5/2008 4:55:43 PM
Analyst: Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.106 | 0.106 | 0.001 | 0.022 | 0.007 | | | 16:56:04 | Yes |
| 2 | 0.030 | 0.030 | 0.000 | 0.020 | 0.006 | | | 16:56:38 | Yes |
| 3 | 0.016 | 0.016 | 0.000 | 0.025 | 0.005 | | | 16:57:12 | Yes |
| Mean: | 0.051 | 0.051 | 0.001 | | | | | | |
| SD: | 0.048 | 0.048 | 0.0006 | | | | | | |
| %RSD: | 94.87 | 94.87 | 94.87 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 12 Autosampler Location: 9
Sample ID: LCS-DOLT K0712111 (1) Date Collected: 2/5/2008 4:58:01 PM
Analyst: Data Type: Original

Replicate Data: LCS-DOLT K0712111 (1)

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.325 | 4.325 | 0.057 | 0.319 | 0.063 | | | 16:58:22 | Yes |
| 2 | 4.218 | 4.218 | 0.056 | 0.296 | 0.061 | | | 16:58:57 | Yes |
| 3 | 4.452 | 4.452 | 0.059 | 0.314 | 0.064 | | | 16:59:31 | Yes |
| Mean: | 4.332 | 4.332 | 0.057 | | | | | | |
| SD: | 0.117 | 0.117 | 0.0016 | | | | | | |
| %RSD: | 2.701 | 2.701 | 2.70 | | | | | | |

Sequence No.: 13 Autosampler Location: 10
Sample ID: LCS-DOLT K0712111 (2) Date Collected: 2/5/2008 5:00:20 PM
Analyst: Data Type: Original

Replicate Data: LCS-DOLT K0712111 (2)

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.416 | 4.416 | 0.059 | 0.320 | 0.064 | | | 17:00:41 | Yes |
| 2 | 11.08 | 11.08 | 0.147 | 0.894 | 0.152 | | | 17:01:16 | Yes |
| 3 | 1.694 | 1.694 | 0.022 | -0.104 | 0.028 | | | 17:01:50 | Yes |
| Changing BOC | | | | | | | | | |
| Mean: | 5.730 | 5.730 | 0.076 | | | | | | |
| SD: | 4.829 | 4.829 | 0.0640 | | | | | | |
| %RSD: | 84.27 | 84.27 | 84.27 | | | | | | |
| Changing BOC | | | | | | | | | |

See Rerun JK 2/5/08

Sequence No.: 14 Autosampler Location: 5
Sample ID: CCV Date Collected: 2/5/2008 5:02:39 PM
Analyst: Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.47 | 10.47 | 0.139 | 0.739 | 0.144 | | | 17:03:02 | Yes |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 10.41 | 10.41 | 0.138 | 0.708 | 0.143 | | | 17:03:37 | Yes |
| 3 | 10.38 | 10.38 | 0.138 | 0.714 | 0.143 | | | 17:04:11 | Yes |
| Mean: | 10.42 | 10.42 | 0.138 | | | | | | |
| SD: | 0.045 | 0.045 | 0.0006 | | | | | | |
| %RSD: | 0.431 | 0.431 | 0.43 | | | | | | |

QC value within limits for Se 196.03 Recovery = 104.18%
All analyte(s) passed QC.

**Sequence No.: 15** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 2/5/2008 5:05:02 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: CCB**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.115 | 0.115 | 0.002 | 0.025 | 0.007 | | | 17:05:23 | Yes |
| 2 | 0.030 | 0.030 | 0.000 | 0.017 | 0.006 | | | 17:05:57 | Yes |
| 3 | 0.016 | 0.016 | 0.000 | 0.016 | 0.005 | | | 17:06:31 | Yes |
| Mean: | 0.054 | 0.054 | 0.001 | | | | | | |
| SD: | 0.054 | 0.054 | 0.0007 | | | | | | |
| %RSD: | 100.0 | 100.0 | 100.04 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

**Analysis Begun**

**Logged In Analyst: ACQMET10** **Technique: AA FIAS-Flame**
**Spectrometer Model: AAnalyst 200, S/N 200S5061701** **Autosampler Model: AS-90**

**Sample Information File: C:\data-AA\ACQMET10\Sample Information\020508-Se2.sif**
**Batch ID: 020508-Se2**
**Results Data Set: 060614-Se**
**Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb**

**Sequence No.: 16** **Autosampler Location:**
**Sample ID: LCS-DOLT K0712111 (2)** **Date Collected: 2/5/2008 5:09:09 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: LCS-DOLT K0712111 (2)**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.399 | 4.399 | 0.058 | 0.321 | 0.063 | | | 17:09:25 | Yes |
| 2 | 4.441 | 4.441 | 0.059 | 0.312 | 0.064 | | | 17:09:59 | Yes |
| 3 | 4.341 | 4.341 | 0.058 | 0.305 | 0.063 | | | 17:10:34 | Yes |
| Mean: | 4.393 | 4.393 | 0.058 | | | | | | |
| SD: | 0.050 | 0.050 | 0.0007 | | | | | | |
| %RSD: | 1.142 | 1.142 | 1.14 | | | | | | |

**Sequence No.: 17** **Autosampler Location:**
**Sample ID: CCV** **Date Collected: 2/5/2008 5:12:20 PM**
**Analyst:** **Data Type: Original**

**Replicate Data: CCV**

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.37 | 10.37 | 0.137 | 0.730 | 0.143 | | | 17:12:36 | Yes |
| 2 | 10.29 | 10.29 | 0.136 | 0.719 | 0.142 | | | 17:13:10 | Yes |
| 3 | 10.16 | 10.16 | 0.135 | 0.714 | 0.140 | | | 17:13:44 | Yes |
| Mean: | 10.28 | 10.28 | 0.136 | | | | | | |
| SD: | 0.107 | 0.107 | 0.0014 | | | | | | |

%RSD: 1.042 1.042 1.04

==========================================================================================

Sequence No.: 18
Sample ID: CCB
Analyst:

Autosampler Location:
Date Collected: 2/5/2008 5:18:05 PM
Data Type: Original

------------------------------------------------------------------------------------------

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.136 | 0.136 | 0.002 | 0.041 | 0.007 | | | 17:18:21 | Yes |
| 2 | -0.026 | -0.026 | -0.000 | 0.016 | 0.005 | | | 17:18:55 | Yes |
| 3 | 0.009 | 0.009 | 0.000 | 0.010 | 0.005 | | | 17:19:30 | Yes |
| Mean: | 0.040 | 0.040 | 0.001 | | | | | | |
| SD: | 0.085 | 0.085 | 0.0011 | | | | | | |
| %RSD: | 214.8 | 214.8 | 214.77 | | | | | | |

1317 South 13th Avenue Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

December 20, 2007 Analytical Report for Service Request No: K0710142

Kathy Tegtmeyer
New Fields Environmental
4720 Walnut St., Suite 200
Boulder, CO 80301

Dear Kathy:

Enclosed are the results of the samples submitted to our laboratory on October 30, 2007. For your reference, these analyses have been assigned our service request number K0710142.

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 3316. You may also contact me via Email at JChristian@caslab.com.

Respectfully submitted,

**Columbia Analytical Services, Inc.**

Jeff Christian
Laboratory Director

JC/lb

## 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) | - |

MEMBER ACIL

nelac

# Case Narrative

## COLUMBIA ANALYTICAL SERVICES, INC.

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request No.:** | K0710142 |
| **Project:** | Tissue - Se | **Date Received:** | 10/30/07 |
| **Sample Matrix:** | Tissue | | |

## 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

Tissue samples were received for analysis at Columbia Analytical Services on 10/30/07. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored frozen at –20°C upon receipt at the laboratory.

Note that the samples were held until 11/29/07 pending approval from New Fields Environmental to proceed with the analysis.

### Total Metals

**General Comments:**
The samples were freeze-dried to determine moisture and to allow complete homogenization of the dry material. The dried material was milled to a fine meal, and then sub-sampled for digestion. A thorough digestion was performed prior to instrumental analysis to convert all Selenium species to Selenate. Prior to hydride formation, the valence was adjusted by reduction to Selenite.

No anomalies associated with the analysis of these samples were observed.

Approved by ______________________ Date 12/20/07

# Chain of Custody Documentation

# Chain of Custody Page 1 of 1

NEWFIELDS

4720 Walnut St., Suite 200
Boulder, CO 80301
Phone: 303-442-0267
Fax: 303-442-3679



Project Contact: HOWARD BOORSE
PO: 0442-004-900
Courier/Airbill: 7982 9469 2081
Shipped to: COLUMBIA ANALYTICAL SERVICES, INC
1317 SOUTH 13TH AVE
KELSO, WA 98626
Telephone: (360) 430-7733

K0710142 COC #: 102907-1

| Sample ID | Sample Date | Sample Time | Matrix | Tot/Diss | Analysis | Preservative | Lab QC | Comments |
|---|---|---|---|---|---|---|---|---|
| SM1007-CC1A-FT001 | 10/22/07 | 11:30 | FISH TISSUE | | SELENIUM, TOTAL | NONE | | ARCHIVE PENDING |
| SM1007-CC1A-FT001 | 10/22/07 | 11:30 | FISH TISSUE | | PERCENT SOLIDS | NONE | | FURTHER INSTRUCTIONS |
| SM1007-CC1A-FT001-EGGS | 10/22/07 | 11:30 | FISH TISSUE | | SELENIUM, TOTAL | NONE | | FROM K. TEGTMEYER, |
| SM1007-CC1A-FT001-EGGS | 10/22/07 | 11:30 | FISH TISSUE | | PERCENT SOLIDS | NONE | | NEWFIELDS |
| SM1007-CC3A-FT101 | 10/24/07 | 11:43 | FISH TISSUE | | SELENIUM, TOTAL | NONE | | (ALL SAMPLES) |
| SM1007-CC3A-FT101 | 10/24/07 | 11:43 | FISH TISSUE | | PERCENT SOLIDS | NONE | | |
| SM1007-CC3A-FT101-EGGS | 10/24/07 | 11:43 | FISH TISSUE | | SELENIUM, TOTAL | NONE | | PLEASE |
| SM1007-CC3A-FT101-EGGS | 10/24/07 | 11:43 | FISH TISSUE | | PERCENT SOLIDS | NONE | | ARCHIVE |
| SM1007-CC3A-FT001 | 10/24/07 | 10:52 | FISH TISSUE | | SELENIUM, TOTAL | NONE | | THE |
| SM1007-CC3A-FT001 | 10/24/07 | 10:52 | FISH TISSUE | | PERCENT SOLIDS | NONE | | SAMPLES |
| SM1007-CC3A-FT100 | 10/24/07 | 11:43 | FISH TISSUE | | SELENIUM, TOTAL | NONE | | FROZEN |
| SM1007-CC3A-FT100 | 10/24/07 | 11:43 | FISH TISSUE | | PERCENT SOLIDS | NONE | | |
| SM1007-CC3A-FT002 | 10/24/07 | 11:00 | FISH TISSUE | | SELENIUM, TOTAL | NONE | | |
| SM1007-CC3A-FT002 | 10/24/07 | 11:00 | FISH TISSUE | | PERCENT SOLIDS | NONE | | |
| | | | | | | | | |

Total Number of Containers: 7 ~~Individual Lines Reflect Single Containers, Except for Aqueous Analyses Assigned as Laboratory QC~~ KR

Sampler Signature: [signature]

| Relinquished by | Date/Time | Received by | Date/Time |
|---|---|---|---|
| KIM RABY | 10/29/07 1200 | [signature] CAS | 10/30/07 1430 |
| | | | |
| | | | |

LAB USE ONLY—Sample condition on Receipt

PC JC

# Columbia Analytical Services, Inc.
## Cooler Receipt and Preservation Form

Client / Project: Newfields Service Request K07 10142

Received: 10/30/07 Opened: 10/30/07 By: AJ

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): 2.7
   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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

*Additional Notes, Discrepancies, & Resolutions:* ________

# Total Solids

## COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0710142 |
| **Project:** | NA | **Date Collected:** | 10/22-24/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 10/30/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| Sample Name | Lab Code | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|
| SM1007-CC1A-FT001 | K0710142-001 | 12/5/07 | 25.8 | |
| SM107-CC1A-FT001-Eggs | K0710142-002 | 12/5/07 | 35.3 | |
| SM1007-CC3A-FT101 | K0710142-003 | 12/5/07 | 25.2 | |
| SM1007-CC3A-FT101-Eggs | K0710142-004 | 12/5/07 | 36.1 | |
| SM1007-CC3A-FT001 | K0710142-005 | 12/5/07 | 26.7 | |
| SM1007-CC3A-FT100 | K0710142-006 | 12/5/07 | 26.5 | |
| SM1007-CC3A-FT002 | K0710142-007 | 12/5/07 | 26.8 | |

## COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** New Fields Environmental
**Project:** NA
**Sample Matrix:** Tissue

**Service Request:** K0710142
**Date Collected:** 10/24/07
**Date Received:** 10/30/07
**Date Extracted:** NA
**Date Analyzed:** 12/5/07

Duplicate Summary
Total Metals

Sample Name: SM1007-CC3A-FT002
Lab Code: K0710142-007D
Test Notes:

Units: PERCENT
Basis: Wet

| Analyte | Prep Method | Analysis Method | Sample Result | Duplicate Sample Result | Average | Relative Percent Difference | Result Notes |
|---|---|---|---|---|---|---|---|
| Solids, Total | NA | Freeze Dry | 26.8 | 26.7 | 26.8 | <1 | |

Service Request #: K0710142

Analysis For: Freeze Dried Solids

Analytical Batch
KA0628246

| Lab Code | Wet Weight (g) | Tare (g) | Tare + Dry Wt.(g) | Dry Weight (g) | % Total Solids |
|---|---|---|---|---|---|
| K0710142-01 | 21.875 | 79.545 | 85.199 | 5.654 | 25.8 |
| -02 | 21.178 | 78.684 | 86.157 | 7.473 | 35.3 |
| -03 | 23.435 | 79.384 | 85.290 | 5.906 | 25.2 |
| -04 | 20.020 | 78.417 | 85.651 | 7.234 | 36.1 |
| -05 | 21.707 | 78.991 | 84.778 | 5.787 | 26.7 |
| -06 | 20.832 | 78.845 | 84.372 | 5.527 | 26.5 |
| -07 | 22.294 | 79.152 | 85.126 | 5.974 | 26.8 |
| -07D | 23.284 | 78.323 | 84.550 | 6.227 | 26.7 |
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UAB 12/5/07

Time In: 2:15pm 12/5/07 Time Out: 4:00p.m. 12/6/07

Comments: Balance-21B

$\bar{x}$ = RPD =

| | |
|---|---|
| Analyst: Angela Black | Date: 12/5/07 |
| Reviewed By: [initials] | Date: 12/18/07 |

| Sample Number(s): As Listed | Service Request Number(s): K0710142 |
|---|---|

## TISSUE COMPOSITION DATA

| Laboratory ID | Weight (g) | Tare (g) | AB 12/5/07 | | Matrix | Length | |
|---|---|---|---|---|---|---|---|
| 0710142-01 | 265.58 | ~~471.35~~ | 281.03 | | Whole body fish | | |
| -02 | 50.50 | 113.28 | | | eggs | | |
| -03 | 204.83 | ~~472.14~~ | AB 12/5/07 276.98 | | Whole body fish | | |
| -04 | 34.41 | 113.04 | | | eggs | | |
| -05 | 262.78 | | 276.79 | | Whole body fish | | |
| -06 | 302.12 | | 281.22 | | | | |
| -07 | 379.92 | | 276.75 | | | | |

AB 12/5/07

Comments: Balance 23

| Analyst: Angela Black | Date: 12/5/07 |
|---|---|
| Reviewed: | Date: 12/10/07 |

R:\ICP\misc\digforms\TISSUEBENCHSHT

# Metals

# Columbia Analytical Services

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project Name:**
**Project No.:**

**Service Request:** K0710142

| Sample Name: | Lab Code: |
|---|---|
| SM1007-CC1A-FT001 | K0710142-001 |
| SM107-CC1A-FT001-Eggs | K0710142-002 |
| SM1007-CC3A-FT101 | K0710142-003 |
| SM1007-CC3A-FT101-Eggs | K0710142-004 |
| SM1007-CC3A-FT001 | K0710142-005 |
| SM1007-CC3A-FT100 | K0710142-006 |
| SM1007-CC3A-FT002 | K0710142-007 |
| SM1007-CC3A-FT002D | K0710142-007D |
| SM1007-CC3A-FT002S | K0710142-007S |
| Method Blank | K0710142-MB |

**Comments:**

**Approved By:** ____________ **Date:** 12/19/07

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0710142
**Project No.:** NA
**Date Collected:** 10/22/07
**Project Name:** NA
**Date Received:** 10/30/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-CC1A-FT001
**Lab Code:** K0710142-001

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.50 | 0.10 | 10.0 | 12/12/07 | 12/19/07 | 6.4 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental

**Project No.:** NA

**Project Name:** NA

**Matrix:** TISSUE

**Service Request:** K0710142

**Date Collected:** 10/22/07

**Date Received:** 10/30/07

**Units:** mg/Kg

**Basis:** DRY

**Sample Name:** SM107-CC1A-FT001-Eggs **Lab Code:** K0710142-002

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.50 | 0.10 | 10.0 | 12/12/07 | 12/19/07 | 11.5 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** NA
**Matrix:** TISSUE

**Service Request:** K0710142
**Date Collected:** 10/24/07
**Date Received:** 10/30/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-CC3A-FT101 **Lab Code:** K0710142-003

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/12/07 | 12/19/07 | 8.0 | | |

Comments:

## Metals

- 1 -

### INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** NA
**Matrix:** TISSUE

**Service Request:** K0710142
**Date Collected:** 10/24/07
**Date Received:** 10/30/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-CC3A-FT101-Eggs **Lab Code:** K0710142-004

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.48 | 0.10 | 10.0 | 12/12/07 | 12/19/07 | 10.5 | | |

Comments:

## Metals

- 1 -

### INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Service Request:** K0710142
**Project No.:** NA
**Date Collected:** 10/24/07
**Project Name:** NA
**Date Received:** 10/30/07
**Matrix:** TISSUE
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-CC3A-FT001 **Lab Code:** K0710142-005

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.49 | 0.10 | 10.0 | 12/12/07 | 12/19/07 | 5.3 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** NA
**Matrix:** TISSUE

**Service Request:** K0710142
**Date Collected:** 10/24/07
**Date Received:** 10/30/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-CC3A-FT100 **Lab Code:** K0710142-006

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.47 | 0.09 | 10.0 | 12/12/07 | 12/19/07 | 6.3 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** NA
**Matrix:** TISSUE

**Service Request:** K0710142
**Date Collected:** 10/24/07
**Date Received:** 10/30/07
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** SM1007-CC3A-FT002 **Lab Code:** K0710142-007

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.49 | 0.10 | 10.0 | 12/12/07 | 12/19/07 | 6.4 | | |

Comments:

# Metals

- 1 -

## INORGANIC ANALYSIS DATA PACKAGE

**Client:** New Fields Environmental
**Project No.:** NA
**Project Name:** NA
**Matrix:** TISSUE

**Service Request:** K0710142
**Date Collected:**
**Date Received:**
**Units:** mg/Kg
**Basis:** DRY

**Sample Name:** Method Blank **Lab Code:** K0710142-MB

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.10 | 0.02 | 2.0 | 12/12/07 | 12/19/07 | 0.03 | B | |

Comments:

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

**Client:** New Fields Environmental **Service Request:** K0710142

**Project No.:** NA

**Project Name:** NA

ICV Source: Inorganic Ventures CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | 10.0 | 10.06 | 101 | 10.0 | 9.87 | 99 | 9.28 | 93 | 7742 |

# Metals

- 2a -

## INITIAL AND CONTINUING CALIBRATION VERIFICATION

Client: New Fields Environmental

Service Request: K0710142

Project No.: NA

Project Name: NA

ICV Source: Inorganic Ventures

CCV Source: CAS MIXED

Concentration Units: ug/L

| | Initial Calibration | | | Continuing Calibration | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Analyte | True | Found | %R(1) | True | Found | %R(1) | Found | %R(1) | Method |
| Selenium | | | | 10.0 | 9.22 | 92 | 10.01 | 100 | 7742 |

C0026

# Metals
- 2b -
## CRDL STANDARD FOR AA AND ICP

Client: New Fields Environmental

Service Request: K0710142

Project No.: NA

Project Name: NA

Concentration Units: ug/L

| Analyte | CRDL Standard for AA | | | CRDL Standard for ICP | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Initial | | | Final | |
| | True | Found | %R | True | Found | %R | Found | %R |
| Selenium | 0.5 | 0.59 | 118.0 | | | | | |

