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Ammonia and pH Related Toxicity in Alkaline Mine-mill Effluent: The influence of atmospheric carbon dioxide on pH and non-ionized ammonia

Вy

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Submitted as a partial requirement for the completion of the Master of Science Degree Department of Biology

Laurentian University

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ABSTRACT

At INCO Ltd., Copper Cliff, Ontario, effluents from ore processing and tailings disposal sites are generally treated to precipitate nickel and other metals by adding calcium hydroxide (target pH 10.5). As of August 1997, Ontario began restricting the pH of such effluents to 6.0-9.5, and survival must be ≥50% in single concentration static acute toxicity tests with both *Daphnia magna* Straus and rainbow trout (*Oncorhynchus Mykiss* Walbaum). Without modifications, undiluted effluent from the Copper Cliff Waste Water Treatment Plant (CCWWTP) would have exhibited pH >10.0, 5-10 mg/L total ammonia/ium, and toxicity test failures. As the primary stressor was apparently un-ionized ammonia, it was hypothesized that lowering effluent pH would control toxicity by favouring ammonium ions. While previous Toxicity Identification/Evaluations generally supported the hypothesis, uncertainty remained because high survival rates often occurred on occasions when un-ionized ammonia was expected to cause high mortality.

Variability in toxicity was hypothesized to be attributable to spontaneous pH declines that occurred during the course of toxicity testing, and consequent variability in pH among effluent samples that were supposed to be identical. By marginally reducing pH of effluent samples using sulfuric acid, it was possible to eliminate toxicity test failures (mortality >50%) for both Daphnia magna and rainbow trout. Analysis of the influence of pH on mortality, and on the concentration of ammonia, was not straight forward since effluent pH began to decline from the very onset of investigations. The variability of pH as measured during toxicity testing was markedly lowered through efforts to ensure consistent atmospheric exposure. This included the aerations employed to achieve the required 80-100% oxygen saturation range for satisfactory bioassay testing. By focusing on sample pH from the critical periods during testing, i.e. prior to the time of death, I confirmed that the high toxicities observed exclusively in alkaline non adjusted effluents were associated with elevated pH (pH >9.5 for trout and >9.0 for D. magna) and high concentrations of ammonia (> 3.0 mg/L for trout and >2.5 mg/L for D. magna.). It was also confirmed that spontaneous pH declines followed from samples allowed to equilibrate with atmospheric carbon dioxide. (continued)

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1.0 INTRODUCTION

1.1 Background

In conjunction with INCO Ltd., a series of studies were conducted from late fall 1995 and early spring 1997 on the toxicity of effluents from the Copper Cliff Waste Water Treatment Plant (CCWWTP) to rainbow trout (*Oncorhynchus mykiss* Walbaum) and the fresh water zooplankton *Daphnia magna* Straus. Previous studies had determined that toxic effluents were frequently highly alkaline (pH >10.0) and contained total ammonia in the range of 5-10 mg/L (B.A.R. Environmental Inc. 1993; Holtze *et al.* 1989). Effluent toxicity was concluded to be mainly a result of non-ionized ammonia, the chemical species which is associated with alkaline pH and considered to be much more toxic than ammonium ions (Emerson *et al.* 1975; Haywood 1983). It was noted, however, that calculated concentrations of non-ionized ammonia often failed to predict observed mortality rates in toxicity tests on rainbow trout and *D. magna*. Trace metals were considered an additional factor influencing effluent toxicity but not well supported by available data (Aquatic Sciences 1995; B.A.R. Environmental Inc. 1993; Holtze *et al.* 1989).

Municipal Industrial Strategy for Abatement (MISA) regulations becoming effective by 1997 required that effluent pH be <9.5 and that mortality rates in trout and *Daphnia* acute single concentration toxicity tests be ≤50% (EPA 1997). The present investigation was undertaken to provide a more complete understanding of effluent toxicity, and to suggest practical modifications to effluent treatment methods that would consistently reduce its toxicity to acceptable levels.

1.2 Theory

Addition of alkaline materials to effluent, such as slaked lime (Ca(OH)₂), has been a common environmental measure to neutralize low pH (Snucins *et al* . 1995; Winterhalder 1995; Yan *et al* . 1995). Adding a strong base to acid mine drainage to reduce its acidity can minimize the leaching of dissolved trace metals into receiving waters (Buffle *et al*. 1994).

The treatment of effluents at the CCWWTP includes adding slaked lime which increases the pH of the effluent, favouring the process by which dissolved metals form insoluble hydroxides and subsequently precipitate from treated waters (Heale 1995). For example, a pH of at least 10.5 is required for efficient precipitation of Ni (Lanouette 1980). Precipitation of trace metals can markedly reduce the overall potential toxic metal burden in the effluent and the receiving waters (Yan and Dillon 1984).

Strong hydroxide bases such as slaked lime (Ca(OH)₂) added to effluent systems often increase the pH of the treatment waters to highly alkaline levels (pH >10.0). Thus, the pH of treated effluent would frequently exceed the maximum recommended pH of 9.5 established for 1997 by the Municipal Industrial Strategy for Abatement (MISA) legislation (EPA 1997). In addition to exhibiting MISA pH exceedance, highly alkaline effluent can have toxic effects on aquatic organisms. These toxic effects are often attributable to ammonia/ium which can be found in high concentrations in many effluents due to the presence of excess nitrogenous based products found in various industrial processes, i.e. sewage treatment, fertilizers for agricultural practices, and blasting agents in mining (Brezonik 1972; Geadah 1985; McNeely et al. 1979; Pommen 1983). Ontario's guideline for the protection of aquatic life is a concentration of \$0.02 mg/L non-ionized ammonia (OMOEE 1984).

High effluent concentrations of total ammonia, high pH, and elevated temperatures favour the shift of ionized ammonia (NH₄+) to the highly toxic non-ionized ammonia (NH₃) species (Emerson *et al.* 1975). Emerson *et al.* (1975) determined that with analytical data on three parameters, pH, temperature, and total ammonia, one can calculate the concentration of toxic non-ionized ammonia. Clearly, if one or several of these three factors were modified in a given effluent, a different concentration of non-ionized ammonia would be produced. By adjusting effluent samples to promote the transformation of ammonia (NH₃ to NH₄+), one would be able to assess the importance of non-ionized ammonia with respect to toxicity.

Lowering pH in effluent samples should achieve a reduction in toxic ammonia concentrations and would be an experimentally simple alteration since pH can be readily adjusted to a specific target value by the careful addition of an acid (i.e. sulfuric acid) to lower pH. Because bioassay procedures attempt to control temperature at levels optimal to test organisms (i.e. 15°C for trout and 20°C for *D. magna*) and since total ammonia/ium concentration can be determined in effluent samples through analytical methods, these variables are conveniently obtained for use in the calculation of non-ionized ammonia.

The frequent, spontaneous declines in effluent pH previously observed during toxicity tests were of considerable interest, and they had not been examined in depth in previous Toxicity Identification/Evaluation studies (Aquatic Sciences 1995; B.A.R. Environmental Inc. 1993; Holtze et al. 1989). Since highly toxic non-ionized ammonia shifts to the less toxic ammonium ion as pH declines, it was apparent that test organisms exposed to ammonia rich alkaline effluent would have a reduced exposure to non-ionized ammonia. Thus, it seemed necessary to monitor temporal changes in pH very carefully, and to determine the time at which pH would be most critical for mortality. In this manner, a uniform technique of examining the contribution of ammonia and high pH to toxicity would be established.

Thiosalts and other partially oxidized sulfur compounds are known to generate acid, lowering pH as they are oxidized, and they are also typically present in iron sulfide based mining tailings (Bolger 1980). However, thiosalts are considered to be persistent in alkaline waters (Goldhaber 1983), and thiosalt generation has been noted to be mediated by bacteria such as *Thiobacillus* spp. which specifically require a pH range of 2-8 and temperatures of 20-43°C for optimal growth (Staley et al. 1989). For this reason, it was hypothesized that an alternative process was responsible for the spontaneous decline in pH typically observed in the alkaline effluents.

Through exploratory experimentation in 1995, it was observed that the spontaneous decline in pH of alkaline effluents could be climinated by isolating effluent samples from atmospheric carbon dioxide.

The spontaneous declines in pH were hypothesized to have resulted primarily from limed effluents taking up carbon dioxide during aeration, as carbon dioxide equilibrium was being re-established between the effluent and the atmosphere.

Reactions expected in non-equilibrated alkaline effluent exposed to the atmosphere:

- reaction (1) supplies the carbonic acid required for reaction (2).

$$CO_2$$
 (atmospheric) + H_2O (effluent) $+ H_2O$ (1)

$$Ca^{++} + 2OH^{-} + H^{+} + HCO_{3}^{-} \longrightarrow Ca^{++} + CO_{3}^{--} + 2H_{2}O$$
 (2)

Base thus begins to be neutralized because of the substitution of the strong base OH⁻ by CO₃⁻. The CO₃⁻ ion predominates while pH is high (>9.5), but as neutralization proceeds, HCO₃⁻ replaces CO₃⁻ (Butler 1991)

$$Ca^{++} + CO_3^{--} + H^+ + HCO_3^{--}$$
 (3)

and
$$Ca^{++} + 2OH^{-} + 2H^{+} + 2HCO_{3}^{-} \longrightarrow Ca^{++} + 2HCO_{3}^{-} + 2H_{2}O$$
 (4)

HCO₃⁻ ions predominate over both CO₃⁻⁻ and OH⁻ at circumneutral pH (Bulter 1991).

The effluent equilibrium pH level would be expected to vary depending on the concentration of added calcium hydroxide, as a result of the added calcium ions (Ca⁺⁺) from the slaked lime being balanced by the bicarbonate ions (HCO₃⁻) (Butler 1991).

If the substitution of hydroxide by atmospheric carbon dioxide (HCO₃⁻ or CO₃⁻⁻) was responsible for the pH declines observed, then several fundamental observations should be expected in the alkaline effluent during testing:

1) The pH of the alkaline effluent should decline over time and eventually stabilize at a level close to neutral.

- 2) Differences in the degree of effluent exposure to ambient air should control the rate or degree of pH decline observed before or during toxicity testing. Therefore, if effluent samples are subjected to similar and consistent exposure to the atmosphere, then we should observe similar patterns in pH decline among replicate tests, and these replicates should have low variability.
- 3) By isolating effluent from atmospheric carbon dioxide we should observe alkaline effluent pH to be stable at initial values.

1.3 Objectives

- 1) To determine changes in toxicity to rainbow trout and *Daphnia magna* after using sulfuric acid to adjust the pH of alkaline effluents from the Copper Cliff Waste Water Treatment Plant (CCWWTP) to levels <9.5, with toxicity being assessed from government approved (Environment Canada 1990a; 1990b) single concentration static acute toxicity bioassays.
- 2) To confirm or replicate the primary role of carbon dioxide uptake in the reduction of alkaline effluent pH during bioassay tests.

In order to meet these objectives it was necessary:

- To examine the importance of chemical variation among samples collected at weekly intervals, and from two different seasonal periods.
- ii) To compare effluent toxicity between Daphnia magna and rainbow trout.
- iii) To examine the effects of specific pH reductions on effluent toxicity and subsequent spontaneous changes in pH.
- iv) To determine whether effluent toxicity was influenced by filtration.
- v) To confirm that among replicate variability in pH could be minimized through uniform handling and experimental protocols with respect to sample aeration.

- vi) To determine the particular pH and non-ionized ammonia concentrations experienced by test organisms at critical times during static toxicity testing (i.e. prior to typical times of observed stress and mortality).
- vii) To confirm by laboratory experiments:
 - that pH declines would not occur in the absence of effluent exposure to carbon dioxide.
 - that low temperature would not retard spontaneous pH declines in the presence of carbon dioxide, and therefore confirm that pH declines were not likely dependent on biological activity, such as thiosalt oxidation by bacteria.
 - that the addition of an aqueous source of carbon dioxide, such as sodium bicarbonate to alkaline effluents would mimic a spontaneous decline in pH.

1.4 The use of Rainbow Trout and Daphnia magna in Toxicity Testing

Both rainbow trout and the cladoceran, represented by *Daphnia magna*, are commonly found in waters of North America as well as other continents (Environment Canada 1990a 1990b; Gulati 1978). Rainbow trout has been introduced from North America to a large geographic portion of the world due to its importance as a highly sought after sport fish and for table fare (MacCrimmon *et al.* 1972). While trout and *D. magna* represent different trophic levels in the aquatic environment both organisms are considered to have an important role. Cladocerans, such as *D. magna*, are primary consumers in the planktonic community, and are an important food source for both invertebrate and vertebrate predators (Hebert 1978). *D. magna* is considered to be representative of other zooplankton species in regards to feeding habits, physiology, and behaviour (OECD 1984). Of the daphnid species, *D. magna* is determined to be one of the easiest to handle (ten Berge 1978). As a result of its short life span, and its small size, culturing for the use of toxicity testing is rather inexpensive and convenient when compared to larger organisms (Environment Canada 1990b).

Because of its popularity, rainbow trout have been raised in hatcheries for stocking purposes and for commercial aquaculture (Environment Canada 1990a; Letritz et al. 1980). Rainbow trout are widely distributed in the world, therefore are an integral part of many freshwater ecosystems and can be the dominant predator in the food chain (Gulati 1978).

Both *D. magna* and rainbow trout have been studied to a great extent with regards to physiology and toxicological sensitivity (Adema 1978; Alabaster and Lloyd 1980; Ball 1967). While either organism can be used to determine environmental toxicity, the route by which the potential toxicant is bioavailable to these organisms may be different. As a result of smaller organism size, and hence the size of food particles ingested, *D. magna* may be in direct contact with particulate matter in effluent, unlike trout. Trout would not be expected to ingest large quantities of small particulate matter relative to their body mass, but since *D. magna* are known to be indiscriminent filter feeders (Lampert 1987), these organisms could be collecting and ingesting small particulates. Thus, the digestive system could be an additional or alternate route for a potential toxicant to effect the zooplankton.

Because of concerns about using single species tests to represent an entire ecosystem, both test organism are typically utilized to assess sensitivity to a particular toxicant (Taylor 1981a). Under the Environmental Protection Act (1997), industry is required by law to determine organism sensitivity to effluents by subjecting them to routine bioassays using both rainbow trout and *Daphnia*. A scientific data base of great size is available for both *D. magna* and rainbow trout, and both organisms have been accepted as international standards for use in effluent toxicity testing (Baudo 1987; Environment Canada 1990a 1990b).

2.0 METHODS

2.1 Phase I pH Adjustment Experiments

2.1.1 Effluent samples

Three replicate bulk samples of treated effluent (≈ 400 L) were obtained directly from the CCWWTP at the beginning of each of three weeks during late autumn in 1995. These samples, employed in Trials 1 -3, were carried out on the mornings of November 13, December 4, and December 11. Effluent was siphoned through a clean plastic hose from the top of Clarifier #1 into two 200 L vessels at ground level, that had been fitted with clean polyethylene plastic liners. The bulk samples were transported immediately to a work space provided at INCO's Central Processing Technology building, and promptly divided in random sequence among 15 plastic-lined containers (26 L) of the type routinely used for toxicity test samples. Temperature, pH, and dissolved oxygen were recorded for each sample prior to any experimental manipulations.

Trial samples were divided into these 15 portions so that sets of essentially identical samples would be available for testing all combinations of two classes of experimental manipulations. One class of manipulations included five levels of pH adjustment, while the other included three physical treatments that will be termed experiments (A, B, and C). Treatment combinations and the routine procedures associated with them are detailed below, and summarized in Figures. 1 - 2.

2.1.2 Five pH adjustments in combination with experiment A

Four of the 15 effluent samples selected at random were pH adjusted to approximate the targets of pH 9.3, 8.8, 8.3, and 7.8, by adding 10% (1:10 dilution) sulphuric acid dropwise through a burette while stirring gently to minimize aeration. The volumes of acid added were recorded in each case. While these pH adjustments were proceeding, pH was monitored in a fifth sample of effluent, which was also gently stirred, but not pH adjusted. When the pH of each 26 L sample was stabilized close to the desired target, and the pH and dissolved oxygen levels had been recorded, a 2 L subsample was extracted, sealed, and reserved for subsequent extensive chemical analyses (see Chemical Analyses below, section 2.4).

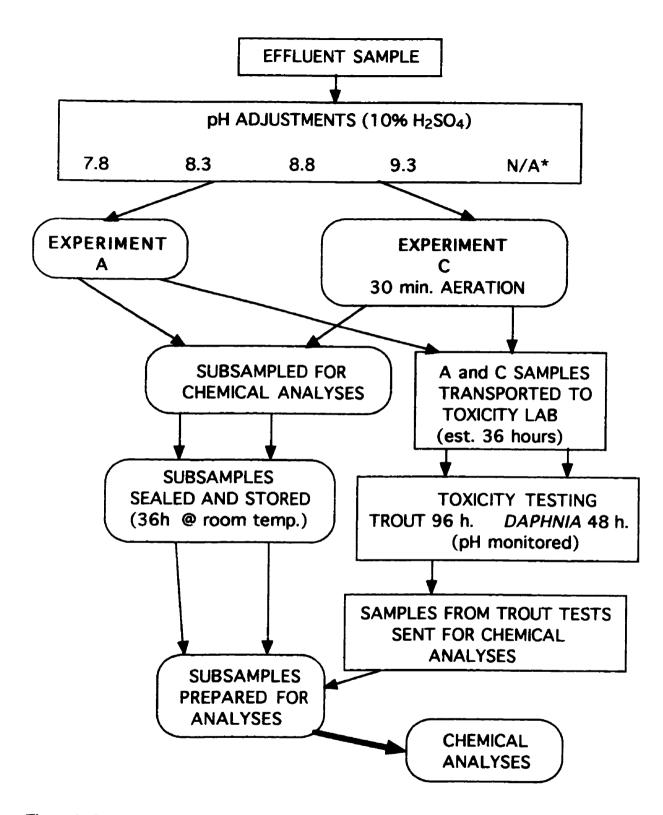


Figure 1: Manipulations of CCWWTP effluent samples for experiments A and C, trials 1-3, 1995.

^{*} indicates raw unadjusted effluent

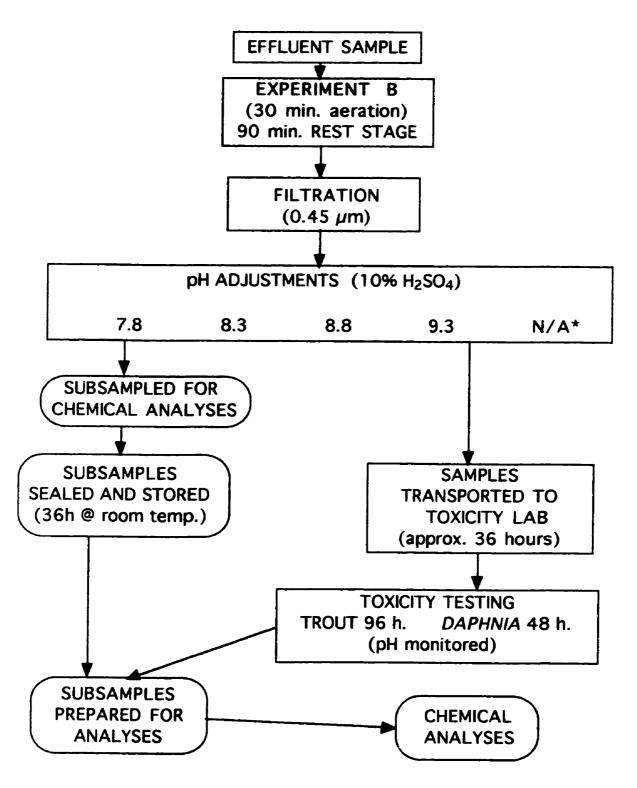


Figure 2: Manipulations of CCWWTP effluent samples for experiment B, trials 1-3, 1995.

* indicates raw unadjusted effluent

The remaining 24 L of each experimental sample was immediately scaled, minimizing headspace, labelled, and shipped as soon as possible by courier to Aquatic Sciences Inc. (St. Catharines, Ontario) for toxicity tests on rainbow trout and *Daphnia magna* (see Toxicity Tests below, section 2.3). The typical time elapsed from the preparation and scaling of the samples to the time of opening for toxicity testing was estimated to be approximately 36h.

2.1.3 Five pH adjustments in combination with experiment B.

On each effluent sampling date, five randomly selected 26 L samples were vigorously acrated for 30 minutes to ensure oxygen availability, and then allowed to stand for another 90 minutes. Each of the samples were separately passed through a high capacity pressure filter (393mm dia. Supor®, 0.45 µm pores) utilizing nitrogen gas at about 1.5 Bar as the propellant. After all five effluent samples had been filtered, four of the samples were randomly pH adjusted to pH targets 9.3, 8.8, 8.3, and 7.8. While gently stirring each sample, 10% (1:10 dilution) sulphuric acid was added dropwise from a burette, and the volumes of acid added were recorded. During the adjustment period, the fifth sample of filtered effluent was gently stirred and monitored for pH, but not pH adjusted. When the pH of each 26 L sample was stabilized close to the desired target, and the pH and dissolved oxygen levels had been recorded, a 2 L subsample was extracted, sealed, and reserved for the subsequent extensive chemical analyses we required (see Chemical Analyses below, section 2.4). The remaining 24 L of each experimental sample was immediately sealed, minimizing headspace, labelled, and shipped as soon as possible by courier to Aquatic Sciences Inc. (St. Catharines, Ontario) for toxicity tests on rainbow trout and Daphnia magna (see Toxicity Tests below, section 2.3). The typical time elapsed from the preparation and sealing of the samples to the time of opening for toxicity testing was estimated to be approximately 36h.

2.1.4 Five pH adjustments in combination with experiment C.

Four of the remaining five effluent samples were pH adjusted to approximate targets of pH 9.3, 8.8, 8.3, and 7.8, by adding 10% (1:10 dilution) sulphuric acid dropwise through a burette while stirring gently to minimize aeration. The volumes of acid added were recorded in each case. While these pH adjustments were proceeding, pH was monitored in the fifth sample of effluent, which was also gently stirred, but not pH adjusted. When the pH of each 26 L sample was stabilized close to the desired target, all five samples were vigorously aerated for 30 minutes. Following this aeration, pH and dissolved oxygen were measured, and a 2 L subsample was extracted from each sample, sealed, and reserved for subsequent chemical analyses (see Chemical Analyses below, section 2.4). The remaining 24 L of each experimental sample was immediately sealed, minimizing headspace, labelled, and shipped as soon as possible by courier to Aquatic Sciences Inc. for toxicity tests on rainbow trout and *Daphnia magna* (see Toxicity Tests below, section 2.3). The typical time elapsed from the preparation and sealing of the samples to the time of opening for toxicity testing was estimated to be approximately 36h.

2.2 Phase II pH Adjustment Experiments

2.2.1 Effluent sampling protocol

Three bulk samples of treated effluent (approx. 600L) were obtained directly from the Copper Cliff Waste Water Treatment Plant at the beginning of each of three weeks during the early spring/late winter of 1997. These samples, referred to as Trials 4-6, were collected on the mornings of April 28, May 5, and May 12. Each bulk sample was collected through a plastic hose attached to a line tapped into Clarifier #1, and each sample was received into three 200L vessels which had been fitted with clean polyethylene liners. These vessels were immediately transported to a work area provided at INCO's Central Processing and Technology building, and they were then divided among 32 smaller plastic lined containers of the type commonly used for transporting toxicity test samples.

Eight samples were extracted from the above vessels for chemical analysis; four (8L in volume) were passed through a high pressure filter apparatus (1.5 Bar, 0.45μm pore size, Supor® membrane) using nitrogen gas as the propellant, and four samples were not filtered. Four replicate filter residues, four 1.5L volumes of filtrant, and four 1.5L volumes of unfiltered effluent were immediately stored at 4°C (+/- 2) until they could be accepted for chemical analysis (see section 2.4). Temperature and pH were recorded for each sample prior to experimental manipulations.

Trial samples were divided into four replicates in such a manner that similar samples would be available for replicate experimental testing. One set of manipulations included physical treatments referred to as experiments (E and F), while the other included four levels of pH adjustment, using sulfuric acid obtained from INCO's acid plant. The pH adjustments and differences between experiments are discussed in the following sections, and are summarized in Figures. 3, 4, and 5.

2.2.2 Four pH adjustments, unfiltered samples (experiment E)

On each Trial date, sixteen effluent samples (approx. 25 L) were randomly distributed into four replicate groups. Three of the four samples in a replicate group were adjusted to predetermined pH targets of 9.1, 8.7, and 7.6. Adjustment of pH was completed using a 5% (1:20 dilution) of sulfuric acid added drop wise through a burette while the sample was mechanically stirred under moderate agitation. The fourth sample was monitored for pH during this period, while being stirred, but it was not pH adjusted.

Once the desired pH targets were achieved, the 25L samples were labelled, sealed, minimizing headspace, and shipped via courier to Aquatic Sciences Inc. for acute static toxicity testing with rainbow trout and *Daphnia magna* (section 2.3). The typical time clapsed from the preparation and sealing of the samples to the time of opening for toxicity testing was estimated to be approximately 36h.

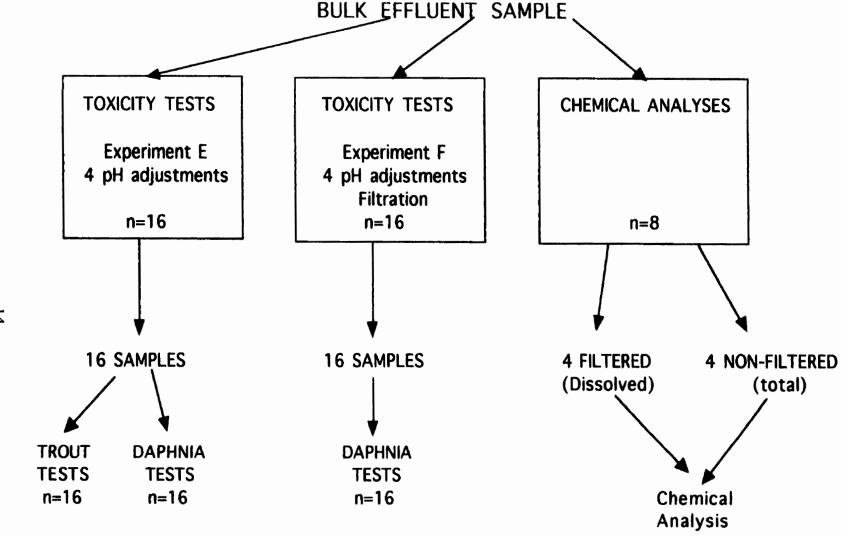


Figure 3: Divisions of bulk effluent through to acute toxicity testing. Effluent experiments were performed on three bulk samples, trials 4-6 from the Copper Cliff Waste Water Treatment Plant from early spring 1997.

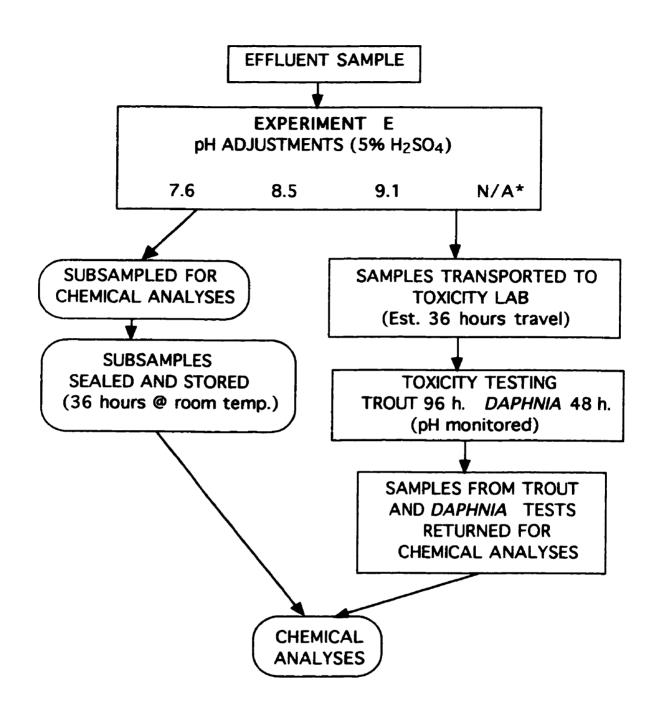


Figure 4: Manipulations of CCWWTP effluent samples for experiment E,trials 4-6, 1997.

^{*} indicates raw unadjusted efflent

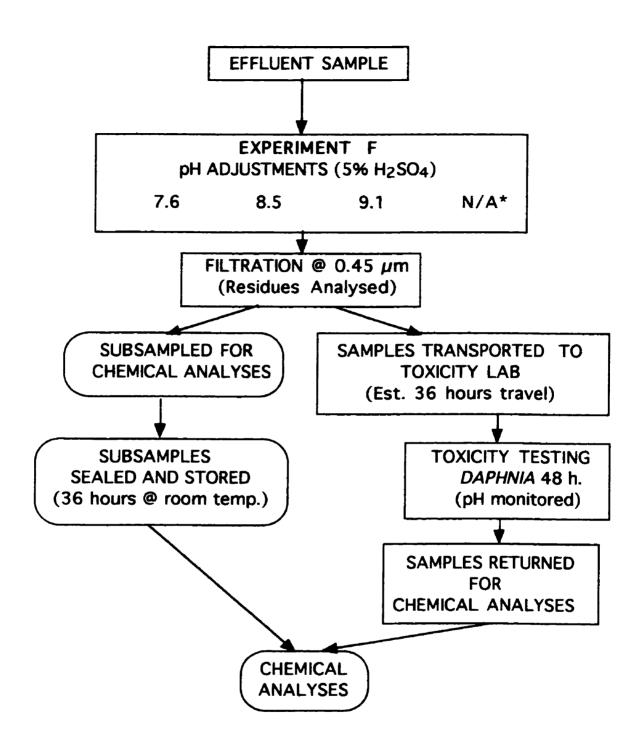


Figure 5: Manipulations of CCWWTP effluent samples for experiment F, trials 4-6, 1997.

* indicates raw unajusted effluent.

2.2.3 Four pH adjustments, samples filtered (experiment F)

On each trial date, sixteen effluent samples (approx. 10L) were taken from the bulk effluent collected, and randomly distributed into four replicate groups. Three of the four samples in each replicate group were modified to predetermined pH targets of 9.1, 8.7, and 7.6. Adjustment of pH was completed as described above, using a 5% (1:20 dilution) of sulfuric acid added drop wise through a burette while the sample was mechanically stirred under moderate agitation. The fourth sample was monitored for pH while being stirred during the experimental period, but not pH adjusted. Once the desired pH levels had been achieved, 8 L of each sample was passed through a high volume pressure filter apparatus (0.45µm pore size, Supor® membrane) using nitrogen gas as the propellant. Filters and residues were stored at room temperature until preparation for further chemical analysis (section 2.4). Upon completion of the above preparations, the filtered effluent samples were labelled, sealed, minimizing headspace, and shipped via courier to Aquatic Sciences for acute static toxicity testing with *Daphnia magna* (section 2.3). The typical time elapsed from the preparation and sealing of the samples to the time of opening for toxicity testing was estimated to be approximately 36h.

2.3 Toxicity Test Procedures

2.3.1 Rainbow trout and D. magna protocol for toxicity testing

Rainbow trout and *D. magna* toxicity tests were conducted by Aquatic Sciences Inc. in St. Catharines, Ontario essentially according to the standard Canadian protocols for acute static tests (Environment Canada 1990a; 1990b). In both cases undiluted effluent failed the test whenever total mortality was $\geq 50\%$ of the exposed animals.

The 96-hour static rainbow trout tests were conducted by placing 10 specimens (0.3g-5.0g) into a sufficient volume of the test solution to ensure a loading density of < 0.5g/L. Samples were continually aerated during testing, and temperature was maintained at 15°C (+/-1). Mortalities were recorded after elapsed times of 24h, 48h, 72h, 96h, and 15h, 24h, 48h, 72h, and 96h for phase I and phase II studies respectively. Observations of stress were recorded throughout the test period.

Mortalities were determined by the absence of opercular movement and no response to subsequent gentle prodding. Symptoms of stress included failure to maintain balance, gasping at the water surface, and lethargic or sporadic swimming activities (Environment Canada 1990a).

For the 48-hour *D. magna* tests, three groups of 10 neonates (< 24h of age) were placed in three separate vessels containing 200mL replicate subsamples of the effluent at a temperature of 20°C (+/-1). Immobile specimens and any other indications of stress were recorded after elapsed times of 24h and 48h for both studies. Mortalities were determined by visual microscopic inspection of the organisms upon completion of each test (48h). Mortality was determined by the lack of appendage movement and absence of a heart beat. Symptoms of stress included immobility; defined as the inability to sustain free suspended swimming characteristics due to absence of antennae movement, or by the presence of organisms trapped in the water surface tension (Environment Canada 1990b).

2.3.2 Phase I study; additional procedures

When a bulk sample was received, three 200 mL subsamples were removed for *D. magna* tests, and the rest of the sample was reserved for a single rainbow trout test. At my request, each sample was aerated for a minimum of 30 minutes before toxicity testing began. Also, in accordance with the standard protocol, any sample exhibiting either a low or supersaturated concentration of dissolved oxygen was aerated further until dissolved oxygen levels fell between 80%-100% saturation (Environment Canada 1990a; 1990b).

2.3.3 Phase II study; additional procedures

Upon reception of the samples submitted for Experiment E, a subsample was extracted from each for *D. magna* testing. The parent samples, used subsequently for trout tests, and the *D. magna* test subsamples, were immediately sealed and held at 4°C (+/-2) until testing.

Upon request, the following variance from the usual protocol was added. All samples being prepared for trout testing were aerated for 90 minutes, partly to eliminate the possibility of over- or under-saturation of dissolved oxygen during the test, but especially to ensure each sample of effluent had a very similar pre-test exposure to atmospheric carbon dioxide. Without this modification in methodology, only samples over- or under-saturated with oxygen would have been pre-aerated. The samples to be used for *Daphnia* testing were consistently pre-aerated for 30 minutes for the same reasons; the aeration time was reduced from 90 minutes because *D. magna* tests employed a much smaller effluent sample volume than trout tests.

2.3.4 Chemical analyses at toxicity test laboratory

Prior to testing effluent samples, Aquatic Sciences Inc. raised stored effluent samples to temperature required for toxicity testing [i.e. 15 °C (+/-1) for trout and 20 °C (+/-1) for *Daphnia*](Environment Canada 1990a; 1990b), recorded dissolved oxygen, pH, temperature, conductivity, hardness, physical state of sample, clarity, colour, presence of precipitate, and odour. Temperature, pH, dissolved oxygen, and conductivity were monitored at intervals during the toxicity tests. In detail, pH was monitored in rainbow trout tests at the time intervals of 0h, 24h, 48h, 72h, 96h and 0h, 15h, 24h, 48h, 72h, and 96h for phase I and phase II studies respectively. Temperature, dissolved oxygen, and specific conductivity were recorded at the same time frames, but excluding 15h for the phase II study. In *D. magna* tests, pH was monitored at elapsed times of 0h and 48h and 0h, 24h, and 48h for phase I and phase II studies respectively. The other parameters listed above were monitored at 0h and 48h.

2.3.5 Post-bioassay chemical analysis

i) Phase I study

Upon completion of each rainbow trout toxicity test at Aquatic Sciences Inc., a 2 L effluent subsample from the test vessel was returned to INCO's Central Processing Technology laboratories at Copper Cliff. These samples were stored and transported at 4 °C (+/-2), and sample containers were kept closed. Upon sample arrival at the Copper Cliff laboratory, five aliquots from each sample were processed for the routine series of chemical analyses, as described in section 2.4.

ii) Phase II study

Upon completion of each trout and *Daphnia* toxicity test at Aquatic Sciences Inc., a 250 mL sample was collected from each trout test vessel, and a 250 mL composite was collected from the three subsets of effluent subjected to *Daphnia* tests. All effluent samples were sealed, stored, and transported, at 4°C (+/-2), to the Central Processing Technology building at INCO Ltd., Copper Cliff, Sudbury. Once the effluent samples had arrived, post-test pH was determined, and then the samples were acidified and stored. Total ammonia was later measured for each sample as described in section 2.4.

2.4 Chemical Analyses

2.4.1 Phase I and Phase II effluent studies

The aliquots of effluent samples from both pre-test and post-biassay samplings of the phase I and phase II study were prepared for the specified chemical analyses as summarized in Figure 6.

- Aliquot 1) Preserved with 1:1 H₂SO₄ @ 3 drops per 200 ml of sample; for total ammonia/ium & chemical oxygen demand (COD) analyses.
- Aliquot 2) No preservative added; used for suspended solids*.

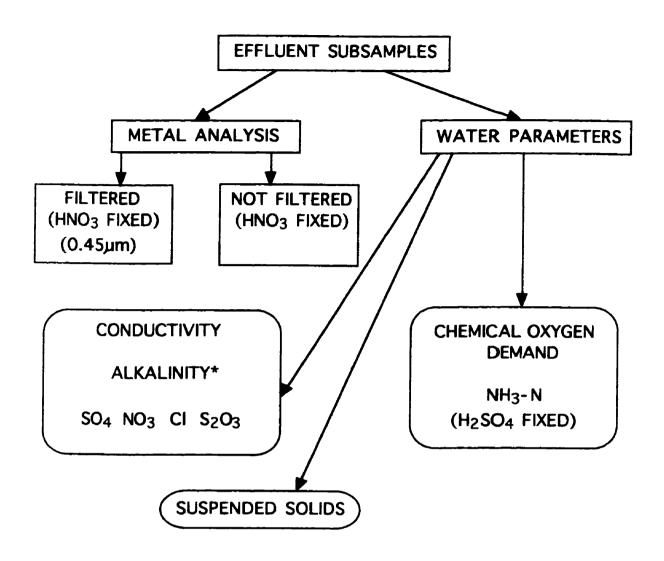


Figure 6: Treatment paths for chemical analyses of effluent subsamples, trials 1-6, from the CCWWTP studies of 1995 and 1997.

^{*}includes total and phenolphthalein alkalinity.

- Aliquot 3) No preservative added; used for analyses of sulfate, nitrate, chloride, thiosulfate, conductivity, phenolphthalein alkalinity**, and total alkalinity.
- Aliquot 4) Filtered samples used for determination of "dissolved" elements. †
- Aliquot 5) Non-filtered samples were used for "total" element analysis. †
- * Suspended solids were completed only for the Phase I study.
- ** Phenolphthalein alkalinity was only measured in the Phase II study involving experiment E and F.
- † Samples from aliquot 4 and 5 were preserved with a 1:1 dilution of nitric acid at 2 mL of acid per 50 mL of sample prior to being analysed for various elements (analyses included Ca, Na, Mg, K, Fe, Mn, Ni, Co, Cu, and Zn, among others).

2.4.2 Experiment F: filtered residues.

Filtered residues were liberated from the filters by placing them in 50mL of distilled water and then adding 5mL of concentrated HCl acid. The filters and solutions were subjected to an ultrasonic bath for approximately 20 minutes, and then fixed with 2 mL of nitric acid per 50 mL of solution. An aliquot of each sample was then analysed though inductively coupled plasma-atomic emission spectrophotometry (ICP-AES). The elements determined included Ca, Na, Mg, K, S, Fe, Mn, Al, Ni, Cu, Zn, Co, and several others. Unused filter material was also similarly analysed as blanks to allow for data correction where required. The total mass of each element retained on the filter was reported; this value was equivalent to the mass of the element in particulate form in 26 L and 8 L of effluent for experiments B and F respectively.

2.4.3 Analytical procedures for samples

Most chemical analyses were conducted by, or under the supervision of, staff chemists at INCO's Central Processing Technology laboratory facilities in Copper Cliff. Following the laboratory's normal protocol, total ammonia/ ammonium was analyzed by ion specific electrode. Chemical oxygen demand was determined by Hach® colorimetry and suspended solids were measured gravimetrically. The ions nitrate, chloride, sulfate, and thiosulfate were measured through ion chromatography. Phenolphthalein alkalinity, total alkalinity, and specific conductivity were measured using an automated Metohm® analyser. Element analysis was carried out by inductively coupled plasma-atomic emission spectrophotometry (ICP-AES).

2.5 Experiment D: Ambient Air Experiments

Procedures for studying the involvement of carbon dioxide in the decline of effluent pH are described in detail below and summarized in Figure 7.

2.5.1 Effluent Manipulations

Two effluent samples approximately 20L in volume were collected from the Copper Cliff Waste Water Treatment Plant Clarifiers in the morning on the specific dates of June 1/98 and July 6/98. These samples referred to as trials 10 and 11 were sampled from a outflow line from the clarifiers into a clean polycarbonate 20L container with no head space and sealed for immediate transport to Laurentian University. Upon arrival, the bulk samples for each trial were divided randomly into 28, 500 mL polyethylene containers (PETE®) and sealed. Sixteen of these 500 ml subsamples, were immediately cooled in an ice bath in preparation for cold condition experiments, while the remaining 12 sealed subsamples were left to equilibrate to room temperature (24 °C (+/-1.5)) at a provided work space. After approximately one hour, samples in the ice bath were placed in a refrigerator to adjust to a temperature of 4°C (+/-2.0) before test iniation.

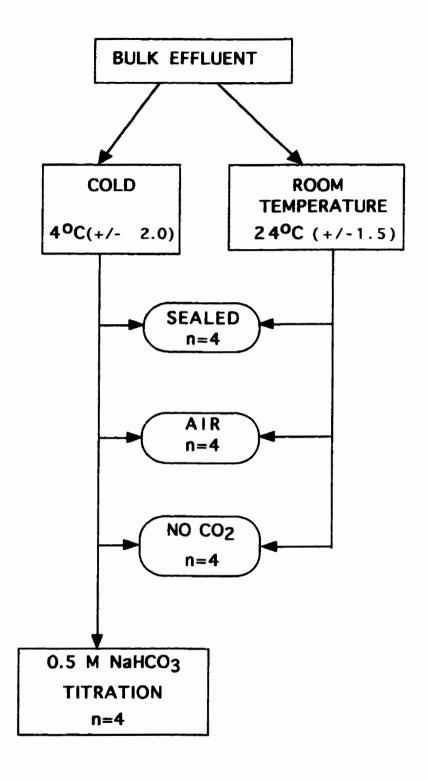


Figure 7: Manipulations of effluent subsamples from the CCWWTP for the ambient air studies of experiment D.

2.5.2 Procedures for air experiments

Trial samples were divided into four replicates for three physical manipulations of air for the two temperature conditions as previously described. For each temperature condition a set of four replicates were left sealed for the 96h duration of the experiments. Another set of replicates were subjected to glass wool filtered, atmospheric air bubbled into each sample. The final set of replicates was aerated using glass wool filtered air which was also passed through a column of Ascarite ® to remove carbon dioxide gas. At the start of the tests, each sample was opened briefly and measured for pH and temperature and immediately sealed with food grade plastic wrap. Each of the replicates were then subjected to experimental conditions as indicated above. To reduce potential mixing of effluent sample with ambient air outside the vessel, samples involving aeration were performed by piercing the plastic wrap covering to insert the aeration tube to allow for bubbling of samples. A second small perforation was made to avoid pressure build up in the vessel. Samples were only opened to monitor pH and temperature at specified time periods of 0, 2, 6, 15, 24, 48, 72, and 96h and promptly returned to conditions as described above.

2.5.3 Procedure for sodium bicarbonate study

The final set of four replicates that had been acclimated to cool temperatures, 4°C (+/-2.0) were removed and immediately subjected to a titration using 0.5 M sodium bicarbonate (NaHCO3) within a 50 mL burette. 400mL of each replicate effluent sample was gently stirred as the 0.5 M NaHCO3 solution was added dropwise and measured at random volumes while pH was recorded during the titration.

2.6 Chemical and Statistical Analyses and Integrity

Quality control and quality assurance of analytical processes were verified through routine analysis of spiked samples, certified standard reference materials, and blank samples for chemical parameters tested as demonstrated through INCO's analytical protocol. Most analytical work was completed by experienced professional chemists at the Central Processing and Technology building at INCO's Copper Cliff location. At Aquatic Sciences Inc., St. Catharines, On., parallel blank control bioassays to ensure the viability of both trout and *Daphnia*, utilizing dechlorinated tap water, were routinely run at the time bioassays were performed on tested effluent. Toxicity testing was considered void if blank controls exhibited mortality rates >10% (Environment Canada 1990a; 1990b). Sodium chloride was also used as a reference toxicant to ensure lethality to test organisms was well within documented values (Appendix B).

Statistical analyses were completed with the aid of two statistical software packages; one was SPSS statistical analyses on the VMS VAX mainframe computer, while the other was completed on a personal computer using the JMP statistics software (SAS).

3.0 RESULTS

3.1 Effluent Samples

3.1.1 Effluent variability

Initial chemical analyses of alkaline effluents indicated that the pre-test subsample variation within trials was low. Within the phase II study, for example, of the 21 chemical parameters analyzed, only six of these (phenolphthalein alkalinity, chemical oxygen demand, Co, Fe, Mn, and Ni) had coefficients of variation exceeding 5% (Table 1a, 1c). The coefficient of variation was only relatively high for the metals Fe, Mn, and Ni in trial 6, 15.1-18.1%, and for chemical oxygen demand and Co (10.5-23.5%) in trials 4 and 5 (Table 1a, 1c).

In contrast to within trial observations, most of the chemical parameters displayed significant variation among the six trials. Of particular interest was the fact that pH, alkalinity, and thiosulfate showed the highest levels in trial 5 (Table Ia, Ib). The base cations, Ca and Na showed the greatest concentrations in trial 1, as did sulfate and chloride ions (Table Ic). Total ammonia and Zn were most prominent in trial 2 (Table Ia, Ic). Trace metals Co, Al, Fe, Mn, Cu, and Ni tended to be the highest in trials 3 and 6 (Table Ic).

3.1.2 Pre- and post-test comparisons

Data representing total trace metals (Co, Al, Fe, Mn, Cu, Ni, and Zn), cations (Ca, Na, K, and Mg) and anions (sulfate, chloride, and nitrate) concentrations for phase I rainbow trout tests are displayed in Table 1b and 1c. Examination of comparable post-test phase I chemical data (trials 1-3) did not indicate consistent temporal (pre-test/ post-test) trends (Appendix I and II; III and IV). Post-test total ammonia levels of trials 1-6 similarly did not reveal a consistently increasing, decreasing, or static pattern for the phase I (Appendix I and II) or the phase II studies (Appendix VI, VIII, and IX). Prior to toxicity testing, thiosulfate concentrations ranged from 10-22 mg/L in trials 1-3 (Appendix I). Samples analyzed for thiosulfate following the trout tests only in the first three trials indicated a reduction in concentration from pre-test analysis, most being < 5 mg/L (Appendix II).

Table 1a: Chemical characteristics of two trios of bulk effluent samples collected from the INCO - Copper Cliff Waste Water Treatment facility in late fall 1995 and early spring 1997. The ranges shown (bold face) for samples from 1995 are the values observed in experiments A and C non-adjusted unfiltered effluents. Data for the 1997 samples (bold face) are the means of four replicates of experiment E non-adjusted unfiltered effluents, and the associated coefficients of variation (%).

	Sample	Date Collected	pH (-log [H+])	Total Alkalinity (mg/L)	Phenolphthalein Alkalinity (mg/L)	Total Ammonia (mg/L)	COD (mg/L)	Cond µS/cm
	Trial 1(n=2)	13/11/95	10.3-10.4	37-40	no data	5.7-6.0	23-28	2300
	Trial 2(n=2)	4/12/95	10.2-10.2	35-36	no data	6.9-7.2	38-40	2300
28 28	Trial 3(n=2)	11/12/95	10.2-10.3	38-40	no data	6.6-6.8	18-25	2300-2400
	Trial 4(n=4)	4/28/97	10.4 0.6%	47 1.4%	2 6 4.1%	5.5 1.9%	5 5 11.9%	2000 1.2%
	Trial 5(n=4)	05/05/97	11.1 0.0%	68 2.0%	3 8 5.9%	5.8 0.0%	4 8 10.5%	2300 0.2%
	Trial 6(n=4)	5/12/97	10.2 0.0%	5 2 1.3%	2 6 5.6%	6.3 2.3%	5 2 4.1%	2300 0.9%

Table 1b: Chemical characteristics of two trios of bulk effluent samples collected from the INCO - Copper Cliff Waste Water Treatment facility in late fall 1995 and early spring 1997. The ranges shown (bold face) for samples from 1995 are the values observed in experiments A and C non-adjusted unfiltered effluents. Data for the 1997 samples (bold face) are the means of four replicates of experiment E non-adjusted unfiltered effluents, and the associated coefficients of variation (%).

	Sample	Date	Calcium	Sodium	Magnesium	Potassium	Sulfate	Chloride	Nitrate	Thiosulfate
		Collected	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
	Trial 1(n=2)	13/11/95	480-490	138-140	67-68	35-36	1700	91-95	4	10
	Trial 2(n=2)	4/12/95	420-430	135-138	68-70	37-38	1700	72-84	4 - 5	14-15
29	Trial 3(n=2)	11/12/95	430-450	132-136	71-74	37-39	1700-1800	101-106	5 5	20-22
9	Trial 4(n=4)	4/28/97	320 1.1%	98 0.5%	66 0.5%	26 1.1%	1 1 0 0 2.4%	70 3.8%	7 1.2%	34 2.4%
	Trial 5(n=4)	05/05/97	340 2.1%	106 2.4%	5 <i>7</i> 1.8%	2 4 3.4%	1200 0.7%	80 4.4%	6 1.0%	35 0.7%
	Trial 6(n=4)	5/12/97	390 0.8%	137 0.8%	81 0.6%	32 0.8%	1400 2.0%	88 2.4%	4 3.1%	33 2.0%

Table 1c: Chemical characteristics of two trios of bulk effluent samples collected from the INCO - Copper Cliff Waste Water Treatment facility in late fall 1995 and early spring 1997. The ranges shown (bold face) for samples from 1995 are the values observed in experiments A and C non-adjusted unfiltered effluents. Data for the 1997 samples (bold face) are the means of four replicates of experiment E non-adjusted unfiltered effluents, and the associated coefficients of variation (%).

Sample	Date Collected	Cobalt (mg/L)	Aluminum (mg/L)	lron (mg/L)	Manganese (mg/L)	Copper (mg/L)	Nickel (mg/L)	Zinc (mg/L)
Trial 1(n=2)	13/11/95	0.010	0.120-0.179	0.125-0.513	0.023-0.062	0.023-0.080	0.275-0.749	0.010
Trial 2(n=2)	4/12/95	0.010-0.012	0.160-0.168	0.176-0.216	0.029-0.030	0.057-0.096	0.276-0.286	0.035-0.039
Trial 3(n=2)	11/12/95	0.013-0.013	0.210-0.261	0.216-0.557	0.034-0.077	0.046-0.101	0.356-0.783	0.010-0.013
								
Trial 4(n=4)	4/28/97	0.007 23.5%	0.1 93 2.8%	0.357 8.4%	0.018 8.0%	0.055 3.9%	0.244 6.9%	D.L.
Trial 5(n=4)	05/05/97	0.009 13.3%	0.1 62 1.4%	0.339 8.8%	0.020 8.2%	0.045 4.9%	0.200 7.4%	D.L.
Trial 6(n=4)	5/12/97	0.013 3.6%	0.206 1.8%	0.804 18.1%	0.058 15.5%	0.089 4.1%	0.52 6 15.1%	D.L.

D.L. - < detection limit (0.005 mg/L).

3.1.3 Effluent particulates and metal concentrations

Trace metal concentrations were found to be low, and in some instances, close to detection limits of the analytical method (i.e. Zn, Table 1, Appendix VII). [The effectiveness of metal removal in the Copper Cliff treatment facility may be appreciated by comparing the analyses of treated effluents entering and leaving the treatment facility (Appendix XII)].

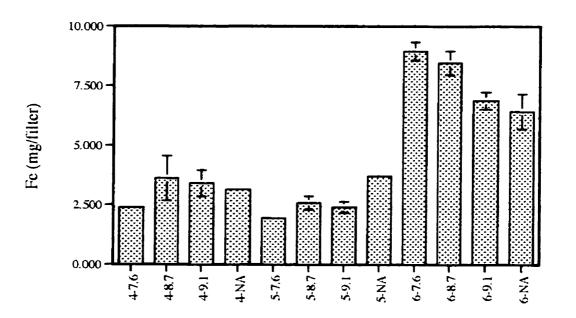
In order to better understand the biological availability of these metals contained in effluent samples studied, material retained from the filtering process in experiment F was analyzed for metals in question (Appendix X). In this fashion, metals accumulated on the filter disc could be concentrated by utilizing a larger volume of effluent. Thus, concentrated metals would allow for quantitative interpretation without the hindrance of low detection limits. It was also anticipated that as pH was lowered to specified pH targets, increased metal solubility would be reflected in decreased concentrations of trace metals captured on the filter discs.

Chemical data for trials 4 and 5 suggested that metal solubility had generally increased as effluent samples were adjusted to pH 7.6 (Figure 8). In contrast, a reverse in solubility was apparent in trial 6 (Figure 8). In trial 6 the metals Fe, Cu, Al, and possibly Zn showed a greater solubility in the unadjusted alkaline samples, and the least solubility in circumneutral effluents. The solubilities of Mn, Ni, and Co were not significantly influenced by the pH adjustments in trial 6.

3.2 Toxicity Results

The results of effluent toxicity tests with rainbow trout indicated consistently high level of mortalities (100%) in all non adjusted alkaline effluents examined (Table 2). In contrast, all pH modified effluents indicated a high survival rate for rainbow trout. Only three instances in phase I, trials 1 and 2 indicated mortalities of \geq 10% in pH targets of 8.8 and 7.8 and under no circumstances were mortalities \geq 50% (Table 2). Filtered alkaline effluent samples tested in experiment B of the phase I study showed no differences in mortality with respect to experiments A and C.

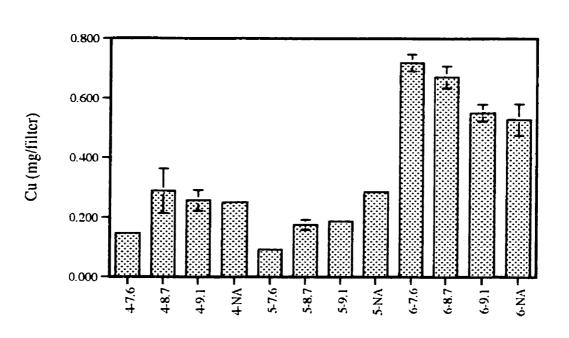
Figure 8. Mean total mass (mg) and standard errors (bars) observed for seven metals filtered (0.45 μ m) from quadruplicate, pH-adjusted 8L samples of three effluents (Expt. F; Trials 4-6 1997) from the INCO-Copper Cliff Waste Water Treatment Plant: a) Fe, b) Cu, c) Al, d) Zn, e) Mn, f) Ni, and g) Co.



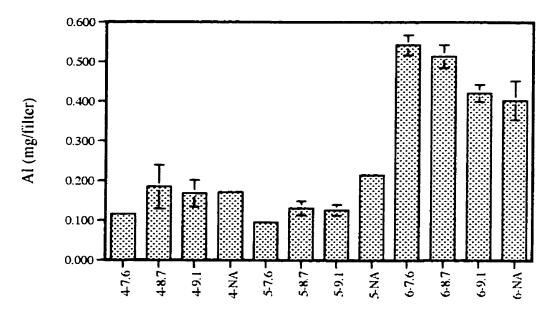
Target pH of Samples from Trials 4-6

8a

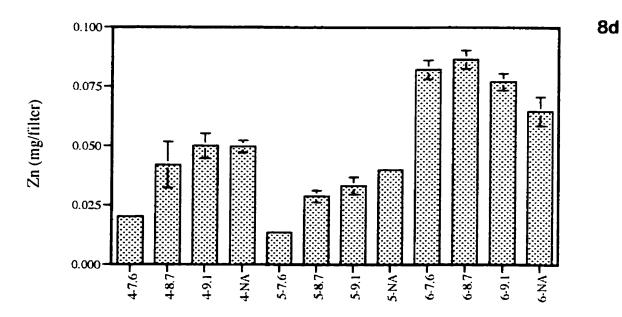
8b



Target pH of Samples from Trials 4-6



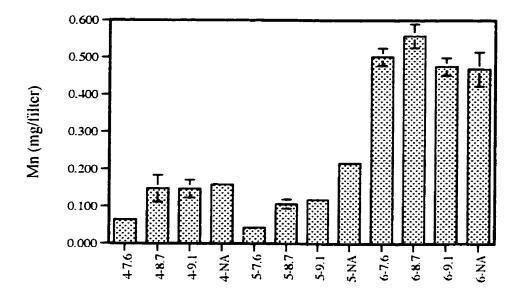
Target pH of Samples from Trials 4-6



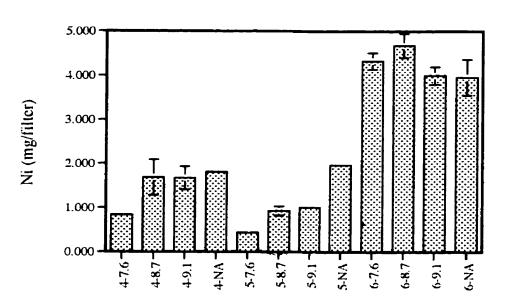
Target pH of Samples from Trials 4-6



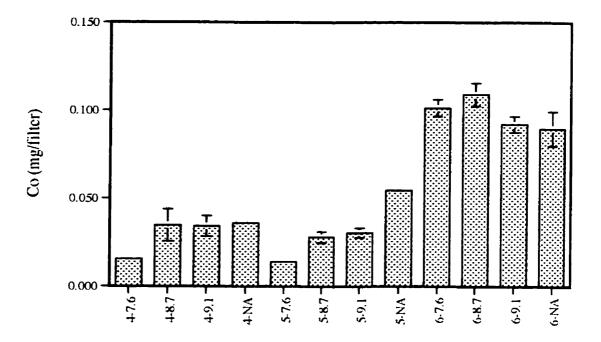
8f



Target pH of Samples from Trials 4-6



Target pH of Samples from Trials 4-6



Target pH of Samples from Trials 4-6

Table 2. Percent mortality of rainbow trout in static, acute (96h) toxicity tests carried out in fall 1995 and spring 1997 on CCWWTP* effluents that were previously subjected to pH adjustments and aeration/ filtration procedures. Collection of effluent samples on six dates provided for six trials. Mortality rates ≥ 50% are in bold face. Mortality values displayed in trials 1-3 are based on single toxicity tests (n=1) while trials 4-6 are means of four replicate tests (n=4).

		PERCENT MORTALITY of RAINBOW TROUT							
	TRIAL No.	NOMINAL PH ADJUSTMENTS							
EXPERIMENT	(Sampling Date)	N/A†	9.3	8.8	8.3	7.8			
Α	1 (Nov. 13)	100	0	0	0	10			
('95)	2 (Dec. 4)	100	0	10	0	20			
	3 (Dec. 11)	100	0	0	0	0			
В	1 (Nov. 13)	100	0	0	0	0			
('95)	2 (Dec. 4)	100	0	0	0	0			
	3 (Dec. 11)	100	0	0	0	0			
С	1 (Nov. 13)	100	0	0	0	0			
('95)	2 (Dec. 4)	100	0	0	0	0			
	3 (Dec. 11)	100	0	0	0	0			
EXPERIMENT	TRIAL No.	N/A†	9.1	8.7		7.6			
E	4 (Apr 29)	100	0	0		0			
(' 97)	4 (Apr.28) 5 (May 5)	100	2.5	0		0			
(3/)	6 (May 12)	100	2. 5 0	0		0			
	U (Way 12)					<u> </u>			

^{*} Copper Cliff Waste Water Treatment Plant.

[†] Non-adjusted effluent samples

Hence, for this reason and to eliminate unnecessary investigations in phase II experiments, trout toxicity testing involving filtered effluents was excluded from the latter study.

In *Daphnia* bioassays, mortalities greater than 50% were commonly observed in unadjusted alkaline effluent samples of the phase II study trials 4-6 and in the first trial of the phase I study of experiment A (Table 3). Even with the inclusion of immobile organisms (as a possible indicator of stress) with mortalities, no test exceeded the failure criterion of 50% for the pH adjusted effluents samples (Table 3). The pH modified effluent samples showed a high survival rate for organisms tested. With the exception of experiment A, at pH target of 7.8 of the phase I study, which produced a mortality rate of 27%, none of the pH adjusted effluents tested exceed a mortality rate of 10% (Table 3). Filtration of alkaline effluents prior to toxicity testing (experiments B and F) caused no apparent differences in *Daphnia* mortality in relation to non filtered effluents.

3.3 Sources of Toxicity

3.3.1 General effluent chemistry

Excluding pH, data collected from alkaline effluents displayed in Table 1 and Figure 8, did not suggest a possible source of toxicity to trout or *D. magna*. Since mortalities were substantial in non-adjusted alkaline effluent, and the process of filtration had no apparent effect on mortalities, it was concluded that a soluble component was responsible for toxicity observed. None of the soluble cations Ca, Na, Mg, K, Co, Al, Fe, Mn, Cu, Ni, Zn, nor anions sulfate, chloride, nitrate, thiosulfate, and total ammonia demonstrated a relationship different from pH adjusted, low mortality effluents and high pH high mortality effluents.

3.3.2 pH decline

Adjustment of pH to the intended targets was difficult with the 10% dilution of sulfuric acid in 1995, and was not always accurate (Appendix V). In fact, as a result of malfunctioning pH equipment in trial 2 and 3, acid was added to samples using amounts previously determined from trial 1, to achieve desired pH targets.

Table 3. Percent mortality among neonate *Daphnia magna*, and percent immobile-plusdead, in static, acute (48h) toxicity tests carried out in 1995 and 1997 on INCO-Copper Cliff Waste Water Treatment Plant effluents that were previously subjected to pH adjustments and aeration/filtration procedures. Collection of effluent samples on six dates provided for six trials. Mortality rates $\geq 50\%$ are in bold face. Mortality values displayed in trials 1-3 are based on single toxicity tests (n=1) while trials 4-6 are means of four replicate tests (n=4).

		PERCENT (Percent		LITY of D	•	_
	TRIAL No.		NOMIN	AL pH A	DJUSTM	ENTS
EXPERIMENT	(Sampling Dates)	N/A†	9.3	8.8	8.3	7.8
A ('95)	1 (Nov. 13) 2 (Dec. 4)	77 (87) 0(0)	0(0) 0(0)	0(7) 3(10)	3(23) 7(7)	27(44) 3(7)
	3 (Dec. 11)	0(3)	0(0)	0(0)	0(0)	0(0)
В	1 (Nov. 13)	27(37)	0(20)	0(0)	0(0)	0(0)
('95)	2 (Dec. 4)	0(0)	0(0)	0(0)	0(0)	0(0)
	3 (Dec. 11)	0(0)	0(0)	0(0)	0(0)	0(0)
С	1 (Nov. 13)	0(27)	0(0)	3(3)	7(10)	3(3)
('95)	2 (Dec. 4)	17(57)	0(0)	0(0)	0(0)	0(0)
	3 (Dec. 11)	0(20)	3(3)	0(0)	0(0)	0(0)
EXPERIMENT	TRIAL No.	N/A†	9.1	8.7		7.6
E	4 (Apr. 28)	8 0 (97)	0	0		0
('97)	5 (May 5)	100	0	0		0(19)
	6 (May 12)	88(98)	0(7)	0(1)		2(4)
F	4 (Apr. 28)	96(98)	0	0		0
('97)	5 (May 5)	100	1	0		3(5)
	6 (May 12)	8 2 (95)	1(2)	0		0(1)

[†] Non-adjusted effluent samples

However, using a 5% dilution of acid in 1996, initial adjustments were within +/- 0.1 pH units of the intended targets of 9.1, 8.7, and 7.6 (Appendix XI).

In all effluent samples, regardless of any prior pH adjustment, pH levels at the start times of toxicity tests were lower than the pH levels recorded at completion of pH adjustment and other pre-bioassay treatments. By the conclusion of the 96h trout tests, again regardless of any prior pH adjustment, all but one test solution exhibited a pH close to neutral (Tables 4 and 5). The coefficients of variation for pH measurements taken at different elapsed times in the phase II study were less than 5% for both trout and *Daphnia* tests (Tables 5 and 6).

3.3.3 Determination of pH critical to mortality

Assessing the influence of pH on the toxicity of effluents was complicated by the fact that pH typically declined while each test was proceeding. Generally, however, mortalities were not scattered throughout the whole test period; rather, mortalities and stress almost always occurred within a few hours of test initiation. These observations indicated that water quality characteristics at the end or even mid-way through a test period could be quite irrelevant for identifying the conditions causing toxicity. Aquatic Sciences Inc. saw indications of very early mortality in some trout tests (2h in trial 5) and noted almost immediate signs of stress in all tests that failed (see toxicity test reports, Appendix B). Such observations suggested that effluent toxicity would be most strongly correlated with water quality data from test start times (t=0). Since data at 24h was not obtained for Daphnia tests in 1995, and apparent Daphnia mortalities were not confirmed until completion of 48h acute tests (Environment Canada 1990b), it seemed that data from the 0h or 48h time frames would be the most appropriate for assessing the possible role of pH in determining effluent toxicity.

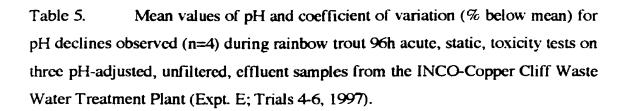
Initial sample pH in trout tests typically differed significantly from initial sample pH in *Daphnia* tests performed on the same effluent (i.e. trial 1, target pH 8.7, Experiment E; t=0 pH=8.1 for Daphnia; t=0 pH=8.6 for trout,) (Tables 5 and 6). In addition, the duration of acute testing for trout (96h) exceeded the duration of *Daphnia* tests (48h).

4

Table 4: Ranges of temporal pH declines observed for Experiments A and C (n=2) during rainbow trout 96h acute, static, toxicity tests on a trio of pH adjusted, aerated, unfiltered effluent samples from the Copper Cliff Waste Water Treatment Plant, INCO Ltd. (1995). Ranges of pH reported for initial time 0h and concluding 96h are indicated by outlined text.

Sample tar	get pH	Oh	24h	48h	72h	96h	
Trial I '95	7.8	6.8-7.0	6.9-7.0	6.8-7.0	6.9-7.1	6.9-7.2	
A&C	8.3	7.2-7.4	6.9-7.1	6.8-7.0	7.0-7.1	7.007.2	
	8.8	7.4-8.1	7.2	7.0-7.2	7.0-7.3	7.1-7.3	
	9.3	8.8-9.7	7.3-7.6	7.2-7.3	7.3-7.6	7.2-7.6	
	N/A	9.8-10.0	9.0-9.4	8.4-9.0	8.8*	8.6*	
Trial II '95	7.8	6.8.7.2	6.8-7.0	6.2-6.6	5.0-5.1	3.8-4.2	
A&C	8.3	7.2.7.3	7.1	6.9	6.6-6.9	6.4.6.9	
	8.8	7.5.8.2	7.2-7.4	7.1-7.2	7.1-7.2	7.0.7.2	
	9.3	8.0-8.2	7.4-7.5	7.2	7.1-7.2	7.0.7.3	
	N/A	9.7	9.3-9.4	8.8	7.9-8.1	T.A-T.T	
Trial III '95	7.8	8.0.8.6	7.5-7.7	7.2-7.3	7.3-7.4	7.1-7.2	
A&C	8.3	8.2-8.6	7.4-7.7	7.2-7.4	7.3-7.4	7.1.7.2	
	8.8	8.7-8.9	7.9-8.2	7.3-7.4	7.4	7.007.3	
	9.3	8,1-8,5	7.6-7.7	7.4-7.5	7.4	7.0.7.2	
	N/A	9,5-9,7	8.7-8.9	7.6-8.0	7.2-7.6	7.2-7.6	

^{*} Experiment C toxicity test terminated at 48h, Experiment A data reported only.



PH AT ELAPSED TIMES DURING TOXICITY TESTS

Sample	Target pH	0h	15h	24h	48h	72h	96 h	
TRIAL 4	7.6	7.7	7.3	7.2	7.2	7.3	7.2	
		3.5%	1.8%	2.2%	1.6%	2.1%	2.3%	
	8.7	8.6	7.5	7.3	7.4	7.4	7.4	
		2.0%	0.9%	1.7%	1.1%	1.3%	1.5%	
	9.1	9.1	7.8	7.5	7.5	7.5	7.5	
		0.5%	2.0%	1.1%	0.9%	1.3%	1.3%	
	N/A	10.1	9.6 (1	lests term	ninated)			
		0.4%	1.0%					
TRIAL 5	7.6	7.4	7.2	7.2	7.2	7.3	7.2	
		5.1%	1.9%	1.5%	1.8%	1.6%	1.2%	
	8.7	8.5	7.3	7.3	7.3	7.3	7.2	
		0.6%	1.2%	1.0%	1.5%	1.5%	1.5%	
	9.1	8.9	7.4	7.4	7.4	7.4	7.4	
		0.7%	0.6%	0.9%	1.0%	0.7%	0.8%	
	N/A	10.5	9.6 (test terminated)					
		0.6%	0.7%					
TRIAL 6	7.6	7.7	7.3	7.2	7.2	7.3	7.2	
		3.5%	1.8%	2.2%	1.6%	2.1%	2.3%	
	8.7	8.6	7.5	7.3	7.4	7.4	7.4	
		2.0%	0.9%	1.7%	1.1%	1.3%	1.5%	
	9.1	9.1	7.8	7.5	7.5	7.5	7.5	
		0.5%	2.0%	1.1%	0.9%	1.3%	1.3%	
	N/A	10.1	9.6 (1	est termi	nated)			
	-	0.4%	1.0%		•			

Table 6. Mean values of pH (n=4) and coefficient of variation (%) for pH declines observed in Expts. E and F during *Daphnia magna* 48h acute, static toxicity tests on three pH-adjusted effluent samples (Trials 4-6, April 4, and May 12, 1997) from the INCO-Copper Cliff Waste Water Treatment Plant.

PH AT ELAPSED TIMES DURING TOXICITY TESTS

		Daphnia	Experin	nent E	Daphnia Experiment F			
Sample	Target pH	0h	24h	48h	0h	24h	48h	
TRIAL 4	7.6	7.4 1.8%	7.3 0.7%	7.2 0.4%	7.2 1.4%	7.2 0.4%	7.1 0.6%	
	8.7	8.1 1.8%	7.8 1.7%	7.5 1.2%	7.9 0.6%	7.7 1.5%	7.4 1.5%	
	9.1	8.7 0.8%	8.5 1.6%	8.0 2.5%	8.6 1.3%	8.4 1.4%	7.9 1.5%	
	N/A	9.8 0.5%	9.5 1.6%	9.1 2.2%	9.7 0.5%	9.6 1.1%	9.2 1.4%	
TRIAL 5	7.6	7.4 4.4%	7.3 4.1%	7.1 3.4%	7.0 2.3%	6.9 1.6%	6.9 1.5%	
	8.7	8.3 1.4%	8.1 1.0%	7.7 1.6%	8.2 1.8%	7.9 1.5%	7.5 1.3%	
	9.1	8.8 0.5%	8.5 1.2%	8.2 3.4%	9.0 1.7%	8.6 1.3%	8.3 1.4%	
	N/A	10.3 0.3%	10.1 1.1%	9.8 2.0%	10.3 0.9%	10.1 1.2%	10.0 2.0%	
TRIAL 6	7.6	7.5 2.7%	7.3 2.3%	7.2 0.9%	7.2 1.6%	7.1 0.9%	7.2 0.7%	
	8.7	8.4 1.2%	7.9 1.0%	7.5 1.6%	8.0 2.5%	7.7 1.4%	7.5 9.5%	
	9.1	8.9 0.9%	8.5 1.6%	8.2 2.0%	8.6 1.0%	8.3 1.6%	7.9 1.7%	
	N/A	9.9 0.9%	9.5 1.6%	9.2 1.9%	9.6 0.9%	9.4 1.3%	9.2 0.2%	

Thus, it was apparent that interpretation of mortalities in the two test organisms should be examined separately.

3.3.4 Mortality and pH

Since pH declines usually occurred during the progress of a toxicity test, and mortalities confirmed were determined at widely separated time intervals during each test, any observed association of pH with mortality rates could not be highly accurate. Nevertheless, for rainbow trout, the data indicated that 50% or greater mortality would be observed whenever pH at t=0 was approximately 9.5 or higher (Figure 9). For *Daphnia* tests, the possible relationship between pH and mortality was examined using the median pH for the selected time frame of 0h - 48h. Thus, it was interpolated that a pH of approximately 9.0 or higher would be associated with *Daphnia* mortality rates of 50% or greater in both filtered and non-filtered effluents (Figure 10).

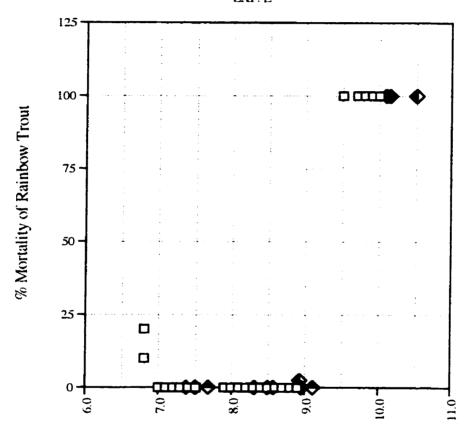
3.3.5 Ammonia and toxicity

Non-ionized ammonia was not determined by direct chemical analysis, but by indirect calculations that requires data on temperature, pH, and total ammonia/ium (Emerson et al. 1975). These particular parameters were routinely recorded throughout each bioassay, hence the Emerson equation could be applied to all circumstances and the expected concentration of free ammonia was calculated for each individual trout and Daphnia test.

Sample temperature (+/- 1.0 °C, Appendix B) did not differ significantly throughout the toxicity tests. Therefore, temperatures of 15 °C for trout and 20 °C for Daphnia were used in the Emerson equation. As expected, total ammonia/ium varied significantly from trial to trial. Also comparisons of pre-test with post-test data on total ammonia/ium suggested that total ammonia/ium concentrations changed little if any during the bioassays (Appendix I, II, VII, and IX). Thus, it seemed most suitable to use the means obtained from initial ammonia/ium data based on total concentrations for each separate trial to calculate non-ionized ammonia (Table 1a).

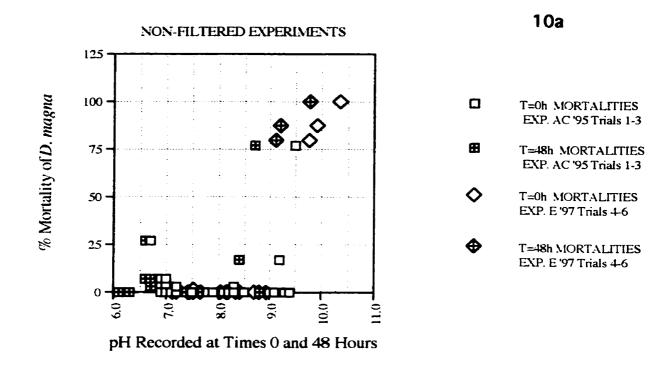
Figure 9. Scattergram of results from 96h rainbow trout static toxicity tests on CCWWTP effluents (fall 1995 and spring 1997), showing the relationship between mean mortality rate and mean effluent pH at elapsed time of 0h. Data on pH is plotted for experiments A, B, and C (n=1, '95) and E (n=4, '97).

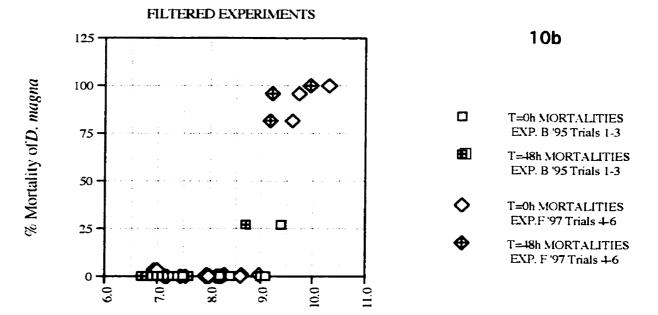
- MORTALITIES '95 EXP. ABC Trials 1-3
- TRIALA '97 MORTALITIES EXP. E
- TRIAL 5 '97 MORTALITIES EXP. E
- TRIAL 6 '97 MORTALITIES EXP. E



pH recorded at time 0 hours

Figure 10. Scattergram of results from 48h D. magna static toxicity tests on CCWWTP effluents (fall 1995 and spring 1997), showing the relationship between mean mortality rate and mean effluent pH at elapsed times of 0h and 48h. Data is plotted for both non filtered [experiments A and C (n=1, '95) and E (n=4, '97)] and filtered (0.45 μ m) effluent samples [experiments B (n=1, '95) and F (n=4, '97)].





pH Recorded at Times 0 and 48 Hours

Values of pH representing the periods critical to mortality and stress (0h for trout; 0h and 48h for *Daphnia*) were used to calculate ammonia exposure concentrations. Based on calculations, elevated levels of ammonia were associated with high mortality rates in alkaline effluents for both trout and *Daphnia* bioassays. More specifically, 50% or higher mortality was observed in trout tests where non-ionized ammonia levels had been at or above approximately 3.0 mg/L (Figure 11). *Daphnia* toxicity showed a similar relationship between elevated ammonia in alkaline effluents and high mortality. As a result of utilizing the time frames of 0h and 48h, the median concentration of ammonia calculated was used as the predictor of toxicity. It was determined that an approximate concentration of 2.5 mg/L or higher ammonia had been associated with 50% or greater mortality in all *Daphnia* tests examined (Figure 12).

3.4 Experiment D: Aeration and Carbonate Studies

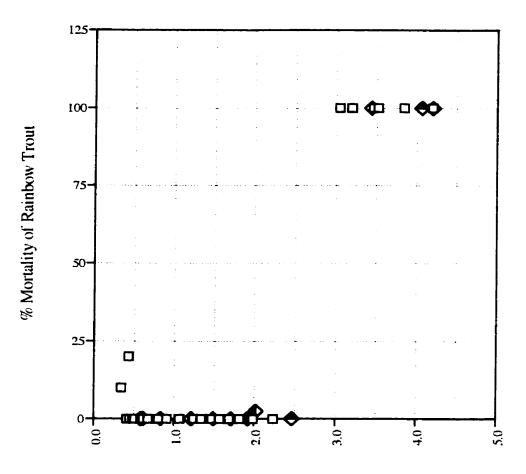
3.4.1 Quality assurance

Bulk samples taken from the Copper Cliff Waste Water Treatment facility for each trial date were determined to have an initial pH > 10.0. Trial 11 bulk effluent sample was higher in pH (11.1 @ 24 °C) than trial 10 (10.8 @ 24 °C) (Appendix XIII). Although it was not intended to ensure absolute consistency within warm and cold temperature treatments during the course of the 96 h testing period for both warm and cold adjusted samples, the temperature variation were determined to be relatively low. In fact, warm temperature samples were found to have a mean temperature of 24.0 °C (+/- 1.5 °C, n=64) for both trials 10 and 11, and cold acclimated samples had a mean temperature of 4.0 °C (+/- 2.0 °C, n=64).

Measurements of pH over the 96 h time frame for each set of replicated effluent tests (n=4) indicated highly consistent results. Other than two instances observed in cold adjusted samples which were subjected to regular air (standard error 0.13 and 0.16 pH units), the standard error for pH was determined to be < 0.1 pH units (n=4) in all other time frames for the two temperature modified treatments.

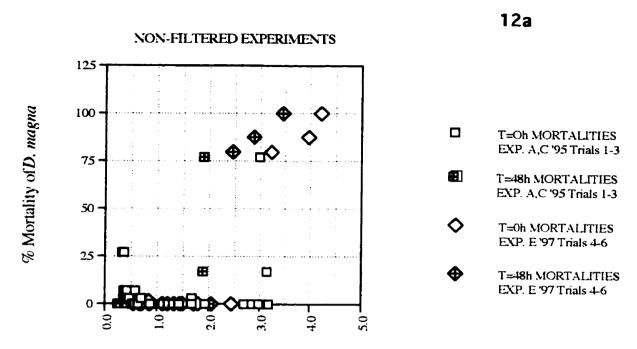
Figure 11. Scattergram of results from 96h rainbow trout static toxicity tests on CCWWTP effluents (fall 1995 and spring 1997), showing the relationship between mean mortality rate and the calculated mean concentration of non-ionized ammonia at elapsed time of 0h. Data on non-ionized ammonia is plotted for experiments A, B, and C (n=1, '95) and E (n=4, '97).

- MORTALITIES '95 ABC Trials 1-3
- TRIAL 4 '97 MORTALITIES EXP. E
- TRIAL 5 '97 MORTALITIES EXP. E
- TRIAL 6 '97 MORTALITIES EXP. E

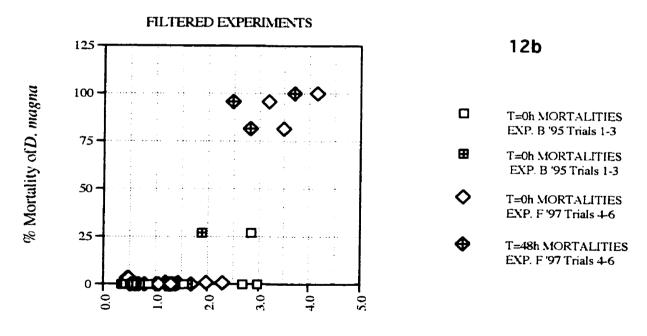


Ammonia Levels (mg/L) Calculated from time 0 Hours

Figure 12. Scattergram of results from 48h, static, *D. magna* toxicity tests on CCWWTP effluents (fall 1995 and spring 1997), showing the relationship between mean mortality rates and calculated mean concentrations of non-ionized ammonia at elapsed times of 0h and 48h. Data is plotted for both filtered [experiments A and C, (n=1, 95) and E, (n=4, 97)] and filtered $(0.45 \mu m)$ effluent samples [experiments B, (n=1, 95) and F, (n=4, 97)].



Ammonia Levels (mg/L) Calculated from Times 0 and 48 Hours



Ammonia Levels (mg/L) Calculated from Times 0 and 48 Hours

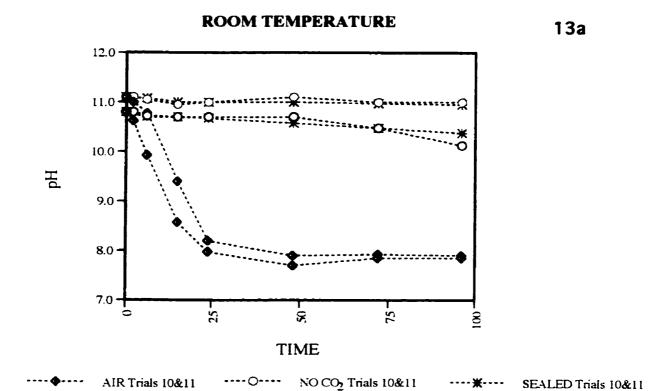
3.4.2 Examination of aerated effluents

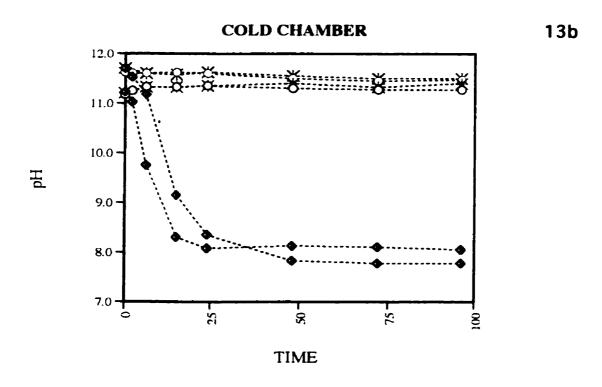
At initiation of each aeration test for warm and cold adjusted conditions, it was noted that samples at 4°C were typically 0.5 pH units higher than the warm sample counterparts (24 °C) (Figure 13). Sealed samples and those subjected to air passed through the acscarite® column showed negligible deviation in pH regardless of temperature conditions over the course 96 h for both trials. However, samples subjected to regular aeration in both temperature conditions, showed a significant decline in pH over time for the first 24 h of testing. Measurements of pH taken from 48 h onward were essentially stable at circumneutral pH levels (Figure 13).

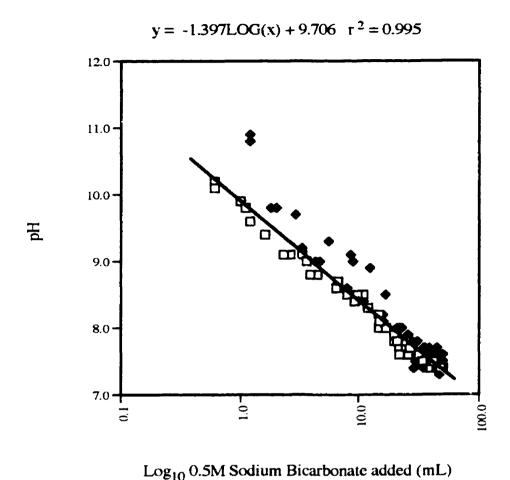
3.4.3 Examination of Carbonate titrations

Titration of alkaline effluents with 0.5 M sodium bicarbonate revealed an initial decline in pH as the amount of bicarbonate increased. As the titrations progressed, pH showed stability at circumneutral level regardless of several further additions of 0.5 M sodium carbonate to the effluent samples (Appendix XIV). A scattergram of the log₁₀ concentration of bicarbonate added to effluent samples indicated a high correlation with a decease in pH for all samples investigated. The correlation coefficient value (r²) for the relationship was determined to be 0.995 (Figure 14).

Figure 13. Measurements of pH over 96 hours for effluent samples collected from the Copper Cliff Waste Water Treatment Plant in 1998. Effluent samples were divided into replicated samples (n=4) and subjected to scaled, aerated, and carbon dioxide absent aerated samples under room temperature (24°C +/-1.5) and cold acclimated (4 °C +/-2.0) conditions. Standard error bars were <0.16 pH units.







☐ Trial 10 effluent samples (n=4) Trial 11 effluent samples (n=4)

Figure 14. Scattergram of pH measured in each 400 mL effluent sample from the CCWWTP, as 0.5M sodium bicarbonate (mL, Log_{10}) was titrated via a 50 mL burette. Replicate effluent samples (n=4) were for each of trial 10 and 11 for the dates of June 1 and July 6, 1998 respectively. Correlation coefficient $r^2=0.995$

4.0 DISCUSSION

4.1 Quality Control of Study

4.1.1 Design

INCO was interested in utilizing sulfuric acid from its local recovery systems to lower effluent pH in the most efficient manner possible, such that no toxicity test failures would occur in undiluted effluent. Past research on effluent toxicity mainly examined the toxicity in the alkaline effluents, and contrasted the results with those from pH modified effluents at neutral pH or lower (Aquatic Sciences 1995; B.A.R. Environmental Inc. 1993; Holtze et al. 1989). In these studies, however, chemical data on the experimentally altered effluents were frequently unavailable. Thus, the data recorded in previous studies, did not allow for the thorough investigation of the agents and circumstances of toxicity.

This project was designed to employ the routine procedures involved in producing data for INCO's regulatory and monitoring needs. In this manner, it was ensured the conclusions derived from this study would be relevant for understanding previous experiences with effluent toxicity. This approach was also based on the judgment that INCO's routine procedures would provide highly satisfactory data.

4.1.2 Chemical and toxicity test variability

Even though high quality data were expected from INCO's analytical laboratory and from Aquatic Sciences Inc., it was necessary to assess the quality of the data with great care, especially with regard to the magnitude of any bias in chemical and analytical observations. Through the routine use of certified reference standards, spiked, and blank samples, by the analytical staff, excellent quality assurance and control was achieved. Precision of the data was verified to be of high quality as demonstrated though low variation (< 5.0%) found by replication of effluent sample analysis (see section 3.1).

With the exception of pH and alkalinity, variation of chemistry in pH modified effluents from the same trial was found to be negligible (Appendix I and II). Confidences were increased in pre-test chemical data due to high reproducibility among replicate samples (see section 3.1). Thus, as the quality of analytical data was not in question, it was concluded that differences observed in chemical data examined among the six trials were a product of real effluent variation. Though variation was observed in pre-test to post-test comparisons for most chemical data, chemical changes were not considered relevant in understanding the causes of observed toxicity.

Assurance of quality of rainbow trout and *Daphnia magna* in bioassays were demonstrated through complete survival of test organisms in dechlorinated tap water bioassays (Appendix B). Standard reference toxicity tests using sodium chloride indicated no bias in the viability of trout and *Daphnia* used for bioassay testing. The predominance of toxicity test results that were either high (100 %) or nil (0%) in both trout and *Daphnia* tests, indicated that testing was excellent in terms of reproducibility and the lack of ambiguity in the responses (see section 3.2).

4.2 Effluent Toxicity

4.2.1 Trace heavy metals

By filtering effluent samples prior to toxicity testing, it was possible to separate soluble components in the effluent from insoluble filterable particulates. By separating particulate matter from effluent solution, it was feasible to assess possible relationships between both particulate and dissolved matter to effluent toxicity.

Most trace metal data were at or near detection limits in effluent samples and low variation among treatment pH adjustments was observed. As a result, the relationship of trace metal concentrations with mortality rates in effluent samples was difficult to assess. This difficulty was addressed in part by calculating effluent trace metal concentrations from data on metal concentrations in the filter residues extracted from larger volumes of effluent (Appendix X). Dissolved trace metals were eliminated as possible agents of toxicity because the relatively small quantities recorded were mostly found to be present in particulates (Appendix III and IV). In cases where lowered pH appeared to increase trace metal solubility no consistent tendency to increased toxicity was evident (see section 3.1.3). That is, trace metals captured in filter particulates were also eliminated as variables causing toxicity. Filtered and non-filtered alkaline effluents indicated no differences in mortality of test organisms (see section 3.2). This provided direction to examine the dissolved components in alkaline effluents, excluding dissolved trace metals, for the source(s) of toxicity

4.2.2 pH variability

By using sulfuric acid to marginally reduce the pH of alkaline effluents below the MISA maximum of 9.5, it was possible to sharply reduce toxicity of CCWWTP effluents to both rainbow trout and *Daphnia magna*. In contrast, without pH adjustments, the alkaline effluents consistently imposed a high level of toxicity on both organisms (see section 3.2). Unexplained differences in mortality rates among similar treated effluents, as observed in results of the preliminary study (Table 3, trial 1, experiments A and C, *Daphnia*) and past research [both trout and *Daphnia* (Aquatic Sciences 1995; B.A.R. Environmental Inc. 1993; Holtze *et al.* 1989)] were eliminated in the phase II study,

apparently through consistent sample handling methodology. Previous inconsistencies in mortality rates, appeared to be attributable to variability in the spontaneous declines in pH that were persistent during the time following initial pH adjustment. Through consistent sample handling methodology, major variability in the pH decline rate was eliminated among replicated toxicity tests (Tables 5 and 6). Consistent methodology, however, did not halt the spontaneous decline of pH following initial pH measurements. Because pH was not constant, it was necessary to consider which of the available pH data were most pertinent to explain toxicity (see below).

4.2.3 pH and critical periods of mortality and stress

A specific series of facts allowed for the logical selection of pH observation times most appropriate for interpreting toxicity results. In summary: i) sample pH was typically lower at initiation of toxicity tests than periods of examination prior to bioassay initiation, ii) sample pH was usually higher early in test periods than upon test termination, and iii) as a result of requested additional monitoring of both pH and the behaviour of test organisms, it was reported that the viability of both trout and *Daphnia* was being compromised at early stages of acute testing. Thus, the pH level at or immediately prior to the period most critical to organism mortality and stress was pH at t=0h for trout and pH at t=0h and 24h for *Daphnia*. Focusing on test conditions in these time periods provided a uniform method of examining effluent related toxicity.

4.2.4 Ammonia and pH related mortality

It was concluded that pH and ammonia were highly associated with effluent toxicity, and that slight lowering of effluent pH also lowered the concentration of non-ionized ammonia to concentrations which would not be expected to cause toxicity test failures [highest reported LC₅₀ value=0.697 mg/L for trout; highest reported LC₅₀ value=2.77 mg/L for *Daphnia*] (Alabaster and Lloyd 1980; Haywood 1983; Thurston *et al.* 1981a; U.S. EPA 1983). Ammonia being highly soluble (Gordon *et al.* 1972), neither total ammonia/ium nor pH should be influenced by filtration. Thus, the above conclusion was consistent with no differences being observed between mortality rates in filtered and non-filtered effluents, for either *Daphnia* or trout bioassays.

It was assumed that if ammonia was the primary agent of toxicity, species differences in mortality would be observed at specific concentrations of pH or ammonia/ium because rainbow trout and *D. magna* have different sensitivities to ammonia (Alabaster and Lloyd 1980; Haywood 1983; Thurston *et al.* 1981a; U. S. EPA 1983). It was not anticipated, however, that observed critical values of calculated ammonia [3.0 mg/L for trout and 2.5 mg/L for *Daphnia*] would be typically higher than the LC 50 values reported in the literature (Alabaster and Lloyd 1980; Haywood 1983; Thurston *et al.* 1981a; U.S. EPA 1983). These discrepancies between established incipient lethal concentrations of ammonia and values observed in the present study, are believed to be the result of several factors. Although literature articles on ammonia toxicity to rainbow trout could confirm previous findings from similar studies (Alabaster and Lloyd 1980; Haywood 1983; Thurston *et al.* 1981a), only one reference could be found for reported ammonia toxicity values for *D. magna* (U. S. EPA 1983).

Thus, the reported LC₅₀ toxic concentrations of non-ionized ammonia for the single D.

magna article could not be supported by other work.

Recall that the equation used in this study to calculate the concentration of non-ionized ammonia was based on temperature, pH, and total ammonia/ium (Emerson *et al* 1975). Temperatures measured in toxicity test were deemed sufficiently accurate and precise for use in the equation, and varied little within or among tests. Ammonia degassing during testing was apparently insignificant, since no specific pre-test to post-test trend in total ammonia/ium could be identified, and since degassing was not expected. The solubility of ammonia in water (322 mg/L at 25 °C, Gordon *et al.* 1972) is higher than any ammonia concentrations observed in this study. Hence, as neither temperature nor total ammonia/ium data were considered problematic, but pH was unstable, it was likely that only pH instability could have contributed a bias to ammonia calculations. The equation for calculating non-ionized ammonia was derived exclusively for samples in which all independent variables were stable (Emerson *et al.* 1975). Therefore, while the estimations of relevant sample pH had a logical objective basis, it was uncertain how the use of pH data from samples with unstable pH would compromise the validity of the equation.

Published data on ammonia toxicity to various organisms was generally collected from experiments performed in solutions chemically similar to those of natural surface waters (Haywood 1983). Effluent examined from the CCWWTP, on the other hand, was quite unique in its composition and chemistry. Therefore, it is also possible that elevated tolerance of organisms to ammonia could be attributable in some unknown way to the unique chemistry of the effluent. Ammonia is well known to form complexes with other chemicals and elements, including the various heavy metals present in the Copper Cliff Treatment Plant effluent (Bjerrum 1957).

Such complexes may have low acute toxicity, but the ammonia could be freed during sample analysis. This would increase the recorded total ammonia/ium concentrations and increase the apparent tolerance of trout and *Daphnia* to ammonia.

4.3 The Influence of Carbon dioxide on pH Stability

Through a series of controlled experiments, it was demonstrated that spontaneous pH declines in alkaline effluents from the CCWWTP could be halted by isolating samples from carbon dioxide, in particular, by preventing prolonged atmospheric exposure, or by the removal of carbon dioxide from aeration air. Also, the high level of similarity in data between tests conducted at near freezing and at room temperature (see section 3.4.2) suggested that biological activity was not responsible for the observed decline in pH. For example, biological oxidation of thiosalts was rejected as a factor in the declining effluent pH during toxicity testing. Further to this conclusion, background chemistry on the second trial studied (trial 11) indicated a concentration of thiosalts below the analytical detection limits (< 5mg/L) (Appendix XII). This indicated that in at least trial 11 experiments, virtually no thiosulfate was present, nor available for oxidation to sulfuric acid.

It appeared that carbon dioxide availability had a definitive influence on pH stability in highly alkaline effluents, and this influence could be rendered consistent and reproducible through ensuring uniform exposure of effluents to the atmosphere. Although not quantitatively examined, the hypothesized role of carbon dioxide availability in controlling the stability of effluent pH was supported by the absence of pH reduction in the absence of carbon dioxide. It was further supported by the occurrence of pH declines by the addition of an aqueous ion source (sodium bicarbonate) (see section 3.4.3).

4.4 Summary

It was concluded that toxicity of the Copper Cliff Waste Water Treatment Plant alkaline effluent was primarily a function of excessive non-ionized ammonia and high pH. The wide range of chemical parameters analysed made it possible to consider, and generally reject, many effluent constituents (cations, anions, and trace metals), both total and dissolved as the possible source(s) of toxicity. The findings of this study further indicated that alkaline effluents from the Copper Cliff Waste Water Treatment facility could be rendered consistently non-toxic to both rainbow trout and *Daphnia magna* by marginally adjusting effluent pH to about pH 9.0, using sulfuric acid. Low variation in chemical concentrations among replicated experimental toxicity samples clearly demonstrated that previously reported discrepancies in testing, and consequent difficulties in bioassay interpretation, could be eliminated through improved methodology in respect to aeration protocols. The present study also provided quality information to interpret and confirm the source of toxicity, and to identify the times for sample analysis that were most pertinent to organism stress.

The isolation of effluent from carbon dioxide during aeration indicated that indeed differences in pH as measured over time were due to a carbon dioxide imbalance with the atmosphere that occurred because the effluents had been highly limed for a short time (2h) prior to collection. Periodic variability and inconsistency of pH data, as observed in the preliminary study, could be eliminated by handling and aerating all replicated samples in similar fashion. Because differences in toxicity results were demonstrated to be partially attributable to pH instability, it was apparent that consideration should be given to carbon dioxide equilibrium in all bioassays on recently limed alkaline effluents.

Unless they are known to be in equilibrium with atmospheric carbon dioxide, effluents of alkaline nature should be handled to ensure consistent exposure to atmospheric carbon dioxide in order to produce consistent results in toxicity investigations. This aspect of good practise for acute static bioassay tests has not been adequately discussed in the published literature to date.

4.5 Applications to INCO

From test results, it was concluded that by adjusting alkaline effluents from the Copper Cliff Waste Water Treatment Plant, to a pH < 9.0 [lower than the lethal level for one of the most pH sensitive organisms (*Daphnia*)], INCO would be in compliance with MISA regulations (EPA 1997). This would also ensure that ammonia concentrations are below the estimated level of toxicity [2.5 mg/L for the most sensitive organism (*Daphnia*)]. Adjustment of alkaline effluent using sulfuric acid was determined to be an effective method to modify pH. If alkaline effluent is modified according to these conclusions, future toxicity should be eliminated providing that effluent chemistry is similar to what was observed in this study.

5.0 ACKNOWLEDGEMENTS

I wish to express my gratitude towards several research facilities, which were essential for the completion of this study. I truly appreciate the diligent and effective manner in which information was conveyed through the course of the study.

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Toxicity testing of the effluent, conducted by Aquatic Sciences Inc., St. Catharines, Ontario, was organized by Kim Groombridge (Project Manager). Static 96 hour rainbow trout tests and 48 hour *Daphnia magna* tests were overseen by Gillian Shriner (Laboratory Supervisor).

To conclude, I wish to thank my academic supervisor, Dr. J. R. Morris and the members of my graduate committee for the thoughtful advice and direction to achieve the final product.

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7.0 APPENDIX A (CHEMICAL ANALYSES)

Appendix I. Chemical characteristics of experimental effluent samples from the Copper Cliff Waste Water Treatment Plant prior to toxicity testing. Sample Codes indicate Trials (1-3), Experiments (A, B, C), and pH Adjustments (NA/non-adjusted, 9.3, 8.8, 8.3, 7.8). Trials 1-3 refer to sampling dates Oct. 30, Nov. 6, Nov. 13, Dec. 4, and Dec. 11, 1995. Experiment B samples were aerated and filtered $(0.45\mu m)$ prior to pH adjustment, Experiment C samples were aerated following pH adjustment but not pre-filtered, and Experiment A samples were neither pre-filtered nor aerated. Part of each sample was filtered $(0.45\mu m)$ at analysis (dissolved/Dslvd), and part was analysed without filtration (Total). Alk refers to total alkalinity, Cond. refers to specific conductivity, NHx refers to total ammonia/ium, and COD refers to chemical oxygen demand.

Sample		Ca	Mg	Na	K	Alk.	SO ₄	a	Cond.	_		COD	S ₂ O ₃
Code	Anal.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	mg/L	mg/L	mg/L
1 A-N/	A Total	481	67	138	35	42	1729	91	2296	4.1	6.0	28	10
1 A-9.	3 Total	468	66	137	35	18	1750	93	2290	4.3	6.0	18	10
1 A-8.	3 Total	489	69	143	37	14	1782	91	2286	4.1	5.7	20	10
1 A-8.	3 Total	501	70	146	37	12	1821	88	2282	4.2	5.7	18	10
1 A-7.8	3 Total	475	67	138	35	9	1765	90	2278	4.2	5.7	20	10
	A Total	500	71	148	38	40	1734	92	2276	4.2	5.5	27	10
1 B-9.3	3 Total	472	66	137	35	22	1766	92	2280	4.2	5.7	22	10
1 B-8.8	3 Total	487	68	141	36	16	1767	92	2274	4.2	5.7	25	10
1 B-8.3	3 Total	488	69	142	36	15	1730	91	2272	4.3	5.5	25	10
1 B-7.8	3 Total	489	69	144	37	13	1769	95	2268	4.3	5.7	29	10
1 C-NA	Total	489	68	140	36	37	1746	95	2266	4.1	5.5	23	10
1 C-9.3	3 Total	482	67	138	35	21	1810	95	2278	4.4	5.5	34	10
1 C-8.8	3 Total	484	68	140	36	14	1801	97	2276	4.2	5.7	29	10
1 C-8.3	3 Total	489	69	144	37	13	1811	95	2270	4.3	5.5	22	10
1 C-7.8	3 Total	491	69	142	37	12	1811	100	2266	4.5	5.5	20	10
	Total	432	70	138	38	36	1715	84	2266	4.7	7.2	40	15
	3 Total	399	64	127	35	22	1725	77	2292	5.0	7.2	31	12
	3 Total	445	72	142	39	21	1654	75	2298	4.8	7.2	38	12
	3 Total	418	68	133	37	16	1786	86	2302	4.6	7.2	40	5
	3 Total	425	68	135	37	0	1755	75	2290	4.4	7.2	43	5
	Total	438	70	138	38	40	1667	77	2346	3.9	7.0	38	15
	Total	421	68	134	37	26	1679	77	2332	4.4	7.0	36	12
	Total	452	73	146	40	21	1733	82	2314	4.1	7.0	40	12
	Total	427	69	138	38	20	1754	84	2316	3.8	7.0	38	11
	Total	453	73	144	40	17	1706	69	2316	3.9	7.2	38	10
	Total	418	68	135	37	35	1704	77	2354	4.1	7.0	38	14
	Total	432	70	136	37	22	1762	78	2336	4.5	7.0	38	11
	Total	432	70	137	37	19	1858	81	2320	4.4	7.5	38	9
	Total	423	68	132	36	10	1761	77	2316	4.1	7.5	40	5
2 C-7.8	Total	428	69	135	37	3	1886	83	2310	4.8	7.5	40	5

Sample Code A	nal.	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Alk. . mg/L	SO ₄ mg/L	Cl mg/L	Cond. µS/cm	-	- •	COD mg/L	S ₂ O ₃ mg/L
3 A-NA T	otal	452	74	136	39	40	1805	106	2384	5.1	6.8	18	22
3 A-9.3 T		461	75	139	39	36	1835	104	2448	4.5	6.8	13	21
3 A-8.8 T	otal	429	70	128	36	32	1750	102	2438	5.6	6.8	16	21
3 A-8.3 T	otal	442	72	133	38	29	1825	107	2446	4.7	6.8	20	19
3 A-7.8 T	otal	445	72	134	38	28	1780	104	2402	4.4	6.8	20	22
3 B-NA T	otal	435	71	131	37	42	1705	102	2380	4.3	6.6	25	21
3 B-9.3 T	otal	439	71	133	38	33	1695	99	2358	4.2	6.6	25	20
3 B-8.8 T	otal	414	67	124	35	26	1645	96	2339	4.2	6.3	22	19
3 B-8.3 T	otal	442	72	134	38	28	1755	102	2364	4.5	6.6	22	20
3 B-7.8 T	otal	439	71	133	38	26	1740	103	2424	5.4	6.6	25	20
3 C-NAT	otal	432	71	132	37	38	1720	101	2370	4.6	6.6	25	20
3 C-9.3 T	otal	442	72	133	37	34	1760	97	2444	4.2	6.6	25	19
3 C-8.8 T		427	70	129	36	34	1730	103	2436	5.7	6.3	27	20
3 C-8.3 T		450	73	135	38	31	1820	107	2444	4.6	6.3	25	20
3 C-7.8 T		442	72	133	38	27	1845	106	2434	5.0	6.3	20	22

Sa	ımple	•	Ca	Mg	Na	K	Alk.	SO ₄	a	Cond.	NO ₃	NH_X	COD	S ₂ O ₃
Co	ode	Anal.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μS/cm	mg/L	mg/L	mg/L	mg/L
1	A-NA	Dslvd	489	68	142	36	·							
1	A-9.3	3Dslvd	479	68	140	36								
1	A-8.8	3Dsivd	484	68	140	36								
		3Dslvd	495	69	142	36								
		3Dslvd	471	67	138	35								
		A Dslvd	476	67	139	36								
		3Dslvd	475	66	136	35								
		3Dslvd	491	68	141	36								
		3Dslvd	474	67	139	36								
		3Dslvd	497	70	145	37								
		Dolvd	487	68	140	36								
		3Dslvd	479	66	136	35								
		3Dslvd	488	69	142	37								
		3Dslvd	479	68	140	36								
1	U-7.8	3Dslvd	491	68	140	36								
2	A	Dalend	404	~~	400	00								
		NDslvd 3Dslvd	421 426	68 68	132 131	36								
		BDsivd	427	69	133	36 37								
		BDsivd	426	69	135	37								
		3Dslvd	434	70	137	38								
		Dsivd	432	70	136	37								
		3Dsivd	423	68	131	36								
		3Dslvd	445	72	140	38								
		3Dslvd	419	68	131	36								
		BDslvd	420	68	130	36								
		Dslvd	426	69	132	36								
		BDslvd	422	68	129	36								
		BDslvd	431	70	135	37								
		BDslvd	427	70	138	38								
		3Dslvd	434	71	137	38								

Sample		Ca	Mg	Na	K	Alk.	SO ₄	а	Cond.	NO ₃	NH_X	COD	S ₂ O ₃
Code	Anal.	mg/L	mg/L	mg/L	mg/L	.mg/L	mg/L	mg/L	μS/cm	mg/L	mg/L	mg/L	mg/L
3 A-NA	Dsivd	431	71	132	37		· 						
3 A-9.3	Dslvd	450	73	136	38								
3 A-8.8	Dslvd	432	70	131	37								
3 A-8.3	Dslvd	444	72	135	38								
3 A-7.8	Dslvd	427	70	129	36								
3 B-NA	Dsivd	422	69	130	37								
3 B-9.3	Dslvd	426	69	129	37								
3 B-8.8	Dslvd	404	66	123	35								
3 B-8.3	Dslvd	431	70	132	37								
3 B-7.8	Dsivd	433	71	131	37								
3 C-NA	Dslvd	448	74	138	39								
3 C-9.3	Dslvd	446	73	134	38								
3 C-8.8	Dslvd	438	72	133	37								
3 C-8.3	Dslvd	431	70	130	37								
3 C-7.8	Dslvd	432	70	130	37								

Appendix II. Chemical characteristics of experimental effluent samples from the Copper Cliff Waste Water Treatment Plant as analysed after trout toxicity testing. Sample Codes indicate Trials (1-3), Experiments (A, B, C), and pH Adjustments (NA/non-adjusted, 9.3, 8.8, 8.3, 7.8). Trials 1-3 refer to sampling dates Nov. 13, Dec. 4, and Dec. 11, 1995. Experiment B samples were aerated and filtered $(0.45\mu m)$ prior to pH adjustment, Experiment C samples were aerated after pH adjustment but not pre-filtered, and Experiment A samples were neither aerated nor pre-filtered. Part of each sample was filtered $(0.45\mu m)$ at analysis (dissolved/Dslvd), and part was analysed without filtration (Total). Alk refers to total alkalinity, Cond. refers to specific conductivity, NHx refers to total ammonia/ium, and COD refers to chemical oxygen demand.

Sample	•	Ca	Mg	Na	κ	Alk.	SO ₄	a	Cond.	NO ₃	NHx	COD	S ₂ O ₃
Code	Anal.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	μS/cm	mg/L	mg/L	mg/L	mg/L
1A-NA	Total	501	70	146	38	34	1829	83	2418	5.0	5.5	20	5
1A-9.3	Total	498	70	145	37	14	1788	115	2368	4.0	6.7	15	5
1A-8.8	Total	480	67	141	36	9	1870	102	2366	4.0	6.7	15	5
1A-8.3	Total	492	69	145	37	10	1845	124	2410	9.0	6.5	13	5
1A-7.8	Total	501	70	146	38	6	1917	123	2472	5.0	6.5	15	5
1B-NA	Total	482	68	141	36	33	1880	124	2402	4.0	6.2	13	5
1B-9.3	Total	508	71	149	38	18	1843	98	2396	7.0	6.5	20	5
1B-8.8			68	141	36	14	1894	101	2394	3.0	6.5	15	5
1B-8.3	Total	492	69	144	37	12	1892	139	2402	1.0	6.5	22	5
1B-7.8			70	146	37	9	1908	119	2400	1.0	6.5	20	5
1C-NA			69	144	37	33	1918	132	2408	5.0	5.7	11	5
1C-9.3			68	142	36	16	1916		2402	4.0	6.5	11	5
1C-8.8		-	68	142	36	15	1862	94	2410	5.0	6.7	17	5
1C-8.3			69	144	37	13	1910	120	2400	1.0	6.7	9	5
1C-7.8	Total	477	67	141	36	10	1903	134	2394	4.0	6.7	11	5
2A-NA			72	140	39	23	1820	102	2394	4.0	6.3	11	5
2A-9.3			69	134	37	15	1760	97	1184	3.6	6.8	13	6
2A-8.8		_	70	136	37	18	1795	102	2404	3.7	6.8	13	5
2A-8.3		_	69	134	37	12	1780	97	2400	3.6	6.8	13	5
2A-7.8		-	70	135	37	0	1725	93	2418	3.7	6.8	11	5
2B-NA		-	69	133	36	20	1775	100	2386	3.6	5.8	13	5
2B-9.3			71	138	38	25	1720	95	2350	3.9	6.6	20	13
28-8.8			71	137	37	22	1730	94	2404	3.4	6.8	18	13
2B-8.3			71	138	38	17	1735	99	2360	3.4	6.8	28	8
2B-7.8			68	132	36	14	1765	99	2402	3.8	6.8	18	5
2C-NA			69	135	37	16	1670	96	2338	3.7	6.1	18	5
2C-9.3			69	134	37	18	1715	97	2402	3.9	6.6	13	5
2C-8.8	Total	426	70	136	37	23	1805	101	2404	3.9	6.6	25	5

Sample Code		Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Alk. mg/L	SO ₄ mg/L		Cond. µS/cm	NO ₃ mg/L	NH _X mg/L	COD mg/L	S ₂ O ₃ mg/L	
2C-8.3	Total	425	72	139	38	 5	1740	97	2326	3.6	6.6	16	5	
2C-7.8			68	131	36	0	1800		2342	3.9	6.6	18	5	
3A-NA	Total	428	71	131	37	18	1706	83	2474	4.4	6.7	30	5	
3A-9.3			73	135	39	7	1602		2526	4.5	7.3	28	5	
3A-8.8			72	133	38	5	1567	90	2532	4.5	7.3	20	5	
3A-8.3			74	138	39	3	1547	92	2550	4.5	7.3	25	5	
3A-7.8			73	136	39	7	1567	79	2532	4.8	7.3	30	5	
3B-NA			73	136	39	4	1642	82	2496	4.1	6.0	27	5	
3B-9.3				134	38	6	1524	72	2490	4.3	7.0	24	5	
3B-8.8			71	131	38	4	1497	83	2428	4.2	7.0	31	5	
3B-8.3			72	135	38	10	1566	82	2508	4.4	7.3	32	5	
3B-7.8				140	40	4	1596	82	2522	4.4	7.3	19	5	
3C-NA			74	138	39	22	1563	80	2520	4.5	6.7	25	5	
3C-9.3				135	38	7	1594	87	2530	4.4	7.0	21	5	
3C-8.8			75	141	40	7	1582	77	2520	4.1	6.7	32	5	
3C-8.3				140	40	2	1580	84	2548	4.3	7.0	28	5	
3C-7.8			73	136	39	7	1602	77	2532	4.5	7.0	27	5	

Sample Code		Ca mg/L	•		K mg/L			Cond. µS/cm	_		
 3A-NA	Delvd	444	74	138	40	 , , <u></u> , -	 				
3A-9.3			74	138	39						
3A-8.8			75	141	40						
3A-8.3			-	136	39						
3A-7.8			71	134	38						
3B-NA			70	131	37						
3B-9.3			72	135	39						
3B-8.8			70	130	37						
3B-8.3	-		72	136	39						
3B-7.8			72	135	38						
3C-NA	Dslvd	428	72	134	38						
3C-9.3	Dslvd	431	72	134	38						
3C-8.8	Dslvd	429	72	134	38						
3C-8.3			70	132	38						
3C-7.8	Dslvd	442	74	139	40						

Appendix III. Trace metal concentrations in experimental effluent samples from the Copper Cliff Waste Water Treatment Plant prior to toxicity testing. Sample Codes indicate Trials (1 - 3), Experiments (A, B, C), and pH Adjustments (NA/non-adjusted, 9.3, 8.8, 8.3, 7.8). Trials 1-3 refer to sampling dates Nov. 13, Dec. 4, and Dec. 11, 1995. Experiment B samples were aerated and filtered $(0.45\mu m)$ prior to pH adjustment, Experiment C samples were aerated after pH adjustment but not pre-filtered, and Experiment A samples were neither pre-filtered nor aerated. Part of each sample was filtered $(0.45\mu m)$ at analysis (dissolved/Dslvd), and part was analysed without filtration (Total).

Sam	ple		Fe	Mn	Ai	Ni	Cui	Zn	Co
Cod	ie 	Anai.	mg/L						
	Blank	Total	0.007	0.000	0.008	0.009	0.084	0.005	0.005
1	A-NA	Total	0.125	0.023	0.120	0.275	0.023	0.010	0.010
1	A-9.3	Total	0.166	0.030	0.122	0.379	0.029	0.010	0.010
1	8.8-A	Total	0.149	0.032	0.119	0.393	0.026	0.010	0.010
1	A-8.3	Total	0.134	0.038	0.112	0.462	0.023	0.010	0.010
1	A-7.8	Total	0.139	0.042	0.111	0.523	0.028	0.010	0.010
1	B-NA	Total	0.013	0.001	0.097	0.057	0.002	0.010	0.010
1	B-9.3	Total	0.013	0.001	0.096	0.061	0.002	0.010	0.010
1	B-8.8	Total	0.013	0.001	0.088	0.057	0.002	0.010	0.010
1	B-8.3	Total	0.013	0.001	0.100	0.059	0.002	0.010	0.010
1	B-7.8	Total	0.013	0.001	0.107	0.059	0.002	0.010	0.010
1	C-NA	Total	0.513	0.062	0.179	0.749	0.080	0.010	0.010
1	C-9.3	Total	0.418	0.057	0.157	0.700	0.072	0.010	0.010
1	C-8.8	Total	0.160	0.035	0.128	0.429	0.026	0.010	0.010
1	C-8.3	Total	0.351	0.051	0.157	0.628	0.061	0.010	0.010
1	C-7.8	Total	0.145	0.036	0.123	0.465	0.025	0.010	0.010
	Blank	Total	0.020	0.000	0.008	0.009	0.005	0.007	0.005
2	A-NA	Total	0.216	0.030	0.168	0.276	0.057	0.035	0.012
2	A-9.3	Total	0.555	0.055	0.189	0.532	0.084	0.042	0.013
2	A-8.8	Total	0.316	0.048	0.182	0.433	0.070	0.036	0.011
2	A-8.3	Total	0.208	0.045	0.170	0.397	0.061	0.035	0.011
2	A-7.8	Total	0.309	0.054	0.177	0.486	0.073	0.040	0.015
2	B-NA	Total	0.023	0.007	0.153	0.134	0.034	0.046	0.010
2	B-9.3	Total	0.013	0.005	0.140	0.104	0.027	0.030	0.010
2	B-8.8	Total	0.013	0.007	0.145	0.124	0.032	0.032	0.010
2	B-8.3	Total	0.013	0.007	0.150	0.115	0.033	0.034	0.011
2	B-7.8	Total	0.013	0.007	0.158	0.127	0.035	0.039	0.010
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	C-NA	Total	0.176	0.029	0.160	0.286	0.096	0.039	0.010
2	C-9.3	Total	0.295	0.047	0.181	0.433	0.071	0.038	0.010
2	C-8.8	Total	0.374	0.051	0.177	0.479	0.075	0.037	0.014
2	C-8.3	Total	0.342	0.048	0.196	0.453	0.072	0.036	0.015
2	C-7.8	Total	0.284	0.048	0.188	0.445	0.070	0.037	0.012

Sample	ı		Fe	Mn	A	Ni	Cu	Zn	Co
Code		Anal.	mg/L						
	Blank	Total	0.007	0.000	0.008	0.009	0.001	0.005	0.005
3	A-NA	Total	0.557	0.077	0.261	0.783	0.101	0.013	0.013
3 3	A-9.3	Total	0.797	0.097	0.285	0.986	0.120	0.014	0.017
3	A-8.8	Total	0.458	0.067	0.239	0.682	0.081	0.010	0.012
3 3 3 3 3 3 3	A-8.3	Total	0.380	0.060	0.228	0.595	0.071	0.010	0.010
3	A-7.8	Total	0.206	0.048	0.216	0.465	0.052	0.010	0.010
3	B-NA	Total	0.013	0.003	0.208	0.135	0.018	0.010	0.010
3	B-9.3	Total	0.013	0.003	0.200	0.129	0.019	0.010	0.010
3	B-8.8	Total	0.013	0.003	0.189	0.122	0.016	0.010	0.010
3	B-8.3	Total	0.054	0.004	0.202	0.136	0.020	0.050	0.010
3 3	B-7.8	Total	0.013	0.003	0.198	0.129	0.019	0.010	0.010
3	C-NA	Total	0.216	0.034	0.210	0.356	0.046	0.010	0.013
3	C-9.3	Total	0.418	0.062	0.234	0.643	0.075	0.010	0.010
3	C-8.8	Total	0.394	0.060	0.260	0.614	0.072	0.010	0.015
3	C-8.3	Total	0.467	0.062	0.232	0.620	0.074	0.010	0.013
3	C-7.8	Total	0.460	0.067	0.232	0.693	0.083	0.010	0.010
	Blank	Dslvd	0.007	0.000	0.008	0.009	0.042	0.005	0.005
1	A-NA	Dslvd	0.013	0.001	0.135	0.019	0.002	0.010	0.010
1	A-9.3	Dslvd	0.013	0.007	0.125	0.131	0.002	0.010	0.010
1	A-8.8	Dslvd	0.013	0.014	0.114	0.211	0.002	0.010	0.010
1	A-8.3	Dslvd	0.013	0.025	0.106	0.330	0.002	0.010	0.010
1	A-7.8	Dslvd	0.013	0.037	0.113	0.437	0.012	0.010	0.010
1	B-NA	Dslvd	0.013	0.001	0.110	0.055	0.002	0.010	0.010
1	B-9.3	Dsivd	0.013	0.001	0.105	0.063	0.002	0.010	0.010
1	B-8.8	Dsivd	0.013	0.001	0.115	0.065	0.002	0.010	0.010
1	B-8.3	Dslvd	0.013	0.001	0.101	0.056	0.002	0.010	0.010
1	B-7.8	Dslvd	0.013	0.001	0.106	0.138	0.017	0.010	0.010
1	C-NA	Dslvd	0.013	0.001	0.104	0.040	0.002	0.010	0.010
1	C-9.3	Dsivd	0.013	0.006	0.101	0.135	0.002	0.010	0.010
1	C-8.8	Dslvd	0.013	0.020	0.112	0.274	0.002	0.010	0.010
1	C-8.3	Dsivd	0.013	0.025	0.105	0.328	0.002	0.010	0.010
1	C-7.8	Dsivd	0.013	0.025	0.110	0.342	0.002	0.010	0.010

Sample	Э		Fe	Mn	A	Ni	Cu	Zn	Co
Code		Anal.	mg/L						
	Blank	Dslvd	0.007	0.000	0.008	0.011	0.041	0.028	0.005
2	A-NA	Dslvd	0.013	0.001	0.163	0.052	0.034	0.034	0.011
2	A-9.3	Dslvd	0.013	0.027	0.174	0.219	0.036	0.033	0.013
2	A-8.8	Dslvd	0.013	0.029	0.175	0.236	0.038	0.047	0.013
2 2 2 2	A-8.3	Dslvd	0.013	0.038	0.170	0.325	0.047	0.036	0.012
2	A-7.8	Dsivd	0.018	0.052	0.176	0.459	0.070	0.049	0.015
2	B-NA	Dslvd	0.013	0.007	0.174	0.125	0.032	0.036	0.010
	B-9.3	Dslvd	0.013	0.006	0.172	0.114	0.032	0.036	0.014
2	B-8.8	Dslvd	0.013	0.008	0.174	0.129	0.035	0.039	0.012
2	B-8.3	Dslvd	0.013	0.007	0.181	0.122	0.035	0.037	0.010
2	B-7.8	Dslvd	0.013	0.007	0.185	0.126	0.038	0.034	0.012
2 2	C-NA	Dslvd	0.058	0.002	0.184	0.053	0.029	0.034	0.010
2	C-9.3	Dslvd	0.013	0.026	0.188	0.234	0.036	0.036	0.014
2	C-8.8	Dslvd	0.013	0.033	0.178	0.274	0.040	0.036	0.016
2	C-8.3	Dslvd	0.013	0.038	0.156	0.331	0.045	0.036	0.010
2	C-7.8	Dslvd	0.013	0.042	0.177	0.371	0.052	0.035	0.014
	Blank	Dslvd	0.007	0.000	0.008	0.009	0.010	0.005	0.005
3	A-NA	Dslvd	0.013	0.001	0.194	0.037	0.013	0.010	0.010
3	A-9.3	Dslvd	0.013	0.012	0.229	0.146	0.015	0.010	0.010
3	A-8.8	Dslvd	0.013	0.015	0.198	0.171	0.015	0.010	0.010
3	A-8.3	Dslvd	0.015	0.020	0.199	0.204	0.016	0.010	0.010
3 3	A-7.8	Dslvd	0.013	0.024	0.191	0.233	0.018	0.010	0.012
3	B-NA	Dslvd	0.013	0.003	0.194	0.134	0.016	0.010	0.010
3	B-9.3	Dslvd	0.013	0.003	0.199	0.132	0.017	0.010	0.010
3 3 3 3	B-8.8	Dslvd	0.013	0.003	0.180	0.113	0.014	0.010	0.010
3	B-8.3	Dslvd	0.104	0.004	0.206	0.205	0.020	0.010	0.051
3	B-7.8	Dslvd	0.013	0.002	0.199	0.130	0.019	0.010	0.010
3	C-NA	Dsivd	0.013	0.001	0.205	0.064	0.012	0.010	0.010
3	C-9.3	Dslvd	0.013	0.015	0.198	0.182	0.016	0.010	0.010
3	C-8.8	Dslvd	0.013	0.015	0.190	0.173	0.014	0.010	0.010
3	C-8.3	Dslvd	0.013	0.018	0.196	0.212	0.016	0.010	0.010
3	C-7.8	Dslvd	1.174	0.037	0.219	1.776	0.050	0.010	0.898

Appendix IV. Trace metal concentrations in experimental effluent samples from the Copper Cliff Waste Water Treatment Plant as analysed after trout toxicity testing. Sample Codes indicate Trials (1 - 3), Experiments (A, B, C), and pH Adjustments (NA/non-adjusted, 9.3, 8.8, 8.3, 7.8). Trials 1-3 refer to sampling dates Nov. 13, Dec. 4, and Dec. 11, 1995. Experiment B samples were aerated and filtered $(0.45\mu m)$ prior to pH adjustment, Experiment C samples were aerated following pH adjustment but not pre-filtered, and Experiment A samples were neither pre-filtered nor aerated. Part of each sample was filtered $(0.45\mu m)$ at analysis (dissolved/Dslvd), and part was analysed without filtration (Total).

Sa	mple		Fe	Mn	A	Ni	Cu	Zn	Co
C	code	Anal.	mg/L						
	Blank	Total	0.007	0.000	0.008	0.009	0.001	0.005	0.005
1	A-NA	Total	0.026	0.006	0.173	0.082	0.018	0.011	0.010
1	A-9.3	Total	0.026	0.022	0.178	0.292	0.018	0.010	0.010
1	A-8.8	Total	0.025	0.029	0.170	0.357	0.021	0.010	0.010
1	A-8.3	Total	0.020	0.035	0.169	0.426	0.021	0.011	0.010
1	A-7.8	Total	0.043	0.046	0.187	0.529	0.039	0.010	0.010
1	B-NA	Total	0.013	0.001	0.164	0.060	0.008	0.010	0.010
1	B-9.3	Total	0.013	0.001	0.172	0.072	0.010	0.010	0.010
1	B-8.8	Total	0.013	0.001	0.161	0.060	0.009	0.010	0.010
1	B-8.3	Total	0.013	0.001	0.168	0.063	0.011	0.010	0.010
1	B-7.8	Total	0.031	0.002	0.170	0.077	0.009	0.010	0.010
1	C-NA	Total	0.013	0.010	0.169	0.148	0.012	0.010	0.010
1	C-9.3	Total	0.024	0.020	0.171	0.273	0.017	0.010	0.010
1	C-8.8	Total	0.063	0.027	0.169	0.349	0.017	0.010	0.010
1	C-8.3	Total	0.075	0.031	0.170	0.391	0.020	0.023	0.010
1	C-7.8	Total	0.023	0.031	0.168	0.394	0.021	0.010	0.010
	Blank	Total	0.007	0.000	0.008	0.009	0.064	0.039	0.005
2	A-NA	Total	0.040	0.016	0.192	0.149	0.044	0.020	0.010
2	A-9.3	Total	0.028	0.038	0.189	0.308	0.025	0.010	0.015
2	8.8-A	Total	0.018	0.038	0.182	0.306	0.023	0.010	0.010
2	A-8.3	Total	0.034	0.047	0.202	0.410	0.040	0.012	0.011
2	A-7.8	Total	0.148	0.058	0.236	0.529	0.073	0.040	0.011
2	B-NA	Total	0.013	0.008	0.200	0.113	0.021	0.010	0.010
2	B-9.3	Total	0.048	0.006	0.197	0.101	0.021	0.013	0.010
2	B-8.8	Total	0.013	0.007	0.204	0.113	0.021	0.010	0.010
2	B-8.3	Total	0.013	0.007	0.191	0.112	0.022	0.010	0.010
2	B-7.8	Total	0.013	0.007	0.198	0.112	0.022	0.010	0.010
2	C-NA	Total	0.024	0.013	0.198	0.115	0.020	0.010	0.010
2 2 2 2 2 2	C-9.3	Total	0.019	0.036	0.191	0.312	0.024	0.010	0.010
2	C-8.8	Total	0.036	0.041	0.190	0.349	0.029	0.013	0.012
2	C-8.3	Total	0.025	0.051	0.215	0.452	0.051	0.010	0.012
2	C-7.8	Total	0.071	0.051	0.225	0.458	0.063	0.010	0.016

Samole		Fe	5	₹	2	ā	72	8
Code	Anal.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	∭ mg/L
7		070			0.00	,	0	
	- T	0.00	- 9		0.0	- 6	0.032	0.010
V 0-4 V 0-4 V 0-8		0.02	0.0	0.60	0.172 0.368	0.020	5 5	0.00
	- T	0.02		0.555	0.00	0.000	0.00	0.0.0
	10 to 1	10.0	0.036	0.220		0.020	0.00	0.010
2-7-8-3 3-7-8-3		0.00	440.0	0.6.0	574.0	0.020	0.00	0.070
	- L	2.00		0.66	0.00	0.027	0.00	0.010
			90.0	0.616	24 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	0.020	0.010	0.010
	- Otal	0.013	0.003	0.207	0.150	0.013	0.010	0.010
	- 0121	0.013	0.003	0.210	0.140	0.017	0.010	0.010
	lotai	0.013	0.004	0.213	0.148	0.023	0.010	0.010
	Total	0.013	0.003	0.220	0.152	0.025	0.010	0.010
	Total	6	0.050	0.213	0.225	0.021	0.010	0.010
	Total	9	0.034	0.214	0.357	0.021	0.010	0.010
C-8.8	Total	Ö		0.214		0.023	9	0.010
	Total	.02	0.043	0.226		0.030	0.010	0.010
	Total	5	0.042	0.214	0.422	0.030		0.010
Blank	Dslvd	0.007	0.000	0.008	0.00	0.019	0.005	0.005
Ą	Dslvd	0.013		0.166	0.061	0.021	0.020	0.010
1 A-9.3	Dslvd	0.013	0.020	0.165	0.279	0.014	0.014	0.010
A-8.8	Dslvd	0.013	0.028	0.174	0.416	0.022	0.015	0.010
A-8.3	Dslvd	0.013	0.034	0.167	0.449	0.023	0.016	0.010
A-7.8	Dalvd	0.040	0.045	0.175	0.542	0.039	0.014	0.010
B-NA	Dslvd	0.014	0.001	0.168	0.060	0.008	0.010	0.010
B-9.3	DajsO	0.013	0.001	0.161	0.059	0.008	0.010	0.010
B-8.8	Dslvd	0.013	0.001	0.159	0.056	0.00	0.012	0.010
B-8.3	Dalvd	0.013	0.001	0.172	0.065	0.010	0.010	0.010
B-7.8	Dslvd	0.013	0.001	0.174	0.029	0.009	0.010	0.010
¥ Ċ	Dslvd	0.022	0.009	0.168	0.146	0.010	0.010	0.010
C-9.3	Dslvd	0.013	0.018	0.165	0.253	0.013	9	0.010
C-8.8	Dslvd	0.013	0.026	0.165	33	0.015	0.010	0.010
C-8.3	Dslvd	0.013	0.028	0.158		0.021	6	0.010
	Dslvd	0.013	0.031	0.172	_	0.023	0.018	0.010
Blank	Dslvd	0.007	0.000	0.008	0.009	0.010	0.008	0.005
A-NA	Dslvd	0.035		0.193	0.120	0.031		0.010
A-9.3	Dslvd	0.013	0.037	0.201		0.025	0.010	0.010
A-8.8	Dslvd	0.013	0.037	0.209		0.023	0.010	0.012
A-8.3	Dslvd	0.013	0.047	0.206	0.409	0.041	0.013	0.010
A-7.8	Dslvd	0.142	0.059	0.310		0.078	0.018	0.013
B-NA	Dslvd	0.013	0.00	0.232		0.030	0.010	0.011
B-9.3	Dslvd	0.013	900.0	0.198		0.029	0.010	0.010
B-8.8	Dalvd	0.013	0.007	0.201		0.028	0.010	0.010
	7						,	
ייי בייני בייני				200	0 113	0000	0.10	

Sample Code Anal.		Fe	Mn	Al	N	Cu	Zn	Co	
		Anal.	mg/L						
2	C-NA	Dsivd	0.013	0.010	0.518	0.100	0.024	0.010	0.010
2	C-9.3	Dsivd	0.013	0.037	0.202	0.306	0.031	0.010	0.010
2	C-8.8	Dslvd	0.013	0.040	0.199	0.331	0.033	0.014	0.011
2	C-8.3	Dslvd	0.013	0.048	0.211	0.428	0.054	0.010	0.011
2	C-7.8	Dslvd	0.068	0.055	0.256	0.491	0.080	0.010	0.010
	Blank	Dslvd	0.013	0.001	0.015	0.018	0.002	0.010	0.010
3	A-NA	Dslvd	0.016	0.016	0.222	0.181	0.047	0.017	0.010
3	A-9.3	Dsivd	0.019	0.037	0.223	0.368	0.021	0.010	0.010
3	A-8.8	Dsivd	0.023	0.033	0.221	0.341	0.026	0.010	0.010
3	A-8.3	Dsivd	0.017	0.043	0.217	0.412	0.028	0.010	0.010
3	A-7.8	Dslvd	0.025	0.038	0.252	0.383	0.029	0.010	0.010
3	B-NA	Dslvd	0.013	0.004	0.216	0.138	0.018	0.010	0.010
3	B-9.3	Dslvd	0.014	0.003	0.229	0.143	0.010	0.010	0.010
3	B-8.8	Dslvd	0.013	0.003	0.228	0.131	0.024	0.010	0.010
3	B-8.3	Dslvd	0.013	0.003	0.210	0.151	0.026	0.010	0.010
3	B-7.8	Dsivd	0.013	0.003	0.210	0.143	0.022	0.010	0.010
3	C-NA	Dslvd	0.013	0.019	0.211	0.207	0.018	0.010	0.010
3	C-9.3	Dsivd	0.013	0.034	0.209	0.361	0.019	0.010	0.010
3	C-8.8	Dslvd	0.021	0.030	0.208	0.321	0.019	0.010	0.010
3	C-8.3	Dslvd	0.040	0.040	0.213	0.387	0.029	0.010	0.010
3	C-7.8	Dslvd	0.013	0.043	0.222	0.434	0.026	0.010	0.010

A15
Appendix V. Amount of 10% dilution of sulfuric acid added in mLs for samples that were adjusted to a pH target of 9.3, 8.8, 8.3, 7.8, and not adjusted (NA) for experiments A, B, and C. Values of pH were recorded upon initial pH adjustment, 36 h after pH adjustments at Copper Cliff, and upon return of samples after completion of bioassay tests (post). Trials 1-3 effluents were collected on Nov. 13, Dec. 4, and Dec. 11 of 1995 respectively. X in data set indicates missing values.

Trial& Expt.	Target pH	Dilute Acid Added (mL)	рН	pH (36 h)	pH (post)
1 A	NA	0.0	10.4	9.9	7.6
1 A	9.3	3.6	9.3	8.8	6.6
1 A	8.8	4.2	8.8	8.2	6.4
1 A	8.3	4.2	8.3	7.1	6.4
1 A	7.8	4.8	7.0	6.8	7.6
1 B	NA	0.0	10.4	9.8	7.1
1 B	9.3	2.6	9.2	8.9	6.9
1 B	8.8	3.6	8.7	8.3	6.5
1 B	8.3	3.7	8.3	7.7	6.5
1 B	7.8	4.0	7.3	7.1	6.4
1 C	NA	0.0	10.4	9.8	7.3
1 C	9.3	3.3	9.3	8.8	6.7
1 C	8.8	4.2	8.7	7.8	6.9
1 C	8.3	4.4	8.0	7.3	6.8
1 C	7.8	4.3	7.0	7.3	6.6
2 A	NA	0.0	X	9.7	6.9
2 A	9.3	3.5	X	8.3	6.7
2 A	8.8	4.0	X	8.3	6.8
2 A	8.3	4.2	X	7.5	6.5
2 A	7.8	4.7	X	6.7	3.9
2 B	NA	0.0	10.0	9.6	6.8
2 B	9.3	3.0	9.2	8.7	7.1
2 B	8.8	3.7	8.1	7.6	7.2
2 B	8.3	4.0	7.5	7.4	7.1
2 B	7.8	4.4	7.6	7.0	6.9
2 C	NA	0.0	X	9.6	7.1
2 C	9.3	3.5	X	8.2	6.7

Trial& Expt.	Target pH	Dilute Acid Added (mL)	рН	pH (36 h)	pH (post)
2.0	0.0	4.0			
2 C	8.8	4.0	X	7.7	6.9
2 C	8.3	4.2	X	7.3	5.8
2 C	7.8	4.6	X	7.3	4.2
3 A	NA	0.0	X	9.8	6.0
3 A	9.3	3.0	X	9.1	5.3
3 A	8.8	3.5	X	8.9	5.5
3 A	8.3	3.8	X	8.7	5.4
3 A	7.8	4.3	X	8.5	5.8
3 B	NA	0.0	X	9.7	5.4
3 B	9.3	2.8	X	8.9	5.3
3 B	8.8	3.2	X	8.2	4.9
3 B	8.3	3.6	X	8.4	5.8
3 B	7.8	4.0	X	8.2	5.0
3 C	NA	0.0	X	9.6	6.4
3 C	9.3	3.0	X	8.9	5.3
3 C	8.8	3.5	X	8.9	5.5
3 C	8.3	3.8	X	8.6	4.6
3 C	7.8	4.2	X	8.3	5.6

trial 1 initial temperature 1.0°C

trial 2 initial temperature 1.0°C

trial 3 initial temperature 0.5°C

trial 1 initial dissolved oxygen not available trial 2 initial dissolved oxygen 10.2 mg/L trial 3 initial dissolved oxygen 12.0 mg/L

A17 Appendix VI. Chemical characteristics of effluent samples (Trials 4-6) collected from the Copper Cliff Waste Water Treatment Plant on April 28, May 5, and May 12, 1997, as determined prior to toxicity testing.

Plant on April 28, May 5, and May 12, 1997, as determined prior to toxicity testing.

Analyses are identified by Trial, replicate number, and subsample code number. Data classified as "diss" (dissolved) were filtered at 0.45µm prior to analyses and "total" samples were not filtered. COD refers to chemical oxygen demand, pH Lab denotes pH when analyses were started, and Cond. indicates specific conductivity. Total alkalinity is denoted by Alk.(t), and phenolphthalein alkalinity by Alk.(p). NHx indicates total ammonia /ammonium concentrations.

Trial Repl. Code		Ca mg/L	Na mg/L	Mg mg/L	K mg/L	NO3 mg/L	CI mg/L	SO4 mg/L	S2O3 mg/L	COD mg/L	pH Lab mg/L	cond uS/cm	Alk. (p) mg/L	Alk. (t) mg/L	NHx mg/L
4.1-1	total	328	98	67	26	7	67	1201	33	52	9.7	1984	27	48	5.6
4.2-2	total	322	98	66	26	7	73	1080	34	62	9.7	2032	26	48	5.4
4.3-3	total	322	97	66	26	7	70	1070	35	60	9.6	2034	25	47	5.4
4.4-4	total	321	98	66	26	7	69	1070	34	48	9.6	2030	25	47	5.4
4.1-5	diss	322	97	66	25	7	73	1070	35	52	9.6	2028	27	52	5.2
4.2-6	diss	299	91	62	23	7	69	1025	34	50	9.6	2028	27	52	5.4
4.3-7	diss	327	99	67	26	7	79	1035	35	55	9.6	2032	26	52	5.2
4.4-8	diss	317	97	66	25	7	71	1033	34	55	9.6	2026	25	51	5.2
5-9	total	347	108	58	25	6	84	1169	35	50	10.1	2314	40	69	5.8
5-10	total	337	104	56	23	6	76	1170	35	47	10.1	2322	40	69	5.8
5-11	total	330	103	56	23	6	81	1165	3 5	54	10.0	2310	36	67	5.8
5-12	total	337	107	57	24	6	77	1163	35	42	9.9	2312	36	68	5.8
5-13	diss	340	105	57	24	6	85	1168	35	50	10.0	2322	39	73	5.8
5-14	diss	306	115	57	26	6	80	1168	36	54	9.9	2320	37	71	5.8
5-15	diss	336	106	56	24	6	99	1161	36	52	9.9	2312	37	71	5.8
5-16	diss	344	108	58	25	6	88	1168	36	45	9.9	2324	36	71	5.8

Trial Code	Anal.	Ca mg/L	Na mg/L	Mg mg/L	K mg/L	NO3 mg/L	CI mg/L	SO4 mg/L	S2O3 mg/L	COD mg/L	pH Lab mg/L	cond us/cm	Alk. (p) mg/L	Alk. (t) mg/L	NHx mg/L
6-17	total	390	136	81	32	4	88	1377	33	53	9.7	2314	28	53	6.5
6-18	total	394	137	82	32	4	91	1359	34	53	9.6	2346	26	52	6.5
6-19	total	387	138	82	32	4	88	1363	33	49	9.6	2314	24	51	6.2
6-20	total	388	138	82	32	4	86	1368	33	53	9.6	2352	26	53	6.2
6-21	diss	3 9 2	140	8 2	32	4	95	1417	34	53	9.6	2336	27	56	6.2
6-22	diss	390	140	81	32	4	94	1416	33	49	9.6	2330	28	58	6.2
6-23	diss	386	137	80	32	4	94	1420	33	48	9.6	2322	27	56	6.0
6-24	diss	388	139	81	32	4	95	1427	33	49	9.6	2328	26	55	6.0

Trial Code	Anai	Fe mg/L	Mn mg/L	Al mg/L	Ni mg/L	Zn mg/L	Cu mg/L	Co mg/L
				<u></u>			<u></u> -	
4-1	total	0.3740	0.0189	0.1899	0.2509	0.0049	0.0560	0.0080
4-2	total	0.3709	0.0189	0.1889	0.2479	0.0049	0.0549	0.0080
4-3	total	0.3120	0.0160	0.1940	0.2189	0.0049	0.0520	0.0089
4-4	total	0.3720	0.0189	0.2010	0.2569	0.0049	0.0570	0.0049
4-5	diss	0.0065	0.0003	0.1599	0.0320	0.0049	0.0260	0.0048
4-6	diss	0.0065	0.0003	0.1609	0.0320	0.0049	0.0250	0.0049
4-7	diss	0.0065	0.0003	0.1739	0.0260	0.0049	0.0280	0.0048
4-8	diss	0.0065	0.0003	0.1679	0.0299	0.0049	0.0280	0.0048
5-9	total	0.3709	0.0219	0.1599	0.2179	0.0260	0.0480	0.0099
5-10	total	0.3339	0.0199	0.1630	0.2000	0.0049	0.0439	0.0080
5-11	total	0.3129	0.0179	0.1609	0.1819	0.0049	0.0430	0.0089
5-12	total	0.3379	0.0199	0.1650	0.1990	0.0049	0.0460	0.0109
5-13	diss	0.0130	0.0003	0.1500	0.0280	0.0049	0.0230	0.0048
5-14	diss	0.0065	0.0003	0.0549	0.0092	0.0049	0.0070	0.0048
5-15	diss	0.0065	0.0003	0.1439	0.0209	0.0049	0.0179	0.0048
5-16	diss	0.0065	0.0003	0.1459	0.0199	0.0049	0.0199	0.0048
6-17	total	0.5970	0.0450	0.2109	0.4120	0.0049	0.0850	0.0130
6-18	total	0.8360	0.0599	0.2020	0.5500	0.0049	0.0890	0.0140
6-19	total	0.9390	0.0659	0.2049	0.5960	0.0049	0.0939	0.0140
6-20	total	0.8450	0.0599	0.2049	0.5479	0.0049	0.0890	0.0140
6-21	diss	0.0109	0.0003	0.1469	0.0350	0.0049	0.0230	0.0048
6-22	diss	0.0120	0.0003	0.1529	0.0309	0.0049	0.0240	0.0048
6-23	diss	0.0080	0.0003	0.1490	0.0329	0.0049	0.0219	0.0048
6-24	diss	0.0080	0.0003	0.1379	0.0309	0.0049	0.0209	0.0048
		_						

Appendix VIII. Total ammonia/ammonium (NHx) and pH as measured in samples collected at 96h time frame of trout toxicity tests.

Values represent three trial samples from early spring 1997. Missing data for pH and ammonia/ammonium are indicated as an X.

Trial	Target pH	рH	NHx	
4	NA NA	Х	X	
4	9.1	â	4.4	
4	8.7	X	4.2	
4	7.6	X	4.6	
4	NA.	X	X	
4	9.1	X	4.6	
4	8.7	X	5.4	
4	7.6	X	5.4	
4	NA	X	X	
4	9.1	X	5.2	
4	8.7	X	5.2	
4	7.6	X	5.2	
4	NA	X	X	
4	9.1	X	5.0	
4	8.7	X	5.0	
4	7.6	X	5.0	
5 5 5 5	NA	X	X	
5	9.1	6.4	6.4	
5	8.7	6.3	6.4	
5	7.6	6.4	6.2	
5 5 5 5	NA	X	X	
5	9.1	6.1	6.2	
5	8.7	5.8	6.4	
5	7.6	5.9	6.2	
5 5 5 5	NA	X	X	
5	9.1	5.8	5.9	
5	8.7	5.9	5.9	
5	7.6	6.2	5.9	

×HN	На	Target pH	Trial
X	X	₩	S
6.2	£.3	1.6	S S S
2.9	6.2	7.8	Š
2.9	2.9	9.7	S
X	X	AN	9
9.9	£.3	1.6	9 9 9
9.9	2.8	7.8	9
9.9	9.8	9.7	9
X	X	₩	9
9.9	£.3	١.6	9 9 9
6.9	0.9	7.8	9
9.9	6·S	9.7	9
X	X	₩	9
9.9	S.8	1.6	9
9.9	£.3	7.8	9 9
9.9	£.9	9.7	a
X	X	AN	9
7 .9	₽ .8	1.6	9 9 9
9.9	£.9	7.8	9
9.9	4.8	9.7	9

		Exper	iment E	Exp	periment F	
Trial	Target pH	рΗ	NHx	Hq		
4	NA	Х	4.6	X	4.2	·····
4	9.1	X	4.6	X	4.0	
4	8.7	X	4.6	X	4.2	
4	7.6	X	4.6	X	3.9	
4	NA	X	4.4	х	4.2	
4	9.1	X	4.4	X	3.9	
4	8.7	X	4.4	Х	4.2	
4	7.6	X	4.4	Х	3.9	
4	NA	X	4.2	х	3.9	
4	9.1	X	4.4	X	3.7	
4	8.7	X	4.2	X	3.9	
4	7.6	X	4.4	Х	3.9	
4	NA	X	4.4	X	3.7	
4	9.1	X	4.4	Х	3.7	
4	8.7	X	4.4	Х	3.9	
4	7.6	X	4.2	Х	3.5	
5	NA	9.2	5.5	9.7	6.0	
5	9.1	7.4	5.2	7.7	6.0	
5 5 5	8.7	6.9	5.7	7.2	6.0	
5	7.6	6.7	5.5	6.6	5.6	
5	NA	9.4	5.5	9.7	5 .8	
5	9.1	7.1	5.5	7.9	6.0	
5 5 5	8.7	6.7	5.5	7.2	5. 6	
5	7.6	6.5	5.5	6.9	6.0	
5	NA	9.4	5.8	9.6	6.0	
5	9.1	7.5	6.3	7.8	6.3	
5 5 5 5	8.7	7.0	6.3	7.2	6.3	
5	7.6	6.8	6.3	6.9	6.3	

Trial	Target pH	Experi pH	iment E NHx	Experiment F pH NHx
5	NA 0.1	9.4	6.3	9.4 6.3
5 5 5	9.1	7.7	6.0	8.1 6.0
5	8.7	6.8	6.0	7.2 6.0
5	7.6	6.6	6.0	6.7 6.3
6	NA	8.8	5.9	8.8 5.0
6	9.1	6.5	5. 9	7.1 5.5
6	8.7	6.0	6.2	6.9 5.5
6	7.6	6.3	6.2	6.8 5.5
6	NA	8.8	5.9	9.0 5.2
6	9.1	6.7	5.9	7.6 5.5
6	8.7	6.2	5.9	7.1 5.2
6	7.6	6.3	5. 9	6.8 5.5
6	NA	8.9	5.7	9.0 5.0
6	9.1	6.6	5.9	7.4 5.2
6	8.7	6.3	5.7	7.1 5.5
6	7.6	6.3	5.7	6.9 5.2
6	NA	8.8	5.5	8.9 5.0
6	9.1	6.7	5.7	7.6 5.2
6	8.7	6.0	5.7	7.0 5.2
6	7.6	6.5	5.7	6.9 5.2

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Appendix X. Total mass of each of 11 elements found in the effluent particulates collected by filtering (0.45µm) 8L effluent samples after pH adjustment (Experiment F). Sample codes indicate Trials 4-6 and identification numbers. Trials 4-6 are samples from April 28, May 5, and May 12, 1997. Target pH is adjustment to 7.6, 8.7, 9.1, or not adjusted.