# Metals

- 3 -

## BLANKS

Client: New Fields Environmental | Service Request: K0710142

Project No.: NA

Project Name: NA

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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 7742 |

C0028

# Metals

-3-

## BLANKS

Client: New Fields Environmental    Service Request: K0710142

Project No.: NA

Project Name: NA

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 | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | | | 0.2 | B | | | | | 7742 |

C0029

# Metals

- 5A -

## SPIKE SAMPLE RECOVERY

Client: New Fields Environmental

Service Request: K0710142

Project No.: NA

Units: MG/KG

Project Name: NA

Basis: DRY

Matrix: TISSUE

Sample Name: SM1007-CC3A-FT002S

Lab Code: K0710142-007S

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 65 - 124 | 22.2 | | 6.4 | | 15.96 | 99.0 | | 7742 |

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

# Metals

- 5B -

## POST SPIKE SAMPLE RECOVERY

Client: New Fields Environmental
Service Request: K0710142
Project No.: NA
Units: UG/L
Project Name: NA
Basis: DRY
Matrix: WATER

Sample Name: K0710642-0002A
Lab Code: K0710642-0002A

| Analyte | Control Limit %R | Spike Result | C | Sample Result | C | Spike Added | %R | Q | Method |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 75-125 | 7.383 | | 2.762 | | 5.0 | 92.4 | | 7742 |

# Metals

- 6 -

## DUPLICATES

Client: New Fields Environmental | Service Request: K0710142

Project No.: NA | Units: MG/KG

Project Name: NA | Basis: DRY

Matrix: TISSUE

Sample Name: SM1007-CC3A-FT002D Lab Code: K0710142-007D

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | Method |
|---|---|---|---|---|---|---|---|---|
| Selenium | 30 | 6.4 | | 5.6 | | 13.3 | | 7742 |

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

## COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

**Client:** New Fields Environmental
**Project:** NA
**LCS Matrix:** Tissue

**Service Request:** K0710142
**Date Collected:** NA
**Date Received:** NA
**Date Extracted:** 12/12/07
**Date Analyzed:** 12/19/07

Laboratory Control Sample Summary
Total Metals

Sample Name: Laboratory Control Sample
Lab Code: K0710142-LCS
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Source: N.R.C.C. Dolt-3

| **Analyte** | **Prep Method** | **Analysis Method** | **True Value** | **Result** | **Percent Recovery** | **Control Limits** | **Result Notes** |
|---|---|---|---|---|---|---|---|
| Selenium | PSEP Tissue | 7740 | 7.06 | 5.37 | 76 | 5.26-9.05 | |

LCS/032295

# Metals
- 10 -
## DETECTION LIMITS

Client: New Fields Environmental  Service Request: K0710142

Project No.: NA

Project Name: NA

ICP/ICP-MS ID #:

GFAA ID #: K-FLAA-02  AA ID #:

| Analyte | Wave-length (nm) | Back-ground | MRL ug/L | MDL ug/L | M |
|---|---|---|---|---|---|
| Selenium | | | 0.5 | 0.1 | F |

Comments:

# Metals
-13-
## PREPARATION LOG

Client: New Fields Environmental    Service Request: K0710142

Project No.: NA

Project Name: NA

Method: F

| Sample ID | Preparation Date | Initial Volume | Final Volume (mL) |
|---|---|---|---|
| K0710142-001 | 12/12/07 | 0.3030 | 30.0 |
| K0710142-002 | 12/12/07 | 0.3030 | 30.0 |
| K0710142-003 | 12/12/07 | 0.3130 | 30.0 |
| K0710142-004 | 12/12/07 | 0.3100 | 30.0 |
| K0710142-005 | 12/12/07 | 0.3040 | 30.0 |
| K0710142-006 | 12/12/07 | 0.3180 | 30.0 |
| K0710142-007 | 12/12/07 | 0.3060 | 30.0 |
| K0710142-007D | 12/12/07 | 0.3070 | 30.0 |
| K0710142-007S | 12/12/07 | 0.3140 | 30.0 |
| K0710142-MB | 12/12/07 | 0.3000 | 30.0 |
| LCS-DOLT | 12/12/07 | 0.30 | 30.0 |
| LCS-DORM | 12/12/07 | 0.30 | 30.0 |
| LCSS DORM | 12/12/07 | 0.30 | 30.0 |

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0710142

**Project No.:** NA

**Project Name:** NA

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 12/19/07 **End Date:** 12/19/07

| Sample No. | D/F | Time | % R | AL | SB | AS | BA | BE | CD | CA | CR | CO | CU | FE | PB | MG | MN | HG | NI | K | SE | AG | NA | TL | V | ZN | CN |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAL BLK | 1 | 08:39 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CAL BLK | 1 | 08:40 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 0.5 | 1 | 08:43 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 1.0 | 1 | 08:45 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 5.0 | 1 | 08:47 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 10.0 | 1 | 08:50 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| STD 15.0 | 1 | 08:52 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICV1 | 1 | 08:55 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ICB1 | 1 | 08:57 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CRA | 1 | 08:59 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV1 | 1 | 09:02 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB1 | 1 | 09:04 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-MB | 2 | 09:06 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCS-DOLT | 20 | 09:09 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCS-DORM | 4 | 09:11 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 10 | 09:13 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 10 | 09:16 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 10 | 09:18 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 10 | 09:20 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 10 | 09:23 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0710142-001 | 10 | 09:25 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-002 | 10 | 09:28 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV2 | 1 | 09:30 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB2 | 1 | 09:32 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-003 | 10 | 09:35 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-004 | 10 | 09:37 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-005 | 10 | 09:39 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-006 | 10 | 09:42 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-007 | 10 | 09:44 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-007D | 10 | 09:46 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| K0710142-007S | 40 | 09:49 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 10 | 09:51 | | | | | | | | | | | | | | | | | | | | | | | | | |

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

# Metals
- 14 -
## ANALYSIS RUN LOG

**Client:** New Fields Environmental **Service Request:** K0710142

**Project No.:** NA

**Project Name:** NA

**Instrument ID Number:** K-FLAA-02 **Method:** F

**Start Date:** 12/19/07 **End Date:** 12/19/07

| Sample No. | 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 |
| CCV3 | 1 | 09:53 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB3 | 1 | 09:56 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| LCSS DORM | 2 | 09:59 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| ZZZZZZ | 2 | 10:02 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 2 | 10:05 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 2 | 10:07 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 2 | 10:10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ZZZZZZ | 2 | 10:24 | | | | | | | | | | | | | | | | | | | | | | | | | |
| K0710642-0002A | 10 | 10:32 | 1540. | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCV4 | 1 | 10:34 | | | | | | | | | | | | | | | | | | | X | | | | | | |
| CCB4 | 1 | 10:37 | | | | | | | | | | | | | | | | | | | X | | | | | | |

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

Columbia Analytical Services
Metals Tissue Digestion Sheet

Service Request Number(s) : K0710042, K0710142

Star Lims Run No.: 59944

Method : Tissue

Analysis for : ICP ICP-MS GFAA

other: Se-hydride

| Sample | Initial Weight (g) | freeze Dry | Wet | Final Volume (ml) | Matrix |
|---|---|---|---|---|---|
| PB | | | X | 30ml S | 15% HNO3 |
| Dolt | 0.301 | | | | |
| Dorm | 0.302 | | | | |
| K0710042-01 | 0.309 | | | | |
| -02 | 0.306 | | | | |
| -08 | 0.354 | | | | |
| -09 | 0.307 | | | | |
| -10 | 0.214 | | | | |
| K0710142-01 | 0.303 | X | | | |
| -02 | 0.303 | | | | |
| -03 | 0.313 | | | | |
| -04 | 0.310 | | | | |
| -05 | 0.304 | | | | |
| -06 | 0.318 | | | | |
| -07 | 0.306 | | | | |
| -07D | 0.307 | | | | |
| -07S* | 0.314 | | | | |

AB 12/12/07

**Time Digestion Started:** 3:00p.m 12/12/07 **Oven Temp:** 110°C

**Lot # Acids Used: HNO3** MS10-81-C

**Time Digestion Ended:** 9:00a.m. 12/15/07

**Oven Temp:** 107°C

**Balance I.D.:** 21-B

**LCS: Dorm-2, Dolt-3**

**QCP CICV-1, MET1-59-H,** ___________ **mls. added**
**QCP CICV-2, MET1-59-I,** ___________ **mls. added**
**QCP CICV-3, MET1-59-J,** ___________ **mls. Added**
**SS6, MET1-59-K,** ___________ **mls. Added**

**SPIKE INFO**
**SS1-MET1-60-R,** 0.3 **mls added**
**SS5-MET1-61-P,** 0.05 **mls added**
**SS6-MET1-60-O,** 0.05 **mls added**
**Additional spikes:** ___________

**Comments:** K0710042-1,2,8,9,&10 are wet sample (limited)

**Analyst** Angela Black **Date** 12/12/07
**Reviewer** [signature] **Date** 12/18/07

Element Analyzed Se Hydride Instrument K-FLAA-2
Service Request # K10642, K10142

Batch QC SR's #

Calibration Std. AA1-8-A
Starlims # 102455
Run # 121907-Se

# Hydride Data Review Form

| | Yes | No | NA |
|---|---|---|---|
| 1 ICV within 10% of true Value | X | | |
| 2. Calibration data included | X | | |
| 3. CCV's in control | X | | |
| 4. CCB's and/or ICB's below MRL | X | | |
| 5. All reported Results within Cal. Range | X | | |
| 6. All Calculations are Correct | X | | |

Comments

Primary Reviewed by [signature] Date 12/19/07

Secondary Reviewed by JDB Date 12/19/07

COLUMBIA ANALYTICAL SERVICES, INC.

GFAA Run Log

| | |
|---|---|
| **Method:** (Circle Method Used)<br>7742 7062<br>Other:________<br>Element: As Se | **Service Request # :** |

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| ICV | - | 10.062 | 101% | |
| ICB | - | 0.063 | | |
| CRA | - | 0.594 | 119% | |
| CCV | - | 9.868 | 99% | |
| CCB | - | 0.061 | | |
| K0710642-PB | 1/2 | 0.139 | | |
| LCSS DOLT | 1/2+1/10 | 2.600 | 75% | |
| ~~LCSS DORM~~ | ~~1/2+1/2~~ | ~~1.905~~ | | Rerun |
| ~~K0710642-001~~ | ~~1/2+1/5~~ | ~~0.703~~ | | Rerun |
| K0710642-002 | 1/2+1/5 | 2.762 | | |
| K0710642-008 | 1/2+1/5 | 4.059 | | 12/19/07 |
| K0710642-009 | 1/2+1/5 | 7.153 | | |
| ~~K0710642-010~~ | ~~1/2+1/5~~ | ~~0.369~~ | | Rerun |
| K0710142-001 | 1/2+1/5 | 6.476 | | |
| K0710142-002 | 1/2+1/5 | 11.584 | | |
| CCV | - | 9.284 | 93% | |
| CCB | - | 0.085 | | |
| K0710142-003 | 1/2+1/5 | 8.350 | | |
| K0710142-004 | 1/2+1/5 | 10.812 | | |
| K0710142-005 | 1/2+1/5 | 5.356 | | |
| K0710142-006 | 1/2+1/5 | 6.628 | | |
| K0710142-007 | 1/2+1/5 | 6.532 | | |
| K0710142-007D | 1/2+1/5 | 5.721 | | |
| K0710142-007S | 1/2+1/20 | 5.816 | 100% | |
| ~~K0710142-007A~~ | ~~1/2+1/5~~ | ~~9.132~~ | | Rerun |
| CCV | - | 9.217 | 92% | |
| CCB | - | 0.010 | | |
| LCSS DORM | 1/2 | 2.709 | 68% | 12/19/07 |
| K0710642-001 | 1/2 | 2.150 | | |
| ~~K0710642-010~~ | ~~1/2~~ | ~~1.698~~ | | Rerun |

| **True Values/QC Limits:** | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (80-120%) | 73.0mg/kg (61-142%) | 1000ppb (80-120%) |

| **Analyst** | **Date:** | **Page Number:** |
|---|---|---|
| [signature] | 12/19/07 | 1 |

COLUMBIA ANALYTICAL SERVICES, INC.
GFAA Run Log

| Method: (Circle Method Used)<br>7742 7062<br>Other:<br>Element: As Se | Service Request # : |
|---|---|

| SAMPLE NUMBER | Dilution Factor | Measured (µg/L) | Recoveries (ICV, CCV, CRA, LCS, Matrix Spk.) | Comments |
|---|---|---|---|---|
| K0710642-010 | 1/2 | 1.274 | | |
| ~~K0710642-001A~~ | ~~1/2~~ | ~~3.812~~ | | Rerun |
| ~~K0710642-010A~~ | ~~1/2~~ | ~~3.511~~ | | 12/19/07 Rerun |
| K0710642-0002A | 1/2+1/5 | 7.383 | 92% | Post Spike = 5 ppb |
| CCV | - | 10.006 | 100% | |
| CCB | - | 0.233 | | |

| True Values/QC Limits: | LCSW | Water Spike | LCSS (ERA D045540) | Soil Spike |
|---|---|---|---|---|
| Arsenic: | 2500ppb (80-120%) | 1000ppb (80-120%) | 146.0mg/kg (80-120%) | 1000ppb (80-120%) |
| Selenium | 2500ppb (71-122%) | 1000ppb (80-120%) | 73.0mg/kg (61-142%) | 1000ppb (80-120%) |

| Analyst | Date: | Page Number: |
|---|---|---|
| Jena Funk | 12/19/07 | 2 |

=====================================================================================

Analysis Begun

Logged In Analyst: ACQMET10 Technique: AA FIAS-Flame
Spectrometer Model: AAnalyst 200, S/N 200S5061701 Autosampler Model: AS-90

Sample Information File: C:\data-AA\ACQMET10\Sample Information\121907-Se.sif
Batch ID: 121907-Se
Results Data Set: 121907-Se
Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb

=====================================================================================

Sequence No.: 1 Autosampler Location: 1
Sample ID: Cal Blk Date Collected: 12/19/2007 8:40:54 AM
Analyst: Data Type: Original

-------------------------------------------------------------------------------------

Replicate Data: Cal Blk

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.00] | 0.004 | 0.008 | 0.004 | | | 08:41:15 | Yes |
| 2 | | [0.00] | 0.005 | 0.019 | 0.005 | | | 08:41:49 | Yes |
| 3 | | [0.00] | 0.005 | 0.019 | 0.005 | | | 08:42:23 | Yes |
| Mean: | | [0.00] | 0.005 | | | | | | |
| SD: | | 0.00 | 0.0003 | | | | | | |
| %RSD: | | 0.00 | 5.74 | | | | | | |

Auto-zero performed.

=====================================================================================

Sequence No.: 2 Autosampler Location: 2
Sample ID: Std 0.5 Date Collected: 12/19/2007 8:43:12 AM
Analyst: Data Type: Original

-------------------------------------------------------------------------------------

Replicate Data: Std 0.5

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [0.5] | 0.010 | 0.072 | 0.015 | | | 08:43:34 | Yes |
| 2 | | [0.5] | 0.008 | 0.053 | 0.013 | | | 08:44:08 | Yes |
| 3 | | [0.5] | 0.010 | 0.073 | 0.015 | | | 08:44:42 | Yes |
| Mean: | | [0.5] | 0.009 | | | | | | |
| SD: | | 0.0 | 0.0014 | | | | | | |
| %RSD: | | 0.0 | 14.69 | | | | | | |

Standard number 1 applied. [0.5]
Correlation Coef.: 1.000000 Slope: 0.01898 Intercept: 0.00000

=====================================================================================

Sequence No.: 3 Autosampler Location: 3
Sample ID: Std 1.0 Date Collected: 12/19/2007 8:45:31 AM
Analyst: Data Type: Original

-------------------------------------------------------------------------------------

Replicate Data: Std 1.0

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [1.0] | 0.020 | 0.107 | 0.025 | | | 08:45:53 | Yes |
| 2 | | [1.0] | 0.020 | 0.130 | 0.024 | | | 08:46:27 | Yes |
| 3 | | [1.0] | 0.019 | 0.116 | 0.024 | | | 08:47:01 | Yes |
| Mean: | | [1.0] | 0.020 | | | | | | |
| SD: | | 0.0 | 0.0005 | | | | | | |
| %RSD: | | 0.0 | 2.74 | | | | | | |

Standard number 2 applied. [1.0]
Correlation Coef.: 0.999325 Slope: 0.01944 Intercept: 0.00000

=====================================================================================

Sequence No.: 4 Autosampler Location: 4

Sample ID: Std 5.0
Analyst:

Date Collected: 12/19/2007 8:47:51 AM
Data Type: Original

---

Replicate Data: Std 5.0

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [5.0] | 0.083 | 0.467 | 0.087 | | | 08:48:14 | Yes |
| 2 | | [5.0] | 0.082 | 0.459 | 0.087 | | | 08:48:48 | Yes |
| 3 | | [5.0] | 0.086 | 0.495 | 0.091 | | | 08:49:22 | Yes |
| Mean: | | [5.0] | 0.084 | | | | | | |
| SD: | | 0.0 | 0.0021 | | | | | | |
| %RSD: | | 0.0 | 2.53 | | | | | | |

Standard number 3 applied. [5.0]
Correlation Coef.: 0.998705 Slope: 0.01686 Intercept: 0.00000

---

Sequence No.: 5
Sample ID: Std 10.0
Analyst:

Autosampler Location: 5
Date Collected: 12/19/2007 8:50:12 AM
Data Type: Original

---

Replicate Data: Std 10.0

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [10.0] | 0.160 | 0.916 | 0.165 | | | 08:50:35 | Yes |
| 2 | | [10.0] | 0.158 | 0.893 | 0.163 | | | 08:51:10 | Yes |
| 3 | | [10.0] | 0.164 | 0.887 | 0.168 | | | 08:51:45 | Yes |
| Mean: | | [10.0] | 0.161 | | | | | | |
| SD: | | 0.0 | 0.0028 | | | | | | |
| %RSD: | | 0.0 | 1.75 | | | | | | |

Standard number 4 applied. [10.0]
Correlation Coef.: 0.999303 Slope: 0.01623 Intercept: 0.00000

---

Sequence No.: 6
Sample ID: Std 15.0
Analyst:

Autosampler Location: 6
Date Collected: 12/19/2007 8:52:36 AM
Data Type: Original

---

Replicate Data: Std 15.0

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | [15.0] | 0.249 | 1.402 | 0.253 | | | 08:52:59 | Yes |
| 2 | | [15.0] | 0.250 | 1.374 | 0.255 | | | 08:53:33 | Yes |
| 3 | | [15.0] | 0.248 | 1.354 | 0.253 | | | 08:54:08 | Yes |
| Mean: | | [15.0] | 0.249 | | | | | | |
| SD: | | 0.0 | 0.0012 | | | | | | |
| %RSD: | | 0.0 | 0.48 | | | | | | |

Standard number 5 applied. [15.0]
Correlation Coef.: 0.999604 Slope: 0.01647 Intercept: 0.00000
The calibration curve may not be linear.

---

Calibration data for Se 196.03 Equation: Linear Through Zero

| ID | Mean Signal (Abs) | Entered Conc. ug/L | Calculated Conc. ug/L | Standard Deviation | %RSD |
|---|---|---|---|---|---|
| Cal Blk | 0.0000 | 0 | 0.000 | 0.00 | 5.7 |
| Std 0.5 | 0.0095 | 0.5 | 0.576 | 0.00 | 14.7 |
| Std 1.0 | 0.0195 | 1.0 | 1.187 | 0.00 | 2.7 |
| Std 5.0 | 0.0835 | 5.0 | 5.071 | 0.00 | 2.5 |
| Std 10.0 | 0.1606 | 10.0 | 9.753 | 0.00 | 1.7 |
| Std 15.0 | 0.2490 | 15.0 | 15.118 | 0.00 | 0.5 |

Correlation Coef.: 0.999604 Slope: 0.01647 Intercept: 0.00000

Sequence No.: 7
Sample ID: ICV
Analyst:

Autosampler Location: 7
Date Collected: 12/19/2007 8:55:00 AM
Data Type: Original

Replicate Data: ICV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.12 | 10.12 | 0.167 | 0.938 | 0.171 | | | 08:55:24 | Yes |
| 2 | 10.08 | 10.08 | 0.166 | 0.926 | 0.171 | | | 08:55:59 | Yes |
| 3 | 9.988 | 9.988 | 0.165 | 0.920 | 0.169 | | | 08:56:33 | Yes |
| Mean: | 10.06 | 10.06 | 0.166 | | | | | | |
| SD: | 0.067 | 0.067 | 0.0011 | | | | | | |
| %RSD: | 0.663 | 0.663 | 0.66 | | | | | | |

QC value within limits for Se 196.03 Recovery = 100.62%
All analyte(s) passed QC.

Sequence No.: 8
Sample ID: ICB
Analyst:

Autosampler Location: 1
Date Collected: 12/19/2007 8:57:25 AM
Data Type: Original

Replicate Data: ICB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.133 | 0.133 | 0.002 | 0.032 | 0.007 | | | 08:57:47 | Yes |
| 2 | 0.037 | 0.037 | 0.001 | 0.019 | 0.005 | | | 08:58:21 | Yes |
| 3 | 0.018 | 0.018 | 0.000 | 0.014 | 0.005 | | | 08:58:55 | Yes |
| Mean: | 0.063 | 0.063 | 0.001 | | | | | | |
| SD: | 0.062 | 0.062 | 0.0010 | | | | | | |
| %RSD: | 98.62 | 98.62 | 98.62 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 9
Sample ID: CRA
Analyst:

Autosampler Location: 2
Date Collected: 12/19/2007 8:59:44 AM
Data Type: Original

Replicate Data: CRA

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.580 | 0.580 | 0.010 | 0.070 | 0.014 | | | 09:00:05 | Yes |
| 2 | 0.607 | 0.607 | 0.010 | 0.074 | 0.015 | | | 09:00:40 | Yes |
| 3 | 0.594 | 0.594 | 0.010 | 0.071 | 0.014 | | | 09:01:14 | Yes |
| Mean: | 0.594 | 0.594 | 0.010 | | | | | | |
| SD: | 0.013 | 0.013 | 0.0002 | | | | | | |
| %RSD: | 2.267 | 2.267 | 2.27 | | | | | | |

QC value within limits for Se 196.03 Recovery = 118.78%
All analyte(s) passed QC.

Sequence No.: 10
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 12/19/2007 9:02:04 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.510 | 9.510 | 0.157 | 0.907 | 0.161 | | | 09:02:27 | Yes |
| 2 | 9.479 | 9.479 | 0.156 | 0.877 | 0.161 | | | 09:03:01 | Yes |
| 3 | 10.61 | 10.61 | 0.175 | 0.903 | 0.180 | | | 09:03:35 | Yes |
| Mean: | 9.868 | 9.868 | 0.163 | | | | | | |

| | | | |
|---|---|---|---|
| SD: | 0.647 | 0.647 | 0.0107 |
| %RSD: | 6.558 | 6.558 | 6.56 |

QC value within limits for Se 196.03 Recovery = 98.68%
All analyte(s) passed QC.

==========

Sequence No.: 11
Sample ID: CCB
Analyst:

Autosampler Location: 1
Date Collected: 12/19/2007 9:04:27 AM
Data Type: Original

----------

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.115 | 0.115 | 0.002 | 0.030 | 0.007 | | | 09:04:48 | Yes |
| 2 | 0.044 | 0.044 | 0.001 | 0.027 | 0.005 | | | 09:05:24 | Yes |
| 3 | 0.025 | 0.025 | 0.000 | 0.013 | 0.005 | | | 09:05:58 | Yes |
| Mean: | 0.061 | 0.061 | 0.001 | | | | | | |
| SD: | 0.047 | 0.047 | 0.0008 | | | | | | |
| %RSD: | 77.23 | 77.23 | 77.23 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

==========

Sequence No.: 12
Sample ID: K0710642-PB
Analyst:

Autosampler Location: 9
Date Collected: 12/19/2007 9:06:47 AM
Data Type: Original

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Replicate Data: K0710642-PB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.157 | 0.157 | 0.003 | 0.030 | 0.007 | | | 09:07:08 | Yes |
| 2 | 0.116 | 0.116 | 0.002 | 0.024 | 0.007 | | | 09:07:42 | Yes |
| 3 | 0.145 | 0.145 | 0.002 | 0.023 | 0.007 | | | 09:08:16 | Yes |
| Mean: | 0.139 | 0.139 | 0.002 | | | | | | |
| SD: | 0.021 | 0.021 | 0.0003 | | | | | | |
| %RSD: | 15.14 | 15.14 | 15.14 | | | | | | |

==========

Sequence No.: 13
Sample ID: LCSS DOLT
Analyst:

Autosampler Location: 10
Date Collected: 12/19/2007 9:09:05 AM
Data Type: Original

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Replicate Data: LCSS DOLT

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.519 | 2.519 | 0.041 | 0.276 | 0.046 | | | 09:09:26 | Yes |
| 2 | 2.680 | 2.680 | 0.044 | 0.282 | 0.049 | | | 09:10:00 | Yes |
| 3 | 2.600 | 2.600 | 0.043 | 0.259 | 0.047 | | | 09:10:34 | Yes |
| Mean: | 2.600 | 2.600 | 0.043 | | | | | | |
| SD: | 0.080 | 0.080 | 0.0013 | | | | | | |
| %RSD: | 3.090 | 3.090 | 3.09 | | | | | | |

==========

Sequence No.: 14
Sample ID: LCSS DORM
Analyst:

Autosampler Location: 11
Date Collected: 12/19/2007 9:11:24 AM
Data Type: Original

X 12/19/07

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Replicate Data: LCSS DORM

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.970 | 1.970 | 0.032 | 0.215 | 0.037 | | | 09:11:46 | Yes |
| 2 | 1.867 | 1.867 | 0.031 | 0.203 | 0.035 | | | 09:12:20 | Yes |
| 3 | 1.878 | 1.878 | 0.031 | 0.200 | 0.036 | | | 09:12:53 | Yes |

| | | | |
|---|---|---|---|
| Mean: | 1.905 | 1.905 | 0.031 |
| SD: | 0.057 | 0.057 | 0.0009 |
| %RSD: | 2.970 | 2.970 | 2.97 |

Sequence No.: 15
Sample ID: K0710642-001
Analyst:

Autosampler Location: 12
Date Collected: 12/19/2007 9:13:44 AM
Data Type: Original

JA 12/19/07

Replicate Data: K0710642-001

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.732 | 0.732 | 0.012 | 0.075 | 0.017 | | | 09:14:06 | Yes |
| 2 | 0.632 | 0.632 | 0.010 | 0.061 | 0.015 | | | 09:14:40 | Yes |
| 3 | 0.746 | 0.746 | 0.012 | 0.085 | 0.017 | | | 09:15:14 | Yes |
| Mean: | 0.703 | 0.703 | 0.012 | | | | | | |
| SD: | 0.062 | 0.062 | 0.0010 | | | | | | |
| %RSD: | 8.815 | 8.815 | 8.81 | | | | | | |

Sequence No.: 16
Sample ID: K0710642-002
Analyst:

Autosampler Location: 13
Date Collected: 12/19/2007 9:16:04 AM
Data Type: Original

Replicate Data: K0710642-002

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.671 | 2.671 | 0.044 | 0.265 | 0.049 | | | 09:16:27 | Yes |
| 2 | 2.948 | 2.948 | 0.049 | 0.283 | 0.053 | | | 09:17:01 | Yes |
| 3 | 2.667 | 2.667 | 0.044 | 0.252 | 0.049 | | | 09:17:35 | Yes |
| Mean: | 2.762 | 2.762 | 0.045 | | | | | | |
| SD: | 0.161 | 0.161 | 0.0027 | | | | | | |
| %RSD: | 5.827 | 5.827 | 5.83 | | | | | | |

Sequence No.: 17
Sample ID: K0710642-008
Analyst:

Autosampler Location: 14
Date Collected: 12/19/2007 9:18:26 AM
Data Type: Original

Replicate Data: K0710642-008

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.983 | 3.983 | 0.066 | 0.366 | 0.070 | | | 09:18:50 | Yes |
| 2 | 4.095 | 4.095 | 0.067 | 0.384 | 0.072 | | | 09:19:24 | Yes |
| 3 | 4.100 | 4.100 | 0.068 | 0.376 | 0.072 | | | 09:19:59 | Yes |
| Mean: | 4.059 | 4.059 | 0.067 | | | | | | |
| SD: | 0.066 | 0.066 | 0.0011 | | | | | | |
| %RSD: | 1.632 | 1.632 | 1.63 | | | | | | |

Sequence No.: 18
Sample ID: K0710642-009
Analyst:

Autosampler Location: 15
Date Collected: 12/19/2007 9:20:51 AM
Data Type: Original

Replicate Data: K0710642-009

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.131 | 7.131 | 0.117 | 0.627 | 0.122 | | | 09:21:15 | Yes |
| 2 | 7.149 | 7.149 | 0.118 | 0.658 | 0.122 | | | 09:21:50 | Yes |
| 3 | 7.178 | 7.178 | 0.118 | 0.665 | 0.123 | | | 09:22:24 | Yes |
| Mean: | 7.153 | 7.153 | 0.118 | | | | | | |
| SD: | 0.024 | 0.024 | 0.0004 | | | | | | |
| %RSD: | 0.333 | 0.333 | 0.33 | | | | | | |

==========================================================================================

Sequence No.: 19
Sample ID: K0710642-010
Analyst:

Autosampler Location: 16
Date Collected: 12/19/2007 9:23:16 AM
Data Type: Original

X 12/19/07

Replicate Data: K0710642-010

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.359 | 0.359 | 0.006 | 0.054 | 0.011 | | | 09:23:40 | Yes |
| 2 | 0.372 | 0.372 | 0.006 | 0.052 | 0.011 | | | 09:24:15 | Yes |
| 3 | 0.377 | 0.377 | 0.006 | 0.045 | 0.011 | | | 09:24:49 | Yes |
| Mean: | 0.369 | 0.369 | 0.006 | | | | | | |
| SD: | 0.009 | 0.009 | 0.0002 | | | | | | |
| %RSD: | 2.529 | 2.529 | 2.53 | | | | | | |

==========================================================================================

Sequence No.: 20
Sample ID: K0710142-001
Analyst:

Autosampler Location: 17
Date Collected: 12/19/2007 9:25:41 AM
Data Type: Original

Replicate Data: K0710142-001

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.402 | 6.402 | 0.105 | 0.638 | 0.110 | | | 09:26:01 | Yes |
| 2 | 6.519 | 6.519 | 0.107 | 0.641 | 0.112 | | | 09:26:35 | Yes |
| 3 | 6.506 | 6.506 | 0.107 | 0.648 | 0.112 | | | 09:27:10 | Yes |
| Mean: | 6.476 | 6.476 | 0.107 | | | | | | |
| SD: | 0.064 | 0.064 | 0.0011 | | | | | | |
| %RSD: | 0.988 | 0.988 | 0.99 | | | | | | |

==========================================================================================

Sequence No.: 21
Sample ID: K0710142-002
Analyst:

Autosampler Location: 18
Date Collected: 12/19/2007 9:28:00 AM
Data Type: Original

Replicate Data: K0710142-002

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.62 | 11.62 | 0.191 | 1.174 | 0.196 | | | 09:28:24 | Yes |
| 2 | 11.70 | 11.70 | 0.193 | 1.151 | 0.197 | | | 09:28:58 | Yes |
| 3 | 11.43 | 11.43 | 0.188 | 1.143 | 0.193 | | | 09:29:32 | Yes |
| Mean: | 11.58 | 11.58 | 0.191 | | | | | | |
| SD: | 0.140 | 0.140 | 0.0023 | | | | | | |
| %RSD: | 1.211 | 1.211 | 1.21 | | | | | | |

==========================================================================================

Sequence No.: 22
Sample ID: CCV
Analyst:

Autosampler Location: 5
Date Collected: 12/19/2007 9:30:22 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.066 | 9.066 | 0.149 | 0.836 | 0.154 | | | 09:30:45 | Yes |
| 2 | 9.412 | 9.412 | 0.155 | 0.874 | 0.160 | | | 09:31:18 | Yes |
| 3 | 9.375 | 9.375 | 0.154 | 0.861 | 0.159 | | | 09:31:53 | Yes |
| Mean: | 9.284 | 9.284 | 0.153 | | | | | | |
| SD: | 0.190 | 0.190 | 0.0031 | | | | | | |
| %RSD: | 2.045 | 2.045 | 2.05 | | | | | | |

QC value within limits for Se 196.03 Recovery = 92.84%
All analyte(s) passed QC.

Sequence No.: 23
Sample ID: CCB
Analyst:
Autosampler Location: 1
Date Collected: 12/19/2007 9:32:45 AM
Data Type: Original

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.069 | 0.069 | 0.001 | 0.035 | 0.006 | | | 09:33:06 | Yes |
| 2 | 0.073 | 0.073 | 0.001 | 0.013 | 0.006 | | | 09:33:40 | Yes |
| 3 | 0.113 | 0.113 | 0.002 | 0.031 | 0.007 | | | 09:34:15 | Yes |
| Mean: | 0.085 | 0.085 | 0.001 | | | | | | |
| SD: | 0.024 | 0.024 | 0.0004 | | | | | | |
| %RSD: | 28.52 | 28.52 | 28.52 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

Sequence No.: 24
Sample ID: K0710142-003
Analyst:
Autosampler Location: 19
Date Collected: 12/19/2007 9:35:04 AM
Data Type: Original

Replicate Data: K0710142-003

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.314 | 8.314 | 0.137 | 0.855 | 0.142 | | | 09:35:25 | Yes |
| 2 | 8.395 | 8.395 | 0.138 | 0.830 | 0.143 | | | 09:35:59 | Yes |
| 3 | 8.342 | 8.342 | 0.137 | 0.820 | 0.142 | | | 09:36:33 | Yes |
| Mean: | 8.350 | 8.350 | 0.138 | | | | | | |
| SD: | 0.041 | 0.041 | 0.0007 | | | | | | |
| %RSD: | 0.489 | 0.489 | 0.49 | | | | | | |

Sequence No.: 25
Sample ID: K0710142-004
Analyst:
Autosampler Location: 20
Date Collected: 12/19/2007 9:37:23 AM
Data Type: Original

Replicate Data: K0710142-004

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.95 | 10.95 | 0.180 | 1.098 | 0.185 | | | 09:37:46 | Yes |
| 2 | 10.55 | 10.55 | 0.174 | 1.063 | 0.178 | | | 09:38:20 | Yes |
| 3 | 10.93 | 10.93 | 0.180 | 1.095 | 0.185 | | | 09:38:54 | Yes |
| Mean: | 10.81 | 10.81 | 0.178 | | | | | | |
| SD: | 0.228 | 0.228 | 0.0038 | | | | | | |
| %RSD: | 2.106 | 2.106 | 2.11 | | | | | | |

Sequence No.: 26
Sample ID: K0710142-005
Analyst:
Autosampler Location: 21
Date Collected: 12/19/2007 9:39:44 AM
Data Type: Original

Replicate Data: K0710142-005

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.234 | 5.234 | 0.086 | 0.546 | 0.091 | | | 09:40:05 | Yes |
| 2 | 5.424 | 5.424 | 0.089 | 0.525 | 0.094 | | | 09:40:39 | Yes |
| 3 | 5.410 | 5.410 | 0.089 | 0.528 | 0.094 | | | 09:41:13 | Yes |
| Mean: | 5.356 | 5.356 | 0.088 | | | | | | |
| SD: | 0.106 | 0.106 | 0.0017 | | | | | | |
| %RSD: | 1.976 | 1.976 | 1.98 | | | | | | |

Sequence No.: 27
Sample ID: K0710142-006
Analyst:

Autosampler Location: 22
Date Collected: 12/19/2007 9:42:03 AM
Data Type: Original

---

Replicate Data: K0710142-006

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.790 | 6.790 | 0.112 | 0.662 | 0.117 | | | 09:42:25 | Yes |
| 2 | 6.537 | 6.537 | 0.108 | 0.636 | 0.112 | | | 09:42:59 | Yes |
| 3 | 6.557 | 6.557 | 0.108 | 0.644 | 0.113 | | | 09:43:33 | Yes |
| Mean: | 6.628 | 6.628 | 0.109 | | | | | | |
| SD: | 0.141 | 0.141 | 0.0023 | | | | | | |
| %RSD: | 2.120 | 2.120 | 2.12 | | | | | | |

===

Sequence No.: 28
Sample ID: K0710142-007
Analyst:

Autosampler Location: 23
Date Collected: 12/19/2007 9:44:23 AM
Data Type: Original

---

Replicate Data: K0710142-007

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.581 | 6.581 | 0.108 | 0.660 | 0.113 | | | 09:44:45 | Yes |
| 2 | 6.488 | 6.488 | 0.107 | 0.659 | 0.112 | | | 09:45:19 | Yes |
| 3 | 6.528 | 6.528 | 0.108 | 0.643 | 0.112 | | | 09:45:53 | Yes |
| Mean: | 6.532 | 6.532 | 0.108 | | | | | | |
| SD: | 0.047 | 0.047 | 0.0008 | | | | | | |
| %RSD: | 0.713 | 0.713 | 0.71 | | | | | | |

===

Sequence No.: 29
Sample ID: K0710142-007D
Analyst:

Autosampler Location: 24
Date Collected: 12/19/2007 9:46:43 AM
Data Type: Original

---

Replicate Data: K0710142-007D

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.772 | 5.772 | 0.095 | 0.601 | 0.100 | | | 09:47:06 | Yes |
| 2 | 5.617 | 5.617 | 0.093 | 0.586 | 0.097 | | | 09:47:40 | Yes |
| 3 | 5.773 | 5.773 | 0.095 | 0.582 | 0.100 | | | 09:48:14 | Yes |
| Mean: | 5.721 | 5.721 | 0.094 | | | | | | |
| SD: | 0.090 | 0.090 | 0.0015 | | | | | | |
| %RSD: | 1.568 | 1.568 | 1.57 | | | | | | |

===

Sequence No.: 30
Sample ID: K0710142-007S
Analyst:

Autosampler Location: 25
Date Collected: 12/19/2007 9:49:04 AM
Data Type: Original

---

Replicate Data: K0710142-007S

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.676 | 5.676 | 0.093 | 0.520 | 0.098 | | | 09:49:27 | Yes |
| 2 | 5.791 | 5.791 | 0.095 | 0.519 | 0.100 | | | 09:50:02 | Yes |
| 3 | 5.980 | 5.980 | 0.098 | 0.549 | 0.103 | | | 09:50:37 | Yes |
| Mean: | 5.816 | 5.816 | 0.096 | | | | | | |
| SD: | 0.154 | 0.154 | 0.0025 | | | | | | |
| %RSD: | 2.642 | 2.642 | 2.64 | | | | | | |

===

Sequence No.: 31
Sample ID: K0710142-007A
Analyst:

Autosampler Location: 26
Date Collected: 12/19/2007 9:51:28 AM
Data Type: Original

X 12/19/07

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Replicate Data: K0710142-007A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.13 | 11.13 | 0.183 | 1.339 | 0.188 | | | 09:51:51 | Yes |
| 2 | 7.451 | 7.451 | 0.123 | 0.522 | 0.127 | | | 09:52:25 | Yes |
| 3 | 8.818 | 8.818 | 0.145 | 0.877 | 0.150 | | | 09:52:59 | Yes |
| Mean: | 9.132 | 9.132 | 0.150 | | | | | | |
| SD: | 1.858 | 1.858 | 0.0306 | | | | | | |
| %RSD: | 20.35 | 20.35 | 20.35 | | | | | | |

===

**Sequence No.: 32** **Autosampler Location: 5**
**Sample ID: CCV** **Date Collected: 12/19/2007 9:53:50 AM**
**Analyst:** **Data Type: Original**

---

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.407 | 9.407 | 0.155 | 0.862 | 0.160 | | | 09:54:13 | Yes |
| 2 | 8.735 | 8.735 | 0.144 | 0.757 | 0.149 | | | 09:54:48 | Yes |
| 3 | 9.509 | 9.509 | 0.157 | 0.868 | 0.161 | | | 09:55:22 | Yes |
| Mean: | 9.217 | 9.217 | 0.152 | | | | | | |
| SD: | 0.421 | 0.421 | 0.0069 | | | | | | |
| %RSD: | 4.562 | 4.562 | 4.56 | | | | | | |

QC value within limits for Se 196.03 Recovery = 92.17%
All analyte(s) passed QC.