Sample Code	Target pH	Ca (mg)	Mg (mg)	Na (mg)	K (mg)	Fe (mg)	Mn (mg)	Al (mg)	Ni (mg)	Cu (mg)	Zn (mg)	Co (mg)
4-SC117	N/A	2.025	2.893	0.344	0.123	3.513	0.176	0.190	2.006	0.271	0.055	0.040
4-SC118	9.1	2.555	1.972	0.221	0.082	2.792	0.122	0.131	1.401	0.241	0.044	0.028
4-SC119	8.7	8.444	5.043	0.371	0.126	6.425	0.255	0.348	2.891	0.509	0.071	0.062
4-SC120	7.6	2.230	1.190	0.218	0.080	2.470	0.076	0.122	0.966	0.164	0.021	0.018
4-SC121	N/A	2.013	2.704	0.320	0.108	3.213	0.162	0.176	1.845	0.254	0.052	0.037
4-SC122	9.1	2.891	2.018	0.273	0.094	2.820	0.119	0.131	1.373	0.205	0.042	0.028
4-SC123	8.7	2.867	2.058	0.270	0.092	2.897	0.115	0.141	1.322	0.203	0.035	0.027
4-SC124	7.6	2.282	1.087	0.292	0.097	2.206	0.065	0.109	0.831	0.142	0.020	0.015
4-SC125	N/A	1.745	2.298	0.284	0.097	2.718	0.139	0.148	1.580	0.222	0.043	0.031
4-SC126	9.1	3.414	2.186	0.316	0.108	2.935	0.128	0.142	1.463	0.223	0.049	0.029
4-SC127	8.7	2.466	1.854	0.259	0.091	2.561	0.111	0.126	1.274	0.251	0.032	0.025
4-SC128	7.6	2.577	1.067	0.313	0.110	2.416	0.062	0.117	0.809	0.145	0.023	0.015
4-SC129	N/A	2.092	2.680	0.342	0.119	3.122	0.158	0.171	1.807	0.253	0.049	0.036
4-SC130	9.1	6.543	4.408	0.390	0.129	5.063	0.218	0.269	2.450	0.360	0.065	0.052
4-SC131	8.7	2.585	1.795	0.217	0.079	2.572	0.109	0.123	1.259	0.191	0.030	0.025
4-SC132	7.6	2.315	0.902	0.296	0.123	2.445	0.052	0.117	0.721	0.137	0.018	0.014
5-SC217	N/A	2.518	5.634	0.228	0.074	3.759	0.218	0.219	1.987	0.310	0.038	0.055
5-SC218	9.1	2.315	2.612	0.247	0.079	3.049	0.143	0.165	1.256	0.213	0.044	0.038
5-SC219	8.7	1.411	1.202	0.222	0.073	2.119	0.081	0.100	0.726	0.132	0.024	0.022
5-SC220	7.6	1,277	0.374	0.305	0.097	1.737	0.031	0.079	0.341	0.096	0.012	0.011

Sample Code	Target pH	Ca (mg)	Mg (mg)	Na (mg)	K (mg)	Fe (mg)	Mn (mg)	Al (mg)	Ni (mg)	Cu (mg)	Zn (mg)	Co (mg)
5-SC221	N/A	3.119	5.953	0.362	0.115	3.900	0.226	0.227	2.065	0.291	0.042	0.057
5-SC222	9.1	1.782	2.025	0.206	0.070	2.244	0.114	0.117	0.962	0.190	0.031	0.029
5-SC223	8.7	1.513	1.378	0.245	0.082	2.074	0.089	0.101	0.759	0.165	0.025	0.023
5-SC224	7.6	1.185	0.527	0.221	0.073	2.062	0.049	0.103	0.491	0.099	0.015	0.016
5-SC225	N/A	2.673	5.647	0.245	0.083	3.720	0.218	0.215	1.988	0.285	0.042	0.055
5-SC226	9.1	2.019	2.082	0.232	0.073	2.348	0.118	0.123	0.998	0.176	0.031	0.030
5-SC227	8.7	2.094	2.029	0.215	0.074	3.068	0.124	0.162	1.085	0.199	0.032	0.033
5-SC228	7.6	0.985	0.410	0.163	0.058	1.854	0.039	0.093	0.397	0.078	0.011	0.013
5-SC229	N/A	2.801	5.274	0.312	0.097	3.425	0.200	0.198	1.829	0.257	0.038	0.051
5-SC230	9.1	1.675	1.720	0.176	0.065	1.962	0.097	0.100	0.825	0.170	0.027	0.025
5-SC231	8.7	2.154	2.121	0.213	0.071	3.051	0.130	0.162	1.133	0.207	0.034	0.034
5-SC232	7.6	1.131	0.526	0.180	0.061	2.115	0.05	0.107	0.500	0.096	0.016	0.016
6-SC317	N/A	8.263	7.955	0.000	0.118	6.107	0.448	0.383	3.781	0.505	0.059	0.085
6-SC318	9.1	11.840	7.889	0.000	0.151	6.871	0.472	0.418	3.977	0.546	0.073	0.091
6-SC319	8.7	13.770	9.679	0.000	0.132	9.190	0.613	0.552	5.135	0.734	0.090	0.119
6-SC320	7.6	10.270	6.707	0.000	0.118	8.287	0.457	0.496	3.964	0.674	0.073	0.092

Sample Code	Target pH	Ca (mg)	Mg (mg)	Na (mg)	K (mg)	Fe (mg)	Mn (mg)	Al (mg)	Ni (mg)	Cu (mg)	Zn (mg)	Co (mg)
6-SC321	N/A	10.830	10.360	0.000	0.129	7.779	0.555	0.492	4.708	0.634	0.075	0.107
6-SC322	9.1	13.380	9.133	0.000	0.137	7.756	0.532	0.476	4.479	0.620	0.085	0.103
6-SC323	8.7	15.110	10.000	0.000	0.192	9.413	0.615	0.572	5.154	0.737	0.095	0.121
6-SC324	7.6	11.320	7.285	0.000	0.124	8.992	0.495	0.540	4.288	0.713	0.083	0.100
6-SC325	N/A	10.720	9.747	0.000	0.168	7.325	0.523	0.463	4.43	0.582	0.074	0.101
6-SC326	9.1	10.880	7.026	0.000	0.129	5. 98 5	0.419	0.370	3.513	0.483	0.069	0.081
6-SC327	8.7	11.650	7.731	0.000	0.115	7.455	0.494	0.456	4.123	0.603	0.077	0.096
6-SC328	7.6	11.010	7.211	0.000	0.124	8.507	0.490	0.519	4.185	0.687	0.081	0.098
6-SC329	N/A	6.874	5.883	0.000	0.145	4.476	0.350	0.272	2.898	0.392	0.050	0.064
6-SC330	9.1	12.500	7.968	0.000	0.122	6.898	0.480	0.420	4.015	0.554	0.080	0.092
6-SC331	8.7	12.490	8.128	0.000	0.126	7.764	0.513	0.474	4.279	0.611	0.083	0.100
6-SC332	7.6	13.390	8.559	0.000	0.152	10.000	0.567	0.612	4.854	0.801	0.092	0.115

Experiment	Trial	Code	Initial pH Target	Dilute Acid Added (mL)	Final Adjusted pH
E	4	101	na	0.0	10.3
Ε	4	102	9.1	6.5	9.1
E	4	103	8.7	7.8	8.6
E	4	104	7.6	8.6	7.6
E	4	105	na	0.0	10.4
E	4	106	9.1	6.7	9.1
E E	4	107	8.7	7.5	8.7
E	4	108	7.6	8.7	7.6
E	4	109	na	0.0	10.4
Ε	4	110	9.1	6.5	9.1
Ε	4	111	8.7	7.6	8.6
E E	4	112	7.6	8.8	7.6
E	4	113	na	0.0	10.3
E	4	114	9.1	6.5	9.1
E	4	115	8.7	7.5	8.7
E E	4	116	7.6	8.6	7.6
F	4	117	na	0.0	10.4
F	4	118	9.1	3.8	9.1
F	4	119	8.7	3.8	8.6
F	4	120	7.6	5.0	7.6
F	4	121	na	0.0	10.4
F	4	122	9.1	3.8	9.1
F	4	123	8.7	3.6	8.7
F	4	124	7.6	4.6	7.5
F	4	125	na	0.0	10.4
F	4	126	9.1	3.8	9.0
F	4	127	8.7	3.4	8.7
F	4	128	7.6	4.4	7.5
F	4	129	na	0.0	10.4
F	4	130	9.1	3.1	9.1
F	4	131	8.7	3.5	8.7
F	4	132	7.6	4.2	7.5

Experiment	Trial	Code	Initial pH Target	Dilute Acid Added (mL)	Final Adjusted pH
E	5	201	na	0.0	11.1
E E E	5	202	9.1	9.4	9.1
E	5 5 5 5	203	8.7	10.0	8.7
E		204	7.6	13.0	7.6
E	5	205	na	0.0	11.1
E	5	206	9.1	9.4	9.1
E	5	207	8.7	10.2	8.7
E	5	208	7.6	12.3	7.6
E	5	209	na	0.0	11.1
E	5	210	9.1	9.5	9.1
E E E	5	211	8.7	10.5	8.7
	5	212	7.6	12.7	7.6
E E E	5 5 5 5	213	na	0.0	11.1
E	5	214	9.1	9.4	9.1
E	5	215	8.7	10.7	8.7
E	5	216	7.6	12.3	7.5
F	5	217	na	0.0	11.1
F	5	218	9.1	5.2	9.1
F	5	219	8.7	6.3	8.6
F	5	220	7.6	6.8	7.6
F	5	221	na	0.0	11.1
F	5 5 5	222	9.1	4.4	9.1
F	5	223	8.7	5.0	8 .7
F	5	224	7.6	6.2	7.6
F	5	225	na	0.0	11.1
F	5	226	9.1	4.4	9.1
F	5	227	8.7	5.3	8.6
F	5	228	7.6	6.4	7.6
F	5	229	na	0.0	11.1
F	5	230	9.1	4.3	9.1
F	5	231	8.7	5.1	8.7
F	5	232	7.6	6.0	7.6
E	6	310	na	0.0	10.2
E	6	301	9.1	6.5	9.2
Ē	6	303	8.7	7.8	8.7
E	6	304	7.6	10.0	7.6
E	6	305	na	0.0	10.2
Ē	6	306	9.1	6.4	9.1
Ē	6	307	8.7	8.0	8.7
E	6	308	7.6	9.0	7.6

Experiment	Trial	Code	Initial pH Target	Dilute Acid Added (mL)	Final Adjusted pH
E	6	309	na	0.0	10.2
E	6	310	9.1	6.7	9.1
E	6	311	8.7	7.6	8.8
E	6	312	7.6	9.0	7.5
E	6	313	na	0.0	10.2
E	6	314	9.1	6.8	9.1
E E	6	315	8.7	8.0	8.7
E	6	316	7.6	9.2	7.5
F	6	317	na	0.0	10.2
F	6	318	9.1	4.9	9.1
F	6	319	8.7	4.6	8.7
F	6	320	7.6	5.9	7.6
F	6	321	na	0.0	10.2
F	6	322	9.1	3.1	9.1
F	6	323	8.7	4.1	8.7
F	6	324	7.6	4.7	7.6
F	6	325	na	0.0	10.2
F	6	326	9.1	3.0	9.1
F	6	327	8.7	3.9	8.6
F	6	328	7.6	4.8	7.6
F	6	329	na	0.0	10.2
F	6	330	9.1	4.3	9.1
F	6	331	8.7	3.9	8.7
F	6	332	7.6	4.7	7.5

Appendix XII. Chemical analyses of INCO/Copper Cliff Creck effluents prior to entering the Copper Cliff Waste Water Treatment Plant, and effluent sample (CCC4) exiting the treatment facility. Effluent samples, identified by the code CCC and date collected, were analysed to show both total (unfiltered) and dissolved (0.45 μm filtered) compositions. Values following "<" were below detection limits.

Sample	Date Collected	Calcium (mg/L)	Sodium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Cobalt (mg/L)	Aluminium (mg/L)	
CCC2 total CCC2 dissolved	05/05/97	304	119	101.0	28.0	0.383	2.535	
CCC3 total CCC3 dissolved	05/12/97 05/12/97	260 250	90 85	79.0 78.0	28.0 27.0	0.227	1.403	
CCC4 total	86/20/90	929	117	4.3	34.3	0.003	<0.005	
Sample	Date Collected	Iron (mg/L)	Manganese (mg/L)	Copper (mg/L)	Nickel (mg/L)	Sulfur (mg/L)	Zinc (mg/L)	\$203 (mg/L)
CCC2 total CCC2 dissolved	05/05/97	32.87	1.303	1.574 0.966	13.67	485	0.228	
CCC3 total CCC3 dissolved	05/12/97 05/12/97	17.92 6.36	1.016 0.972	0.608	8.791 7.710	471 454	0.010	
CCC4 total	26/20/90	0.22	0.008	0.038	0.095	552	600.0	<10.0

Appendix XIII. Measurements of pH and temperature over the duration of 96 h for Experiment D bulk effluent samples from the CCWWTP trials 10 and 11 from June 1 and July 6, 1998 respectively. Each trial was divided into three quadruplicate treatment groups for two temperature conditions, room temperature [24°C (+/-1.5)] and refrigerated [4°C (+/-2.0)]. Each treatment group refers to NOCO (carbon dioxide absent aerated samples), AIR (aerated samples), and SEALED samples. Additional pH data were collected post 96h for a temperature switch test (i.e. cold condition samples were room temperature acclimated and visa versa, trial 10) and for observations of pH in trial 11 samples several days afterwards (July 15**). Four temperature measurements were randomly selected from among similar temperature acclimated treatment groups and are indicated at the appropriate time frames directly below pH data from the specific treatment groups. Missing values are represented as an X in the data set.

Trial	Exp	Time	interval	0-96 ho	urs and	Temper	ature (^o	C)		
		0	2	6	15	24	48	72	96	temp. switch
10	NOCO	10.8	10.8	10.7	10.7	10.7	10.7	10.6	10.3	10.4
10	NOCO	10.8	10.8	10.7	10.7	10.7	10.7	10.4	10.0	10.1
10	NOCO	10.8	10.8	10.7	10.7	10.7	10.7	10.5	10.2	10.3
10	NOCO	10.8	10.8	10.7	10.7	10.7	10.7	10.4	10.0	10.1
10	AIR	10.8	10.6	9.7	9.7	7.7	7.7	7.8	7.8	8.2
10	AIR	10.8	10.6	10.0	10.0	7.7	7.7	7.9	7.8	8.1
10	AIR	10.8	10.7	10.0	10.0	7.7	7.7	7.9	7.9	8.3
10	AIR	10.8	10.6	10.0	10.0	7.7	7.7	7.8	7.9	8.1
10	SEALE	010.8	X	10.7	10.7	10.6	10.6	10.5	10.4	10.3
10	SEALE	010.8	X	10.7	10.7	10.7	10.6	10.5	10.4	10.4
10	SEALEI	D 10.8	X	10.7	10.7	10.7	10.6	10.5	10.4	10.4
10	SEALE	0 10.8	X	10.7	10.7	10.7	10.6	10.4	10.3	10.4
					Temne	erature (' 9 C)			
					Cirip	Jacor (
		20	22	24	24	24	25	25	25	5
		20	22	24	24	24	25	25	25	5
		20	22	24	24	24	25	25	25	5
		20	22	24	24	24	25	25	25	5

Trial	Ехр	Time	interval	0-96 ho	ours and	Tempe	rature (C	PC)			
		0	2	6	15	24	48	72	96	temp. sw	itch
10 10	NOCO NOCO	11.1 11.2	11.2 11.3	11.3 11.3	11.3 11.3	11.3 11.3	11.3 11.3	11.2 11.3	11.3 11.3	10.6 10.6	
10 10	NOCO NOCO	11.2	11.2	11.4 11.3	11.3 11.4	11.4 11.4	11.3 11.3	11.3 11.3	11.2 11.3	10.6 10.6	
10	AIR	11.2	11.1	9.7	8.4	8.1	8.1	8.2	8.1	7.8	
10 10 10	AIR AIR AIR	11.3 11.2 11.2	11.1 11.1 10.8	10.1 9.7 9.5	8.4 8.3 8.1	8.1 8.0 8.1	8.1 8.1 8.2	8.1 8.1 8.0	8.0 8.0 8.1	7.8 7.8 7.9	
10 10 10	SEALEI SEALEI SEALEI SEALEI	011.2 011.2	X X X	11.3 11.3 11.4 11.3	11.3 11.3 11.3 11.4	11.3 11.3 11.4 11.4	11.4 11.4 11.4 11.4	11.3 11.3 11.3 11.4	11.4 11.4 11.4 11.4	11.3 11.3 11.3 11.3	
				Temp	erature	(°C)					
		2 2 2	4 4 4	4 4 4	3 3 3	3 3 2	4 4 4	2 2 2	2 2 2	24 24 24	
		2	4	4	3	2	3	2	2	24 	
1	NOCO	11.1	11.1	11.0	10.9	11.0	11.1	11.0	11.0	July 15 ⁴	r*
1	NOCO NOCO	11.1 11.1 11.1	11.1 11.1 11.1	11.0 11.1 11.1	11.0 10.9 11.0	11.0 11.0 11.0	11.1 11.1 11.1	11.0 11.0 11.0	11.0 11.0 11.0	10.9 10.8 10.9	
1 1 1	AIR AIR AIR AIR	11.1 11.1 11.1 11.1	11.0 11.0 11.0 11.0	10.8 10.7 10.8 10.8	9.4 9.2 9.5 9.5	8.3 8.2 8.2 8.1	7.9 7.9 7.9 7.9	7.9 7.9 7.9 8.0	7.9 7.9 7.9 7.9	7.7 7.7 7.7 7.7	
1 1	SEALED SEALED SEALED)11.1)11.1	X X X	11.1 11.1 11.1	11.0 11.0 11.0	11.0 11.0 11.0	11.0 11.0 11.0	10.9 11.0 11.0	10.9 10.9 11.0	10.5 10.6 10.8	
1	SEALED		x	11.1	11.0	11.0	11.0	11.0	11.0	10.8	
					Tempe	erature (OC)				
		23 23 23 23	25 24 25 25	25 25 25 25	26 26 25 26	26 26 26 26	26 26 26 26	26 26 26 26	24 24 24 24	25 25 25 25	

Trial	Ехр	Time i	nterval	0-96 ho	urs and	Tempera	ature (^Q	C)		
		0	2	6	15	24	48	72	96	July 15**
11	NOCO	11.6	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.2
11	NOCO	11.6	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.2
11	NOCO	11.6	11.6	11.6	11.6	11.6	11.5	11.4	11.4	11.2
11	NOCO	11.7	11.6	11.6	11.7	11.6	11.5	11.4	11.5	11.2
11	AIR	11.7	11.5	11.1	9.5	8.4	7.8	7.8	7.7	7.6
11	AIR	11.7	11.5	11.1	9.0	8.4	7.8	7.8	7.7	7.6
11	AIR	11.7	11.6	11.2	8.8	8.3	7.8	7.8	7.9	7.6
11	AIR	11.7	11.5	11.3	9.3	8.3	7.8	7.7	7.8	7.6
11	SEALE	D 11.7	X	11.6	11.5	11.6	11.5	11.5	11.5	11.2
11	SEALE		X	11.6	11.6	11.6	11.5	11.5	11.5	11.1
11	SEALE		X	11.6	11.6	11.6	11.5	11.5	11.5	11.0
11	SEALE		X	11.6	11.7	11.7	11.5	11.5	11.5	11.1
				Tempo	erature ((° C)				
		5	8	8	6	5	6	5	4	4
		6	8	8	6	5	6	5	4	4
		5	8	8	6	5 5 5	6	5	4	4
		6	8	8	6	5	6	5 5	4	4

pH1	carb1 mLs	pH2	carb 2 mLs	рН3	carb3 mLs	pH4	carb4 mLs
11.3	0.0	11.2	0.0	11.2	0.0	11.2	0.0
10.1	0.6	9.8	1.1	10.2	0.6	9.9	1.0
9.6	1.2	9.1	2.6	9.4	1.6	9.1	3.3
9.1	2.3	8.8	4.5	9.0	3.6	8.5	10.9
8.8	3.9	8.5	8.0	8.7	6.7	8.0	14.9
8.6	6.5	8.3	12.0	8.5	9.8	7.8	20.0
8.4	9.3	8.0	17.0	8.2	14.8	7.7	22.0
8.1	15.0	7.6	22.0	7.9	20.0	7.7	25.0
7.8	21.1	7.6	26.0	7.8	25.0	7.6	30.1
7.7	27.0	7.6	32.0	7.6	30.0	7.5	33.0
7.5	34.0	7.5	37.0	7.5	38.0	7.5	37.0
7.5	42.0	7.5	42.0	7.4	46.0	7.4	40.0
7.4	48.0	7.4	49.0	7.4	49.0	7.4	45.0
						7.4	50.0
рН5	carb5 mLs	рН6	carb 6 mLs	рН7	carb7 mLs	рН8	carb8 mLs
11.6	0.0	11.6	0.0	11.6	0.0	11.6	0.0
10.9	1.2	9.8	1.8	9.8	2.0	10.8	1.2
9.7	2.9	9.0	4.3	9.0	4.7	9.2	3.3
9.3	5.6	9.1	8.6	8.6	8.0	8.6	7.0
9.0	9.0	8.4	11.0	8.4	11.0	8.4	10.0
8.9	12.5	8.2	15.0	8.2	16.0	8.1	16.1
8.5	16.8	7.9	19.9	8.0	21.0	8.0	22.0
8.0	23.0	7.7	24.0	7.9	26.0	7.8	28.0
7.4	29.0	7.5	30.0	7.8	31.0	7.7	35.0
7.4	34.9	7.4	35.0	7.7	36.0	7.6	40.0
7.4	43.0	7.4	40.0	7.7	39 .0	7.6	43.0
7.4	49.0	7.3	47.0	7.7	45.0	7.5	48.0
				7.6	50.0	7.5	50.0

8.0 APPENDIX B (TOXICITY REPORTS)

48 HOUR STATIC DAPHNIA MAGNA TEST

Client:

Inco Ltd.

Project Number:

L9224

Sample Type:

Copper Cliff

Sample Number:

131 - 145

Sample State:

Grab Liquid Test Number:

D270 - D284

QUALITY ASSURANCE INFORMATION

Reference Toxicant Data

Chemical Used:

Sodium Chloride

Date of Test:

November 14/95

48-hour LC50:

6305 mg/L

Warning Limits:

5911 - 7039 ma/L

Test Protocol

Biological Test Methods: Reference Methods for Determining

Acute Lethality of Effluents to Daphnia magna

Environment Canada

July 1990

Test Conditions

Test Organism:

Daphnia magna

Test Type:

Static

Test Temperature:

20+/-1C 200mL

Test Volume:

Loading Density: Photoperiod:

20mL/neonate

16 hours light/8 hours dark Dechlorinated Tap

Dilution Water:

Organism Age:

<24 hours

Stock Source:

in house cultures

Time of First Brood:

7 dava

Average Brood Size:

25 neonates

Ephippia Frequency:

Comments

The reference toxicant results show that test reproducibility and organism are within acceptable limits.

All data is scrutinized for errors.

Instruments used to monitor parameters are calibrated daily

and continuously maintained.

Reviewers

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST **EPS 1/RM/14**

Project Number:

L9224

Client:

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID: Chain of Custody #: Copper Cliff Wastewater Treatment Plant

0453

Sample Number:

Test Number:

131

Sample Date/Time:

D270 11/13/95 //-:- hrs

Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician:

K Groombridge

				Consens	SECTION SECTION		
	Sample ID:				!	SC3-A10Y	,
	Sample #:					131	
TIME	PARAMETER	CONTROL-A	CONTROL-B	CONTROL-C	100-A	100-8	100-C
	Dissolved Oxygen	8.8	8.8	8.8	9.5	9.5	9.5
	pН	7.78	7.78	7.78	9.53	9.53	9.53
0 HOURS	Temperature(C)	20.3	20.3	20.3	19.5	19.5	19.5
	Conductivity(uS)	301	301	301	2970	2970	2970
	# Immobile (10 exposed)	0	0	0 /	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# Immobile	0	0	0	3	5	6
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.3	8.3	8.2	8.5	8.5	8.5
	рН	7.59	7.61	7.58	8.71	8.72	8.72
48 HOURS	Temperature (C)	20.4	20.4	20.4	20.3	20.3	20.3
	Conductivity	302	304	303	2930	2930	2940
	# Immobile	0	0	0	0	2	<u>N</u>
	# Dead (10 exposed)	0	0	0 +	9	<u> </u>	_ (9
TAL MORTAL	LITY (10 EXPOSED)	0	0	0	9	5	9
EAN PERCEN	T MORTALITY	0%			(77%)		

RESULTS

48-HOUR RESULT:

SC3-A10Y - FAIL (77% mortality)

Brood Culture:

101695

Time to First Brood:

7 days

Average Brood Size:

24 neonates

Comments:

- effluent sub-sample numbers 131 - 145 were preserated for 120 minutes since D.O. > 100% of saturation

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM:14

Project Number:

L9224

Client:

inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Chain of Custody #:

Copper Cliff Wastewater Treatment Plant

0453

Sample Number:

Test Number:

132 - 133 D271 - D272 11/13/95 //-:- hrs

Sample Date/Time: Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician:

K Groombridge

	Sample ID:		SC3-A931	r j		SC3-ASSY	7
	Sample #:		132	i		133	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.6	9.6	9.6	9.5	9.5	9.5
	pH	8.15	8.15	8.15	7.15	7.15	7.15
0 HOURS	Temperature(C)	19.4	19.4	19.4	19.4	19.4	19.4
	Conductivity(uS)	3010	3010	3010	3020	3020	3020
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# Immobile	1	1	2	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.4	8.3	8.3	8.4	8.3	8.3
	рH	7.31	7.26	7.27	6.94	6.91	6.92
48 HOURS	Temperature (C)	20.4	20.4	20.4	20.4	20.4	20.4
	Conductivity	2950	2950	2960	2960	2960	2950
	# Immobile	0	0	o \	0	1	· o- (
	# Dead (10 exposed)	0	0	<u> </u>	0	0	o `
TAL MORTAL	LITY (10 EXPOSED)	0_	0	0	9_	0	0
EAN PERCEN	T MORTALITY	(0%)			(0%)		

RESULTS

48-HOUR RESULT:

SC3-A93Y - PASS (0% mortality)

SC3-A88Y - PASS (0% mortality)

Comments:

- 23% of daphnids floating at SC3-A93Y effluent surface

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM 14

Project Number:

L9224

Client:

inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

0453

Sample Number:

134 - 135

Test Number: Sample Date/Time: D273 - D274 11/13/95 //-:- hrs

Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician:

K Groombridge

				Concentrations	SYN		
	Sample ID:	,	SC3-A83	1		SC3-A78\	7
	Sample #:		134			135	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.4	9.4	9.4	9.4	9.4	9.4
	рH	6.91	6.91	6.91	6.73	6.73	6.73
O HOURS	Temperature(C)	19.4	19.4	19.4	19.4	19.4	19.4
	Conductivity(uS)	3020	3020	3020	3020	3020	3020
	# Immobile (10 exposed)	0	0	o .	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.4	8.4	8.4	8.4	8.4	8.4
	pН	6.65	6.70	6.72	6.57	6.57	6.56
48 HOURS	Temperature (C)	21.5	21.7	21.0	22.1	22.3	22.3
	Conductivity	2950	2960	2960	2950	2960	2900
	# Immobile	1	2	3	3	2	1
	# Dead (10 exposed)	0	1	0	4	3	1
OTAL MORTAL	LITY (10 EXPOSED)	0	1	0	4	3	1
MEAN PERCEN	T MORTALITY	3%			27%		

RESULTS

48-HOUR RESULT:

SC3-A83Y - PASS (3% mortality)

SC3-A78Y - PASS (27% mortality)

48-HCUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1-RM/14

Project Number:

L9224

Client

inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

0453

Sample Number:

Test Number:

136 - 137

Sample Date/Time:

D275 - D276 11/13/95 //-:- hrs

Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician: K Groombridge

					SV /V		
	Sample ID:		SC3-B101	r 1		SC3-8931	7
	Sample #:		136			137	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.5	9.5	9.5	9.6	9.6	9.6
	ρH	9.37	9.37	9.37	8.43	8.43	8.43
0 HOURS	Temperature(C)	19.5	19.5	19.5	19.4	19.4	19.4
	Conductivity(uS)	2990	2990	2990	3010	3010	3010
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# Immobile	1	0	0	\ 0	0	0
	# Dead (10 exposed)	0	0	0		0	0
	Dissolved Oxygen	8.6	8.6	8.5	8.4	8.4	8.3
	pΗ	8.73	6.69	8.63	7.61	7.64	7.60
48 HOURS	Temperature (C)	20.9	20.8	20.7	20.8	20.7	20.7
	Conductivity	2920	2940	2920	2940	2940	2950
	# Immobile	1	0	2	1	3	2
	# Dead (10 exposed)	2	4	2	0	0	0
OTAL MORTA	LITY (10 EXPOSED)	(3)	((2)	0	0	0
EAN PERCEN	T MORTALITY	27%			(0%)	_	

RESULTS

48-HOUR RESULT:

SC3-B10Y - PASS (27% mortality)

SC3-B93Y - PASS (0% mortality)

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Client

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #: 04

0453

Sample Number:

Test Number:

138 - 139 D277 - D278

Sample Date/Time:

11/13/95 //-:- hrs

Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician:

K Groombridge

				Concestrations.	SVN		
	Sample ID:		SC3-B881	1		SC3-863	1
	Sample #:		138			139	
ПМЕ	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.5	9.5	9.5	9.6	9.6	9.6
	pH	7.18	7.18	7.18	7.06	7.06	7.06
0 HOURS	Temperature(C)	19.5	19.5	19.5	19.5	19.5	19.5
	Conductivity(uS)	3020	3020	3020	3020	3020	3020
	# Immobile (10 exposed)	0	O	0	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	. 0	0	0
	Dissolved Oxygen	8.3	8.1	8.3	8.3	7.9	8.3
	pH	6.90	6.88	6.92	6.78	5.44	6.78
48 HOURS	Temperature (C)	20.7	20.7	20.7	20.8	20.7	20.7
	Conductivity	2970	2960	2970	2960	2970	2960
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	o	0	0
OTAL MORTAL	JTY (10 EXPOSED)	0	0	0	0	0	0
EAN PERCEN	TMORTALITY	(0%)			0%		

RESULTS

48-HOUR RESULT:

SC3-B88Y - PASS (0% mortality)

SC3-B83Y - PASS (0% mortality)

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Client

Inco Ltd

Sample Name/ID:

Copper Cliff. Ontario
Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

0453 & 0454

Sample Number:

140 - 141

Test Number:

D279 - D280

Sample Date/Time:

11/13/95 //-:- hrs

Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician:

K Groombridge

					SYN		
	Sample ID:		SC3-B78\	7	; ;	SC3-C101	7
	Sample #:		140		•	141	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-8	100-C
	Dissolved Oxygen	9.2	9.2	9.2	9.6	9.6	9.6
	рН	6.86	6.86	6.86	9.42	9.42	9.42
0 HOURS	Temperature(C)	19.6	19.6	19.6	19.5	19.5	19.5
	Conductivity(uS)	3020	3020	3020	2990	2990	2990
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.1	8.1	8.1	8.6	8.6	8.6
	рH	6.69	6.70	6.71	8.78	8.73	6.75
48 HOURS	Temperature (C)	20.9	20.7	20.6	20.9	20.9	21.0
	Conductivity	2950	2960	2970	2930	2940	2930
	# Immobile	0	0	0	·3	3	2
	# Dead (10 exposed)	o	0	0	0	0	0
TAL MORTA	LITY (10 EXPOSED)	0	0	0	٩	0	0
AN PERCEN	IT MORTALITY	(0%)]	(0%)		

RESULTS

48-HOUR RESULT:

SC3-B78Y - PASS (0% mortality)

SC3-C10Y - PASS (0% mortality)

48-HCUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1 RM 14

Project Number:

L9224

Client

Copper Cliff, Ontario

Sample Name/ID: Chain of Custody #: inco Ltd

Copper Cliff Wastewater Treatment Plant

0454

Sample Number:

Test Number:

142 - 143 D281 - D282

Sample Date/Time:

11/13/95 //-:- hrs

Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician:

K Groombridge

				and the second	YVV		
	Sample ID:		SC3-C93	7		SC3-C881	1
	Sample #:		142			143	
TIME	PARAMETER	100-A	100-8	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.7	9.7	9.7	9.3	9.3	9.3
	Hq	8.34	8.34	8.34	6.96	6.96	6.96
0 HOURS	Temperature(C)	19.5	19.5	19.5	19.6	19.6	19.6
	Conductivity(uS)	3020	3020	3020	3020	3020	3020
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# Immobile	0	0	0	0	1	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.5	8.6	8.2	8.3	8.4	8.3
	рH	7.80	7.66	7.40	6.89	6.88	6.84
48 HOURS	Temperature (C)	20.7	20.7	20.8	20.9	20.8	20.8
	Conductivity	2940	2950	2970	2960	2960	2960
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	o	0	0	0	(j.
TAL MORTA	LITY (10 EXPOSED)	٥	0	0	٥	0	1
AN PERCEN	T MORTALITY	090			33		=

RESULTS

48-HOUR RESULT:

SC3-C93Y - PASS (0% mortality)

SC3-C88Y - PASS (3% mortality)

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM:14

Project Number:

L9224

Client:

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Chain of Custody #:

Copper Cliff Wastewater Treatment Plant

0454

Sample Number:

Test Number:

144 - 145 D283 - D284

Sample Date/Time:

11/13/95 //-:- hrs

Sample Technician:

unknown

Test Date:

11/14/95// 18:00 hrs

Technician:

K Groombridge

				care tratera	LYN		
	Sample ID:		SC3-C83	Y ?		SC3-C781	1
	Sample #:		144			145	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.4	9.4	9.4	9.4	9.4	9.4
	pH	6.86	6.86	6.86	6.86	6.86	6.86
O HOURS	Temperature(C)	19.6	19.6	19.6	19.6	19.6	19.6
	Conductivity(uS)	3020	3020	3020	3030	3030	3030
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.6	20.6	20.6	20.6	20.6	20.6
24 HOURS	# !mmobile	0	0	0	0	1	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.3	8.4	5.2	8.4	8.4	8.3
	pH	6.74	6.77	6.73	6.75	6.76	6.77
48 HOURS	Temperature (C)	21.0	20.9	21.0	21.1	21.1	21.0
	Conductivity	2960	2970	2960	2960	2950	2950
	# Immobile	1	0	0	0	0	0
	# Dead (10 exposed)	0	1	1	0	1	0
TAL MORTAL	LITY (10 EXPOSED)	0	1	1	٩	1	0
EAN PERCEN	T MORTALITY	(7%)			(3%)		

RESULTS

48-HOUR RESULT:

SC3-C83Y - PASS (7% mortality)

SC3-C78Y - PASS (3% mortality)

96 HOUR STATIC RAINBOW TROUT TEST

Client:

Inco Ltd.

Project Number:

L9224

Sample Type:

Copper Cliff Grab

Sample Number: Test Number:

131 - 145 T269 - T283

Sample State:

Liquid

QUALITY ASSURANCE INFORMATION

Reference Toxicant Data

Chemical Used:

Sodium Chloride October 31/95

Date of Test: 96-hour LC50:

14890 mg/L

Warning Limits:

13459 - 15806 mg/L

Test Protocol

Biological Test Methods: Reference Methods for Determining

Acute Lethality of Effluents to Rainbow Trout

Environment Canada

July 1990

Test Conditions

Test Organism:

Rainbow Trout

Test Type:

Static

Test Temperature: Test Volume:

15+/-1C 16 litres

16 hours light/8 hours dark

Photoperiod:

Dechlorinated Tap

Dilution Water:

Organism Age:

Fingerlings

Stock Source:

Rainbow Springs Hatchery

Mean Weight:

0.13 + /- 0.02g

Comments

The reference toxicant results show that test reproducibility and organism are within acceptable limits.

All data is scrutinized for errors.

Instruments used to monitor parameters are calibrated daily

and continuously maintained.

Reviewers

ACL ATIC SCIENCES INC.

25-DUR STATIC RAINBOW TROUT TEST

Sect Number: S.---

r

L9224

Sample Name/ID: Chair of Custody €: Inco Ltd. Copper Cliff, Ontano

Copper Cliff Westerwater Treasment Plant

Sample Number: Test Number: Sample Date/Time: Sample Tech:

T200 - T275 11/13/95 // - - P/19 Unknown

131 - 137

Test Date: Technicien: 11/15/95//15 30 Nrs K Groomenage

	Sample ID:	CONTROL	SC3-A10Y	SC2-Aggy	SC3-AMEY	SC2-A63Y	SC2-A7RY	SC3-810Y	SC2-80
	Sample #:		131	132	133	134	135	126	137
TIME	PARAMETER	0	100	100	100	100	100	100	100
	Dissolved Oxygen	8.7	9.0	9.3	9.0	9.3	9.4	9.2	9.3
	pH	7.72	10.03	8.74	8.07	7.42	6.00	9.73	0.70
C HOURS	Temperature(C)	15.5	14.5	14.6	15.0	15.4	15.6	15.0	14.6
	Conductivity(uS)	206	3080	3080	3100	3000	3100	3080	3110
	# Immobile (10 exposed)	0	0	0	0	0	0		0
	Dissolved Oxygen	9.2	9.4	9.3	9.2	9.3	9.3	9.5	9.3
	pH	7.77	9.41	7.30	7.22	7.11	6.01	8.57	7.48
	Temperature (C)	15.7	15.5	15.7	15.7	15.7	15.7	15.2	15.2
4 HOURS	Conductivity	297	2900	3030	3030	3030	3040	3020	3030
	# Immobile	0	-	0	0	0	•		9
	# Deed (10 exposed)	0	10	•	•	o o		10	i
	Dissolved Oxygen	9.6	9.7	9.5	9.6	9.6	9.5		9.4
	pH	7.63	6.03	7.23	7.05	6.00	6.79	7.66	7.31
a -ours	Temperature (C)	15.6	15.0	15.8	15.7	15.7	15.6	15.1	15.2
	Conductivity	204	2900	3020	3020	3030	3030	3010	1020
	€ Immobile	٥	•	٥	0	0	0		
	# Deed (10 exposed)	0	•	0	ò	0	0 1		۵
	Dissolved Oxygen	9.4	9.6	9.5	1.5	9.6	8.4	9.7	13
	pH	7.75	8.79	7.29	7.06	7.00	6.67	7.50	7.29
2 →OURS	Temperature (C)	15.8	15.9	16.0	15.0	15.0	15.8	15.4	15.5
	Conductivity	204	2900	3020	3030	3040	3040	3020	3020
	# Immobile	0	•	٥	0	0			<u> </u>
	# Deed (10 exposed)	0		0	ō	ā	١		ō
	Dissolved Oxygen	9.7	9.6	9.4	9.4	9.5	9.7	9.7	0.7
	pH	7.73	4.90	7.28	7.67	7.02	ا ھە	7.63	7.46
-OURS	Temperature (C)	15.9	16.0	16.1	16.0	16.0	15.0	15.5	15.5
	Conductivity	200	3010	3030	3030	3050	3080	1020	3030
	# Immobile	0	•	0	0	0	•	•	•
	#gDeed (10 exposed)	0	-	0	6	٥	•	_	å

RESULTS 96-HOUR RESULT:

SC3-A10Y - FAIL (100% mortality) SC3-A80Y - PASS (0% mortality) SC3-A66Y - PASS (0% mortality)

SCI-ABIY - PASS (D's morelly)

0.34 +/- 0.10 4 een Weight: 0.21 g fat/L Loading Density:

SC3-A78Y - PASS (10% mortality) SC3-810Y - FAL (100% mortality) SC3-803Y - PASS (0% mortality)

- stress evident in samples 131, 141, 135 in <30 minutes

	8C3-A18Y	SC3-ARSY	SC3-ABBY	SC3-AG3Y	SC3-A7EY	SC3-810Y	SC3-863Y
Dissolved Oxygen (epm):	11.2	11.1	10.8	11.0	10.5	11.0	11.2
p#1:	44.3	0.15	4.00	7.81		10.13	9.13
Temperature (C):	4.0	6.0	0.6	7.0	6.7	6.0	7.9
Conductivity (uS/cm):	2970	3020	3030	3030	3030	2000	3020
Haraness (mg/L):	1615	1615	1615	1015	1015	1488	1488
Physical State:	Equid	liquid	liquid	لنبهنا	liquid	liquid	لفنجنا
Clerray:	clear	ciner	clear	clear	clear	clear	clear
Colour:	yellow	yellow	yellow	yellow	yellow	colourines	colourless
Precipitate:	yee	yes	yee	yee	yee	no	no
Oscur	nane	none	none	none	none	none	neme
Pre-coreton Time (minutes):	••	•	•••	80	60	•	•

96-HOUR STATIC RAINBOW TROUT TEST

Project Number: Client:

L9224

ince Ltd.

Sample Name/ID: Chain of Custody #: 0453 - 0454

Copper Cliff, Ontono
Copper Cliff Westerwater Treatment Plant

Sample Number: Test Number:

Sample Date/Time: Semple Tech: Test Deta: Technician:

138 - 145 T276 - T283 11/13/85 // - - Pris 11/15/95//15:30 hrs

K Groomendge

		.					
SC3-Reay	SC3-863Y	5C3-876Y	SC3-C10Y	SC3-CB3Y	SC3-CBSY	SC3-CB3Y	SC3-C78Y
130	130	140	141	142	143	144	145
100	100	100	100	100	100	100	100

	Sample ID:	5C3-866Y	SC3-863Y	SC3-878Y	SC3-C10Y	SC3-CB3Y	SC3-CBSY	SC3-CB3Y	SC3-C78
	Sample #:	130	130	140	141	142	143	144	145
TIME	PARAMETER	100	100	100	100	100	100	100	100
	Dissolved Oxygen	9.4	9.4	9.9	9.4	0.5	1.0	9.5	9.8
	ρH	7.88	7.20	7.08	9.70	8.82	7.37	7.29	7.04
O HOURS	Temperature(C)	14.6	14.7	15.2	15.0	14,4	14.2	14.2	14.5
	Conductivity(u5)	3120	3100	3110	3070	3100	3100	3100	3130
	# Immobile (10 exposed)	<u> </u>	0	•]	0	0	0	0	0
	Dissolved Oxygen	9.3	9.3	5.2	9.2	9.4	9.4	9.4	9.4
	pH	7.21	7.17	7.08	9.05	7.80	7.23	6.94	6.96
	Temperature (C)	15.2	15.2	15.4	15.2	15.1	14.8	14.7	14.7
24 HOURS	Conductivity	3030	2000	3030	3010	3030	3030	3030	3030
	# Irremphile	0	0	• \	•	0	٥	0	0
	# Deed (10 exposed)	•	0		10	0	0	•	•
	Dissolved Oxygen	●.7	9.8	9.0	9.7	9.6	0.5	8.6	9.4
	pH	7.17	7.13	7.07	8.45	7.30	7.16	6.84	6.05
IB HOURS	Temperature (C)	15.3	15.2	15.4	15.2	15.1	14.9	14.8	14.7
	Conductivity	3020	3020	3020	3010	3030	3020	3020	3020
	# Irremotivie	0	0	•	•	•	0	0	0
	# Deed (10 expense)	0	0	0		0	.0	0	0
	Discoved Oxygen	9.0	9.6	9.6	•	9.6	9.4	1.5	9.3
	PH	7.30	7.21	7.11	•	7.62	7.30	7.13	7.00
2 HOURS	Temperature (C)	15.6	15.5	15.7	•	15.4	15.3	15.0	15.0
	Conductivity	3030	3030	3010	-	3030	3030	3030	3030
	# Immobile	0	0	0	•	0	0	0	0
	# Deed (10 exposed)	0	0	<u> </u>	•	0_	0 _	0	0
	Dissolved Cirygen	8.7	9.6	9.6	•	0.0	9.4	1.5	9.7
	pH Hq	7.60	7.20	7.10 /	•	7.57	7.88	7.21	7.16
6 HOURS	Temperature (C)	15.6	15.5	15.7	•	15.5	15.3	15.2	15.0
	Conductivity	3030	3040	3030	•	3030	3030	3040	3030
	# immobile	0	٥	0	-	0	0	0	0
	# Deed (10 exposed)	0	0	•		0	•	0	0
TAL MOR	TALITY (10 EXPOSED)	0	0	0	10	0	٥	0	0

RESULTS 95-HOUR RESULT:

SCI-BASY - PASS (0% mortality) SCI-BASY - PASS (0% mortality) SCI-B7SY - PASS (0% mortality) SCS-C10Y - FAIL (100% marship)

SC3-C83Y - PASS (0% mortality) SC3-C86Y - PASS (O's mortality) SC3-C83Y - PASS (O's mortality) SC3-C78Y - PASS (O's mortality)

Mean Weight: 0.34 +/- 0.10 g Loading Density: 0.21 g figh/L

	1C3-866Y	1C3-013Y	8C3-878Y	8C3-C10Y	3C3-C83Y	SC2-CBBY	SC3-C83Y	8C3-C781
Dissolved Oxygen (spm):	11.4	11.0	11.4	11.2	11.2	11.2	11.8	11.0
pH:	0.57	7.91	7.57	10.13	8.11	7.86	7.42	7.23
Temperature (C):	7.1	7.6	7.1	7.3	7.5	7.5	7.2	7.9
Conductivity (u5/cm):	3030	3030	3030	2000	3020	3030	3030	3040
Herdness (mg/L):	1486	1405	1486	1445	1445	1445	1445	1445
Physical State:	liquid	Squid	liquid ;	liquid	liquid	liquid	إنجنا	لهنبهتا
Clarity:	clear	clear	clear	clear	clear	clear	clear	clear
Colour:	colourless	colourless	colourless	yellow	yellow	yellow	yellow	yellow
Precipitete:	no	no	no '	yes	y 00	yee	yee	700
Odour:	none	nene	none	none	none	nene	none	nene
Pre-seration Time (min):	••	e 0	6 0	60	•••	€0	6 0	•

48 HOUR STATIC DAPHNIA MAGNA TEST

Client:

Inco Ltd.

Copper Cliff

Project Number:

_9224

Sample Type:

Grab

Sample Number:

156-17C

Sample State:

Liquid

D295-D309 Test Number:

QUALITY ASSURANCE INFORMATION

Reference Toxicant Data

Chemical Used:

Sadium Chloride

Date of Test

November 20/95 6558 mg/L

48-hour LC50: Warning Limits:

4967 - 7987 mg/L

Test Protocol

Biological Test Methods: Reference Methods for Determining

Acute Lethality of Effluents to Daphnia magna.

Environment Canada

July 1990

Test Conditions

Test Organism:

Daphnia magna

Test Type:

Static

Test Temperature:

20+/-1C

Test Volume:

200mL

Loading Density:

20mL/neonate

Photoperiod:

16 hours light/8 hours dark

Dilution Water:

Dechlorinated Tap

Organism Age:

<24 hours

Stock Source:

in house cultures

Time of First Brood:

7 days

Average Brood Size:

28 neonates

Ephippia Frequency:

Comments

The reference toxicant results show that test reproducibility and organism are within acceptable limits.

All data is scrutinized for errors.

instruments used to monitor parameters are calibrated daily

and continuously maintained.

Reviewers

Landinge Final Review

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Client

Inco Ltd

Copper Cliff, Ontario

Sample Name/iD: Chain of Custody #: Copper Cliff Wastewater Treatment Plant

0452

Sample Number

Test Number:

156

Sample Date/Time:

D295 12/04/95 //-:- hrs

Sample Technician:

Test Date:

unknown

Technician.

12/06/95// 14:45 hrs K Groombridge/C Huras

	Sample ID:		SC4-A10Y							
TIME	Sample #: PARAMETER	CONTROL-A	CONTROL-B	CONTROL-C	100-A	156 100-8	100-C			
	Dissolved Oxygen	5.9	8.9	6.9	9.1	9.1	9.1			
	pH	7.85	7.85	7.85	411	9.11	9.11			
0 HOURS	Temperature(C)	20.5	20.5	20.5	20.4	20.4	20.4			
	Conductivity(uS)	299	299	299	2760	2780	27 8 C			
	# Immobile (10 exposed)	0	0	0	0	0	0			
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.9			
24 HOURS	# Immobile	0	0	0	0	0	0			
	# Dead (10 exposed)	0	0	0	6	0	0			
	Dissolved Oxygen	8.3	8.2	8.2	7.9	7.9	8.0			
	рH	8.30	8.35	8.27	LI	2.94	8.02			
48 HOURS	Temperature (C)	2.7	20.7	20.7	20.8	20.8	20.8			
	Conductivity	323	315	322	2780	2790	2780			
	# Immobile	0	0	0	0	٥	0			
	# Dead (10 exposed)	0	0	0	0	0	0			
TAL MORTAL	JTY (10 EXPOSED)	0	0	C	0	0	0			
EAN PERCEN	T MORTALITY	0%			6%					

RESULTS

48-HOUR RESULT:

SC4-A1CY - PASS (0% mortality)

Brood Culture:

110695

Time to First Brood:

7

Average Brood Siza:

30

⁻ sample 156 was preaerated for 86 minutes since D.O. >100% of saturation

48-60UR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Clent

Inco Ltd

Copper Cliff. Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

0452

Sample Number:

Test Number:

157 - 158 D296 - D297

Sample Date/Time:

12/4/95 //-:- hrs

Sample Technician:

unknown

Test Date: Technician: 12/06/95// 15:30 hrs

K Groombridge/C Huras

						AND DOUGH			
	Sample ID:		8C4-A931			SC4-ABSY			
	Sample #:		157			156			
TIME	PARAMETER	100-A	100-8	100-C	100-A	100-8	100-C		
	Dissolved Oxygen	8.9	8.9	8.9	9.1	9.1_	9.1		
	pH	7.08	(7.08 ₎	7.08	7.18	(7.15)	7.18		
0 HOURS	Temperature(C)	20.2	20.2	20.2	20.5	20.5	20.5		
	Conductivity(uS)	2610	2610	2810	2810	2810	2610		
	# immobile (10 exposed)	0	0	0	0	0	0		
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.0		
24 HOURS	# Immobile	0	٥	0	0	•	1		
	# Dead (10 exposed)	0	00	0	0	0	0		
	Dissolved Oxygen	7.2	7.7	7.8	7.4	7.9	7.9		
	pΗ	6.97	6.90	6.99	6.19	6.96	(6.94)		
48 HOURS	Temperature (C)	20.8	20.8	20.5	20.9	20.9	20.9		
	Conductivity	2610	2820	2810	2800	2810	2800		
	# Immobile	0	0	0	\$	0	0		
	# Dead (10 exposed)	0	0	0	0	•	0		
TAL MORTA	LITY (10 EXPOSED)	0	0	0	0	1	0		
EAN PERCEN	T MORTALITY	0%			3.3%				

RESULTS

48-HOUR RESULT:

SC4-A93Y - PASS (0% mortality)

SC4-A88Y - PASS (3.3% mortality)

Comments:

- Sample 157 preserated 120 minutes since D.O. > 100% air saturaion.
- Sample 158 preserated 85 minutes since D.O. > 100% air saturaion.

Rom

48-HOLF STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST

EPS 1/RM/14

Project Number: Client.

L9224 Inco Ltd

Sample Number: Test Number:

159 - 160 D296 - D299

Samble Name/ID:

Copper Cliff, Ontario Copper CIM Wastewater Treatment Plant Sample Date/Time: Sample Technician: 12/04/95 //-:- hrs

unknown

Chain of Custody #:

0452

Test Date: Technician: 12/06/95// 15:30 hrs K Groombridge/C Huras

				THE COMPANY STANCE	049 ZUEC		WEAT BILLIONES	2
	Sample ID:		SC4-A891			8C4-A78Y		H (-1
	Sample # :		159			160		
TIME	PARAMETER	10C-A	100-B	100-C	100-A	100-B	100-C	
	Dissolved Oxygen	9.1	9.1	9.1	9.2	9.2	9.2	
	pH	6.99	6.99	6.99	6.76	6.76	6.76	
O HQURS	Temperature(C)	20.3	20.3	20.3	20.3	20.3	20.3	
	Conductivity(uS)	2 820	2620	2820	2810	2510	2810	
	# Immobile (10 exposed)	0	0	0	0	0	C	
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.0	
24 HOURS	# Immobile	0	1	0	0	0	0	
	# Dead (10 exposed)	0	0	0	0	0	0	
	Dissolved Oxygen	7.0	7.5	7.1	3.7	4.6	4.4	_
	pH	6.62)	6. 65	6.62	4.38	4.35	4.18	
48 HOURS	Temperature (C)	20.8	20.8	20.6	20.8	20.8	20.8	
	Conductivity	2790	2800	2760	2780	2610	2510	
	# immobile	0	0	0	4	0	0	
	# Dead (10 exposed)	L	_ •	0	1	0		
TOTAL MORTAL	LITY (10 EXPOSED)	1	1	0	1	0	0	
MEAN PERCEN	T MORTALITY	6.7%			3.3%			

RESULTS

48-HOUR RESULT:

SC4-A83Y - PASS (6.7% mortality) SC4-A78Y - PASS (3.3% mortality)

Comments:

- Samples 159, 160 preserated 120 minutes since D.C. > 100% of air saturation.

ACLATO SCIENCES INC.

48-0UF STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/FM/14

Project Number:

L9224

Client

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID: Chain of Custody #: Copper Cliff Wastswater Treatment Plant

0452

Sample Number:

Test Number:

161 - 162 D300 - D301

Sample Date/Time:

12/04/95 //-:- hrs

Sample Technician:

unknown

Test Date:

12/06/95// 14:45 hrs

Technician:

K Groombridge/C Huras

	A				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		With an and an in the lates. It has to
	Sample ID:		8 C4-8101 161			8C4-863\	•
nve	Sample #: PARAMETER	:00-A	100-B	100-C	1 00-A	162 100-8	100-C
	Dissolved Oxygen	9.0	9.0	9.0	9.0	9.0	9.0
	рН	9.10	9.10	9.10	7.30	7.30	7.30
CHCURS	Temperature(C)	20.4	20.4	20.4	20.5	20.5	20.5
	Conductivity(uS)	2790	2790	2790	2610	2810	2610
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.0
24 HOURS	# Immobile	0	0	0	0	C	0
	# Dead (10 exposed)	0	6	0	0	0	0
	Dissolved Oxygen	7.7	8.0	8.0	8.0	7.9	8.1
	pH	5.30	6.25	8.20	7.07	7.09	7.12
48 HOURS	Temperature (C)	20.8	20.8	20.8	20.8	20.8	20.8
	Conductivity	2783	2600	2780	2790	2790	2800
	# Immobile	C	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
IATROM JATO	JTY (10 EXPOSED)	0	0	0	0	0	0
IEAN PERCEN	T MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC4-B10Y - PASS (0% mortality)

SC4-B93Y - PASS (0% mortality)

Comments:

- Samples 161, 162 preserated 85 minutes since D.O.>100% of air saturation.

Run

48-HOUF STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST

EPS 1/PM/14

Project Number:

L9224

Client:

inco Ltd

Sample Name/ID:

Copper Cliff, Ontario

Chain of Custody #:

Copper Cliff Wastewater Treatment Plant

0452

Sample Number:

Test Number:

Sample Date/Time:

Sample Technician:

Test Date:

Technician:

163 - 164

D302 - C303

12/04/95 //-:- hrs

unknown

12/06/95// 14:45 hrs

K Groombridge/C Huras

	9		SC4-B961			Martiness, extension, markets, i.e.,	
	Sample ID: Sample #:		163	1		5C4-883Y	
TALE	PARAMETER	100-A	100-B	100-C	100-A	1 64 100-8	100-C
	Dissolved Oxygen	9.1	9.1	9.1	9.1	9.1	9.1
	pH	7.11	7.11	7.11	7.05	7.06	7.05
0 HCURS	Temperature(C)	20.4	20.4	20.4	20.5	20.5	20.5
	Conductivity(uS)	2810	2810	2810	2810	2810	2810
	# immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.0
24 HOURS	# immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0		0	0
	Dissolved Oxygen	7.9	5.1	6.0	7.7	7.7	7.9
	рH	7.05	7.09	6.99	6.92	6.96	7.01
48 ∺OURS	Temperature (C)	20.7	20.7	20.7	20.8	20.8	20.8
	Conductivity	2790	2790	2780	2790	2780	2780
	# Immobile	0	0	0	0	C	0
	# Dead (10 exposed)	0	0	0	0	0	0
TAL MORTA	UTY (10 EXPOSED)	0	0	0	0	0	0
AN PERCEN	MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC4-B88Y - PASS (0% mortality)

SC4-883Y - PASS (0% mortality)

Comments:

- Samples 163, 164 preaerated 85 minutes since D.O > 100% of air saturation.

48-HCU= STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/EM/14

Project Number:

L9224

Client

Inco Ltd

Copper Cliff, Onzario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

0452, 0451

Sample Number:

Test Number:

165 - 166 D304 - D305

Sample Date/Time:

12/04/95 //-:- hrs

Sample Technician:

uniknown

Test Date:

12/06/95// 15:30 hrs

Technician: K Groombridge/C Huras

			7/07/13/8A				
	Sample ID:		SC4-878\	7		8C4-C101	1
	Sample #:		165			166	
TME	PARAMETER	100-A	100-8	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.3	9.3	9.3	9.0	9.0	9.0
	pH	6.86	6.86	6.86	9.16	9.16	9.16
0 HOURS	Temperature (C)	20.2	20.2	20.2	20.7	20.7	20.7
	Conductivity(uS)	2820	2820	2620	2760	2760	2760
	# Immobile (10 exposed)	0	_0	. 0	0	0	0
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.0
24 YOURS	# Immobile	0	0	0	2	•	0
	# Dead (10 exposed)	0	0	. 0	٥	0	٥
	Dissolved Oxygen	7.9	8.1	8.0	5.1	8.1	6.1
	pH	6.88	6.87	6.85	8.15	8.55	8.44
48 ≒OURS	Temperature (C)	20.8	20.8	20.8	21,6	21.6	21.1
	Conductivity	2600	2810	2610	2780	27.50	2790
	# Immobile	0	0	0	•	5	4
	# Dead (10 exposed)	0	. 0	_ 0	0	4	T
TAL MORTAL	JTY (10 EXPOSED)	0	0	0	٥	4	1
AN PERCEN	T MORTALITY	0%			16.7%		

RESULTS

46-HCUR RESULT:

\$C4-878Y - PASS (0% mortality) 8C4-C10Y - PASS (16.7% mortality)

Comments;

- Samples 165, 166 were presented for 120 minutes since 0.0. > 100% of air saturation.

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Client:

ŧ

inco Ltd

Sample Name/ID:

Copper Cliff, Ontario

Chain of Custody #:

Copper Cliff Wastewater Treatment Plant

0451

Sample Number: Test Number:

167 - 168 D306 - D307

Sample Date/Time: Sample Technician: 12/04/95 //-:- hrs

unknown

Test Date:

12/06/95// 15:30 hrs

Technician: K Groombridge/C Huras

						7. P. S. P.	
	Sample ID:		8C4-C83			8C4-C861	1
	Sample #:		167			166	
TIME	PARAMETER	100-A	100-8	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.0	9.0	9.0	9.2	9.2	9.2
	рH	7.14	7.14	7.14	7.12	7.12	7.12
0 HOURS	Temperature(C)	20.3	20.3	20.3	20.3	20.5	20.3
	Conductivity(uS)	2810	2810	2810	2810	2810	2810
	# Immobile (10 exposed)	0	0	0	0	G	0
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.0
24 HOURS	# Immobile	0	0	0	0	O	9
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	7.9	7.6	7.8	7.9	8.1	8.0
	pH	6.93	5.86	6.88	6.91	6.94	6.91
48 HÇURS	Temperature (C)	20.9	20.9	20.9	20.9	20.9	20.9
	Conductivity	2 80 0	2810	2640	2800	2840	2 83 0
	# Immobile	٥	0	0	0	0	Q
	# Dead (10 exposed)	0		0	0	0	0
OTAL MORTAL	JTY (10 EXPOSED)	0	0	0	0	0	C
MEAN PERCEN	TMORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC4-C93Y - PASS (0% mortality) SC4-C85Y - PASS (0% mortality)

Comments:

- Samples 167, 168 were preserated for 120 minutes since D.O.>100% of air saturation.

48-HCJR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST

EPS 1/FW/14

ı

Project Number: Client.

Sample Name/ID:

Chain of Custody #:

L9224

Inco Ltd

Copper Cliff, Ontario

Copper Cliff Wastewater Treatment Plant

0451

Sample Number:

Test Number:

169 - 170 D308 - D309

Sample Date/Time:

12/04/95 //-:- hrs

Sample Technician:

unknown

Test Date:

12/05/95// 15:30 hrs

Technician:

K Groombridge/C Huras

	Sample ID:		8C4-C83		Maria Cara	8C4-C78\	
	Sample #:		160	•		170	,
TIME	PARAMETER	100-A	100-8	100-C	100-A	100-8	100-C
	Dissolved Oxygen	9. 0	9.0	9.0	9.3	9.3	9.3
	pH	6.96	6.95	6.96	6.12	6.92	6.92
2ACCH 0	Temperature (C)	20.2	20.2	20.2	20.5	20.5	20.5
	Conductivity(uS)	2 6 20	2820	2820	2610	2610	2810
	# immobile (1C exposed)	0	0	0	0	0	0
	Temperature(C)	20.0	20.0	20.0	20.0	20.0	20.0
24 HOURS	# Immobile	0	•	0	0	C	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	7.1	6.8	6.5	6.0	6.0	6.3
	pH	6.39	6.33	6.27	6.02	6.10	6.14
48 HOURS	Temperature (C)	20.8	20.8	20.8	20.8	20.8	20.8
	Conductivity	2790	2830	2800	2810	2830	2830
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	C	0	0	0	0
TAL MORTA	LITY (10 EXPOSED)	0	0	0	0	0	0
AN PERCEN	IT MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC4-C83Y - PASS (0% mortality)

SC4-C78Y - PASS (0% mortality)

Comments:

- Samples 169, 170 preserated 120 minutes since D.O.>100% of air saturation.

96 HOUR STATIC RAINBOW TROUT TEST

Client

inco Ltd.

Project Number:

L9224

Copper Cliff

Sample Number:

156 - 170

Sample Type: Sample State: Grab Liquid

T291 - T305 Test Number:

CUALITY ASSURANCE INFORMATION

Reference Toxicant Data

Chemical Used: Date of Test 96-hour LC50:

Sodium Chloride November 20/95

15232 mg/L

Warning Limits:

11365 - 19846 mg/L

Test Protocol

Biological Test Methods: Reference Methods for Determining

Acute Lethelity of Effluents to Rainbow Trout

Environment Canada

July 1990

Test Conditions

Test Organism:

Rainbow Trout

Test Type:

Static

Test Temperature:

15+/-1C

Test Volume:

16 litres

Photoperiod:

16 hours light/8 hours dark

Dilution Water:

Dechlorinated Tap

Organism Age:

Fingerlings

Stock Source:

Rainbow Springs Hatchery

Mean Weight

0.17 +/-0.01g

Comments

The reference toxicant results show that test reproducibility and organism are within acceptable limits.

All data is scrutinized for errors.

instruments used to monitor parameters are calibrated daily and continuously maintained.

Final Review

26-HOUR STATIC PAINSON TROUT TEST

Project Number: Iliant:

19224

ines LM. Copper Ciff. Ontere Copper Ciff Westwester Treatment Flant

Samule Name/ID: Chain of Custody #:

Test fourther: Seriele Dete/Ture:

150 - 182 T201 - T207 1204/86 // -- 7/3

Sample Teets: Test Date:

Unicipum 12/6/66//11:55 Pro

C Huran

	A (a 45a				T. SCALE	SCA-ASTY	SCA-ATTY	SCA-BYOY	ERCEIZ:
	Sample ID:	SOUTHOL		197	186	199	185	181	197
TIME	PANAMETUP	0	1 66 100	197	100	199	190	100	100
1146	Ludwig 1								
	Disselved Oxygen	9.4	10.0	10.0	10.9	10.1	19.0	10.9	1.01
	pél	7.77	6.72	8.21	6.10	7.25	0.00	1.00	146
O HOURS	Temperature(C)	16.0	16.2	18.1	16.6	15.0	15.4	15.1	15.1
	Conductory(u6)	200		2070	2000	2670	200	222	200
	d immubile (10 expects)	•	0		6	3	0		0
	Classified Oxygen	9.1	9.3	6.7	4.4	5.6	6.6	6.1	1.1
	get	7.55	9,61	7.82	7.40	7.12	0.02	4.06	7.01
	Temperature (5)	14.5	14.5	14.4	14.6	14.2	14.1	12.9	13.6
24 HOURS	Censuctivity	304	2000	2670	207C	参わ	2000		2040
	₹ Immabile	•	•	•	•	•	•	6	0
	# Dond (10 expense)	0	10		0	0	6	10	9
	Disserves Osygen	9.2	44	2.0	8.4	8.4	7.5	8.0	8.7
	p∺	7.00	(8.81 ·	7.17	7.11	6.93	6.17	8.00	7.32
48 HOURS	Temperature (C)	14.8	197	14.4	14.3	14.2	13.9	15.8	19.6
	Conductivity	200	2000	2000	2006	2000	2000	2900	2000
	# immebile	•	-	•	0	0	1	•	•
	# Deed (10 eagend)	٥	•	8	0	0	0		9
_	Disselved Chygan	8.0	7.8	7.7	8.0	0.0	7.5	7.0	8.0
	pH	7.70	7.80	7.20	7.17	0.02	4.00	7.05	7.20
72 HOURS	Temperature (C)	15.0	14.9	14.6	14.7	14.7	14.8	14.5	14.5
	Conductivity	207	2670	2670	2000	2000	22	2270	2000
	# Immedia	0	•	9	•	0	٥	•	9
	# Deed (10 exposed)	3	<u>•</u>	•	0	•	. 1	<u> </u>	<u> </u>
	Disselved Signer	7.5	43	7.7	7.0	7.8	7.9	6.3	7.5
	pH.	7.74	7.41	7.50	7.23	•	3.85	7.00	7.18
10URS	Temperature (C)	15.2	16.1	15.0	14.5	14.0	14,8	14.0	14.5
	Condustivity	300	2000	2000	2000	2000	204	2000	2000
	# Immeelle	9	•	e	•	0	•	•	•
	◆ Dess (10 expense)	a	•	٥	_1	0	1	•	0
STAL MOR	TAUTY (10 DEPOSED)	3	- 6	6	1	- C	-	10	•

RESULTS

SE HOUR RESULT:

SC4-A10Y - FAIL (100% marsky) SC4-A63Y - PASE (PL marsking) SC4-A65Y - PASE (10% marsking)

SC4-ABSY - PAGE (DE merality)

0.20 +/- 0.11 g 0.21 g fab.L

SC4-AZEV - PASS (BD% mark SCHOOL PAR (1992 merelly) SCHOOL PASS (19 merelly)

THE COLUMN IS INCOME. SEE, THE COLUMN !

	NATURE .		SOT-ACTY	SC-VET.	SOLVIEN.	901-8197	904-987 10.4
intelved Caygon (pp/h):	10.2	10.2	24	10.4	10.2	44.0	***
H:	46.11	ar .	***	740	430	17.5	10.1
emperature (C):	10.4	10.7	12.6	19.4	11.8	1 1 1	
enductivity (uS/sm):	2940		2070	2000	2000	-	
artinesa (mg/L):	1871	1971	1671	1971	1971	1139	1130
hyeical State:	tiquid	Equis	Depute	liquid	كنيها	Report	
letty:	cher	clear	alas	CHEST	des	-	dies
elaur:	yellow	yellow		yellow	yeller		enter l'un
recipitate:	700	700	706	yes	Ass	i 🕳	700
deur:	APRO .	nene	REPO	nene	none	MOTO	neme

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ACUATIC SCENCES INC.

96-HOUR STATIC RAINSOW TROUT TEST

Project Number Citons:

Ingo L'al. Cospor Cliff, Onlano Coppor Cliff Wellbuster Tradition Plant

Semple Name/ID: Chain of Customy #:

3451 - DAGE

163 - 170 T896 - T306 18/04/65 // -- hrs

12/06/88//12:00 hrs

	Semaia IC:	SC4-BOST	SC4-B43Y	SC4-E7EY	9C4-C10Y	SC4-CSSY	BO4-CBBY	804-089Y	804-C76
	Secreta &	160	164	100	100	167	100	100	170
TOME	PARAMETER	100	100	100	100	100	100	160	100
	Disselved Oxygen	10.1	10.0	10.0	10.0	9.8	10.1	10.0	10.1
	pH	7.83	7.18	6.00	0.70	8.62	7.89	7.18	7.22
O HOURS	Temperature(C)	14.5	13.0	15.2	15.3	13.2	14.6	15.2	14.0
	Conductivity(u6)	2670	2970	2270	2230	2273	2570	207C	2000
	# Immebile (19 especial)	0	•	<u> </u>	0	0	4	0	a
	Dissolved Coyeen	0.0	0.0	LJ.	13	9.0	€.0	0.0	u
	pH	7.25	7.27	7.11	0.21	7.20	7.16	7.14	4.45
	Temperature (C)	14.0	14 1	14.1	14.0	13.8	13.8	13.7	13.7
M HOURS	Conductivity	2000	2000	2070	1840	2007	2000	2000	2000
	# Immebile	8	D	0	0	0	9	0	0
	# Dead (10 empeed)	0	8	0	16	0	6	0	0
	Disserved Oxygen	4	6.3	8.4	8.0	8.7	8.0	8.5	7,
	pH .	7.22	7.06	6.97	4.77	7.25	7.20	6.84	146
8 HQURS	Temperature (C)	14.0	14.2	14.0	19.9	18.8	18.7	18.7	18.6
	Conductivity	2000	2000	2000	3060	2000	2000	2000	2000
	# immetalle	0	0	0	•	0	3	0	6
	# Dead (10 separad)	0	0	0		0	4	9	0
	Dissolved Citygen	7.7	0.0	6.0	7.3	7.7	7.5	7.7	7.8
	PH	7.18	7.97	6.00	8.10	7.11	7.00	1.56	5.17
Z HOLIRS	Temperatura (C)	14.5	14.4	14.5	14.5	14.4	14.4	14.3	14.3
	Conductivity	2000	2000	2000	2970	2000	2000	2000	2000
	# terrobile	0	0	0	•	0	0	9	•
	# Daed (10 expense)		0	0	-	0	_0	<u> </u>	0
	Dissolved Coygen	7.6	7.5	7.5	7.2	7.2	7.0	7.6	7.3
	pH	7.14	7.86	6.00	7.7 2	7.04	7.66	9.37	4.15
6 HOURS	Temperature (C)	14.6	14.5	14.7	14.7	14.5	14.6	14.5	14.4
	Conductivity	2000	2000	2000	2000	2000	2000	2000	200
	# Inmobile	0	0	0	•	0	0	9	•
	# Dead (10 expense)	0	0	0		0	0	0	6
STAL MOR	TAUTY (10 EXPOSED)	•	•	3	•		0		0

RESULTS		
SS-HOUR RESULT.	SC4-BOSY - PASS (D% martelity)	SCA-COSY - PASS (Dis markedy)
	SCA-BASY - PASS (DS martelly)	SCA-CAST - PASS (DL morbilly)
1	SC4-678Y - PAGE (8% manufay)	SC4-CLSY - PASS (It's restally)
1	SC4-C107 - FAIL (199% marterly)	SC4-CTSY - PASS (PL mortusty)
Mean Weight	0.35 +/- 0.11 m	-
Leading Density:	0.21 g floh A.	•

	SCA-BEST	SC4-BHBY	504-878Y	504-C10Y	804-0#3Y	SOLCESY	SOLORIY	los-ctey
Dissolved Onygen (spm):	10.2	10.0	10.4	9.4	10,0	10.4	10.4	10.4
pH:	7.80	7.22	6.84	10.13	1.42	7.82	7.44	7.25
Temperature (C):	10 4	8.7	9.D	11.5	11.5	9.2	10.8	8.7
Conductivity (u&/cm):	2000	2000	2000	2840	2000	2000	2000	2000
hardness (mg/L):	1120	1139	1130	1160	1160	1188	1180	1160
Physical Bists:	لغبية	Heute	أنجنا	لفيجنا	انتيطا	hquid	liquid	Hapid
Clarty:	clear	CIDO	clear	of the same		clear	cheer	clear
COIOUT.	colourtou	color-face	colourtess	yelite	Jego	-	yester	Perferen
Preciptus:	-	•		700	yes)300	yes.	-
Odeur:	ncne	1000	~0~0	rene		NOA0	~~~	nghe
Pre-ecration Time (min):	-	•	•	•	•	•	•	•

48 HOUR STATIC DAPHNIA MAGNA TEST

Client:

Inco Ltd.

Copper Cliff

Project Number:

L9224 171-185

Sample Type:

Grab

Sample Number: Test Number:

D310-D324

Sample State:

Liquid

QUALITY ASSURANCE INFORMATION

Reference Toxicant Data

Chemical Used:

Sodium Chloride

Date of Test:

December 15/95

48-hour LC50:

6272 mg/L

Warning Limits:

4981 - 7962 mg/L

Test Protocol

Biological Test Methods: Reference Methods for Determining

Acute Lethality of Effluents to Daphnia magna

Environment Canada

July 1990

Test Conditions

Test Organism:

Daphnia magna

Test Type:

Static

Test Temperature:

20+/-1C

Test Volume:

200mL

Loading Density:

20mL/neonate

Photoperiod:

16 hours light/8 hours dark

The state of the s

Dechlorinated Tap

Dilution Water:

<24 hours

Organism Age: Stock Source:

in house cultures

Time of First Brood:

6 days

Average Brood Size:

28 neonates

Ephippia Frequency:

0

Comments

The reference toxicant results show that test reproducibility and organism are within acceptable limits.

All data is scrutinized for errors.

Instruments used to monitor parameters are calibrated daily

and continuously maintained.

Reviewers

Technical Review

Final Review

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST **EPS 1/RM/14**

Project Number:

L9224

Client:

Inco Ltd

Copper Cliff, Ontano

Sample Name/ID: Chain of Custody #: Copper Cliff Wastewater Treatment Plant

0449

Sample Number:

Test Number:

Sample Date/Time:

12/11/95 //14:30 hrs Sample Technician: S Clark

Test Date: Technician: 12/15/95// 13:00 hrs

171

D310

S Hilliker / K Groombridge

					don SVA		
	Sample ID:					SC5-A10Y	•
	Sample #:					171	
TIME	PARAMETER	CONTROL-A	CONTROL-B	CONTROL-C	100-A	100-B	100-C
	Dissolved Oxygen	8.8	8.8	5.8	8.9	8.9	8.9
	pH	7.95	7.95	7.95	9.30	9.30	9.30
0 HOURS	Temperature(C)	19.5	19.5	19.5	19.5	19.5	19.5
	Conductivity(uS)	307	307	307	2900	2900	2900
	# Immobile (10 exposed)	_0_	0	0	0	0	0
	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.9	8.9	8.9	8.0	8.1	8.1
	pΗ	7.74	7.70	7.70	8.27	8.26	8.32
48 HOURS	Temperature (C)	21.0	21.0	21.0	20.6	20.6	20.6
	Conductivity	309	310	309	2890	2920	2920
	# immobile	0	0	0	0	1	0
	# Dead (10 exposed)	0	0	0	0	0	0
TAL MORTA	LITY (10 EXPOSED)	0	0	0	0	0	0
EAN PERCEN	T MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC5-A10Y - PASS (0% mortality)

Brood Culture:

110695

Time to First Brood:

Average Brood Size:

28 neonates

Comments:

- sample 171 was preserated for 120 minutes since D.O. >100% air saturation

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Client:

I

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID: Chain of Custody #:

0449

Copper Cliff Wastewater Treatment Plant

Sample Number: Test Number:

172 - 173

Sample Date/Time:

D311 - D312

12/11/95//14:30 hrs

Sample Technician:

S Clark

Test Date: Technician:

12/15/95// 13:20 hrs S Hilliker / K Groombridge

		***************************************		Concentrations	5 V/V	***	
	Sample ID:		SC5-A93\	1		SC5-A881	7
	Sample #:		172			173	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	8.9	8.9	5 .9	8.9	8.9	8.9
	рH	8.47	8.47	8.47	8.11	8.11	8.11
O HOURS	Temperature(C)	19.4	19.4	19.4	19.4	19.4	19.4
	Conductivity(uS)	2910	2910	2910	2920	2920	2920
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	5.6	5.8	5.7	6.6	5.6	5.8
	pН	6.98	6.98	7.03	7.07	7.06	6.99
48 HOURS	Temperature (C)	20.7	20.5	20.5	20.8	20.5	20.6
	Conductivity	2920	2980	2930	2930	2990	2930
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0

Ö

0

0

0%

0

0

RESULTS

48-HOUR RESULT:

TOTAL MORTALITY (10 EXPOSED)

MEAN PERCENT MORTALITY

SC5-A93Y - PASS (0% mortality) SC5-A88Y - PASS (0% mortality)

0

0%

- Samples 172 & 173 preaerated 120 minutes since D.O. > 100% air saturaion.

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

0449

Client:

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

Sample Number:

174 - 175

Test Number:

D313 - D314

Sample Date/Time:

12/11/95 //14:30 hrs S Clark

Sample Technician:

Test Date:

12/15/95// 13:20 hrs

Technician:

S Hilliker / K Groombridge

				oncentrations	*VN		
	Sample ID:		SC5-A831	7		SC5-A78	1
	Sample #:		174			175	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	8.9	8.9	8.9	9.1	9.1	9.1
	рH	7.86	7.86	7.86	7.90	7.90	7.90
0 HOURS	Temperature(C)	19.5	19.5	19.5	19.5	19.5	19.5
	Conductivity(uS)	2900	2900	2900	2900	2900	2900
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	6.9	7.1	7.0	7.6	7.7	7.9
	рH	7.02	7.05	7.06	7.16	7.17	7.21
48 HOURS	Temperature (C)	20.8	20.6	20.6	21.0	20.6	20.7
	Conductivity	2990	2940	2980	2910	2970	2920
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	_ 0	0	0	0	0	0_
OTAL MORTA	LITY (10 EXPOSED)	0	0	0	0	0	0
IEAN PERCEN	T MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC5-A83Y - PASS (0% mortality) SC5-A78Y - PASS (0% mortality)

Comments:

- Samples 174, 175 preaerated 120 minutes since D.O. > 100% of air saturation.

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST **EPS 1/RM/14**

Project Number:

L9224

Client:

:

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

0449

Sample Number:

176 - 177 D315 - D316

Test Number: Sample Date/Time:

12/11/95 //14:30 hrs

Sample Technician:

S Clark

Test Date:

12/15/95// 13:25 hrs

Technician:

S Hilliker / K Groombridge

			*********	Concentrations '	390		
	Sample ID:		SC5-B10Y	1		SC5 -B93 Y	1
	Sample #:		176			177	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissalved Oxygen	8.9	8.9	8.9	8.9	8.9	8.9
	pН	8.99	8.99	8.99	8.18	8.18	8.18
O HOURS	Temperature(C)	19.4	19.4	19.4	19.5	19.5	19.5
	Conductivity(uS)	2850	2850	2850	2850	2850	2850
	# Immobile (10 exposed)	0	0	0	0	0	.0
	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	6.4	5.6	6.1	8.0	8.1	8.1
	рН	7.24	7.20	7.19	7.47	7.47	7.51
48 HOURS	Temperature (C)	20.8	20.9	20.6	20.7	20.7	20.8
	Conductivity	2990	2920	2900	2880	2870	2880
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
OTAL MORTAL	LITY (10 EXPOSED)	0	0	0	0	0	0
EAN PERCEN	IT MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC5-B10Y - PASS (0% mortality) SC5-B93Y - PASS (0% mortality)

Comments:

- Samples 176, 177 preserated 120 minutes since D.O.>100% of air saturation.

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Client:

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID: Chain of Custody #: Copper Cliff Wastewater Treatment Plant

0449

Sample Number:

178 - 179

Test Number:

D317 - D318

Sample Date/Time:

12/11/95 //14:30 hrs

Sample Technician:

S Clark

Test Date:

12/15/95// 13:25 hrs

Technician:

S Hilliker / K Groombridge

				Concentrations	SVN		
	Sample ID:	~-///	SC5-B881	1		SC5-B831	
	Sample #:		178			179	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	8.9	8.9	8.9	8.9	8.9	8.9
	pH	7.42	7.42	7.42	7.46	7.46	7.46
0 HOURS	Temperature(C)	19.6	19.6	19.6	19.6	19.6	19.6
	Conductivity(uS)	2730	2730	2730	2880	2880	2880
	# Immobile (10 exposed)	0	0	0	0	0	0
_	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	7.4	7.6	7.6	8.0	8.1	8.2
	pH	6.74	6.80	6.82	7.11	7.15	7.22
48 HOURS	Temperature (C)	20.7	20.8	20.7	20.6	20.6	20.6
	Conductivity	2810	2750	2740	2880	2900	2890
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
OTAL MORTAL	LITY (10 EXPOSED)	0	0	0	0	0	0
MEAN PERCEN	TMORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC5-B88Y - PASS (0% mortality)

SC5-B83Y - PASS (0% mortality)

Comments:

- Samples 178, 179 preserated 120 minutes since D.O.>100% of air saturation.