===

**Sequence No.: 33** **Autosampler Location: 1**
**Sample ID: CCB** **Date Collected: 12/19/2007 9:56:13 AM**
**Analyst:** **Data Type: Original**

---

Replicate Data: CCB

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.107 | 0.107 | 0.002 | 0.030 | 0.006 | | | 09:56:34 | Yes |
| 2 | -0.035 | -0.035 | -0.001 | 0.007 | 0.004 | | | 09:57:08 | Yes |
| 3 | -0.043 | -0.043 | -0.001 | 0.011 | 0.004 | | | 09:57:43 | Yes |
| Mean: | 0.010 | 0.010 | 0.000 | | | | | | |
| SD: | 0.085 | 0.085 | 0.0014 | | | | | | |
| %RSD: | 859.1 | 859.1 | 859.05 | | | | | | |

QC value within limits for Se 196.03 Recovery = Not calculated
All analyte(s) passed QC.

===

**Analysis Begun**

**Logged In Analyst: ACQMET10** **Technique: AA FIAS-Flame**
**Spectrometer Model: AAnalyst 200, S/N 200S5061701** **Autosampler Model: AS-90**

**Sample Information File: C:\data-AA\ACQMET10\Sample Information\121907-Se.sif**
**Batch ID: 121907-Se**
**Results Data Set: 121907-Se**
**Results Library: R:\ICP\WIP\DATA\K-FLAA-02\Results.mdb**

===

**Sequence No.: 34** **Autosampler Location:**
**Sample ID: LCSS DORM** **Date Collected: 12/19/2007 9:59:33 AM**
**Analyst:** **Data Type: Original**
User canceled analysis.

===

**Sequence No.: 35** **Autosampler Location:**

Sample ID: LCSS DORM
Analyst:

Date Collected: 12/19/2007 9:59:47 AM
Data Type: Original

---

Replicate Data: LCSS DORM

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.775 | 2.775 | 0.046 | 0.277 | 0.050 | | | 10:00:03 | Yes |
| 2 | 2.688 | 2.688 | 0.044 | 0.281 | 0.049 | | | 10:00:37 | Yes |
| 3 | 2.664 | 2.664 | 0.044 | 0.277 | 0.049 | | | 10:01:11 | Yes |
| Mean: | 2.709 | 2.709 | 0.045 | | | | | | |
| SD: | 0.059 | 0.059 | 0.0010 | | | | | | |
| %RSD: | 2.163 | 2.163 | 2.16 | | | | | | |

===

Sequence No.: 36
Sample ID: K0710642-001
Analyst:

Autosampler Location:
Date Collected: 12/19/2007 10:02:22 AM
Data Type: Original

---

Replicate Data: K0710642-001

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.206 | 2.206 | 0.036 | 0.231 | 0.041 | | | 10:02:38 | Yes |
| 2 | 2.110 | 2.110 | 0.035 | 0.221 | 0.039 | | | 10:03:13 | Yes |
| 3 | 2.135 | 2.135 | 0.035 | 0.231 | 0.040 | | | 10:03:47 | Yes |
| Mean: | 2.150 | 2.150 | 0.035 | | | | | | |
| SD: | 0.050 | 0.050 | 0.0008 | | | | | | |
| %RSD: | 2.326 | 2.326 | 2.33 | | | | | | |

===

Sequence No.: 37
Sample ID: K0710642-010
Analyst:

Autosampler Location:
Date Collected: 12/19/2007 10:05:17 AM
Data Type: Original

KL 12/19/07

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Replicate Data: K0710642-010

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.351 | 2.351 | 0.039 | 0.323 | 0.043 | | | 10:05:34 | Yes |
| 2 | 1.353 | 1.353 | 0.022 | 0.127 | 0.027 | | | 10:06:08 | Yes |
| 3 | 1.388 | 1.388 | 0.023 | 0.139 | 0.028 | | | 10:06:42 | Yes |
| Mean: | 1.698 | 1.698 | 0.028 | | | | | | |
| SD: | 0.566 | 0.566 | 0.0093 | | | | | | |
| %RSD: | 33.37 | 33.37 | 33.37 | | | | | | |

===

Sequence No.: 38
Sample ID: K0710642-010
Analyst:

Autosampler Location:
Date Collected: 12/19/2007 10:07:38 AM
Data Type: Original

---

Replicate Data: K0710642-010

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.269 | 1.269 | 0.021 | 0.116 | 0.026 | | | 10:07:56 | Yes |
| 2 | 1.304 | 1.304 | 0.021 | 0.136 | 0.026 | | | 10:08:30 | Yes |
| 3 | 1.250 | 1.250 | 0.021 | 0.123 | 0.025 | | | 10:09:05 | Yes |
| Mean: | 1.274 | 1.274 | 0.021 | | | | | | |
| SD: | 0.027 | 0.027 | 0.0005 | | | | | | |
| %RSD: | 2.150 | 2.150 | 2.15 | | | | | | |

===

Sequence No.: 39
Sample ID: K0710642-001A
Analyst:

Autosampler Location:
Date Collected: 12/19/2007 10:10:21 AM
Data Type: Original

Replicate Data: K0710642-001A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.831 | 3.831 | 0.063 | 0.399 | 0.068 | | | 10:10:38 | Yes |
| 2 | 3.822 | 3.822 | 0.063 | 0.387 | 0.068 | | | 10:11:12 | Yes |
| 3 | 3.782 | 3.782 | 0.062 | 0.381 | 0.067 | | | 10:11:46 | Yes |
| Mean: | 3.812 | 3.812 | 0.063 | | | | | | |
| SD: | 0.026 | 0.026 | 0.0004 | | | | | | |
| %RSD: | 0.681 | 0.681 | 0.68 | | | | | | |

A 12/19/07

Sequence No.: 40
Sample ID: K0710642-010A
Analyst:
Autosampler Location:
Date Collected: 12/19/2007 10:24:28 AM
Data Type: Original

Replicate Data: K0710642-010A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.494 | 3.494 | 0.058 | 0.363 | 0.062 | | | 10:24:44 | Yes |
| 2 | 3.573 | 3.573 | 0.059 | 0.366 | 0.064 | | | 10:25:18 | Yes |
| 3 | 3.466 | 3.466 | 0.057 | 0.369 | 0.062 | | | 10:25:53 | Yes |
| Mean: | 3.511 | 3.511 | 0.058 | | | | | | |
| SD: | 0.055 | 0.055 | 0.0009 | | | | | | |
| %RSD: | 1.577 | 1.577 | 1.58 | | | | | | |

Sequence No.: 41
Sample ID: K0710642-0002A
Analyst:
Autosampler Location:
Date Collected: 12/19/2007 10:32:19 AM
Data Type: Original

Replicate Data: K0710642-0002A

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.813 | 6.813 | 0.112 | 0.630 | 0.117 | | | 10:32:35 | Yes |
| 2 | 8.013 | 8.013 | 0.132 | 0.797 | 0.137 | | | 10:33:09 | Yes |
| 3 | 7.322 | 7.322 | 0.121 | 0.666 | 0.125 | | | 10:33:43 | Yes |
| Mean: | 7.383 | 7.383 | 0.122 | | | | | | |
| SD: | 0.602 | 0.602 | 0.0099 | | | | | | |
| %RSD: | 8.160 | 8.160 | 8.16 | | | | | | |

Sequence No.: 42
Sample ID: CCV
Analyst:
Autosampler Location:
Date Collected: 12/19/2007 10:34:45 AM
Data Type: Original

Replicate Data: CCV

| Repl # | SampleConc ug/L | StndConc ug/L | BlnkCorr Signal | Peak Area | Peak Height | Bkgnd Area | Bkgnd Height | Time | Peak Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.21 | 10.21 | 0.168 | 0.904 | 0.173 | | | 10:35:01 | Yes |
| 2 | 9.796 | 9.796 | 0.161 | 0.907 | 0.166 | | | 10:35:36 | Yes |
| 3 | 10.01 | 10.01 | 0.165 | 0.928 | 0.170 | | | 10:36:10 | Yes |
| Mean: | 10.01 | 10.01 | 0.165 | | | | | | |
| SD: | 0.206 | 0.206 | 0.0034 | | | | | | |
| %RSD: | 2.057 | 2.057 | 2.06 | | | | | | |

Sequence No.: 43
Sample ID: CCB
Analyst:
Autosampler Location:
Date Collected: 12/19/2007 10:37:05 AM
Data Type: Original

Replicate Data: CCB

| Repl | SampleConc | StndConc | BlnkCorr | Peak | Peak | Bkgnd | Bkgnd | Time | Peak |
|---|---|---|---|---|---|---|---|---|---|

| # | ug/L | ug/L | Signal | Area | Height | Area | Height | | Stored |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.070 | 0.070 | 0.001 | 0.018 | 0.006 | | | 10:37:22 | Yes |
| 2 | 0.122 | 0.122 | 0.002 | 0.029 | 0.007 | | | 10:37:56 | Yes |
| 3 | 0.508 | 0.508 | 0.008 | 0.072 | 0.013 | | | 10:38:30 | Yes |
| Mean: | 0.233 | 0.233 | 0.004 | | | | | | |
| SD: | 0.239 | 0.239 | 0.0039 | | | | | | |
| %RSD: | 102.6 | 102.6 | 102.63 | | | | | | |

# Columbia Analytical Services

**- Cover Page -**
**INORGANIC ANALYSIS DATA PACKAGE**

**Client:** New Fields Environmental
**Service Request:** K0710142
**Project Name:**
**Project No.:**

| Sample Name: | Lab Code: |
|---|---|
| SM1007-CC1A-FT001 | K0710142-001 |
| SM1007-CC1A-FT001-Eggs | K0710142-002 |
| SM1007-CC3A-FT101 | K0710142-003 |
| SM1007-CC3A-FT101-Eggs | K0710142-004 |
| SM1007-CC3A-FT001 | K0710142-005 |
| SM1007-CC3A-FT100 | K0710142-006 |
| SM1007-CC3A-FT002 | K0710142-007 |
| SM1007-CC3A-FT002D | K0710142-007D |
| SM1007-CC3A-FT002S | K0710142-007S |
| Method Blank | K0710142-MB |

**Comments:**

**Approved By:** ______________________ **Date:** ______________________

## Metals

**- 1 -**
**INORGANIC ANALYSIS DATA PACKAGE**

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0710142 |
| **Project No.:** | NA | **Date Collected:** | 10/22/07 |
| **Project Name:** | NA | **Date Received:** | 10/30/07 |
| **Matrix:** | TISSUE | **Units:** | mg/Kg |
| | | **Basis:** | DRY |

**Sample Name:** SM1007-CC1A-FT001-Eggs **Lab Code:** K0710142-002

| Analyte | Analysis Method | MRL | MDL | Dilution Factor | Date Extracted | Date Analyzed | Result | C | Q |
|---|---|---|---|---|---|---|---|---|---|
| Selenium | 7742 | 0.50 | 0.10 | 10.0 | 12/12/07 | 12/19/07 | 11.5 | | |

Comments:

**COLUMBIA ANALYTICAL SERVICES, INC.**

Analytical Report

| | | | |
|---|---|---|---|
| **Client:** | New Fields Environmental | **Service Request:** | K0710142 |
| **Project:** | NA | **Date Collected:** | 10/22-24/07 |
| **Sample Matrix:** | Tissue | **Date Received:** | 10/30/07 |

Solids, Total

| | | | |
|---|---|---|---|
| Prep Method: | NONE | Units: | PERCENT |
| Analysis Method: | Freeze Dry | Basis: | Wet |
| Test Notes: | | | |

| Sample Name | Lab Code | Date Analyzed | Result | Result Notes |
|---|---|---|---|---|
| SM1007-CC1A-FT001 | K0710142-001 | 12/05/07 | 25.8 | |
| SM1007-CC1A-FT001-Eggs | K0710142-002 | 12/05/07 | 35.3 | |
| SM1007-CC3A-FT101 | K0710142-003 | 12/05/07 | 25.2 | |
| SM1007-CC3A-FT101-Eggs | K0710142-004 | 12/05/07 | 36.1 | |
| SM1007-CC3A-FT001 | K0710142-005 | 12/05/07 | 26.7 | |
| SM1007-CC3A-FT100 | K0710142-006 | 12/05/07 | 26.5 | |
| SM1007-CC3A-FT002 | K0710142-007 | 12/05/07 | 26.8 | |

# APPENDIX E
EPA's TRAP Software and Summary Output Statistics for Each Model Run

**Toxicity Relationship Analysis Program (TRAP) version 1.2 (Erickson 2008) – Data Inputs and Outputs**

Logistic regression analysis was performed using USEPA regression-analysis software (TRAP version 1.2; Erickson 2008). This program analyzes the decline of a biological variable (e.g., survival, growth, fecundity) from its control value to zero as chemical exposure (e.g., concentration, log concentration, dose) increases. The software allows for two types of analysis options including Maximum Likelihood Tolerance Distribution Analysis and Least-Squares Nonlinear Regression Analysis.

The logistic regression model in the Least-Squares Nonlinear Regression Analysis option was selected for use consistent with USEPA's (2004) approach. The independent variable (exposure variable) for each of these analyses was egg selenium (mg/kg dw). Separate analyses of the egg selenium data found that it was log normally distributed; therefore all analyses using these data in the logistic regression function were conducted using log transformed egg selenium data. Furthermore, Log transformation of concentrations is often desirable to make the analysis models (which are symmetric) more applicable to toxicological toxicity relationships (which are often skewed) (Erickson 2008). The data were entered as raw values and the program provided the log transformation. Independent variables (effects variables) included:

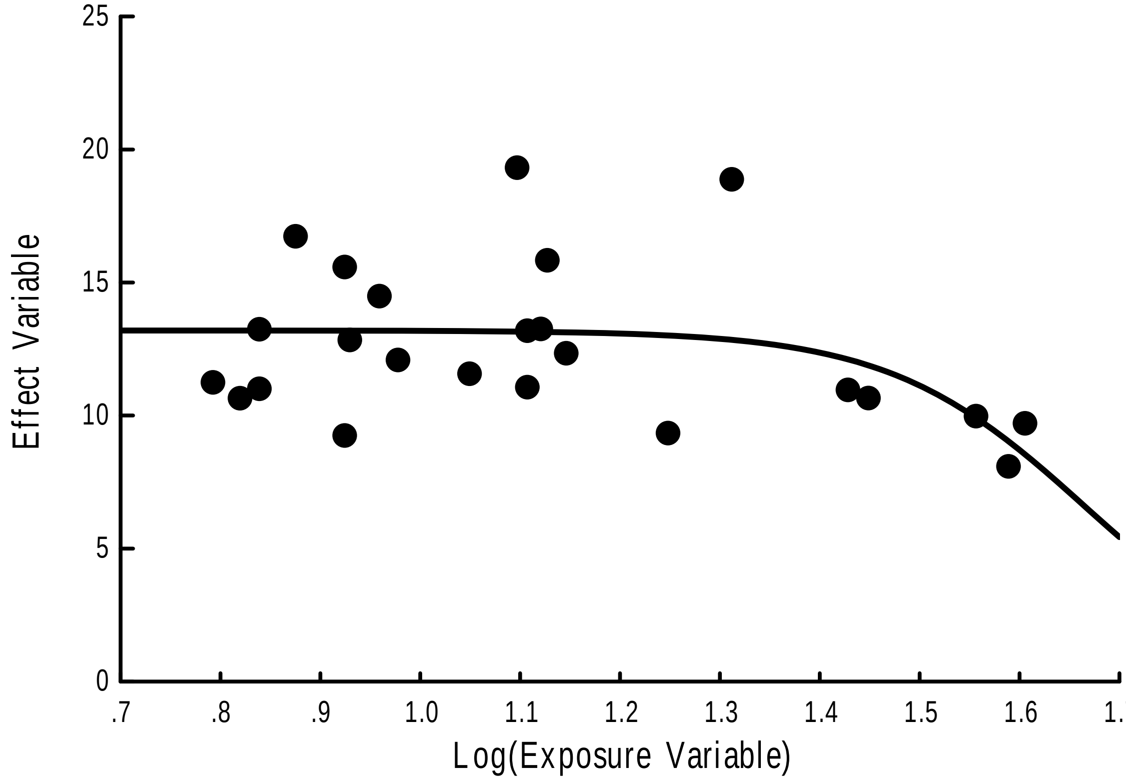
- Larval fish growth
- % Survival 15 day post swim up feeding trial
- % Survival Overall
- % Survival (hatch to test end)
- Cranio facial deformities (fraction normal)
- Skeletal deformities (fraction normal)
- Finfold deformities (fraction normal)
- Edema deformities (fraction normal)
- Sum Fraction normal
- Mean Fraction normal

Data for each of these variables were not transformed.

The model allows for initial guesses of the model parameters X50 (effect concentration that causes a 50% reduction relative to the control, Y0 (control value), and S (p-50)/(Xp-X50) which is the steepness. If no initial guessed are made, the model will estimate these parameters. No initial guesses were made and the model was allowed to fill in these parameters.

Independent model runs were made for each pairing of egg selenium data and the dependent variable to obtain a model output which is shown in the remainder of this appendix. The model output illustrates the graphical distribution of the data and the predicted logistic regression line fit to the data. It also includes a parameter summary, predicted effects concentrations and their confidence limits, a regression analysis of variance, a summary of the data, and an error summary. The data summary for each output includes the exposure variable (log transformed egg selenium (mg/kg dw), and the observed effects (raw untransformed input data), predicted effects, and residual error.

# Egg Se vs. Growth




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.6132 | 1.6649 | 0.1119 | 1.4321 | 1.8977 |
| S | 2.530 | 2.546 | 2.897 | -3.478 | 8.570 |
| Y0 | 13.454 | 13.198 | 0.705 | 11.731 | 14.664 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 46.23 | 27.05 | 79.01 |
| 20.0 | 33.79 | 22.84 | 49.99 |
| 10.0 | 28.13 | 13.09 | 60.44 |
| 5.0 | 23.76 | 7.54 | 74.80 |

# Egg Se vs. Growth

## Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 201.5 | 8.76 | | |
| Regression | 2 | 42.0 | 20.98 | 2.76 | 0.0861 |
| Error | 21 | 159.5 | 7.60 | | |

## Data Summary

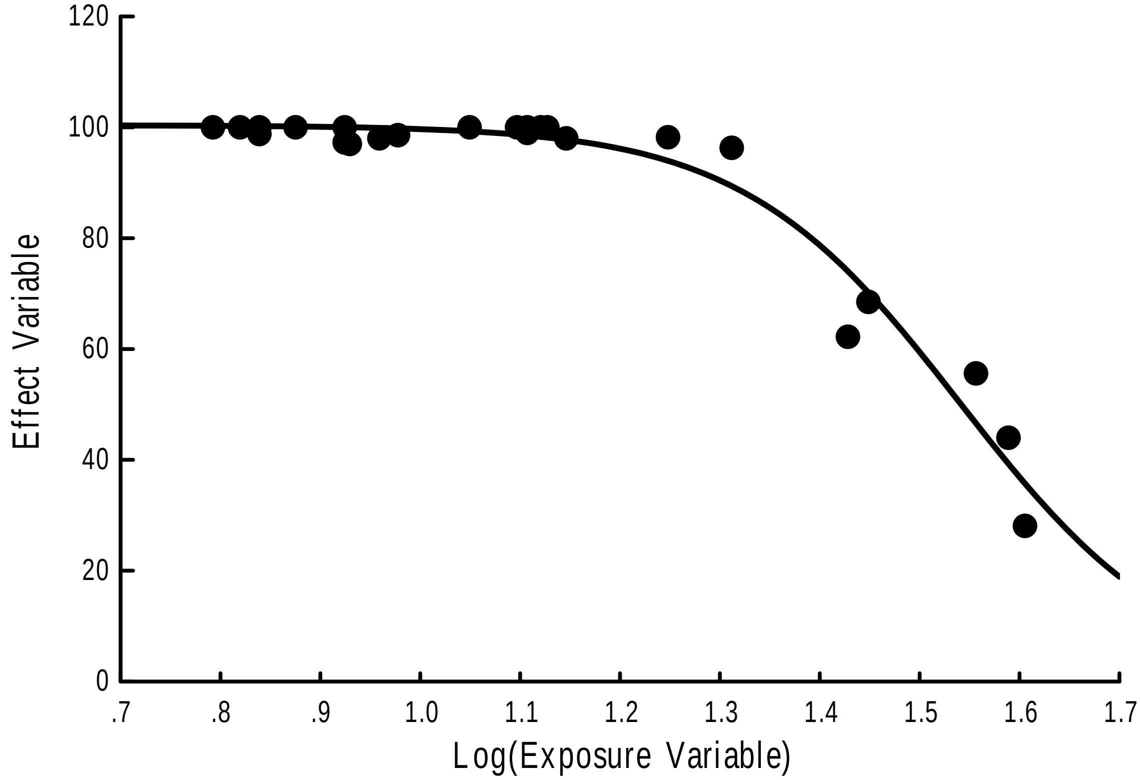
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 11.2480 | 13.1957 | 1.9477 | 1. |
| 0.8195 | 10.6530 | 13.1951 | 2.5421 | 1. |
| 0.8388 | 13.2450 | 13.1946 | -0.0504 | 1. |
| 0.8388 | 11.0090 | 13.1946 | 2.1856 | 1. |
| 0.8751 | 16.7360 | 13.1933 | -3.5427 | 1. |
| 0.9243 | 15.5830 | 13.1905 | -2.3925 | 1. |
| 0.9243 | 9.2485 | 13.1905 | 3.9420 | 1. |
| 0.9294 | 12.8400 | 13.1902 | 0.3502 | 1. |
| 0.9590 | 14.4860 | 13.1876 | -1.2984 | 1. |
| 0.9777 | 12.0890 | 13.1855 | 1.0965 | 1. |
| 1.0492 | 11.5730 | 13.1726 | 1.5996 | 1. |
| 1.0969 | 19.3190 | 13.1571 | -6.1619 | 1. |
| 1.1072 | 13.1880 | 13.1526 | -0.0354 | 1. |
| 1.1072 | 11.0690 | 13.1526 | 2.0836 | 1. |
| 1.1206 | 13.2560 | 13.1461 | -0.1099 | 1. |
| 1.1271 | 15.8350 | 13.1426 | -2.6924 | 1. |
| 1.1461 | 12.3420 | 13.1309 | 0.7889 | 1. |
| 1.2480 | 9.3420 | 13.0112 | 3.6692 | 1. |
| 1.3118 | 18.8780 | 12.8454 | -6.0326 | 1. |
| 1.4281 | 10.9670 | 12.1112 | 1.1442 | 1. |
| 1.4487 | 10.6560 | 11.8832 | 1.2272 | 1. |
| 1.5563 | 9.9790 | 9.9163 | -0.0627 | 1. |
| 1.5888 | 8.0918 | 9.0341 | 0.9423 | 1. |
| 1.6053 | 9.7100 | 8.5418 | -1.1682 | 1. |

# Egg Se vs. Growth

## Error Summary

Large Standard Error for Steepness

## Egg Se vs. Survival (15 day post feeding trial)




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.5396 | 1.5407 | 0.0099 | 1.5200 | 1.5613 |
| S | 1.8091 | 2.292 | 0.264 | 1.742 | 2.841 |
| Y0 | 99.16 | 100.38 | 1.26 | 97.76 | 103.01 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 34.73 | 33.11 | 36.42 |
| 20.0 | 24.51 | 22.26 | 26.99 |
| 10.0 | 19.997 | 17.369 | 23.022 |
| 5.0 | 16.575 | 13.790 | 19.921 |

## Egg Se vs. Survival (15 day post feeding trial)

### Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 9918. | 431.23 | | |
| Regression | 2 | 9514. | 4757.22 | 247. | 0.0000 |
| Error | 21 | 404. | 19.23 | | |

### Data Summary

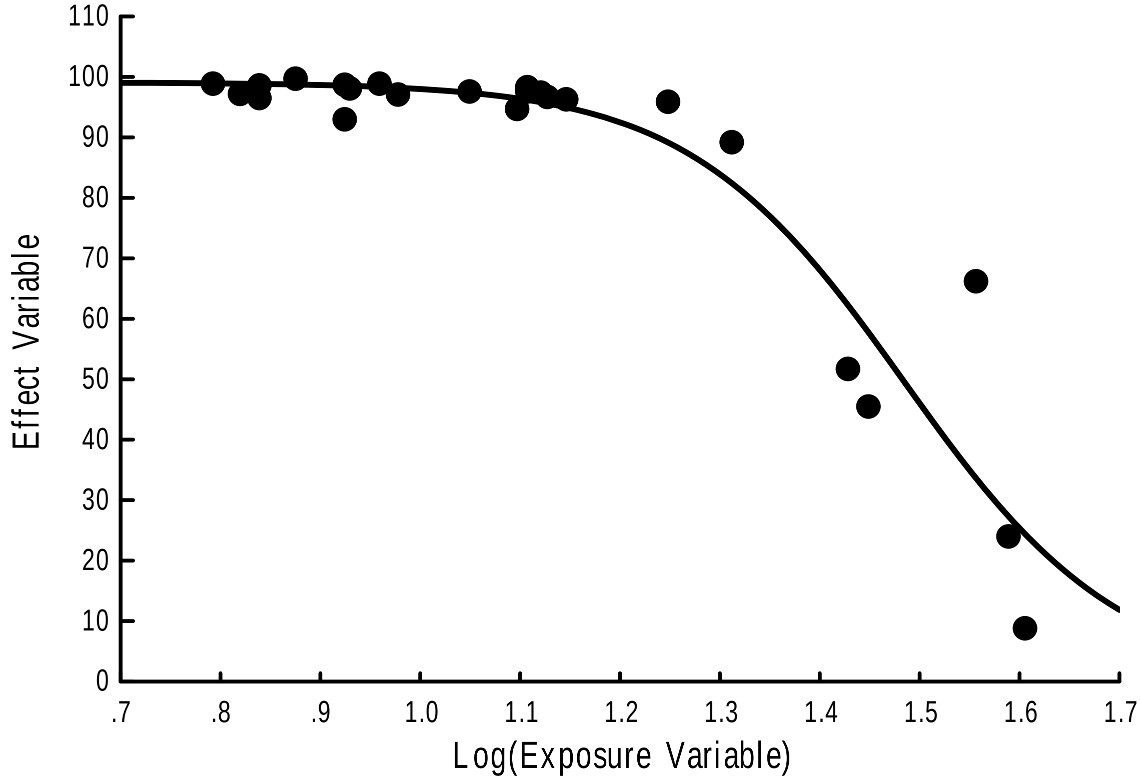
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 100.0000 | 100.2759 | 0.2759 | 1. |
| 0.8195 | 100.0000 | 100.2462 | 0.2462 | 1. |
| 0.8388 | 100.0000 | 100.2201 | 0.2201 | 1. |
| 0.8388 | 98.8000 | 100.2201 | 1.4201 | 1. |
| 0.8751 | 100.0000 | 100.1568 | 0.1568 | 1. |
| 0.9243 | 100.0000 | 100.0294 | 0.0294 | 1. |
| 0.9243 | 97.3000 | 100.0294 | 2.7294 | 1. |
| 0.9294 | 97.0000 | 100.0125 | 3.0125 | 1. |
| 0.9590 | 98.0000 | 99.8980 | 1.8980 | 1. |
| 0.9777 | 98.6000 | 99.8082 | 1.2082 | 1. |
| 1.0492 | 100.0000 | 99.2835 | -0.7165 | 1. |
| 1.0969 | 100.0000 | 98.6918 | -1.3082 | 1. |
| 1.1072 | 100.0000 | 98.5276 | -1.4724 | 1. |
| 1.1072 | 99.0000 | 98.5276 | -0.4724 | 1. |
| 1.1206 | 100.0000 | 98.2911 | -1.7089 | 1. |
| 1.1271 | 100.0000 | 98.1650 | -1.8350 | 1. |
| 1.1461 | 98.0000 | 97.7538 | -0.2462 | 1. |
| 1.2480 | 98.2000 | 93.9580 | -4.2420 | 1. |
| 1.3118 | 96.3000 | 89.4133 | -6.8867 | 1. |
| 1.4281 | 62.2000 | 74.0020 | 11.8020 | 1. |
| 1.4487 | 68.5000 | 70.1752 | 1.6752 | 1. |
| 1.5563 | 55.6000 | 46.6005 | -8.9995 | 1. |
| 1.5888 | 44.0000 | 39.2882 | -4.7118 | 1. |
| 1.6053 | 28.1000 | 35.7425 | 7.6425 | 1. |

## Egg Se vs. Survival (15 day post feeding trial)

**Error Summary**

No Errors

## Egg Se vs. Survival (hatch to test end)




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4841 | 1.4846 | 0.0212 | 1.4406 | 1.5286 |
| S | 2.072 | 2.316 | 0.474 | 1.330 | 3.301 |
| Y0 | 97.32 | 99.10 | 2.75 | 93.39 | 104.82 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 30.52 | 27.58 | 33.77 |
| 20.0 | 21.62 | 17.77 | 26.32 |
| 10.0 | 17.677 | 13.440 | 23.249 |
| 5.0 | 14.681 | 10.357 | 20.810 |

## Egg Se vs. Survival (hatch to test end)

### Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 15331. | 666.6 | | |
| Regression | 2 | 13611. | 6805.3 | 83.1 | 0.0000 |
| Error | 21 | 1721. | 81.9 | | |

### Data Summary

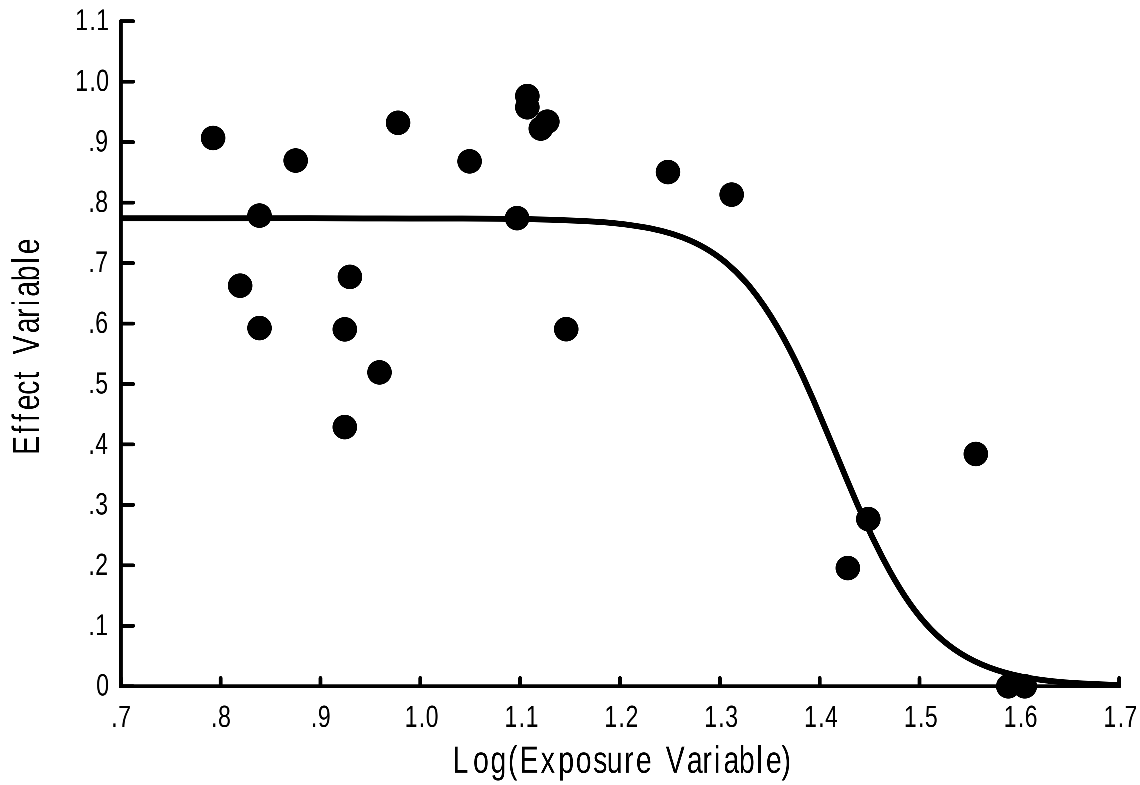
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 98.9000 | 98.9424 | 0.0424 | 1. |
| 0.8195 | 97.2000 | 98.8961 | 1.6961 | 1. |
| 0.8388 | 98.6000 | 98.8553 | 0.2553 | 1. |
| 0.8388 | 96.5000 | 98.8553 | 2.3553 | 1. |
| 0.8751 | 99.7000 | 98.7562 | -0.9438 | 1. |
| 0.9243 | 98.7000 | 98.5559 | -0.1441 | 1. |
| 0.9243 | 93.0000 | 98.5559 | 5.5559 | 1. |
| 0.9294 | 98.1000 | 98.5293 | 0.4293 | 1. |
| 0.9590 | 98.9000 | 98.3490 | -0.5510 | 1. |
| 0.9777 | 97.1000 | 98.2075 | 1.1075 | 1. |
| 1.0492 | 97.6000 | 97.3794 | -0.2206 | 1. |
| 1.0969 | 94.7000 | 96.4466 | 1.7466 | 1. |
| 1.1072 | 98.3000 | 96.1883 | -2.1117 | 1. |
| 1.1072 | 97.6000 | 96.1883 | -1.4117 | 1. |
| 1.1206 | 97.4000 | 95.8167 | -1.5833 | 1. |
| 1.1271 | 96.7000 | 95.6189 | -1.0811 | 1. |
| 1.1461 | 96.3000 | 94.9751 | -1.3249 | 1. |
| 1.2480 | 95.9000 | 89.1474 | -6.7526 | 1. |
| 1.3118 | 89.2000 | 82.4730 | -6.7270 | 1. |
| 1.4281 | 51.7000 | 62.2247 | 10.5247 | 1. |
| 1.4487 | 45.5000 | 57.7159 | 12.2159 | 1. |
| 1.5563 | 66.2000 | 33.6760 | -32.5240 | 1. |
| 1.5888 | 24.0000 | 27.3308 | 3.3308 | 1. |
| 1.6053 | 8.8000 | 24.4157 | 15.6157 | 1. |

## Egg Se vs. Survival (hatch to test end)

**Error Summary**

No Errors

## Egg Se vs. Cranio Facial Fraction Normal




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4405 | 1.4157 | 0.0347 | 1.3436 | 1.4878 |
| S | 2.739 | 5.153 | 3.811 | -2.773 | 13.079 |
| Y0 | 0.7802 | 0.7740 | 0.0430 | 0.6845 | 0.8634 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 26.04 | 22.06 | 30.75 |
| 20.0 | 22.31 | 15.91 | 31.27 |
| 10.0 | 20.37 | 12.78 | 32.47 |
| 5.0 | 18.742 | 10.402 | 33.769 |

# Egg Se vs. Cranio Facial Fraction Normal

## Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 2.035 | 0.0885 | | |
| Regression | 2 | 1.381 | 0.6903 | 22.2 | 0.0000 |
| Error | 21 | 0.654 | 0.0312 | | |

## Data Summary

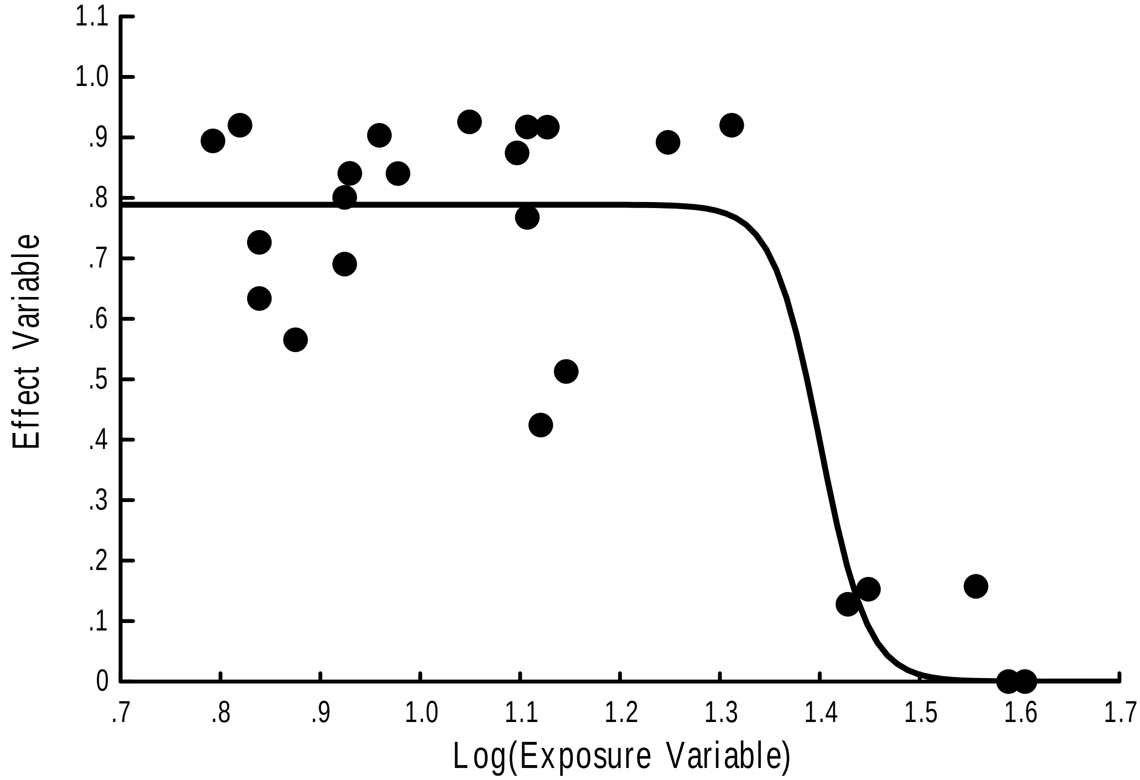
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 1.1072 | 0.9577 | 0.7739 | -0.1838 | 1. |
| 0.9243 | 0.4286 | 0.7739 | 0.3454 | 1. |
| 0.9294 | 0.6773 | 0.7739 | 0.0966 | 1. |
| 0.9243 | 0.5903 | 0.7739 | 0.1836 | 1. |
| 0.9590 | 0.5191 | 0.7739 | 0.2548 | 1. |
| 0.8751 | 0.8696 | 0.7739 | -0.0956 | 1. |
| 0.8195 | 0.6626 | 0.7739 | 0.1113 | 1. |
| 0.8388 | 0.5926 | 0.7739 | 0.1813 | 1. |
| 0.7924 | 0.9068 | 0.7739 | -0.1329 | 1. |
| 1.1461 | 0.5907 | 0.7739 | 0.1832 | 1. |
| 0.8388 | 0.7786 | 0.7735 | -0.0051 | 1. |
| 0.9777 | 0.9320 | 0.7729 | -0.1591 | 1. |
| 1.1072 | 0.9761 | 0.7726 | -0.2035 | 1. |
| 1.6053 | 0.0000 | 0.7726 | 0.7726 | 1. |
| 1.5563 | 0.3841 | 0.7722 | 0.3880 | 1. |
| 1.4281 | 0.1957 | 0.7719 | 0.5763 | 1. |
| 1.2480 | 0.8505 | 0.7710 | -0.0795 | 1. |
| 1.5888 | 0.0000 | 0.7503 | 0.7503 | 1. |
| 1.1206 | 0.9224 | 0.6926 | -0.2297 | 1. |
| 1.1271 | 0.9340 | 0.3376 | -0.5964 | 1. |
| 1.3118 | 0.8133 | 0.2602 | -0.5532 | 1. |
| 1.0969 | 0.7744 | 0.0404 | -0.7339 | 1. |
| 1.0492 | 0.8682 | 0.0212 | -0.8470 | 1. |
| 1.4487 | 0.2765 | 0.0152 | -0.2612 | 1. |

## Egg Se vs. Cranio Facial Fraction Normal

**Error Summary**

Large Standard Error for Steepness

## Egg Se vs. Skeletal Fraction Normal




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4219 | 1.4002 | 0.0489 | 1.2986 | 1.5019 |
| S | 3.519 | 10.557 | 14.610 | -19.827 | 40.940 |
| Y0 | 0.7936 | 0.7887 | 0.0351 | 0.7157 | 0.8617 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 25.13 | 19.89 | 31.76 |
| 20.0 | 23.30 | 15.01 | 36.18 |
| 10.0 | 22.29 | 12.68 | 39.20 |
| 5.0 | 21.40 | 10.84 | 42.25 |

# Egg Se vs. Skeletal Fraction Normal

## Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 2.397 | 0.1042 | | |
| Regression | 2 | 1.929 | 0.9644 | 43.3 | 0.0000 |
| Error | 21 | 0.468 | 0.0223 | | |