11/1

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/14

Project Number:

L9224

Client:

Inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant 0449, 0448

Chain of Custody #:

3224

Sample Number: Test Number: 180 - 181 D319 - D320

Sample Date/Time:

12/11/95 //14:30 hrs

Sample Technician:

S Clark

Test Date:

12/15/95// 15:15 hrs

Technician:

K Groombridge/C Huras

				CHOCK WAR	SV/V		•
	Sample ID:	***************************************	SC5-B78\	1		SC5-C10	Y
	Sample #:		180			181	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	8.9	8.9	8.9	8.8	8.8	8.8
	pН	7.27	7.27	7.27	8.96	8.96	8.96
0 HOURS	Temperature(C)	19.8	19.8	19.8	19.8	19.6	19.8
	Conductivity(uS)	2800	2800	2800	2850	2850	2850
	# Immobile (10 exposed)	0	O	0	0	0	_ 0
	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	1	1
	# Dead (10 exposed)	0	0	0	0	0	0
·	Dissolved Oxygen	8.1	8.2	5.2	4.8	4.3	4.7
	pΗ	7.17	7.16	7.19	7.25	7.11	7.19
48 HOURS	Temperature (C)	20.6	20.5	20.5	20.7	20.8	20.7
	Conductivity	2870	2820	2850	2880	2920	2880
	# Immobile	0	0	0	6	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
OTAL MORTAL	JTY (10 EXPOSED)	0	0	0	0	0	_ 0
IEAN PERCEN	T MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC5-B78Y - PASS (0% mortality)

SC5-C10Y - PASS (0% mortality)

Comments:

- Samples 180, 181 were preserated for 95 minutes since D.O. > 100% of air saturation.

11-

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/=W/14

Project Number:

L9224

Client:

ŗ

inco Ltd

Copper Cliff, Ontario

Sample Name/ID: Chain of Custody #: Copper Cliff Wastewater Treatment Plant

448

Sample Date/Time:

182 - 183

Sample Number: Test Number:

D321 - D322

Sample Technician:

12/11/95 //14:30 hrs S Clark

Test Date:

12/15/95// 15:15 hrs

Technician:

K Groombridge/C Huras

				Concentrations	SVN		
	Sample ID:		SC5-C931	7		SC5-C881	?
	Sample #:		182			183	
TME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	8.9	8.9	8.9	8.9	8.9	8.9
	рH	8.29	8.29	8.29	8.29	8.29	8.29
0 HOURS	Temperature(C)	19.7	19.7	19.7	19.7	19.7	19.7
	Conductivity(uS)	2880	2880	2880	2890	2890	2890
	# Immobile (10 exposed)	0	0	0	0	0	0
	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	6.1	6.5	6.6	7.2	7.3	7.6
	pH	7.13	7.10	7.15	7.36	7.40	7.43
48 HOURS	Temperature (C)	20.7	20.7	20.7	20.6	20.6	20.6
	Conductivity	2920	2910	2880	2920	2910	2920
	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	1	0	0	0
OTAL MORTAL	LITY (10 EXPOSED)	0	0	1	0	0	0
EAN PERCEN	T MORTALITY	3%			0%		

RESULTS

48-HOUR RESULT:

SC5-C93Y - PASS (3% mortality) SC5-C88Y - PASS (0% mortality)

Comments:

- Samples 182, 183 were preserated for 95 minutes since D.O.> 100% of air saturation.

Popular.

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST EPS 1/RM/*4

Project Number:

L9224

Client:

inco Ltd

Copper Cliff, Ontario

Sample Name/ID:

Copper Cliff Wastewater Treatment Plant

Chain of Custody #:

0448

Sample Number:

184 - 185 D323 - D324

Test Number: Sample Date/Time:

12/11/95 //14:30 hrs

Sample Technician:

S Clark

Test Date:

Technician:

12/15/95// 15:15 hrs K Groombridge/C Huras

			T.	oncediations:	W/N		
	Sample ID:		SC5-C831	7		SC5-C78	1
	Sample #:		184			185	
TIME	PARAMETER	100-A	100-B	100-C	100-A	100-B	100-C
	Dissolved Oxygen	9.0	9.0	9.0	9.0	9.0	9.0
	Hq	7.85	7.85	7.85	7.47	7.47	7.47
O HOURS	Temperature(C)	19.7	19.7	19.7	19.7	19.7	19.7
	Conductivity(uS)	2920	2920	2920	2900	2900	2900
	# Immobile (10 exposed)	0	O	0	0	0	0
	Temperature(C)	20.2	20.2	20.2	20.2	20.2	20.2
24 HOURS	# Immobile	0	0	0	0	0	0
	# Dead (10 exposed)	0	0	0	0	0	0
	Dissolved Oxygen	8.1	5.0	8.0	7.6	7.6	7.7
	ρH	7.28	7.21	7.18	7.10	7.08	7.05
48 HOURS	Temperature (C)	20.5	20.6	20.6	20.6	20.6	20.7
	Conductivity	2930	2970	2950	2900	3000	2900
	# Immobile	0	0	0	0	0	1
	# Dead (10 exposed)	0	0_	0	0	0	0
TAL MORTAL	AL MORTALITY (10 EXPOSED)		0	0	0	0	0
AN PERCEN	T MORTALITY	0%			0%		

RESULTS

48-HOUR RESULT:

SC5-C83Y - PASS (0% mortality)

SC5-C78Y - PASS (0% mortality)

Comments:

- Samples 184, 185 preaerated 95 minutes since D.O.>100% of air saturation.



96 HOUR STATIC RAINBOW TROUT TEST

Client:

Inco Ltd.

Project Number:

L9224

Copper Cliff

Sample Number: Test Number:

171 - 185

Sample Type:

Grab

Sample State: Liquid T306 - T320

QUALITY ASSURANCE INFORMATION

Reference Toxicant Data

Chemical Used:

Sodium Chloride

Date of Test:

December 15/95 17020 mg/L

96-hour LC50: Warning Limits:

11509 - 19770 mg/L

Test Protocol

Biological Test Methods: Reference Methods for Determining

Acute Lethality of Effluents to Rainbow Trout

Environment Canada

July 1990

Test Conditions

Test Organism:

Rainbow Trout

Test Type:

Static

Test Temperature:

15+/-1C

Test Volume:

16 litres

Photoperiod:

16 hours light/8 hours dark

Dilution Water:

Dechlorinated Tap

Organism Age:

Fingerlings

Stock Source:

Rainbow Springs Hatchery

Mean Weight:

0.23 + / - 0.03g

Comments

The reference toxicant results show that test reproducibility and organism are within acceptable limits.

All data is scrutinized for errors.

Instruments used to monitor parameters are calibrated daily

and continuously maintained.

Reviewers

AGL ATIC SCIENCES INC.

96--- DUR STATIC RAINBOW TROUT TEST

Project Number:

L9224

inco Ltd.

Sample Name/ID: Chair of Custody #: Copper Cliff, Ontano

Copper Cliff Wastewater Treatment Plant

0449

Sample Number: Test Number:

171 - 177 T306 - T312

Sample Date/Time: Sample Tech:

12/11/95 // 14:30 hrs S Clark

Test Date/Time:

12/15/95//10:45 hrs

Technicien: C Hures

					Constant				*****
	Sample ID:	CONTROL	SCS-A10Y	SCS-A03Y	SCS-ABSY	SCS-ABIY	SCS-A78Y	SCS-B10Y	SC5-80
	Sample #:		171	172	173	174	175	176	177
TME	PARAMETER	0	100	100	100	100	100	100	100
	Dissalved Oxygen	9.5	9.6	9.8	10.6	10.4	10.6	10.4	10.4
	pH	8.04	9.70	8.13	8.91	8.62	8.55	9.54	8.74
C →OURS	Temperature(C)	14.3	14.8	14.5	14.2	13.9	13.9	14.1	13.9
	Conductivity(uS)	314	2680	2920	2930	3120	2930	2670	2880
	# immobile (10 exposed)	0	0	0	0	0	0	0	0
	Dissalved Oxygen	9.4	9.6	9.5	9.3	9.7	9.3	9.5	9.2
	pH	8.19	8.66	7.70	8.20	7.58	7.66	6.96	7.62
	Temperature (C)	14.6	14.3	14.1	14.0	13.6	13.8	13.8	13.8
24 HOURS	Conductivity	313	2910	2950	2940	2950	2950	2680	2640
	# Immobile	0	•	0	0	0	0	•	0
	# Dead (10 exposed)	0	10	0	0	0	0	10	0
	Dissalved Oxygen	9.8	10.1	10.0	9.8	10.1	9.9	9.1	9.0
	pH	7.89	7.56	7.38	7.39	7.35	7.26	7.15	7.26
48 HOURS	Temperature (C)	14.7	15.2	15.Q	14.9	14.6	14.7	14.7	14.8
	Conductivity	318	2980	3030	3010	3070	2990	3030	2940
	# immobile	0	-	0	0	0	٥	•	0
	# Dead (10 exposed)	0		0	0	0_	o	-	0
	Dissalved Oxygen	9.3	9.0	9.1	8.7	9.7	9.0	8.9	9.2
	pH	7. 87	7.56	7.43	7.45	7.43	7.37	7.45	7.38
72 HOURS	Temperature (C)	14.5	15.1	14.9	14.8	14.6	14.6	14.7	14.5
	Conductivity	319	2950	2970	2970	2970	2980	2900	2820
	# Immobile	0	•	0	0	0	0	-	0
	# Deed (10 exposed)	0		<u> </u>	0	0	0		0
	Dissalved Oxygen	9.8	9.0	9.0	9.1	8.9	9.5	9.0	9.3
	pΗ	7.86	6.94	6.97	7.03	7.08	7.14	7.10	7.27
96 HOURS	Temperature (C)	14.3	14.9	14.7	14.6	14.6	14.5	14.5	14.4
	Canductivity	320	3010	2990	3000	3010	3020	2990	2890
	# Immobile	0	•	0	0	0	0	-	0
	₱ Dead (10 exposed)	0	•	0	0	0	0	•	0
STAL MORTA	LITY (10 EXPOSED)	0	10	0	0	0	0	10	0

RESULTS

96-HOUR RESULT:

SCS-A10Y - FAIL (100% martelity)

SCS-ABBY - PASS (0% martility) SCS-ASSY - PASS (0% martishty) SCS-AB3Y - PASS (0% martery)

0.23 +/- 0.03 g

SCS-A78Y - PASS (0% mortality) SC5-B10Y - FAIL (100% mortality)

SCS-BBSY - PASS (0% mortality)

Mean Weight: 0.14 g fish/L Loading Density:

AGLIATIC SCIENCES INC.

55-DUR STATIC RAINBOW TROUT TEST

Project Number:

L9224

inco Ltd.

Copper Cliff, Ontano

Sample Name/ID: Chain of Custody #: Copper Cliff Wastewater Treatment Plant

0449 - 0446

Semple Number: Test Number: Sample Date/Time: 178 - 185 T313 - T320

12/11/95 //14:30 hrs

Sample Tech:

S Clark

Test Date:

12/15/95//10:45 hrs

Technician: C Hures

								***********	******
	Sample ID:	SCS-Beey	SC5-883Y	SCS-878Y	SC5-C10Y	SCS-C83Y	SC5-C88Y	SC5-C83Y	SC5-C78
	Sample #:	178	179	160	181	182	183	184	185
TME	PARAMETER	100	100	100	100	100	100	100	100
	Dissolved Oxygen	10.6	10.2	11.0	10.2	10.2	10.2	10.0	10.2
	рН	8.17	8.18	8.15	9.47	8.49	8.72	8.19	7.99
C →OURS	Temperature(C)	13.7	13.9	13.6	14.1	13.8	14,3	13.8	14.4
	Conductivity(uS)	2770	2910	2920	2870	2930	2920	2950	2920
	# immabile (10 exposed)	_ o	0	0	0	0	0	o	o
	Dissolved Oxygen	9.6	9.3	9.1	9.5	9.5	9.4	9.6	9.4
	рН	7.38	7. 3 3	7.31	8.86	7.52	7.92	7.99	7.46
	Temperature (C)	13.8	13.9	13.8	14.0	14.0	14.0	13.7	14.0
24 HOURS	Conductivity	2800	2920	2930	2690	2970	2930	2950	2930
	# Immobile	0	0	0	-	0	0	0	o
	# Deed (10 exposed)	0	0	0	10	0	0	0	0
	Dissolved Oxygen	10.1	10.0	10.2	9.6	10.0	9.7	9.6	9.7
	pΗ	7.29	7.17	7.26	8.01	7.47	7.31	7.23	7.18
46 HOURS	Temperature (C)	14.7	14.9	14.8	15.0	14.8	15.0	14.8	15.0
	Conductivity	2990	2970	3270	2960	3100	3090	3210	3000
	# immobile	0	0	0	-	0	0	0	0
	P Dead (10 exposed)	0	0	0	-	o	0	0	0
	Dissalved Oxygen	8.9	9.0	8.9	8.3	9.1	9.2	6.6	9.1
	pH	7.37	7.34	7.32	7.15	7.36	7.41	7.30	7.32
72 HOURS	Temperature (C)	14.6	14.8	14.6	14.9	14.6	14.8	14.5	14.8
	Conductivity	2940	2930	2940	2930	2980	2940	2970	2950
	# Immobile	0	0	0	-	0	0	0	0
	# Dead (10 exposed)	0	0	0		0	0	0	0
	Dissaived Oxygen	8.8	9.2	9.1	9.6	9.1	9.7	8.5	9.4
	pН	7.09	7.12	7.15	7.18	7.19	7.28	7.18	7.16
16 HOURS	Temperature (C)	14.3	14.3	14.3	14.3	14.3	14.3	14.2	14.3
	Conductivity	2850	2940	2970	2990	2970	2990	2980	2960
	# Immabile	0	0	0	-	0	0	0	O
	# Dead (10 exposed)	0	0	0	•	0	0	0	0
TAL MORT	ALITY (10 EXPOSED)	0	0	0	10	0	0	0	0

RESULTS

96-HOUR RESULT:

SCS-B86Y - PASS (0% mortality) SCS-BB3Y - PASS (0% mortality)

SCS-C93Y - PASS (0% mortality) SCS-C88Y - PASS (0% mortality) SCS-C83Y - PASS (0% mortality)

SCS-B78Y - PASS (0% mortality) SC5-C10Y - FAIL (100% mortality)

SCS-C78Y - PASS (0% mortality)

Mean Weight 0.23 +/- 0.03 g Loading Density: 0.14 g fish/L

Comments:

	SC5-A10Y	SC5-A93Y	SCS-ABBY	SCS-ABJY	SCS-A78Y	SC5-810Y	SC5-893Y
Dissalved Oxygen (ppm)	10.6	10.0	10 4	10.2	10.2	100	10.2
iH.	10.02	9.11	9.09	8.91	6.75	9.78	8.95
emperature (C)	13.4	14 1	10.6	10.7	10.2	13.2	12.8
Conductivity (uS/cm):	2740	2920	2440	2700	2550	267C	2860
lardness (mg/L).	not avalable						
hysical State:	part frozen	part frozen	part frozun	part frozen	pert frazen	pert frozen	part frozen
lanty-	cieer	cieer	cienr	clear	dear	clear	clear
colour:	yellow	yellow	yellow	yelica	yellow	colouriess	colourless
recipitate:	yes	yes	yes	yes	yes	00	no
	none	none	nane	nane	none	nane	nane

	SCS-BARY	SCS-BASY	SC5-878Y	8C5-C10Y	SC5-C93Y	SCS-COSY	SCS-CB3Y	8CS-C78Y
Dissolved Oxygen (ppm):	10.4	9.6	10.2	9.6	10.3	9.6	9.6	9.6
pH:	8.44	5.93	8.40	9.71	9.00	8.94	8.66	8.34
Temperature (C):	9.9	12.8	9.7	13.3	11.4	13.6	13.8	13.6
Conductivity (uS/cm):	2550	2920	2420	2680	2640	2920	2930	2920
Hardness (mg/L):	not available							
Physical State:	pert. frozen	pert. frozen	pert. frazen	pert. frozen	pert. frozen	part. frozen	part. frozen	part. frozen
Clarity:	clear	clear	clear	clear	clear	clear	clear	clear
Colour:	calcuriess	colouriess	colouriess	yellow	yellow	yallow	yellow	yellow
Precipitate:	no	no	по	yes	yes	yes	yes	yes
		none	none	none	nane	nane	nane	

48 HOUR STATIC DAPHNIA MAGNA SINGLE CONCENTRATION TEST EPS 1/RM/14

Project Number:

L9367

Inco Ltd

Sample Number: Test Number:

01 - 32 D01 - 032

Client

Copper Cliff, Ontano

Sample Date/Time: 04/28/97//-:- hrs

Sample Name/iD:

Experimental Treatments for CCWWTP Sample Identification #101 - 132

Sample Technician: S Clark

05/01/97// 14:10 - 17:40 hrs

Sample Location:

CCWWTP

Test Date/Time:

Chain of Custody #: Sample Method:

2112 Grab

Technician:

J Farquharson/W Mesters/S Hittiker

RESULTS

48 HOUR RESULT:	01: 101:	PASS (50% mortality)	00: 100:	FAIL (100% mortality)	17: 117:	FAIL (83% mortally)	25: 125:	FAIL (80% mortality)
	02: 102:	PASS (0% mortality)	10: 110:	PASS (0% mortality)	18: 118:	PASS (0% mortality)	26: 126:	PASS (9% mortality)
l	03: 103:	PASS (0% mortality)	11: 111:	PASS (0% mortality)	19: 119:	PASS (0% mortality)	27: 127:	PASS (6% mortality)
į	04: 104:	PASS (0% mortality)	12: 112:	PASS (0% mortality)	20: 120:	PASS (0% mortality)	20: 126:	PASS (0% mortality)
ļ	05: 106:	FAIL (89% mortality)	13: 113:	FAIL (199% mortality)	21: 121:	FAIL (199% mortally)	29: 129:	FAIL (100% mertality)
	06: 106:	PASS (0% mortality)	14: 114:	PASS (0% mortality)	22: 122:	PASS (0% mortality)	30: 130:	PASS (0% mortality)
	07: 107:	PASS (0% mortality)	15: 115:	PASS (0% mortality)	23: 123:	PASS (0% mertally)	31: 131:	PASS (0% mortality)
	06: 106:	PASS (0% mortelity)	16: 116:	PASS (0% mortality)	24: 124:	PASS (0% mortality)	32: 132:	PASS (0% mortality)

QUALITY ASSURANCE INFORMATION

REFERENCE TEST CONDITIONS

Test Organism:

Test Type:

Dephnie megne

040197

Brood Culture: Test Temperature:

State 20 +/- 2C 150 mL

Test Valume: Loading Density:

Control Water Hardness:

15 mL/neonete 136 mg/L

Photopenad:

Dilution Weter:

Organism Age:

<24 hours Stock Source: in house cultures 7 days

Time of First Broad: Average Brood Size: Ephippia Frequency:

37 nechates 0

16 hours light/6 hours dark

Dechlonneted Tep

REFERENCE TOXICANT DATA

Chemical Used: Date of Test:

Sodium Chlonde April 22/97

95% Confidence Interval:

5734 ma/L

Historic Mean LC50: Warning Limits:

6171 mg/L 4952-7390 mg/L

48-hour LC50:

5479-8001 mg/L

TEST PROTOCOL

Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna.

Environment Canada, July 1990

COMMENTS

The reference toxicant results show that test reproducibility and organism sensitivity are within acceptable limits.

All data is scrutinized for errors daily during the test, at test termination and during the report Technical and Final Review stages. Instruments used to manitor parameters are calibrated daily and continuously maintained.

QUALITY REVIEW

Gill St.

-6-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/HM/14)

Project Number: Semple Number: Test Number: Chain of Gustody #:		A - C		Semme Tech:	et Investor Docs/Time:		04/28/97/1? AFIGURE 7 1/5/10 20 MM SH		
TIME	SAMPLE ID. PARAMETER	CONTROLAZ	ontrul commone	A contricue	160-A	(05-0)		PARAMETRIS	GARIC RVEW_
	Disserved Onygen	G	. 1			91	<u></u>		
	pH		24	<u> </u>		8.24		1F	la.h
g HOURS	Temperature(C)		. 3			19.2			[W\
	Conductivity(uS)	2	296			296		16-00	
imm	obility @ 30 minutes (10 exposus)	6	C	0	0	0	0	1	
	рН	8.,-	8 11	8.13	1823	5:19	8.22		
24 HOURS	Terntersture(C)			20	<u> </u>		3	1330	Cos
217702772	# Immobile	0	0	0	6	0	8	- m	
	Distriked Oxygen	8.i	Sig	87	8.7	8.7	9.6		
	pH	5.09	5.14	5-16	8 10	8.17	8.19	Wiley.	
46 HOURS	Temperature (C)	10 <	19.9	20.0	20.0	20.0	20.0	البنال	C05
	Conductiver	298	298	299	298	298	299		7
	# introdule	0	0	0	0	0	0	as	
	# Deed (10 exposed)	0	3	0	O	0	0	1433	
OTAL MORTALITIES	0 0000 (10 00000)	0	3	D	0	0	0	1	
EAN % MORTALITY		0			0	10		1	
REMEMBER TO	CONTROL				// con:	no- B((07-	>-4/	(5)
EST CONDITIONS rood Culture: me to First Brood: verage Brood Size: otal Number Exposed/ ontrol Water Hardness		CUDI T devi 33 neg 3316 neg	Notice Lates	Preserteon Time: Recean for Presert	16an:	eta est ust			
est Replication (for Q/	-	N/W wee/n		pH Adjustment: Herdness Adjustm Test Salution Volu Loading Density:			(gg/1 y (gg/1 y (gg/2 gg// 15 g	66 68 0 mL	
IITIAL PARAMETERS	S (prior to leating) Dissolved Oxygen: Instal on: Temperature: Conductivity: Instal Mardness:		! ;	Adj. pH (if applicat Adjustment Octobs Adj. Herthods (if a	t .				

Odour:

45-HOUR STATIC SINGLE CONCENTRATION DAPHRIA MAGNA TEST (EPS 1/99/14)

Project Number:		
Sample Number:	01+02	
Test Nutriber:	001 +002	
Chain of Custody #:	2112	
		_
	SAMPLE ID:	
TIME	PARAMETER	CONTROLA

Sample Dath/Time: Sample Tech: Test indepten Dath/Time: Technique: 04/29/97//10:00 05/01/57 // 1910

TIME	SAMPLE PARAMETER		1201	COMMOLC	100-A	DC 2	, 100-€	PARAMETRIS	OAKSE MEVNEW
	Diseases Oxygen		9.6			9.8		1425	
	р Н		9.74			8.60			(n)
0 HOURS	Temperature(C)		19.7		<u> </u>	19.7] 9~	0
	Conductivity(uS)		2290			2330			
Imn	nobility @ 30 minutes (10 execution	. 0	0	0	0	0	0		
	рн	9 38	9.31	9.20	8.25	827	8.30	1420	cn
24 HOURS	Tempersture(C)		20.		.0			المحادا	-
•	€ immowie	3	16	3	0	0	0	gen	
	Dissolved Caygon	8.7	13.7	9.7	3.6	8.7	8.7	1000	
	рН	8.94	8.94	0.95	7.83	7.79	7.83	MM	
46 HOURS	Temperature (C)	20.4	20.5	20.6	20.4	20.3	20.3	i5:0℃	5
	Conductivity	2296	2280	2300	232C	2330	2330]	-
	# Immobile	4	3	4	0	O	0	6	
	# Deed (10 exposed)	5	6	4	0	0	0	430	
TAL MORTALITIES		5	6	4	O	ა	0	77	
AN % MORTALITY			20.5		O				

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS 48-HOUR Result: # 10	01 ; PASS \$ 60	2 montalis) //	02: PASS (0? -2-talig)
TEST CONDITIONS TO DOWN TORKS	040197		
Time to First Brood:		Preseration Time:	= 134C
Average Brood Size: Total Number Exposed/Concentration:	3.3 neonetes	_	30 mic
Control Water Hardness:		Recess for Preserveen:	DAZIDO1. SGITUVATTO
Effluent Subsampled from 25L pail for Testing:	ries i no	Preseration Rate:	25 - SOME JOHN A.
Test Replication (for QA/QC):		pH Adjustment: Hardness Advistment:	(GP) 1990
		Test Solution Volume:	200 mg/ 150 mL
	CANTROL A	Loading Density:	(20)/ 15 mL/manata
INITIAL PARAMETERS (prior to locating)			
THE PARTIES OF THE CONTROL OF	21 07		
Dissorved Oxygen:	10.5	_	
intel on:	9.45 3.77	_ Adj. sH (if essicate):	
Temperature:	18.8	Adjustment Details:	
Conductivity:	2290 2330	Adi. Hardness (if applicable):	
Physical State Upon Receipt:	110 0.0	Adjustment Details:	
Clanty:	CIPCIA 1 = c. r		
Colour:	معدد . ۱۱۵: ۱۶ ۵ ۰ مام	_	
ورعان السيح و :Precipitale		_	
Odour:	ves ves		

Additional Observations:

45-HOUR STATIC SINGLE CONCENTRATION DAPMMA MAGNA TEST (EPS 1/RM/14)

Project Number: Sample Number: Test Number: Chain of Custody #:	C9387		<u>-</u>	Sample Date/Time Sample Tech: Total Indepten Date Technician:		<u>05/01/4</u>	29/97//	/10:00	
TIME	SAMPLE ID: PARAMETER	COMMOTA	OC3 comace		100-A	0 04 100-6	169-C	PARAMETERS TECHNISE	- GAGE GAGE
	Dissolved Citygen		0.2			10.0		_	
	pH	5	8-06			7.46		1425	(4
a HOURS	Temperature(C)		19.8			19.5			0
	Conductivity(uS)	2	340			2340	-	_	
Irmin	mbility @ 30 minuse (10 expense)	0	C	c	ن	0	Ü		
	pH	7.87	7 15	770	7.33	7.71	7.28	14823	
24 HOURS	Temperature(C)			20	Ö			_ الم	5
<u>.</u>	# Immosile	0	C	U	0	0	0	9-	
	Dissoved Caygon	8.7	8.3	र द	9.7	8.8	8.7] , _~ ,	
	pH	7.35	7.42	7.43	7.19	7.23	7.23] Willy	
48 HOURS	Temperature (C)	20.6	20. L	20.5	20.3	20.3	20.3	15:10	
	Conductivity	2320	2340	2340	233c	2330	2330]	ans
	€ Immonie	0	0	0	၁	0	0	5	
	€ Deed (10 exposed)	J	3	0	0	0	ا ن	1433	!
TOTAL MORTALITIES		3	0	0		2	70	7	
YEAN & MORTALITY		D			3			<u></u>	<u> </u>
REMEMBER TO	# 103 : PASS				* * *	Pn 55 (08 ~-	41:3)
Brood Culture: Time to First Brood: Average Brood Size: Total Number Expose Control Water Hardner	te: from 25L past for Testing:	OHCI 7 day 23 nes 3X10 nes 134 gest yes/f	motor	Presented Time: Reason for Present Presention Refa: pH Adjustment: Herdness Adjustment Test Salution Volu Leading Density:	int :	dar ent tota	1340 1410 30 min 071007 3-80m (**) (**) (**) (**) (**) (**)	Munit. Munit. yee yee so mil.	
NITIAL PARAMETER	15 (prior to testing)		04						
	Dissolves Oxygen: Initial om: Temperature: Conductivity: Initial Haraness: Physical State Upon Receipt: Clanty:	C3 11 19 8 14 19 5 22 119 C	13.5 17.57 1 (Y.Y. 1 23.20 1173 1 ayra	Adj. pH (if assessed Adjustment Detail Adj. Maraness (if a Adjustment Detail	k: Opincolifo):				•

Additional Observations:

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/14)

L9387

Semple Number: Test Number: Chain of Cuspay #:	05+06	Sample Tech: Technicism Code/ Technicism:		e/Time:	05/0-/67/141 92 SH				
TIME	SAMPLE ID: PARAMETER	CONTINUE:A	0,5	come.c	190-▲	心 さる 100-8	100-C	PARAMETERS TECHNISMS	GAGE GAGE
	Dissoned Cirygen		4 S			9.6			
	pH	971 8.66					1425	1	
O HOURS	Terreservator(C)		19.8			98	1/2-	1/21	
	Conductivity(uS)		2290			2330]`0	`
- training	obility @ 30 minutes (10 extreme)	C	0	C	0	Ü	0]	
	pH	4.37	1457	4.51	8-41	5-37	8.42	1425	
24 HOURS	Temperature(C)		· · · · · · · · · · · · · · · · · · ·	20	: ن			()v	5
	# Immobile	9-05	9 am	8 con	0	0	0	On	
	Dissolved Chygon	8.7	3.0	3.7	?.6	8.7	8.7	,	
	pH	8.97	9.03	9.05	7.91	7.86	7.89	MM	
48 HOURS	Temperasure (C)	2C.9	20.7	20.8	20.3	20.1	20.3	15:27	
	Conductivity	2280	Z300	23CC	2330	2340	2340	1'	9
	# Immatule	4		2	0	0	0	cs	
	# Dead (10 exposed)	-3	4	8	0	0	0	1515	
TOTAL MORTALITIES		3/9	9	8	0	>	2		! !
MEAN & MORTALITY		69	7.		0	<u> </u>			
RESULTS	#105 FAIL				106 P	ass (0	200-4	= 1 3)	
Brood Culture: Firms to First Brood: Average Brood Size: Fotal Number Exposed Control Water Hardnes	t: om 25L seil for Testing:	04019 7 deve 3 3 x10 seed 3x10 seed 140 yee / fe	office	Presention Time: Present for Present Presention Rete: pH Adjustment: Herdhese Adjustment Test Solution Votel Lopping Deneity:		enert end total	13 Up 19 10 30 min 25 90min (20 min) 19 (200 min) 19 (200 min) 19 min	MANA.	d
NITIAL PARAMETERS	Dissores Onygen: Initial pri: Temperature: Conductivity: (Initial Hardness: Physical State Upon Receipt:		CL (0.3 (4.4 (2.1) (2.7)	Adj. phi (if applicab Adjustant Datale Adj. Heranas (if a Adjustiant Datale	: : : : : : : : : : : : : : : : : : : :				
	Clanter Colour: Precoprate:	Green	2000 A STATE OF THE STATE OF TH	,					

Samue Date/Time:

04/28/97//20:00

45-HOUR STATIC SIA	VOLE CONCENTRATION DAPPINIA MA	COMM TEST CEPS 1/F	MA (14)						
Project Number:	L9387			Serrate Dem/Tir	Teac	04	1/28/97	// 7 0 : 00	>
Sample Number:	30770C		-	Sample Tech:			S. Clark		
Test Number: Chain of Custody #:	1302400	7.6	_	Test Indiana ()	SED/Time:	05/01	197 / 14	<u> </u>	
CHAIR OF CUSALITY V.	3112			10,000,000			SA VINA		
					***	noming /	The Comment		
	SAMPLE ID:	***************************************	007			DCB			
TIME	PARAMETER	CONTROLA	CONTROLS	CONSTRUCT.C	100-A	100-6	100-C	PARAMETERS	OA/OE
	Digestrated Citypen		9.8			9.8		TROVINE	- SANSA
	pH		8.15			723	*	1430	.
0 HOURS	Temperasse(C)		19.8			19.9		Jan	1,20
	Conductivity(uS)		2340			2340		7 0	`
irete	obility @ 30 minutes (10 exposes)	0	0	0	0	C	U		
	рн	7.88	7.79	790	720	7.18	7.29	1112-1	
24 HOURS	Temperature(C)			۷	υ · υ			-1427	03
	# Immobile	1	1		Ö		0	7 %	
-	Dissorved Oxygen	8.7	8.7	8.5	8.5	8.5	8.6		
	рH	7.43	7.45	7.52	7.16	7.15	7.23]	
48 HOURS	Temperature (C)	20.7	20.5	ZC.7	20.5	20.2	20.3	WM 15:30	
	Conductivity	233c	2340	2340	234c	2340	2340] 15:50	5
	# Invitable	C		0	O	0	0	in	
	# Dead (10 esposed)	9	0	O	0	2	0	1530	
OTAL MORTALITIES		0	0	3	0	٦	3	7,3	
EAN % MORTALITY		0			3				
REMEMBER TO	O COLLECT DAPHNIDS A	ND TEST SO	DLUTIONS A	T 48 HRS			-		
ESULTS	# 107 0 (<u></u>	1 1.6	1/-				1.1	7
S-HOUR Result	# 107 Pass (6	0 6 - 3	~ TR 1.7	//#	108 PA	22 (0,	2 ~ = = +	× 1.75	<u> </u>
EST CONDITIONS	tor Boun tesk	04019	-						
rood Culture:	30. 20	- 67641	G - GP						
me to First Brood:		7 cav		Preserveen Time:		-	1390		
verage Brood Size:	_	3 3 near	Netpo	-		•	1410		
otal Number Exposed. ontrol Water Herdnes		3X10 Asset		- Recent for Preser		194	30 VOIC 30	editor bit	
	om 25L pail for Testing:	/ma/n		Preservation Rate:			25 · 50mL		`
est Replication (for Q/	NGC):	700 /6	<u></u>	pH Adjustment: Herdness Adjustm					
				Test Solution Volu			200 mL / 19		
		CONTR	CLB	Looking Density:			11 15	mi_meemete	
IITIAL PARAMETERS	5 (prior to testing)	07	18						
.	Dissibilities Okygen:	10.5	.04	•					
	Inited pri:	₹4:	7.25	Adj. pH (if applica	D40):				
	Temperature:	74.5	19.5	Adjustment Deteils	•				
	Conductivity:	23:0	2270	•					- 1

Colour Odour:

ACUATIC SCIENCES I	¥C.	
48-HOUR STATIC SING	ELE CONCENTRATION BAPHINA MAG	na test (EPS 1/RM
Project Number: Sample Number: Test Number: Chain of Custody #:	L9387 Co. +1015 €	• •
TIME	SAMPLE ID: PARAMETER	CONTROL
	Dissolved Caygon	
	pH	
OHOURS	Temperature(C)	
	Conductivity(uS)	
mmel	bility @ 30 minutes (10 esposes)	0
	pH	, 24
24 HOURS	Temperature(C)	
	# Immobile	0
	Disserved Chygen	8.7
	ρΗ	8.18
48 HOURS	Temperature (C)	20.5

Sample Date/Time:	
Sample Tech:	
Test Indean Date/Time:	:
Tachecon:	

04/28/97//?	
E Clark	
CC/01/57///C/D	
Oi win St	
,	

TIME	SAMPLE ID: PARAMETER		0 ~ + + + 0 (conmota 05 - 10)	CONTROL4	жал	Contro (13-11	0	PARAMETERS TECHNICAL	QAGE TEVER
	Disselved Caygon		9.1		9	.]			
	pH		१२५		8.7			134	15.
o HOURS	Temperature(C)		193			.3		الع.زز	100
	Conductivity(uS)		296		29	را!		٦,٠	[
l ma	nobility @ 30 minutes (10 espaces)	Ó	0	C	0	0	0		
	pH	. 29	8 28	8 36	8-23	8.23	825	1430	5
24 HOURS	Temperature(C)	20		-0				3	
	# Immobile	0	0	C	0	ی	0	94	
	Disadred Cirygen	8.7	5.5	₹.5	95	8.6	8.6		
	ρΗ	8.13	9.19	3.09	8.16	816	8.20	- mimi	
48 HOURS	Temperature (C)	20.5	20.4	20.6	ZC.5	20.4	20.6	15:45	0
	Conductivity	297	295	298	299	298	297		
	# Immobile	0	0	0	ව	0	0	In	
	# Dead (10 exposed)	0	0	0	0	0	0	1535	
OTAL MORTALITIES		0	٥	J	0	2	3	ביכי [
MEAN & MORTALITY					J				

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

48-HOUR Result: CONTROL C	PASS (0°6-0-+21.3)	//content D	PASS (02-0-421.43)
TEST CONDITIONS			
Brood Culture: Time to First Brood: Average Brood Size: Total Number Esposed/Concentration: Control Water Hardness: Effluent Subsamped from 25L pail for Testing: Test Replication (for QA/QC):	7 negnates 3X10 negnates 17(2) Research 17(2) Present 17(2) yes / no pri Adju	ition Time: Iter Preservingn: Item Rate: Item Rate: Item Adjustment: Item Volume: Deneny:	25 - SOME / YEAR
INITIAL PARAMETERS (prior to tooting)			
Dissorred Caygen: Initial ph: Temparature: Conductivity: Initial Hardness: Physical State Upon Receipt: Clanty: Colour: Precipitate: Odour:	Adjustiv Adj. He	(if applicable): nent Details: reness (if applicable): nent Details:	

48-HOUR STATIC SI	VGLE CONCENTRATION DAPHRIA MAC	OMA TEST (EPS 1/M)	W/14)						
•	10397					041	7.8167/	10:00	,
Project Number: Sample Number:			-				(16.64		
Test Number:	001700		-		n/Time:	05/01/9	7/ 14/12		
Chain of Custody #:	2112		-	Technisian:		- 36	AM SH		

	Note Street Str								
T:ME	PARAMETER	CONTROLA	CONFROL-6	CONTROL-C	100-A		109-C	PARAMETERS TREMTME	_
	Dissortes Oxygen				9				
	SAMPLE D. SAMP								
o HOURS	Terretonium(C)		9.9		2	0 -1		1 gr	(/V\
			2290		2	330		7	
lme	•••			0	0	0	Ü	1	
		G &!		4.64	8.57	8-61	8.59		
24 HOLIBS	-							100	6
241100715		IC	10	10	0	0	0	9.	
		 	९६	 					
								m'y	
48 401 186	·							1.52	
- HOURS	, , , ,							15.	9
	,								-
					 		r	cm	
	● Deed (10 embesse)							1547	
		 		110		0		1	
MEAN & MICHTALITY	······································	<u> </u>	20					<u>!</u>	
REMEMBER T	O COLLECT DAPHNIDS A	ND TEST SQ	LUTIONS A	T 48 HRS					
RESULTS				\ //.					$\overline{}$
8-HOUR Result:	# 109 FAIL (100% ~	ortality) //=	10 PAS	5 60	and the	~ 1.大)
				/ // .			,	<u> </u>	
EST CONDITIONS	for poin Lest								
Irood Culture:	الارد عداء (مدر عليه			•			. 7		
ime to First Broad:		- 7 days		Preserveen Time:					
otal Number Exposus		3X10 neen	etee .	•		total	30 mm		
				•	MAR:				~
				,			(no// y		
		_		•					
	Control (-						(28 11 15 π		
NITIAL PARAMETER		09	L 10				·		
	Dissolved Oxygen:	10.4	10 4						
	Initial pht:	, 0.0.2	4.95				<u> </u>		
	•			Adjustment Octobe	•		-		
	Indial Hardness:	1134	1126						
				Adjustment Octobs					
	•			ileta.			7		
	Otour		2.0	•					

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/14)

Project Number: 4387 Semple Number: 11+12 Test Number: 11+12 Chain of Custody #: 2112		Sample Tech:			04/28/97/10-00				
Chain of Custody #:	2112		-	Technolen:			/~		
TIME	SAMPLE ID: PARAMETER	COMPROX:A	O/I confiner-s	cerme.c	100-A	ان ک 100-8	- 100-C		QAGC
		,	ने व		1	G.U		TECHTRIS	45454
	Dissorved Oxygen	₹			-	751			
	pH		9.4			196		1520	iM
0 HOURS	Temperature (C)	2 =	3-50		<u> </u>	2350	·	15	0
	Conductivity(u5)	0	0	C	0	()	Τΰ	1	
Immot	olite @ 30 mmutes (10 expects)	777	769	7 69	735	732	7 36	11177	
24 HOURS	pH Tamanana (C)				<u>\</u>		1 , ,,	1440	5
24 HOURS	Temperature(C)	0	0	6		10	Ö	On.	
	Dissolved Caygon	8.7	87	9.7	8,5	8.5			
	pH	7.40	7.40	7.40	7.22	7.20	7-24	MAN	
48 HOURS	Terreseasure (C)	20.6	20.5	20.6	20.4	20.3	20.3	1/0:CC	
	Conductivity	2330	234C	2340	233C	2340	2340	\ \	
	€ Immobile	٥	0	0	0	0	0	~	5
	Dead (10 expose)	ی	0	0	0	0	0	1 '	
TOTAL MORTALITIES		3	3	0	0	٥	3	15:55	
MEAN & MORTALITY		O			O				
	COLLECT DAPHNIDS A	ND TEST SO	LUTIONS AT	48 HRS					
RESULTS 46-HOUR Result:	111 PASS (03-) //	# 112	PASS	602-	sotal.	3)	
TEST CONDITIONS	for both tests.				<u></u>				
Brood Culture: Time to First Brood: Average Brood Size: Total Number Exposed/Control Water Hardness: Effluent Subsempted froi Test Replication (for QA)	: m 25L pail for Temng:	240 1 dave 32 near 3210 near 1216 geal no year / 6		Presention Time: Resent for Present Presented Rete: pH Adjustment: Hertiness Adjustme Test Solution Volut Leading Density:	MC	start and total	15 10 30 min DD> 00/5 25-50min (no) / y (20) pt. / 19 (20) // 15 m	nin/L	
INITIAL PARAMETERS		T)	٠ ١٧						
	Dissolved Oxygen: Initial phi: Temperature: Conductivity: Initial Hardness: Physical State Upon Receipt: Clarity: Coldur: Preciptate:	10.2 5.31 19.2 23cc 1156 1166 1166 1167	10.5 749 16 4 2865 1173 1246 1184 1184 1184 1184 1184 1184 1184 11	Adj. pri (if applicati Adjustment Details Adj. Hardness (if al Adjustment Details	: Solicable):				

Additional Observations:

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/14)

Control D

Project Number: Sempre Number: Test Number: Chain of Custody #:	001: 1713 + 1014			Service Deta/Time: Service Teich: Test Indexen Deta/Time: Technicien:		04/29/97/10 05/01/57/16/0			
TIME	SAMPLE ID: PARAMETER	COMPRE:-A	Commoc 8	COMMOL-C	100-A	D14 100-8	199-C	PARAMETERS TROWING	diver over
	Dissorves Oxygen		92			9.2			
	ρΗ		9.81			5.72	1520	[7:A]	
0 HOURS	Temperature(C)	į	93			19.4		- m	(M)
	Conductivity(uS)	2	290		2	2340		」 ৺	1
· mm	obility @ 30 minutes (10 exposed)	C	0	Ü	Ŋ	0	0		
	рH	94	451	4 50	8.53	8-66	8.60	1445	
24 HOURS	Temperature(C)		<u> </u>	20.	20.0				Ca
24 HOORS		10	10	10	ι	C	Το		
		9.7	3.8	8.5	8.7	8.7	Q 7	Min	
	Disserved Oxygen	9.27	9.09	9.4	8.19	8.22	9.37	, .	1
	pH	20.5	20.5	 	20.4	20.3	2c.2	16:76	•
48 HOURS	Temperature (C)			20.5	 	7 — · · · ·		⊣ \♥	3
	Conductivity	2280	2300	2300	2330	2340	234c	+	
	€ Immatate		 		0	0	+	173	
	# Deed (10 exposed)	10	10	13	0	0	0	1602	
TOTAL MORTALITIES		10	13	10	0	0	10	٦ (۵	
MEAN % MORTALITY		100			10			<u> </u>	
	O COLLECT DAPHNIDS	AND TEST SC	LUTIONS A	T 48 HRS					
RESULTS 7 48-HOUR Result:	#113 FAIL (1	00% -	2-talis	5) //#	114 PA	55 60	2 ~o~7	41:3)
TEST CONDITIONS	for both tesk	•							
Brood Culture: Time to First Brood:		0467		Preserven Time:		-	· INC		
Average Brood Size:	_) le neer	Metes	•		•	عنی ا		. [
Total Number Exposed Control Water Herdred		3X10 neor		Seeson for Presen	100A:		30 mair		_
Effluent Subsampled \$	rom 25L pail for Testing:	(reely n		Preservoon Rate:			25 - 90ml	/mm/L	
Test Replication (for Q	MQC1:	V00 16	<u>• \</u>	pH Adjustment					. [

NITIAL PARAMETERS (prior to tosting)	_13	14	_	
Dissolves Onygen:	_10.4	:0.5	_	
Impel pH:	10 00	1 8 85	Ad). pH (if applicable):	
Temperature:	19.7	119.5	Adjustment Orthitis:	
Conductivity:	225C	. 229 C	_	
Initial Hardness:	1105	1105.	Adj. Hardness (if assiscable):	
Physical State Upon Receipt:	16000	1. Cl. Cl	Adjustment Details:	
Clarity:	T. Da.			
Colour:	37245	10000	 	
Precipreto:	- 3	1/40	_	
Qdour:	1.55			

48-HOUR STATIC SIN	IGLE CONCENTRATION DAPHINA MAG	DIA TEST (EPS 1/RM	1/14)							
	19387			Samue Dete/Time	r	04/29/97//70:00				
Project Number: Sample Number:	15 716		•	Samue Tech:			J. Clark			
Test Number:	015 - 016	Test II		Test Indiaban Date	/Time:	05/01/5	7// S 10			
Chain of Custody #:	202		-	1						
						M. B. Stranger		i		
_	SAMPLE ID:	CONTROL A	1212	CONTROL-C	100-A	ار و ا∞ء	100-C	-	CANC	
TIME	PARAMETER				, ,			TECHTER	-	
	Disserved Caygon		2.6			7.2		4		
	pH		8.36			<u>۱۲۰</u>		1820	63	
o HOURS	Terresease(C)		19 6		1	9.6		1 12	W	
5	Conductivity(u5)		2340		Z	340		1	ļ	
		ð	C	0	0	0	U			
Treat	robility @ 30 minutes (10 exposed)	8.03	8 00	1507	7.31	7.30	7.29	1,010		
	pH	3 0 3	<u> </u>		0.0			1540	رح	
24 HOURS Temperature(C)			0	10	0	0	To	Q.		
	# Immobile	0	20	5.8	9.5	8.4	8.6	(m)		
	Dissolved Caygon	8.7				7.20	7.19	Must	ļ	
	pH	7.55	7.59	7.63	7.20	+	77-46	16:18		
	Temperature (C)	20.6	20.5	20.6	20.3	2c.3	2000AH	= 1/0.	6	
	Conductivity	234C	2350	2.350	2340	235C	235c	├ ──	1	
	€ immossie	0	0	0	0	0	0	4	1	
	@ Deed (10 expound)	٥	0	0	0	3	0	100		
TOTAL MORTALITIES		0	0	0	0	<u> </u>	<u></u> 0	1610		
MEAN % MORTALITY		0		·	13			<u> </u>	<u> </u>	
REMEMBER 1	TO COLLECT DAPHNIDS	AND TEST S	DLUTIONS A	T 48 HRS						
RESULTS		<u> </u>	1 , ,	\ //-		/-	٠	11	<u>,) </u>	
48-HOUR Requit:	#115 PASS (07 ~2	·talit	1 //-	116 /	A55 (O	1 ~3	72 7.9	<u>7</u> .	
TEST CONDITIONS	tis pour tests:		 							
Brood Culture:		7067				_	n 1440			
Time to First Broad: Average Broad Size:		den دن .		Preserves Time	.	•	15.10		-	
Total Number Expos	ed/Concentration:	3X10 ne		_ 			1207 100 LS		<u>.</u>	
Control Water Hardre	ees: I from 25L pail for Teseng:	130		Research for Press Pressration Rets			25 - 50mL		 _	
Test Replication (for		V00 /		pri Adjustment			(ne)		-	
				Herdness Adjusti Test Solution Vol Loading Density:	lume:		(200 AL / 1			
INITIAL PARAMETE	ERS (prior to totaling)		19							
	Dissolved Oxygen:	10-12	100	_						
	Initel pri:	161 7	7 2 2	Adjustment Date					-	
	Temperature: Conductivity:	2310	22-0	_					-	
	Inital Hardness:	11510	105	Adj. Hardness (il Adjustrent Dess					-	
I	Physical State Upon Receipt:	<u> </u>								

10)

Additional Observations:

Clanty

Precipitate: Odour:

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/14)

Project Number:	<u></u>	938	フ	
Sample Number:				_
Test Number:	Cov	1701	==	7
Chain of Custody #:	.2	رر ک		_

Sempte Date/Time: Sempte Tech: Test Initiation Date/Time: Techniquen:

04/28/97//?	
5. Clerk	
05/01/97/16/50	
On INM SI+	

TIME	SAMPLE :	CONTROL-4	conmocal 7 - 30	-	184	2-24	F ===	PARAMETERS TROUTERS	dvide Ovide
and the second s	Dissorved Oxygen		8.24			9.! 8.24		15	Cal
O HOURS Tempersure(C) Conductivity(uS)			19.75 29 6			(9.3 296			(")
Imm	iobility (9) 30 minutes (10 exposed	, 0	С	0	U	C	0	 	
24 HOURS	pirl Temperature(G)	¥.31	3.31	T	8.31	8.28	8.29	1543	3
	# Immpole	0	0	<u> </u>	ļ <u> </u>	0	0	9.	-
	Dissolved Oxygen pH	9.7 8.20	8.8 8.25	\$.3 \$.22	8.21	5.18	8.21	WW1 16:24	
48 HOURS	Temperature (C) Conductivity	20.3 297	20.4 29.5	20.5	20.4 298	20.3 298	20.3 298	1/0	5
	Ø Immobile Ø Deed (10 exposat)	0	0	0	0	0	0	in	
TOTAL MORTALITIES		0	3	3	0	D	3	16'4	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS		~ 11	
48-HOUR Result: CONTRULE P	A55 (27 -3-42)	(3) // CONTRUL	F PASS (02-0-tal.5)
TEST CONDITIONS			
Brood Cutture:	040797		
Time to First Broad:	₹ devs	Preseration Time:	
Average Brood Size:	r (g neonates		end
Total Number Exposed/Concentration:	3X10 necrease		
Control Water Hardness:	176	Reason for Pressration:	NU.
Effluent Subsempled from 25L pail for Testing:	1/4h yes/no	Presertion Rets:	25 - SOMLAMINAL
Test Replication (for QA/QC):	NOT YES/NO	pH Adjustrent	
		Herdness Asjustment:	
		Test Solvean Volume:	20 ml 190 ml
		Loading Denaty:	
INITIAL PARAMETERS (prior to testing)			
INITIAL PARAMETERS (pror to totally)			
Dissolved Oxygen:	•		
Initial off:		Adj. pH (if eppicable):	
Temperature:		Adjustment Details:	
Conductivity:		<u> </u>	
Instal Hardness:	,	Adj. Herdness (if assircable):	
Physical State Upon Receipt:		Adjustment Details:	
Clanty:			
Colour:			
Precipitate:			
Odour:			
Additional Observations:			

46-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/14)

Project Number:	L9397
Sample Number:	617+18
Test Number:	ンバインシン
Chain of Custody #:	2115

04/29/97//70:00
S. Chick
05/01/97//16:55
JE WM SH

TIME	SAMPLE ID: PARAMETER	CENTROL-A	COMMO-S	commet-c	100-A	<u>口</u> (分 100-6	109-C	PARAMETERS TECHNICAL	dvæ.
	Distanced Citygen	9.4				۶.۹		ماعد	
	pH	368			950 9	3.45		SK	121
0 HOURS	Terresreture(G)	213			مردا	71.0		1700	$ \mathcal{U}^{\wedge} $
	Conductivity(uS)	2260			2266	2280			ļ
imn	nobility @ 30 mmutee (10 estacese)	Ĉ	0	C	C	C	0		
-	pH	9.53	19.57	9.58	8.30	8.38	8.24	CH	
	Temperature(C)			シ	0.0			ا	5
	€ Inmobile	4	8	4	U	0	0_	1435	ļ
	Dissolved Oxygen	99	5 व	3.લ	8.4	3.6	3.6	Nim	
	рH	9.14	9.17	9.23	7.84	7.94	7,77		
48 HOURS	Тепприявые (С)	2c.7	20.9	21.0	ZC. 5	20.3	20.4	16:32	
	Conductivity	2290	2300	230c	234C	2340	2340		4
	# Immphile	-	i	(3	0	0	Ä	
	€ Dead (10 exposed)	(J	9	9	0	9	0		1
TAL MORTALITIES		10	9	9	0	3	J	1625	
AN & MORTALITY		9.3	%		٥			<u></u>	<u> </u>

REMEMBER TO COLLECT DAPHNIOS AND TEST SOLUTIONS AT 48 HRS

RESULTS 48-HOUR Result: # 117 FAIL (9	32 nortal	h)//=118 P	PASS (02
TEST CONDITIONS DET LESS Brood Cutture: Time to First Brood: Average Brood Size: Total Number Exposed/Concentration: Control Water Hardness: Effluent Subsempress from 28 peut for Testing:	M dave	Presention Time: Research for Presentation: Presentation Refe:	1620 1650 1650 30 min NO > 1656 satiration
Test Replication (for QA/QC): (Em ht.] [INITIAL PARAMETERS (prior to testing)	yes (A)	pH Adjustment: Hardness Adjustment: Test Solution Volume: Loading Consty:	(no) / yee (no) / yee (200 m). / 150 m). (200 /// 15 m)./meanate

INITIAL PARAMETERS (prior to testing)			
Disserved Oxygen: Initel pht: Tempersture:	Jan 10 2 9 5	Adj. pH (if applicatio): Adjustment Details:	
Conductivity:	2250 1225 V		
Phytical State Upon Receipt:	1.33 " 1.7.1.	Adjustment Details:	
Clerity: Colour:	1772 17 C 196 V		
Precipitate: Odour:	757		
Additional Observations:			

@ 27his =17 - 21 daphnids floating at me effluent surface

48-HOLER STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/14

46-HOUR STATIC SIM	GLE CONCENTRATION DAY-HAR BAN	SER 1631 (EP3 1/14	M(14)							
	(9387					۸ .	176157	1/20.00	•	
Project Number: Semple Number:	19+20		-	Semple Date/Time: Semple Tech:		04/28/97/70:00				
Test Number:	019-02	c	- -	Test Installan Des	n/Time:	05/01/97/17/00				
Chain of Custody #:	711.2		-	Technician:		<u></u>	5H			
		***************************************					.			
	SAMPLE ID:		517	3844		D>0				
TIME	PARAMETER	COMPRET.A	come-s	COMMONC	100-A	100-6	100-C	PARAMETRIS TEDATAS	ONO:	
	Disserves Oxygen	189			8.9					
	pH	7.96			7-33			Say	1	
0 HOURS	Temperature(C)	21.1			211			1303	$ \mathcal{O} $	
	Conductivity(uS)	2300			2290					
!mma	ibility @ 30 minutes (10 extraces)	0	C		0_			1		
	pH	7.55	7.51	7.56	7.20	7-21	7.21	CH		
24 HOURS	Temperature(C)			20	ა. O		1 1	Con		
·	€ Immotivie	0	0	C	i	0	0	1441		
	Disagnes Caygen	8'.7	5'.7	4.7	8.8	8.8	8.8	cas		
	pH	725	730	732	7.14	7.10	7.11	1800	<u> </u>	
48 HOURS	Temperature (C)	23.3	237	207	2370	232	20.2	վ '"	İ	
	Conductivity	5320	2360	2342	23-2350	2325	2322	-		
	€ Immothin	0	0	0	3	0	0	as		
	€ Deed (10 execute)	0	<u> </u>	10)	0	2	•		
TOTAL MORTALITIES))	<u> </u>	0	0	<u> </u>	0	1630		
MEAN & MORTALITY	 				3			<u> </u>		
REMEMBER TO	COLLECT DAPHNIDS	AND TEST SO	LUTIONS AT	T 48 HRS						
RESULTS		•	1	- //			<u> </u>		. \	
18-HOUR Result:	= 119 PASS (0	of mont	ニルムノ	11 #	20 P	PASS (C	5°? ~~	. tal. t	5/	
EST CONDITIONS	かっている		_							
Brood Culture:		DUC7	2, 7	Preservesin Time:			1620			
lime to First Brood: Average Brood Size:		I Co need				•	1650			
Total Number Exposed/		3X10 neer		Research for Present		1016	35.00		<u>.</u>	
Control Water Hardness Efficient Subsampled fro	e: om 25L pell for Te ssin g:	yes / 4	<u> </u>	Presentan Rate:			1)C > 1Co	min/L	ic.	
Test Replication (for Qd	NQC):	yes / A	<u> </u>	pH Adjustment:			(n)			
				Test Solution Volume			(200 ml) / 15	O ML		
	Long	01 B.		Lossing Density:			E 11 15	nunesnete .		
NITIAL PARAMETERS		G	1 26							
	Dissorved Oxygen:	93	92							
	Instal pH: Temperature:	473	7.50	Adj. pH (if eagures) Adjustment Desaits						
	Conductivity:	224 C	172°C	•						
	Inited Hardness: Physical State Upon Receipt:		1030	Adj. Haranees (it et Adjustment Details						
				•						

Additional Observations:

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/MM/14)

Project Number: (9387) Sample Number: 21+22 Test Number: 021+022			Semple Dete/Time: Semple Teals: Test Indeten Dete/Time:			04/28/97/110:00 (\$7.01) 47 11 17:05			
Chain of Custody #:	2002		-	Techniquen:			SL'		
TIME	SAMPLE ID: Parameter	CONTROL-A	COMMOCS (2) Z		100-A	ひてこ 1996	160-C	PARAMETERS TRENTINE	ONGC THE
	Disserved Caygon	9.0			8.9				
	pH	9.78			8.72			1705	
0 HQURS	Temperature(C)	21.1			21.1] ()	LH
	Conductivity(uS)	2230			2270]	
Irmine	oblitte @ 30 minutes (10 empessi)	0	0		C	C	0]	
	pH	9.62	9.53	9.72	8.47	8.53	8.53	a	a
24 HOURS	Тептрогович(С)			.20) · O].,,,,,	-5
	# Immobile	10	9	10	0	0	0	1446	
	Dissolved Caygon	8.9	8.9	9.0	89	89	8.9]	
	рН	4.30	9.24	9.27	7.99	8.02	8.10		
48 HOURS	Temperature (C)	20.3	25.5	25.3	20.7	20.4	25.4	1800	
	Conductivity	2300	2280	2270	2350	2300	2310		حرا
	€ Interropaire	_	_	_	0	0	0	(m)	
	€ Deed (10 exposes)	10	၉	10	0	0	0	1620	
TOTAL MORTALITIES		13	10	10	٥	3	0]	
MEAN % MORTALITY		100			2			<u> </u>	
	COLLECT DAPHNIDS A				122 P	PASS (67 ~	-41.	<i>b)</i>
Broad Culture: DUC797							tien		
INITIAL PARAMETER	Dissorted Oxygen: Intel pri: Temperature: Conductivity: Initel Herdness: Physical State Uson Receiet: Clarity: Colour: Precipitals: Odour:	1.25.7	9.5 5.95 19.4 2.250 10.52 11.561 1.661	Adj. shi (if espical Adjustment Details Adj. Herdness (if a Adjustment Details	: squicable):				

Additional Observations:

04/28/97/110:00

48-HOUR STATIC SINGLE CONCENTRATION DAPPINGA MAGMA TEST (EPS 1/99M/14)

Project Number:	L9387
Semple Number:	23 ~ 24
Test Number:	1752 × 057
Chain of Custody #:	えいて

Semple Date/Time: Semple Tech: Test insesten Date/Time: Technome:

04/28/97//70:00
Siluste.
05/01/97//17:10
2m TF SH

TIME	SAMPLE ID:		CONTRACT	S commou-c	100-A	D27 100-8	160-C	PARAMETERS TECHNISME	OASC STATE
	Dissolved Oxygen	8.9			90			144	
	pH	7.92			7.15			1707	1.1
0 HOURS	Temperature(C)	21.0			2350				W
	Conductivity(uS)	2280	>]	
lmr	nobility @ 30 minutes (10 exposes)	C	C	0	0	C	0		
	pM	7.69	7.69	7.75	7.17	7.21	7.19	CH	
24 HOURS	Temperature(C)			20	D · O] _,	5
	# immoste	0	0	0	0	0	ပ	1451	<u> </u>
	Disselved Caygon	8.7	88	3.8	8 9	89	8.4		Π
	рH	7-43	7. 73	745	7.11	7.08	707	5	
46 HOURS	Temperature (C)	20.6	20.4	20.4	20.5	20.5	70.0	1805	
	Conductivity	2340	2775	2340	2350	2325	2370		
	# Immobile	0	3	0	9	O	0	n	5
	# Deed (10 exposed)	0	0	0	3	0	0	1654	
TAL MORTALITIES		0	3	0	ی	2	3	1 "	
AN % MORTALITY		U		· — — —	3		·	1	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS 46-HOUR Result:	23 PASS (C	2 -0. tal.t.	s) //=124 PA	ars (03-0-tality)
TEST CONDITIONS Brood Culture: Time to First Brood: Average Brood Size: Total Number Exposed/Conc. Control Water Hardness: Effluent Subsempled from 25 Test Replication (for QA/QC)	iL pail for Testing:	Gave	Presented Time: Present for Presented: Presented Rate: pH Adjustment: Hardness Adjustment: Tost Selution Volume: Loading Denety:	27 24 ond 1650 SC. 1607/set 166 25.500L/mm/L 657/ yea (200 ML / 150 ML (200 ML / 150 ML
India Terr Con- India Phy Cier Coic	solved Oxygen: al pH: wersture: iductivity: al Hardness: sical State Upon Receipt: tty: our: c:pnese:	22 24 9.2 9.0 \$ 21 715 (1) \$ (1) \$ 22(0) 2750 12(0) 10(0) (1) \$ (1) \$ (1) \$ (1) \$ (2) \$ (2) \$ (2) \$ (2) \$ (3) \$ (2) \$ (4) \$ (2) \$ (5) \$ (2) \$ (6) \$ (2) \$ (7) \$ (2) \$ (7) \$ (2) \$ (8) \$ (2) \$ (9) \$ (2) \$ (1) \$ (2) \$ (1) \$ (2) \$ (1) \$ (2) \$ (1) \$ (2) \$ (2) \$ (2) \$ (3) \$ (2) \$ (4) \$ (2) \$ (5) \$ (2) \$ (6) \$ (2) \$ (7) \$ (2) \$ (7) \$ (2) \$ (8) \$ (2) \$ (8) \$ (2) \$ (9) \$ (2) \$ (1) \$ (2) \$ (2) \$ (2) \$ (3) \$ (2) \$ (4) \$ (2) \$ (4) \$ (2) \$ (5) \$ (2) \$ (6) \$ (2) \$ (6) \$ (2) \$ (7) \$ (2) \$ (8) \$	Adj. pH (if applicable): Adjustment Details: Adjustment Outsils: Adjustment Outsils:	

AQUATIC SCIENCES I	PIC.		
48-HOUR STATIC SIN	GLE CONCENTRATION DAFFINA MAG	NA TEST (EPS 1/R	M/14)
Project Number: Sample Number: Test Number: Chain of Custody #1:	L9387	H	<u>-</u>
тіме	SAMPLE IO:	CONTROLAR	ontr
	Disperved Coygan		4
	pH		₹.,
o HOURS	Temperature(C)		10
	Conductivity(uS)		2
Imms	obility @ 30 minutes (10 exposes)	ς	<u> </u>
	pH	8-19	18.5
24 HOURS	Temperature(C)		
	# Immobile	0	
	Dissolved Chygen	88	1 8 9
	pH	8 10	5 %
46 HOURS	Temperature (C)	20.6	ی. وح
	Conductivity	302	303
	€ Immobile	0	
	₱ Dead (10 exposed)	0	<u></u>
TOTAL MORTALITIES		0	3

04/23/97//?	
5. Clark	
C5/01/97//17:30	
SH JE NM	

TIME	SAMPLE ID: PARAMETER		control 2(-2)	CONTROLA		1 75 - 33	H	PARAMETRIS	GAGE REVER
:	Disserved Caygon		9.1			9.1			
a H OUR S	pH		6.24			5 25	 	JF	1.
	Temperature(C)		19.3			19.3			1
	Conductivity(uS)		296		296				
lener.	nobikty @ 30 minutes (10 exposes)	σ		ر-	C	<u> </u>	0	<u> </u>	
	p#1	8-19	8.21	8.21	8.22	8.37	8.27	CI	
24 HOURS	Tempersure(C)			20	.0			1456	200
•	# Immobile	0	0	0	0	0	O	1512	
	Dissolved Onygen	88	88	38	3.7	8.8	8.3]	T
	pH	8 10	5 20	8.20	8.21	3.21	8.22	an	ļ
46 HOURS	Temperature (C)	20.6	20.5	20.6	20.6	ی.د	20.5	1810	l
	Conductivity	302	303	306	304	305	303	<u> </u>	یر ا
	# Immoune	0		0	O	0	0	C-7	
	# Deed (10 exposed)	0	9	0	0	0	D	1701	
AL MORTALITIES		0	3	3	2	ا ا	٥]''	
N % MORTALITY		U						1	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS	4 (-	(() //	
48-HOUR Result: #D.N.TROL G	PASS (0% -0	1 6 / 6 / 6 / at-	H PASS (07 tally)
TEST CONDITIONS			
Brood Culture: Time to First Brood: Average Brood Size:	days J. Moonesse 3X10 represses	Preserveen Time:	
Total Number Exposed/Concentreson: Control Water Hardness: Effluent Subsempled from 25L pell for Tesang:	156 VP vec/no	Reason for Presentation:	NUT 2 - Stopp / march
Test Replication (for QA/QC):	N.A. ves/no	pH Adjustment: Herdness Adjustment: Test Solution Volume: Loading Denerty:	65 // yee 450 mt / 150 mt 25 // 15 mt/mense
INITIAL PARAMETERS (prior to todding)			
Dissolved Oxygen:		Adi. pM (if accurate):	į
Initial phi Temperature:		Advision Details:	
Conductivity:		Adj. Hergness (if applicable):	
Physical State Upon Receigt:		Adjustment Details:	
Clanty:			
Colour:			
Preciptate: Odour:			
			
Additional Observations:			

Project Number:	L9387
Sample Number:	25 +26
Test Number:	172 T + 1026
Chain of Custody #:	2112

04/29/97// 70:00
Sillars
05/01/97//17/15
IF SH WM

TIME	SAMPLE ID: PARAMETER	<u>COMMOC</u> A	5 C/ 8-20mas		100-A	026 100-6	100-C	PARAMETERS TROMPASE	CARE THE
	Dissolved Citygen	88			90			o ia	
	ρH	977			3-91			1512	1,1
0 HOURS	Temperasure(C)	21.6			20.2			月川	(M
	Conductivity(uS)	2220			3290]	
Ime	nobility @ 30 minutes (10 exposes)	С	C	C	0	C	0	1	
	pH	9-45	9.42	7.50	8.22	823	8.26	CU	
24 HOURS	Temperature(C)			Q C	0.0			7 ′	63
	€ tmmobile	8	6	フ	0	O	0	1503	•
	Dissolved Caygon	-ز. 8	8.6	8.6	8.7	8.3	8-4	(2	
	pH	7.02	9.30	9.09	778	7.80	7.80	18 00	
48 HOURS	Temperature (C)	20.6	20.6	20.6	20.5	20.5	20.5		
	Conductivity	2290	7280	2290	2 370	2330	2330		
	# Immobile	_	0	0	v	0	0	9	
	# Deed (10 exhous)	10	9	9	ی	0	0	ا ا	-
TOTAL MORTALITIES		10	3	9	O	2	0	1715	
MEAN & MORTALITY			10%		J		•	<u>[</u> _	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS		1 11	
48-HOUR Result # 125 FAIL	(90% mortali	5) // #726 4	7+55 (07 ta 1.73)
		///	
TEST CONDITIONS NY 15CHY KSK	· · · · · · · · · · · · · · · · · · ·		
Brood Culture:	140797		
Time to First Broad:	S days	Preserveson Time:	1620
Average Brood Size:	1 la neoneme		1650
Total Number Exposed/Concentration:	3X10 recrees	-	SC SC SC SC MIN
Control Water Herdhets:	136	Reason for Preservision:	ויים ובכיים במדעות לוכיי
Effluent Subsempled from 25L pail for Testing:	yee / f6	Presertes Rete:	25 - 80mL/mm/L
Test Replication (for QA/QC):	yes / (R)	pH Adjustrant:	(mir) (year)
		Herdness Adjustment	AB) / yee
		Test Salution Valums:	200 mg / 150 ms.
Com	× 1 6	Looking Denoty:	CD II 15 ML/Manusa
INITIAL PARAMETERS (prior to testing)	25i 2b		
INTERPOLETERS (pilet to touring)		•	
Disselved Covern:	46 9.3		
Initial pH:	प्रयत् दिश्व	Adj. pH (If applicable):	-
Temperature:	193 192	Adjustment Details:	
Conductivity:	2230 12250	<u> </u>	
Initel Herdness:	10:52 1054.	Adj. Hardhess (if applicable):	
Physical State Upon Receipt:	March 11 Cray	Adjustment Detaile:	
Clanty:	الإنكاني المراجع	_	
Colour:	_0044-0-7-10134445	<u> </u>	
Precorate:	<u> </u>	-	ļ
Odeur:		_	
Additional Openvations:			
· · · · · · · · · · · · · · · · · · ·			

RESULTS

46-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/MM/14)

Project Number:	_ <u> </u>
Sample Number:	27 - 48
Test Number:	027+023
Chain of Customy #:	2112

Semple Date/Time: Semple Tech: Test Initiation Date/Time: Testamine

04/28/97/170-00
J. Clark
05/01/974
Ju SH NIM

TIME	SAMPLE (I)27 commerce	COMPACLC	100-A	ウ <u>ン</u> と つ <u>ン</u> と	100-C	PARAMETRIA TECHNIC	OAGE ATTEN
	Dissorred Onygen	9.0				8.9		J 27.	
	pH	8.07				7.10		17/54	┥ .
G HOURS Temperature(C)	ن. ا <i>ج</i> ر				2C.7			M	
	Conductivity(uS)	3280)			2250] 24.	
lme	nobdity @ 30 minutes (10 exposed		0	C	0	0	0	17.50	1
	pH	7.70	7.71	7.70	7.24	7-22	7.25	CM	
24 HOURS	Temperature(C)		20.			0			6
	₽ Immotale	0	0	0	0	0	0	1508	
	Dispotved Oxygen	8.3	3.8	8.8	8.7	8.6	3.6		
	p H	7.45	7.50	7.51	7.18	7.18	7.14	700	
48 HOURS	Temperature (C)	204	25.4	20.5	20.4	20.4	20.4	1815	1
	Conductivity	2 340	2350	2350	2 340	2350	2340	7	5
	€ Immatule	0	0	0	0	0	0	6	
	● Deed (10 exagend)	0	9	2	2	2	D	\$7:23	
OTAL MORTALITIES		0]]	D	10	3	2		
EAN % MORTALITY		J			Ü			7	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS				· · · · · · · · · · · · · · · · · · ·
48-HOUR Result: # 123 P	455 (02)	~ 2-ta /d	1/200	PASS(07 -0-1/15)
			// // 28	7.103(0 , 2017,270 3)
TEST CONDITIONS TO COM	trek			۶۶ ۲۶
Brood Culture:		46797		27 28
Time to First Brood:		₹ dave	Processon Time:	1620 17.CC
Average Brood Size:		_ neenetes		16:50 17:30
Total Number Exposed/Concentration:		10 negnetes	-	30mio 30mio
Control Water Hardness:		136	Researctor Preserveson:	X >1009,00 DC >100%, set.
Effluent Subsempled from 25L peil for Testing:		yes / (b)	Preserveon Rate:	25 - SQML/mm/L
Test Replication (for QA/QC):		700 I/TO	pH Adjustment:	Case// yes
	<u> </u>		Hardhada Adjustment:	Utor / yea
			Test Saluten Volume:	(200 pt. / 150 m.
	(more)	<u>_</u>	Losding Denany:	Z // 15 ML/Mannata
	1 Carried I	_1		
INITIAL PARAMETERS (prior to touting)	47	128		
			-	
Dissolved Oxygen:	93	9.4	_	
Instal pri:	<u> </u>	7,5 =	Adj. pH (if eposcobie):	
Temperature:	19:5	14.1	_ Adjustment Octobs:	
Conductivity: (rutel Hardness:	2300 1051	127:50	Adi, Hardreen (d agnucable):	
Physical State Upon F			Adulatment Details:	
Clarity:	lecouse 1 City			
Colour:	20 Mar		-	
Preopitate:	- - 1 / 1 / 1	76	-	
Odour	\ -	1,50	-	
			-	
Address Observance				

45-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/14)

Project Number:	(9387	
Sample Number:	シェイ・コロ	
Test Number:	ことによりはら	
Chain of Custody #:	2112	

Sempto Date/Timp: Sempto Tech: Test Invasion Date/Timp:

04/29/97//80:00
3. 6(0/6
CS/C1/97//17:35
and TE

TIME	PARAMETER	SAMPLE ID:	COMPACA	OZ coma-s	CONTROL C	100-A	ಶಿತ್ತ್ವರ	169-C	PARAMETERS TECHNISE	- GA-GE
	Dissolved Oxygen		10.2			87			NVM	
	pH		4.74	+		5.60] 1/2	A
O HOURS	Terreservice(C)		20.5	5		20.5			17:54	المسريا
	Conductivity(uS)		222	C		2230] ' '	İ
Imm	nobility @ 30 minutes (() exposed)	0	C	0	0	0	C]	
	pH		4.71	9.62	9.71	8.45	8.41	9.50	C4	
24 HOURS	Temperature(C)				ヹ゙゙゙゙゙	· 0],	3
	@ Immosile		٩	10	10	0	ಲ	0	1518	
	Diseates Oxygen		8.9	5.5	8.9	8.71	3.8	8.7	-	
	рH		9.34	9.40	9.38	831	9.08	8.01	on	
48 HOURS	Temperature (C)		20.4	20.4	20.4	20.5	20.5	20.5	1820	
	Conductivity		2300	2710	2313	2350	2340	2340		25
	# Immobile		-	_	_	0	0	0	3	Ĭ
	# Deed (10 exposes	1)	10	10	10	0	0	0	1732	
TOTAL MORTALITIES	i		(0	ιō	(3	0	J	3		
MEAN % MORTALITY			(3)			ی				

RESULTS	# 129 FAIL	(100)	1 14) // = 120	PASS (03-0-talis)
	129 PAIC	(100 6-2-7	2 10/3/// 130	1433 (0%~3~3~3)
TEST CONDITIO	NS Social III			
	ns for Both lesk	5.		
Brood Culture:		040797		. 7. 6.
Time to First Broo		dove	Preservecin Time:	<u> 17:00</u>
Average Brood Size:) (_ negnetes		end <u>17:30</u>
	nosed/Concenstation:	3X10 negnetes	<u> </u>	3Cinin
Control Water Har	dness:	10	Reason for Preservion:	DE > 10000 seturation
Effluent Subeamp	ed from 25L pail for Testing:	yes / (16	Preserveron Reta:	25 - SQUIL/MINAL
Test Replication (for QA/QC):	vee (no	pH Adjustivant:	₩ / yes
		_	Hardness Adjustment	(a) / yes
			Hardness All perminc Test Solution Volume:	(200 mL / 150 mL
	, ·	· - \asl 11		
	(emtral H	Test Salution Volume:	(200 mL / 150 mL
NITIAL PARAME	TERS (prior to testing)		Test Salution Volume:	(200 mL / 150 mL
NITIAL PARAME	TERS (prior to tosting)	emtrol H	Test Salution Volume:	(200 mL / 150 mL
NITIAL PARAME	TERS (prior to toating) Dissorted Oxygen:		Test Salution Volume:	(200 mL / 150 mL
NITIAL PARAME		رو کی	Test Salution Volume:	(200 mL / 150 mL
NITIAL PARAME	Dissorved Oxygen:	29 30 98 96	Test Solution Volume: Loading Dentity:	(200 mL / 150 mL
NITIAL PARAME	Dissorved Oxygen: Inreel ptt:	29 30 48 95 945 698	Test Solution Volume: Loading Denety: Adj. pH (iff applicable):	(200 mL / 150 mL
NITIAL PARAME	Dissorved Oxygen: Initial pit: Temperature:	29 30 48 912 995 696 1916 193	Test Solution Volume: Loading Denety: Adj. pH (iff applicable):	(200 mL / 150 mL
NITIAL PARAME	Dissorved Oxygen: Inited pt: Temperature: Conductivity:	29 30 98 915 998 6.98 1915 1915 2248 2270	Test Solution Volume: Loading Denety: Adj. pH (if expirablis): Adjustrant Details:	(200 mL / 150 mL
NITIAL PARAME	Dissolved Oxygen: Instel pri: Temperature: Conductivity: Instel Heroness:	29 30 98 96 995 696 1966 196 1246 2276 1003 1005	Test Solution Volume: Loading Denery: Adj. pH (if applicable): Adjustment Details: Adj. Haraness (if applicable):	(200 mL / 150 mL
NITIAL PARAME	Dissolved Oxygen: Instel ph: Temperature: Conductivity: Instel Hardness: Physical State Usion Receies:	29 30 98 96 995 696 1966 196 2240 2270 2240 2270 2003 1005	Test Solution Volume: Loading Denery: Adj. pH (if espicable): Adjustreent Details: Adi. Hardness (if assiscable): Adjustreent Details:	(200 mL / 150 mL
NITIAL PARAME	Dissolved Oxygen: Initial off: Temperature: Conductivity: Initial Heroness: Physical State Upon Receipt: Clarity:	29 30 99 915 995 696 1916 1918 2246 2270 1003 1005 10010 1005 (1907 1001)	Test Solution Volume: Loading Denery: Adj. pH (if espicable): Adjustreent Details: Adi. Hardness (if assiscable): Adjustreent Details:	(200 mL / 150 mL

48-HOUR STATIC SINGLE CONCENTRATION DAPPINIA MAGNA TEST (EPS 1/RM/14)

Project Number:	
SAFTEME Number:	31 7 3 7
Test Number:	72.4035
Chain of Custosty #:	2いこ

Senate Deta/Time: Senate Tech: Test Indeten Deta/Time: Technican:

04/23/97//10:00
5. Clause
55/61/97//17:40
Wim IF

TIME	SAMPLE (D: Parameter	COMMICCA	()3 \ COMMOL&	COMMOL-C	100-A	○3 <u>~</u> 100-8	100-C	PARAMETERS TECHNISE	GARGE
	Dissorted Caygon	9.C			18.9			Ι,	
	ρΗ	₹.03	3		7.21] sninct	1.1
0 HOURS	Terresersore(C)	2c. 3	<u> </u>		19.7		····	1756	
	Conductivity(u5)	229	0		2270			$\prod_{k \in \mathcal{N}} $	
lme	robikty @ 30 minutes (10 exposes)	0	0_	0	0	ပ	0	<u></u>	İ
	pH	7.53	7-84	7.87	7.28	7.25	7.22	CY	
24 HOURS	Terresersture(C)			20	0				3
	# Invitable	0	0	0	0	0	0	1523	1
_	Distance Oxygen	8.7	88	8.5	8.7	57	5.7		
	pH	7.54	7.60	7.62	721	720	7.14	9	
46 HOURS	Temporature (C)	20.5	20.5	23.5	20.4	20.7	20.5	18 20	
	Consuctivity	2340	2340	2342	2350	2340	2372		
	# Invasio	0	0	0	0	0	0	6	13
	● Dead (10 exposed)		0	0	2	2	0] _	
TOTAL MORTALITIES		0	0	3	0	J	0	1743	
JEAN % MORTALITY		2			U				

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS #/3/ P.45	5 (07 -o-ta	(5) / #32	Pass (03 + 15
TEST CONDITIONS Brood Culture: Time to First Brood: Average Brood Size: Total Number Exposed/Concentration: Control Water Hardness: Effluent Subsampled from 25L out for Teseng: Test Replication (for QA/QC):	040797 × deve 1 (2 nonnesse 3X10 nogenesse 1100 1100 yes /fo; yes /fo;	Presented Time: Recease for Presentation: Presentation Rate: oH Adjustment: Hertiness Adjustment: Test Solution Volume: Looking Density:	TOTAL SECTION OF THE PROPERTY
Dissolved Oxygen: Initial on: Temperature: Conductivity: Initial Partiness: Physical State Upon Receipt: Clarity: Colour: Precipitate: Odour:	31 32 93 915 5.45 7.61 147 18 8 2260 2250 1405 7605 16111 1611 173 18 18 18 18 18 18 18 18 18 18 18 18 18	Adj. pH (if applicable): Adjustment Details: Adj. Harsness (if applicable): Adjustment Details:	
ddibonai Observations:			

AQUATIC SCIENCES INC.

96 HOUR STATIC RAINBOW TROUT SINGLE CONCENTRATION TEST **EPS 1/RM/13**

Project Number:

L387

Sample Number:

01 - 16

Client:

inco Ltd

Test Number:

T01 - T16

Sample Name/ID:

Copper Cliff, Ontario **Experimental Treatments for CCWWTP**

Sample Technician: S Clark

Sample Date/Time: 04/28/97//-:- hrs

Sample Identification #101 - 116 CCWWTP

Test Date:

05/01/97//17:00 hrs

Sample Location: Chain of Custody #:

2112

Technician:

Sample Method:

Grab

C Huras/J Farquherson

RESULTS

96 HOUR RESULTS:	01: 101:	FAIL (100% mortality)	09: 109:	FAIL (100% mortality)	
	02: 102:	PASS (0% mortality)	10: 110:	PASS (0% mortality)	
	03: 103:	PASS (0% mortality)	11: 111:	PASS (0% mortality)	
	04: 104:	PASS (0% mortality)	12: 112:	PASS (0% mortality)	
	05: 106:	FAIL (100% mertality)	13: 113:	FAIL (100% mortality)	
	06: 106:	PASS (0% mortality)	14: 114:	PASS (0% mortality)	
	07: 107:	PASS (0% mortality)	15: 115:	PASS (0% mortality)	
	08: 106:	PASS (0% mortality)	16: 116:	PASS (0% mertality)	

QUALITY ASSURANCE INFORMATION

REFERENCE TEST CONDITIONS

Test Organism:

Rainbow Trout

Test Aeration Rate:

6.5 +/- 1 mL/min/L

Trout Batch Number:

041497

Photoperiod:

16 hours light/8 hours dark

Test Type: Test Temperature: Static

Dilution Water:

Dechlorinated Tap **Fingerlings**

Test Volume:

15+/-1C

Organism Age: Stock Source:

Rainbow Springs Hatchery

Test Solution Depth:

15 Litres 27 cm

Mean Weight:

0.43 +/- 0.17 g

REFERENCE TOXICANT DATA

95% Confidence interval:

Chemical Used: Date of Test:

Sodium Chloride April 30/97

Historic Mean LC50:

16153 mg/L

96-hour LC50:

14893 mg/L

13363 - 16177 mg/L

Warning Limits:

12017 - 20288 mg/L

TEST PROTOCOL

Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout.

Environment Canada. July 1990

COMMENTS

The reference toxicant results show that test reproducibility and organism sensitivity are within acceptable limits. All data is scrutinized for errors daily during the test, at test termination and during the report Technical and Final Review stages. Instruments used to monitor parameters are calibrated daily and continuously maintained.

QUALITY REVIEW

Test Number:		7-10	Test Inidetton Date/Time:		1/97//	700
Cu etody €:	2112		Technimen:		H/SF	
		Hipportionistones:	The State of the S		•	
		Control A	CUNTRICE	PARAMETER	OMOC	
TIME	PARAMETER	100	100	TECH/TIME	NEVIEW	
	Disserved Caygon	7.81	9.3	CH	1 . 1	
0 HOURS	pH Temperature(C)	14.5	14.6	1740_	المنر	
Uncons	Conductivity(u.S)	299	298	1	'	
Immobil	fity (9 30 minute (10 exposed)	0	C	1748		
15 - 18 HOURS	PIC	7.71	1.64	2/m 0400	in	
	Disserved Oxygen	9 9	9.5			
	pH	8 c 2	9.01	11 00	4	
24 HOURS	Tempersoure(C)	14.1-	14.7	1600	「フー	
	Conductivity(uS)	299	300	de		
	# Immobile	0		i '		
	Total # Dead Discoved Oxygen	9.5	9 9	 	 	
	pH Cayyon	7.45	4m - 4.01	:m\	/	
48 HOURS	Temperature(C)	14 .5	14.3	17m	5	
	Consuctivity(uS)	300	WM = 300 301	14:10	'	
	€ Immobile	C		197		
	Total # Deed	0	C			
	Disserved Citygen	9 9	10.0		}	
70.1101.00	pH	7.86	7.92	1500	1	
72 HOURS	Temperature(C) Conductivity(uS)	14 12	19.3	l' <i>~</i> ~	13	
	# immode	300	302	\cup_{i}	/	
	Total # Dead		† 	ļ "	l l	
	Dissolved Oxygen	9.5	9.6	CU		
	p∺	7.85	5.02		CM - 1	
96 HOURS	Temperasure(C)	14.7	14.3	1505	8	
	Conductivity(uS)	307	303			
	# Immobile	<u> </u>	6	1510	I	
TOTAL MORTALITY	Total ≠ Deed	0	6	, , , ,	1	
	MEASUREMENTS IF 100% KILL IN	1 10119 1415 752		20.15.16.12.13		•
RESULTS			UTION SUBSAMPLES AT 1 HOUR			
96 Hour Results:	(Emple) A' f	Pass (0°) mi	octalish (sal	ml B. Pe	z<<(&?	modelih.
TEST ORGANISM CO	CHILGIC A IS FC.K	S. Mortage of College 7 Days Pr	wm Te: -: 17.	Province Day Last F	innelina Timar	1300
	- 1, 1, 2, 1, 2, 1, 2, 3	,				
Control Weight (g) / Le	ngक्र (लाल):					
0.20/27	0.43, 33 17-74 38	2.54350.52 35	0.3430039320	1.19 . 30	0.46320	1 44 30
	0 13. 33.0				0 10 32	7-10/ 383
Sample Size:			Meen Weight: 0-44. Weight Min/Mex: 0-20.	++ O-140		
Mean Fork Length:	33 +/- 3· Cmm		Weight Min/Mex: 0.20	0.729		1
Fork Length Min/Mex:	3.7 · 38 mm		Loosing Density: 0.2	<u>.S 9/L</u>		ļ
						
TEST CONDITIONS						
Total Presertion Time:	sen 153 c	~	To an Carlo and Market and A.		1	i
TOWN PROMISES TIME:	ene 1700		Test Solution Volume (L): Test Solution Deser (18cm:10L: 28cr		166	
	900		Total Number Especial/Concentrate	-	10	
Reason for Preseration			Test Replication (for QA/QC):	•	yes/no	
Preseration & Test Agra	150n Rate: 6.5 +/- 1 mL/m	in/L		-		
pH Adrustment:	ves (no)					
INITIAL PARAMETERS	(prior to testing)					
Dissolved Oxygen (ppm	y:		Physical State Uson Receipt:			
pri:			Clanty:			
Temperature (C): Conductivity (uS/cm):			Calqur: Precipretti:	. —	<u>.</u>	
			Odour:			
(Adj. pH [if applicable]):		· · · · · · · · · · · · · · · · · · ·		7		
(Adjustment Details):				<i>f</i>		
Comments						

Project Number:	L9387		Sample Date/Time:	04/2	9/97//1	7.00
Sample Mumber:	01 + 02		Service Tech:		Clask	
Test Number:	TO1 + TO2		Test Intesten Osts/Time:			1700
Custody #:	2112		Technique:		FICH	
		Marine Survey Comment	Same of the same of			
TIME	PARAMETER	TC/ 100	ア ひえ 100	PARAMETER TECH/TIME	MEVIEW	
-	Distance Caygon	10.8	10:6	01/	1	
	pH1	10.05	974		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
0 HOURS	Temperaure(C) Conductivity(uS)	:37	15.1	-,,-	CN	
Immobil	kity @ 30 minutes (10 exposed)	2310	2350	1743		
15 - 16 HOURS	pH	1 11.104	7.621	WM SSI	400	
TO1-15-16-10	Dissolved Oxygen	10 2	4.4	101		
	PH	3.79	7.51	ال المالي	9	
TO 7 - 24 HOURS	Temperature(C) Conductively(uS)	74 ()	10.2			
	# Immosale	25.0	3376	Jun 30 1	1	
	Total # Oead	10		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
	Distanted Oxygen	94	५.९			
48 HOURS	pH Temperature (C)		7.49	1,747		
40 HOURS	Temperature(C) Conductivity(uS)		7.290	441C	6	
	# Immosale		7.350	1410	"	
	Total # Deed		0			
	Dissalved Citygen		10.C			
72 HOURS	pH Terreparature(C)		7.47	00	1	
721100110	Conductivity(uS)		2380	1500	9	
	# Immobile	1	2	-)		
	Total # Deed		<u> </u>			
	Di ssorved Okygen pM		9.7	CH	~10A	
96 HOURS	Torrogramme(C)		7.47	/		
	Conductivity(uS)		2300	1507	1	
	€ Immosile		. 0	,,,,,	1	
TOTAL MORTALITY	Total # Dead	Y	0	1		
	MEASUREMENTS IF 100% KILL IN	1 100	177011 71700 4170 70 40 40 40 40			
RESULTS &			UTION SUBSAMPLES AT 1 HOUR			
98 Hour Results: / 🔾	1. Fail (1000).	nortality /	02: Pass (0	9 morta	fin)	
TEST ORGANISM CON	DITIONS					
Trout Betch Number:	041497C-4BE	% Mortality of Culture 7 Days Pr	or to Teating: 1://	Toxesus Day Last For	ading Time: /	600
Control Weight (g) / Len						
·,	2 1	5	9 7			10
6.20 / 7.1	C47 33 C-127 35	C-74 47 C-51 45	0.341.30 10.31 331 (3.351 32 C	37 (2.46 ÷3
Semole Size:	10		Mean Warght 0.44	+0.14.		
Meen Fork Length:	22 +/ j.: mm	1	Weight MinAles C.2C .	5. 7J.		
Fork Length Min/Mex:	<u></u>	1	Looding Density: 2	_ايو		
77.77.00.00	· - //					
TEST CONDITIONS	10: 150-11-25-52					
Total Presertion Time:	<u> </u>	2	Test Salvaan Valume (L):		16 L	}
	end 1700		Feet Solution Death (19cm:10L: 29cm	_	24112	
Reason for Preserason >	30 minutes: 30 2 i co		Total Muritier Expositi/Concentration Test Replication (for QA/QC):		10	
Preserzeon & Test Aerab			en uebucasou (los modic):	_	yes (no)	
pH Adiustment	ves (no)					
INITIAL PARAMETERS	(prior to locking) TC:	1-62				
		121 :: 0				
Dissolved Oxygen (ppm):	10.05 11			· quid		
Temperature (C):	77 10.72		Clanity:	1808,001	JE11:-2/	
Conductivity (u\$/cm):	23.10			# Y+5		
(Adj. pri (if applicable)):			dour:	VPC .		
(Adjustment Details):				,		
Commercia/Deviations:) !! - 0/ %	- 1.	1217		Crest ser	
:	2 lbv 3/10 no	AL LANGES	= (oi) ==			
		-				

Project Number:			Sample Date/Time:		29/97// <i>I</i> C	:CC
Sample Number:	03 + 04		Sertigue Tech:		Clark	
Test Number:	T03+ T04		Test Inflation Com/Time:		197//170	<u>د</u>
Custody #:			Tephnesen:		H 15F	
		the second of the second	and the second of the second o			
		T03	TOY	PARAMETER	OVOC	
TIME	PARAMETER	100	9.9	TECH/TIME	NEVIEW	
	Disserved Citygen pH	2.13	7.54		1 1	
0 HOURS	Temperature(C)	15.5	15.6]	CM	
	Consuctivity(uS)	2360	2360	1 1746		
Immosuir	tv 😨 30 minums (10 exposus)		C			
15 - 16 HOURS	‡n	7.300	7.40	OSIBINM	7	
	Disserted Oxygen	4.6	7. 27		,	
24 HOURS	pri Termerssure(C)	145	10.3	14.05	161	
241100113	Conductivity(uS)	2570	2 360	1602	1 1	
	# Immgede		3		i i	
	Tatal # Deed	·				
	Disserved Cinygen	4.2	9.4	=		
48 HOURS	pri Temperatura(C)	7.53	7.29	14:13		
40 HOCHS	Conductivity(uS)	2390	23°C	July		
	# Investigation	0	7	- 'M'		
	Total # Dead	Ü	Ö	٦		
	Dissolved Oxygen	9.8	1C · C			
	PH	7.14	7.24	1.00		
72 HOURS	Temperature(C)	74.0	14.3	1502	6	
	Conductivity(uS) # Invitodile	2350	-380 -380	ー グ	1 1	
	Total # Dead	~~~	7	-	1	
	Dissolved Citygen	9.6	9.8	CU	~~	
	pri	7.25	7.32]	200	
96 HOURS	Tempersture(C)	14.4	14.3	J		
	Conductivity(uS)	2390	2380	1509		
	€ Immpedie Total € Deed	8	8		1	
TOTAL MORTALITY		Č	8	_		
REMEMBER TO TAKE	MEASUREMENTS IF 100% KILL IN	1 HOUR TAKE TEST SO	LUTION SUBSAMPLES AT 1 HO	UR OR 15 - 16 HOURS	AND SE HOURS	
RESULTS 7:	22: 30===(=6	1 11	1 # 12 d D-5	1 267	1-1	
96 Hour Results:	03 . Pass(di	martality)	JF104 Pass	COM M	ortality)	
TEST ORGANISM CON	DITIONS					-
Trout Batch Number:	0414976-1.13 F.G.	% Mortality of Culture 7 Days P	nor to Teating:	Provious Day Last f	feeding Time: 160	20_
Control Weight (g) / Len	on (mm)					
1	2 3	4 5	6 7			10
0-20172	1-14-53 C-74-3X	0.543510.57535	031300313	10.351.32	のまりいいつ。主	15.5
Sample Size:	iC		1 0.4d	+ C.14 .		
Mean Fork Length:	23 +/- 3. C mm		Waiser Min/Mar: (). (1)	0720		
Fork Length Min/Mex:	23 - 24 mm		Looking Density: C-2	Q g/L		
TEST CONDITIONS	してはけいとうちょ					~
					1.7.7	
Total Presertion Time:	1530		Test Solution Volume (L):		١٥٠	
	end 1701		Test Solution Death (19cm:10L; 2		<u> </u>	
Resson for Preseration >			Total Number Espesso/Concentre Test Represson (for QAQC):		yes (60)	 [
Preservation & Test Agrat				•		
oH Adiustment:	ves (mg/					
INITIAL PARAMETERS	(prior to leating)	TDS				
	11.5			1 1		
Dissolved Oxygen (ppm)		11-0	Physical State Uson Receipt:	light d		
pH:		77:	Clarity:	Clexic	· • » 1 » · » ·	
Temperature (C): Conductivity (uS/cm):	• 3	23.50	Calcur: Precipitate:	Brises Chi	C1234	
CONCENTY (GOVERN):		<u></u>	Odour:	٧٤٤		
(Adj. pH (if appucable)):						
(Adjustment Details):						
Comments/De vietlens:	a kalandi, engastra	The Same		070 minus L 1487/6	PREACHON! WILL	

2n 3

Project Number:	L9387		Samue Date/Time:	04	123/97	7//10:00
Sample Number:	05+06		Sample Tech:	5	. Cleark	
Test Number:	TOS+TC6		Test Installan Cots/Time:	05/01/9		
Cu mpdy # :	3/13		Testinisen:		in Of	
		and the second s	The state of the s	ž		
		TUS	TO 6	PARAMETER	OVOC	
TIME	PARAMETER Disasses Caygon	100	100	TECH/TIME	REVIEW	
	pri	10:56	9.02	1(9	11/	
O HOURS	Temperature(C)	14.6	13.7	-	$ \mathcal{U} $	
	Conductivity(uS)	2500	2350	J1750	1 1	
	ty (© 30 minutes (10 expense)		2			
15 - 16 HOURS	ort	cae an unic	9.33	10815 CP	63	
T05-15-16	Discoved Oxygen	10.0	7.57	7515 1515	1 _ 1	
TC6 -24 HOURS	Terransusure(C)	14.9	131	⊣ ი≲!>/	6	
C6	Conductivity(uS)	2290	2570	1615		
	# Introduc	-	C			
	Total # Deed	(C) eisha)	1 Tob		
	Disserved Caygon	<u> </u>	9.5	~m		
44 HOUSE	pH T		7.45	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
46 HOURS	Terreporte(C) Conductivity(uS)		2370	-1 (1)	4	
	# Immobile		6	14.7		
	Total # Dead		č	1	ii	
	Disserved Oxygen		1017			
	pH		7.42	1507		
72 HOURS	Temperature(C)	<u> </u>	10.2	11ンツ	43	
	Consuctivity(uS) # Immobile		2376	4 (r)		
	Total # Dead		6	-	ļ .	
	Dissoved Oxygen		9.5			
	pH		7.43	CU 15 11	385	
96 HOURS	Temperasure(C)		14.2		5 —	
	Conductivity(uS)	ļ	2350	1,51	i i	
	€ Immosile Total € Dead	\	0	┨′		
TOTAL MORTALITY		78	8	1		
REMEMBER TO TAKE	MEASUREMENTS IF 100% KILL IN	1 HOUR TAKE TEST SOL	UTION SUBSAMPLES AT 1 HOU	R OR 15 - 16 HOURS	AND SE HOURS	
RESULTS TOTAL	5= 5 1 1000		E11- D 10	(4)	1.21	
96 Hour Results:	< tail 100%	mortelia)	-9100. Pass (C	of more	ALLY)	
TEST ORGANISM CON	DITIONS +3	· · · · · · · · · · · · · · · · · · ·				. /
Trout Betch Number:	14/657C XG	S Mortelity of Culture 7 Days Pr	nor to Teating: 1/.	Previous Day Last F	seding Time: 🔃	600
Control Weight (g) / Len	oth (men):	·				
1	2 3	4 5	6 7		•	10
0.56,34	0.6035 0.61,35	0.56,34 0.62,35	0-36/31 0-44/32	0.56134	2.57/35 O	37/30
Sample Size:	10		Mann Wessit: 0.53	+-0-10 a		
Mean Fork Length:	34 +/- 1. 8mm		Weight Min/Mex: U- T. A	· O-6 / g		
Fork Length Min/Mex:	30 - 35 mm		Lossing Deneny: O-			
						
TEST CONDITIONS	BY DOWN KSIS					
					: (1	
Total Presertson Time:	7530 7700		Test Salutian Valume (L):		16.2	
	# 40 m		Test Solviton Depth (19cm:10L: 25 Total Number Espesso/Censented	-	2961	
Reason for Preservation >		· ·	Test Regiscation (for QA/QC):	-	may no	
Presersion & Test Aeras	ion Rate: 6.5 +/- 1 mL/m	bn/L		-	~	
oH Adjustment:	vegr no					
INITIAL PARAMETERS	(prior to totaling)	ME				
	-163	.: 13				
Dissolved Oxygen (ppm)			Physical State Upon Receipt:	(29 17		
pH: Temperature (C).	7		Clarity: Colour:	11/0000	U.Caz	
Conductivity (uS/cm):	7 200		Precentete:	N/35		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Odour:	No. 2		
(Adj. pH (if applicable)): (Adjustment Details):	 -	/				-
(mipourant Deutie):	/					
				070		
Comments/Devistions:	2 1 hr 10/10 2	Hous leman	11C - (35)			
`	_	-	1 -			

Comments/Deviations:

Project Number:	<u> </u>	7	Sample Octa/Time:	241	125/97	1/10:00
Sample Number:	07+0		Sample Tech:		Clarle	
Test Number:	TU7+-		Test trideten Dete/Time:	05/01/97	ווויייי	
Custody #:	2112		Technicien:	\sim	104	
			1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	7		
		てるア	TOS	PARAMETER	OMOC	
TIME	PARAMETER	100	100	TECHTIME	MEVIEW	•
	Disserves Otrygen	ن ع	10.4		1	
	5H	3.23	7.37	→ ′′		
O HOURS	Temperature(C) Conductivity(uS)	2370	2360	1 1755		
Immobil	iny @ 30 minutes (10 emoces)		500		l i	
15 - 16 HOURS	ort	762	1.33	0816 2	4	
	Disserved Oxygen	9.4	9.8			
	PM	7.41	7.17		4	
24 HOURS	Temperature(C)	14.0	14.1	1620		
	Conductivity(uS)	2370	+ 237C	→	l i	
	€ Immobile Tatel € Dead	9			1	
	Disserved Oxygen	10.0	4 4		-	
	pH	7.44	7.18	⊣ :	i I	
48 HOURS	Temperature(C)	14.1	4.2	100		
	Conductivity(u\$)	2390	2330		6	
	₹ Immobile	C		14:20		
	Total # Dead	U				
	Disserved Citygen	10.1	90	_		
72 HOURS	pH Temperature(C)	7.42	7.20	1513-		
12 HOURS	Conductivity(uS)	2380	14.3	⊣ ≀5'ລ~ ∣		
	# Immobile	C	0	 ' ' '		
	Total # Dead	0		-		
	Disserved Oxygen	4.7	9.7			
	pH	7.45	7.24	7 (4)	CH.	
96 HOURS	Temperature(C)	14-1	14.2	→ ′ ∣	34 /	
	Conductivity(u5)	2350	2380	1513	i	
	€ Invitobile Total € Deed	8		- ' ^		
TOTAL MORTALITY	10000		- 0			
REMEMBER TO TAKE	MEASUREMENTS IF 100% K	ILL IN 1 HOUR TAKE TEST S	OLUTION SUBSAMPLES AT 1 HO	UR OR 15 - 16 HOURS	AND M HOUSE	١.
RESULTS #	m; 1) = 1					
96 Hour Results:	CF: Pass (sel mortality	YF US lias	510% mi	ictal ut	ر <u>اما</u>
TEST ORGANISM CO	ADCTIONS 1/2		7:			
Trout Beach Number:	0010476	15 Moresity of Culture 7 Days	Prior to Teening: 1/-	Provious Day Last Fr	eeding Time: 1	600
				<u> </u>	···	
Control Weight (g) / Ler	2 3	4 5	6 7	•1	•	10
C.56/34	Cac ico	ハワインといかよい	1301310-4133	C-56 34	0.59 351	0.577 38
			2 /2			
Sample Size:	10		Mean Weight: ().) 5	++ 0·10 g		
Meen Fork Length: Fork Length Min/Mex:	30 35	THE STATE OF THE S	Weight MinAdes: ()- 36	3 94		
TORK CONTROL AND AND AND AND AND AND AND AND AND AND						
TEST CONDITIONS	wi Down Je	S/S .				
Total Preseration Time:	- 153 d	9	Test Salusan Valume (L):		16.2	
	ona <u>17 (</u> (Test Solveon Depth (180m:10L: 2	Ben:16L; 35en:20L): _	29(~	
	100M GU 1	nia.	Total Number Exposed/Concent	meen:	10	
Reason for Preseration		16: 5676370-	Test Replication (for QA/QC):	-	700(7)	
Preseration & Test Asra pH Adiustrient:		1 mL/mm/L				
pri Adiosement:		<u>@</u>				
INITIAL PARAMETERS	(pner to testing)	i Tes				
0 0	11.4	11. 2		" and		İ
Di ssolved Oxygen (ppm pH:	11.4 4.60	- 11	Physical State Upon Recept: Clenty:	CIENY		
pri. Temperature (C):	14.17	174.8	Colour:	(34.85 W 1.54 C)		
Conductivity (uS/cm):	- 360	23/.1:	Precipitate:	1.25	·	
			Odour:	V25		
(Adj. DH (if applicable))	<u> </u>	:				— . —
(Adjustment Details):						Į
						1

OFFICE CHENNERS (CONTRACTOR OFFI

	(4387			041	29/97//	17
Project Number:			Service Deta/Torre:		Cleark	
Sample Number:	Controls	+17+	Service Tetch: Test Indianan Data/Tillit:	0518	197//	1700
Test Number:	CORTIONS		Total committee of the		CH 13F	
Cutatody #:			(Carriegan:		<u> </u>	
			American and a second			
	34844	Control C	Control D	PARAMETER TECH/TRIE	ONOC REVIEW	
TIME	PARAMETER Disparses Citygen	9.3	7.2	CIA		
	pri	7.99	7.40	12,	ایما	
O HOURS	Temperature(C)	14.5	14.5	1756	1721	
V	Conductivity(uS)	299	20.7	1		
Immobilit	ty @ 30 minutes (10 expected)	0	,			
15 - 16 HOURS	orl	7.70	7.63	WW CECK	Cn	
	Dissolved Oxygen	4.5	43		! !	
	pH	<u> </u>	8.02	II_NO		
24 HOURS	Temperature(C)	10,0	1-14:	1600	6 7	
	Consucernty(u5)	300	1 300	1 ~~	1	
	P Irrevisibile	<u>-</u>	<u> </u>	{ "	}	
	Tatal # Deed	9.8	1 99		 	
	Disserved Caygon	¥ CC	9.11	4	i i	
48 HOURS	pH Terreserature(C)	14,5	14:1	WW.	7.	
-c mouns	Consummy(uS)	301	301	Imico"	3	
	€ irrencesio	<u> </u>		141	}	
	Total & Dead	0	Ĉ.			
	Disserved Oxygen	10 · C	10, 3			
	pH	P. CO	9.07	1 1		
72 HOURS	Temperature(C)	14.4	14.2	150	/_	
	Conductivity(uS)	301	302	(Ch		
	• immosile	<u> </u>	ļ	j j		
	Total # Deed		9.5			
	Dissolved Oxygen	9.6	9.7	(4	an	
96 HOURS	pH Temperature(C)	14.5	14:3	سر ہسر	\$	
96 HOURS	Consuctivity(uS)	303	303	1515		
	# immobile	0	6	/_	ł	
	Total # Deed	0	2	1519		
TOTAL MORTALITY		O	0			
REMEMBER TO TAKE	MEASUREMENTS IF 100% KILL IN	1 HOUR TAKE TEST SO	LUTION SUBSAMPLES AT 1 HOUR	OR 15 - 16 HOURS	AND SE HOURS	
RESULTS /_	1111111111111	-J \	/ : > ~	1 06		1.3
96 Hour Results: C	ngal C. Pass (Of mortality) (interior	10 5 10°	s merta	199
TEST ORGANISM CON	TOTTONS.	- 7	triad A.			/
Trout Betch Number:	071447C-4.3.F.G.	% Mortality of Culture 7 Days F	mor to Testing:	Provious Day Last F	eading Time:	1600
	اد ر					
Control Weight (g) / Lan	rgen (mm):	4 5	6 7	A		10
0.51133			10.5434 0.43, 32	2-46/32	0.511 34 0	
0.57.	2.3.3314 37.118	<u>, , , , , , , , , , , , , , , , , , , </u>	10 2 0 3 : 0 • 0 : 0 • 0 • 0 • 0 • 0 • 0 • 0 • 0			
Sample Size:			Maan Worght: 0-48			1
Meen Fork Langth:	33 2. Cmm		Weight Min/Mex: 17-27			İ
Fork Length Min/Max:			Loading Density: 0-30			
TEST CONDITIONS						
		_			161	1
Total Preseration Time:	153 C		Test Salvean Volume (L):		29	
	end 1700		Test Solution Depth (18cm:10L; 28c Total Number Especial/Concentrate		10	
Reason for Presentation			Test Replication (for QA/QC):	.	700 (TO)	
Preseration & Test Agra				•		
ori Adjustrenti	We / Wo	\				
INITIAL PARAMETERS	(prior to testing)					İ
Dissolved Oxygen (ppm	n):		Physical State Upon Recept:			
pH:			Clerity:	i		
Temperasure (C):			Colour			
Conductivity (uS/cm):			Precipitate:			
	j		Odour:			
(Adj. pH (if applicable)) (Adjustment Details):						İ

Comment of Deviations:

OPTO MERCIA E VALUE PAR PARAMENTAL MEST

	<u> </u>		Service Deta/Torre:	07/2	9/97/17	$\nu \cdot \cup \cup \cup$
Project Number: Sample Number:	07710		Sample Tech:		3- Cleark	
Test Number:	T09 + T10	>	Test Installen Date/Time:	15/01/97	11700	
Cuendy #:	2112		Technologic	- On	CH	
		11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	manager of the property of the second of the	, 1		
		T09	てい	PARAMETER	OMOC	
TIME	PARAMETER	100	100	TECH/TIME	VENEM	
	Dissorves Citygen	10 - 2	10.4	CH	1 4 1	
	pH	10.12	7.CZ	± 10	CV	
O HOURS	Temperature(C)	13.7	2350	71800		
	ConductivitytuS) ility @ 30 minutes (10 expense)	2310	2530	┥ `	1	
15 - 16 HOURS	ori	3-2 3- 3-3	1 2 2	183500	6	
- 15-16 hx	Disserved Onygen	(C) C	10.0	104/		
- 13-18/11	pri	05	7.51	70835	6	
	Temperature(C)	10.7	14.2		-7	
	Conductivity(uS)	2300	2370	37/605	1	
	# Immobile		<u> </u>	- 10°C/r		
	Total # Dead		<u> </u>			
	Disserved Oxygen		9.9	$\Lambda_{\alpha o i \alpha}$	}	
45 40456	pH		7.54	3 Ning	1	
48 HOURS	Termerature(C) Conductivity(uS)		2350			
	# Immobile		5	- "4"	ク	
	Total & Dead		i c			
	Dissolved Citygen		4.4			
	pH		7.00	コールリー		
72 HOURS	Temperature(C)		14.4	1/504	6	
	Conductivity(uS)		2380	⊣ 'ኇ^		
	# Immobile		1 2	⊣ `	!	
	Total # Dead Drasswed Oxygen		9.6			
	pH		7.5-1	(4	24.	
96 HOURS	Temperature(C)		14.9]	247	
	Conductivity(uS)		2390	1516		
	/ Immobile		0	שי כי 🗀		
	Total # Deed		6			
TOTAL MORTALITY		10	<u></u>			
					AMD OF HOURS	``
	MEASUREMENTS IF 100% KILL		LUTION SUBSAMPLES AT 1 HO	UNI UNI 13 - 16 MUURI		
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DERIU TE		on mertality		10% m		4)
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RESULTS 96 Hour Regults:	109: Park (10		1/2 11C 7655		artalit	7
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Comments Deviations:

Project Number:	L9387		Senge Data/Time:	03/	25/97//	10:00
Sample Number:	11 + 12		Semple Tech:		5. Clas	<i>h</i>
Test Number:	TIL + TIZ		Test bulleton Date/Time:	05/01/9		700
Custody #:	6211		Technicus:	C	11/2/2	
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		·www.	ディ ン	PARAMETER	OWOC	
TIME	PARAMETER	100	100	TECH/TIME	REVIEW	_
	Digastives Oxygen	10.4	10-3	CIA		
	рн	4-35	7.5.6			
O HOURS	Temperature(C)	14.0	13.7	$\exists . a \circ a$	$\mathcal{L}\mathcal{M}$	
	Conductory(u5)	236c	2370	11802	` '	
!mmobilit	y (9 30 minutes (10 empesse)					
15 - 16 HOURS	pH	7.51	7.46	093C 3%	<u> </u>	
	Districted Oxygen	3.3	10.0		1	
	pH	7.33	142	مارين 🕂	4	
24 HOURS	Temperature(C)	2370	2370	1606	,	
	Conductivity(uS) # immobile		1 5	→ 9~	1	
	Total # Oced		2	 ∜		
	Dissolved Oxygen	10.0	0.9			
	pH	7.49	7,31	Vini		
48 HOURS	Temperature(C)	ių.Z	14.1			
	Conductivity(u5)	235C	2350	HAW.	5	
	# Immobile			70%		
	Total @ Dead	6				
	Dissorved Oxygen	ic.c	10.1		ł i	
	pH	7 30	7.26	1505	i l	
72 HOURS	Temperature(C)	144	14.4	→ 17%~	<u>/ </u>	
	Conductivity(uS)	2280	2380	 ';	4	
	# immobile			 i		
	Total # Dead	9-6				
	Distolved Oxygen	7.34	9. 6.	- 1 (4	35	
96 HOURS	pH Temperature(C)	14.4	14.3	⊣ ′	2	
30 1100113	Conductivity(uS)	2390	2390	J 15 13		
	# Immobile	C				
	Total # Deed	2	-]	
YTILATROM JATO			0			
EMEMBER TO TAKE	MEASUREMENTS IF 100% KILL	N I HOUR TAKE TEST SC	CUTION SUBSAMPLES AT 1 HO	NUR OR 15 - 16 HOURS	AND SE HOUR	•
RESULTS	1. 1.	1 124 \ 11	15 D==10	£: : :	•/-	
8 Hour Results: #11	1: Passice2 n	no (talion) //	112.165510	E invial	1/4	
EST ORGANISM CON	OTTOMS #75	• /				
rout Beach Number:	1.41497C FG	. Marsiny of Culture 7 Days (Pnor to Testing: //-	Provious Day Last !	leading Time:	1660
	·	<u> </u>		_		
Control Weight (g) / Lan	gth (mm):	4 5	7		_	10
1 / 2 2	045,330,34,31	h.61/35/035 2	how were	5 T. AL. / LA	0.50 34	
<u> </u>		L 2 7 3 7 - 2	12/3/31 8-3-1-4	2 0.101 300	<u> </u>	
iampie Size:	10	_	Mean Weight: CAS	+F 0.10 g		
leen Fork Length:	12 ++ 1,0 mm	<u>-</u>	Weight Min/Mes: C-++	- C.61 a		
ork Length Min/Mex:	_2	1	Loading Density:	30 gr		
						
EST CONDITIONS						
	•				ic	ſi .
otal Presertion Time:	- 1530 - 1530		Test Salveen Volume (L):		<u> </u>	<u></u>
	<u>/700</u>		Test Salvean Death (18cm:10L:	•	240	
	Se Somin		Total Number Especial/Concent	reben:	10 yes (%)	
leason for Preseration : Preseration & Test Aeras			Test Replication (for QA/QC):	•		`
H Adjustment:	ves und					
NITIAL PARAMETERS	(prior to locking)	712				-
		11 - 13	Obversel State House Samuel	1.00.0		
Dissolved Oxygen (ppm): <u> 11. 1 </u>	7.6%	Physical State Upon Receipt: Clanty:	C 11.		
iH: 'emperature (C):	70.0	<u> </u>	Colour:	1.14 - 1- 107	li: N	
Conductivity (uS/cm):	23k C	दुव १८	Precipitate:	1000		
	_ :		Odour	475		
Adj. pH [if applicable]):						
Adjustment Details):						

OHOURS Tem Cor Immobility (9): :5-16 HOURS OH 13-15-16 INTO Diss PH 24 HOURS Tem Con Fin Tota 72 HOURS Tem Con Fin Tota 72 HOURS Tem Con Fin Tota 72 HOURS Tem Con Fin Tota 72 HOURS Tem Con Fin Tota 73 HOURS Tem Con Fin Tota 74 HOURS Tem Con Fin Tota 75 HOURS Tem Con Fin Tota 75 HOURS Tem Con Fin Tota T	Inductivity(uS) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (C) 30 minutes	7(3) 18. 2 19. 2 1	7.07 9.6 7.51 10.1 7.77 0 9.9 9.9 7.44 14.0 2380 0 10.0 7.47 14.2 23.70 0 19.7 7.76 17.0 23.80		CANCE MEVEN IN A STATE OF THE S	
Custody #: TIME P. Discontinuous Tem OHOURS Tem Com Immobility @: 15-16 HOURS DH 13-15-16 J:YS Discontinuous D	ARAMETER moves Oxygen represent(C) reductivity(uS) 20 minutes (10 exposes) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen represent(C) inductivity(uS) moved Oxygen	7(3) 18. 2 19. 2 1	714 100 100 100 100 100 100 100 1	1504 1504 1504 1504 1507 1602 1602 1602 1602 1602 1602 1602 1602		
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O HOURS Tem Core Immobility (9): 15-16 HOURS OH 13-15-16 HOURS OH PH 24 HOURS Tem Con Fin Tota 72 HOURS Tem Con Fin Tota 72 HOURS Tem Con Fin Tota 75 HOURS Tem Con Fin Tota 76 HOURS Tem Con Fin Tota 77 HOURS Tem Con Fin Tota 78 HOURS Tem Con Fin Tota 79 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Con Fin Tota 70 HOURS Tem Fin Tota 70 HOURS Tem Fin Tota 70 HOURS Tem Fin Tota 70 HOURS Tem Fin Tota Tota Tota Tota Tota Tota Tota Tota	Inductivity(uS) 20 minutes (10 emposes) 20 minutes (10 emposes) 20 minutes (10 emposes) 20 minutes (10 emposes) 21 minutes (10 emposes) 22 minutes (C) 23 minutes (C) 24 minutes (C) 25 minutes (C) 26 minutes (C) 27 minutes (C) 28 minutes (C) 29 minutes (C) 29 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 21 minutes (C) 22 minutes (C) 23 minutes (C) 24 minutes (C) 25 minutes (C) 26 minutes (C) 27 minutes (C) 28 minutes (C) 28 minutes (C) 29 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 21 minutes (C) 22 minutes (C) 23 minutes (C) 24 minutes (C) 25 minutes (C) 26 minutes (C) 27 minutes (C) 28 minutes (C) 28 minutes (C) 29 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 20 minutes (C) 21 minutes (C) 22 minutes (C) 23 minutes (C) 24 minutes (C) 25 minutes (C) 26 minutes (C) 26 minutes (C) 27 minutes (C) 28 minutes (C) 29 minutes (C) 20 minutes (C)	19 0 19 0 29 7 13 15 20 2 15 10 2 15 10 5 2 3 15	7 CY 14 C 23 S C 23 S C 24 C 25 C 25 C 27 C 25 C 27 C 27 C 27 C 27 C 27 C 27 C 27 C 27	0820 -713/ 530/ 713/ 16/2 16/2 16/3 14:30	5 65	
O HOURS Tem Cor Immobility (9): 15-16 HOURS DH 13-15-16 HOURS DISS PH 24-16 HOURS Tem Con P In Total 72 HOURS Tem Con P In Total 72 HOURS Tem Con P In Total Total TOTAL MORTALITY REMEMBER TO TAKE MEAS RESULTS 96 HOURS TEM TOTAL TOTAL MORTALITY REMEMBER TO TAKE MEAS RESULTS 96 HOURS CONDITION TOTAL MORTALITY Control Weight (g) / Length In Control Weight (g) / Length In Sample Size: 10 Sample Size: 10 Sample Size: 10 Sample Size: 10 Sample Size: 10 Mean Fork Length: 12	Inductivity(uS) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (10 espace) 30 minutes (C) 30 minutes	19 0 29 7 23,15 2 2 24 215 13, 2 2 2 7 7 1 10 5 2 7 10 2	7.00 2350 2350 2350 2350 2350 2350 0 2370 0 2370 0 19.0 2380 0 19.2 2380 0 19.7 7.76 17.0 2380	0820 -713/ 530/ 713/ 16/2 16/2 16/3 14:30	5 65	
Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr Control Weight (g) / Length tr	anducavity(uS) 30 minutes (10 exposes) soved Citygen sperature(C) sducavity(uS) motive Citygen sperature(C) sducavity(uS) motive Citygen sperature(C) sducavity(uS) motive Citygen sperature(C) ducavity(uS)	297 33.10 302 24 315 10.22 0.77 114 5 2310 10	235C 2.157 9.6 7.51 10.1 2.370 0 4.4 7.4* 14.C 238C 0 7.47 14.C 238C 0 7.47 14.C 238C 0 7.47 14.C 238C 0 7.47 14.C 238C 0 7.47 14.C 238C 0 7.47 14.C 238C 0 0 19.C 7.47 14.C 238C 0 0 0 19.C 7.47 19.C 19.C 7.47 19.C 19.C 7.47 19.C 19.C 7.47 19.C 19.C 7.47 19.C	0820 -713/ 530/ 713/ 16/2 16/2 16/3 14:30	5 65	
IMMODILITY (9): 15-16 HOURS OH 13-17-10-175 Diss PM 13-17-10-175 Diss PM Total 48 HOURS Term Con Fin Total 72 HOURS Term Con Fin Total 96 HOURS Term Con Fin Total 77 Total PM Total TOTAL MORTALITY REMEMBER TO TAKE MEAS RESULTS 96 HOUR STEM TOTAL MORTALITY REMEMBER TO TAKE MEAS RESULTS 96 HOUR STEM TOTAL MORTALITY REMEMBER TO TAKE MEAS TOTAL MORTALITY RESULTS 96 HOUR STEM TOTAL MORTALITY RESULTS 96 HOUR STEM TOTAL MORTALITY RESULTS 97 TOTAL MORTALITY RESULTS 98 HOUR RESULTS 12 TOTAL MORTALITY TEST ORGANISM CONDITION TOTAL MORTALITY TOTAL MORTALITY RESULTS 98 HOUR RESULTS 12 TOTAL MORTALITY TOTAL	20 minutes (10 exposes) moresture(C) iductivity(uS) imposes at # Dead iductivity(uS) introduce id # Dead iductivity(uS) introduce id # Dead iductivity(uS) introduce id # Dead iductivity(uS) iductivity	3 ce 2 4 cm 5 12 2 c 7 7 1 1 4 5 2 2 1 1 2 5 2 2 1 1 2 5 2 2 1 1 2 5 2 2 1 1 2 5 2 2 1 2 5 2 1 2 5 2 1 2 5 2 1 2 5 2 1 2 5 2 1 2 5 2 5	7.07 9.6 7.51 10.1 7.77 0 9.9 9.9 7.44 14.0 2380 0 10.0 7.47 14.2 23.70 0 19.7 7.76 17.0 23.80	15 37 15 37	5 65	
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Con # in Total Diss pH 48 HOURS Term Con # in Total Diss pH 72 HOURS Term Con # in Total Diss pH 98 HOURS Term Con # in Total TOTAL MORTALITY REMEMBER TO TAKE MEAS RESULTS 98 Hour Results: # 12 TEST ORGANISM CONDITIC Trout Batch Number: CU Control Weight (g) / Length in Control Weight (g) / Length (g) / Length in Control Weight (g) / Length (g) /	Introduce of Dead Sound Crygen Constant (C) Sound Constant (C) Sound Constant (C	2 - 10 - 0 - 0 - 0 - 0	7.44 7.44 14.0 2380 C 10.0 19.0 14.2 23.70 0 9.7 7.46 14.0 23.80 0	1513 1513 1513	Gy	
# In Total Dies ph 48 HOURS Term Con P In Total Ph In Total Ph In Total Ph In Total Ph In Total Ph In Total Ph In Total MORTALITY REMEMBER TO TAKE MEAST SE Hour Results: 12 TEST ORGANISM CONDITIC Trout Betch Number: (1) Test Organism Condition (1) Length In Total Ph	revisible ai # Deed sorved Oxygen recensure(C) stuczynty(uS) recensure(C) stuczynty(uS) sereture(C) stuczynty(uS) sereture(C) stuczynty(uS) sereture(C) stuczynty(uS) sereture(C) stuczynty(uS) sereture(C) stuczynty(uS) strobile st # Deed		C) C) C) C) C) C) C) C) C) C) C) C) C) C	mm 14:30	Gy	
Total MORTALITY REMEMBER TO TAKE MEAS RESULTS 98 Hour Results: 1/2 TEST ORGANISM CONDITIC Trout Batch Number: 5/4 Sample Size: 1/2 Mean Fork Length: 1/2	at # Deed sorved Oxygen represent(C) sducewny(uS) remains at # Deed solved Oxygen serestare(C) ducewny(uS) verpoise at # Deed solved Oxygen serestare(C) ducewny(uS) verpoise at # Deed solved Oxygen serestare(C) ducewny(uS) verpoise at # Deed	\ <u>c</u>	7.4° 7.4° 14.6 2386 6 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0	mm 14:30	Gy	
AS HOURS Term Con P IN Total 72 HOURS Term Con P IN Total 72 HOURS Term Con P IN Total Diese 96 HOURS Term Con P IN Total TOTAL MORTAUTY REMEMBER TO TAKE MEAS RESULTS 96 Hour Results: 12 TEST ORGANISM CONDITION Trout Batch Number: 6U Control Weight (g) / Length in Control Weight (g) / Length in Sample Size: 12 Sample Size: 12	Internation (C) Inductively(uS) Innotate In Plead Investigate Internation (C)	- Z	7.4~ 14.0 2350 0 10.0 7.41 14.2 23.70 0 9.7 7.46 14.0 23.80 0 0	1513	Gy	
48 HOURS Tem Con # IN Total Disse pH 72 HOURS Tem Con # In Total Disse 98 HOURS Tem Con # In Total PH 98 HOURS Tem Con # In Total TOTAL MORTALITY REMEMBER TO TAKE MEAN RESULTS 98 Hour Results: # [2] TEST ORGANISM CONDITION Trout Batch Number: GU Control Weight (g) / Length in Control Weight (g) / Length (g) /	inducewhytuS) invitation of Deed itolwell Oxygen interesting(C) ductivitytuS) invitation overesting(C) ductivitytuS) invitation overesting(C) ductivitytuS) virtudide it of Oeed SUREMENTS IF 100% KILL IN	- Z	14.C 238C 6 7.0.C 7.41 14.2 23.70 0 9.7 7.16 15.C 23.80	1513	Gy	
Control Weight (g) / Length tr Control Weight (g) / Length tr Sample Size: Mean Fork Length:	inducewhytuS) invitation of Deed itolwell Oxygen interesting(C) ductivitytuS) invitation overesting(C) ductivitytuS) invitation overesting(C) ductivitytuS) virtudide it of Oeed SUREMENTS IF 100% KILL IN	- Z	2380 0 10.0 7.41 14.2 23.70 0 9.7 7.46 14.0 23.80 0	1513	Gy	
TOTAL MORTAUTY REMEMBER TO TAKE MEAN RESULTS 96 HOURS TOTAL MORTAUTY RESULTS 96 HOUR CONDITION TOTAL MORTAUTY RESULTS 96 HOUR RESULTS 97 HOUR RESULTS 98 HOUR RESULTS 99 HOUR RESULTS 99 HOUR RESULTS 99 HOUR RESULTS 90 HOUR RESULTS 90 HOUR RESULTS 90 HOUR RESULTS 90 HOUR RESULTS 90 HOUR RESULTS 91 HOUR RESULTS 91 HOUR RESULTS 91 HOUR RESULTS 92 HOUR RESULTS 93 HOUR RESULTS 94 HOUR RESULTS 95 HOUR RESULTS 96 HOUR RESULTS 97 HOUR RESULTS 97 HOUR RESULTS 98 HOUR RESULTS 98 HOUR RESULTS 99 HOUR RESULTS 99 HOUR RESULTS 90 HOUR	Invitation of Deed Divide Chygen Deced Divide Chygen Deced Divide Chygen Deced Divide Chygen Deced Divide Chygen Deced Divide Chygen Deced Divide Chygen Deced Divide Chygen Divide Chyge	- Z	0 10.0 7.41 14.2 23.70 0 9.7 7.46 14.0 23.80	1513		
Total Diss PM 72 HOURS Term Control P Im Total 96 HOURS Term Control P Im Total TOTAL MORTALITY REMEMBER TO TAKE MEAS RESULTS 96 Hour Results: 12 TEST ORGANISM CONDITION Trout Batch Number: 12 Sample Size: 12 Mean Fork Length: 2	of Poed coived Oxygen corestro(C) duczynytuS) whoole if Poed coved Oxygen corestro(C) duczynytuS) whoole if Oeed surreture(C) duczynytuS) whoole if Oeed	- Z	7 - 1 - 1 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2	1513		
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72 HOURS Tem Con # In Tota Dies pH 96 HOURS Tem Con # Tota TOTAL MORTALITY REMEMBER TO TAKE MEAS RESULTS 96 Hour Results: 12 TEST ORGANISM CONDITIC Trout Betch Number: 00 Control Weight (g) / Length in Control Weight (g) / Length (g) / Length in Control Weight (g) / Length (g) / Leng	ductivity(uS) whoose of Poed coved Oxygen dentare(C) ductivity(uS) whoose if Poed SUREMENTS IF 100% KILL IN	, c	14.2 23.70 0 9.7 7.46 14.0 23.80			
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FESULTS 96 HOURS TOTAL MORTALITY REMEMBER TO TAKE MEAST RESULTS 96 Hour Results: \$\frac{1}{2}\$ TEST ORGANISM CONDITION Trout Betch Number: \$\frac{1}{2}\$ Control Weight (g) / Length (r) Sample Size: \$\frac{1}{2}\$ Mean Fork Length: \$\frac{1}{2}\$	NYPODING LI F Doest CONTROL CO CONTROL C	, ic	9.7 7.46 14.0 23.80		€.	
Total Diese pH 96 HOURS Term Control Montauty REMEMBER TO TAKE MEAST RESULTS 96 Hour Results: \$\frac{1}{2}\$\$ TEST ORGANISM CONDITION Trout Batch Number: \$\frac{1}{2}\$\$ Control Weight (g) / Length (r) Sample Size: \$\frac{1}{2}\$\$ Mean Fork Length: \$\frac{1}{2}\$\$	u # Dead coved Oxygen densture(C) ductwny(uS) whobite il # Dead	, ic	9.7 7.46 14.0 23.80	C4 1520	€.	
Diese pH 96 HOURS Term Continue of the Total MORTAUTY REMEMBER TO TAKE MEAST RESULTS 96 Hour Results: \$\frac{1}{2}\$ TEST ORGANISM CONDITION The Batch Number: \$\frac{1}{2}\$ Control Weight (g) / Length (r) Sample Size: \$\frac{1}{2}\$ Mean Fork Length: \$\frac{1}{2}\$	coved Oxygen constant(C) ductwhy(uS) whooling if Oced SUREMENTS IF 100% KILL IN	, ic	9.7 7.46 14.0 23.80	1520)	
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Control Weight (g) / Length tr Control Weight (g) / Length tr Sample Size: Mean Fork Length:	ductwhy(uS) Whobile I & Oeed SUREMENTS IF 100% KILL IN	\(\frac{1}{2} \)	2380	1520	हु। इंग्रे	
TOTAL MORTAUTY REMEMBER TO TAKE MEAN RESULTS 96 Hour Results: 112 TEST ORGANISM CONDITION Trout Betch Number: 01 Control Weight (g) / Length in Sample Size: 12 Mean Fork Length: 12	Wildlig of Food SUREMENTS IF 100% KILL IN	\frac{1}{2}	0 0	1520		
TOTAL MORTALITY REMEMBER TO TAKE MEAN RESULTS 98 Hour Results: 1/2 TEST ORGANISM CONDITION Trout Batch Number: 0/1 Control Weight (g) / Length in Sample Size: 1/2 Mean Fork Length: 1/2	I F Deed SUREMENTS IF 100% KILL IN	10	O U			
TOTAL MORTAUTY REMEMBER TO TAKE MEAS RESULTS 96 Hour Results: 112 TEST ORGANISM CONDITION Trout Batch Number: (1) Control Weight (g) / Length in Sample Size: 12 Mean Fork Length: 2	SUREMENTS IF 100% KILL IN	10	Ü			
REMEMBER TO TAKE MEAS RESULTS 96 Hour Results: # 113 TEST ORGANISM CONDITION Trout Batch Number: 69 Control Weight (g) / Length in 1 Control Weight (g) / Length in 1 Sample Size: 10 Mean Fork Length: 12			·			
RESULTS 96 Hour Results: 113 TEST ORGANISM CONDITION Trout Betch Number: 607 Control Weight (g) / Length in Sample Size: 10 Meen Fork Length: 12		1 HOUR TAKE TEST SO			<u></u>	
96 Hour Results: 115 TEST ORGANISM CONDITION Trout Betch Number: (1) Control Weight (g) / Length in Sample Size: 10 Meen Fork Length: 12			LUTION SUBSAMPLES AT 1	HOUR OR 15 - 16 HOUR	S AND SS HOURS	
TEST ORGANISM CONDITION Trout Betch Number: 69 Control Weight (g) / Length in 1 Control Weight (g) / Length (g) /	Fait > (00°)	1 11 1	114. Pass	Ob made	<u>r.h.</u>	
Trout Batch Number: 6U Control Weight (g) / Length in Control Weight (g) / Length in Control Weight (g) / Length in Sample Size: Meen Fork Length: 2	· 14/ 7/40	Trice Shid Sh	11.35	CAR THORIE	1114	
Control Weight (g) / Length (r C 5 / 23 C.4 Sample Size: 1C Meen Fork Length: 2	10470 78		: '/			/600
Sample Size: IC Meen Fork Length: 2		% Mortality of Culture 7 Days I	Phor to Testing:	Provinces Day Last I	reading Time:	600
Sample Size: IC Meen Fork Length: 2	アドル					
Sample Size: 10 Meen Fork Length: 2	2 3	4 5	9 7		9	10
Meen Fork Length:	15/32(129/31)	O-11/3 / O・ベン 54	1048 54 10443	310.40/23	0-21/24/10	15 m 28
Meen Fork Length:			Man Water D. 48	++010.		
	2		7:	- 0.01	,	
Fork Length Min/Max:			Weight MinAfex: (7	0.50 %	•	
TOTA CENGUI MINUTED			Commy Certary.	J:		
TEST CONDITIONS TO	でなっている。				_	
Total Preseration Time:	- 1530		Test Salusan Valume (L):		j6 I	
1000 F100010111111111111111111111111111	end /700		Test Salveon Depth (1907):10	L: 20cm:10L: 35cm:20U:	29(0	
	100 90 mm)	Total Number Exposus/Conce	· · · · · · · · · · · · · · · · · · ·	10	
Reason for Preservation > 30 r	moune De 7/02/	· ¥:/	Test Replication (for QA/QC):		yes (ma)	
Preseration & Test Asration R	late: 0.5 +/- 1 mL/n	mn/L				
orl Adjustment:	Yes (AN)					
INITIAL PARAMETERS (prie	r in testion) 2,3	714				
		, . 				
Dissolved Oxygen (ppm):		<u> </u>	Physical State Upon Receipt:	Licaria		
pH:		4 11 4	Clarity:	ا بن المله الدر		
Temperature (C).		· • · r	Colour	3/00/10	11411	
Conductivity (uS/cm):	ाप गः		Precipitate:	2		
(Ag, and (d annuaction))	ाप गः	2330				
(Adj. pH (if applicable)): ((Adjustment Details):	ाप गः	2335	Odeur:	<u> </u>		
	ाप गः	2336	Occur:			
	ाप गः	2336	Osour:	<u> </u>		
	19 () 22 ()	2336 Yout 12 Union		Out of the Control of	Address St.	

Project Number:	L9387		Secretor Dath/Time:	04/2	29/97//	!O:CO
•	15 + 16		Securio Tock:		Clark	
Semple Number:	T(5 + T16		Test Initiation Data/Time:	05/01/5		
Test Number:	2112		Technolog:	() s	A /	
Custody #:				/		
		TIS	T16	PARAMETER	ONOC	
TIME	PARAMETER	100	160	TECH/TIME	NEVIEW	
	Dissurves Oxygen	10.1	10.0		1 . 1	
	PH	8.50	7.53	—i જપ્રે		
0 HOURS	Terreservator(C)	100	12270	ードン ト	\w\\ \	
	Consuctivity(uS)	231-0	+ × × ′ · · · · · · · · · · · · · · · · ·	⊣		
*5 - 16 HOURS	N @ 30 minutes (10 essesse)	750	7: 216	1817	23	
13 - 16 HOURS	Disserves Caygon	9.3	44	1021		
	pH	7.31	7.53			
24 HOURS	Temperature(C)	70.0	140	1621	3	
	Conductivity(u5)	23,70	2350			
	# Immonie	C	C]	1 1	
	Total # Dead	0	G.			
	Disserved Onygon	95	9.	Mm7		
	p#4	7.34	7.27	197.11 /		
48 HOURS	Temperature(C)	14.0	14.0	⊣ ''`	9	
	Conductivity(uS)	2350	2350	→ 34		
	/ immedia		<u> </u>			
	Total # Donal		43			
	Dissorted Oxygen pH	7.26	7.21	\dashv	3	
72 HOURS	Temperature(C)	14.7	14.1	-	19 1	
72 HOONS	Consuctivity(uS)	2350	2550	コッ〜	1	
	# Immaile	0	Ö	-	{ !	
	Total # Deed		0	<u> </u>		
	Dissones Oxygen	9.6	9.13			
	ρH	7.34	7-26		384	
96 HOURS	Temperature(C)	17:00	19.0		373	
	Conductivity(uS)	2590	2390	-15 ⁻ 22	<u> </u>	
	€ Immosile	0	1 0		f 1	
	Total # Dead		+ - 2		1	
TOTAL MORTALITY						
	MEASUREMENTS IF 100% KILL		LUTION SUBSAMPLES AT 1 HO			
RESULTS #	15 <u>: Pass</u> (0	el: mortality	1/110: Pass	10% m	ra: W	
TEST ORGANISM CON Trout Batch Number:	DITIONS DVILLED C - G	% Morenty of Culture 7 Days (Prior to Teatres: 11/2	Providue Day Less (Feeding Time: /	1600
Long peacy sequence:	KZ /V	- A moreony or Corane 1 never				
Control Weight (g) / Len						
1 2	2 3	25 25 21 21 2	13.0403439	10.49.31	A23 30 0	121,20
0.74 1.32	12 12 10-161 54	アンジェン(0.3/1.24	10.794 9 10 77 5	11C-5:7-5!	(35.11)OK)' 3' 1' 2' - 1
Sample Size:	ic		Mars 1844 0.49	++(2.6 X .		
Mean Fork Length:	33 +/· 3. \ m	_ m	Weight MinMes:	· U.769	•	
Fork Length Min/Mex:	25 . 34 m		Loading Dentity: 0-3	9/L		
		-				J
TEST CONDITIONS						
1231 CONDITIONS						
Total Preseration Time:	м и <u>/530</u>		Test Salveon Valume (L):		16 k	
	end _/7/10		Test Salution Depth (19cm:10L;		790	
	100 m:		Total Number Exposes/Concern	ragen:	10	
Reason for Presention		1.5671111X	Test Replication (for QA/QC):			
Preservan & Test Aere						
pH Adjustment		<u> </u>				
INITIAL PARAMETERS	(prior to tooling) TiC	1 116				
	11.1	1		Non di		
Dissolved Oxygen (ppm		110.0	Physical State Upon Receipt:	1 30 6		
pH.	<u> </u>		Clarity: Colour:	1 - 1 - 1 - 1 - 1		
Temperature (C).	2360	The state of the s	Colour: Precisitate:	- · · · ·		
Conductivity (uS/cm):	<u> </u>		Odour:			
(Adj. pri (if applicable)):	<u> </u>	<u>; </u>				
(Adjustment Details):						
						

Comments/Deviations.

Aquatic Sciences Inc.

Me. Carolyn Hunt Inco Ltd. Copper CRII, Ontario L2J 3G2 Reference #: L8967-89-04 Received: 05/06/07 Total Number of Pages: 34

Toxicity Testing Results
Report Date: 05/12/97

Sample Information

Sample # Sample Description Date Collected

L9387-33-64

Experimental Treatments for CCWWTP Sample Identification #201 - 232 05/05/97

Approved by:

Gill Shriner, Laboratory Supervisor

July 1/97

Inquiries may be made to Gill Shriner.

Disposal of toxic samples will occur within seven (7) days of reporting unless alternate arrangements have been made.

ACCREDITED BY THE STANDARDS COUNCIL OF CANADA (SCC), IN CO-OPERATION WITH THE CANADIAN ASSOCIATION FOR SINVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL), FOR SPECIFIC ENVIRONMENTAL TESTS LISTED IN THE SCOPE OF ACCREDITATION APPROVED BY THE SCC.

AQUATIC SCIENCES INC.

48 HOUR STATIC DAPHNIA MACHA SINGLE CONCENTRATION TEST EP\$ 1/RM/14

Project Number:

Client

19387

ince Ltd

Copper Cliff, Ontano

Esperimental Treatments for CCWWTP ndfleation #201 - 232

Sample Location:

Chain of Custody #: Sample Method:

Semple Neme/IC:

2115

CCWWTP

Grab

Sample Number:

33 - 64

Test Number:

56: 224: PASS (7% mortality)

D33 - D64 Sample Date/Time: 05/05/97//-:- hrs

Sample Technicien: S Clerk

05/08/87// 13:50 - 16:35 hvs

64: 222: PASS (3% mortality)

Test Date/Time: Technician:

J Ferquinerson/C Huras

16 hours light/6 hours dark

Dechiannesed Tep

in house cultures

<24 hours

24 necretor

RESULTS

48 HOUR RESULT: 33: 201: Fall (100% mortality) 41: 200: FAIL (100% mortality) 40: 217: FAIL (100% mortality) 57: 225: FAIL (100% mortality) 50: 218: PASS (% mortality) 50: 228: PASS (3% mortality) 30: 227: PASS (6% mortality) 34: 202: PASS (6% mortality) 42: 210: PASS (6% mortality) 43: 211: PASS (9% mortality) 35: 203: PASS (P% mortally) 51: 219: PAGG (9% mortality) 00: 226: PASS (3% mortality) \$2: 220: PASS (0% mortality) 36: 204: PASS 675 mortality) 44: 212: PASS (05 mortality) \$3: 221: FAIL (100% mortally) 61: 229: FAIL (100% mort 37: 205: FAIL (100% mortally) 46: 213: FAIL (100% mortally) 38: 206: PASS (0% mortality) 46: 214: PASS (9% mortally) 54: 222: PASS (0% mortality) 62: 230: PASS (0% mortality) 63: 231: PASS (0% mortally) 39: 207: PASS (0% mortally) 47: 215: PASS (9% mortally) 55: 223: PASS (0% mortality)

46: 216: PASS (0% mortality)

QUALITY ASSURANCE INFORMATION

REFERENCE TEST CONDITIONS

Test Organism:

Broad Culture:

Test Type:

Same

Test Temperature: Test Volume:

150 mL Loading Density:

Control Water Herdness:

95% Confidence interval:

Dephnie megne 040197 + 040797

20 +/- 2C

40: 208: PASS (0% mortally)

15 mL/neonate

136 mg/L

Photopened:

Dilution Water:

Organism Age:

Stock Source:

Time of First Broad: Average Brood Size:

Ephippia Frequency:

n

5 deva

REFERENCE TOXICANT DATA

Chemical Used:

Date of Test: 48-hour LCSO:

Sadium Chlande May 5/97

5657 mg/L 5000-6400 mg/L Historic Mean LC50: Werning Limits:

6147 mg/L 4906-7386 mg/L

TEST PROTOCOL

Biological Test Method: Reference Method for Determining Acute Lethelity of Effuents to Dephnis magne. Environment Canada, July 1990

COMMENTS

The reference topicant results show that test reproducibility and organism sensitivity are within acceptable limits. All data is scrubnized for errors delty during the test, at test termination and during the report Technical and Final Review stages. instruments used to manitor parameters are calibrated daily and continuously maintained.

46-HOUR STATIC SINGLE CONCENTRATION DAPHORA MAGNA TEST (EPS 1/RM/14)

Project Municer:	L9287			Servate Date/Time Servate Tech:	-	05/05/97/1000				
Sample Number: Test Number:	1 33			•	Test Indianam Data Testingan:	/Tons:	05/08/5	1/3:00 m C#		
Chain of Custody #:				•						
TIME	PARAMETER	SAMPLE ID:	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	TROL COMMOLS		'3; 100-A	7-201	108-C	PARAMETERS TROUTER	OMBS NEWEN
	Diseased Cinygo	······································		7.1			9.4			
	pH	•		5-18		10	10.39		1350	CM
0 HOURS	Temperature(C)		19.2			19.8] 9	
	Conductivity(uS)			29.g			400		4	
imme	osiiry @ 30 minutes	(10 expense)	0	0	0	0	0	0		
	ρH		7.46	7.46	8.04	10.01	10.23	9.97	1432	
24 HOURS Temperature(C)					20	· D	18			
	# Immobile		0	0	0	10	10	10	Mm	
	Dissolved Chygan	1	8.6	8.7	8.7	8.6	8.6	8.7	1255	
	pH		7.8.5	7.85	7.87	9.44	9.75	9.47	240	أحهدا
48 HOURS	Temperature (C)		20.0	20.6	20.0	2C.I	20.0	20.1	100	400
	Conductivity		303 <0 0	304	304	2400	24100	2410	1. B	
	# Immobile		0	0	0	11/11	10		-	
	# Deed (10 e-mee		Ò	0	0	11/11	10	10	1	
OTAL MORTALITIES				0/:		/	100 /		1	
							<u> </u>			
REMEMBER TO	O COLLECT I	DAPHNIDS A	ND TEST SO	LUTIONS AT	48 HRS					
ESULTS 5-HOUR Result: 2	01-FAIL	(100%.	mertal	24)						
EST CONDITIONS road Culture: time to First Broad:			0407°		Properation Time:		•	1310		
verage Broad Size: otal Number Exposed			15 neen 3X10 neen				***	13 40 30 mm	11 × 0 50	
iontrol Water Hardnes Hiuent Subsampled #	rom 25L parl for Tess	ng:	(119		According Process Processed Auto:	 		D//> 1007-S/2		·
est Replication (for Q	A/QC):		yee (**e		pH Adjyetnent Herdness Adjyetne		,	(VC)		·
					Test Selution Value Looding Density:	NO:	,	230 mg)/ 19		.
NITIAL PARAMETER			0.5							
	Disselved Citygen Indel ph:	ž ,	95 1945		Adj. pH (if applicab					
	Temperature: Conductivity:		19.9 2440		Adjustment Details:					<u> </u>
	Initial Hardness: Physical State Use	on Receipt:	rozo Travid		Adj. Herdness (if es Adjustment Details:					
	Clarity: Colour:		Vellow							
	•		140							i

AQUATIC SCHOOLS INC.