## Data Summary

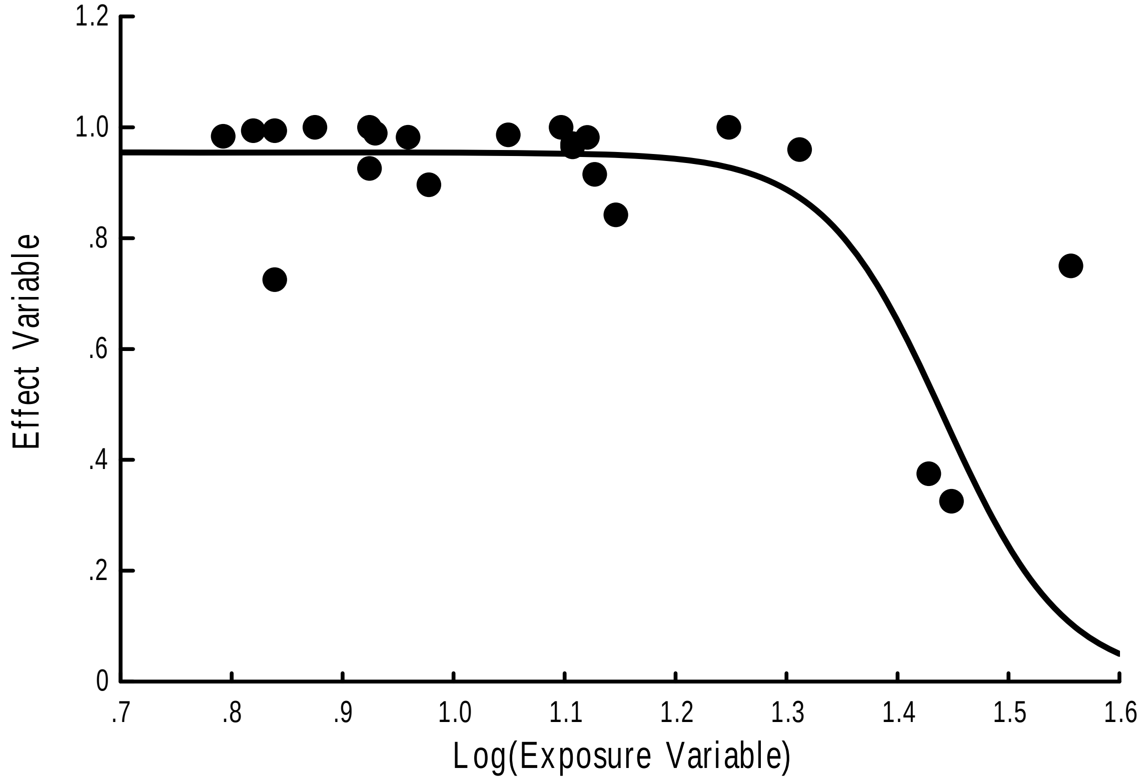
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 0.8943 | 0.7887 | -0.1056 | 1. |
| 0.8195 | 0.9202 | 0.7887 | -0.1316 | 1. |
| 0.8388 | 0.7263 | 0.7887 | 0.0624 | 1. |
| 0.8388 | 0.6336 | 0.7887 | 0.1551 | 1. |
| 0.8751 | 0.5652 | 0.7887 | 0.2235 | 1. |
| 0.9243 | 0.8008 | 0.7887 | -0.0121 | 1. |
| 0.9243 | 0.6903 | 0.7887 | 0.0984 | 1. |
| 0.9294 | 0.8404 | 0.7887 | -0.0517 | 1. |
| 0.9590 | 0.9034 | 0.7887 | -0.1147 | 1. |
| 0.9777 | 0.8402 | 0.7887 | -0.0515 | 1. |
| 1.0492 | 0.9257 | 0.7887 | -0.1370 | 1. |
| 1.0969 | 0.8744 | 0.7887 | -0.0857 | 1. |
| 1.1072 | 0.9173 | 0.7887 | -0.1286 | 1. |
| 1.1072 | 0.7676 | 0.7887 | 0.0211 | 1. |
| 1.1206 | 0.4242 | 0.7887 | 0.3645 | 1. |
| 1.1271 | 0.9170 | 0.7887 | -0.1283 | 1. |
| 1.1461 | 0.5130 | 0.7887 | 0.2757 | 1. |
| 1.2480 | 0.8918 | 0.7874 | -0.1043 | 1. |
| 1.3118 | 0.9200 | 0.7703 | -0.1497 | 1. |
| 1.4281 | 0.1278 | 0.1856 | 0.0578 | 1. |
| 1.4487 | 0.1527 | 0.0902 | -0.0625 | 1. |
| 1.5563 | 0.1575 | 0.0011 | -0.1564 | 1. |
| 1.5888 | 0.0000 | 0.0003 | 0.0003 | 1. |
| 1.6053 | 0.0000 | 0.0001 | 0.0001 | 1. |

# Egg Se vs. Skeletal Fraction Normal

### Error Summary

Maximum Iterations Reached Without Convergence
Steepness At Maximum or Minimum Limit
Large Standard Error for Steepness

## Egg Se vs. Finfold Fraction Normal




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4119 | 1.4416 | 0.0270 | 1.3851 | 1.4982 |
| S | 4.979 | 4.568 | 2.808 | -1.310 | 10.446 |
| Y0 | 0.9576 | 0.9546 | 0.0416 | 0.8675 | 1.0417 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 27.65 | 24.27 | 31.49 |
| 20.0 | 23.22 | 17.85 | 30.19 |
| 10.0 | 20.96 | 14.30 | 30.73 |
| 5.0 | 19.077 | 11.591 | 31.398 |

# Egg Se vs. Finfold Fraction Normal

## Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 21 | 0.767 | 0.0365 | | |
| Regression | 2 | 0.212 | 0.1062 | 3.64 | 0.0459 |
| Error | 19 | 0.554 | 0.0292 | | |

## Data Summary

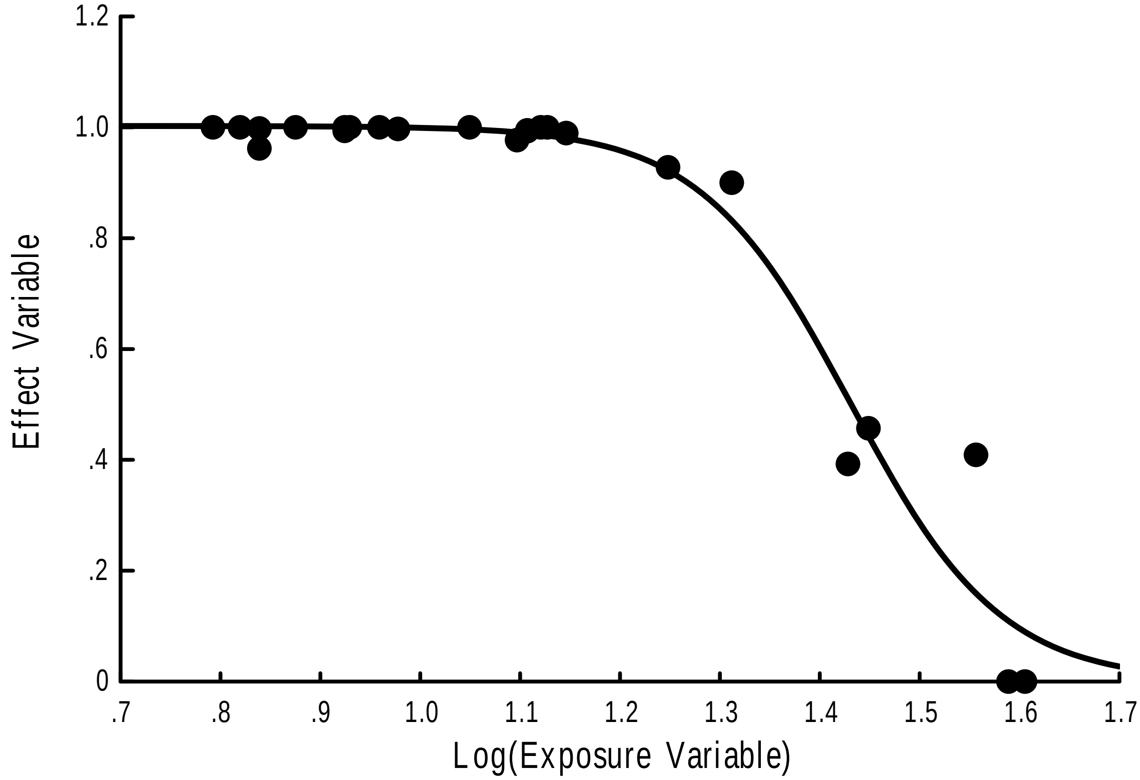
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 0.9839 | 0.9546 | -0.0293 | 1. |
| 0.8195 | 0.9939 | 0.9545 | -0.0393 | 1. |
| 0.8388 | 0.9938 | 0.9545 | -0.0393 | 1. |
| 0.8388 | 0.7252 | 0.9545 | 0.2294 | 1. |
| 0.8751 | 1.0000 | 0.9545 | -0.0455 | 1. |
| 0.9243 | 1.0000 | 0.9545 | -0.0455 | 1. |
| 0.9243 | 0.9258 | 0.9545 | 0.0287 | 1. |
| 0.9294 | 0.9894 | 0.9545 | -0.0349 | 1. |
| 0.9590 | 0.9820 | 0.9544 | -0.0276 | 1. |
| 0.9777 | 0.8964 | 0.9544 | 0.0579 | 1. |
| 1.0492 | 0.9865 | 0.9538 | -0.0327 | 1. |
| 1.0969 | 1.0000 | 0.9528 | -0.0472 | 1. |
| 1.1072 | 0.9706 | 0.9524 | -0.0181 | 1. |
| 1.1072 | 0.9648 | 0.9524 | -0.0123 | 1. |
| 1.1206 | 0.9819 | 0.9519 | -0.0301 | 1. |
| 1.1271 | 0.9151 | 0.9515 | 0.0364 | 1. |
| 1.1461 | 0.8420 | 0.9503 | 0.1083 | 1. |
| 1.2480 | 1.0000 | 0.9276 | -0.0724 | 1. |
| 1.3118 | 0.9600 | 0.8732 | -0.0868 | 1. |
| 1.4281 | 0.3750 | 0.5359 | 0.1609 | 1. |
| 1.4487 | 0.3253 | 0.4465 | 0.1212 | 1. |
| 1.5563 | 0.7500 | 0.1046 | -0.6454 | 1. |

## Egg Se vs. Finfold Fraction Normal

### Error Summary

Maximum Iterations Reached Without Convergence
Large Standard Error for Steepness

## Egg Se vs. Edema Fraction Normal




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4299 | 1.4310 | 0.0133 | 1.4033 | 1.4587 |
| S | 2.116 | 3.328 | 0.525 | 2.236 | 4.420 |
| Y0 | 0.9953 | 1.0024 | 0.0186 | 0.9638 | 1.0410 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 26.98 | 25.31 | 28.75 |
| 20.0 | 21.23 | 18.95 | 23.77 |
| 10.0 | 18.448 | 15.818 | 21.515 |
| 5.0 | 16.211 | 13.361 | 19.670 |

# Egg Se vs. Edema Fraction Normal

### Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 2.3608 | 0.10264 | | |
| Regression | 2 | 2.2570 | 1.12852 | 228. | 0.0000 |
| Error | 21 | 0.1038 | 0.00494 | | |

### Data Summary

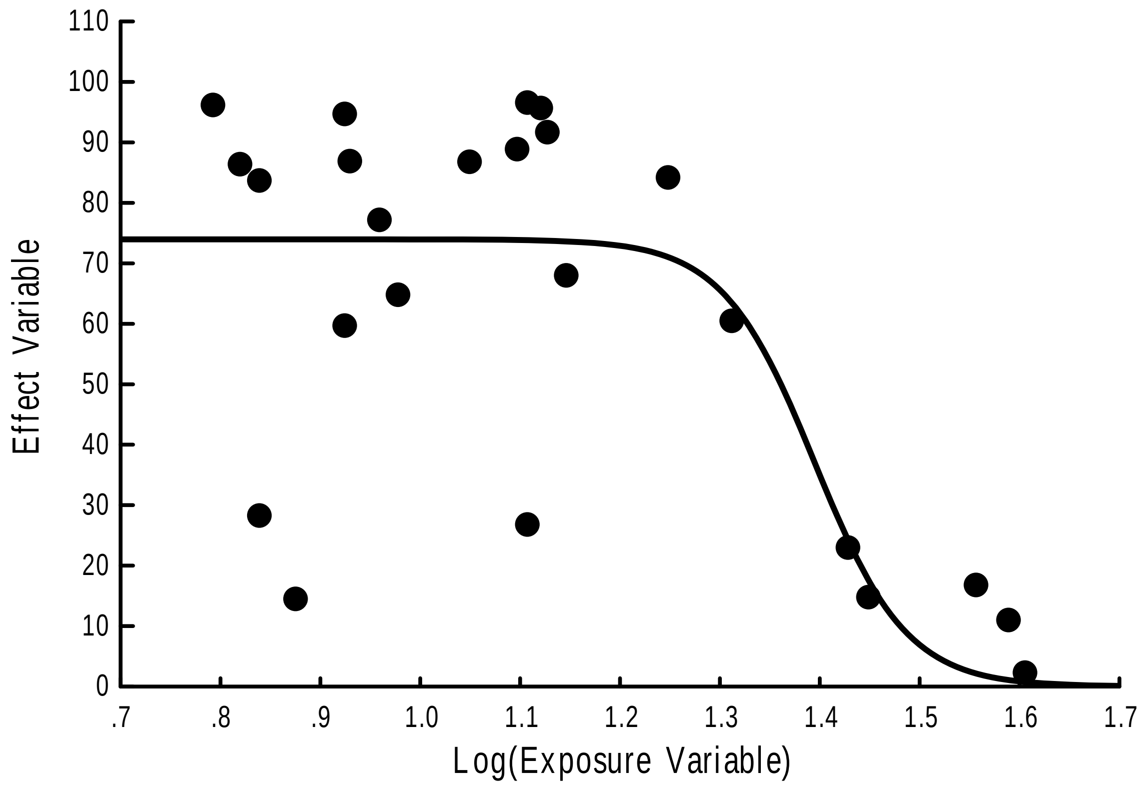
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 1.0000 | 1.0022 | 0.0022 | 1. |
| 0.8195 | 1.0000 | 1.0021 | 0.0021 | 1. |
| 0.8388 | 0.9979 | 1.0021 | 0.0041 | 1. |
| 0.8388 | 0.9618 | 1.0021 | 0.0402 | 1. |
| 0.8751 | 1.0000 | 1.0018 | 0.0018 | 1. |
| 0.9243 | 1.0000 | 1.0013 | 0.0013 | 1. |
| 0.9243 | 0.9935 | 1.0013 | 0.0077 | 1. |
| 0.9294 | 1.0000 | 1.0012 | 0.0012 | 1. |
| 0.9590 | 1.0000 | 1.0006 | 0.0006 | 1. |
| 0.9777 | 0.9970 | 1.0000 | 0.0030 | 1. |
| 1.0492 | 1.0000 | 0.9963 | -0.0037 | 1. |
| 1.0969 | 0.9769 | 0.9908 | 0.0139 | 1. |
| 1.1072 | 0.9945 | 0.9892 | -0.0053 | 1. |
| 1.1072 | 0.9930 | 0.9892 | -0.0038 | 1. |
| 1.1206 | 1.0000 | 0.9866 | -0.0134 | 1. |
| 1.1271 | 1.0000 | 0.9852 | -0.0148 | 1. |
| 1.1461 | 0.9896 | 0.9803 | -0.0093 | 1. |
| 1.2480 | 0.9278 | 0.9218 | -0.0060 | 1. |
| 1.3118 | 0.9000 | 0.8323 | -0.0677 | 1. |
| 1.4281 | 0.3925 | 0.5108 | 0.1182 | 1. |
| 1.4487 | 0.4570 | 0.4424 | -0.0146 | 1. |
| 1.5563 | 0.4091 | 0.1591 | -0.2500 | 1. |
| 1.5888 | 0.0000 | 0.1092 | 0.1092 | 1. |
| 1.6053 | 0.0000 | 0.0897 | 0.0897 | 1. |

# Egg Se vs. Edema Fraction Normal

**Error Summary**

No Errors

## Egg Se vs. Overall Survival




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4184 | 1.3950 | 0.0530 | 1.2848 | 1.5051 |
| S | 2.683 | 5.419 | 5.029 | -5.039 | 15.877 |
| Y0 | 75.75 | 73.98 | 5.79 | 61.93 | 86.03 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 24.83 | 19.27 | 32.00 |
| 20.0 | 21.43 | 13.60 | 33.77 |
| 10.0 | 19.661 | 10.745 | 35.978 |
| 5.0 | 18.161 | 8.594 | 38.380 |

# Egg Se vs. Overall Survival

## Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 25808. | 1122. | | |
| Regression | 2 | 14085. | 7042. | 12.6 | 0.0003 |
| Error | 21 | 11724. | 558. | | |

## Data Summary

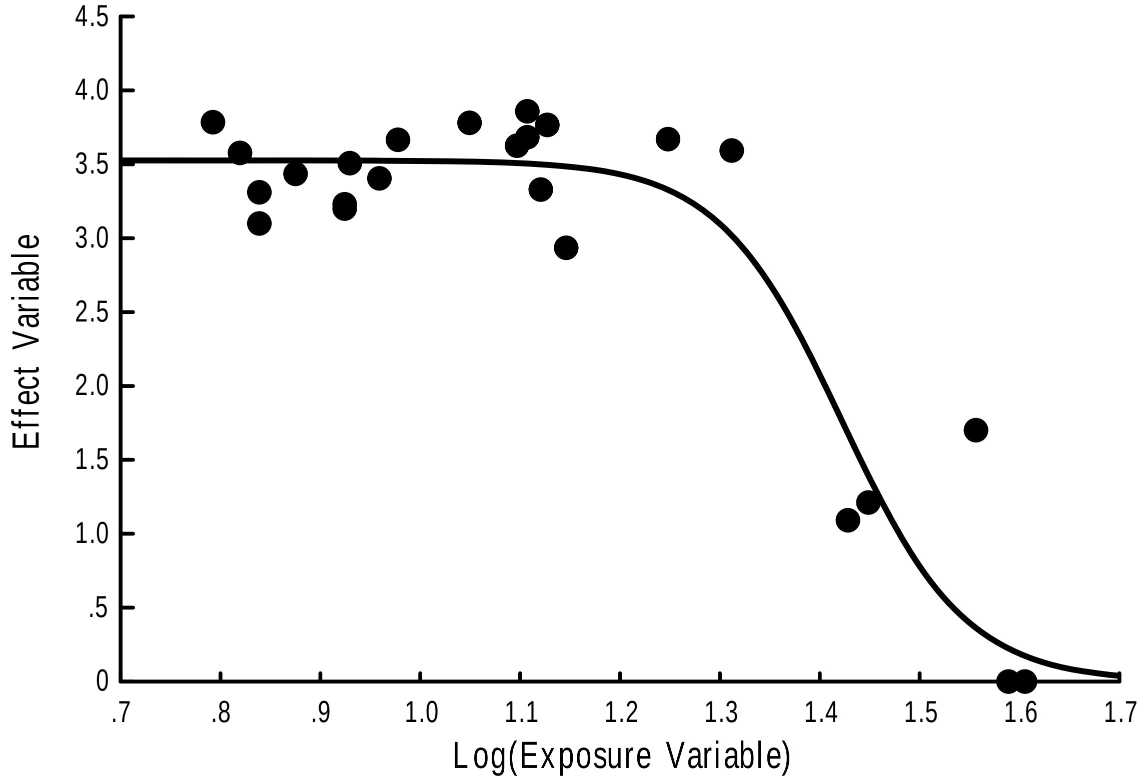
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 96.2000 | 73.9772 | -22.2227 | 1. |
| 0.8195 | 86.4000 | 73.9771 | -12.4229 | 1. |
| 0.8388 | 83.7000 | 73.9770 | -9.7230 | 1. |
| 0.8388 | 28.3000 | 73.9770 | 45.6770 | 1. |
| 0.8751 | 14.5000 | 73.9765 | 59.4765 | 1. |
| 0.9243 | 94.7000 | 73.9747 | -20.7253 | 1. |
| 0.9243 | 59.7000 | 73.9747 | 14.2747 | 1. |
| 0.9294 | 86.9000 | 73.9743 | -12.9257 | 1. |
| 0.9590 | 77.2000 | 73.9716 | -3.2284 | 1. |
| 0.9777 | 64.8000 | 73.9687 | 9.1687 | 1. |
| 1.0492 | 86.8000 | 73.9363 | -12.8637 | 1. |
| 1.0969 | 88.9000 | 73.8619 | -15.0381 | 1. |
| 1.1072 | 96.6000 | 73.8331 | -22.7669 | 1. |
| 1.1072 | 26.8000 | 73.8331 | 47.0331 | 1. |
| 1.1206 | 95.7000 | 73.7847 | -21.9153 | 1. |
| 1.1271 | 91.7000 | 73.7555 | -17.9445 | 1. |
| 1.1461 | 68.0000 | 73.6428 | 5.6428 | 1. |
| 1.2480 | 84.2000 | 71.0420 | -13.1580 | 1. |
| 1.3118 | 60.5000 | 63.5194 | 3.0194 | 1. |
| 1.4281 | 23.0000 | 24.2424 | 1.2424 | 1. |
| 1.4487 | 14.8000 | 17.5956 | 2.7956 | 1. |
| 1.5563 | 16.8000 | 2.1755 | -14.6245 | 1. |
| 1.5888 | 11.0000 | 1.0911 | -9.9089 | 1. |
| 1.6053 | 2.3000 | 0.7668 | -1.5332 | 1. |

# Egg Se vs. Overall Survival

**Error Summary**

Large Standard Error for Steepness

## Egg Se vs. Sum fraction normal




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4419 | 1.4222 | 0.0207 | 1.3791 | 1.4652 |
| S | 2.733 | 4.041 | 1.266 | 1.409 | 6.672 |
| Y0 | 3.516 | 3.526 | 0.108 | 3.301 | 3.751 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 26.43 | 23.94 | 29.19 |
| 20.0 | 21.70 | 18.09 | 26.02 |
| 10.0 | 19.329 | 15.072 | 24.789 |
| 5.0 | 17.377 | 12.696 | 23.785 |

# Egg Se vs. Sum fraction normal

## Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 32.34 | 1.4060 | | |
| Regression | 2 | 28.46 | 14.2307 | 77.1 | 0.0000 |
| Error | 21 | 3.88 | 0.1846 | | |

## Data Summary

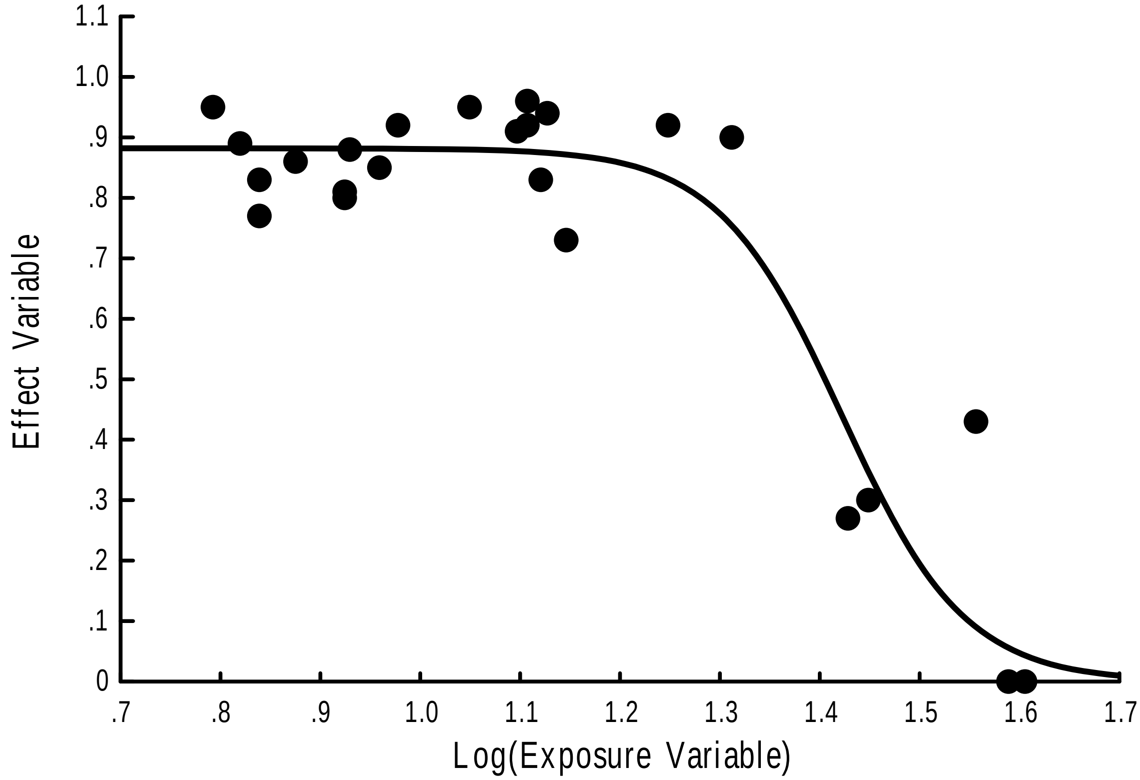
| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 3.7849 | 3.5262 | -0.2587 | 1. |
| 0.8195 | 3.5767 | 3.5261 | -0.0505 | 1. |
| 0.8388 | 3.3107 | 3.5261 | 0.2154 | 1. |
| 0.8388 | 3.0992 | 3.5261 | 0.4269 | 1. |
| 0.8751 | 3.4348 | 3.5258 | 0.0911 | 1. |
| 0.9243 | 3.2293 | 3.5252 | 0.2959 | 1. |
| 0.9243 | 3.2000 | 3.5252 | 0.3252 | 1. |
| 0.9294 | 3.5071 | 3.5251 | 0.0180 | 1. |
| 0.9590 | 3.4045 | 3.5244 | 0.1199 | 1. |
| 0.9777 | 3.6657 | 3.5237 | -0.1420 | 1. |
| 1.0492 | 3.7804 | 3.5179 | -0.2625 | 1. |
| 1.0969 | 3.6256 | 3.5081 | -0.1175 | 1. |
| 1.1072 | 3.8585 | 3.5048 | -0.3537 | 1. |
| 1.1072 | 3.6831 | 3.5048 | -0.1783 | 1. |
| 1.1206 | 3.3285 | 3.4996 | 0.1711 | 1. |
| 1.1271 | 3.7660 | 3.4967 | -0.2693 | 1. |
| 1.1461 | 2.9352 | 3.4861 | 0.5509 | 1. |
| 1.2480 | 3.6701 | 3.3271 | -0.3430 | 1. |
| 1.3118 | 3.5933 | 3.0194 | -0.5739 | 1. |
| 1.4281 | 1.0910 | 1.6780 | 0.5870 | 1. |
| 1.4487 | 1.2114 | 1.3906 | 0.1792 | 1. |
| 1.5563 | 1.7007 | 0.3620 | -1.3387 | 1. |
| 1.5888 | 0.0000 | 0.2233 | 0.2233 | 1. |
| 1.6053 | 0.0000 | 0.1737 | 0.1737 | 1. |

# Egg Se vs. Sum fraction normal

## Error Summary

No Errors

## Egg Se vs. Mean Fraction normal




**Parameter Summary (Logistic Equation Regression Analysis)**

| Parameter | Guess | FinalEst | StdError | 95%LCL | 95%UCL |
|---|---|---|---|---|---|
| LogX50 | 1.4418 | 1.4218 | 0.0210 | 1.3780 | 1.4656 |
| S | 2.723 | 4.039 | 1.283 | 1.371 | 6.707 |
| Y0 | 0.8797 | 0.8820 | 0.0275 | 0.8248 | 0.9391 |

**Effect Concentration Summary**

| %Effect | Xp Est | 95%LCL | 95%UCL |
|---|---|---|---|
| 50.0 | 26.41 | 23.88 | 29.21 |
| 20.0 | 21.68 | 18.02 | 26.07 |
| 10.0 | 19.310 | 15.000 | 24.859 |
| 5.0 | 17.359 | 12.622 | 23.874 |

# Egg Se vs. Mean Fraction normal

## Regression Analysis of Variance

| Source | df | SS | MS | F | Alpha |
|---|---|---|---|---|---|
| Total | 23 | 2.028 | 0.08816 | | |
| Regression | 2 | 1.778 | 0.88898 | 74.8 | 0.0000 |
| Error | 21 | 0.250 | 0.01189 | | |

## Data Summary

| Exposure | Obs Effects | Pred Effects | Residual | Weight |
|---|---|---|---|---|
| 0.7924 | 0.9500 | 0.8819 | -0.0681 | 1. |
| 0.8195 | 0.8900 | 0.8819 | -0.0081 | 1. |
| 0.8388 | 0.8300 | 0.8819 | 0.0519 | 1. |
| 0.8388 | 0.7700 | 0.8819 | 0.1119 | 1. |
| 0.8751 | 0.8600 | 0.8818 | 0.0218 | 1. |
| 0.9243 | 0.8100 | 0.8817 | 0.0717 | 1. |
| 0.9243 | 0.8000 | 0.8817 | 0.0817 | 1. |
| 0.9294 | 0.8800 | 0.8816 | 0.0016 | 1. |
| 0.9590 | 0.8500 | 0.8815 | 0.0315 | 1. |
| 0.9777 | 0.9200 | 0.8813 | -0.0387 | 1. |
| 1.0492 | 0.9500 | 0.8798 | -0.0702 | 1. |
| 1.0969 | 0.9100 | 0.8773 | -0.0327 | 1. |
| 1.1072 | 0.9600 | 0.8765 | -0.0835 | 1. |
| 1.1072 | 0.9200 | 0.8765 | -0.0435 | 1. |
| 1.1206 | 0.8300 | 0.8752 | 0.0452 | 1. |
| 1.1271 | 0.9400 | 0.8745 | -0.0655 | 1. |
| 1.1461 | 0.7300 | 0.8718 | 0.1418 | 1. |
| 1.2480 | 0.9200 | 0.8318 | -0.0882 | 1. |
| 1.3118 | 0.9000 | 0.7544 | -0.1456 | 1. |
| 1.4281 | 0.2700 | 0.4184 | 0.1484 | 1. |
| 1.4487 | 0.3000 | 0.3466 | 0.0466 | 1. |
| 1.5563 | 0.4300 | 0.0901 | -0.3399 | 1. |
| 1.5888 | 0.0000 | 0.0556 | 0.0556 | 1. |
| 1.6053 | 0.0000 | 0.0433 | 0.0433 | 1. |

## Egg Se vs. Mean Fraction normal

**Error Summary**

No Errors

APPENDIX F
Agency Comments on February 5, 2009 Draft Report

IDEQ – Pocatello Comments on
Draft Brown Trout Laboratory Reproduction Studies Conducted in Support of Development of a Site-Specific Selenium Criterion
18 Feb 09

*General Comments*

- The initial power analysis suggested 40 fish were necessary to cover the expected range of maternal selenium. The number of fish in the mid-range (i.e., effects level) may not provide a sufficient sample size to completely resolve this question.
- Be consistent with references, e.g., use of period after et al, separating citations with comma or semi-colons.

*Specific Comments*

- Page 4, Section 1.2, Bullet 3. Was this relationship graphically represented in the report? If not, it needs to be.
- Page 7, Section 2.1.2, Paragraph 2. Why were adult carcasses shipped to ENSR?
- Page 12, Section 3.2, Paragraph 1. Eggs were collected from 26 fish yet Table 5 shows that 34 ripe females were retained. Two of those females (from Stump Creek) were released. What was the disposition of the other 6 fish?
- Page 12, Section 3.2.1, Paragraph 3. Please identify the previous field monitoring data to which you refer.
- Page 15, Section 3.4.3, Paragraph 2, Line 8. Please remind the reader, maybe in parentheses, the change in fertilization technique.
- Page 16, Section 3.4.4, Paragraph 1, Line 9. Please reword the sentence beginning with "As noted previously . . ." as I could not understand the point as written.
- Page 21, Section 4.1, Paragraph 2, Last line. Site LSV-2C is not depicted in Figure 24. Please do so.
- Page 24, Section 4.3.1, Paragraph 3, Line 1. Please explain what is meant by "variability of the overall mortality endpoint."
- Page 25, Section 4.4, Paragraph 1. It was mentioned previously that the data are not normally distributed. Please explain how the TRAP model is able to deal with data which are not normally distributed.
- Page 27, Section 4.4.2, First partial paragraph, Line 1. Please explain what is meant when it is said that no errors were reported in the TRAP software output.

*Editorial Comments*

- Page 1, Introduction, Paragraph 3, Line 5. Change *compliment* to complement.
- Page 2, Introduction, Bullet 9, Line 1. Eliminate the s from cutthroat.
- Page 3, Section 1.1, Paragraph 1, Line 1. Add for selenium to the end of the first sentence to read, ". . . water quality standard for selenium."

- Page 3, Section 1.1, Paragraph 1, Line 2. Add downstream to read, ". . . exceedances decline downstream with tributary inflows."
- Page 3, Section 1.1, Paragraph 2, Line 1. Consider adding gravid and deleting *ready to spawn* to read, ". . . testing used gravid adult wild fish captured at . . ."
- Page 7, Section 2.1.3, Paragraph 2, Line 2. The town is Lewistown not *Lewiston*. Also occurs on Page 13, Section 3.3, Paragraph 2.
- Page 10, Section 2.4, Paragraph 1, Line 2. Consider using hatching rate or hatching success rather than just *hatch*.
- Page 10, Section 2.4, Paragraph 1, Line 5. Change *changed* to change.
- Page 10, Section 2.4, Paragraph 2, Last line. Change *EC10* to $EC_{10}$ to be consistent with $EC_{20}$ and later usage.
- Page 12, Section 3.2.1, Paragraph 2, Line 6. Eliminate the comma following *fish*.
- Page 15, Section 3.4.3, Paragraph 2, Line 16. Please consider revising the sentence to "As shown in Figure 12, the eggs from those five LSV-2C samples had the highest . . ."
- Page 21, Section 4.1, Paragraph 2, Line 5. Eliminate the s on *terms*.
- Page 24, Section 4.3.1, Paragraph 1, Line 5. Add a comma between *analyze* and *for*.
- Page 26, Section 4.4.2, Paragraph 2, Line 6. Delete *does*.
- Page 28, Section 4.4.3, Paragraph 4, Line 10. Consider changing the sentence to read, ". . . not only a good fit, but a low variability as well."
- Page 30, Section 4.5, Paragraph 2, Line 3. Change *later* to latter.
- Page 30, Section 4.5, Paragraph 3, Line 4. Change *increase* to increased or increasing.
- Page 30, Section 4.5, Paragraph 4, Line 8. Eliminate one of the two ands.

*Table & Figure Comments*

- Tables 1 and 5. Add zeros in blank cells where appropriate to be consistent with first row.
- Tables 2, 3, and 4. Put in the footnotes what the shaded cells represent (e.g., October 2007 sampling).
- Table 5. The table notes that 8 ripe females were retained from CC-150, but there were 9 total egg samples submitted. What accounts for this difference?
- Table 6. Change *dwt* to dw in the legend and column headings.
- Table 7. Put in the footnote what the shaded cells represent (e.g., October/November 2007 sampling).
- Table 8. Change *Ecx* to ECx in legend and column heading. Change *Comcentration* to Concentration in column heading.
- Figures 10, 11, 14, 15, 16, 17, 18, and 23. Please denote that the order of fish as represented on the X-axis is in order of egg selenium concentration.
- Figure 30. Is the heavy black line for both wild and hatchery fish? If so please identify accordingly.
- Figure 33. Eliminate the period that precedes Percent.

**Forest Service Comments**
*Brown Trout Laboratory Reproduction Studies Conducted in Support of a Site-specific Criterion* (Newfields 2009)
Mary E. Kauffman
February 25, 2009

Comments provided by Steve Bauer under contract to the Forest Service

**Figure 2. *Fish Collection vs Exposure*.** The adult brown trout used in the study are grouped by Background (CC-150), Low Exposure (CC-350), and High Exposure (LSV2C). It should be noted that no adult spawners were collected from Hoopes Springs, the highest exposure area, because Hoopes Springs does not provide spawning habitat and that this is one of the reasons that the adult spawner selenium concentrations are lower than the total brown trout population selenium concentrations as summarized in Figure 47.

**Figure 3 and 4. *Selenium Concentration vs. Size*.** These figures include both hatchery and wild exposed fish. The illustration of the relationship between size and selenium concentration would be improved by including only the wild fish so that the Y-scale can be adjusted appropriately.

**Figure 5 and Figure 47. *Range of selenium exposure.*** These two figures show the same information. I suggest using only Figure 47 since it contains more data points for the same information. The sufficiency of the adult fish used in the lab study in representing the full range of selenium exposure below Hoopes Springs is an important issue. Figure 47 displays the 90$^{th}$ percentile (I assume of all fish from the watershed, but not the adult spawners for this study). It is apparent that there are numerous brown trout in Hoopes and Sage Creek that exceed the range of selenium concentration in the adult spawners used in the brown trout lab study.

The question of adequate sample size is discussed on page 31, 3$^{rd}$ paragraph, of the report. The report reiterates that the target tissue concentration for the study was the 90$^{th}$ percentile, 20 mg/kg dw. Two adult female brown trout were captured that fit the criteria, with a max of 22.6 mg/kg. The report concludes that the adult study fish span the range of whole body tissue concentration for brown trout from the watershed. It also notes, more importantly, that the resulting range of egg selenium spans the full range of effects.

This issue of whether the fish captured meets the target deserves additional analysis and discussion. A visual inspection of Figure 47 indicates a much lower range of selenium in the test fish in comparison to the range of selenium in the fish population in the watershed. A box plot of the adult study fish vs all other fish collected would provide a screening assessment. Descriptive statistics (mean, sd, median, interquartile range, etc.) and statistical tests may help to answer this question.

Whether the egg selenium concentration spans the full range of effects is a separate question that also deserves some further explanation. The TRAP model figures, Figure 37 to Figure 46 illustrate similar relationships among the endpoints. Would these relationships be improved by including more female spawners with a higher body burden, and would that affect the outcome, that is the 13.35 mg/kg concentration endpoint? Several of the models exhibit poor $R^2$ values and wide confidence intervals. One could speculate that the inflection point would be steeper, and the confidence intervals would be tighter if more data from the higher selenium range were available.

**Number of High Exposure Fish**. The outcome of the TRAP models depend on the influence of 5 fish (egg batch per adult spawner). The conclusion of the report relies primarily on two relationships, illustrated in Figure 40 and Figure 46, evaluated by logistic regression: 1) Egg selenium vs percent survival, and 2) Egg selenium vs mean fraction normal fish larvae – the deformities metric. The $R^2$ for these equations is 0.89 and 0.88, indicating a good fit for the data. Does the high $R^2$ alone indicate that there is good fit in the model and therefore a valid conclusion? Or would this conclusion be altered if there was a larger sample of spawners with high whole body selenium?

On the call we asked the EPA toxicologists to address this issue in their written comments since they have specific experience in conducting these kinds of tests.

**Figure 10 and 11.** There are several figures that include hatchery fish with the wild exposed fish. The fish from the Saratoga Hatchery, labeled SC, exhibited high egg mortality and poor hatch. One would assume the fish were included in the study as a control in evaluation endpoints. It turns out that the hatchery fish are not used as controls for effects evaluation. I suggest revising these and other figures either to remove these from the data set with the explanation of why and/or move the information into an appendix. Including these fish seems an unnecessary distraction.

A footnote should be added to explain reasons for the mortality if known for the egg batches that are labeled “None fertilized” and “Dead upon arrival”.

**Figure 12**. Five egg batches from LSV2C did not swim up. It would be useful to indicate in parentheses what the average selenium concentration was in these eggs.
Response:

**Figure 14, Figure 18.** The authors should consider removing the SC Hatchery fish from these figures. Mortality is apparently related to factors outside of the test for selenium and therefore this set of fish does not function as a control. The other set of hatchery fish should be adequate for the intended purpose.

**Figure 25 vs Figure 26**. Figure 26 illustrates the relationship between the selenium in egg vs whole body in the wild fish. This is the relationship that is later used appropriately to calculate the whole body selenium tissue value from the egg selenium concentration. Figure 25, which includes the hatchery fish, is extraneous.

**Figure 27**. This graph shows a weak relationship between fecundity (number of eggs) and egg selenium concentration. It may not add to the project outcome, but it seems that the variation introduced by body size should be removed prior running the regression. A variable such as Number of eggs/length or eggs/weight could be used as the dependent variable.

Even though there is a weak relationship, the graph illustrates that a female spawner with a higher body burden produces a lower number of eggs. One would expect the $R^2$ to improve if additional female spawners with a higher body burden had been captured, this would then be more representative of the selenium body burden of the total brown trout population. Is fecundity an issue that reduces the population in Sage and Crow Creeks?