ALMONE STATIC STATIC STATIC CONCENTRATION DAPPORA MAGNA TEST (EPS 1/RM/14)

Project Manager	19387-34-5-351
Scripto Mander:	34 1 35
Test Number:	D3U . 335
-	-2115

Sempte Date/Time: Sempte Teals: Teat Initiation Cote/Time: Teatmoners: 05/05/97/1000 5.(107) 5.7/05/57 11/45

 TIME	SAMPLE D: PARAMETER		34 - 20 2 coma.	corme_4	100-A	35 - こじ 1988	3 100-C	PARAMETURA TREMPER	OMBE MEMBER
	Dissolved Caygon	}	9.0			7.1		13)5	
	pH Terminantico	*	482. 9.7			8.35 19.6			
¢ HOURS	Conductivity(uS)	2	2450			2450			
Irret	cobility @ 30 minutes (10 essented)	0	0	0	0	0	0	1	
	peri	8.34	844	8.54	8.07	8-09	8.12	1440	
24 HOURS	Temperature(C)		20.0] •	
	/ Invitabile	0	0	0	0	0	0		
	Dissolved Citygen	8.4	8.6	8.6	8.5	8.5	8-6	min	
	ρH	1.55	7.58	8.04	7.67	7.67	7.71	1	308
46 HOURS	Temperature (C)	20.1	20.1	20.1	20.2	20. i	20.1	13:10	~
	Conductivity	2470	2470	2470	2460	2480	2470		
	€ Irrenobile	0	0	0	O	0	0	1250	ŀ
	€ Deed (10 expected)	0	0	0	0	0	0] g~	
TOTAL MORTALITIES		0	0	9/11	Ò	0	O		
MEAN & MORTALITY		<u>l</u>	0%		<u> </u>	07.		<u> </u>	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS 18-HOUR Result 202 - Pass (oi mortality)	203 - Pag	of (of mostally)
TEST CONDITIONS Broos Culture; Time to First Brood: Average Brood Stat: Total Number Exposed/Concentration: Control Water Hardness: Effluent Subsempted from 25L paul for Testing: Test Replication (for QA/QC):	19 com 19 com 17 com 177 com 1	Presented Time: Research for Presention: Presention Rate: pH Adjustment: Hardness Adjustment: Test Salution Volume: Lasting Density:	1310 1340 30 Min 5071007 Setta v cetto 8-800 Anin (no y yea
INITIAL PARAMETERS (prior to testing) Disserved Oxygen:	34 35 9.7 - 9.6	-	

INITIAL PARAMETERS (prior to locking)	34	35	_	
Oleanwed Caygen:	9.7 -	9.6		_
Instal pit:	<u> 8.80</u>	1.38	_ Adj. pH (H applicable):	
Temperature:	20.0	19.7	Adjustment Datate:	
Conductivity:	2470	2440	_	
Initial Hardhook:		1020	Adj. Hardness (if applicable):	
Physical State Upon Receipt:		Ticuld	Adjustment Datails:	**************************************
Clenty:	<u>clear</u>	cuar	_	
Colour:	WOILEN	Vellaw	-	
Precipitals:	VIC	no		
Otlaur:	ves	ves		
1	•	1 .		
Additional Observations:				

some daphnia trains fires in =35(203)

46-HOUR STATIC SINGLE CONCENTRATION DAPHORA MAGNA TEST (EPS 1/FM/14)

Project Number:	19387	Sample Date/Tirte	E	5.000					
Sample Number: Test Number:	736		-	Sample Tech: Test tridaden Des	n/Time:	DE/08/	97/135		
Chain of Custody #:	2115		- -	Technician:			Ja c		
		# 1 × 4 × 1	0-204						
TIME	SAMPLE IO: PARAMETER	2)(GENTRÉE-A	CONTROL O	-cavme _{c-c} -	105-A	ONTRO		PARAMETERS	CARE
								THEOTHE	A STATE OF
	Disastrad Corpon		તે !			9.1		J 3F	1, 1
		7	31			8-18		1355	$ \mathcal{M} $
	_		9.7			19.2		7,3,,	`
o HOURS	Temperature(C)		420			298			
	Conductivity(uS)		7		 			┪	
Irrem	obility @ 30 minutes (10 emposes)	0	0	0	- 0	0	0		
	pH	7.23	7.20	7.17	8.14	8.19	8.20	141	
24 HOURS	Temperature(C)			20.0				1447	
	ø instaltile	0	0	0 0		0 0		7 ′	
	Dissolved Carygon	8.6	8.5	9.5	8.6	8.3	8.6		
		6.95	6.96			중.14	8.14	」か。 /	ZXK
	ρ i f			6.99	8.09	1	1	Nm 13-25	2
48 HOURS	Temperature (C)	20.6	206	2C.6	20.2	20.2	20.3	13-2	
	Conductivity	2450	2470	2480	302	302	302	├ ──	
	# immobile	0		1	0	0	<u> </u>	1405	į
	# Deed (10 emound)	0	0	0		0	0		
TOTAL MORTALITIES		0	0	0	0	υ	6	jà	
MEAN & MORTALITY			61			0%			
DEMEMBED T	COLLECT DAPHNIDS	AND TEST SO	LITTIONS AT	40 400		••			
nemember it	J COLLECT DAPHNIDS		AI	TO MINO					
RESULTS		(./)	0.1	<u> </u>					
48-HOUR Result:	204 - Pass	Col mas							
		(7/. 2mm	ich. (e)						
TEST CONDITIONS		· · · · · · · · ·							
Brood Culture:		04079	7						
Time to First Broad:		₹ days		Preserveen Time:		-	1310		1
Average Brood Size: Total Number Exposed	/Concentration:	17 neen					13 4 D		Į.
Control Weter Hardnes		119		Reason for Present	den:		DD >100 /. 51		ń
Emuent Subsempled in Test Replication (for Q	om 25L peil for Testing: NGC1:	yee /pre		Preservison Rate: pH Adjustrate:			35-80mL		!
				Hardness Adjustma			(m))		
				Test Selvten Volut Leading Density:	Ma:		20 mL y 15		1
INITIAL PARAMETERS	S (prior to testing)								
	Disserved Oxygen:	9.8		,					f
	Instel pH:	7.0		Adj. pH (H apphosis Adjustivent Dotaile:	-				
	Temperature: Conductivity:	2440			•				
	Initial Hardness:	1054		Adj. Hardness (if as		=			
	Physical State Upon Receipt: Clarity:	Clear	 '	Adjustment Details:	-				
	Colour:	vellow			•				1
	Precipitate:	'No							- 1
	Odeur:	1/6/							1

48-HOUR STATIC STRIGLE CONCENTRATION DAPPING MAGINA TEST (EPS 1/FM/14)

Project Number: Semple Number: Test Number: Chain of Custody #:	Number: 37 / 3% Number: D37 / D3% of Custody #: 2/15			Sample Data/Tim Sample Tech: Technique: Technique:		05/05/97//1000 5-(10x) 07/08/97//1400			
TIME	SAMPLE ID: PARAMETER		7-205	CONTINUE:C	100-A	38 - 20 100-8	100-C	MANAGEMENT TROVINGE	OMBE
	Disserved Coygon	9.				9.0			
	pH		37			81		148	CN
0 HOURS	Temperature(C)		.8			9.7			
	Conductivity(u6)	2380				420		1	
Imeno	obility @ 30 minutes (10 expense)	0	0	0	0	10	0		
	pět	10.25	10.13	10.08	8.61	8.65	8.61	1458	
24 HOURS	Temperature(C)	1		20.0		150			
	Ø Investida	10	10	10	0	0	0	-	
	Distance Coygon	8.7	8.5	3.9	8,5	8.6	8.4	mm	
48 HOURS	pH Temperature (C)	20.1	9.91	9.58	8.43	8:44	8.32	1	Ø8.
- Mouns	Conductively	2390	20.0 2410	20.0	20.2	20.2	20.2	13:35	320
	C Immedia	2370	2770	2410	2450	2470	2470		
	# Dead (10 employed)	10	10	10	0	0		1300	
TOTAL MORTALITIES		10	(;)	10	c 0	O C	0	8	ŀ
MEAN % MORTALITY		100 /			65/				
REMEMBER TO	COLLECT DAPHNIDS A	ND TEST SO	LUTIONS AT	48 HRS					
REBULTS 46-HOUR Result: 0	205 - Fail (10	0% mort	alog)	20	6 - Pa	s (°%.	mote	ez)
Brood Culture: O 4 0 7 9 7						nd.			
	Olemented Citygen: Initial ptt: Temperplure: Conductivity: Initial Hardmen: Physical State Upon Receipt: Clenty:	10.39 20.1 2350 1054 164.d	2030	dj. pH (H applicable djustrant Details: dj. Hardriess (H appl djustrant Details:	=				

YPS I YPS

48-HOLIR STATIC SINGLE CONCENTRATION BAPHRIA NAGINA TEST (EPS 1/RM/14)

Project Number: Semple Number: Test Number: Chain of Custody #1	19387 39 3 50 D79 8 540		<u>-</u>	Sample Date/Tim Sample Teah: Teat Initiation Dat Technicien:		55/55/57// 1000 5. (19 V) 6102/97//140			
TME	SAMPLE ID: Parameter	-cormet-A-	9-20-	7 come.c	193-A	\$10 - Z	-08 _{mac}	MANAGERINA TROVINS	over.
	Disselved Caygon	9	· 10) · D		1420	
	pH		118			9.8		9-	<i>γ</i> .Λ
o HOURS	Тептрегивите(С)		19.8					┛	(M)
	Conductivity(u.6)		<u> 430</u>		ļ ·	2410	T 2	-	
know	mility @ 30 minutes (10 empared)	10	0	0	0	0	0	 	
	pět	8.00	8.06	8.15	7.49	7.46	17.43	187	l
24 HOURS	Тепрепади(С)	20						1, 7),	
	Ø immabile		0	0	0	0_	0	 	ļ <u>.</u>
	Dissalved Caygon	3.5	8.3	8.4	9.2	8.2	8.3	┨	
	pit	7.53	7.48	7.59	7.25	7.24	7.24	MM	000
44 HOURS	Temperature (C)	20.1	20.2	20.2	20.3	20.3	1	13:45	
	Conductivity	247C	2486	2480	2470	2490	2480	 	İ
	# Immobile	0	0	<u> </u>	0	0	15	1324	
	P Dead (10 esposed)	0	0	0	0	2	-S-	ク	
TOTAL MORTALITIES		0	07.	0	0	0%	0	Į	
REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS RESULTS 46-HOUR Result: 207 - Pass (0% mortality) 208 - Pass (0% mortality)									
PEST CONDITIONS Brood Culture: Firms to First Broad: Average Broad Size: Fotal Number Exposed. Control Water Martines Effluent Subsampled for Fest Replication (for Qu	k: om 251. pail for Teating:	0 4 0 7 ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °		Presention Time: Research for Present Presention Reta: pH Adjustment Herdreen Adjustm Test Salution Volu- Leading Outerly:	enc.	clart cod total	13.45 14.15 20 m.n. 70 700 / 5 3 - 5 4 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	nin/L His D mil.	_
NITIAL PARAMETER	E (prior to sessing) Disselved Caygon: Initial sH: Temperature: Conductivity: Initial Heroness: Physical State Uson Recept: Carty: Colour: Proceptate: Odour:	CLOCK	40 95 7.63 20.2 24.10 969 164.10	Adj. pM (If applical Adjustment Details Adjustment Details	; ppl:::::::::::::::::::::::::::::::::::				

commence 2142 hrs. I duphnid in each ressel of sample 39 every thing libres

44-HOUR STATIC SINGLE CONCENTRATION DAPPING MACINA TEST (EPS 1/RM/14)

Project Number:	L9387
Sample Number:	Let 1
Test Number:	NU
Chain of Custody #:	-115

TIME	SAMPLE ID: PARAMETER		NTRUL	CONTROLC	100-A	H - 209	169-C	**************************************	enge reven
	Distahed Cinygen		9.1			7·0			
	ρM		8-18			-34		1422	16.1
0 HOURS	Temperature(C)		19.2			0.0		0	$ \mathcal{M} $
	Conductivity(u6)		298		2	380			
knen	obility @ 30 minutes (10 especial)	0	D	0	0	0	0	l	
	pH	8.22	5.23	8.21	10.15	9.91	10.20		
24 HOURS	Terriporature(C)	20.0						1515	
	€ Immetrile	0	0	0	10	10	10		
	Disturbed Congen	8.6	8.7	8.7	8.8	8.7	8.8	WM	
	Pid	8.15	8.19	8.2i	9.73	9.76	9.96	_	Ø\$
46 HOURS	Temperature (C)	20.1	20.1	20.2	20.2	20.1	20.1	13:54	
	Conductivity	302	303	303	2380	2400	2400		
	€ Immabile	U	0	0)	1345	
	≠ Dead (10 organs)	0	0	0	{0	10	Ö	2	
TOTAL MORTALITIES		ð	0	0	(0	10	(0)		
MEAN & MORTALITY			0/-			1001			

HOUR Result: 209 - Fa	il (1001 most	ality)	
ST CONDITIONS			
ood Culture: me to First Broad; erage Broad Size: tal Number Exposes/Concensuson; introl Water Hardness; luent Subsempted from 25L pail for Testing; et Replication (for QA/QC);	040797	Proportion Time: Proportion for Proportion: Proportion Reta: pri Adjustivent: Handroon Adjustivent: Total Solution Volume: Leading Denety:	2, 45 12 15 15 15 15 15 15 1
TIAL PARAMETERS (prior to touting) Distorted Chygen: Intial git: Temperature: Consuctivity: Invited Hardness: Physical State Upon Reco	9.6 10.41 20.0 25C 1020 1.611.0 CUAY VC110M/ MD	Adj. pH & continuès: Adjustiment Details: Adjustiment Details: Adjustiment Details:	

48-HOUR STATIC SIN	IGLE CONCENTRATION DAFFICEA MA	DIA TEST @PS IM	(6/1-4)						
Project Number:	L9387		-	Sample Date/Time	E	25/25	197/100	0	
Sample Number:	42 1 43	Sample Teat: Test Inidates Dat		5.00 147 11470					
Test Number: Chain of Custody #:	Duz : Dus			Techniques:			5- CH		
			_				,	<u> </u>	
TIME	SAMPLE ID: PARAMETER	-come-a	42-	210	190-A	43. 100-8	-211 mc	Parkingtoping Technology	GAGE GAGE
	Disserved Coygon		G.			.1			
	pH	[&.	80		8] HIV	l a k	
o HCURS	TermententG	2	C D	20.1				HU	
Uncons	Conductivity(u5)	2	440	2420			- 1		
Imme	strillty (§ 30 minutes (10 exposure)	0	0	0	0	0	U	1	1
	pH .	862	8.42	8 39	8.12	804	8.22		
24 HOURS	Terrepretare(C)	20.0						1528	
	Ø Immedide	0	0	0	0	0	0	78	į
	Dissolved Cayper	8.5	8.6	8.5	9.5	8.4	8.6		
	pH Temperature (C)	8.47	8.15	8,00	7.83	7.575	7.86	Nm	
48 HOURS		20.2	20.3	20.3	20.4	20.3	20.3	14:05	EX
	Conductivity	2450	2480	2480	2470	2480	2480	14.03	
	Ø Immebile	0	0.	0	0	0	0	(341)	
	● Dead (10 espasse)	0	0	0	0		0] 7	
TOTAL MORTALITIES		0	0	Ò	0		0]	
MEAN % MORTALITY			07.			001	<i>G</i>		
	COLLECT DAPHNIDS A	AND TEST SO	LUTIONS AT	T 48 HRS					
RESULTS 48-HOUR Result: Cal	210 - Pass (oi	mota	lify)	lan-	Pass	01. m	estalo	4)	
TEST COMPITIONS									
		04079	7						
Brood Culture: Time to First Brood:		S days		Preservous Time:			1345		j
Average Brood Size:		/9 near				•	1915		ŀ
Total Number Esposed/ Control Water Hardness		3X10 neen			 -	-	30 mia	B. 46 b	1
Effluent Subsempled fro		()00) 700		Research for Preservation: Preservation Rote:			81-100 TOO		
Test Replication (for QA	vacı:	yes the		pH Adjustment			(™) y		
				Hardness Adjustice Test Salution Value Leading Density:			(300 mL) / 15	O mt.	

42

(18/1 ×

Additional Observations:

INITIAL PARAMETERS (prior to totaling)

46-HOUR STATIC SINGLE CONCENTRATION DAPHINA MAGNA TEST (EPS 1/RM/14)

Project Number:	19387		_	Sample Date/Tim	8:	25/02	197//10	00	
Serupio Member: Test Member:	746		-	Sample Tech: Test Initiation Del	n/Time:	5. (16) V	7// (400		
Chain of Custody #:	2115		-	Technician:			ON CH		
								-	
	SAMPLE ID:	A Kara Wali	44-21	2	Ĺ	CNTRO L			
TIME	PARAMETER	GENTAGE-4-	CONTROL	- commat-c	100-A	100-6	109-C	PARAMETERS	CARE
			9.0		T	9.1		TECHNTER	
	Diseasonal Chrygan		1.82		 	8.18		┥	
	pH							1425	16.1
O HOURS	Temperature(C)		20:1		 	19.2		1 %	
	Conductivity(sdl)		2450		ļ	<u> 29.5 </u>		4	1
brun	ministry @ 30 retructure (10 emplement)	0	0	0	0	0	0	1	
		7.66	7.68	7.63	815	8.19	3.19	-25	
24 HOURS	Temperatura(C)			Z	0.0			1535	
		0	0	0	0	0	0	7	
	# Immabile	8'.4	8.3				8.7	100	
	Disselved Chygan			8.4	8.6	8.7	 	MM	
	p il	7.43	7.39	7.45	8.11	8.20	8.2i	4	4
48 HOURS	Тепрополи (С)	20.5	20.5	20.4	20.3	20.2	20.3	14:17	
	Conductivity	247C	2480	2480	302	302	302		i
	€ Introdule		0		0	0	0	1400	
	P Deed (10 exposed)	0	0	0	0	0	0	1450	
TOTAL MORTALITIES		O	0	0	0	0	0		
MEAN % MORTALITY			.C / ·			0%	<u> </u>	1	
OFMEMBER #	0.0011507.04014400							***************************************	
	O COLLECT DAPHNIDS A	UND IEST SC	LU HONS A	1 48 HRS					
RESULTS	0 /	- 1	6.1	\					
48-HOUR Result: G	712 - Paso (i mon+	ach ty) 21	•				
									
TEST CONDITIONS		<u> </u>		 , 				· · · · · · · · · · · · · · · · · · ·	
Brood Culture:		04079	7	_					
Time to First Brood: Average Brood Size:		y deve		Preserveen Time:			1345		
Total Number Exposes		3X10 reen		- 			20 min		
Control Weter Herdings Effluent Subsempled &	tc tom 25L ped for Tegang:	/, 9 (yea/se		Readon for Present Properties Rets:	den:		1007 1001-5		
Test Replication (for Q	-	yes (no		pH Adjustment			(24)		
		_		Hardroop Adjusting			(200 min 15		1
				Leading Density:			(30)// 15 m		
NITIAL PARAMETER	3 (prior to testing)	4 0							
	Dissolved Oxygen:	9.8			4 =1.				l
	Initial pH: Temperature:	7.98		Adj. pH (H applicable Adjustment Details:					1
	Conductivity:	2440		•					ľ
-	Initial Heronous:	1037		Adj. Herdness (if as Adjustment Details:					
-	Physical State Upon Receipt: Clarity:	Clear		والمصفح المحاصية	•				1
	Colour:	7211a -		•					1
	Precipitate:	700							ľ

commencements Q 24 nrs. sample 44 has preaplete on the bottom of the 4x+ voixels.

Y 15 15

CHOPPING AND PROPERTY OF THE P

46-HOUR STATIC SINGLE CONCENTRATION DAPPING MAGINA TEST (EPS 1/RM/14)

Project Number: Semple Number: Test Number: Chain of Custody #:	LG3\$7 115 : 46 DUS : DUG		<u>-</u>	Sample Dete/Tim Sample Tesh: Test Indiation Det Teshviman:		SILVE	97/1900 97/1948 90/14		
TIME	SAMPLE ID: PARAMETER	cormo-A	+5-21°	earma-c	100-A	식6 - 교기 1888	100-C	PARAMETERS TECHNOLE	- STATES
<u> </u>	Disputed Copyers		9.2			8.5]	
	pH		c · 3/		8	·72		1450	1
0 HOURS	Temperature(C)	2	0.2	·		20.3] %	M
	Conductivity(uS)		2380			2400]	
Invito	bility @ 30 minutes (10 expense)	0	0	0	0	0	0_		
	ρH	10.23	10-11	[0.10	8.56	847	8.58	Γ,	
24 HOURS	Temperature(C)) · O			7544 9-	
	€ Immetale	10	10	10	0	0	0	5	
	Disserved Caygon	8.7	8.7	8.7	3.5	8.5	8.5		
	pH	9.98	9.90	9.93	8.42	8.17	8.35	14:23	~X
48 HOURS	Temperature (C)	20.1	20. i	ZC.1	20.4	20.3	20.5	Nm	40X
	Conductivity	2400	2410	2-10	2450	2470	2460		
	€ trenstate				O	0	0	3/ -	
	€ Dead (10 emested)	03	10	ίΰ	0	0	0	1705	
OTAL MORTALITIES		(6	10	ID	0	0	0	(JC	
YEAN & MORTALITY			1001			٥/			
ESULTS	COLLECT DAPHNIDS A				Pass (01.mv	Hali Ly)	
EST CONDITIONS Irood Culture: Time to First Brood: verage Brood Size: otal Number Espossificated Water Hardness filluent Subsempted for est Replication (for QA	c om 25L pad for Testing: VQC):	G days C days I G near 3X10 pear L G (yee Am		Presention Time: Present for Present Presention Rate: pH Adjustment Hordream Adjustment Test Solution Value Leading Danielly:	DAC .	dari ord utu	14/1 30 mm 20 mm 20 7 1 mov - (1 20 mov) 1 mov (20 mov)	m.	
NITIAL PARAMÈTERS	Disserved Copper:	9.9	9.9	Adj. pH (Il applicab	::	_		·	

Yello

Additional Observations:

44-HOLR STATIC SINGLE CONCENTRATION DAFFORM MAGNA TEST (EPS 1/FMA/14)

Project Number:	L9387	
Serrote Museber:	47 : 48	
Test Number:	747 : D4F	
Chain of Custody #:	2115	

Sample Date/Time: Sample Tests: Test Initiation Date/Time: Technology

05/05/97// 1000					
S. CIANA					
05/08/57/1/455					
Um CH					

TIME	SAMPLE ID: PARAMETER	47 come.4	- 215 -como.s	CONTROL	100-A	48-21 100-8	- 100 C	PARAMETRIA TROVINS	040C
	Classified Caygon		9.1			9 v			
	pir		8 34		•	7.05		1455	1.1
0 HOURS	Temperatre(C)		20.4			20.3		1	M
	Conductivity(uS)		440			2420		9n	ŀ
ine	nobility @ 30 minutes (10 expense)	0	0	0	0	0	0	1	1
	pH	7.94	7.97	8.01	687	6.90	6.89		
24 HOURS	Temporaum(C)			20	. 0			1550	ļ
	€ Instruction	0	0	0	2	2	1	9	ĺ
	Dissalved Congen	8.5	8.5	8.6	8.5	8.6	\$8.5		
	pH	7.50	7.63	7.66	6.83	6.88	6.80	MM	ωK
48 HOURS	Temperature (C)	20.4	20.6	2C.6	21.0	20.9	20.9	436	OR
	Conductivity	2450	2480	2470	2460	2470	2470		
	€ immobile	0	0	0	6/9	7	67	1415	
	P Dead (10 empand)	0	0	0	0	0	0	رکم ا	
OTAL MORTALITIES		0	0	0	0	0	0		
EAN % MORTALITY			07.			0%			

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

48-HOUR Result: 215 - Pass (6	1 mortal ty) 216-Par	(69 / immobile)
TEST CONDITIONS		
Brood Culture: Time to First Brood: Average Brood Size: Total Number Esposes/Concentrates: Control Water Hardress: Effluent Substrated from 25L pail for Testing: Test Replication (for QA/QC):	OYD797 Saye Presented Time: 19 nesnates 3X10 resenates 197 Presented tor Presentent: (y86 fino Presentent Reta: ptrainess Adjustment: Test Selution Volume: Leading Density:	1415 1416 150 min 100/ 50 harati 3-6ma man 2/ yes (30 ma / 130 ma 2/ yes (30 ma / 130 ma 3-7 13 minemans
INITIAL PARAMETERS (prior to tooling)		
Dissolves Chygan: Initial sri: Temparasure: Conductivity: Initial Hardness: Physical State Upon Receipt: Clarity: Colour: Precipasse:	9.9 9.9 5.52 6.79 Adj. pH M applicable): 20.0 20.1 Adjustment Docume: 1020 1071 Adjustment Docume: Clear Vella	

AGUATIC SCIÈNCES INC

AAHCLER STATIC STATIC STATIC CONCENTRATION DAPPERS MACRIA TEST (EPS 1/RM/14)

Project Number:	19387			Sarato Data/Tire		05/05/			
Sample Mumber: Test Mumber:	79		_	Sample Teph: Test Indiana De		5. (10 x)			
Chain of Custody #:	2115		-	Technolog:			On CH		
		the company							
	SAMPLE D:		-	=	100-4	om<u>tro</u>	==		
TIME	PARAMETER		MYROL	_ E		19-21	¬ ™		CARE .
	Disserved Cityteen		9.1			9-0		1	
	Commence Copper		8-15		 	10 44		4,00	
	pH				+			1 o	1711
o HOURS	Temperature(C)		192			19.7	<u></u>	↓ _	\(\cdot \)
	Conductivity(uS)		298			24.00		1	
Imme	shilly @ 30 manages (10 expenses)	0	0	0	0	0	O	7	
	pH	8.12	3.14	8.15	10-23	10.18	10.30	20	
24 HOURS	•				.0			POO	
2 1000	Tempertsure(C)	0	T 6	0	10	10	10	19	İ
	# Immetrie		0	+	 	† 	 		
	Disastrad Caygon	8.6	8.6	8.7	3.8	8.8	8.9	m	
	PH	8.18	8.16	8.20	10.13	9.86	10.12	MM	,
48 HOURS	Temperature (C)	20.3	20.3	2c.3	20.3	20.2	20.3	14:50	0X
	Conductivity	301	303	303	2390	2400	2410	٦	
	€ Irranobalo	0	0	0	_	_		1437	
	# Dood (10 emposed)	0	0	0	10	10	10	[2	
TOTAL MORTALITIES		0	0	0	10	10	(3		
MEAN & MORTALITY		1	07.	<u> </u>	<u> </u>	100	/ .	1	l
REMEMBER TO	O COLLECT DAPHNIDS	AND TEST SC	XLUTIONS A	r 48 HRS					
ESULTS				/ \					
8-HOUR Regult:	217 - Fail (100%m	sostali	(4)					
				<u> </u>					
EST CONDITIONS									
Irood Culture:		0407	97						
ime to First Brood:		- S days	- 	Presenten Time:			1		
verage Brood Size:		19 1	Nether .	•					ł
otel Nurvier Exposed/ Control Water Hardness		3X10 res		•	-		-/-		1
	Im 25L pail for Teating:	yes (n		Reason for Present Presention Rate:			3-60mL/m		
est Replication (for QA		yee (A		pH Adjustment			(a) y		1
				Hardress Adjustin	N.C.				į
				Test Salution Value	Ma:		20 10 1 10		ļ
				Loading Density:					1
UTIAL BARANCE									
IITIAL PARAMETERS	(hum, so grand)	0 10							1
	Dissolved Coygen:	9.0		Ant me 80	danik.	_			į
	Initial pH: Tertperature:	19:7		Adjustment Details					ļ
	Conductivity:	2400			•				ĺ
	Initial Hardness:	1037		Adj. Hardness (f 4)	7				[
	Physical Siste Upon Receipt: Clarity:	reura cleur		Adjustment Details	•				
	Colour:	Veilen			•				ļ

Project Number:	
Comple Hymber:	
: Test Humber:	
Chair of Cantrily #:	

19387	
50 (5)	
DSG : DS!	
2115	

05/05/97/17	
S. CIA VA	
35/08/57 1 / 50 5	

THE	SAMPLE ID:	oorma. A	0-218	COMMON-G-	109-4	1-219	109-C	PARAMETERS TECHNOLOGY	OMBE TEVER
	Disselved Chrygon		8.7		۶	.5			
•	981		7.91	·		7.97		1503	10.1
o HCLIRS	Temporature(C)		20.0		1	99		J	$ \mathcal{W} $
	Conductivity(uS)		2400		2	430] ′	ł
tenet	maility @ 30 minutes (10 especial)	0	0	0	0	0	0		
	pH	8 42	854	8.60	777	7.81	7.71		
24 HOURS	Temperse,se(C)	20-			· 0			11002	
	# Immobile	0	0	0	0	0	0	9	<u> </u>
	Dissolved Caygon	3.4	8.6	8.6	8.8	84	8.4	1000	
	ρi·l	809	8.23	3.16	7.49	7.48	7.45	mm	,
48 HOURS	Temperature (C)	20.5	20.4	20.4	20.5	20.4	20.3	14:58	(AK)
	Conductivity	2450	2470	2470	2460	2470	2480	17.5	\ \
	# Interrobile	0	0	၁	O	0	0	1444	
	€ Dead (10 exposed)	0	0	0	0	0	0	\frac{7}{2}	
TOTAL MORTALITIES		0	0	0	0	J	Ò		
MEAN % MORTALITY			0,			0/.			

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS 48-HOUR Result:	218 - Pass Colmostality	T 2	A-Pass (61. mostulity)

TEST CONDITIONS	-		
Brood Culture: Time to First Brood: Average Brood Size: Total Number Emount/Concensus:	640797 8 mm	Procession Time:	
Control Water Hardness:	3X10 manage	Recess for Procession:	
Effluent Subemmeted from 25L paid for Testing: Test Replication (for QA/QC):	yee (no)	Presention Rate: pH Adjustment:	S- Challend
		Hardness Adjustmanc Test Salution Volume:	(70) / yea (20) rel. (10) rel.
		Leading Denaty:	25 15 mL/memoto

NITIAL PARAMETERS (prior to touting)	_50_	10		· · · · · · · · · · · · · · · · · · ·
Discohod Coyyan:	87	8.5		
initial piri:	इ.दा	2.57	Adj. pH (A applicable):	<u> </u>
Temperature:	20.0	19.9	Adjustment Octobs:	
Conductivity:	SAUD	2430	_	
Initial Hardings:	1003	1.434	Adj. Herdness (if epphashis):	
Physical State Upon Receipt:	Iran. 3	I.G. U.C	Adjustment Details:	
Clarity:	FIRELY	CIDAR	<u> </u>	
Colour:	Villani	Vel and		
Preciariase:	.13			
Odour:	V 65	1.01	<u>_</u>	
	1		-	
ditional Observations:				

sumple.

	14387		_	Sample Date/Time	ĸ	05/05/	7//-		
753			-	Semple Tech:		<u> </u>	<u> </u>		
			-	Test Initiation Det Technicien:	e/Turne:	05/08/5	77 1005	4	_
	2115		-	· Consider i.			<u> </u>		_
				grander in the second second					
	SAMPLE ID:		3-22		601	VTROL	F	-	
ti 🌋	PARAMETER	COMME	-confficie-o-	CONTROLIC	400-4	1000		PARAMETRIS TRENVISION	
F	Dissolved Oxygen		8.7			9.1			Т
F			6.78			8.18		1505	1
	p M				 			10	
O HOURS	Temperature(C)	 	20.0	 	 	19.2	·	┨	
•	Conductivity(uS)		2440	,		298		4	
ime	nobility @ 30 minutes (10 exposed)	0	0	0	0	0	0		
	pěř	691	6.86	6.74	7.91	8-15	816		Γ
24 HOURS	Temperature(C)		<u> </u>	20.	ひ			11613	
24 1100110		0	0	0	0	٥	0	19~	
	# Immobile						+	+ 	+
	Dissolved Oxygen	3.4	5.4	84	8.5	8.7	8.7	MM	1
	pH	6.95	6.94	6.71	3.18	8.19	8.21	↓ '	
48 HOURS	Temperature (C)	20.7	20.6	20.5	20.6	20.4	20.4	1506	1
	Conductivity	2460	2470	2470	301	30Z	302		'
	€ Immobile	0	0	0	0	0	0	1450	
	# Deed (10 expound)	0	0	0	0	0	0	11750	
		0	0	o		0	0	14	1
TAL MORTALITIES	<u> </u>	 	07.		0/9	<i>Ö</i> /.		Ⅎ	l
CAN						ω.			1
	O COLLECT DAPHNIDS	AND TEST SO		48 HRS					_
EMEMBER 1			LUTIONS AT	48 HRS					_
EMEMBER T	O COLLECT DAPHNIDS		LUTIONS AT						
EMEMBER 1 SULTS HOUR Result: ST CONDITIONS	O COLLECT DAPHNIDS	- 04075	beliefy)	12-					
EMEMBER T	O COLLECT DAPHNIDS	04075	LUTIONS AT			others.			
EMEMBER T SULTS HOUR Result: ST CONDITIONS and Culture: the to First Broad: the Rege Broad Size: tal Number Expose	COCOLLECT DAPHNIDS	04075 9 days 15 need	LUTIONS AT	Preservation Time:		eteri end und			
EMEMBER T SULTS -HOUR Result: ST CONDITIONS ood Culture: me to First Brood: erage Brood Size: tal Number Expose entrol Weter Hardne	d/Concentration:	04075 9 days 15 near	LUTIONS AT	Preservition Time:	den:	eteri end total			
EMEMBER 7 SULTS HOUR Result: ST CONDITIONS and Culture: he to first Broad: herspe Broad Size: hal Number Expose http://www.results.com/	ro collect daphnids	04075 9 days 15 need	LUTIONS AT	Preservition Time: Research for Preservition Rate: pH Adjustment:		eters end sets	25 - 90mL/	00	
EMEMBER T SULTS HOUR Result: ST CONDITIONS and Culture: ne to First Brood: erage Brood Size: tal Number Expose entrol Water Hardne	ro collect daphnids	04075 9 days 15 near	LUTIONS AT	Preservition Time: Resean for Preservition Rate: pH Adjustment: Hardness Adjustment	nt	etert end total	25 - \$0mL/ (66 /) (66)	60	
EMEMBER 7 SULTS -HOUR Result: ST CONDITIONS and Culture: ne to First Broad: say Number Expose netrol Water Hardne	ro collect daphnids	04075 9 days 15 near	LUTIONS AT	Preservition Time: Research for Preservition Rate: pH Adjustment:	nt	eter end uster	25 - 90mL/	ee ee 10 mL	
SULTS HOUR Result: ST CONDITIONS and Culture: he to First Broad: herage Broad Size: hal Number Expose to the substantial Martin State has the substantial Martin Substantial Martin Substantial Replication (for C	ad/Concentration:	04075 9 days 15 near	LUTIONS AT	Preservation Time: Research for Preservation Planting Planting Adjustment: Hardiness Adjustment Test Solution Volume	nt	start and total	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
EMEMBER T SULTS HOUR Result: ST CONDITIONS and Culture: me to First Broad: arrage Broad Size: tal Number Expose introl Weter Hardne tuent Subsempled i et Replication (for 0	ro collect daphnids	04075 9 days 15 near	LUTIONS AT	Preservation Time: Research for Preservation Planting Planting Adjustment: Hardiness Adjustment Test Solution Volume	nt	etert end total	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
EMEMBER T SULTS HOUR Result: ST CONDITIONS and Culture: he to First Broad: erage Broad Size: tal Number Expose tal Number Expose trout Water Hardne tuent Subsempled at Replication (for 0	In COLLECT DAPHNIDS of COL	04075 9 days 15 near 3x10 near 1157 1157 1157 1157 1157 1157 1157 115	LUTIONS AT	Preservition Time: Reason for Preservition Pate: pH Adjustment: Herdiness Adjustment Test Schoton Volum Loading Density:	int	eteri erai ustari	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
EMEMBER T SULTS HOUR Result: ST CONDITIONS and Culture: me to First Broad: arrage Broad Size: tal Number Expose introl Weter Hardne tuent Subsempled i et Replication (for 0	COCOLLECT DAPHNIDS 220 - Pass Co d/Concentration: as: from SiL pail for Teeting: DA/OC): TS (prior to teeting) Dissolved Onygen: Initial pH:	04075 9 days 15 near 3x10 near 11 7 yee (11 yee (11)	LUTIONS AT	Preservion Time: Recean for Preservion Rate: pH Adjustment: Hardiness Adjustment: Loading Density: Adj. pH (# applicate		steri end uster	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
EMEMBER T SULTS HOUR Result: ST CONDITIONS and Culture: me to First Broad: arrage Broad Size: tal Number Expose introl Weter Hardne tuent Subsempled i et Replication (for 0	In COLLECT DAPHNIDS of COL	04075 9 days 15 near 3x10 near 19 yea (in	LUTIONS AT	Preservition Time: Reason for Preservition Pate: pH Adjustment: Herdiness Adjustment Test Schoton Volum Loading Density:		eter end ustal	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
EMEMBER T SULTS HOUR Result: ST CONDITIONS and Culture: me to First Broad: arrage Broad Size: tal Number Expose introl Weter Hardne tuent Subsempled i et Replication (for 0	Initial pH: Concentration: C	04075 9 days 15 near 3x10 near 11 7 yee (11 yee (11)	LUTIONS AT	Preservition Time: Research for Preservition Rate: pH Adjustment: Hardness Adjustment Loading Density: Adj. pH (if applicable Adjustment Details: Adj. Hardness (if ap	ent: do): splicable):	eteri ord utul	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
EMEMBER T SULTS -HOUR Result: ST CONDITIONS and Culture: me to First Broad: emige Broad Size: tal Number Expose introl Weter Hardne tuent Subsempled I et Replication (for 0	Initial phi: Tompurature: Conductivity: Initial phi: Tempurature: Conductivity: Initial Physical State Upon Receipt:	9.7 month	LUTIONS AT	Preservation Time: Research for Preservation Reter- per Adjustment: Hardness Adjustment Test Solution Volum Loading Density: Adj. pH (If applicable Adjustment Details:	ent: do): splicable):	out out	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
ESULTS I-HOUR Result: IST CONDITIONS TOOK Culture: The to First Brood: The top First Brood: T	d/Concentration: ac: from 25L paid for Testing: 2A/OC): NS (prior to testing) Dissolved Oxygen: Initial pH: Temperature: Conductivity: Initial testings: Physical State Upon Receipt: Clarity:	5.7 Sept 10 Se	LUTIONS AT	Preservition Time: Research for Preservition Rate: pH Adjustment: Hardness Adjustment Loading Density: Adj. pH (if applicable Adjustment Details: Adj. Hardness (if ap	ent: do): splicable):	oter ord utul	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	
EMEMBER T ESULTS -HOUR Result: ST CONDITIONS ood Culture: me to First Brood: renge Brood Size: rist Number Expose rist Number Expose filent Subsempled if et Replication (for 0	Initial phi: Tompurature: Conductivity: Initial phi: Tempurature: Conductivity: Initial Physical State Upon Receipt:	9.7 month	LUTIONS AT	Preservition Time: Research for Preservition Rate: pH Adjustment: Hardness Adjustment Loading Density: Adj. pH (if applicable Adjustment Details: Adj. Hardness (if ap	ent: do): splicable):	oter ord utal	25 - 90 mL/ (60 / / (60) / (60) ml/ / 11	ee ee 10 mL	

46-HOUR STATIC SINGLE CONCENTRATION DAPPORA MAGNA TEST (EPS 1/RM/14)

Project Number:	19387
Serrate Number:	54 . 55
Test Number:	753 ' 254
Chain of Custody #:	-4115

Servate Cote/Time: Servate Tech: Test Initiation Cote/Time Testantion: :5/05/57//? = (10x)

TME	SAMPLE ID:	40mg-\$	3-22	Commove	105-A	59 -2.	;esc	PARAMETERS TODAYTHE	GNAE GNAE
	Disserved Carygon		8.9			8.7		454	
	pH		10.27			8.95		1510/	المن
o HOURS	Temperenero(C)	į	9.4			20.0			1
	Conductivity(uS)	2	350		<u> </u>	2400		100	1
lown	obility @ 30 minutes (10 expense)	0	0	0	0	C	0	100	
	pH	10.20	10.21	10.09	870	8.62	8-51		
24 HOURS	Temperature(C)			20	- O			1620	
	Ø Immobile	10	10	10	0	0	0	1 9	
	Disselved Coygon	<i>ই.</i> %	8.9	89	8.5	8.6	8.4	alm	
	pH	10.16	10.12	9.93	8.43	8.26	8.25	MM	₩
48 HOURS	Temperature (C)	20.5	20.3	20.3	20.5	20.3	20.2	15:12	م
	Conductivity	2330	2410	2410	2470	2480	2470		
	€ International			_	0	0	0	1458	
	# Deed (10 emosed)	10	10	10	0	0	C	1458	l
TOTAL MORTALITIES		1.0	10	10/11	Ü	d	0		
MEAN % MORTALITY			1007			o∕·			

Control Water Hardness: Effluent Subservated from 25L peal for Testing: Test Replication (for QA/QC): yee(go) yee(go) yee(go) presention RBs: yee(go) Presention RBs: yee(go) presention RBs: yee(go) presention RBs: yee(go) presention RBs: yee(go) presention RBs: (go) / yee Hardness (go) / yee H	REMEMBER TO COLLECT DAPHNIDS	S AND TEST SOLUTIONS A	\T 48 HRS	
TEST CONDITIONS Broad Culture: Time to First Broad: Average Broad State: Total Number Expenses/Concentration: Control Meter Hardwese: Effluent Subsampled from 25L pail for Teating: Figure Subsampled from 25L pail for Teating: Test Replication (for QA/QC): Note That Replication (for QA/Q	RESULTS	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	1 1 222 0	
Brood Culture: Time to Pires Broad: Average Broad Stat: 15 near-see Control Water Handware: Control Water Handware: (19	46-HOUR Result: 221 - Paul C		222-1000	(01. mostal by)
Time to First Broad: Average Broad State: Control Water Exposed/Concentration: Control Water Hardware: Effluent Substranted from 25L and for Testing: Test Replication (for QA/QC): Page 100 Properties Time: Authorized Fifth: Test Replication (for QA/QC): Properties Time: Properties Time: Authorized Fifth: D C 7 (DO/-SQLTCL/DLTO) 2- Effluent Substrante (ap) / yes For Selection Velorize: Conformation: (ap) / yes (ap) / yes Test Selection Velorize: (ap) / yes (ap)	TEST CONDITIONS			
Average Broad Size: 15 nearmone	Brood Culture:	040797		453 (371) only
Total Number Exposed/Concentration: Control Water Handmark: Effluent Subservation for ZSL pail for Testing: Test Replication (for QA/QC): Page 700 Procession Ribe: Test Replication (for QA/QC): Discovered Oxygen: Initial PARAMETERS (prior to testing) Discovered Oxygen: Initial pat: Temperature: Conductivity:			Presenten Time:	
Control Water Hardwase: Effluent Subservated from 25L peal for Testing: Test Replication (for QA/QC): 1986 800			-	
Effluent Subservated from 25L paid for Teating: Test Replication (for QA/QC): yee(go) yee(go) yee(go) yee(go) ph Adjustment (mg) / yee Hardness Adjustment Test Selution Value: Leading Density: Disservated Carygen: Initial pri: Temperature: Conductivity: Conductivity: Physical State Upon Recept: Clarity: Colour: Yee(go) Presention Rite: ph Adjustment Adj. ph (ff applicable): Adjustment Densite: Adjustment Densite: Clarity: Colour: YEA Colour: Yee(go) Presention Rite: ph Adjustment Adjustment Densite: Adjustment Densite: Adjustment Densite: Adjustment Densite: Adjustment Densite: Adjustment Densite: Adjustment Densite: Adjustment Densite: Clarity: Colour: YEA Colour:				50 mm
Test Replication (for QA/QC): yee(no) yee(no) PM Adjustment (no) / yee Test Solution Volume: Leading Density: Discovered Oxygen: Initial part: Conductivity: Conductivity: Physical Sate Upon Receipt: Colour: Yee(no) PM Adjustment Details: (no) / yee (n	Effluent Subsampled from 256, peri for Testing:			
Test Solution Volume: Leading Density: Discovered Caygen: Initial part: Temperature: Conductavity: Initial Herdmane: Physical State Upon Receipt: Colour: Text Solution Volume: Leading Density: 9.3 9.3 9.3 9.3 9.3 9.3 9.3 9.	Test Replication (for QA/QC):		pH Adjustment	
INITIAL PARAMETERS (prior to testing) Discovered Caygen: Invited pri: Temperature: Conductavity: Invited Herdreuse: Physical State Upon Receipt: Colour: Colour: Carting: Colour: Carting: Colour: Carting: Colour: Carting: Carting: Carting: Colour: Carting: Carting: Colour: Carting: Carting: Carting: Colour: Carting: Colour: Carting: Carting: Carting: Colour: Carting: Carting: Colour: Carting: Carti				
INITIAL PARAMETERS (prior to testing) Discovered Caygen: Initial pri: Tempereture: Conductivity: Initial Herdrouse: Physical State Upon Receipt: Clarity: Colour: Colour: Circle prior to testing) Circle prior to test				
Discorred Oxygen: Intel pri: 10:51 - 5:55 Adj. pri 6f explicable): Temperature: Conductavity: Conductavity: Intel Herdmane: Physical State Upon Receipt: Clearly: Colour: Colour: 2.30 Adj. Markmant Details: Circle Colour: Circ			Landing Denoty:	
Discoved Oxygen: 10 51 - 5.9 Adj. pH (f explication): Temperature:	INITIAL PARAMETERS (order to treatmen)	C2 1-34		
Instel ent: Temperature:				
Temperature: - 19.9	Dissurred Caygon:	9.3 9.7	_	
Conductivity: 2-590 ZY00 Initial Hardness: 654 G52 Adj. Hardness (if applicable): Physical State Upon Receipt: 1 G10 Adjustment Details: Clarity: 18 A.Y. Colour: 10 14 19 55	Indial phi:			
Inited Herdreuse: Py GPV Adj. Herdrees (f applicable): Physical State Upon Recept: GLOC Adjustment Details: Clarry: GRAY GOLD G			_ Adjustment Details:	
Physical State Upon Receipt:			ad Manhan d	
Clarity: CIBRLY Colour: CIBRLY IPCS				
Colout: PRINTER OF	-			
	- •		-	
ricasis: Vig	Precipitate:	/\circ\	_	
Odour.	Odour:	VOS.	- -	
Additional Observations:	Additional Observations:	<u> </u>		

48-HOUR STATIC SINGLE CONCENTRATION DAPPING MAGNA TEST (EPS 1/RM/14)

Project Number:	L9387	
Sample Number:	55 56	
Test Number:	DST : 056	
Chein of Custody #:	2115	

Serrote Ceta/Time: Serrote Test: Test statution Ceta/Time: Testamen:

15/05/97/17	
S. Clark	
as 1971 97 11 1515	

TIME	SAMPLE ID: PARAMETER	cormo 5	5-223		-105+A	56-2	100C	Paradettes Titlerflat	CASE PROPERTY
	Dissifyed Claygon		8.5	· · · · · · · · · · · · · · · · · · ·		ط .8		(7)	
	pH		8-28			7.11		(575	
o HOURS	Temperature(C)		20.0			20.3	 	10	ω (
	Conductivity(uS)		1440		<u> </u>	2420]	ļ
irren	nobility @ 30 Monutes (10 experient)	O	0	Ù	0	0	O		
	p#1	7.99	799	7.90	7.07	7.08	7.07	1125	
24 HOURS	Temperature(C)			20	ن.			1625	
	# Internation	0	0	0	0	0	0	5	
	Dissulved Cinygen	8-3	8.5	86	3.4	8.4	8.3	o lm	
	ρH	7.62	7.65	7.65	7.06	7.06	7.05	MM	B
48 HOURS	Temperature (C)	20.6	20.3	20.4	20.7	20.5	20.5	15:20	
	Conductivity	2460	2470	2480	2460	2480	2470		
	# Immebile	0	0	0	0	0	0	1507	
	# Dead (10 expense)	0	0	0	σ	0	2] `````	
TOTAL MORTALITIES		Ō	0	0	Ò	0	2		
MEAN % MORTALITY			0).			7%			

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

48-HOUR Result: 223 - Pars Co	1. mostality) 224-Pas	o (7% mostality)
TEST CONDITIONS			
Brood Culture:	040797	_	,
Time to First Brood:	X days	Presenteen Time:	****
Average Brood Size:	9 neenetes	· 	~
Total Number Espossi/Concentration:	3X10 nemnatus		
Control Water Hartinees:		Reason for Proceedien:	- na
Effluent Subsampled from 25L pail for Testing:	yes Aire	Preservent Reta:	S - Continued
Test Replication (for QA/QC):		pH Adjustment	<u> </u>
	•	Hardness Adjustitions	(\$20 mg / 150 mg
		Test Selvier Volume: Leading Dentity:	11 15 MLAnamata

INITIAL PARAMETERS (prior to touting)	JT , 5b		
Dissolved Caygon: initial pH: Temperature:	5.5 5.6 5.25 7.11 20.0 20.3	Adj. pH (fil applicable): Adjustment Outsite:	
Conductivity: Initial Hardness:	1054 1 1071	Adj. Hardness (if applicable):	
Physical State Upon Receipt: Clenty:	TIGO V	Adjustment Details:	
Colour: Preciptate: Odour:	no ve	-	
Additional Observations:	YE'.	_	

commune ett hrs. sample 56 one dend daphind but green inde along back of body.

AGUATIC SCENCES INC.

. .

48-HOUR STATIC SIN	IGLE CONCENTRATION DAPPORA MA	GNA TEST (EPS 1/A	M/14)						
	L9387			Service Com/Tra		05/05/6	7117		
Project Number: Seresia Humber:	57		-	Santato Took:	•	05/05/	v k		
Test Number:	DST		_	Test Inidates De	Toma:	05/08/5	711 16 35		
Chain of Custody #:	31:5		-	Tochnisten:			Ju CH		
TIME	SAMPLE D: PARAMETER	COMPELA	COMMO S		705-7	ADT RIVE	1897))) 	owe:
						<u>57-23</u>	72		retreetr.
	Cissolved Caygon		9.1		<u> </u>	9.0		4	ł
	Pile		8.18			10-30		1635	211
o HOURS	Temperature(C)		19.2			19.9		1635	
	Conductivity(uS)		298		T	2360		12	1
Immo	shifty @ 30 minutes (10 expense)	0	0	0	0	0	To	1	
	pH	8.15	8.14	8.19	10.22	10-21	10.17	 	
24 HOURS	TermentamiCi		<u> </u>	20			1	1633	
	Ø brunskile	P10	0	0	10	10	10	1633	
	Disserved Oxygen	5.6	3.7	€ 7	8.9	8.9	99	 	
		8.22	9 2 2	823	T T	9.97	9.91	MM	/
_	pH	20.5			10.04			15.25	100
46 HOURS	Temperature (C)		20.3	20.4	20.4	20.4	2c.3	15.	,
	Conductivity	301	302	30Z	2400	2416	2410	 	ŀ
	# inunatale		0	- 8				1515	l
	€ Deed (10 exposed)	0			(0	(0	(0	1 Cm	
TOTAL MORTALITIES		0	0	0	(0	(0)	10] "	
MEAN % MORTALITY			07.			100/			
	COLLECT DAPHNIDS A	ND TEST SO	LUTIONS AT	48 HRS					
RESULTS 18-HOUR Result:	225 - Fail (1	0% m	stali.t	(g)					
EST CONDITIONS		04.D 24	7	······································			¥57(22	s) on ly	,
ironi Cumpre: Time to First Brood: (verage Brood Stas: 'otal Number Espassa//	Concentration:	04D79 \$ days 1 9 nears	often .	Presentant Time:		•••	1605 1635 30 min		
Control Water Hardness: Muent Subsampled to:				Recent for Present	dian:		D0.>100 /- 3		·
est Replication (for QA				Presenten Rate: pH Adjustment:		•	3 - 30 mL/m		
			-	Hardness Adjusting Test Solution Volum		•	(200 mL)/ 190		ł
				Leading Density:		•	(20)// 18 R		
STIAL PARAMETERS	(prior to todding)								
	Dissolved Chygan:	9.3							j
	Initial pH:	10:50		Adj. pH (H applicab					l
	Temperature:	20		Adjustment Octobs:					

Clare No

Additional Observations:

	LG387	arna test reps 1/	MM(14)						
Project Munder: Semple Munder:	58:59			Sampto Data/To Sampto Tosts:	Majo:	02/02/	97//		
Test Number:	NS8 257		=	Test Indiction D	nda/Time:	05/05/6	7///520		
Chain of Custody 6	2//5		_	Technica:			7		
TIME	SAMPLE 10: PARAMETER	COMODA	58-22 comas	Commerc	180A-S	، حدد و	7	*********	940
	Disserved Copper		8-6			8.5		1000	-
	pH		9.19			8:17		1520	
o HOURS	Termonomico		19.9			20.2		_ ^	
	Conductivity(5)		2470			2390		10	//
least the same of		0	10	D			1 0	4	٢
		8.54	854		0	0	0	 	
	pH	0.37	1 0 3 7	8.60	7.78	7.75	7.78	1635	
24 HOURS	Temperature(C)	<u> </u>		20.	0			10	
	# Immobile	0	0	0	0	0	0	ישר ך	1
	Dissolved Citygen	8.4	8.4	8.4	84	8.4	8.4	1000	
	ρH	8.27	8.22	3.24	7.42	7.45	7.46	NM	_~
48 HOURS	Temperature (C)	20.6	№ 20.5	20.4	20.4	20.4	20.4	15:34	A
	Conductivity	2450	2470	2470	2470	2470	2480	100	
	€ Irremobile	0	0	0	0	0	0	 	ĺ
	# Deed (10 especial)	1	0	0	0	0		1520	
TOTAL MORTALITIES		t	0	O	0	3	0	9-	
MEAN % MORTALITY			3%			0%		'	
REMEMBER TO	O COLLECT DAPHNIDS A	ND TEST SO		48 HRS		07.			
RESULTS									
48-HOUR Result	226 - Pass (37	morta	e, 2,)	1227	-Pass	(o/. m	in tel	·4)	
TEST CONDITIONS									
Brood Culture: Time to First Brood:	3	وروبو		Procession Time:			,		
Average Brood Stat: Total Number Exposed/	Concentration:	SX10 name	dag .			~	/_		
Control Water Hardness Effluent Subsempled fro		119		leason for Present	en:	*** _	/na		
Test Replication (for QA		yes (74)		Vecanidan Reta: H Adjustment		-	S - Mini /mi		
				landnass Adjustman oct Salutian Valums		=	(2) rg. / 180 (
				Density:			15 ML		
NITIAL PARAMETERS	(prior to testing)	57	59						
	Disserved Oxygen:	5-6	R.<						
	Temperatre:	9.9		lj. pH (f applicable) Fjustment Datalle:): 				
	Conductivity: 2		2340		_				

calarcless

RESULTS

ARABOT STATE COLOR C	CONCENTRATION DAPPOSA	MACHA TEST	CTS 1/04/14

Project Number:	L9387	
Semple Number:	6 C	
Test Number:	<i>560</i>	
Chain of Custom #:	2115	

Sample Data/Time: Sample Test: Test billeden Data/Time: Testminten:

05/05/	197/12		
5. U.	rh.		
05/08/	97 // 15	30	

TIME	SAMPLE (D: PARAMETER	60 	-328	- сантах-с	169-A CA	NTRO	- 4 mac	Particularity of the Particula	enti may
····	Disselved Chygen		8.7			9.1		1530	CIA
o HOURS	pH Temperature(C)		6.98			19.2		9	24
	Conductivity(all)	2	380			298	<u> </u>	į	
linet	nobility @ 30 minutes (10 exposed)	0	0	0	0	0	0		
	gél	6.93	6.83	6.86	8-19	8-16	8.20	CY	
24 HOURS	Temperature(C)	Zo . O			1646				
	# investible	0	0	O	0	0	0		
	Diseased Congres	8.4	8.4	8.5	8.6	8.7	7.6	Mm	
	phi	6.85	6.89	6.93	8.16	8.12	8.13		
48 HOURS	Temperature (C)	20.7	20.7	20.7	20.6	20.5	20.4	15.45	48
	Conductivity	2460	2470	2470	302	303	303		1
	€ Irretiabile	0	gr D 1	0	0	0	0	1528	
	P Deed (10 exposed)	0	١	0	6	6	0	1528	
TOTAL MORTALITIES		0	l	0	0	0	0		
MEAN % MORTALITY			3/.			0			

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

MEHICUR Result 208 - Pass (3/. mortality) 3/. immobile)	
TEST CONDITIONS Brood Culture: Time to First Brood: Average Brood Size: Total Number Exposed/Concentration: Control Water Hardness: Effluent Subsequent from 25L pail for Testing: Test Replication (for QA/QC):	CONTROL H OUUT97 DUIUGT Stope 7 do us Proceedin True: 19 research 34 glog reader 3x0 research 119 Proceedin Rese: political processor Value of Control Total School Value of Control Landing Control:	S - Strategy (S) yes (
INITIAL PARAMETERS (prior to testing) Disselved Oxygen: Initial ph: Temperature: Conductivity: Initial Hardress:	6.77 6.977 Add. pol (if applicable): 20.5 Adjustment Details: 23.50 Adj. Hardress (if applicable):	

CONTROL H has 041497 neonates C44 his. sunyie #60 - I dead daphind, liminghite & a few of the alive over had green on upper, inside of bodies. (diestive track.)

	19387		- -	Sample Date/Tirre Sample Teph: Test Initiation Den Testimaten:		05/p5/2	7/1/2		
	SAMPLE ID:	CONTROLA	COMMON COMMON	_como_c	100.6	2-230	100+	PARAMETERS TERROPORE	CARC
	Observed Copper	8.7			8	.1			
	phi	! ()	1 4 3		8	83		1545	11
e HOLAS	Temperature(C)	2	20.2] gr			
	Conductivity(uS)	3.	760		2	420]	ľ
lrust	whility @ 30 Minutes (10 especial)	0	C	U	0	0	0	7	•
	pH	9.83	80.01	10.23	8.79	8.81	8.68	1640	
st HOURS	Temperature(C)			U	0 • 0			100	
	# Immabile	(0	10	10	0	0	0	1 ()	
	Distahed Crypen	8.8 NA				8.6	8.4	10.0	
	oH	9.45	9.79	10.05	8,45	8.48	8.35	WM	
	•	20.5	20.3	ZC.3		20.4	20.5		کعب ا
49 HOURS	Temperature (C)				20.6			15:52	
	Conductivity	2390	2410	2 500	245C	2470	2470		Ì
	/ Immobile				0		0	1537	}
	P Dend (10 exposed)	ιÜ	(0	10	0	0	0	40~	1
TOTAL MORTALITIES		10	(0	(0)		0	0	7	1
MEAN & MORTALITY	···	<u> </u>	1001			0/-			L
RESULTS 48-HOUR Result:	229 - Fair				230 - Pa	200 (67	-mort	el: ty	.)
TEST CONDITIONS Broad Culture: Time to First Broad: Average Broad Size: Fotal Number Exposes Control Water Invenes Effluent Subservated in Fest Replication (for Q	n: rom 25L pail for Teaning:	0414 7 days 54 need 3310 need 115 yes (ne		Proposition Time: Receip for Proposition Proposition Rete: pH Adjustment: Hardness Adjustme Tool Schellen Vehril Louding Condity:	ne	cant ord test	(my)	10 10	
NITIAL PARAMETER	S (prior to toelling) Dissolved Onygen: Initial shi: Temperature: Consluctivity: Initial Herdress: Physical State Uson Receipt: Conty: Cotour: Preceptate: Cdour:	8.1 10.23 10.2 10.2 23.60 1156 1160	1910 1173	Adj. pri (f applicabl Adjustium Dotalis: Adj. Humanass (f ap Adjustium Dotalis:	Manto) :				

Project Number: Semple Number: Fest Humber: Chain of Custody #	L9387 -63: 64 D63: D64		<u> </u>	Sample Oses/Tir Sample Test: Test Initiation De Testession:			
TIME	SAMPLE D: PARAMETER	6 ·	3 - 251	CONTROC	160-17		
	Disselved Coygun		F. 7			ζ,	
	pH		8.28		7		
0 HOURS	Temperature(C)		20.4			20	
	Conductivity(uS)		2410		2	4	
lman	reality @ 30 remotes (10 exposed)	10	0	Ù	0		
	phi	8.05	7.98	7.79			
24 HOURS	Тепрепене(С)	20.0					
	# immobile	0	0	0		1	
	Disselved Citygen	8.5	8.6	8.6	8.3		
	PH	7.65	7.69	7.62	6.89		
48 HOURS	Temperature (C)	20.6	20.5	20.4	Z0.8		
	Conductivity	2440	2470	2480	2440		
	€ Immedide	0	0	0	0	\prod	
	# Danid (10 emound)	0	0	0	1	I	
AL MORTALITIES		δ	0	\circ		Ι	
AN % MORTALITY			07.				
EMEMBER T	O COLLECT DAPHNIDS A	UND TEST SO	LUTIONS AT	48 HRS			

420 9 Ò 6.99 6.97 CY 653 0 0 8.5 8.5 MM 7.01 6.94 4K 16:00 20.7 20 2480 2480 Z O 1545 0 0 0 0 3 %. o (3% mostality) (7% immobile 041497 Brood Cutture: Time to First Brood: ige Brood Size: 119 Effluent Subsampled from 25L Test Replication (for QA/QC): (A) / yes ding Deng INITIAL PARAMETERS (prior to touting) 64.. S.U 2.14 20.1 2420 initial att: reud ואטעעשפום Additional Obstitution

05/05/97 //? S [] 0 1/4 05/08/92 1/600

64-332

1600

AQUATIC SCIENCES INC.

94 HOUR STATIC RAINBOW TROUT SINGLE CONCENTRATION TEST EPS 1/RM/13

Project Number:

Client:

L9387

inco Ltd

Copper Cliff, Ontario

CCWWTP

Experimental Treatments for CCWWTP

Sample identification #201 - 216

Sample Location:

Sample Name/ID:

Chain of Custody #:

Sample Method:

2115 Grab

Sample Number: 33 - 48

Test Number: T17 - T32 Sample Date/Time: 05/05/87//-:- hrs

Sample Technician: S Clark

Test Date:

05/07/97//16:45 hrs

Technician:

C Huras/J Farguharson

RESULTS

96 HOUR RESULTS: 33: 201: FAIL (100% mertality) 34: 202: PASS (10% mertality)

36: 203: PASS (0% mortality) 36: 204: PASS (0% mortelity) 37: 206: FAIL (100% mertality) 36: 206: PASS (0% mertality) 30: 207: PASS (0% mertality)

40: 208: PASS (0% mortality)

41: 200: FAIL (180% mertality) 42: 210: PASS (O% mertally) 43: 211: PASS (O% mertally) 44: 212:

46: 216:

PASS (0% mortality) FAIL (100% mertality) 45: 213: 46: 214: 47: 215:

PASS (0% mortelli PASS (0% mertality) PASS (0% mertality)

QUALITY ASSURANCE INFORMATION

REFERENCE TEST CONDITIONS

Test Organism:

Trout Batch Number:

Test Type: Test Temperature:

Test Volume:

Test Solution Depth:

Rainbow Trout 041897A

Static 15+/-1C

15 Litres 27 cm

Test Aeration Rate:

Photoperiod:

Dilution Water:

Organism Age: Stock Source:

6.5 +/- 1 mL/min/L 16 hours light/8 hours dark

Dechlorinated Tap

Fingerlings

Rainbow Springs Hatchery

0.52 +/- 0.12 @ Mean Weight:

REFERENCE TOXICANT DATA

Chemical Used: Date of Test:

Sodium Chloride May 6/97

96-hour LC50:

15693 mg/L

14826 - 16611 mg/L

Historic Mean LC50: 16246 mg/L

Warning Limits:

12252 - 20239 mg/L

TEST PROTOCOL

95% Confidence Interval:

Biological Test Method: Reference Method for Determining Acute Lethelity of Effluents to Rainbow Trout.

Environment Canada. July 1990

COMMENTS

The reference toxicant results show that test reproducibility and organism sensitivity are within acceptable limits. All data is scrutinized for errors deily during the test, at test termination and during the report Technical and Final Review stages. Instruments used to monitor parameters are calibrated daily and continuously maintained. All tests were presented for 90 minutes at the request of Sandford Clark of Laurentian University.

QUALITY REVIEW.

Tochnical Review

AQUATIC SCIENCES INC. 96-HOUR PASS/FAL RANGOW TROUT TEST (EPS 1/RM/13) 19387 33 05/05/97/1000 Servero Ocea/Time: Project Nursber: 5. CLAY Sauce Tarb Sample Number: 05/07/97// 1845 Test Number: Test initiation (Into/Time: CH 2115 Technique. Custody #: Carllella del 1990 33-201 CONTROL A PARAMETER **QAVQC** TECHYTME REVIEW PARAMETER TIME $10 \cdot a$ 10.54 4K 4.4 O HOURS Terroresturo (C) 2 440 Conductivity(uS) 10.24 ity 😭 30 minutes (10 esp 1900 45.0 9137 9133 15-16hm. 46-46 HOURS 433-15-16 hrs in 149 ----(C) 1617 Conductivity(u5) 2441) 4 ø Immobile Total # Dead Dissulved Chygon CU B Temperature(C) 48 HOURS Conductivity(u5) 160 B مانخىيىي ج Total # Deed Dissalved Oxygen 1620 CAK Temperature(C) 72 HOURS Conductivity(u5) g Total # Dass Mm Dissolved Oxygen 16:44 CM 96 HOURS Temperature(C) 14. Conductivity(uS) **704** Total & Dand TOTAL MORTALITY REMEMBER TO TAKE MEASUREMENTS IF 100% KILL IN 1 HOUR TAKE TEST SOLUTION SUBSAMPLES AT 1 HOUR OR 15 - 16 HOURS AND 95 HOURS RESULTS 201- Fail (100% mortality 96 Hour Results: TEST ORGANISM CONDITIONS 41897 4 % Mortality of Culture 7 Days Prior to Testing: 141. Providue Day Last Feeding Time: 1630 Control Weight (g) / Length (mm): 0.44, 23 0.49, 34 0.73, 40 0.37, 32 0.81, 46 0.58, 35 0.68, 37 0.58, 36 044, 37 0.57 ++ 0.13. 0.37 . 0.81 . Meen Fork Length: mpm. Weight Min/Max: 0.37 Fork Length Min/Mex: TEST CONDITIONS 6 <u>1615</u> Test Solution Valume (L): Total Preseration Time: 29cm ファント Test Salution Depth (18cm:10L; 28cm:16L; 25cm:20L): **Total Number Exposed/Concents** <u>0 00 100</u> Test Replication (for QA/QC): Reason for Presertion > 30 minu Preseration & Test Agration Rate: 6.5 +/- 1 mL/min/L oH Adjustment per (60) INITIAL PARAMETERS (prior to testing) 10.2 Dissolved Oxygen (ppm):

Cihr all trout swimming sideways, upside down, some immebile. @ - 2 hr, all tout died in 33. Subsumpled.

10.6

3460

oH:

Temperature (C):

Conductivity (uS/cm): (Adj. pH [if applicable]): (Adjustment Details):

clede

green

	1 020-			15/05/5	7/10	2/2
Project Number:	L9387		Sample Date/Time: Sample Total:	05/05/° 5.CIRY	<u> </u>	<u>/C</u>
Sample Humber:	34:35		Test initiation Com/Total:	05/07	7/57//	1445
Test Number:	T18: T19		Testomen:	CH		
Custody #:						
		3/1- 702	35-203	PARAMETER	ONOC	
TIME	PARAMETER	34-202	100	TECHTIME	REVIEW	
	Districted Copyright	9.8	7.9			
	p il	8.90	8.52	11-45	SIK	
0 HOURS	Temperatric)	14.6	2500	1645	300	İ
(manufacture)	Conductivity(uS)	2490	2300	<u>_</u>)	l	
15 - 16 HOURS	illy @ 30 mirutes (10 especial)	7.38	1.65	0810	47	
	Olesatved Citygen	9.3	9.3			
	phi	7-28	7-17	CY		
24 HOURS	Тепримическ	17.3	14.3	•	6	
	Conductivity(u6)	2510	2510	1620	1	
	Ø Immuhilib Tgdal Ø Oadal	a a	8		1	
	Disprised Congrets		4.5	CIA		
	att	7.28	7.13	W	233	
48 HOURS	Temperature(C)	14.4	14.3	1		
	Conductivity(u6)	2520	2520	16(1		
	/ Introduito	0	0	1'''		
	Total # Deed	4	9,5			
	Dissolved Coygon sti	7.3	3.17	ł	SB	
72 HOURS	Termerature(C)	14.6	14.8		100	
	Conductivity(uS)	2520	2510	160-1		
	# Immigaile	0	0	1621		
	Total # Deed		0			
	Dissolved Citygen	9.4	9.3	160		
	pH.	7.39	7.11	NM 16:46	ا ۸۸ ا	
96 HOURS	Temperature(C) Conductivity(uS)	14.5 2520	14.5 2520		<i>()</i> 0 F	
	# Immobile	0	0	عه: طا		
	Total # Dead		0	, ,	,	
TOTAL MORTALITY		ľ	C			
REMEMBER TO TAKE	E MEASUREMENTS IF 100% ICLL IN	1 HOUR TAKE TEST SOL	UTION SUSSAMPLES AT 1 HOUR	OR 15 - 16 HOURS	MO SE HOUR	16
RESULTS	202 - Pars (101	1 1-6:1-	1 202 - 8-	10:1		0:4.
96 Hour Results: *	202 - Pass (181	· morreis vy)	1 203 - 103	2 (0 /· m	note	<u> </u>
TEST ORGANISM CO	NOTTONS		5 141/			1/30
Trout Batch Number:	0418974	% Marting of Culture 7 Days A	1. 4 1/-	Provious Day Last F	feeding Time:	1630
Control Weight (g) / La	ingth (mm):					
1	2 3	4 5	7			10
0.53 1 35	0.44133 6.49134	573140 0.37132	0.8/140 658135	0-68/37	0.8136	044137
Sample Size:	10		Maan Weight: 0.59	++ 0.13		
Meen Fork Length:	36 ++ 3 mm			. 0.31 9		
Fork Length Min/Mex:			Loading Density: O .			
TEST CONDITIONS						
		_				
Total Presertion Time			Test Seluten Volume (L):		<u> 16 C</u>	
	<u> المياد</u>		Test Salutan Dapth (190m:10L; 20c		.39	<u>cm</u>
Reason for Preservings	total <u>30 m.u</u> n > 30 mmutate: M.C.		Total Number Expectel/Concentration Total Replication (for QA/QC):		***	<u> </u>
Preseration & Test Ass				•		
oH Admistream	yes (#S)					
		32		2.1		35
INITIAL PARAMETER	S (prior to tooling)	35		34	_	3>
Dissolved Oxygen (ppr	m): 10.0 !	10.3	Physical State Uson Recept:	isuid	-	i g wid
pH:	8.94		_	Vac	 _ c	leac
Temperature (C):	14.6	14.5	Colour: @	Cee-	+	3000
Conductivity (uS/cm):	2 <u>500- </u>	<u> 250</u> 0	Preciatelli:	ges	+	Y & 7
(Adj. pH (if applicable)):		Odour:	<u> </u>	 	
(Adjustment Details):			المارة المارة	2	1	
1					_	
Comments/Deviations	K			0 ⁴⁰ 0 mm, (14874	NEW 2007 TO 1	
-note #	203 (34) ani	ved with a l	eaking liner be	aq		
	- -		Ú	4		

.

Project Number:	19387		Sample Outs/Time:	25/05	197/15	000
Sample Number:	36: B		Sample Took:	5 Clay	7/47//	Thue
Total Number: Custody #:	2115		Test Initiation Data/Time: Testminien:			1073
Carry V.		<u> </u>			· · ·	
	94944	36-204	CONTROL B	PARAMETER	OVEC	
TIME	PARAMETER Distance Coyen	100	10:2	TECHTIME	NEVEN .	
	pH	7.10	7.67	1850	اسدا	
C HOURS	Temperature(C)	14.1	14.0	7'8r	4K	
المطحسين	Conductivity(u6) ity @ 30 minutes (10 especies)	25 (0	299	┥ ~		
15 - 16 HOURS	p#1	7.11	7.87	0815	62	
	Disserved Coygon	9.7	9.8	C		
24 MOVES	pH T	7.11	B: 02	CU	6	
24 HOURS	Temperaturo(C) Conductoropylus()	2520	301	1		
	# Immediate		0	1721	1 1	
	Total & Dead	-0	0			
	Diametrod Chygan gH	7:10	8.20	CU		
48 HOURS	Temperato(C)	14-3	14.4		\$26	
	Conductivity(c5)	2520	302	1603	l i	
	# Inmade		<u> </u>	1,00	1 1	
	Total # Dead Disselved Covers	9. 5	9.7		 	
	pH	1.16	7.91	1	ha- 1	
72 HOURS	Temperature(C)	14.5	14.6	162	186	
	Canductivity(u5) # trunshile	2520	363	· -m	1 1	
	Total # Deed	3	0	1		
	Disselved Caygon	9.7	9.7			
	pH.	7:17	7.96	16:21	ا ۸ ا	
96 HOURS	Temperature(C) Conductivity(uS)	14.4 2530	14.4		$ \langle N \rangle $	
	# bronupado	9	0	\b'.5\		
	Total # Dead	0	0/9	``		
TOTAL MORTALITY	MEASUREMENTS IF 190% FULL IN		0			
			LUTION SUBCAMPLES AT 1 HOU	GR 13 - 14 NOON		·
98 Hour Results: 2	04 - Pars (61.m	nortality)				
TEST OFICIANISM CON	O41897A	2 11				1/30
		"S Impressity of Curtains 7 Days in	7.11.	Promote day can't	-	0.61
Control Weight (g) / Len	gin (mm):	4 5	0 7	•		10
	0.37, 31 0.49, 35			0.65137		
, , , , , , , , , , , , , , , , , , , ,	9					
Semple Size: Mean Fork Langth:	34 ++ 2 mm		Weight MinMax: 0.34	++ 0.12 g		
Fork Length Min/Mex:	31 · 37 mm			28 M		1
					 	
TEST CONDITIONS						7
Total Presuration Time:	- 16/5	_	Test Salutan Valuma &1:		166	
	1645		Total Schister Depth (18th: 10t.; 20c	m:1 6L; 36 cm: 2 5L):	29	em
	30 mi		Tetal Number Exposed/Concentrate	m:	10	
Reason for Preseration :			Test Replication (for QA/QC):	•		<u>'</u> [
Preservion & Yest Aeres pH Adjustment	ton Rate: 6.5 + 1 mL/m yee / /fb)					
INITIAL PARAMETERS				<u> </u>		
	30					
Distolved Oxygen (spm)			Physical State Upon Recent: Clarity:	<u>Liquid</u>		
pH: Temperature (C):	7·07	-	Calour:	3(4)		
Conductivity (uS/cm):	2510		Proceedits:	yes		
(Ad) and til annumber).	_	- 	Come:	<u>^</u>		
(Adj. pH (if applicable)): (Adjustment Details):			6.0	Ken aa		
Comments/Devisions:					MADO 6 191	

note - #204 (36) arrived with a leaking liner bag

GEHOUR PAREFAE	L RAMBOW TROUT TEST (EPG 1A	-		15/05/ 5. Clark	167 // 7	0.00
Project Number:	19387		Sample Date/Time:	10 10 1	7 1 11	000
Sample Number:	37 : 38 T21 ! T22		Sangto Tech:	3.1411.6	07/97/	11.11.50
Test Humber:	T21 1722		Test Millation Date/Time:	03/0		71093
Custody #:	2115		Teatunisian:		CH	
TIME	PANAMETER	37-205	38-206 100	PARAMETER TECHNINE	ONOC NEVEW	
	Classical Cayper	9.8	70.0			7
		10.57	9.01	7 .,	į	
0 HOURS	Temperature(C)	14.0	14.3	7165%	AR .	1
	Conductivity(s)	2000	2500		''	1
broven	illty @ 30 minutes (10 expected)	0	0	43.7		i
15 - 16 HOURS		216 -0 10.3	0 7.46	1900181	150	ļ
7-15-16 hr.	Changhand Citygen	9.9	9.8	3540		
		9.60	7-51	- 1'0'/,	6	į
24 HOURS	Temperaturo(C)	2440	3516	1 1/4	,	ĺ
	Conductivity(sS) # Investors	7440	0	$+$ $/$ \sim \cdot	1	
	Total & David	10		1624	i	
	Disserved Conserv		9.9			
	pH		7.43	1 CY	₹	
48 HOURS	Temperature(C)		14.3	」		
	Conductivity(u6)		2520	71615	j	
	€ brumphile		0	コル のノ		
	Total # Danid		U			
	Disserted Coygon	<u> </u>	9.9	⊣		
	pH	<u> </u>	7-41	- 1/ 72 │		
72 HOURS	Temperature(C)		14.7	1623 1623	AR.	•
	Conductivity(uS) # Immabile		7520	- Gr	1	
	Total & Dead	 	7	1 /		
	Distained Oxygen		9.7	75:63 Nm		
	siti		7.42	- I		
96 HOURS	Temperature(C)		14.3	1 W"	$ c_{\Delta} \Lambda $	
	Conductivity(uS)		2520	7		
	€ Immedia				^	
	Total # Dead			□ `		
TOTAL MORTALITY		10				
REMEMBER TO TAKE	E MEASUREMENTS IF 180% IQLI	LIN 1 HOUR TAKE TEST S	DLUTION SUSBAMPLES AT 1 HOL	UR OR 15 - 16 HOURS	MID OF HOUR	•
RESULTS 96 Hour Results: "	205 - Fail (100	(motality)	206 - Pars	6.1. mort	elity)	
TEST ORGANISM CO	19974 19974	& Marries of C. Dom 7 Bours	Prior to Testing: 1-4-1-	Dente Bout on S	7	1630
L		_ =====================================	<u> </u>			05-0
Control Weight (g) / Le	(1000): 2	4 5	T 6 1 7			90
6.46 1 33	0.37131 0.49135	- 0.56135 O.Sel 35	0.36/31 4.34/31	045737	2461 36	
7.00		1-30173			<u> </u>	
Sample Size:	9	_		++0.12,		
Meen Fork Length:		<u> </u>		-0.66		
Fork Length Min/Mex:	3/ 37		Landing Density:	.28 or		
TEST CONDITIONS						
1231 CORDITIONS		_				
Total Preseration Time:	: <u>161</u>	5	Total Salution Volume (L):	_	16	
	- 164°		Test Selveen Depth (18sm:10L; 2		<u>a</u> 9	<u>e </u>
	30 n		Total Nutribor Especial/Concepto	plan:	10	
Research for Preservation			Test Replication (for QA/QC):	-		}
Preservation & Test Ass						
pH Adjustment	yee (f					
INITIAL PARAMETER	S (prior to testing) 37	. 28		32		38
		1		, , , , , , , , , , , , , , , , , , , 	,	
Dissolved Oxygen (ppr		10:3	Physical State Upon Receipt:	Lywid _	+	عنع يونح
pH:	10:63	9.05	Clarity:	cleac	+	clear
Temperature (C):	7460	14.5	Colour:	O.C.		a reen
Consuctivity (uS/cm):	2460	2490	Precentate: Odeser:	745	+	Yes
(Adj. pH (if applicable))): <u> </u>		 -		;	
(Adjustment Detaile):						
						

AQUATIC SCIENCES INC.

e30 min #37 -some trout dark in colour, swimming sideways, stressed #71 e 1 hr all trout swimming erratically.

@ 1582 no octof 192 - all dead in #37; subscripted.