**Deformities metric**. After examination of the data Newfields chose to use the fraction normal versus the GSI scores in the TRAP model. The GSI scores necessarily depend on the judgment of the analyst in deciding the category score, a procedure which introduces a source of variability. Evaluating only "normal" vs "non-normal" provides a more robust that would expected to be highly repeatable between different observers, thereby increasing method precision.

**Selecting Biological Endpoints**. Newfields used logistic regression to evaluate a number of different biological endpoints (summarized in Table 8). These endpoints are consistent with the literature in evaluating the most sensitive life stage. Selecting the two endpoints with the best fit; hatch to test end and overall fraction of deformities normal; is logical and captures the range of response in all the endpoints.

**EC 20 vs. EC 10**. Charlie Delos pointed out that EPA policy would be to use the EC 10 vs the EC 20 concentration for this type of contaminant. This decreases the EC for the selected endpoints: 21.6 mg/kg to 17.7 mg/kg for the survival endpoint, and 21.7 mg/kg to 19.3 mg/kg for the deformities endpoint. Using the EC 10 would consequently lower the calculated whole body tissue concentration. We would assume that Newfields will revise the toxicity level to be consistent with EPA policy.

**Approach**. The methods used were consistent with the study approach previously reviewed by the work group and with the literature. Using numerous endpoints and several test species is a strength of these studies. Combining the results of this lab study with the Yellowstone cutthroat trout study will provide several lines of evidence that will be useful in proposing a site-specific criteria.

**Documents**: I would like to see the Parmetrix (2009) and Erickson (2008) documents referenced in this study posted on the website. I sent this request to Sean Covington by e-mail after our meeting.

APPENDIX G
EPA Comments on ECx Values

**EPA's *Draft* Comments on Formation's August 2010 Draft Interpretive Findings for Field and Laboratory Studies and Literature Review in Support of a Site-Specific Selenium Criterion, Smoky Canyon Mine**

December 21, 2010

The overall study is comprehensive and provides information needed to assess the nature of the selenium toxicity problem and determine the selenium effects concentration threshold in eggs, with potential to translate that to water concentrations, when the project reaches that stage.

**Toxicity Study Conduct**

Maternal Transfer Reproductive Studies (with offspring of wild-caught brown trout and Yellowstone cutthroat trout) – We have not identified any issues with the conduct of these studies.

We have incorporated the brown trout data in our internal draft national criterion document. This study is of outstanding quality in terms numbers of individual fish, comprehensiveness of endpoints evaluated, and chemical measurements taken. Although the more recent cutthroat trout study appears to be of comparable quality to the brown trout study, we have not yet had time to consider it for the national document, and as a result, our review of that data has not been as thorough as for the brown trout study.

Non-Reproductive (Non Maternal Transfer) Early Life Stage Survival – Yellowstone cutthroat trout only. Control survival, measured from start to finish, was low. If we were to assume that dissolved selenium has little propensity to enter eggs, such that hatchability is not an issue, survival is still somewhat low, around 70% measured from Day 6 (hatch) to the end of the test.

We have evaluated the results as Day 71 (end) survival divided by Day 6 (hatch) survival, as well as Day 71 divided by Day 38 (Se diet start) survival. Although survival at all Se-spiked exposures were lower than for control, there was no recognizable response to incrementally increased selenium concentrations over a 16 fold range, and no ECs can be calculated. It appears that the threshold for Se effects to this life stage, sans maternal transfer of Se, is higher than the highest tested concentration.

Our hypothesis prior to this test was that it would not involve a sensitive endpoint, and the results do not counter the hypothesis. This test, in spite of its difficulties with the health of the controls, probably should not be considered an issue.

**Calculation of Brown Trout Effect Concentrations**

Formation examined a number of different effects and chose survival from hatch to test end (Formation's Figure 5-5) as the best endpoint for deriving a criterion. Examining the graphed data independent of the fitted line, we agree with this choice. This is the endpoint we selected in the internal draft national criterion document. In contrast, the high background response variability at low selenium exposures makes total survival including hatch (Formation's Figure 5-4), facial-cranial deformities, and skeletal deformities (Figures 5-7 and 5-8) less desirable. Fraction normal (Figures 5-11 and 5-12), finfold deformities (Figure 5-9), and survival 15-days post feeding (Figure 5-6) show less effects at around 20 mg/kg, suggesting that they are slightly less sensitive measures. Edema (Figure 5-10) shows a pattern similar to survival from hatch to test end, but its measurement is more subjective. Because the test was so long, the concern about irreversible edema is already accounted for in the measurement of survival at test end. Consequently, independent of particular estimates of EC10s for all these endpoints, the data themselves favor survival to test end (Figure 5-5) as the endpoint of concern.

Formation used EPA's TRAP program to calculate the ECs. TRAP's help screens provide the following guidance for its application:

> *In the end, to effectively use this (or any similar) program, the user should examine the fitted curve relative to the data and decide if the various parameter estimates and confidence limits appear reasonable. The value of this type of toxicity relationship analysis is to provide some quantitative objectivity and assessment of uncertainty to the estimation of parameters of interest that the user already can approximate by inspection of the data. The computed toxicity relationship should be close to what someone could get by just "eyeballing" the data; otherwise, some aspect of the data, model, or analysis might be causing problems. This kind of analysis demands some judgment from the user - if the results don't look good, they probably aren't and more evaluation is needed.*

TRAP has many options for calculating the EC, and Formation presented the one option that is the same as what EPA used in the internal draft national criterion document: nonlinear regression comparing the untransformed effect with the log of the exposure concentration, and fitting to a logistic S-curve. For this application there are nine options that could be considered: three options for transforming the effect scale, times three options for the generic shape of the fitted S-curve. The logistic S-curve that EPA commonly uses for calculating the ECs of various pollutants is ordinarily the most environmentally conservative approach because it has a long and relatively thick tail that never reaches zero effect – there is always some effect at any nonzero concentration. The other two shapes available are "threshold sigmoid" a curving S-shape with a nonzero threshold, and "piecewise linear", more commonly called hockey stick. The non-zero threshold of these latter two shapes might be more consistent with idea that selenium is a necessary nutrient.

The EC50s, EC20s, and EC10s for these nine reasonable options are shown in Table 1. The values for $R^2$ should only be compared for the three Curve Shapes within Effect Transform groups, not between groups.

Table 1. Summary of alternative TRAP analyses for fitting the all brown trout data for Crow Creek and Lower Sage Creek (and excluding hatchery fish per both the Formation report and the EPA internal draft national criteria document).

| Effect Transform | Curve Shape | EC50 | EC20 | EC10 | $R^2$ | |
|---|---|---|---|---|---|---|
| None | Logistic | 30.52 | 21.62 | 17.677 | 0.888 | See Fig. 1 |
| | Threshold Sigmoid | 30.69 | 21.8 | 18.344 | 0.888 | |
| | Piecewise Linear | 30.49 | 21.84 | 19.547 | 0.900 | |
| SqRt | Logistic | 30.08 | 21.91 | 18.205 | 0.858 | |
| | Threshold Sigmoid | 30.17 | 22.08 | 18.865 | 0.858 | |
| | Piecewise Linear | 30.07 | 22.4 | 20.31 | 0.871 | See Fig. 2 |
| ArcsinSqRt | Logistic | 30.75 | 22.98 | 19.384 | 0.904 | |
| | Threshold Sigmoid | 30.73 | 22.91 | 19.764 | 0.904 | |
| | Piecewise Linear | 30.03 | 21.74 | 19.522 | 0.913 | |
| Overall Average | | 30.39 | 22.14 | 19.07 | | |
| Coefficient of Variation | | 0.010 | 0.023 | 0.045 | | |
| Max/Min | | 1.024 | 1.063 | 1.149 | | |

All nine models fit the complete dataset reasonably well. The EC50s vary negligibly. The EC20s vary slightly, with Max 6% greater than Min, and the EC10s vary slightly more with Max=20.31 mg/kg being 15% greater than Min=17.67 mg/kg. The EC10 presented in the Formation document is the most environmentally conservative choice. Its graph is presented in Figure 1.

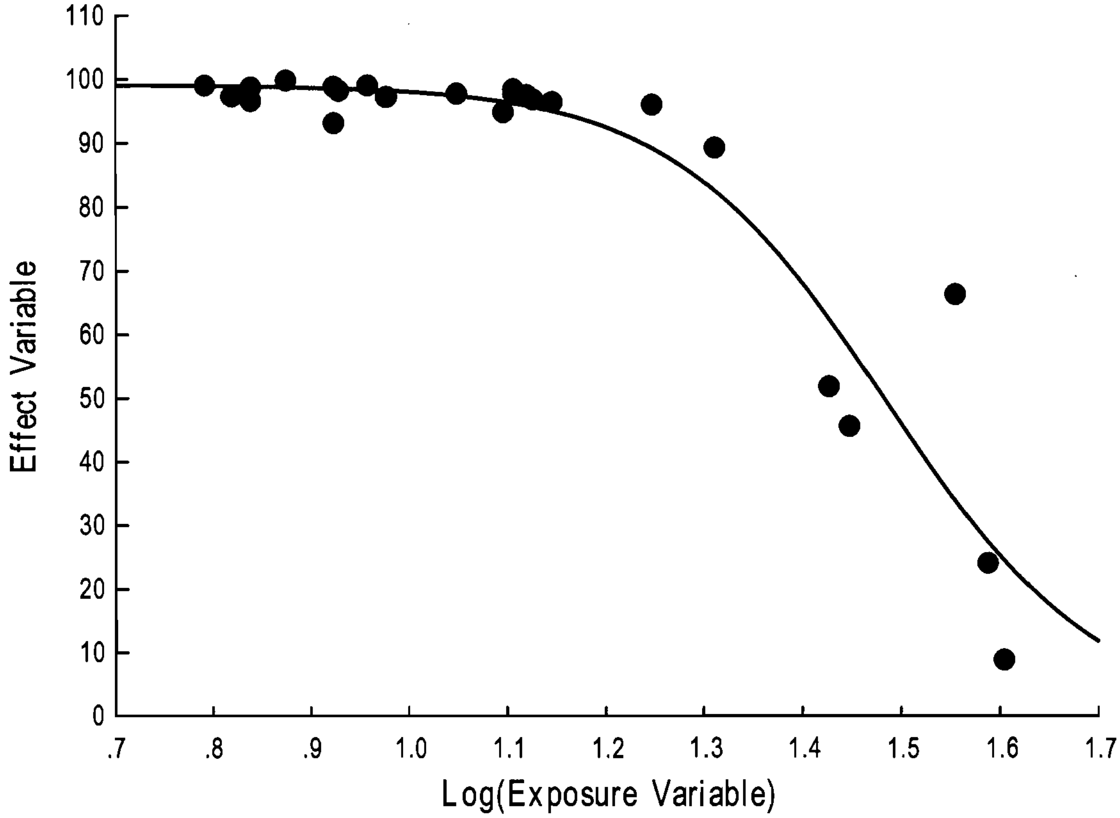



**Figure 1. Brown trout nonlinear regression, logistic curve, effect not transformed, EC10=17.67 mg/kg.**

X-Axis Log Scale Translator:

| Log | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
|---|---|---|---|---|---|---|
| Value | 12.6 | 15.8 | 20.0 | 25.1 | 31.6 | 39.8 |

The Figure 1 curve can be seen to slightly overstate the observed effects at y-values near 90% (10% effect). In contrast to the line there is a point showing 8% (Abbott adjusted) reduction from background survival at a concentration of 20.5 mg/kg (log≈1.3), whereas the curve yields 10% reduction in survival at 17.67 mg/kg.

Figure 2 shows the curve yielding the highest EC10 in Table 1. Examining the data points nearest the beginning of the downward effect on survival, its fit to the observed data points is better than that shown in Figure 1, and likewise better than any of the other Table 1 models.

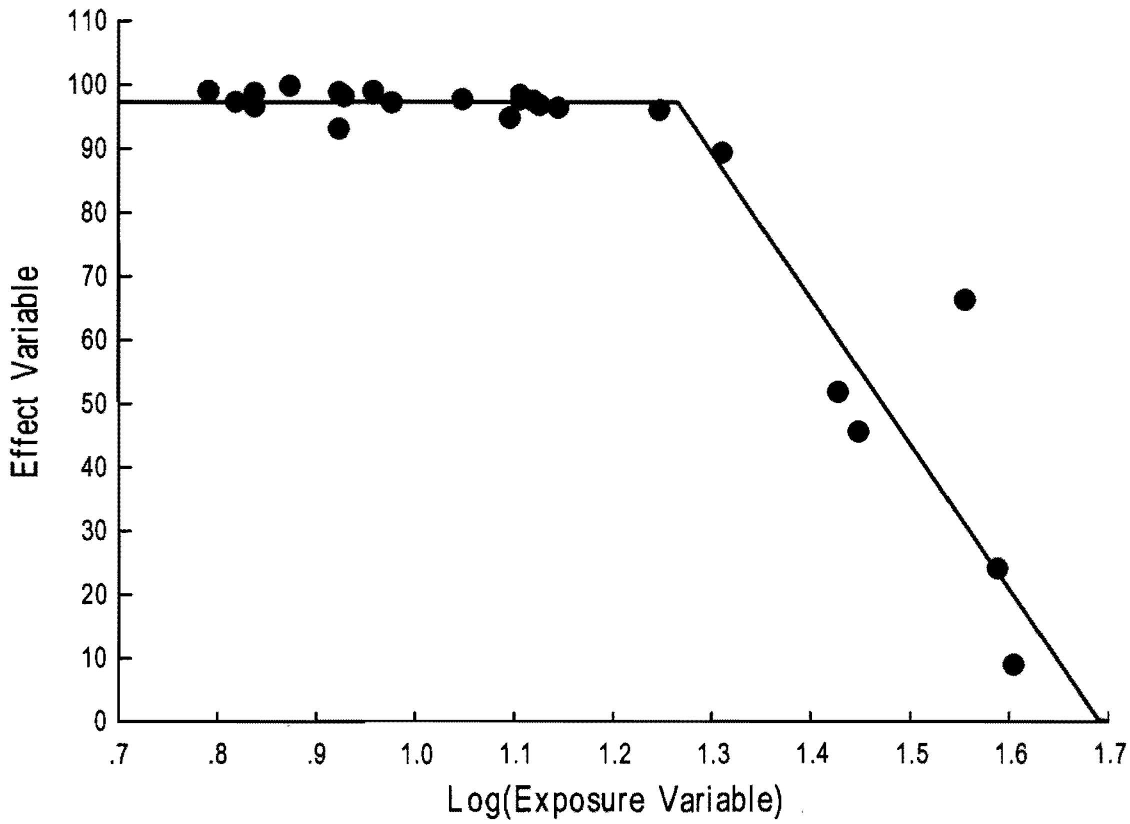



**Figure 2. Brown trout nonlinear regression, piecewise linear (hockey stick) curve, square root effect transformation, EC10=20.3 mg/kg.**

X-Axis Log Scale Translator:

| Log | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
|---|---|---|---|---|---|---|
| Value | 12.6 | 15.8 | 20.0 | 25.1 | 31.6 | 39.8 |

It should be noted that the TRAP program does not know what percent effect the user is interested in: e.g., EC10, EC50, or EC90. In attempting to fit all the points as well as possible, it compromises the fit in the region we are most interested in, 15-30 mg/kg (log=1.2-1.5). Consequently, one additional approach for estimating the EC10 is worth noting. Eliminating the three points above 30 mg/kg (log>1.5) allows TRAP to focus on the threshold region we are interested in, as shown in Figure 3. This yields an EC10 of 20.7 mg/kg, thus indicating that the Formation's EC10 of 17.7 mg/kg is environmentally conservative.

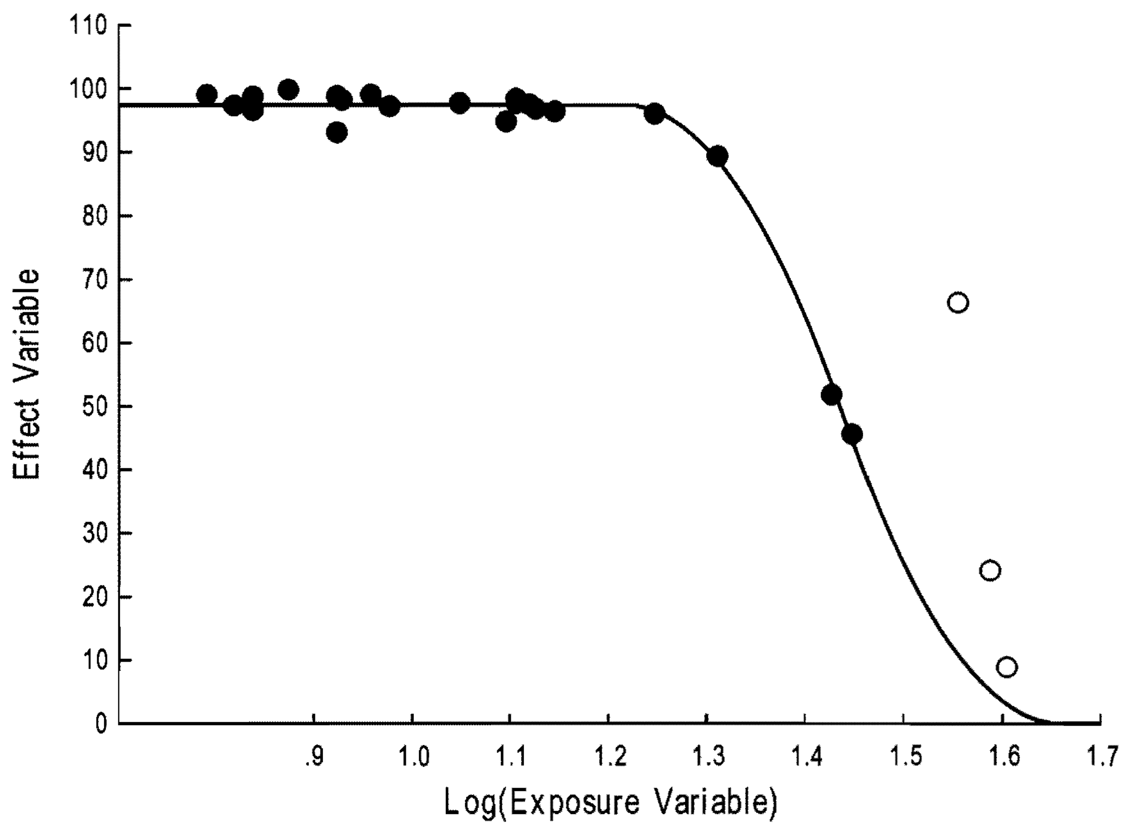



**Figure 3. Brown trout nonlinear regression, sigmoid threshold, effect not transformed, observations above 30 mg/kg (log=1.5) ignored. EC10=20.7 mg/kg. Replacing the sigmoid threshold shape with the logistic shape yields an essentially identical curve, with EC10=20.8 mg/kg.**

X-Axis Log Scale Translator:

| Log | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
|---|---|---|---|---|---|---|
| Value | 12.6 | 15.8 | 20.0 | 25.1 | 31.6 | 39.8 |

**Translation to Whole Body Concentration**

For translation from egg to whole body, Formation used log-log regression: log(Egg Se) vs. log(Whole Body Se), for *combined brown and cutthroat trout*, excluding hatchery fish. Because the log-log slope is slightly different from 1.0, the relationship is not quite a direct proportion, and the Egg/WB ratio varies slightly, from 1.53 to 1.54 in the range of the brown trout calculated EC10 and EC20.

For brown trout in the current internal draft national criteria document, we used the Smoky Canyon brown trout data, including hatchery fish, plus a few other measurements from elsewhere. We used arithmetic scale (not log scale) single-parameter regression (where the regression slope is estimated after forcing the line through the origin). We thereby obtained an Egg/WB ratio of 1.74, which yields a slightly more conservative WB tissue criterion translation. For application to Smoky Canyon, Formation's log-log approach might well be judged as good or better than the linear approach we used. However, the combining of brown and cutthroat data might or might not be viewed as appropriate, since the WB translation yields a slightly lower value using brown trout alone than using the combined data, although there are advantages to increasing the number of data points in the analysis. Considering other strains of cutthroat trout, external to the Smoky Canyon dataset, there is no evidence that mixing in cutthroat trout data would inherently bias the translated WB benchmark upward, since egg/WB ratios implied by the Hardy, Kennedy, and Rudolph data would tend to lower the WB translated benchmark.

**Translation to Water**

EPA is unable to comment on the water translation until the work progresses to that stage.