Commente/Deviations

Project Number:	: 9387		Sample Deta/Time:	02/05/	47//101	00
Sample Number:	39:40		Sample Tests:	S. Clar	lı.	
Togs Number:	T23 . T24		Test Initiation Date/Time:	05/	77/77	1645
Custody #:	2115		Technican:		CU	

		39-207	Y0-208	PARAMETER	OVOC	
TME	PARAMETER	100	9.8	TECHTIME	NEVEW	
	Disserved Copper	8 46	7,54	1 . <	1	
O HOURS	pH Tomoroomatics	14.4	14.7	1655	SSQ	
Onduna	Temperature(C) Conductority(u5)	2500	2500	1 ' ()~	1 1	
lane illi	by @ 30 minutes (10 emposed)	C	0	1 ′	1	
15 - 16 HOURS	pH	7.24	7.74	08160	-	
	Dissaved Cayyon	9.4	9.5			
	pH	7.31	7.28	14	اما	
24 HOURS	Temperature(C)	14.2	14.2]	, ~ ,	
	Conductivity(uS)	2510	2520	1626		
	€ Introdute		<u> </u>	1 (82	1 1	
	Total & Dead	0				
	Disastrad Copper	9.5	7.30	CU	345	
	pH .		14-3	1 1	1 3 1	
48 HOURS	Temperatro(C)	2520	2520	1	1	
	Conductivity(uS) # Immedia	2320	7	11617	1	
	Total # Dani	8		1 ′ ′	1 1	
	Disserved Coygon	-98	44			
	ett.	7.5	7.33	1624	1	
72 HOURS	Temperature(C)	74.4	14.4	1100	世	
	Conductivity(uS)	2520	2520	lacksquare	,-	
	Ø Immebile	ð	<u> </u>		1	
· · · · · · · · · · · · · · · · · · ·	Total # Dead	<u> </u>	\mathcal{O}			
	Dissolved Caygon	9.7	9.7	NM 16:55	1 1	
	pH	7.31	7.20	Mir	1 4.4	
96 HOURS	Temperature(C)	14.2	14.2	1	$I(\mathcal{M})$	
	Conductivity(uS)	2530	2530	14:50	10,1	
	Ø Immebile Total Ø Dead	Ö	\	''	<u> </u>	
TOTAL MORTALITY	102 9 000		6	1	1	
	MEASUREMENTS OF 100% KILL IN	MOUR TAKE TEST SOL	UTION SUBSAMPLES AT 1 HOUR	OR 15 - 16 HOUR	A AND SE HOUSE	
Hour Results: 20	2- Para (Ulim	ortality)	268 - Pars	601.ma	tallety	
TET ORGANISM COM	GITOMS .					
rout Batch Number:	541897 A	% Martality of Culture 7 Days Fr	tor to Teating: 1.47_	Provious Day Last 9	Fooding Time:	1630
Control Weight (g) / Lan	gin (mm):	4 5	0 7			10
6.46 133	0.37131 0.49135	006135052135	0.34/3/ 6.34/31	0.65/37	64436	1
		000,07				
iempie Size:	<u> </u>			++ 0.12 ,	•	
Asan Fork Langth:	34 +1 2 mm			. 0.669	•	ĺ
ork Length Min/Mex:	31 - 37 mm		Leading Donary: 6 . Z	- <u> </u>	•	
						
EST CONDITIONS	··.					
	116	_			166	•
Total Presertation Time:	<u> 1613</u>		Test Salution Valume (L):		29	
	- 1677		Test Salution Dopth (18cm:10L; 200 Testi Number Expensi/Consentation		10	
	20 ini		Test Restingen (for QA/QC):	- 11-	m/6	
lesson for Preseration : Preseration & Test Agrat						
H Adaptment	yes (A)					
	<u></u>			2 %		
NITIAL PARAMETERS	(prior to souting) 3%	40		34	, f	0
Dissolved Oxygen (ppm)	10.2	•	Physical State Upon Researc:	iouid		<u>ianid</u>
orianis de la compania (gapania oriani	8:59			· Vene		iede
Temperature (C):	14.5			alan-		rellan
Conductivity (uS/cm):	2500		Precentate:	yes		<u>'yes</u>
	i		Oteur:	20		
Adj. pH (if applicable)): Adjustment Details):					1	i
						
Comments/Deviations				OTTO		

Project Number:	<u> 19387</u>		Sertone Date/Tirtle:	05/05/	97/10	0.0
Sample Number:	41		Sample Tech:	05/05/ 5. Lin x	k	
Test Number:	725		Test Indutes Date/Time:	05	107/57	1/1645
Custody #:	2115		Technolon:		CU	
		***************************************		t		
TIME	PARAMETER	CONTROL	- 41-209	PARAMETER TECNTIME	QA/QC NEVIEW	
	Disserved Coygon	70.7	7.8]		
	pH	7.65	10.43	コルバニ	1/0~	
0 HOURS	TemperaturalCI	14.0	74.3	1104	(QX	
	Conductivity(sS)	300	2440	コー か	1	
Immebi	lity @ 30 manutine (10 emposed)	0	2			
- HOURS		796	10.2/~1hr	TOOKY	4	
1-15-16 hr	Dispatred Chygon	3-10·c	9.8	0549	1	
	pH V	7.93	9.65	-	اما	
24 HOURS	Temperature(C) Conductively(uS)	301	2440	1/14	5	
	P Investiga	301		1 /]	
	Total & Daniel	0	10	1634	1 1	
	Disserved Oxygen	9.8				
	pH	7-617		(4	اسمدا	
48 HOURS	Tempuratro(C)	14.6] ′	86 5	
	Conductivity(u6)	303] ,/ 60	[]	
	# Instable	0		1 1698]	
	Total # Dead					
	Disputed Coppen	9.8		1		
	pH	इ.५५		11(7)	_,_	
72 HOURS	Temperatro(C)	74.8		1622	58	
	Conductivity(uE)	363		4 4	'	
	/ Immatile	0		- I		
	Total @ Dead	9.8	 			
	Disselved Oxygen	7-8		4 . 1	1	
	-44	7.97				
281 IOH 20	pH Terremovn(C)	7.92	+	1 mm		
96 HOURS	Temperature(C)	14.7		MM	M	
98 HCURS	•	14.7 305		WW59	M	
96 HOURS	Temperature(C) Conductivity(uS)	14.7		NM 16:59	M	
	Temperature(C) Conductivity(uS) # Immedia	14.7 305	10	NW 16:59	M	
TOTAL MORTALITY	Temperature(C) Conductivity(uS) # Immedia	14.7 365 C		1 10		
TOTAL MORTALITY REMEMBER TO TAKE RESULTS	Temperature(C) Conductivity(uS) # Immedia Total # Deed	14.7 3.05 0 0 0 11 HOUR TAKE TEST 8	OLUTION SUBSAMPLES AT 1 HOU	1 10		1
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results:	Temperature(C) Conductivity(US) # Immedia Total # Deed MEABUREMENTS IF 100% KULL H a209 - Fail	14.7 365 C C O N 1 HOUR TAKE TEST S (100%, months	OLUTION SUBSAMPLES AT 1 HOU	1 OR 15-16 HOURS	AND 95 HOURS	
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results:	Temperature(C) Conductivity(US) # Immedia Total # Dated MEASUREMENTS IF 180% KOLL III 209 - Fail MOTTONS OUL 8974	14.7 305 0 0 11 HOUR TAKE TEST B (100/m.c.) ha.	CLUTION SUBSAMPLES AT 1 HOUS L Your to Tessing: 1-41-	Provious Cay Last F	a AND SE HOUSE	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Basch Number: Control Weight (g) / Las	Temperature(C) Conductovity(US) # Immedia Total # Date MEABUREMENTS IF 100% KILL H 209 - Fail MITTORS UN 8974	14.7 365 C C C N 1 HOUR TAKE TEST S (100/	Prior to Tessing:	Provious Day Last F	AMD 66 HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / Las	Temperature(C) Conductovity(US) # Immedia Total # Date MEABUREMENTS IF 100% KULL H 209 - Fail MITTORS UN 8974	14.7 365 C C C N 1 HOUR TAKE TEST S (100/	CLUTION SUBSAMPLES AT 1 HOUS L Your to Tessing: 1-41-	Provious Day Last F	AMD 66 HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM CON Trout Besch Number: Control Weight (g) / Las	Temperature(C) Conductovity(US) # Immedia Total # Date MEABUREMENTS IF 100% KULL H 209 - Fail MITTORS UN 8974	14.7 365 C C C N 1 HOUR TAKE TEST S (100/	CLUTION SUBSAMPLES AT 1 HOUSE A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Province Day Last F	AMD 66 HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Basch Number: Control Weight (g) / Las 1 0.48/35 Sample Size:	Temperature(C) Conductority(uS) # immedia Total # Dass MEABUREMENTS IF 1895 IOLL II #### ############################	14.7 365 C C C C O N 1 HOUR TAKE TEST B (1007. m cn fm.	DUTTION BURBANFLES AT 1 HOUSE Prior to Toesing: 1-41- 0.46 / 38 0.74 38 Mean Weaphe: 0.59	Provious Day Last F	AMD 66 HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / La 1 0.48 / 35 Servele Size: Meen Fork Length:	Temperature(C) Conductority(US) # Immedia Total # Date ###################################	14.7 365 C C O N 1 HOUR TAKE TEST S (1007m cn fm.	D.LUTTION BURBANFLES AT 1 HOUSE Prior to Toesing: 1.41. 0.40 / 38. 0.74/ 35 Mean Weight: 0.59 Weight Mindfall: 0.35	Province Day Last F	AMD 66 HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / La 1 0.48 / 35 Servele Size: Meen Fork Length:	Temperature(C) Conductority(US) # Immedia Total # Dass MEABLIREMENTS IF 1895 IOLL II #################################	14.7 365 C C O N 1 HOUR TAKE TEST S (1007m cn fm.	D.LUTTION BURBANFLES AT 1 HOUSE L 4) Prior to Toesing: 1-41- 0.46 / 38 0.74 38 Mean Weight: 0.59 Weight Mindles: 0.35	0.35/32 + 0.16 g	AMD 66 HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COT Trout Besch Number: Control Weight (g) / Les 1 0.45/35 Semple Size: Mean Fork Length: Fork Length Min/Mex:	Temperature(C) Conductority(US) # Immedia Total # Dass MEABLIREMENTS IF 1895 IOLL II #################################	14.7 365 C C O N 1 HOUR TAKE TEST S (1007m cn fm.	D.LUTTION BURBANFLES AT 1 HOUSE L 4) Prior to Toesing: 1-41- 0.46 / 38 0.74 38 Mean Weight: 0.59 Weight Mindles: 0.35	0.35/32 + 0.16 g	AMD 66 HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / Le 1 0.48 / 35 Servele Size: Meen Fork Length: Fork Length MinMex	Temperature(C) Conductority(US) # Immedia Total # Dass MEASUREMENTS IF 1895 IGUL III 209 - Fail MITTONS OUT 897A WITH IMME 2 3 C.30/ 40 C.44/ 33 10 36 + 3 mm 32 + 70 mm	14.7 365 C C O N 1 HOUR TAKE TEST S (1007m cn fm.	Prior to Toesing: 1.41. 0.40 / 38. 0.74 / 35 Mean Weight: 0.59 Weight Min/Max: 0.35 Leading Density: 0.	0.35/32 + 0.16 g	and as House	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / Lat 1 0.48/35 Semple Size: Mean Fork Length: Fork Length MinMex: TEST CONDITIONS	Temperature(C) Conductority(US) # Immedia Total # Deed MEASUREMENTS IF 1895 IGLL II 209 - Fail MITTORIS C.90, 40 C.44, 33 10 36 + 3 mm 32 - 40 mm	14.7 365 6 0 0 11 HOUR TAKE TEST B (100/	Prior to Teening: 1-41- 0.46 / 38 0.74 38 Mean Weight: 0.59 Weight Min/Max: 0.35 Leading Density: 0.	Province Day Last F 0.35/32 ++ 0.16 9 - 0.80 9	and as HOURS	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / Le 1 0.48 / 35 Servele Size: Meen Fork Length: Fork Length MinMex	Temperature(C) Conductority(US) # Immedia Total # Deed MEASUREMENTS IF 1895 IGLL II 209 - Fail MITTORIS C.90, 40 C.44, 33 10 36 + 3 mm 32 - 40 mm	14.7 365 6 0 0 11 HOUR TAKE TEST B (100/	Prior to Teening: 1-41- 0.46 / 35 0.74 38 Mean Weight: 0.59 Weight MinAfaz: 0.35 Leading Denety: 0.	Province Day Last F 0.35132 +/- 0.16 9 - 0.80 9 37 94	onding Time:	1630
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Regults: TEST ORGANISM COI Trout Batten Number: Control Weight (g) / Let 1 0.48 / 35 Sample Stze: Meen Fork Length: Fork Length Min/Mex: TEST CONDITIONS Total Preservicin Time:	Temperature(C) Conductority(US) # Immedia Total # Dans MEABUREMENTS IF 100% KULL II 209 - Fail COTTONS 2 3 C.80/40 C.44/33 10 32 - +0 mm 32 - +0 mm 16/5 cons 16/5 cons 30 mm	14.7 365 6 0 N I HOUR TAKE TEST & (1007m.cn fm. * Moreony of Culture 7 Days 0.7% 4-0 0.57/37	Prior to Teeting: 1-41- 0.46 / 35 0.74 38 Mean Weight: 0.59 Weight Mindles: 0.35 Leading Density: 0.	Province Day Last F 0.35132 +/- 0.16 9 - 0.80 9 37 94	0.70/3%	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / Les 1 0.45/35 Service Size: Meen Fork Length: Fork Length Min/Mex: TEST CONDITIONS Total Preservion Time: Reeson for Preservion	Temperature(C) Conductority(US) # Immedia Total # Dead ###################################	14.7 365 6 0 N I HOUR TAKE TEST S (100/	Prior to Teening: 1-41- 0.46 / 35 0.74 38 Mean Weight: 0.59 Weight MinAfaz: 0.35 Leading Denety: 0.	Province Day Last F 0.35132 +/- 0.16 9 - 0.80 9 37 94	onding Time:	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Betch Number: Control Weight (g) / Les 1 0.45/35 Service Size: Meen Fork Langth: Fork Langth Min/Mex: TEST CONDITIONS Total Preservion Time: Reeson for Preservion Preservion & Test Asse	Temperature(C) Conductovity(US) # Immedia Total # Date ###################################	14.7 365 6 6 0 N 1 HOUR TAKE TEST 8 (100/	Prior to Teeting: 1-41- 0.46 / 35 0.74 38 Mean Weight: 0.59 Weight Mindles: 0.35 Leading Density: 0.	Province Day Last F 0.35132 +/- 0.16 9 - 0.80 9 37 94	0.70/3%	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Betch Number: Control Weight (g) / Les 1 0.48 / 35 Servele Size: Meen Fork Length: Fork Length Min/Mex: TEST CONDITIONS Total Preservion Time: Reason for Preservion Preservion & Test Asse	Temperature(C) Conductority(US) # Immedia Total # Dead ###################################	14.7 365 6 6 0 N 1 HOUR TAKE TEST 8 (100/	Prior to Teeting: 1-41- 0.46 / 35 0.74 38 Mean Weight: 0.59 Weight Mindles: 0.35 Leading Density: 0.	Province Day Last F 0.35132 +/- 0.16 9 - 0.80 9 37 94	0.70/3%	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / Les 1	Temperature(C) Conductority(US) # Immedia Total # Deed MEASUREMENTS IF 1895 IGUL II #### #############################	14.7 365 6 0 0 11 HOUR TAKE TEST S (100/	Prior to Teeting: 1-41- 0.46 / 35 0.74 38 Mean Weight: 0.59 Weight Mindles: 0.35 Leading Density: 0.	0.35/32 +/- 0.16 g - 0.80 g - 0.80 g	0.70/3%	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Betch Number: Control Weight (g) / Les 1 0.48/35 Semple Stat: Mean Fork Length: Fork Length MinMex: TEST CONDITIONS Total Preservion Time: Reason for Preservion Preservion & Test Asra pH Adjustment: INITIAL PARAMETERS	Temperature(C) Conductovity(US) # Immedia Total # Dans MEABUREMENTS IF 100% KULL H 209 - Fail ###################################	14.7 365 6 0 N I HOUR TAKE TEST B (100/	Prior to Teeting: 1-41- 0.46 / 35 0.74 38 Mean Weight: 0.59 Weight MinAffat: 0.35 Leading Density: 0.35 Total Solviers Depth (Morrisot; 28: Total Number Expected/Consenses Teet Repriceses (for QA/QC):	0.35/32 +/- 0.16 g - 0.80 g - 0.80 g	O.70/3% (163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Besch Number: Control Weight (g) / Les 1 0.48/35 Semple Size: Mean Fork Langth: Fork Langth Min/Mex: TEST CONDITIONS Total Preservion Time: Reason for Preservion Preservion & Test Asra pH Adjustment: [INITIAL PARAMETERS	Temperature(C) Conductority(US) # Immedia Total # Date ###################################	14.7 365 6 0 NI HOUR TAKE TEST B (100/	Prior to Teeting: 1-41- 0.46 / 32 0.74 35 Mean Weight: 0.59 Weight Minifes: 0.35 Leading Density: 0.35 Total Sulvan Dopth (Years:10L; 28: Total Number Expected/Consumers Test Reprises (for QA/QC):	Province Day Last F 0.35/32 +- 0.16 g - 0.80 g 37 g/L	0.70/38	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COT Trout Betch Number: Control Weight (g) / Las 1	Temperature(C) Conductority(US) # Immedia Total # Dated MEABUREMENTS IF 1895 IGUL H ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A ##### PART 1997 A ###################################	14.7 365 6 0 NI I HOUR TAKE TEST B (100/	Prior to Teening: 1-41- O.46 / 32 O.74 35 Mean Weight: 0 . 35 Weight Min.Mas: 0 . 35 Leading Density: 0 . 35 Total Survivor Depth (Morre: 101; 28) Total Number Especial/Consumus Teet Replication (for QA/QC): Physical State Upon Receipt: Clarity:	7 0.16 g - 0.80 g - 0.80 g - 0.16 g - 0.80 g - 0.16 g - 0.80 g - 0	0.70/38	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COT Trout Batch Number: Control Weight (g) / Lat 1 () . +3 / 3-5 Semple Size: Mean Fork Length: Fork Length Min/Mex: TEST CONDITIONS Total Preservion Time: Reason for Preservion Preservion & Test Aere pH Adjustment: INITIAL PARAMETERS Dissolved Oxygen (springht) Temperature (C):	Temperature(C) Conductority(US) # Immedia Total # Dated MEABUREMENTS IF 1895 IGUL H ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A ##### PART 1997 A ###################################	14.7 365 6 0 N 1 HOUR TAKE TEST B (100/mcn fm. 4 Marraney of Culture 7 Days 10.7% 40 0.57/. 37	Prior to Toesing: 1-41- 10.46 / 38 0.74 38 Mean Weight: 0.59 Weight Min.Mea: 0.35 Leading Densey: 0. Toes Solveen Volume 4.): Toes Solveen Copth (Vitori:101; 28: Toest Repriseen (for QA/QC): Physical State Upon Receipt: Clarry: Colour:	7 0.16 g - 0.80 g - 0.80 g - 0.16 g - 0.80 g - 0.16 g - 0.80 g - 0	0.70/38	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COT Trout Betch Number: Control Weight (g) / Las 1	Temperature(C) Conductority(US) # Immedia Total # Dated MEABUREMENTS IF 1895 IGUL H ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A ### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A #### PART 1997 A ##### PART 1997 A ###################################	14.7 365 6 0 NI I HOUR TAKE TEST B (100/	Prior to Toesing: 1-41- 0.46 / 38 0.74 35 Mean Weight: 0.59 Weight Minifes: 0.35 Leading Deneity: 0.00 Toes Selvison Depth (More: 101; 201 Toes Selvison Depth (More: 101; 201 Toes Replication (for QA/QC): Physical State Upon Recept: Colour: Procestate:	0.35/32 +/ 0.16 g - 0.80 g - 0.80 g	0.70/38 /	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COI Trout Batch Number: Control Weight (g) / Lan 1	Temperature(C) Conductority(US) # Immedia Total # Deed MEASUREMENTS IF 1895 IQUA M ###################################	14.7 365 6 0 N 1 HOUR TAKE TEST B (100/mcn fm. 4 Marraney of Culture 7 Days 10.7% 40 0.57/. 37	Prior to Toesing: 1-41- 10.46 / 38 0.74 38 Mean Weight: 0.59 Weight Min.Mea: 0.35 Leading Densey: 0. Toes Solveen Volume 4.): Toes Solveen Copth (Vitori:101; 28: Toest Repriseen (for QA/QC): Physical State Upon Receipt: Clarry: Colour:	0.35/32 +/ 0.16 g - 0.80 g - 0.80 g	0.70/38	163 O 0,531 34
TOTAL MORTALITY REMEMBER TO TAKE RESULTS 96 Hour Results: TEST ORGANISM COT Trout Batch Number: Control Weight (g) / Lat 1 () . +3 / 3-5 Semple Size: Mean Fork Length: Fork Length Min/Mex: TEST CONDITIONS Total Preservion Time: Reason for Preservion Preservion & Test Aere pH Adjustment: INITIAL PARAMETERS Dissolved Oxygen (springht) Temperature (C):	Temperature(C) Conductority(US) # Immedia Total # Deed MEASUREMENTS IF 1895 IQUA M ###################################	14.7 365 6 0 N 1 HOUR TAKE TEST B (100/mcn fm. 4 Marraney of Culture 7 Days 10.7% 40 0.57/. 37	Prior to Toesing: 1-41- 0.46 / 38 0.74 35 Mean Weight: 0.59 Weight Minifes: 0.35 Leading Deneity: 0.00 Toes Selvison Depth (More: 101; 201 Toes Selvison Depth (More: 101; 201 Toes Replication (for QA/QC): Physical State Upon Recept: Colour: Procestate:	0.35/32 +/ 0.16 g - 0.80 g - 0.80 g	0.70/38 /	163 O 0,531 34

e 30 min sample #41 showing signs of distress - durk in colour, swimming with stample up.

e in #41 - all trout swimming erratically or immobile already

a 1 mout dead in 41 silver dead

ments/Deviations

Project Number:	L9387		Sample Date/Time:	25/05/	197//10	000
Sample Muniber:	42 ! 43		Sample Tech:	Sicial	-le	
Test Number:	726:72	<u> </u>	Test Indistan Date/Time:	051	07/97/	17645
Custody #:	2115		Teathmainn:		N	
		"42-210	43-211	PARAMETER	OMOC	
TIME	PARAMETER	100		TECHTIME	REVIEW	
	Digestual Corpon	9.5	4.8		1	
	piri	887	18.56	コ,702		
C HOURS	Temperature(C)	14.6	14.4	1795	 4 € 46	
	Conductedly(u\$)	2490	2500	⊣ ~′	1	
Investi	Ny @ 30 represent (10 expected)			N C 40 1/20		ı
15 - 16 HOURS	_ 	7.48	7.45	08304	6	
	Disselved Citygen	7.42	9.7	CH	i l	
	g#1	14.3	7.34	Ⅎ ゙ʹʹ	9	
24 HOURS	Temperature(C)	2510	2520			
	Conductivity(u5) # translate	2310		1 1636	1	
	Total & Dead	0	8	⊣ '♥')♥	1 1	
	Disselved Cinygen	9.9	9.7	-	 	
	gH	7.43	2.37	104	<n <="" td=""><td></td></n>	
46 HOURS	Temperatra(C)	14.4	1म-प] /	SD	
	Conductivity(uS)	2520	2520	1631	j j	
	€ transpile	0	0	ו כס ייב		
	Total # Deed	0	ð		<u> </u>	
	Disselved Chygon	7.9	9.7			
	pet	7.49	नः 40	J. 91	DE	
72 HOURS	Temperature(C)	14.8	14.6	116	14-2	
	Conductivity(uS)	2520	2520	- 1 ' ^ ~		
	Ø Immebile		D D	162	! I	
	Total # Dead		0		 	
	Disselved Oxygen	9.7	7.20	- Jane	1 . 1	
SE HOURS	pH T	7.32		NMC 17:02	$1 \wedge \Lambda 1$	
SE HOURS	Temperature(C) Conductivity(uS)	14.5 2520	14.5 2520	- 2	0~ ,	
	€ Instrucțiio	C C		- 17:0°	l f	
	Total # Daniel	Č	Ĉ.	1 ` .	j	
TOTAL MORTALITY		5		1	ł	
REMEMBER TO TAKE	MEASUREMENTS IF 100% IQLL I	N 1 HOUR TAKE TEST SO	LUTION SUBSAMPLES AT 1 HOU	B 08 15 - 16 HOUR	AND SE HOUSE	
98 Hour Results:	210 - Pass (o limortale ty) 211-(Pa	LSS (0%.	morta	(in)
TEST ORGANISM CON	0418974	S. Martinia of Culture 7 Down 8	1191/-	Province Con Last 6	inades Time	1632
						- 12
Cantral Weight (g) / Len						
0 44 12	040140 0.44133	4 5	0 7	0 1 1 2	- 34 3 a a	10
0 48 / 35	030/40 0.44/33	0.15140 0.571 37	0461 3 E B. 741 38	0.35 / 3 -	0.438	0·\ 31 3 9)
Semple Size:	10		Name White Co. 65	+ 0.66 1		
Mean Fork Langth:	36 +1 3 mm	-	Water MinMax 0.35	. 0.50	•	
Fork Length Min/Mex:	32 . 40 mm	-	Leading Density: O	3.7 %		
		- 				
TEST CONDITIONS						
Total Presertson Time:	<u>سم</u> ا(عان	<u> </u>	Test Solution Volume (L):	_	16	
			Test Salution Depth (19am:10L; 20		2	<u></u>
	20 in	in	Total Number Espaced/Concentre	DON:	16	
Resson for Pressreson :			Test Reptication (for CA/GC):		/fea	<u> </u>
Preservation & Test Asia						
pH Adiusment:						
INITIAL PARAMETERS	(prior to testing)	43		42		
						7.7
Dissolved Oxygen (ppm		10.0	Physical State Upon Record:	Liguid		16 110
pH:	8.92	8.65	Clanty:	clear		crear
Temperature (C):	77.6	14.6	Calcur:	green		yeses
Conductivity (uS/cm):	2500	2500	Precipitalis:	~YE5		<u> </u>
/Adi and Cd manticulated to	-	l	Odour:	10		-40
(Adj. pH (if applicable): (Adjustment Detaile):				ΛΟ		

OFFIC SPRING E. WHITE PROPERTY SERVICE

Project Number:	19387		Sample Octo/Time:	05/05/	97/100	D
Sample Humber:	44		Sample Teats:	2.Clar	K 107/97/	// 11.45
Test Number:	728		Test Indelen Data/Time: Testmiss:	83	en	/ 1973
Custody #:		×*************************************				
	24244	44-212	CONTROL D	PARAMETER TECHTIME	QNQC REVIEW	
TIME	PARAMETER Disastrated Chapter	9.1	/0.2	1		
	pH .	7.82	7.83	1,767	805	
0 HOURS	Temperature(C)	25/0	200	1707		
errorateit.	Conductivity(uS) by @ 30 minutes (10 expense)	0	2	<u> </u>		
15 - 18 HOURS	gH	7.39	8.03	08251		
	Dissured Caygon	7.35	8.09	14	1 _ 1	
24 HOURS	pH Temperature(C)	14:3	14.1	1	151	
	Conductivity(uS)	2520	301	1638		
	/ Immebile			1 . 300	}	
	Total # Dead Dissulted Congen	9.9	9.8			
	pH	7.39	A.09	1632	-ABS	
48 HOURS	Temperature(C)	14·3 2530	303	1112	İ	
	Conductivity(uS) # Introduction	2330	2	1652	1	
	Total & Dead	0		ĭ		
	Dissolved Oxygen	5.00, 10.0	7 %	1626		
72 HOURS	pH Temperature(C)	14.4	7.00	1624	745	
	Conductivity(u6)	425 to 230	303	\mathcal{L}	}	
	P tremabile	<u> </u>)		
	Total # Dans Dissahed Caypen	4.8	9,9			
	pH	7.37	3.15	12:07 Mm	1 . A 1	
96 HOURS	Temperature(C)	14.5 2530	14.3	~ ~	(N!	
	Conductivity(uS) # Investige	<u> </u>	3 <i>0</i> 4	17:0'		
	Total # Dead	Ö	Ö	```		
TOTAL MORTALITY	 	L0	0			
	MEASUREMENTS IF 100% KILL IN		UTION SUBSAMPLES AT 1 HOUR	OR 15 - 16 HOURS	AND SE HOURS	
95 Hour Require:	112 - Pars (0	1. mortality)			
TEST ORGANISM CON	DITIONS	<u>J</u>				, <u> </u>
Trout Betch Number:	041697A	% Martelly of Culture 7 Days Fr	ter to Teeting: (-4).	Provious Day Last F	terms 15	<u> </u>
Control Weight (a) / Len						
0.65/36	0.57/36 0.45/33	4 5	0.4h, 37 0.44, 32 /	2.76 1.37	D.581 37 D.	#2 / 3 /
<u> </u>					<u> </u>	إ
Sample Size: Meen Fork Langth:	35 + 2 mm			0.76.		j
Fork Length Min/Max:	31 : 39			35 4		
TEST CONDITIONS						
Total Preservacion Time:	··· 1615	-	Test Schoon Volume &):		166	
	1645		Tout Salvaan Dapth (18am:17L; Sha		290	
Resson for Pressussion :	30 mm		Total Number Especal/Consumatic Test Replication (for GVGC):	M: -	10 700	
Preservation & Test Agret				-		
pH Adjustment:						
INITIAL PARAMETERS	(prior to locating)		<u></u>	114		
Dissolved Oxygen (ppm)	()	Physical State Upon Recept:	Lian	id	_
рн:	8.0	2	Clarity:	Clec		
Temperature (C):	14.3		Calour:	ye il	<u>. </u>	
Conductivity (uS/cm):	2510		Proceptoto: Odour:	YZ	}	
(Adj. pH (if applicable)): (Adjustment Details):			_			
A lands refut Francis .						į
		·				

Project Number:	<u>19387</u>		Sample Date/Time:	47/07/3	
Sample Number:	45:46		Sample Teals:	5. Vam	7/1000
Test Number:	T29 1 T30		Test Initiation Date/Time:		07/97// 164
Custody #:	2115		Technicum:		CU
		***************************************			•
		45 - Zi 3	46-214	PARAMETER	OVEC
TIME	PARAMETER	100	100	TEOVITME	PEVEN
	District Copper	-00	9.9		
	gét	10.49	8.45	71208	<1×5
0 HOURS	Temperature(C)	14.1	14.2		<
	Conductivity(u6)	2.450	2500		
interest	udby @ 30 restures (10 expense)		<u>ت</u>	45	
15 - 16 HOURS		2hrs -> 10.24	1.47	100 Kg/0	2
-15-16 hrs.	Clumbad Chygan	98	9.6	1540	
	201	9.58	7.39	1 5.	6
24 HOURS	Temperature(C)	14.7	14.3	- 1/cu	
	Conductivity(u6)	2440	2510	⊣	
	# Immebile	<u> </u>		129	
	Table & Dead Dissipation	10	0	639	
	Creatives Coldina	 	7.40	1 (4	i
48 HOURS	Temperature(C)			-1 -7	STE
	Conductivity(uS)	 	14.2	1	-
	€ Introduits			11639	1
	Total & Dani		1 3	⊣	
	Diamhed Cayent	- 1	9.7	 	
	gH		7.43	" i/	
72 HOURS	Temperature(C)		14.	∄16%	744
	Conductivity(u6)		2520	7 m	İ
	Ø tronstille		0	_	
	Total # Dead		1 0		
	Disselved Caygon		9.6		
	pH		7.45] MM	c1/\ 1
96 HOURS	Temperature(C)		14.3	ا ۱۹۰۸ ا	
	Conductivity(uS)		2520	1 17.0 1	i
	# Investigation			17:09	
		Y.	0	1 17.0	
TOTAL MORTALITY	Ø Investile Total Ø Dead	10	0	1	
REMEMBER TO TAK	# Investige Total # Dead Z MEASUREMENTS IF 100% KULL	M 1 HOUR TAKE TEST SO	CUTION SUBSAMPLES AT 1 HO	1	
REMEMBER TO TAK	# Investige Total # Dead Z MEASUREMENTS IF 100% KULL	M 1 HOUR TAKE TEST SO	CUTION SUBSAMPLES AT 1 HO	UR OR 15 - 16 HOURS A	MID 65 HOURS
REMEMBER TO TAK	Ø Investile Total Ø Dead	M 1 HOUR TAKE TEST SO	CUTION SUBSAMPLES AT 1 HO	UR OR 15 - 16 HOURS A	MID 65 HOURS
REMEMBER TO TAK RESIALTS SO HOUR REGULE: THEY ORGANISM CO	Total & Dead E MEABUREMENTS IF 100% IGUL 213 - Fail (()	mi Hour TAKE TEST SO	LUTION SUBSAMPLES AT 1 HO	(01. most	MD 65 HOURS
REMEMBER TO TAK RESIALTS SO HOUR REGULE: THEY ORGANISM CO	Total & Dead Total & Dead E MEASUREMENTS IF 100% IQLL 213 - Fail (10	mi Hour TAKE TEST SO	LUTION SUBSAMPLES AT 1 HO	(01. most	MD 65 HOURS
REMEMBER TO TAK RESIALTS 68 Hour Results: TEST ORGANISM CC Trout Batch Number:	Total & Dead E MEASUREMENTS IF 100% KULL 213 - Fail (()) DIEDTIONS 048974	mi Hour TAKE TEST SO	LUTION SUBSAMPLES AT 1 HO	(01. most	MD 65 HOURS
REMEMBER TO TAK RESIALTS SO HOUR REGULE: THEY ORGANISM CO	Total & Dead E MEASUREMENTS IF 100% KULL 213 - Fail (()) DIEDTIONS 048974	M 1 HOUR TAKE TEST SO 9-0% mortality) - 4 Marsony of Culture 7 Days F	LUTION SUBSAMPLES AT 1 HO	(01. most	MD 65 HOURS
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ORGANISMS CO Trout Batch Number: Control Weight (g) / Le	Total & Donal E MEASUREMENTS IF 100% ICLL 213 - Fail (() DISTRICTIONS ON 8974 argen (non): 2 3	MI HOUR TAKE TEST SO	CUTTON SUSPANDLES AT 1 HO 2 14 Pass May 8 Teams: 1.41	UR OR 15-16 HOURS A (0 (- mort	MED SE HOUSE Medical Trans. 163 O
REMEMBER TO TAK RESIALTS 68 Hour Results: TEST ORGANISM CC Trout Batch Number:	Total & Dani E MEABUREMENTS IF 100% IGUL 213 - Fail (,, DINDITIONS OUR 974 August (mm): 2 3 6.57/36 6.45/33	M 1 HOUR TAKE TEST SO 9-0% mortality) - 4 Marsony of Culture 7 Days F	CUTTON SUSSAMPLES AT 1 HO 214 Paro Ner's Tessing: 1.41	Previous Day Last For	MED SE HOUSE Medical Trans. 163 O
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ORGANISMS CO Trout Batch Number: Control Weight (g) / Le	Total & Donal E MEASUREMENTS IF 100% ICLL 213 - Fail (() DISTRICTIONS ON 8974 argen (non): 2 3	MI HOUR TAKE TEST SO	CLUTTON SUSSAMPLES AT 1 HO 214 Paro Near D Teating: 1.41	Co 1. most	MED SE HOUSE Medical Trans. 163 O
REMEMBER TO TAK RESIALTS 18 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L 1 D.65 / 3(o Sample Size: Mean Fork Langth:	# Immedia Total # Dans E MEABUREMENTS IF 100% IGUL 213 - Fail (,, DIEDTHONS 040974 6.57/36 6.45/33 10 35 ++ 2 m	# 1 HOUR TAKE TEST SO 90% mortality) 4 Marson, of Custom 7 Days 8 4 5 6.46/34 8-62/35	CLUTTON SUSSAMPLES AT 1 HO 214 Paro Mar & Tesang: 1.41 6 7 0461 77 0.441 32 Many Walphie A. To Walphi Mindian: 4.43	O 76 1 3 9 6	MED SE HOUSE Medical Trans. 163 O
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L D. 65 / 3 (o Sample Size:	# Immedia Total # Dans E MEABUREMENTS IF 100% IGUL 213 - Fail (,, DIEDTHONS 040974 6.57/36 6.45/33 10 35 ++ 2 m	MI HOUR TAKE TEST SO SO ! Mortality) S. Martiny of Culture 7 Days P	CLUTTON SUSSAMPLES AT 1 HO 214 Paro Mar & Tesang: 1.41 6 7 0461 77 0.441 32 Many Walphie A. To Walphi Mindian: 4.43	Co 1. most	MED SE HOUSE Medical Trans. 163 O
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REMEMBER TO TAK RESIALTS 18 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L 1 D.65 / 3(o Sample Size: Mean Fork Langth:	######################################	MI HOUR TAKE TEST SO SO ! Mortality) S. Martiny of Culture 7 Days P	CLUTTON SUSSAMPLES AT 1 HO 214 Paro Mar & Tesang: 1.41 6 7 0461 77 0.441 32 Many Walphie A. To Walphi Mindian: 4.43	O 76 1 3 9 6	MED SE HOUSE Medical Trans. 163 O
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / Li 1 D.65 / 3 (o Sample Size: Mean Fork Langth: Fork Langth Min/Mex:	######################################	MI HOUR TAKE TEST 80 9-0% mortality) * Marsony of Cutture 7 Days F C-46/34 8-62/35*	CLUTTON SUSSAMPLES AT 1 HO 214 Paro Mar & Tesang: 1.41 6 7 0461 77 0.441 32 Many Walphie A. To Walphi Mindian: 4.43	O 76 1 3 9 6	163 O
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / Li 1 D.65 / 3 (o Sample Size: Mean Fork Langth: Fork Langth Min/Mex:	Total & Dead Total & Dead	MI HOUR TAKE TEST 80 9-0% mortality) - Maranny of Culture 7 Days F - C-46/34 8-62/35	CLUTTON SUSSAMPLES AT 1 HO 214 Paro Mar & Tesang: 1.41 6 7 0461 77 0.441 32 Many Walphie A. To Walphi Mindian: 4.43	O 76 1 3 9 6	163 O
REMEMBER TO TAK RESIALTS 100 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L 1 D.65 / 3(o Sample Size: Mean Fork Langth: Fork Langth Min/Mex: TEST CONDITIONS	Total & Dans Total & Dans Dans	MI HOUR TAKE TEST 80 9-0% mortality) - Maranny of Culture 7 Days F - C-46/34 8-62/35	CHATTON SUBSASSPLES AT 1 HO 2 14 P and 1 - 4 1 2 14 P and Near to Teating: 1 - 4 1 8 7 0 461 37 0 - 441 32 Waspe Ministra: 4 - 43 Leading Density: 0 Test Selveen Velume 61: Test Selveen Depth (Martin):	0 1. most	16C 2900
REMEMBER TO TAK RESIALTS 18 Hour Results: TEST ORGANISM CC Trout Betch Number: Control Weight (g) / Li D. 65 / 3 Co Sample Size: Mean Fork Langth: Fork Langth Min/Mes: TEST CONDITIONS Total Preseration Time	Total & Dead Total & Dead Total & Dead Total & Dead	MI HOUR TAKE TEST 80 90% mortality) * Marsony of Cutture 7 Days 6 C-46/34 8-62/35	CHATTON SUBSAMPLES AT 1 HO 2 14 P 0 20 Note to Teating: 1 - 41 8 7 0 461 77 0 - 441 32 Mass Walgire: 4 - 43 Leading Density: 0 Test Schoten Volume 61: Test Schoten Depth (Neutricl.: 5 Test Schoten Depth (Neutricl.: 5	0 1. most	163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O
REMEMBER TO TAK RESULTS 10 Hour Results: TEST ORGANISM CC Trout Betch Number: Control Weight (g) / Li D. 65" / 3(a) Sample Size: Mean Fork Langth: Fork Langth Min/Max: TEST CONDITIONS Total Preseration Time	Total # Dead Total # Dead Color	MI HOUR TAKE TEST SO SO ! Mortality) * Marsony of Culture 7 Days P	CHATTON SUBSAMPLES AT 1 HO 2 14 P and 1 - 4 1 2 14 P and Near to Teating: 1 - 4 1 8 7 0 461 37 0 - 441 32 Waspe Ministra: 4 - 43 Leading Density: 0 Test Selveen Velume 61: Test Selveen Depth (Martin):	0 1. most	16C 2900
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ONGAMISM CC Trout Betch Number: Control Weight (g) / L 1 D. 657 / 3(6 Semple Size: Mean Fork Langth: Fork Langth Min/Mes: Test CONDITIONS Total Preseration Preseration & Test As	## Total # Dane ## Total # Dane ## Total # Dane ## Total # Dane ## Total # Dane ## Total ## Total ## Total ## Total ## Total ## To	MI HOUR TAKE TEST SO SO !- Mortality) Marany of Culture 7 Days F C. 46 / 34 9 62 / 35 M. M. Liminal.	CHATTON SUBSAMPLES AT 1 HO 2 14 P 0 20 Note to Teating: 1 - 41 8 7 0 461 77 0 - 441 32 Mass Walgire: 4 - 43 Leading Density: 0 Test Schoten Volume 61: Test Schoten Depth (Neutricl.: 5 Test Schoten Depth (Neutricl.: 5	0 1. most	163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O
REMEMBER TO TAK RESULTS 10 Hour Results: TEST ORGANISM CC Trout Betch Number: Control Weight (g) / Li D. 65" / 3(a) Sample Size: Mean Fork Langth: Fork Langth Min/Max: TEST CONDITIONS Total Preseration Time	Total & Dead Total & Dead Total & Dead Total & Dead	MI HOUR TAKE TEST SO SO !- Mortality) Marany of Culture 7 Days F C. 46 / 34 9 62 / 35 M. M. Liminal.	CHATTON SUBSAMPLES AT 1 HO 2 14 P 0 20 Note to Teating: 1 - 41 8 7 0 461 77 0 - 441 32 Mass Walgire: 4 - 43 Leading Density: 0 Test Schoten Volume 61: Test Schoten Depth (Neutricl.: 5 Test Schoten Depth (Neutricl.: 5	0 1. most	163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O 163 O
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ONGAMISM CC Trout Betch Number: Control Weight (g) / L 1 D. 657 / 3(6 Semple Size: Mean Fork Langth: Fork Langth Min/Mes: Test CONDITIONS Total Preseration Preseration & Test As	Total & Dane Total & Dane	MI HOUR TAKE TEST 80 90% montality) - * Harmy of Cutum 7 Days F - C. 4 5 - C. 46/34 8-62/35	CHATTON SUBSAMPLES AT 1 HO 2 14 P 0 20 Note to Teating: 1 - 41 8 7 0 461 77 0 - 441 32 Mass Walgire: 4 - 43 Leading Density: 0 Test Schoten Volume 61: Test Schoten Depth (Neutricl.: 5 Test Schoten Depth (Neutricl.: 5	0 1. most	163 O 163 O 163 O 163 O 163 O 163 O 164 O 164 O 165 O 16
REMEMBER TO TAK RESIALTS 18 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L 1 D.65 / 3(o Sample Size: Mean Fork Langth: Fork Langth Min/Mex: TEST CONDITIONS Total Preseration Preseration Preseration & Test As pH Adjustment:	## Total # Dane ## Total # Dane ## Total # Dane ## Total # Dane ## Total # Dane ## Total # Dane ## Total # Dane ## Total ## Total ## Total ## Total ## Total ## Total ## Total ## Total ## Total ## Total ## Total ## Total ##	MI HOUR TAKE TEST SO SO ! Montality) Wheremy of Cutum 7 Days F G. 4 5 G. 46 134 8 62 135	COLUMN SUSSAMPLES AT 1 HO 2 14 P C C C C C C C C C C C C C C C C C C	0.76139 6 0.76139 6 ++ 6.11 9 -0.76 9	163 0 163 0 163 0 163 0 163 0 163 0 164 0 164 0 165 0 16
REMEMBER TO TAK RESIALTS 18 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L 1 D.65 / 3(o Sample Size: Mean Fork Langth: Fork Langth Min/Mex: TEST CONDITIONS Total Preseration Preseration Preseration & Test As pH Adjustment:	######################################	1 HOUR TAKE TEST 80 20 / montality) 3 Harmy of Cutum 7 Days 8 4 5 6.46 / 34 8-62 / 35-	CHATTON SUBSAMPLES AT 1 HO 2 14 P 0 20 Note to Teating: 1 - 41 8 7 0 461 77 0 - 441 32 Mass Walgire: 4 - 43 Leading Density: 0 Test Schoten Volume 61: Test Schoten Depth (Neutricl.: 5 Test Schoten Depth (Neutricl.: 5	0.76,39 6 1.6.11 0.76 9 1.0.76 9 1.0.76 9	1630 1630 1630 1630 1630 164 164 296 10 10 10 10 10 10 10 10 10 10
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REMEMBER TO TAR RESULTS 88 Hour Results: TEST ONGAMISM CC Trout Setch Number: Control Weight (g) / L 1 D. 657 / 3 C Semple Size: Mean Fork Langth: Fork Langth Min/Mes: Test CONDITIONS Total Preseration Time Pleason for Preseration Preseration & Test As pH Adjustment: INITIAL PARAMETER Disnoved Oxygen (septic): Temperature (C):		1 HOUR TAKE TEST 80 90% montality 1 Horamy of Cutum 7 Days 8 4 5 6.46134 8 62135* Limital 10.0 9.00 14.4	Cutton Sussamples at 1 Ho 2 14 Pas-o Mar to Testing: 1-41 6 7 0 461 77 0-441 32 Margin Ministe: 4-73 Lesting Density: 0 Test Scholen Depth (Ment:10L: 3 Test Scholen Depth (Ment:10L: 3 Test Replication (for QUQC): Physical State Upon Receipt: Caleur:	0.76,139 6 1.6.11 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9	1630 1630 1630 1630 164 164 164 164 164 164 164 164
REMEMBER TO TAK RESULTS 88 Hour Results: TEST ORGANISM CC Trout Setch Number: Control Weight (g) / L 1 D. 657 / 3(a) Semple Size: Mean Fork Langth: Fork Langth Min/Max: TEST CONDITIONS Total Preseration Preseration & Test As pH Adjustment INITIAL PARAMETER Dissolved Oxygen (sep pH:		1 HOUR TAKE TEST 80 9-01. mortality) 4 Marsony of Culture 7 Days 6 4 10-0 9-00	Control State Upon Recept: Carny: Cateur: Processes:	0.76,139 6 1.6.11 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9	1630 1630 1630 1630 1630 164 164 164 164 164 164 164 164
REMEMBER TO TAK RESIALTS 18 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L 1 D.65 / 3 Co Sample Size: Mean Fork Langth: Fork Langth Min/Mex: Test CONDITIONS Total Presertson Time Presertson & Test As pH Adjustment: Dissolved Caygon (gap pH: Temperature (C): Conductivity (uS/cm):		1 HOUR TAKE TEST 80 90% montality 1 Horamy of Cutum 7 Days 8 4 5 6.46134 8 62135* Limital 10.0 9.00 14.4	Cutton Sussamples at 1 Ho 2 14 Pas-o Mar to Testing: 1-41 6 7 0 461 77 0-441 32 Margin Ministe: 4-73 Lesting Density: 0 Test Scholen Depth (Ment:10L: 3 Test Scholen Depth (Ment:10L: 3 Test Replication (for QUQC): Physical State Upon Receipt: Caleur:	0.76,139 6 1.6.11 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9	1630 1630 1630 1630 164 164 164 164 164 164 164 164
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REMEMBER TO TAK RESIALTS 18 Hour Results: TEST ORGANISM CC Trout Batch Number: Control Weight (g) / L 1 D.65 / 3 Co Sample Size: Mean Fork Langth: Fork Langth Min/Mex: Test CONDITIONS Total Presertson Time Presertson & Test As pH Adjustment: Dissolved Caygon (gap pH: Temperature (C): Conductivity (uS/cm):		1 HOUR TAKE TEST 80 90% montality 1 Horamy of Cutum 7 Days 8 4 5 6.46134 8 62135* Limital 10.0 9.00 14.4	Control State Upon Recept: Carny: Cateur: Processes:	0.76,139 6 1.6.11 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9 1.0.76 9	1630 1630 1630 1630 1630 164 164 164 164 164 164 164 164

e thr =45 some immebile, some lethargic.

a 12m all rout dead in 45 suissampled.

7

Project Number:	19387		Sample Outs/Time:	05/05/	97/1000 L	
Sample Number:			Sample Tools:	Sage		
Test Number:	T31 T32		Test Indiadan Data/Time:	05	107/97//1640	—
Custody #:	21/5		Technolog:			
		47-215			24.55	
TIME	PARAMETER	100	48-216	PARAMETER TECHTIME	ONOC REVIEW	
***************************************	Disserved Copyen	4.8	10.0			
	pH	e-44	7.03	-210	- Nex	
0 HOURS	Temperature(C)	14.2	14.7	175	\$	
Immobili	Conductivity(uS) by @ 30 minutes (10 capasses)	700	2500	-	} }	
15 - 18 HOURS	PM	7.36	1.10	19704	62	
	Dissaved Onygen	9.8	9.9	111		
	pH	7.29	7:15	1 (4	5	
24 HOURS	Temperature(C) Conductivity(uS)	2510	14.2	1,/4		
	# internation	0	2320	7/641	1	
	Total # Date!	C	0	ī		
	Disselved Oxygen	9.7	9.8	CY	lax I	
40.4400.000	pH	13.3	7-18	-1	[#3	
48 HOURS	Temperature(C) Conductivity(vS)	2520	2520	1636	1	
	# Immobile			41826		
	Total # Dead	3	5	<u> </u>		
	Dispated Onygon	9.9	9.9			
70.400.000	pH	7.39	1-3-16	1, 25	SH	
72 HOURS	Temperature(C) Conductivity(uS)	3520	14: 3 252c	1/62	84	
	F Instable	0	6	1625		
	Total # Deed	U	0	7 /		
	Dissolved Ozygen	9.7	9.9	1	1	
00 HOUSE	pH	7.34	7.26	17:12	Ι - , λ Ι	
96 HOURS	Temperature(C) Conductivity(uS)	2530	2530	1 12	[(^\\]	
	# Immobile	<u> </u>		1 17:10	~	
	Total # Deed		C']	!	
TOTAL MORTALITY			I			
	MEASUREMENTS IF 100% KUL	IN I HOUR TAKE TEST SO	LUTION SUBBAMPLES AT 1 HOU			
RESULTS 96 Hour Reaute: 62	15 - Pars (0	1. mustality)	1216-Par	0601. ma	ntality)	
						_
TEST ORGANISM CON Trout Batch Number:	0418974	% Mertality of Culture 7 Days P	HOT TO TORENGE 1.47	Provides Day Last F	Tending Time: 1630	
Control Weight (g) / Lan	IES (ITEM):					- 1
1	2 3	4 5	7	964	10	
0.65136	65736 8.45133	10-46134 10-62135	046137 644132	0.76139	055137 O.BI31	1
Sample Size:	10		Man Walght 0.56	+ 0.11		
Visen Fork Length:	35 +/- Z A	MR.	Weight Min/Max: 6.43	· 6.76 9		
Fork Langth Min/Mex:	31 . 35 6	<u> </u>	Lossing Density: 0.3	5 gl		- 1
						_
TEST CONDITIONS						
Total Presertion Time:	- 16	15	Test Salusan Valume (L):		166]
	7/2	((Test Salveon Depth (19sh: 10L: 2	lem:16L; 35em:30U:	29cm	
	30	01/12	Total Number Expense/Concenses	een:	10	ļ
Research for Preservation :			Test Replication (for QA/QC):			į
Preseration & Test Aeres						
oH Admetrent:	yee //					_
NITIAL PARAMETERS	(prior to topting) 47	44		47	48	ı
Dissolved Oxygen (ppm)	_ '_	10.0	Physical State Usion Receipt:	Liouid	Lieuiel	- 1
	8.5 F	6.71	Clarry:	cleac	Clear	- 1
oH:	U - 3			- 100-	9 seen	
Temperature (C):	<u> </u>	14.4	Colour:	acen_		
		2010	Precipitate:	105	1 125	
Temperature (C):	14.4					
Conductivity (uS/cm):	14.4		Precipitate:	105	1 125	

Aquatic Sciences Inc.

Ms. Carelyn Hunt Inco Ltd. Copper Cliff, Ontario L2J 3G2 Reference #: L9367-65-66 Received: 05/13/87 Total Number of Peggs: 34

Toxicity Testing Results
Report Date: 05/22/97

Sample Information

Sample # Sample Description Date Collected

L9387-65-96 Experimental Treatments for CCWWTP 05/12/97

Sample Identification #301 - 332

Approved by:

Gill Shriner, Laboratory Supervisor

Approval Date:

July 1/97

Inquiries may be made to Gill Shriner.

Disposal of toxic samples will occur within seven (7) days of reporting unless alternate arrangements have been made.

ACCREDITED BY THE STANDARDS COUNCIL OF CANADA (SCC), IN CO-OPERATION WITH THE CANADIAN ASSOCIATION FOR ENVIRONMENTAL ANALYTICAL LABORATORIES (CAEAL), FOR SPECIFIC ENVIRONMENTAL TESTS LISTED IN THE SCOPE OF ACCREDITATION APPROVED BY THE SCC.

- AQUATIC SCIENCES INC.

48 HOUR STATIC DAPHNIA MAGNA SINGLE CONCENTRATION TEST EPS 1/RM/14

Project Number:

Client

L9387

Inco Ltd

Copper Cliff, Ontano

Sample Name/ID:

Experimental Treatments for CCWWTP

Sample Identification #301 - 322

Sample Location: Chain of Custody #: CCWWTP not received

Sample Method: Grap Sample Technicien: S Clerk

D65 - D96 Sample Date/Time: 05/12/97//-:- hrs

Test Date/Time: 05/15/97// 11:45 - 13:09 hrs

65 - 96

Technicien:

Sample Number:

Test Number:

C Hurse/G Shriner/K Groombridge/W Mesters

RESULTS

48 HOUR RESULT:	65: 301:	Fail (90% mortality)	73: 309:	FAIL (90% mortality)	81: 317:	FAIL (88% mortality)	80: 325:	FAIL (83% mortally)
1	46 : 302:	PASS (0% mortality)	74: 310:	PASS (0% mortality)	82: 318:	PASS (0% mortality)	90: 326:	PASS (3.3% mortality)
j	67: 303:	PASS (0% mortality)	75: 311:	PASS (0% merbilly)	83: 319 :	PASS (0% mortality)	91: 327:	PASS (0% mortality)
	66: 304:	PASS (3% mortality)	76; 312:	PASS (0% mortality)	84: 320:	PAGE (0% mortally)	92: 200:	PAGE (FS mortally)
	69: 306:	FAIL (83.5% mertality)	77: 313:	FAIL (78.8% mortality)	86: 321:	FAL (BLOS mortality)	99: 209:	FAIL (76.0% mortally)
1	70: 306:	PASS (0% mortality)	78: 314:	PASS (O'L mertality)	84: 322:	PASS (0% mortelly)	94: 230:	PASS (0% mortality)
	71: 307:	PASS (0% mortality)	79: 315:	PASS (0% mertality)	87: 323:	PASS (O'S mortality)	96: 231:	PASS (0% mortally)
ŀ	72: 306:	PASS CLS% mortality	80: 316:	PASS (5% mortality)	84: 324:	PASS (D), marteller)	96: 222:	PASS 65% mortality

QUALITY ASSURANCE INFORMATION

REFERENCE TEST CONDITIONS

Test Organism: **Brood Culture:**

Dephnie megne 040197 + 040797

Test Type: Test Temperature: Test Valume:

State

20 +/- 2C 150 mL Loading Density: 15 mL/neonate

Control Water Hardness: 136 mg/L Photopened:

16 hours light/8 hours dark

Dilutan Water: Dechlannesed Tep Organism Age: <24 hours Stack Saurce: in house cultures Time of First Broad: & days

Average Brood Size: 24 neonati

Ephippia Frequency:

٥

REFERENCE TOXICANT DATA

Chemical Used:

Date of Test: 48-hour LCS0:

95% Confidence Interval:

Sodium Chlande May 5/97 5657 mg/L

5000-6400 ma/L

Historic Mean LCSO: Warning Limits:

6147 mg/L 4905-7388 mg/L

TEST PROTOCOL

Biological Test Method: Reference Method for Determining Acute Lethelity of Effluents to Dephnis magne. Environment Canada, July 1990

COMMENTS

The reference toucant results show that test reproducibility and organism sensitivity are within acceptable limits.

All data is scrutnized for errors dely during the test, at test termination and during the report Technical and Final Review stages.

instruments used to manitor parameters are calibrated daily and continuously maintained.

All tests were preserated for 30 minutes at the request of Sendford Clark of Laurenteen University.

QUALITY REVIEW

Fill St for W. nurte

16-HOLER STATIC SIN	GLE CONCENTRATION DAPHNIA MAG	MA TEST (EPS 1/A)	V14)					_	
Project Number: Sergin Munder: Test Hunder: Chain of Custody #:	49387 65 065		• •	Sempto Dess/Time Sempto Tech: Test Initiation Deta Technician:		05/	12/17 5/22/1	1145	
TRME	SAMPLE ID: PARAMETER	COMMOLA	CONTINOL-8	CONTROL-C	100-A	65):301	PARAMETURA TRESVENIE	dve:
	Dissolved Citygen	8	7.9			9.4		stel.	
	рН	8	131		1	0.01		749	4
o HOURS	Тептрегелите(С)		20.8			21-4		1145	
	Conductivity(uS)		309			2540],	
Immo	odity @ 30 minutes (10 assessed)	0	0	0	0	0	0]	
	ρH	3.04	8,12	3.13	4.32	9.31	9.73	Nm	-Ab
24 HOURS	Temperature(C)			i°	7.9			1325	
	Ø Immelsie	0	0	0	10	10	10		
	Distalved Caygon	8.5	8.6	8 6	8.6	8.5	8.5	CU	
	pH	7-84	790	7.92	8-91	9-00	9.46]	
16 HOURS	Temperature (C)	30.1	20.0	19.9	20-0	20-0	30.1	1224	ال ال
	Conductivity	318	317	317	2650	2660	2640	,,,,,,	W\
	€ Inmobile	6	Ų	ں	1	2	-6-		
	€ Dead (10 exposed)	U	6	U	9	8	10		
OTAL MORTALITIES		O	c	C	9	8	10		
MEAN & MORTALITY			0			40%	<u>'0 </u>	L	
REMEMBER TO	COLLECT DAPHNIDS A	ND TEST SO	LUTIONS AT	48 HRS					
REGULTS	301 : FA	11 (90	% m	ortali	ty)				
Test Physication (for Cal	it om 251, pail for Testing: VQC):	04/14/9 7 one 28 non 3X10 13X 7 non		Presention Time: Presention Time: Presention Rate: pH Adjustment: Hardness Adjustme Test Salutan Value Leading Density:	n t	dent end total	105 1125 30 m DD>100 m 50 signal m (m) y (200 gd/1 18 (20) 115 m	so topito mil. o	on .
NITIAL PARAMETERS	(prior to testing)		65						

clear yellow settles sends

Additional Observations:

TIME PARAMETER CONTROL CONTR	Project Number: Serges Number:	L9387	2	M/14) - -	Sanyte Com/Tim Sanyte Test:	-		112/47	/-	
CONTROL CONT	Test Number: Chain of Gustoty #:	066 - 0		- -	Test Initiation Del Technisian:	n/Time:	- CE-19	35 Jus	4	48
Octobring Corporation Octobring Octo	TIME		**	(66)3	CONTROL-C	109-A	-			OARC MENEW
OHOURS Temperature(C) Conduction(pt) 30 minutes (10 casesses) PH 21 HOURS Temperature(C) PH 23 HOURS Temperature(C) PH 24 HOURS Temperature(C) PH 25 C C C C C C C C C C C C C C C C C C C										212
2560 2.590	o HOURS	·					21.5		1148	معنا
PHOURS Temperature(C) PHOURS Temperature(C) PHOURS PHOURS Temperature(C) PHOURS PHOU		Conductivity(uS)] ' ' '	
Provincials C C C C C C C C C	Immo		 		-					
Diseast-val Carygen pH	24 HOURS		3.32	3.57				1 1/23	Mm	SA
## ## ## ## ## ## ## ## ## ## ## ## ##		# Invitabile		C	0		0	0	13:35	
48 HOURS Temperature (C) Conductivity 201 19-8 19-7 19-8 19-8 19-9 19-9 19-9 19-9 19-9 19-9		Disserved Oxygen							CLI	
Conductivity 2680 2690 2690 2690 2690 2690 257	48 MOTIOS	•								,
Provide O O O O O O O O O O O O O O O O O O O	40 moons								1237	الم) ا
CITAL MORTALITIES D D D D D D D D D D D D D D D D D D		# Immobile		0		/		0		
EAN & MORTALITY C		P Dead (10 expense)					0			
ESULTS 302 : PASS (CF/c mc, Tality) HOUR Result: 303 : PASS (OF/c mortality) EST CONDITIONS CHILLIATS OHITS Groud: Intern Subsanished from 25L pail for Testing: If Replication (for QAQC): EST COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS CF/c mc, Tality) C					J	0		0		
SUZ DASS (C*/s mc, Tality) HOUR Result: 3C 3 : PASS (O% mortality) EST CONDITIONS OCA Culture: Interest Brook: OFFICE Brook: OFFICE BROOK: OFFICE BRO		COLLECT DAPHNIDS	NO TEST SO		48 HRS				<u></u>	
CHILLIATA OLITAGA CONDITIONS										
cood Culture: (b) CH CH	HOUR Result:	303 : PASS	(0% n	nortalit	Y)					
To be first Broad: Preserves Time: Preserves Time: Preserves Time: And 1/25 And 1	ST CONDITIONS									
Loading Density: (20 mL/manus) Loading Density: (20 mL/manus)	ontrol Weter H <mark>erdness:</mark> Buent Subsampled Iro	: m 25L pail for Tessing:	7 days 25 norm 3310 norms 1 3 (Reason for Present Presenteen Refe: pH Adjustment: Herdness Adjustme Fest Saluten Volun	nt	eur end end end	11.25 30m 01.2606/ 2.80m (19) ya (20 10) 100	Sortumi ML	icn

Discoved Oxygen:
Initial pit:
Temperature:
Conductivity:
Initial Hardness:
Physical State Upon Receipt:
Clarity:
Colour:
Precipitate:

Additional Observations:

Additional Observations:

649 nrs 67: 303 A sample - I immubile had beam - & led disperive tract

Dissolved Chygan 9.8 5.31 Cdf PH	44-HOUR STATIC 539	GLE CONCENTRATION DAPHNA MA	QNA TEST (EPS 1/RI	M/14)						
Sumple Part Sumple Sumpl	D	49387			Samuel Outs (Time	_	05/	2 62 11	-	
Table PARAMETER	•			<u>-</u>		•				
Take PANAMETER Description		068		-	Test Initiation Det	n/Time:	05/	1921	1151	
Displace Corpus 9.8 5.3 1157	Chain of Custody #:			-	Teshnistan:		- et	5.7 W		
100A 100E		SAMPLE ID:	Mark Control		R 2 300		(B)			
Dissolved Corgan 9.8 5.3 Clf 7.24 5.3 Clf 7.24 5.3 Clf 7.24 5.3 Clf 7.24 5.3 Clf 7.24 5.3 Clf 7.24 5.3 Clf 7.25 5.3 Clf 7.25 5.3 Clf 7.25 5.3 Clf 7.25 5.3 Clf 7.25	TIME			COMMISSION	TOTAL PLANE	1	100		PARAMETRIAL TECHNOLOGY	GV-GC
OHOURS Temperature(C) Conductively(US) Immobility (9 20 nameters (10 executes)) OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO		Dissolved Citygen	L						.,	
OHOURS Temperatural(2) Conductively(LS) Immobility @ 3D remotes (10 expenses) PH 24 HOURS Temperatural(2) E Immobile Disabled Organ PH 7-06 7-04 7-04 5-14 5-23 8-23 N/M 24 HOURS Temperatural(2) E Immobile Disabled Organ PH 7-18 7-11 7-10 8-11 8-21 8-21 40 HOURS Temperatural(2) Conductivity Conductivity Conductivity Conductivity Disabled Organ PH 7-18 7-11 7-10 8-11 8-21 8-21 Conductivity Disabled Organ PH 7-18 7-11 7-10 8-11 8-21 8-21 Conductivity Disabled Organ Disabled Organ PH 7-18 7-11 7-10 8-11 8-21 8-21 Conductivity Disabled Organ Disabled Organ Disabled Organ PH 7-18 7-11 7-10 8-11 8-21 8-21 Conductivity Disabled Organ Disabled Org		pH		7.24			8.31] 44	442
Productive 10 assessed 1	0 HOURS	Temperature(C)					20.8		1151	
24 HOURS Temperature(C) 19		Conductivity(uS)		2590	,	ļ	309			
24 HOURS Temperature(C) 9 temphis C C C C C C C C C C C C C C C C C C C	Irreno	bility @ 30 minutes (10 expense)	0	0			0	0		
24 HOURS Temperature(C)		pH	7.06	7 04		<u></u>	8.23	8.23	aim	CAK.
	24 HOURS	Temperature(C)		, 	!	9.9	,		1	,,,
46 HOURS Temperature (C) Conductivity Promobile Productivity Promobile Productivity Productivi		# Immobile					+ <u></u>		13.76	
46 HOURS Temperature (C) Conductivity # Immabilie # Im		Dissalved Citygen		8.3		8-6			CU	
Conductivity 2690 2700 2660 318 315 310		pH							↓ ′	
### 10 0 0 0 0 0 0 0 0	48 HOURS	Temperature (C)							4	!
P Dead (10 emphase) O		Conductivity	2690	2700		318	315	310	1,743	لال
CITAL MORTALITIES / C O O O O REAL NA MORTALITY 37. REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS ESULTS 3C4: PASS (3% inex tall ty) S-HOUR Result: EST CONDITIONS FOOD CUITARY TO days PROSERVED THE PROSENTE OF THE P		# Immobile	0				0	0		
REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS ESULTS 3 C + : PASS (3 % iner + a1, +y) B-HOUR Result: EST CONDITIONS Frood Culture: Frood Culture: Frood Culture: Frood Size: Total Number Exposed/Concentration: Ontrol Water Hardness: 13 6 Reason for Preservation: DO > 100% Schward Cr		# Dead (10 exposed)				6		G		
REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS ESULTS 3 C 4 : PASS (3 % mer tall ty) SHOUR Result: EST CONDITIONS Frood Culture: From to First Broad: From to First Broad: From to First Broad: From to First Broad: From Number Exposed/Concentrates: From Number Exposed/Concent					0	0		2	{ i	
SHOUR Result: SHOUR Result: CHUAT & CHUAT & CHUAT To CHUAT To CHUAT TO CH		COLLECT DAPHNIDS	ND TEST SO		48 HRS		<i>O</i>		<u></u>	
EST CONDITIONS road Culture: road Culture: road First Broad: verage Broad Size: v	ESULTS	304. 2455	3 % ix	er tali	t-v)					
rood Culture: ime to First Brood: verage Broad Size: otal Number Exposed/Concentration: ontrol Water Hardress: C4/U97 & C4/2897 T days Preservation Time: and 1/25 Otal Number Exposed/Concentration: 33.10 reservation 13.60 Reservation: Preservation: Preservation: Preservation: ON > 100% Section of C	S-HOUR Result:	JC1 . FA33 ((3 / 5 / 1		' 1 /					
rood Culture: rood C	EST CONDITIONS									
me to First Broad: Todays			~UIQ7 +	CU 1007						
rerage Brood Size: 2 € neareste 2 € neare					Preserveon Time:			105	5	
ontrol Water Hardiness: 136 Reason for Preservoin: DO > 100% Setty of Cr	_			ete e				11.25		
150							1004			
Dahler Control of the control of the						en:				cn
ret Replication (for QA/QC): yee(no) pH Adjustment: (18) yee		··· ·								

L PARAMETERS (prior to locating)	63		<i>i</i>	
Dissolved Chygen:	10-0	1 10.2	(4	
initial pH:	7:18	10.04	Adj. pH (if oppicable):	
Temperature:	20:3	740.5	Adjustrant Details:	
Conductivity:	7620	-253 c	-	
instal Hardness:	1326		Adj. Hardhess (if applicable):	
Physical State Upon Re			Adjustment Details:	
Clarity:		Clear	•	
Colour:		W110		
Precipitate:		Hack 501.45		
Odour:		465		
		752		
nal Observaziona:	•			

ALHOLIS STATIC SINGLE CONCENTRATION DAPPOSA MAGNA TEST (EPS 1/RM/	A HOLD STATIC SMG	E CONTRATION	DAPHORA MAGNA TEST	(EPS 1/RM/14)
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Serrate Data/Time: Serrate Tests: Test Indiates Data/Time: Testingues: 05 /12/47/1-05/15/197/11/154

TIME	SAMPLE ID:	-corme_A (25 4	1228	305 comme-	100-A	73	306	**************************************	GVEL GVEL
·	Disselved Cingen		9.7			9.7		cit	-
	pH		9.98			8.99		1	
O HOURS	Tempereture(C)		21.5	, 		21.4		1154	
	Conductivity(uS)		2520			2570			1
latter	nobility @ 30 minutes (10 essenti)	0	0	0	0	0	0	<u> </u>	
	pM	4.55	9.42	9.61	₹.58	8.41	8.45	nm	SAK.
24 HOURS	Топтраневыть(С)			10	1.9			13:55	
	_ € Introduite	10	/ ©	, C	0	0	С	15.55	
	Diseasived Caygon	8.6	8.7	8-6	8-3	8-3	8.2	CH	
	pH	9.31	9.31	9.31	9.24	8.13	8.07		
48 HOURS	Temperature (C)	20.4	20.2	20-1	200	20.0	19.9.		1
	Conductivity	2640	2650	2650	2670	2690	2690	. 3.40	(سم)
	€ Invitable	_	2		Ü	0	0	1248	
	€ Dead (10 exposed)	10	8	11/11	ن	0/11	0		
TOTAL MORTALITIES		10	8	11	0	٥	0		
MEAN % MORTALITY			93.5	15		○°/。		<u> </u>	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS	305 FAIL (93.5% mortality)
48-HOUR Result:	306: PASS .	Oslo mortality)

TEST CONDITIONS 04497 \$ 042897 7 days Broad Culture: Time to First Brood: 2 Manual Par Average Brood Size: Total Number Exposed/Concentration: 3X10 neenstee DC>100% Sotulation
3-100Linux 136 Control Water Hardness: Recent for Processes. 700 No 700 (No) Effluent Subsempted from 25L pail for Testing: Presenten Reta: (Ta)/ yes Test Replication (for QA/QC): pH Adjustment: Herdness Adjustin 20 pt / 190 mt Test Salution Volume: Loading Denaty:

ITIAL PARAMETERS (prior to locking)	69	30 1K	
Dissolved Citygen:	10:2 i	المنتق الأ	
initial pit:	COY	7-08 Adj. pH (if applicable	
Temperature:	20.5	Adjustment Details:	•
Conductivity:	2530	2570	
Indial Hardness:	1309 !	1326 Adj. Hardness (if ass	opplicable):
Physical State Upon Receipt:	مو واو ا	Adjustment Details:	
Clarity:	Clades		
Colour:	روا(س		
Precipitate: DO	it weed	souds	
Odour:	ولاب ر		
•	7		
ditional Observations:	•		

ALLEGE STATIC SHIPE E	CONCENTRATION DAPHNIA MAGN	A TEST (EPS 1/MM/14)

Project Number:	49387
Sample Number:	71- 72
Test Number:	071-072
Chain of Custody #:	

Sample Dath/Time: Sample Tesh: Test Installan Dath/Time: Technolon: 05 /12 /17 /1 25 /14 /22 // (2:10)

TIME	SAMPLE ID: Parameter	00- A	21) 3 como: 6 122-R	のフ Central-c /2つ・	100-A C'	ZQ 3	30 8 100-c	PARAMETERS TROUVERS	GAARE PRINTER
	Disserved Coygon		98			3.4		K	
	pH	L	5.26		7	.62		1	1
0 HOURS	Temperature(C)	K	2560	21.5		1.4		12:36	
	Conductivity(uS)		2560		2	780		1	İ
ima	robility @ 30 minutes (10 expresse)	0	0	0	0	0	0		
	pH	7.90	7.80	7.83	7.50	7.42	7.49	wm	QXX
24 HOURS	Temperature(C)		مبت	' '	7.9			707	100
	€ immetals			C	0	0	0	14·5	
	Dissolved Caygon	7.8	8-1	7.7	フ・フ	7.8	7.8	7.1	
	pH	7-40	7.50	7.50	7.31	7.28	7.25	CU.	1
48 HOURS	Temperature (C)	20.3	20.0	19.9	20.0	19-9	20.0]	10.1
	Conductivity	2680	2610	2690	2650	2710	2700	254	(Ji)
	# Immobile	0	Ü	C	O	0	0]	1
	# Dead (10 exposed)	0/11	0/11	0	0	1/9	0		
TOTAL MORTALITIES		0	U	0	0	1/9	0		
YEAN & MORTALITY			000	,		3.57	0	l	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS	307: PASS (OM/= mertality)	
1	308: PASS (: 3.5% mortality)	

TEST CONDITIONS	· · · · · · · · · · · · · · · · · · ·		
Broad Culture: Time to First Broad: Average Broad Size: Total Number Exposed/Concentration:	04/497 \$ 64289 7 600 25 600	7 _Presentan Time: 	13:1 12:04 30 min
Control Water Maranese:	136	Reason for Preseration:	DC2100% saturation
Effluent Subsempled from 25L pail for Testing:	yed / no	Preservition Flats:	25 - SOML/MINA
Test Replication (for QA/QC):		pH Adjustment:	(re) yes
		Hardrage Adjustment: Test Solution Volume:	(200 mg/ / 190 ms.
		Loading Density:	(20)// 15 mL/manuse

INITIAL PARAMETERS (prior to testing)	71 77	
Dissolved Citygen:	10.2 1 10.2	
initial pri:	8.54 7 - 89 Adj. pH (ff applicable):	
Temperature:	20.5 20:7 Adjustment Details:	
Conductivity:	2560 2590	
Indial Hardness:	1343 1326 Adj. Hardness (if applicable):	
Physical State Upon Receipt:	Adjustment Details:	
Clerity:	clear	
Colour:	Ve land	
Colour:	SELUCE d	
Odour:	uls	
Additional Observations:		

@18455 308 B - cient organism has brown 5-1120 dig street tract

Project Number:
Sample Number:
Test Number:
Chain of Custody #:

49387	
73	
773	

05/12/17/1-
CHI 46/65/MM
CHIEGIGS/MM

TIME	SAMPLE ID: PARAMETER	CONTROL-A	CONTINUE-8	CONTROL-C	100-A	73)	30 9 189-c	PARAMETERS TROUTERS	OVEC
	Discolved Oxygen		8.8			9.2		坡	
	pH		8.31			981			42
0 HOURS	Temperature(C)		26.8			21.3		1241	
	Conductivity(u5)		309		_2	520			ļ
lmn	nobility @ 30 minutes (10 exposed)	0	0	0	0	0	O		
	pH	8 20	8.21	8.20	9.35	9.56	9.63	MM	EXX
24 HOURS	Temperature(C)			í	9.9	7			1
	# Immobile	0	\sim	0	10	10	10	14:15	
	Dissulved Citygen	8.5	3.6	8.5	9-6	9.6	9.6		
	pH	8.20	9.22	8-22	9.04	9.31	9-42	CU	ĺ
46 HOURS	Temperature (C)	20.3	19.9	19.9	20.1	20-1	20.1		
	Conductivity	317	316	317	2640	2640	2650	259	البر)
	# Introdule	0	c	0	a	/	&]	
	# Dead (10 expound)	ن	0	O	5	9	10		
TAL MORTALITIES		0	C	0	8	9	10]	
EAN % MORTALITY			.,,			90%		<u> </u>	

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS 46-HOUR Result: 309;	FAIL (90% mortality)	
TEST CONDITIONS Brood Culture: Time to First Brood: Average Brood Size: Total Number Espaced/Concentration: Control Water Internets: Effluent Subsempted from 25L pail for Testing: Test Replication (for QA/QC):	C+++97 & C+2897 7 days 28 reserves 3X10 reserves 13 C Recent for Preserves: Preserves Rese: Preserves Rese: Preserves Rese: Preserves Rese: Preserves Rese: Preserves Rese: Preserves Rese: Locating Denesy:	1204 1204 30min 1000/a setturation 3-80minum (6) yea (60) 1 180 mi (78) 15 milliones

INITIAL PARAMETERS (prior to tooling)	73		
Olesoved Crypen: Initial ph: Temperature: Conductivity:	10:2 9:31 20:9 2520	Adj. pH (f esplicable): Adjustment Outple:	
Initial Hardness: Physical State Upon Receipt:		Adj. Hardness (if applicable): Adjustment Dessie:	
Clenty: Colour:	clos		
Precipitale: Ordour:	sed led soids	•	
Additional Observations:	7	• 	

RESULTS

	A _			
- AC	LIATIC SCI	ENCES	INC.	
٠.	HOUR STA	TIC SIN	GE C	INCENTRATION DAPHNIA MAGNA TEST (EP

Project Number: * Sample Mumber:	29387 		-	Service Detection Service Tests:	e: m/Tone:		12/91/		<u>_</u>
Test Number: Chain of Customy &			-	Technolog:		CHIKE	15/92 165/NN		
TIME	SAMPLE ID: PARAMETER	100 - A	(77) 3 100 B		100-A	75) 3 11	108-C	PARAMETERS TROVING	e
	Dissured Caygon		9.8			2.5		UD	
	pH		8.90			.47		2	4
0 HOURS	TemperaturatCl		21.4			21.3		43	
	ConsuctratytuS)		2550			580		1	Ì
!met	nobility @ 30 minutes (10 emouse)	0	0	0	0	0	0	7	
	gH	8.45	9.46	845	7.91	8.00	7.93		
24 HOURS	Temperaturo(C)				9.9	<u> </u>		1 MM	B
	ø krynginie	0	1 C	0	0	0	0	14:25	İ
·····	Disselved Ongon	8.2	8.2	6.3	7.8	8.0	9-0		
	М	8-22	8.11	8.24	7.71	7.52	7.48	cu	
48 HOURS	Terresesture (C)	20.2	19.9	19.9	19.9	17-9	20-0		
	Conductively	2680	2610	2640	2670	2690	2610	1306	11
A	# Managara	0	0	ن	6	0	6		Co
9)	# Dead (10 empages)	0	0	C	6	(3	0		
CTAL MORTALITIES		U	U	U	0	٥	0	1	
MEAN & MOPTALITY			270	·		2%		1	
REMEMBER T	S 40: PASS	(0%	mortal	·. + y)				· . · · · · · · · · · · · · · · · · · ·	J
6-HOUR Result	310 PASS	(0%	morta	(1, +y)					
EST CONDITIONS									
Prood Culture: Time to First Breed: Everage Breed Size: Otal Number Exposed Control Weter Havings		04/14/97s		Prisonitéen Tinle: Resean far Prisons		ent ent ent	1134 1204 300 300	20.00	lin aa
	rom 25L pail for Testing:	(m) no		Programm Fam: pH Adjustment: Hardness Adjustma Test Salutan Volun Leading Constly:	MC .		23 m) / 190 (20 m) / 190 (20 m) / 190		-CF1
			-12						
STIAL PARAMETER	(Brief to touting) Distanced Oxygen:	74	10.0			_			
ITTAL PARAMETER			8.62	Nej, gM (if applicable Nejsystemant Details:	o):				

. .

VALUE OF STATIC SINGLE CONCENTRATION DAFFORM MACHA	TEST	EPS 1	(704714)

Project Number:	64357		-	Sample Date/Time Sample Took:	:	05	1.2 /22		
Sample Mumber: Test Mumber:	76		• •	Total Invitation Com	Time		/15/97 /KG/M		<u>ن</u>
Chain of Custody #:			•	I CARONINAN:		CH/GS	/EG/N	· · · · · · · · · · · · · · · · · · ·	
		g sprigger grant, a				(2)			
TIME	SAMPLE ID: PARAMETER	-come-A	COMMOL-S	suma-c	187 CON 1	(P)	64	PARAMETERS	- CARE
		100 4	2-	1-0 (89		1,	
	Disserved Caygon		9.5 7.72			8.31		14	428
	PH		21.4			20.8		/	
3 HOURS	TemperaterCl		2570		<u></u>	309		1246	
	Conductivity(u6)	0	·	0	0	0	0	1	
'''	builty @ 30 minutes (10 expense)	12 T.43	7.30		1 3.17	6. 2	8.18		
	PH	7.43	7.38	7.30	9.9		1 0 . 1 3	MM	345
24 HOURS	Temperature(C)	0	1 ~					14.35	
	€ Immedia		7.9	7.8	8.4	8.5	8.5		
	Disserted Caygon	9.0	7.22		8.19	9.22	8-21	CU	
	PH	7.26	19-4	7-21	19.9	19.8	19.9	†	,
48 HOURS	Temperature (C)	20.2	2700		1316	317	317	1	IM
	Conductivity	2690		2690			0	1311	0 .
	€ terrestate	-	0	<u> </u>	0	-		1	
	Ø Deed (10 engagen)	<u> </u>	Ü	<u> </u>	0	Ü	3	1	
TOTAL MORTALITIES		<u>ت</u>	U	0	-	0		1	
VIEAN & MOPTALITY		<u> </u>	<u> </u>						·
REMEMBER TO	COLLECT DAPHNIDS	AND TEST SO	LUTIONS AT	48 HRS					
RESULTS	16 -	(-0							
48-HOUR Result	312 PAS	I Wilm	ortali	+7.					1
TEST CONDITIONS			1						1
Brood Culture: Time so First Brood:		7 ****	042897	Procession Time:		-	1134		.
Average Brood Size:	•	JZ need		•		***	1204 30min		.
Total Number Exposed Control Weter Hartings	e	136	2	Recess for Present	MOR:		DO21009	Seture	tion
Effluent Subsement for O	om 25L seil for Tessing: NGC):	yes (he	>	Preservoon Rate: pH Adjustment:			(1)	**	.
				Herdrices Adaptive Test Solution Volume			200 PL / 15	D ML	.
				Leading Density:			20) II 15 I		
INITIAL PARAMETER	S (arter to testion)	76							
	Disserved Orvgen:	10:3							
	Inited art:	7.71		Adj. pH (H approach Adjustment Dotate					
	Terretretre: Conductivity:	7580		Adl. Hertinges of a					
	Initel Herghault Physical Sale Uson Reciset:	1360	aid.	Adjustment Deterri		=			
	Clanty: Colour:	المواء		•					

TEMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS ESULTS 313: FAIL (76.6.20 mortal 1) SHOUR Result: 314: PASE: (0% mortal 1) EST CONDITIONS FOOD CUlture: The first Broad: The	Project Number: Sample Number: Test Number: Chain of Gustady #:	- 9 38 7 - 77 - 78 - 277 - 073		• • •	Samus Date/Time Samus Teat: Teat tertagen Date Teathysteen:		05 /1 CH/GS	18/97/ 18/97/WA	1235	
1	TIME		CONTROL A	CENTROL -				3 ig	Participations Technology	CAME
21,2 21.2		Disserved Carygon			-				H	σ×
2530 2550		pH		9.88						G
PA	0 HOURS	Tempuresure(CI			 		21.2		128	-
1		Conductivity(u.S)		2530			120	,		
24 HOURS Terresponder 10 10 0 0 14'-45 15 15 15 15 15 15 15	Internet	obility (9 30 minutes (10 expense)	0	0	0	0	0	0		
Temperature 1		pH	9.29	0.36	9.34	8.36	8.26	8.42	num	84
Disserted Corpgin pH 9.05 9.13 9.31 8.17 7.95 8.06 20.5 20.2 20.1 20.1 20.0 20.0 2640 2650 2640 2670 2700 2690 20.0 1336 CONSTRUCTION P Dead (10 quantities) ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 9 10 0 0 0 6 **CTAL MORTALITIES ### 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	24 HOURS				اد	7.9				
## ## ## ## ## ## ## ## ## ## ## ## ##		• Immegado	109-29	10	10		0		14.47	
AS HOURS Temperature (C) 20.5 20.2 20.1 20.0 20.0 2366	·	Diseates Oxygen	8.5	8.5	8.5	8.1	8.1	8.2	CI	
Conductivity 2640 2650 2640 2670 2700 2690 336 3360		pH	9.05	9.13	9.31	8-17	7-95	8.06		_
Conductivity 2640 2650 2640 2670 2700	48 HOURS	Теппроговые (С)	20.5	30.3	20-1	20.1	20-0	20.0	24/	W
Posed (10 separate) ### 9 /0 0 0 0 6 **COTAL MORTALITIES ###################################		Conductivity	2640	2650	2640	2670	2700	2690	1536	S,
P Deed (10 expenses) 4 9 10 0 0 0 6 PETAL MORTALITIES 4 9 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		,				υ	a	/		
TOTAL MORTALITIES ##EAN % MOPTALITY To .6 % O REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS RESULTS ##EAULTS		# Deed (10 empetial)		9	10	ပဲ	v	6		
REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS RESULTS 313: = A1L (76.400 mortality) REST CONDITIONS REST CON	OTAL MOSTALITIES		4	9	10	4	0/8/	0 0		
RESULTS 313: FAIL (76.6° ornor tall) Genous Culture: Group Broad: Very Broad:			 		^c / _c		0	, 		
SHOUR Remate 314: PASS: (0% martality) EST CONDITIONS Process Culture: True to First Broad: Verrage Broad Size: Total Number Exposed/Concentration: Total Number Exposed/Concentration: Total Number Exposed/Concentration: Total Water Handness: Total Size T	REMEMBER TO	O COLLECT DAPHNIDS	AND TEST SO	LUTIONS AT	48 HRS		•			
SHOUR Remate 314: PASS: (0% martality) EST CONDITIONS Process Culture: True to First Broad: Verrage Broad Size: Total Number Exposed/Concentration: Total Number Exposed/Concentration: Total Number Exposed/Concentration: Total Water Handness: Total Size T	ESULTS	313: =AILi	76.600	morta	-1,-1)					
Shood Culture: C41497 & C42897 Time to First Broads: Average Broad Size: Cotal Number Exposed/Concentration: Six 10 negative Six 10 neg	S-HOUR Result									
Time to First Broad : Very Broad Size: Very Br	EST CONDITIONS									
Name of the state	rood Culture:		041497 a	042897				12:00		
Control Water Handness:					Preservoen Time:			12:30	_	
Effuent Substituted from 25L pail for Testing: Presented from 25L pail for Testing: 25 - 90nd_impt/L.					Recent for Preserv	een:	1949			
	Muent Subsampled fro	om ZiL pari for Teams;	(00) 10		Processon Rate:			25 - 80mL/n		_
Herdiness Adjuditionit: Test Selveen Vetures: Loading Constly: (70) yes (20) (8) / 150 mL (20) // 15 mL/mountes	rst Heplicason (for Gr	wee:			Herdrices Adjustine Test Selution Volum			(200 Pg. / 199	mL.	

Additional Observations:

* 44 WOLD STATE STATE	CONCENTRATION DAPPORA	MACHINA TEST (FES 1/88/14
ALPEAN STATES SHEELS	CORPORATION NOTICES	

Project Number: "Sample Number: Test Number: Chain of Custody #:	19-80 19-80 079-080	2		Sample Date/Tim Sample Tests: Test includes Del Testswan:	a: guffima:		12/4;		
TIME	SAMPLE ID: Parameter	COMMOCAL	- 000000	/3,5 - come.c- /= 2	- 100-A	(80 1023	316 188-C	PARAMETERS TECHNICAL	OLASE TOTAL
-	Diesembs Ceygon		9.3			9.0		1/0	
	рн		8.45			7.55		43	△\$ 8
OHOURS	Terrorian (C)		21.2			21.3		1257	
	Conductivity(u5)		2580		2	560		1,2	
Imme	south @ 30 minutes (10 expense)	C	0	0	0	0	0		
	pel	7.99	7.97	17.98	7.38	7.33	7.31	a (ma	300
24 HOURS	Terresenses(C)				9.9	· · · · · · · · · · · · · · · · · · ·	,	MM	
	Ø Immende	0	0	<u> </u>	0	0	0	14:53	
	Disservice Coygon	7.9	8.0	18:1	8-2	8-2	8.1	CU	
	pH	7.65	フ・マス	7.64	7-29	7.26	7.22	↓ _	
48 HOURS	Temperature (C)	20.3	19-9	19-9	19.9	19.9	19-9.	1	/.√\
	Conductivity	2690	2600	2700	2670	2700	2700	1321	0
	€ Immedia	0	0	U	0	1	1]	
	♥ Deed (10 especial)	0	U	0	C	0	0		
TOTAL MORTALITIES	·····	0	0	ن	0/9	C	0]	
MEAN & MOPTALITY						0_		<u> </u>	
REMEMBER TO	COLLECT DAPHNIDS	ND TEST SO	LUTIONS AT	48 HRS					
RESULTS	3/5 PASS	1 0%	mac+a						
48-HOUR Requit:	316 PASS	•		•					1
	JIV PASS	C 10	7712712	2 ., 70					
EST CONDITIONS									
Brood Culture: Time to First Brood:		C41497 A	C42897				12:00		ĺ
lverege Brood Size:		7 deve		Preserveen Time:			12 30		
otal Number Espains/ Control Weter Hardness	=	3X10 name		Access for Pressure	pen:	1988	30m	n Setur	tion
Muent Subservates tro est Replication (for QA		700 mo		Presenteen Rete: ort Administratio			25 - 50mL/n		
				Hardheen Adeustrie Test Salveen Volum Localing Density:		•	(10) ye (20) ggZ / 150 (20) // 15 m	IRL.	
NITIAL PARAMETERS	(Effects leading)	14	V						
	Olestoves Oxygen: Initial set: Temperature; Consuctivity: Initial Herdines; Physical Size Upon Receipt:	19 10.2 20.9 25.70 1292	200 1292	Adj. SM (il applicati Adjustment Dotalis: Adj. Martinago (il ap Adjustment Dotalis:	-				
	Clarry:	Clabo		- Contract C	-				

· AGUATIC SCIENCES INC.

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* 44-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EPS 1/RM/NI)

Project Municipy:	L9387	
Sorque Munbur:	81	
Test Humber:	P81	
Chair at Contract of		

Sempre Outs/Tota: Sempre Tests: Test instatum Dats/Tota:

05/12/90/1-
OS 1 15 1 6 2 1/ 12 3 9

TIME	SAMPLE IO: PARAMETER	CONTROL-A	COMMOL 4	contribut.c	100-A	81)	3/7 _{100-C}	PARAMETRIS TECHNISIS	eve:
	Disserved Corygon		9.0	*		8.8		Va	0.00
	pH		8.00			9.53		9	(A)
o HQURS	Temperature(C)		21,2		α	20.7]	
	Conduct=9(tu6)		306			2490		125	1
<u>Imr</u>	mobility (§ 30 numeros (10 ampaged)	O	0	0	0	O	0	7	
	pH	NAB 8.13	3.15	8.13	19,40	9.27	9.33	. ==0	00
24 HOURS	Terroperature(C)			i	9.9	MM	AD		
	€ immetale	0	0	0	9	8	6	15:00	l
	Discrete Caygon	8-7	8.6	8.7	8-7	8-7	8.7	CU	
	pH	8.12	8.15	8.15	9.08	8.43	8.96		
48 HOURS	Temperature (C)	20-0	19-8	19-8	19-9	19-9	20.0		111
	Conductivity	315	315	315	2650	2670	2650	1727	
	€ Invitabile	0	0	Ð	1	4	2		
	₽ Dead (10 espans)	0	Ø	0	9	5	4		
TOTAL MORTALITIES		0	0	٥	9	5	4		
MEAN & MOPTALITY		U				60°/	62		

REMEMBER TO COLLECT DAPHNIOS AND TEST SOLUTIONS AT 48 HRS

RESULTS 45-HOUR Result: 317: FA	tIL (60%	mortality)	
TEST CONDITIONS Broad Culture: Time to First Broad: Average Broad Stat: Total Number Exposed/Concurrence: Control Water Hardness: Effluent Subservated from 25L seel for Testing: Test Resiscation (for QA/QC):	7 4 04/2 7 4 04/2 7 4 04/2 25 1000000 13:10 10000000 13:6 (30) 100 100 100 100 100 100 100 100 100 100	Presentant Time: Presentant for Presentant: Presentant Rate: of Adjustment: Hardrose Adjustment: Test Solveen Volume: Leading Consty:	2:00 12:30 20min
INITIAL PARAMETERS (prior to testing)	8(
Disserves Carygon:	<i>જ.</i> જ		

INITIAL PARAMETERS (prior to totaling)	81		
	0 (
Disserved Caygon:	<u>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</u>		
irettel get:	9.55	Adj. eff (if applicable):	-
Тептриговия:	21.4	Adjustment Cottobs:	
Conductivity:	2470		
Initial Haranets:		Ad). Herdnoop 64 oppnositiel:	
Phytical State Usen	Receigt / iquic	Adjustment Details:	
Clarry:	clear	_	
Coleur:	celeurlese		
Precipitate:	none	<u>-</u>	
, Odour:	Ves	_	
:		_	
Additional Observations:			

D. 0 7100% saturation however no daphrice comments were obserted suspended at the surface throughout the duration of the test

46-HOUR STATIC SINGLE CONCENTRATION DAFFORM MAGINA TEST (EFS 1/FM/H4)

Project Number: <u>L9387</u> Seriese Number: <u>82 - 83</u>				Samue Cote/Time:				05/12/27/1-			
Semple Mumber: Test Number:	0.8			-	Test Intestan Co.	n/Time:	05/	162	112	47	
Chain of Custody #:				-	Taskingush:			3/4			
TIME	PARAMETER	SAMPLE IO:	COMMO.A 100 A	(82) 3	(8 comerc 100	160-A	(E3)	3197 100-c	MANUSTRUS TROUTUS	- Greek	
	Distance Corpor			8.7			8・7		1/	~	
	pH			8,72			206		ク	AX	
o HOURS	Terresonanto(C)			20.8			20	.9	1259		
	Conductivity(s)			2560	· · · · · · · · · · · · · · · · · · ·	- 6	2550	,	'		
Invite	aulity @ 30 minutes (10 especial)	0	0	0	0	0	0	L		
	pH		8.11	8.4C	5 28	7.62	7.64	7.59	M	C1A	
24 HOURS	Temperature(C)				10	7.9			100	a D	
	# Immetale		0	0	0	0	0	0	15:07		
	Disserted Oxygen		8.5	8.5	8.6	8.5	8.4	8.4			
	pH		7-74	7.92	7.80	7.48	7.41	7.26	CH		
46 HOURS	Топпроложен (С)		20-2	19-9	19-8	19-8	19-7	19-8		(M	
	Conductivity	2	680	2686	2690	2670	2680	2680	1336		
	# Introduio			O	0	0	0	_			
	P Dead (10 emper	4 1	0/9	6	0	6	0	0			
OTAL MORTALITIES			Ü	U	0	0	0	6			
KEAN % MOFTALITY				0							
REMEMBER TO	COLLECT D	APHNIDS A	ND TEST SO	LUTIONS AT	48 HRS						
ESULTS	318	PASS	1:0%	morta	1,+1)						
8-HOUR Requit:	319 .	PASS	: (0%)	morta	lity)						
EST CONDITIONS											
rood Culture: ime to First Brood: verage Brood Size: otal Number Exposed/A Antiol Webr Henthess		:	04/497 d 7 days 28 mass 33/10 mass (3)		Presenteen Tirke: Resear for Present		otert ond titul	12:15 - 12:45 30min			
Muent Subsemeted from	m 25L peri tor Teams	3 :	/200 / No 1/200 (No)	Presenten filti: pH Adjustman: Hardness Adjustma Test Selution Volun Leading Deneily:	MC:	•	20 mL / (15 m			
IITIAL PARAMETERS	(prior to touting)		82	83						—	
	Disselved Oxygen: Investigat: Temperature: Conductivity: Install Hereness: Physical State Uson Clanty: Colour: Procestate:		8.6 8.81 21.5 25.36 1326	8.8 \$.38 21.5 25.20 17.12 17.12 17.12 17.12	he), got (fl aggment) Adjustment Dottels: Adj. Herdness (fl ag Adjustment Dottels:						

Additional Observations:

48-HOUR STATIC SINGLE CONCENTRATION DAPHNIA MAGNA TEST (EFS 1/RM/14)

Project Number: 4387 Semine Municer: 39			_	Samus Data/Time:			05/12/11/1-				
Test Multiple:	084		-	Test installen Outs/Time:			CH/GS/KG				
Chain of Customy #:			-	Tealmaint:		CH/GS,	186				
		**************************************						B			
TIME	SAMPLE ID: PARAMETER	COMMOLA	(84)	320	-		300	***************************************	0455		
		133 A	120 B	(20 C		9 cons	CONC	THEOLOGY	- Treft		
	Distantal Corpan		8.7			9.0	*	13			
	pH		7.22			8.01		つ	B		
0 HOURS	Тептициалите(С)		20.8			21.2		1301			
	Conductivity(uS)		2580			306], , , ,			
Immoo	Hity @ 30 metabox (10 expense)	0	0	0	O	0	0	L			
	pH	7.16	7.12	7.09	8.10	8.13	8.13				
24 HOURS	Temperature(C)			19	1.9			MM	20%		
	# Irremptule	0	0	0	0	0	0	15:16			
	Disselves Caygon	8.6	8.5	8.5	8.6	8-6	8.5				
	gH	7-15	7.15	7.13	3.02	9.17	8.15	CU			
	Temperature (C)	20.5	20-3	20.1	19-8	19-7	19-8	Ì	N		
	Consuction		2690	2680	315	315	316	1341	(N\		
	# Introduction	υ						,			
		0	<i>3</i>	<u>ර</u> ව	0	0					
	# Deed (10 emperal)	v	U	0	Ü	ن	2				
TOTAL MORTALITIES MEAN & MOPTALITY		0	()			-0	-				
									لـــــــ		
KEWEWBEH 10	COLLECT DAPHNIDS A	ND TEST SO	LUTIONS AT	48 HRS							
RESULTS					()					
48-HOUR Result:	320: P/	455 (00/0	morto	elity/	,			Ì		
EST CONDITIONS											
		~!!!!!		•					-		
Brood Culture: Time to First Brood:	•	0414/974		Programmen Time:			12:15		ł		
Verege Brack Size: 'ctal Nurriber Establish/Co	ancentreson:	29 man				<u></u> :	12:45 30m:		1		
Control Water Hardness: Muent Subsempted from	The next fee Toman.	130		leasin for Progress Yearston Rate:			client r				
est Reglication (for QA/Q		-6	·	H Adjustment		-	3 - 65mi /m				
				larences Adjustican 'est Saluten Valuna		-	(m) / m	21/1	1		
				active Consty:		-		<u> </u>			
HITIAL PARAMETERS (triar to testing)	84					<u></u> -				
	Hospinus Circum:	عرف	7								
ln.	ritel en:	7.	<u> </u>	dj. pH (if apphaable)	l:				1		
· c	ombureture: ionauctvity:	21. 252	<u>C</u>	diversions Deposits	-						
	histel Herdhoos: Nythical State Upon Receipt:	Je VI	<u> </u>	dj. Hardnoto (f eeg) dw as hont Dotwic:	**************************************				-		
	lenty: clour:	COLOU	cless		_						
Pt	recentate:	nor Ve	70								
darbonal Observations:	 -										
CONTRACTOR CONTRACTOR ST.											

chaphan were observed simpended at the surface of the control water during the test

- ACUATIC SCIENCES INC.
- * 40-HOUR STATIC SINGLE CONCENTRATION DAFFORM MAGNA TEST (EPS 1/MM/H4)

	Project Manager:
•	Sample Matther:
	Test Number:
	Chain of Custom #:

49387	
85-86	
085-085	
085-085	

Sample Dest/Time: Sample Test: Topt Indistant Dest/Time: Toptomisson:

05/12/11/1-
CH 165/RG
CH/GS/KG

TIME	SAMPLE D:	100-2	(20)	- CENTRELE	100-A	86	32	PARAMETRIALS TREMPTOR	ove:
	Cinatived Caygon		8.8	·····		<u>ያ. 5</u>		13	A
	pM		9.71			7.61			de
o HOLIRS	Temperature(C)		20.6			20.6		7213	
	Conductivity(s)		2500		2	560	, <u></u>	رحما	
lenge	munday @ 30 minutes (10 entering)	<u> </u>	0		0	0	Ö	<u> </u>	
	pirk	9.45	19.65	19.48	8.29	8.22	8.45	^	QK
24 HOURS	Temperature(C)			J	9.9			May	1
	# Instruction	10	10	10	0	0	0	15:23	
	Diagnitud Copper	8-7	8.7	8-6	8.5	8.5	8-6	CH	
	pH	9.11	9.40	9-28	8-07	7.94	8.14		
46 HOURS	Temperature (C)	20.2	20.2	20-1	20.0	19.8	19-8		الهما
	Conductivity	2650	2640	2640	2670	2680	2670	2100	
	# Invasion	1		_	0	0	0	1346	
	# Dead (10 entrated)	9	10	10	0	0	•		
TOTAL MORTALITIES		9	10	10	U	0	6		
MEAN & MOPTALITY			96.6	20/0		0			

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS	321: PAIL	96.6% mortality)
45-HOUR Result:	322: PASS	Olo mortality)

EST CONDITIONS			
rood Culture:	0414974 0428	97	
ime so First Brook:	7 4000	Programm Time:	<u> </u>
verage Breat Size:	28 100000		12:45
otal Number Exposes/Concensuses:	3X10 necessor		30min
entrol Water Hardress:	136	Pennyn for Preservoor:	client request
Muent Subsembled from 25L seil für Testing:	(yes) no	Programmen Relat:	S-Mitheune, V
ret Replication (for QA/QC):	yee #©	pH Adjustment	(No) yes
		Hardniss Adjustinists	(45) 194
		Test Selusion Volume:	
		Leading Densily:	(2) (3) Hadran

INITIAL PARAMETERS (prior to tousing)	85 8	6	
Disserved Gargen:	9.0 (3.	4	4
Indial pH:	9.97 8.	8 6 Adj. att (if apparatio):	
Temperature:	72.3 22	. C Adjustment Dutate:	
Conductivity:	2430 24		
Initial Haranese:	1258 119		
Physical State Uson Receipt: /	lavio	Adjustment Dettitle:	
Clantv:	clear		
Colour:	none		
Process:	DONE		
Odour: V" (UP5		
	J		
Additional Observesons:			

48-HOUR STATIC SINGLE CONCENTRATION DAPPING MAGNA TEST (EPS T/RM/14)

Project Number:	19	387		_	Sature Com/Tim	•	65	1/2/4	,//	_
Semple Multiper; Test Number;	28	7- 05)		-	Service Tests: Test tributes De	m/lime:		15/2		255
Chain of Customy #:				_	Testiment:		35)	culto		
TIME	PARAMETER	SAMPLE IQ:		(87)	323		<u>8</u> 5	324	B	
			(00-A	- contract	120	- C	1000		TENTE	
	Disserved Coygon			88			8.8		,to	
	рН			8.17			7.21		1	QX
0 HOURS	ТоптаниванняСі			20.6			20.8		208	
	Солинстинуна)			2550			2560		7	
Imme	authy 🍎 30 minutes (1)	0	0	0		0	0	7	
	pH		7.69	7.76	7.87	7.09	7.02	7.00	- 100	&K
24 HOURS	Tertagenetics(C)				1	9.9			MM	æ2
	€ Internación		σ	0	0	0	0	0	15:30	
	Disserved Coygon		8-6	8-5	6.5	8-5	8.5	8.5	cu	
	pH		7.49	7.50	7.50	7.18	7-12	7-10	109	
48 HOURS	Топроводин (С)		20-2	20.0	19-9	19-9	19.9	20-1	اررا	7.1
	Conductority		2670	2680	2680	2690	2610	2680	1356	w
	€ Bronabala		0	٥	0	1	Ø	a	i i	
	Pond (10 empend		6	0	0	0	6	0	1	ŀ
TOTAL MORTALITIES			0	ن		6	O	0		ļ
MEAN % MOPTALITY				0			0		l	
REMEMBER TO	COLLECT DA	PHNIDS AL	ND TEST SO	LUTIONS AT	48 HR\$					
LESULTS	323:	PASS	0%	morte	ality '					
8-HOUR Resurt:	324:	PASS	(0%	mort	ality	/				1
				77.07	7/	<u> </u>				
EST CONDITIONS			~!!!!	ad 2002						
irood Culture: Time to First Brood:		•	041497		Preservoon Time:			12:22	_	j
verage Broad Size: 'ctal Number Espansi/C	Concentration:	-	25 reans					12:52 30m		ŀ
Control Weter Herdinade: Muent Subsembled from		-	[3(leason for Process Translation Rate:	ide:		<u>client r</u>	eaucst	.
est Repircation (for CA)		-	yes (Fa)		H Adjustment			3 · Saula (G)		
					lardroon Adarstma 'est Salutan Yalun		•		3/1	
					andre Denety:			Solution	<u> </u>	
HITIAL PARAMETERS	(prior to testing)		87 1	8-इ						
1	Dissurved Citygen:		8.7	8.8						
	initial pri: Temperature:	_	21.9		d), při (il appropi t djustinant Dolacie:	#: _				1
(Conductivity:	_	2430	2530	dj. Hardness (il asy					
•	Phytical State Usen A	~~~ (<u>-</u>	liet	id A	discount Details:					1
	Clarity: Coleur:	() () () () () () () ()	Color	r1855		-				

Additional Observations:

44-HOLER STATIC SINGLE CONCENTRATION DARROSS MACHIN	TEST	FR: 1	

Project Number:	L9387	
Sample Manager:	84	
Test Number:	08	
Chain of Custody #:		

TIME	SAMPLE ID: PARAMETER	CONTROLA	(G) contingle	commou-c	165-A	(8)	22 G	PARAMETERS TREMPARE	GARE RENEW
<u></u>	Distances Claygon		9.0	*		8.9		10	
	ρH		8.01			9.65	<u> </u>		8X
a HOURS	Тепцияния (С)		21.2			21.0		13 A	1
	Conductivity(uS)		306	•		2480)	Nim	Í
fertel	nathlity @ 30 minutes (10 expense)	0	0	0	0	0	0]	<u> </u>
	pet	8.09	8.03	9.12	19.61	9.44	9.66	m	625
24 HOURS	Terregulature(C)			į.	9.9			JW.	19-
	€ Immusula	0	0	0	10	7	10 *	15:40	
	Disserved Catygon	8,6	8.7	8.6	8.7	2.8	8.7	CH	
	pH	8.12	8-14	8.16	9-31	9.13	9-49]	
48 HOURS	Temperature (C)	20.3	20.0	20-0	20.2	20.3	20.3	W.C.	4
	Conductivity	316	315	316	2640	2640	20.3	וטביו	$ \mathcal{W}' $
	P Introduction	0	Ð	ð		1	6		
	# Dead (10 especial)	o	0	6	10	8	8/9		
TOTAL MORTALITIES		0	U	U	10	8	9/9		
MEAN & MOPTALITY			0			93%	6		

RESULTS	~-·· 		
изноия 325 : FA	1L: 93% mo	rtality	
TEST CONDITIONS			
Brood Culture: Time to First Brood: Average Brood Stat: Total Number Exposed/Concensusen: Control Water Hardness: Effluent Subsaniated from 25L and for Testing: Test Replication (for QA/QC):	04/14/97 04/28/ 7 days 25 responses 33.10 responses / 3.60 / 200 res	97Presention Time:	12:22 12:52 30min Client request 3-80min (3) ya (3) ya (3) ya (3) ya (3) ya
IITIAL PARAMETERS (prior to spesing)	89		
Glaterius Caygon: Initial pri: Temperature: Consuctivity: Initial Harginesi: Physical State Usion Receiet: Clarity:	4.1 4.49 21.9 245C 125 140C Clear	Adj. pH 61 esseenhis: Adjustem Count: Adj. Hardreis (1 appresse): Adjustem Count:	
Coleur: Precipiess: Odour: Idibonal Observacions:	roleviles = none	-	

\$ 00 > 100% saturation however no deptara nere observed surpended of the storing surface during the test.

AQUATIC SCIENCES INC.

•	44-HOUR STATIC SINGLE	CONCENTRATION DAFFORM	MACHA TEST (EPS 1/MA/14)
---	-----------------------	-----------------------	--------------------------

Project Number:	L9387	_	_	Samus Data/Tim	.	05	112/12	//	
Serrous Number: Test Number: Chain of Custody #:	999- 91 1992- D7	<u>, </u>		Sample Test: Test Initiation Del Testamone:	n/Tone		B/45		59
		*	-					•	
TIME	SAMPLE ID: PARAMETER	100 - A	(30-B	commerc-	- 100-A	100-6) 3.F	Parkersoners Theorem	CHEC
	Disserved Congen		প্ %			8.7			
	рН		ع ما ۶۰			7.80)	mm	
C HOURS	Temperature(C)		2c.8			20.9		13:22	ط
	Conductivity(US)		254	5	<u> </u>	2550] ``	
	aulity @ 20 minutes (10 enumes)	0	0	0	0	0	0	<u> </u>	
	piri	8.41	18.46	8.44	7.83	7.71	7.68	WW.	08
24 HOURS	Temperatura(C)			1	9.9			MUS	42
	Ø Inmebile	0	0	0	0	0	0	15.48	
	Disastrad Carygan	8.5	8.5	8.5	8.5	8-5	8.4	cu	
	pH	8-01	8-03	8.10	7.65	7.52	7-51	109	
44 HOURS	Temperature (C)	20.2	20-2	20.1	20-0	20.0	20-0	1 1	, ,
	Conductivity	2680	2680	2660	2680	2680	2680	1407	$[\mathcal{M}]$
	# Immedia		0	6	0	0	E	1	
	₱ Dead (10 especial)	(0	0	6	C	o	1	
TOTAL MORTALITIES		1	0	O	G	ن	٥		
MEAN & MOFTALITY				3%		0010			_]
REMEMBER TO	COLLECT DAPHNIDS A	ND TEST SO	LUTIONS AT	46 HRS					
RESULTS	320: PASS	3.30/2	morte	ality)			······································		
45-HOUR Result:	324: PASS	C% 0	morta	lity)					
TEST CONDITIONS									
Brood Culture:		041497	042897					_	ŀ
Time to First Broad: Average Broad Size:		7 days 29 near		Pronorminan Time:			12:22]
Total Number Express!		3X10 neer		_	-		30m		
Control Weter Mardinaat: Elluant Subsampled from	m 25L pad for Towns;	130 (130) no		Reagain for Present Presentant Rate:			Client (
Test Replication (for GA)	'6G :			oti Adjustradik Hardenson Adjustrad	ME:	•	ev (60)		
				lost Salutan Valen Lauting Dematy:	= :		(20) Jul. / 190 (20) J// 15 mg		
HITIAL PARAMETERS	(prior to testing)	90 1	91						\equiv
	Disserved Caygen:	8.12	8.6						Ì
	Indial sti: Temperature:	22 C	21.8	id), get (if apphaabli idjuarrapsi (italia:	- -				
	Conductivity:	746C	2500 1241	ul. Hardnoon (if on					
	Physical State Upon Receipt:	Cle	110	djugsmant Dottale:	-				
	Colour:		1055		-				

· AQUATIC SCIENCES INC.

		 	 	-
- 45	MOUR STATIC		1531	EPS 1/104/14)

Prosect Number:	L9387
Sample Number:	144-6-2
Test Number:	D 42
Chain of Custody #:	

منواية	Dom/Tutte:
Sample	Tests:
Togs and	tetten Date/Time:
Terror	ine:

06/12/97/1-
28/15/22// 1301
CH Nm GS

TIME	SAMPLE ID:	(00-A	-commerci	120 C	C:	H COYB	C 2 ~ G	TOURIS	
	Disserved Caygon		8.7				*	1	
	pH		7, 28			8.01		Nm	CEN
O HOURS	TerresentativeCT		21-0			21.2		170	/
	Conductivity (s. 6)		253	<u> </u>		306	,	1326	
Inen	paulity @ 30 mm,me (10 especial)	0	10	0	0		0		
	pH	7.20	7.20	7,17	8.04	8.11	18.13	Mm	<2<
24 HOURS	Terrorena Co	19.9				15:55			
	P Interdedit	C	C	0	0	0	0	12.33	
	Disservice Copper	8.5	8.5	8.5	8-6	8-6	8.7	CCA	
	piri	7.22	7-21	7.20	8-09	8.17	8.16	(4	1
48 HOURS	Temporato (C)	20.3	20.1	20.1	20.0	20.0	20-0		(\mathcal{N})
	Conductivity	2680	2690	2690	316	316	316	1413	
	€ Igramatuda	ی	0	0	ن	<u> </u>	0	כו/יו	
	€ Dead (10 assessed)	0	0	0	6	0	C		
TOTAL MORTALITIES		٥	0	U	U	O	J		
MEAN & MOPTALITY			-			0			

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS			
48-HOUR Result:	328: PASS (0%	o mertality)	

TEST CONDITIONS	42	Control	
Brood Culture:	04:413 (342+	17	
Time to First Brook:	0428 7 400	10days Presented Time:	
Average Broad Size:	28 ******	48 neonates	12:52
Total Number Expected/Concentration:	3X10 neenative		3Cmin
Control Weter Hardness:	136	Passon for Preparation:	client request
Effluent Subsemeled from 25L ped for Testing:	(no	Preservation Reta:	25 - 90ms./mm/L
Test Replication (for QA/QC):	700 (NO)	pH Adjustment	(Fig. / yee
		Hardness Adjustment	(m) yee
		Test Salution Volume:	(200 mL / 190 mL
		Leading Density:	(20)// 15 mL/manage

INITIAL PARAMETERS (prior to source)	92					
Distance Grygen: Intel et: Termenture: Construity: Intel Martineet: Physical Sizes Usen Receipt:	3.16 3.16 3.540 3.340	Adj. pri (if eaglicable): Adjustment Details: Adj. Hartman úf estincable): Adjustment Details:				
Clanty:		-				
Colour:	C-144-1853	-				
Preceres:		-				
Odour: -	705	-				
Additional Observations:						

commentations: \$ 0.07100? of saturation, however commentations
no daptain -ere observed suspended at the distribute
Throughout the duration of the feet.

46-HOUR STATIC SINGLE CONCENTRATION DAPHONA MAGNA TEST (EPS 1/RM/14)

Project Number: Sample Mumber: Test Number: Chain of Custady #:	4387 43-44 D93-097			Sample Com/Time: Sample Test: Test indiaten Cath/Time: Testmann:			05 / 12/97/- 05 / 15/92 // 1303 CH 65 2/20			
TIME	PARAMETER	SAMPLE IQ:	CONTROLA	CONTINGLO	common c	108-A	92) 3	137 33	O Producerate Transment	- CAREA ON GE
Distance Congres			8.8			8.8				
pH			9.56			8.52			WM	1
0 HOURS	ТопровологоСЭ			20.9		20.9			1330	1
	Consuceronytes()			2510			2550		1950	
inens	sedily (9 30 menutus (1) +	0	0	0	0	0	0		
	pH		9.42	9.35	9.39	8.28	8.09	8.19	m	SAK
24 HOURS	Terepresentica					1.9			16:03	
	# Immedia		7/9	7	8	0	0	0	├	
	Disserved Chrygan		8.7	8.7	8.7	8.6	8.6	8.6	C4	i i
	pH		9.19	9.08	9.20	8-01	7.78	7.83	1	N
46 HOURS	Тептементо (С)		20.6	20.5	20.5	20-0	20-0	20-0		$ \omega\rangle$
	Consucerity		2640	2640	2640	2660	2690	2610	1417	
	# Immatele		3			0	3	0	ł	
	# Dead (10 expended	·	7		9	0	0	2	}	
OTAL MORTALITIES				76:60	/		δ		}	
	O COLLECT DA			LUTIONS AT	48 HRS					
EBULTS 6-HOUR Result:	329: 330:	Pass (76.6°10	nortali	+y)					
EST CONDITIONS rood Culture: ime to First Brood: verege Brood Stat: verege Brood Stat: cold Number Esposed found Weter Handhood filluent Subsempted for est Replication (for QA	E om 251. pad for Teating	:	(C) 4 () 4 () 4 () 4 () 4 () 4 () 4 () 4		Preservation Time: Reason for Preservation Parties: pri Adjustment: Hardness Adjustment Tool Servition Vehicle Leading Density:	ri t	oters one treat	12:30 13:01 30m Client (5) (6)	eques	;
NITIAL PARAMETERS	Disserved Onygen: Invited ant: Temperature: Conductivity: Invited Herdiness: Physical State Ution: Clarity:		9.1 A. 1.9x E 1.00 2 1360 L	50 1.9 1.9 1.542	Adj. phi (il appressi Adjustinani Details: Adjustinani Details: Adjustinani Details:	phosisis:				

Additional Observations:

48-HOUR STATIC SINGLE CONCENTRATION DAPHGEA MAGNA TEST (EPS 1/RM/H)

Project Number:	45387
Sarrano Number:	45 - 96
Total Number:	015 - 016
Chain of Custody #:	

Sompto (hate/Time: Sompto Teah: Teat trataden Opto/Time: Teahrusson:

05/12/97/	
05/15/12//	1309
CH/GS/Mm	

TIME	SAMPLE ID:	CONTROLA	COMMOL-S	33235 contracc)) 109-A	E.	373) Nac	Andread Tipes Tipes Andread	agragar Greate
	Diemanus Capper		<u> የ</u> .ጵ			8.7			
	pH		7.71			7.0		Nm	AK
0 HOURS	Temperaturo(C)		20.8			20.9		1	
	Conductory(u.6)		2560			2520		13:40	
Inter	natulity († 30 November (10 company)	C	0	0	0	0	C		
	pH	7.58	7.52	7.58	7.16	7.11	7.12	NM	ON C
24 HOURS	Temperatural©			jo	7.9			770.75	
	€ Introdute	0	0	0	0	0	0	16:08	
	Districtual Copyrin	8.5	8-4	8.3	8.5	8.4	8.4	(4	
	pH	7-41	7.40	7-40	7-23	7-07	7.14		1
48 HOURS	Tempurgase (C)	20-2	20.1	20.2	20.1	20.2	スロス		$I \wedge \Lambda$
	Conductority	2680	2690	2680	2610	2680	2690	.,, 2,,	W
	# Immuhio	0	0	€	0	0	0	1424	
	# Dead (10 essents)	0	٥	6	0	0	0		
TOTAL MORTALITIES		U	U	ن	0	U	Ü		
MEAN & MOPTALITY			Ų			6			

REMEMBER TO COLLECT DAPHNIDS AND TEST SOLUTIONS AT 48 HRS

RESULTS		0% mortality	
48-HOUR Result	332 : PASS ("0% mortality"	5

TEST CONDITIONS			
Broos Culture: Time to First Broos: Average Broos Star:	042197 10 cm	Processon Time:	/2:30 /3:00
Total Number Exposed/Concensus:	3X10 neanane		30min
Control Water Hardness:	136	Reason for Procuremen:	client request
Effluent Subsangled from 25L pail for Tecong:	(reg./no	Pressupp Asta:	S-time.mink
Test Replication (for QA/QC):	yes (cg/	pH Adjustment:	(56)/ yee
		Herdrage Adjustment	(n) (n) C-R
		Test Selution Volume:	(30 m) / 100 mL
		Leading Density:	(B) 14 Milhaman

				وبالمساوي والمراوي وا
INITIAL PARAMETERS (prior to tourne)	9>	96		
		1		
Distanced Coygen:	<u> 7.7 </u>	1 8.7	_	
Initial pet:	5.32	1.12	Adj. pH (flagghabble):	
Temperature:	21.4	21.5	Adjustment Details:	
Conductority:	2540	2560		
Inited Herdness:	1326	1343	Adj. Herdness (if espheratio):	
Physical State Usan Retirat:	libraid	Liquid	Adjustment Details:	
Clenty:	char	clean	- -	
Caleur:	calmites	Coldrelles	- -	
Preciprete:	C.O.	11.0	_	
Odour:	413	46	_	
	7-1			
Additional Observations:				

AQUATIC SCIENCES INC.

96 HOUR STATIC RAINBOW TROUT SINGLE CONCENTRATION TEST **EPS 1/RM/13**

Project Number:

Client:

L9387

Inco Ltd

Copper Cliff, Ontario

Experimental Treatments for CCWWTP

Sample identification #301 - 316

Sample Location: Chain of Custody #:

Sample Name/ID:

CCWWTP not received

Sample Method:

Grab

Sample Number:

65 - 80

Test Number:

T33 - T48

Sample Date/Time: 05/12/87//-:- hrs

Sample Technician: S Clark

Test Date:

05/14/97//17:00 - 17:09 hrs

Technicien:

S Hilliker/W Mesters

RESULTS

96 HOUR RESULTS:	65: 301:	FAIL (100% mertality)	73: 300 :	FAIL (100% mertality)
	66: 302:	PASS (0% mertality)	74: 310 :	PASS (0% martelity)
	67: 303:	PASS (0% mortality)	75: 3 11:	PASS (0% mortelity)
	68: 304:	PASS (0% mortality)	76: 312:	PASS (0% mortality)
	60: 306:	FAIL (100% mortality)	77: 313:	FAIL (100% mortality)
	70: 306:	PASS (0% mortality)	78: 314:	PASS (0% mortality)
	71: 307:	PASS (0% mortality)	79: 315:	PASS (0% mertality)
	72: 308 :	PASS (0% mortality)	80; 316:	PASS (0% mortality)

QUALITY ASSURANCE INFORMATION

REFERENCE TEST CONDITIONS

Test Organism:

Rainbow Trout

Trout Batch Number:

Test Type:

Test Temperature:

Test Volume:

041897 Static

15+/-1C

15 Litres

Test Solution Depth: 27 cm

Test Aeration Rate:

Photoperiod:

16 hours light/8 hours dark Dechloringted Tap

6.5 +/- 1 mL/min/L

Dilution Water:

Organism Age: **Fingerlings**

Stock Source:

Rainbow Springs Hetchery

Mean Weight:

0.52 +/- 0.12 g

REFERENCE TOXICANT DATA

Chemical Used:

Sodium Chloride

Date of Test:

May 06/97

96-hour LC50: 95% Confidence Interval:

15693 mg/L 14826 - 16611 mg/L Historic Mean LC50: Warning Limits:

16246 mg/L

12252 - 20239 mg/L

TEST PROTOCOL

Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout. Environment Canada. July 1990

COMMENTS

The reference toxicant results show that test reproducibility and organism sensitivity are within acceptable limits. All data is scrutinized for errors daily during the test, at test termination and during the report Technical and Final Review stages. Instruments used to monitor parameters are calibrated daily and continuously maintained.

QUALITY REVIEW

CAR St. Fo-W. Markers

AQUATIC SCIENCES	INC. RAMBON TROUT TEST (F)	s 1/FM/13)					
SE-HOURI PASE/PAIL				Sample DeterTine:	05/	2/17	//-
Project Number:	29387			Sample Tesh:	-		
Sample Number:	# 6	ک		Test Installen Date/Time:	05/1	4/47	11517:00
Test Number:	<u></u>			= -	54 W		
Custody #:				Technicien:			
		3		C	- 324	OMOC	
			COUMPL	المار مد	TECHTIME	NEVIEW	_
TIME	PARAMETER Disserved Carygon		10.1	CF . 41			
	Dispersed Carygon pH		8.04	10.11	in'm	1	
o HOURS	Terreporterio(C)		!4.4	14.5	17:20	ļ	
V	Conductory(uS)	Į	218	2705	11.		
Immob	ity @ 30 minutes (10 capes	*	7.96	9.5.3	14/820	SH	1
15 - 16 HOURS	pH		10:0	10.0	CU 1659		
	Disserved Caygon pH	İ	8.08	7.5-2		A	
24 HOURS	Temperature(C)	1	14-3	17.9	9x8 /4	_	
241143112	Conductivity(uS)		324	2600	/	1	
	# Introduction		9	10	0101		
	Total # Dead		9.4	 			†
	Disserved Caygon		7.49	+	CY 1605	1,11	
48 HOURS	pH Temperatura(C)		17.6		1	M	
TE NOONS	Conductivity(s)		329		11/15		
	# Immatale		ပ		כטסין	ļ	ļ
	Total # Danid		O,		 /-	 	- taken twick
	Dissalved Caygon		7.99 7.70	 	(it/ox	lu .	-take trice (U same a
72 HOURS	pH Temperature(C)	(iy	14-714-16		1 / 4	14 (J	100
72 NOONS	Conductivity(uS)		336 3/30		J / _		
	# Instruction		0 10		! 1657		
	Total # Dead		0.2		`- 		-
	Distanced Conygen		8.04	 -	1725		
98 HOURS	pH Temperature(C)		14.6		1 /	cil	
36 HOURS	Conductivity(uS)		34.2		ر ۾ [CVI	
	# Immobile		0		41/25	İ	
	Total # Dead		<u> </u>	<u> </u>	4		
TOTAL MORTALITY				OLUTION SUBSAMPLES AT 1 HOU	00 11 - 16 1015	S AND OS HOU	J ER
	E MEASUREMENTS IF 100						
RESULTS 96 Hour Results:	301 F	AIL	100% m	ortality)			
TEST ORGANISMS O	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	<u> </u>	% Manuality of Culture 7 Days	Prior to Tessing: 1.6	Frinches Day Last	Feeding Time:	17:00
Control Weight (g) / L	ength (mm):						
1	2	3	-60136-56135	1.68/38 .92.41	-31 /38	.74, 37	1.53/35
152139	1.561351.66	137	· [0/1/20] · 2 (1/2)	 -		1	1-2:-2
Sample Size:	\ 0				++4.13.	•	
Meen Fork Length:		Omm		Weight MinMes: 453	38 or	-	
Fork Length Min/Mex	35 .41			Lossing Denety: O -	98 90	-	
TEST CONDITIONS							i
Total Preseration Tim	il	4:30		Test Selveen Velume (L):			34
TOTAL PROPERTY.		7:00	3	Test Sekreen Depth (19cm:10L: 2	lon:10L; Mon:37L):		200
	1044	₹0.m		Total Number Express/Consumer Test Replication (for QA/QC):	een:	10 yes (2)
Reason for Presentition		1.5 /		(All (Alburtanes) (fact (Alburtanes) ;			
Preserveon & Test A	erston Rate: 0.5	+/- 1 mL/n					
pri Adiustment		,,					
INITIAL PARAMETE	RS (prior to testing)				7		
Dissolved Oxygen (p	ion): 10.º	<u> </u>		Physical State Upon Receipt:	Maria		
pri:	<u> 10.3</u>	طب		Clarity: Colour:	VIII SA		
Ternosrature (C):		4		Caleur: Precipitate:	500 2100	iii -	Solids
Conductivity (uS/cm): <u>جال</u> ان	100		Caleur	yes.		
(Adj. ph (if applicable	(e)): <i>j</i>				,		
1 ·							

timer Broken at initial parameter check.

pH:
Temperature (C):
Conductivity (uS/cm):
Conductivity (uS/cm):

(Adj. pH (if applicable)):
(Adjustment Decade):

Commentar/Deviations:

Commentar/Deviations:

Physical State Upon Recourt

Dissolved Oxygen (ppm):

્

Project Number: Sample Number: Test Number:	19387 18-49 736-7		Sample Date/Time: Sample Tests: Test indicaton Date/Time:		_	2// 17:04
Custody #:		<u> </u>	Technolor:	SHIN	M	7/ 1/30
				1		
TIME	PARAMETER	(68)-1004	(64) CONTRAC	PARAMETER	CARCE	
	Distaired Coppen	10.0	9.9		THE VIEW	
0 HOURS	pH Temperature(C)	7.29	5.15	17:35	l 1	
01.55.15	Conductivity(s)	276C	315	, ym	} !	
	thy @ 30 minutes (10 expense)	0	0	//		
15 - 16 HOURS	pH Disselved Coppen	9.8	7.83	0029		
	pH	7.15	7.80	\mathcal{U}	34x	
24 HOURS	Temperature(C)	14.6	14.5	·	,	
	ConductivițuS) # Immable	2660	317	11641		
	Total # Dead		0			
	Disselved Coygon pH	7:10	7:03	W		
48 HOURS	Temperature(C)	14.7	14.7	1 ′	M	
	Combacity(uS) # transpile	2670	315	1510		
	Total & Charl	8	8	' ' '	İ	
	Disserved Coppen	प.प	9.3	CIA		
72 HOURS	pH Termeraure(C)	7.17	7.79	CU	7. A	
	Conductivity(u6)	2730	323	1740	ω	
	Firmship		0	1755		
	Total & Dead Dissalved Chappen	9:5	9.5			
	pH	7.13	7.82	1728		
96 HOURS	Temperature(C) Conductivity(uS)	2740	14.5	-10		
	# Investile	0	325	1720	4	
TOTAL MORTALITY	Total # Dead	00	0	i	1	
	MEASUREMENTS IF 100% KILL IN		LUTION SUSSAMPLES AT 1 HOUR			
RESULTS	304: PAS			ON 13 - 10 100015		
96 Hour Results:	309 · PAS	31 040 m	ortality)			
TEST ORGANISM CON Trout Betch Number:	04/18/97	% Mortality of Culture 7 Days Pr	1.67	Provious Day Last Fe	nding Time:	17:00
Control Weight (g) / Len	2 3 3	4 5	7			
.70 / 38	97,42 49,42	591351-66137	87140 66135	79 737.	86/39 -8	11/39
Sample Size:	10					
Meen Fork Length:	38 +1-2.5mm			1.49		
Fork Length Min/Mex:	35 · 42 mm		Leading Density: 0.4	7 94		
EST CONDITIONS						
Total Preservition Time:	- (6:30		Test Selution Volume (L):		181	
	300		Tost Solution Capth (18cm:19L; 28cm Total Number Espacel/Consengate	1: 10L: 30am:(SL): 1:	32	cm
lesson for Preservation >	30 minutes: n/A		Tota Replication (for QA/QC):	_)	
reserven & Test Apres H Adjustment	on Rete: 6.5 +/- 1 mL/mar	<u>u</u>				1
MITIAL PARAMETERS						
				1		
lissolved Oxygen (ppm): H:	: <u>10.1</u>		Physical State Upon Record:	12 md		
emperature (C):	14.4		Caleur:	4KIIOZ		
conductivity (u\$/cm):	3330		Pricette:	woode	Solds	
dj. pH (if applicable):				10.44		
Adjustiment Detaile):						1

Project Number:	<u> </u>		Sample Date/Time:	05/12/97//-		
Samue Number:	70-71 G		Sample Tests:	05/14/92/1 17:56		
Top: Number: Custody #:			Test initiation Date/Tistin: Testpropist:	Sit wm		
C3		,		·		
TIME	PARAMÈTER	(68) 305	(70 mm 306	PARAMETER GA/GC TECH/TIME REVIEW		
	Disserves Congress	4.8	9 5	2 mm		
0 HOURS	pH Temperature(C)	10.17	14.3			
	Conductorly(uS)	2710	2730	11:38		
15 - 16 HOURS	by @ 30 minutes (10 expected)	7.69	7.88	CHIT DESY SA		
13-16-10010	Disselves Citygen	10.0	9.8	14/		
	pH	9.64	7.41	0907/12/000		
24 HOURS	Temperature(C) Conductivity(uS)	2640	2650			
	€ Instabile	5-4	0	1/(647)		
	Total # Dead	10	7			
	Dispolated Coppen	 	7:41	64 (1)		
48 HOURS	Temperature(C)		14.7	1 ²⁹ (M		
	Conductivity(u5)		2650	もつロー I		
	P transaction Total P Dans		2	1711		
	Dispulsari Coppen		9:5			
*****	PM .		7.43	C4 / /		
72 HOURS	Temperature(C) Conductivity(uS)		2710	CM		
	# Immehile		6	1,757		
	Total & Deed		9.9			
	Disselved Oxygen pM		7.3	$ \mathcal{C}\mathcal{U} $		
98 HOURS	Тептрегенич (С)		14.5	1 ' (1)		
	Conductivity(uS)		2730	(730 (4)		
	Ø Instrucțiile Total Ø Dead		0	1 () 0		
TOTAL MORTALITY		10	O			
REMEMBER TO TAKE	MEASUREMENTS IF 100% KILL IN	HOUR TAKE TEST SO	LUTION SUBGAMPLES AT 1 HOUR	OR 15 - 16 HOURS AND SE HOURS		
RESULTS 96 Hour Requite:	305 : FAILL: 100	% mertalit	1) 306: PAS	S(0% mortality)		
TEST ORGANISM CON	DITIONS				_	
Trout Beach Number: Control Weight (g) / Len		C marginity of Culture 7 bays P	1.6	Province Day Last Feeding Time: 17:00		
075,38	047, 42 1.79,42	0.59135066137	0.571 42 0.66135	0.77 137 0.88 1 37 0811 39		
0.075	<u> </u>	7. · // 33 U.S-/3/				
Semple Size:			Man Weight 0.8 4	·+026 ·		
Meen Fork Length: Fork Length Min/Mex:	35 - 42 mm		Weight Mindles: 0.66 Leading Danoth: 0.4	- <u>/, 4 7 g</u>		
					لــ	
TEST CONDITIONS						
Total Preserteon Time:	16:4 17:0		Test Salution Volume (L): Test Salution Death (18cm:10L; 28c			
Reason for Preservition >		<u> </u>	Total Number Expense/Consensus: Test Resissation (for QACC):	10 x(x(no 1)		
Preseration & Test Asset		ra -	(44 Happenson (4- 4446).		- 1	
pH Adjustment	yes (no				لـــ	
INITIAL PARAMETERS	(buten so respind) (0 c1	7 ℃		kg 70		
Dissolved Oxygen (ppm)	ic رق	, Z	Physical State Upon Receipt:	Liquid Liquid		
pH:		·20	Clenty:	Char Char	-	
Temperature (C):	14.4		Caleur:	William Nove		
Conductivity (uS/cm):	7 (2) - 1 d	710	Preceiten:	Mine WS	- {	
(Adj. pH (if applicable)):				<u> </u>		
(Adjustment Details):	-/-			•	ı	
Comments/Deviations:				OFFE SERVICE C. C. LEWIS CO. P. C. C. C. C. C. C. C. C. C. C. C. C. C.		

Project Number:	L9387		Sample Date/Time:	05/	2/47	// -
Sample Number:	71 - 72		Sample Tech:			
Test Number:	T4039-	TYO	Test Initiation Com/Time:			217:08
Custody #:			Technism:	SH 1	N3m	
			226	PARAMETER	OMOC	
TIME	PARAMETER	(71) 100 307	(72) 100 30B	TECHTIME	VEASA	
	Districted Chygan	98	7.85	17:42 17:42		
0 HOURS	při Terropostoro(C)	14.3	14.4	17/11/2		
Uncons	Consuctivity(uS)	2.750	2760	740		
	ry @ 30 minutes (10 expense)	C	Ç	10000		
15 - 18 HOURS	pH Disselved Caygan	7.50	7.42	4110831		
	pH .	7-39	7.33	4	AK	
24 HOURS	Temperature(C)	ाप-प	14.4	· ' 一	440	
	Conductively(uS)	2660	2660	1645		
	P transitio Total P Dand	- 8 -	0			
	Disserted Coppen	9.4	9.7			
	pH .	7.34	7-55	CU	\ \ \ \ \	
48 HOURS	Temperaturo(C) Constastivity(uS)	2660	2 6 6 0	7	$ \mathcal{U}\setminus \mathcal{U} $	
	e investite		0	1712		
	Total # Deed	8				
	Disputed Citygen	1 2	7:39	CY		
72 HOURS	pH Temperature(C)	7.39	14.7	"/	111	
	Conductivity(u6)	2730	2730	1759	$(u \mid$	
	€ investile	0	0		i	
	Total # Danid Disselved Corpon	9 · 6	9.8			
	pH Congress	7.30	7.24	cy	<u> </u>	
96 HOURS	Temperatura(C)	14.5	14.5	-10	CiA	
	Conductivity(uS)	2740	2750	1732	W	
	# Introduction Total # Daniel	<u> </u>	2	`	l	
TOTAL MORTALITY		Ŏ	Ó			
REMEMBER TO TAKE	MEASUREMENTS IF 180% ICLL IN 1	HOUR TAKE TEST SO	LUTION SUSPANDILES AT 1 HOUR	OR 15 - 16 HOURS	AND OS HOURS	
RESULTS 96 Hour Results:	307 8 308	: PASS c	% mortali	F-y		
TEST ORGANISM COM	041897	S. Martinia of Cultury 7 Days &	Territor 1.60	Day Loss St	nation Time	17:00
Control Weight (g) / Lane	gth (mm):	4 5		•	•	10
0.70138	0.97, 42 1.49, 42					
Sample Size:	10		Mann Walste 0.34	+ 0.26		
Mean Fork Length:	34 ++ 2.5 mm			1.49		
Fork Length Min/Mex:	35 · 42 mm		Leading Density: 0.4	7 g/L		
<u> </u>						
TEST CONDITIONS						
Total Preserves Time:	16:30	-	Test Salution Volume (L):		186	_
	17:C		Test Salution Dapid (10am:10L; Stor	:14L; Son:2 L): _	320	m
_			Total Humber Especial/Consumption	N: _	10	
Resson for Pressution > Presention & Test Asrab			Test Replication (for QA/QC):	-	yes (m)	}
pH Adjustment:	700 (70)					
INITIAL PARAMETERS	(admin tration)					
THE PARTY IERS	" +\ T	_	,	71,	1,72	-
Oissolved Oxygen (spm):		0.2	Physical State Upon Researc	- land	Class	/
pH: Temperature (C):		4.4 4.4	Clearly: 1		Char	,
Conductivity (uS/cm):	23201	-130	Precipitati:	wo. Solids	ا مساله	
(Adj. pH (if applicable)):	,	-	Oscur:	4-62	المنضع	
(Adj. pri (it applicame)): (Adjustment Details):		1		•	i	1
		7				
				THE OWNER LANDSON		

AQUATIC SCIENCES INC.

SEHOUR PASSIFAR, RANGOW TROUT TEST (EPS 1/RM/13)

71. liner Broken at initial parameter check.

ACUATIC SCIENCE 16-HOUR PASSIFA	ES INC. L. RAMBON TROUT TEST (EPS 1/RM	713)				
Project Number:	49387		Samula Data/Time:	05/	12/97/	/_
Sample Muribur:	73-2		Sample Tesh:			
Test Number:	TYI		Test Initiation Date/Time:	05/1	4/1711	17:01
Custody #:			Teshnissen:		zim	
				L .a		-
TIME	PARAMETÉR	Correct	100 (73	NAME TEN	ONOC REVIEW	
	Disserved Copper	4.9	9.7			
	pH .	8.20	10.11	Mar	1 1	
0 HOURS	Temperature(C)	14.5 3.8	14.8	1 17:50	1 1	
-	Conductivity(ull) hilly @ 30 minutes (10 exposed)	2/2	2700	⊣ ₹₩	1 1	
15 - 16 HOURS		19.24	9.54	(4//025)	CH	
	Disselved Coygon	9.9	10.0	14/		
	pi-1	8.11	9.54	- John /cul		
24 HOURS	Temperature(C)	(4-8	15-0		20	
	Conductivity(s/E) # trumphile	525	2690	$\dashv h$		
	Total & Dated	8	10	7/1656		
	Digastrad Coppen	9.9			 	
	pH	8.00		ゴムリ	1 1	
44 HOURS	Temperature(C)	14.4		コ ^{ン・} /	W	
	Constactivity(u6)	331		71608		
	/ Immetile	0		11000	i I	
	Total # Dead Disselved Corpon	9.5				
	pH	8.21		$\dashv CU$		
72 HOURS	Temperature(C)	14.7		\mathbf{H}^{-1}		
	Conducting(uS)	33 B		1 ~	U	
	∂ Immyljilo	0		1809	· .	
	Total # Dood					
	Disastvad Caygon	9.2		-11		
96 HOURS	pH Temperature(C)	14.6		ICY		
Je ricons	Conductivity(c5)	340		1742	CIA	
	# Invisible	970		7,742	001	
	Total # Deed	G	V	コ `' '-	i	
TOTAL MORTALITY			10			
RESULTS	Z MEAGUREMENTS IF 100% KILL IN		UTION SUSSAMPLES AT 1 HO		AND 86 HOURS	
66 Hour Results:	309: FA	AIL (100%	mortality	<u>) </u>		
TEST ORGANISM CO Trout Batch Number:	04/897	% Mortality of Culture 7 Days Pri	Todas: 16%	Previous Day Last F	ending Time:	700
Control Weight (a) / L	erigin (mm):					
	2 3	4 5	06210 22217	1-27		10
1-17,43	171 137 55133	-69137 64136	·8540 ·55 134	.65.36	70 M 013	P00
Sample Size:	10		-0.71	++ 0.23.		
Mean Fork Length:	37 + 3.8 mm		Numer 18 6	-117		
Fork Langth Min/Max:	30 . 43		seeding Density: O-	39 or		
TEST CONDITIONS						
Total Preseration Time			fest Seksten Valume (L):	_	184	
	17:00		Test Behrlich Depth (18an:16L; 2	Iun:16L: 25cn:50L):	32 c	<u> </u>
Reason for Preservator			l'etal Municia Espansi/Concentre l'est Replastion (les QA/QC):	den:	10	
Preservation & Test Ass				-) me (m)	
pH Adjustment	yes (Ag					
INITIAL PARAMETER						
	415 -			1.50 -1		
Dissolved Caygon (pp)			Tryplant State Upon Receipt	higand		
pH: Terrorrane (C):	10.30		Zerley: Zeleur:	YE IIGU		
Temperature (C): Conductivity (uS/cm):	3630		vecerati:		ded Silli	75
	-74 TU		Digour:	ILLS		***
(Adj. pH (if applicable)): <u> </u>			1		
(Adjustment Details):						
						
Comments/Devisions	K			OFFI HARME CHARLES		

Project Number:	24:35		Seman Dete/Time:	05/	05/12/95/1-		
Semple Number:			Serrate Tech:		125/14/22//17:03		
Test Number:	<u> </u>		Test inflation Date/Time:				
Custody #:			Tophyseum:		2/1/2		
TIME PARAMETER 100 (74)310 100 (75) I PARAMETER CAUCE							
TIME	DARAMETER	100 (74	1310 - 125) 311 PARAMETER	GA/GC		
11802	PARAMETER Disserved Caygon	- 100 (7)	100	/ IEGVINE	NEVIEW		
	pH	4 6	932		1		
OHOURS	Temperature(C)	.4.2	14.60	Win			
	Conductivity(u5)	273=	2740	17:55			
(mmobili	ny (f) 20 minutes (10 especial)	0	2/11				
15 - 16 HOURS	pH _	7.65	7 - 3-7	w Horsy	1 < 7		
	Disserved Caygon	10.0	9.7		 -3: 		
	pH	7.54	7.26	$\exists \omega$	CAL .		
24 HOURS	Temperature(C)	14.6	14.6	$\neg 1$ /	SP .		
	Conductory(uS)	1660	2660	71654			
	# Introduction	0	0	1671	1 1		
	Total # Deed	O			<u>[</u>]		
	Disserved Cirygen	4.9	9.7				
	pH	7-52	7.33	\Box $\subset \mathcal{U}$	1.8.1		
48 HOURS	Tempurature(C)	14.3	17.4	\square , .	(v)		
	Conductivity(uS)	2670	2660	= 1/611	10 1		
	# Immobile			 □ '	i		
	Total # Dead	ව	0		<u>L</u>		
	Diseason Chaygen	9.7	9.3				
	p#1	7.61	7.35	14	١ ا		
72 HOURS	Temperature(C)	14.6	14.7	7 +807	(4)		
	Conductivity(uS)	2740	2730	J +00/	1 '		
	/ Irrenania	<u> </u>	 	→	1		
	Total # Dead		0				
	Distaired Caygon pH	7.53	7-35	- (4			
98 HOURS	Temperature(C)	14.5		-	_		
au noons	Conductivity(uS)	2750	2740	1740	CU		
	/ Mynobile	<u> </u>	2750	- 117475			
	Total & Dend	0	6	$\dashv $	<u> </u>		
TOTAL MORTALITY		<u> </u>		- -1 i	[
REMEMBER TO TAKE	MEASUREMENTS IF 100% KILL IN	HOLD TAKE THE SO	LUTION SUBSAMPLES AT 1 HG				
RESULTS							
96 Hour Results:	310 a 311:	PASS (CElo morto	21114)			
TEST ORGANISM COM Trout Batch Number:		S. Marrier of Culture 7 Dam 8	ner to Teating:	Service Court on S	1700		
					. 100		
Control Weight (g) / Lens							
1	2 3	4 5	6 7	•	10		
1.17 / 43	c-71137 035133	3.69137 0-841 36	033142 622 134	1065 1361	0.401 40 0361 35		
Semple Size:	iO						
Meen Fork Length:			Mean Weight 8.71	*** 23	j		
Fork Langth Min/Max:	30 -043 mm		Weight MinMes: 3. 36	·/./7 g			
			Lossing Density: 0.39	<u> •</u> L	Ī		
TEST CONDITIONS							
Total Preseration Time:	16:30	-	Toro Salarana Mahama A la		181		
TOTAL PROGRESSION TIME:	17:0		Test Solution Volume (L): Test Solution Depth (18cm:10L;		332		
		21.07	Total Number Expense/Concens	-	10		
Resson for Presentation >			Test Reptication (for QA/QC):		yes fre		
Preservation & Total Agrets				-			
pH Adjustment	yes sho)				i		
INITIAL PARAMETERS	(buter so seemed) = 74	44		· — ·			
Dissolved Oxygen (pam):	. <i>iù</i> -o	10 C	Physical State Upon Recog:	hia : 1	1,22,0		
pH:	9.25		Clenty:	Click	1120 Y		
Temperature (C):	73.7		Caleur:	VIIIDE:	VELICIO		
Conductivity (uS/cm):	2714		Processe:	-W. SCIKA	5050, 50' (05		
•	:		Odour:	ACA!	Ves_		
(Adj. pri (if applicable)):				!			
(Adjustment Details):	·			•	į		
	_						
Comments/Deviations:				OFFE catago E VARIANTO			

AQUATIC SCIENCE: 98-HOUR PASS/FAI	S INC. L. RAMBON TROUT TEST (EPS 1/RM	V13)				
Project Number:	- 19387		Sangeo Doto/Time:	25/	12/97/1	_
Serrete Number:			Samme Tech:		-	
Test Number:			Test master Outs/Time:	ac/	14/57//	7:05
Custody #:			Technologic		wm	1.03
COLLEGE V.			1 CONTRACTOR		77.70	
TIME	PARAMETER	(76)100 3:2	(S-rece D	PARAMETER TECHTIME	QA/GC REVIEW	
=======================================	Disastrat Carpen	1259,6	44	T	- Even	
	pri	7.7	<.2!	Win.		
0 HOURS	Temperature(C)	14 4	:4.2	M_{1}		
	Consuctivity(uS)	2750	2,8	18.00		
mman	lity @ 30 minutes (10 empouse)				1 1	
15 - 16 HOURS	He	7.42	8-21	(4/10252	Sit	
	Disselved Coygon	9-3	10.0			
	pH .	7.91	8.05	CY	723.	
24 HOURS	Temperatural(C)	14.5	14.4		'	
	Conductivity(uS)	2060	332	1652]	
	P Investida Como d Como		<u>Q</u>	しゅうス		
	Total # Dend	9.5	0		 - 	
	Disserved Coygen pH	7.32	9.6	(4		
48 HOURS	Temperature(C)	14.4	14.5	_ ,	W.	
3.133.13	Conductivity(u5)	2660	3 75	1		
	€ Introduction	0	- 10 3 - 0	1613		
	Total & Dead) A	o o			
	Disselved Coygon	9.6	9			
	pH	7.46	9.11	1305		
72 HOURS	Temperature(C)	14.6	14-6	,	(11	
	Conductivity(uS)	2740	333	120/	C01	
	€ Immetale	<u> </u>	C	1005		
	Total # Dead	0				
	Disselved Oxygen	9.5	9.7			
	pH	7.45	5.16	111	}	
96 HOURS	Temperature(C)	14.5	14.5	1738	r	
	Conduct why(u5)	3750	334	<i>'</i> }	$\cup 1$	
	/ Introduce	9		17391		
TOTAL MORTALITY	Total # Dead	0		' 70		
			<u></u>			
	MEASUREMENTS IF 100% KILL II		MON SUSSAMPLES AT 1 HOUR (OR 15 - 16 HOURS	AND 66 HOURS	
RESULTS 96 Hour Results:	312 : PA	SS (0% n	pertality)			
TEST ORGANISM CON Trout Beach Number:	iornous Cary	% Martelity of Culture 7 Days Pro	r to Teaming: 1.67	Tevious Day Last Fo	nesing Time: 17.00	2
Control Weight (g) / Ler						-
·5 5 135	1531321.0642	-66136-67137	76138 611341	-06,41	70138-6613	7
Sample Size:	10		lean Hulphs 0.73 +	-V16 -		
Meen Fork Length:	37 +/- 3 · Om			1:06		
Fork Length Min/Mas:	32 42 mm	u	peding Density: 0.41	91		
TEST CONDITIONS						
Total Presention Time:	16:3	To To	net Solution Valume (L):		18-L	_
	<u> </u>		ret Salutian Depth (18cm:10L: 28cm		32 cm	_
Banana 412 2			otal Nuttber Exposuri/Concentration	:	10	_
Presenton & Test Agrat			et Replicator (for QA/QC):	_	yes (66)	- [
pH Adustment	on Rate: 6.5 +/- 1 mL/r					}
		· · · · · · · · · · · · · · · · · · ·				

NITIAL PARAMETERS (prior to to				
issolved Oxygen (ppm):	9.4 (10.0	Physical State Upon Receipt:	<u> </u>	1
H:	7 94 10 14	Clarity:	clear	1 ,
emperature (C):	ice to a red-	Coleur:	Julic N	
onductivity (uS/cm):	2730 24-75	Precipitati:	SUSP. SCLINS	
	1	Odgur:	ve5	
dj. pH (if applicable)):	<u></u>			1
d _{justment} Oetal(s):				

Project Number: 19387 Service Number: 77 - 78		7 0	Sargeo Dom/Tivro:	05/2/91/-		
Servate Nutribor:		706	Sample Tests:	05/17/62//17:07		
Togs Mumber:	<u> </u>	, 06	Test Installan Cala/Time:		17 / 67/	77.67
Custody #:	Testinates: 24/27					
TIME	PARAMETER	(77)100	178) 100	PARAMETER TECHTIME	CAROC	
	Disserves Carygon	98	7.5			
	pH	:0 12	95	I min		
0 HOURS	Temperature(C)	14.4	14.3	J 114 04	1	
	Conductory(uS)	2G ° 0	275C	18:04	1 1	
Investi	ty (9 30 minutes (10 expense)		<i>C</i>		1	
15 - 16 HOURS	pH	9.72	7.92	14/10076	54	
	Disselved Coygon	10.0	10-0	(4/	1	
	piri	9.72	7.96	$\exists \mathcal{L} \mathcal{L}$	275	
24 HOURS	Temperature(C)	14.7	14.3	005/4	200	
	Conductivity(uS)	2640	36600			
	# Introduite		8	1649	1	
	Total # Days Dissaved Coygon	- 12	9.5		 	
	pH		745	(4	1 . 1	
44 HOURS	Temperature(C)		14-6	7 ′	CU.	
	Conductivity(uS)	 	2660	1 1617	1001-1	
	/ Inchabite		0	7 ' ' '	1	
	Total # Deed		Ò		1	
	Dissulved Oxygen	t	9 . 2			
	pH		7.40	CU	Cut	
72 HOURS	Temperature(C)		14-6	」 ′	Cul	
	Conductivity(u5)		2730	1803	}	
	/ Investile			1.00	l l	
	Total # Dead					
	Dissolved Oxygen		7.47	CU		
98 HOURS	pH Temperature(C)		(4-4	1 0	(i)	
30 HOURS	Conductivity(uS)	 	2740	-	COL	
	f Immobile		0	1736		
	Total # Dead		0	1, , , , ,		
TOTAL MORTALITY		10		7		
REMEMBER TO TAKE	MEASUREMENTS IF 100% ID	ILL IN 1 HOUR TAKE TEST S	IOLUTION SUBSAMPLES AT 1 HOU	R OR 15 - 16 HOURS	AND SE HOURS	
RESULTS	2/2 - 5 11/ /	1006	+1) 314 DA	55/ 00:		7.
96 Hour Results:	313 - PAIL (100% morta	11ty) 314 PA	33 (07c)	mortall	
	12014897	% Martainy of Culture 7 Days	Prior to Tostong:	Province Day Last F	leading Time:	00
Control Weight (g) / Lan	gan (mm): 2 3	1 4 5	1 1 7			10
0.58135	0.53132 1.0 14			1.06 141	021 38 0.66	
				_		
Semple Size:	IU_		Mean Weight 0.73	++ 0.19		j
Mean Fork Length:	37 +1-30		Weight MinAdes: 0-53	1.06		
Fork Langth Min/Mex:	<u> </u>	<u>mm</u>	Loading Dandliy:	0.4/ gr		
						
TEST CONDITIONS						
	i	w:30	6 6-4 M-4 6 \		186	ŀ
Total Presergeon Time:		7:00	Test Solvian Volume (L): Test Solvian Depth (19cm:10L; Si		32c	-
		30 min	Total Number Especial/Concenses	•	10	
Resson for Presentation >	30 moutes: 17	1/0	Test Replication (for QA/QC):	•	yes (70)	
Preseration & Test Agree		mugant.		•		
pH Adjustment:	700	(no)				
MITTAL DADAMETERS						
NITIAL PARAMETERS	(butes so seemed)	. 75				1
Dissolved Oxygen (ppm)	<u> </u>	1 io.0	Physical State Upon Record:	liquid	1 hourd	
pH:	71.34		Clenty:	Clear	21115	
Temperature (C):	14.4		Colour:	Vellen	1 Vailen	
Conductivity (uS/cm):	21:70	27.0	· · · · · · · · · · · · · · · · · · ·	<u> </u>		عدليواح
Mai au (4		:	Odour:	<u> vee</u>	 	
(Adj. pH (if applicable)): (Adjustment Details):					• •	1
_,						1
						

Project Number:

1-9 387

79-80 Semple Tech: Sample Number: 05/14/67/17:09 Test Indiates Date/Time: T47- T48 Test Number: nim Testamen: Custody #: PARAMETER **QAVQC** 190 has 1791 100 TECHTIME REVEW TIME PARAMETER Distanced Coygon MIM تاعل ج Temperature(C) 1:4-7 2 .4 : O HOURS 18:13 2750 2740 Conductivity(uS) minimizer (10 exposus) WIOSYZ 57 15 - 16 HOURS Disserved Chygon CM フ・ロフ 511 **7.3** ٦. 24 HOURS Temperature(C) 1660 Conductoral (\$1 1647 Total @ Deed Distanced Oxygen C4 Z · J · 50 CM. 1·6 2670 4.6 46 HOURS Temperature(C) 1619 060 Conductivity(uS) 8 ø Multiplake Total # Dead **Disselved Chygen** CH CU 14-6 4.6 72 HOURS Temperature(C) 174 U 1802 Conductivity(u\$) ø Immedia 0 Total & Dead Disselved Onygon <u>।पःप</u> 96 HQURS Temperature(C) <u>4 - 3</u> 2740 1734 Conductivatelu5) -Total # Dead TOTAL MORTALITY TAKE TEST SOLUTION SUBSAMPLES AT 1 HOUR OR 15 - 16 HOURS AND 66 HOURS REMEMBER TO TAKE MEASUREMENTS IF 100% IQLL IN 1 HOUR RESULTS 315 \$ 316: PASS(0% mortality) 96 Hour Results: TEST ORGANISM CONDITIONS <u>ما</u>.ا Provideus Day Last Feeding Time: 17:00 % Martality of Culture 7 Days Prior to Tosting: Control Weight (g) / Length (mm): C 531 32 1.2142 0.6136 0.671 37 0.76136 061134 1.06 141 0331 18 0.661 36 0.73 +4 0.19 9 10 Serrote Size: 0.53 - 1.06 9 37 Waight Min/Max: Meen Fork Length: 42 mm 0.41 32 Loading Density: 9/L Fork Length Min/Mex: TEST CONDITIONS 16:30 17:00 181 32cm Test Salutian Valume (L): Total Preseration Time: Test Salution Dopth (10cm:10L; 20cm:10L; 35cm:20L): Total Number Expensed/Concentration: mnla Test Replication (for QA/QC): Reason for Preservanon > 30 menutes: 0.5 +/- 1 mL/min/L Preservon & Test Agreson Rate: PH Admissment 100 INITIAL PARAMETERS (prior to tooling) 90 77 79 90 9.9 × Physical State Upon Researc <u>اع نيمدا</u> Distolved Oxygen (ppm): 7.55 11 8 11 5 rispar 3 6 Clenty: pH: <u>14.3</u> 110 V-2115W Temperature (C): 5,50 5,005 5.50.50.00 2700 Conductivity (uS/cm): (Adj. pH (if applicable)): (Adjustment Details): Commenta/Deviations * initial parameter's missed at time "O" and and evaluations

Sample Com/Time:

05/12/97/1-