Ferguson, Susan M MEM:EX

MMRD

From:

Minister, MEM MEM:EX

Sent:

Tuesday, January 26, 2016 9:16 AM MEM Correspondence MEM:EX

To: Subject:

FW: Victor Wyprysky

Info/File

----Original Message-----

From: Victor Wyprysky [mailto:vw@chieftainmetals.com]

Sent: Tuesday, January 26, 2016 9:08 AM

To: Minister, MEM MEM:EX Cc: Petrie, Cynthia MEM:EX

Subject:

Dear Minister Bennett

I understand from my colleagues you gave good mention of the Tulsequah project in a description of advanced mines in BC at Roundup. Thank you for the mention and your Governments support for mining projects such as ours in BC. Such support at this time is critical to investment confidence in our advanced project financing discussions.

Best Regards Victor

Victor Wyprysky President and CEO Chieftain Metals Corp. D: 416-479-5411

M: 416-305-8313

E: vw@chieftainmetals.com

1

McKnight, Elaine L MEM:EX

From: McKnight, Elaine L MEM:EX

Sent: Wednesday, January 27, 2016 8:40 AM

To: Cochrane, Marlene MEM:EX

Subject: Re: Chieftan metals

Thank you very much

Elaine

Sent from my Blackberry

From: Cochrane, Marlene MEM:EX

Sent: Wednesday, January 27, 2016 8:37 AM

To: McKnight, Elaine L MEM:EX **Subject:** Chieftan metals

This meeting has been moved to Thursday at 11:00, right after the meeting with Jessica and Gary. Thanks, Elaine.

Marlene Cochrane Senior Executive Assistant | Deputy Minister's Office Ministry of Energy and Mines Victoria | British Columbia

From: McKnight, Elaine L MEM:EX

Sent: Tuesday, January 26, 2016 2:47 PM

To: Cochrane, Marlene MEM:EX

Subject: Chieftan metals

Phone (250) 952-0120

Marlene is there any way we could move the chieftan metals meeting to Thursday. Tomorrow is so full.

Elaine

Sent from my Blackberry



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February 8, 2016

Diane Howe, Deputy Chief Inspector - Permitting Ministry of Energy and Mines PO Box 9320, Stn. Prov Govt Victoria, BC V8W 9N3

Re: Tulsequah Chief M-232 Mines Act Permit Amendment for care and maintenance monitoring and reporting activities.

Dear Ms. Howe:

Please be advised that the Tulsequah Chief Mine Project is currently on care and maintenance. Following direction from the combined MEM, MoE & EAO November 2015 inspection report of the Tulsequah Chief Mine, Chieftain Metals Inc. ("CMI") is submitting this letter application to amend its M-232 Mines Act Permit with a revised program as required by the HSRC Sec:10.6.2(2a) when a mine ceases operation for a period longer than one year. Information provided in the initial Mine Act and subsequent amendment applications is still relevant, and will assist as background for this request.

Care and maintenance activities will conform to existing requirements with no new site disturbances, this amendment seeks approval for periodic surveillance and monitoring scheduled only during the spring freshet and open water season, specifically: April, May, August and October, with annual reporting to MEM. The specifics of the these activities are detailed in a revised "Tulsequah Chief Mine Project Environmental Monitoring and Surveillance Plan for Care & Maintenance (2016+)" and includes all MoE requirements under an amended EMA permit #105719. The reduction in environmental monitoring and sampling frequency is supported by the long term consistency with the historical results and repeatable seasonal fluctuation, combined with zero site activities to initiate new changes. The included Tulsequah Chief EMA Quarterly Monitoring Report for Q4 2015 fully documents this information.

Additional information currently being prepared/reviewed will be submitted, as requested prior to March 31st, 2016.

- As built report for the Exfiltration pond.
- Operations, Maintenance and Surveillance manual for the exfiltration pond.
- Plan for decommissioning the emergency sludge pond located besides the IWTP (will be included within 2015 Annual Reclamation report).

Further information requested regarding the IWTP will be provided prior to resuming operations including: signed, final IWTP electrical diagrams; signed IWTP construction plans; and as built report and OMS manual for the emergency sludge pond besides the IWTP.

Concurrently, CMI is applying to MoE to amend EMA Permit 105719 during this period of care and maintenance under Sec:18(5)(a) of the EMA.

Additionally, CMI is re-stating its commitment to re-commencing operations at the IWTP to MEM and MoE by implementing engineered solutions to address the previously identified deficiencies immediately upon receiving project financing to develop the Tulsequah Chief Mine. The IWTP was initially commissioned in anticipation of project construction activities, to conform with the Mines Act condition to treat contaminated discharges from the new HPAG facility at Rogers Creek, with any excess capacity utilized to treat the existing underground acid mine drainage (subsequently modified by MEM in the July 7, 2011 amendment approval to include all portal discharges). As previously discussed, new mine development and operations is the only viable alternative for cleanup and remediation of the historic acid mine drainage and metal leaching at the mine site. Permit amendments for new mine activities will be follow once financing is in place.

We trust this amendment application meets your requirements at this time, and look forward to reviewing a draft amended permit with you. If you have any questions, please do not hesitate to contact us.

Yours Sincerely,

Chieftain Metals Corp.

Keith Boyle, P.Eng.Chief Operating Officer

/attach

cc. Mark Love, MoE Smithers
Arash Janfada, EPO, MoE Surrey
Rob Marsland, Chieftain
Eric Telford, TRTFN
Mark Connor, TRTFN



February 8, 2016

Diane Howe Deputy Chief Inspector, Ministry of Energy and Mines British Columbia diane.howe@gov.bc.ca

Candace Caunce Director, Compliance Ministry of Environment British Columbia candace.caunce@gov.bc.ca

Autumn Cousins Manager, Compliance Environmental Assessment Office British Columbia autumn.cousins@gov.bc.ca

Dear Ms. Howe, Ms. Caunce and Ms. Cousins;

We have enclosed the Compliance Plan to put Chieftain Metals Corp's Tulsequah Chief Mine into compliance as requested in your letter dated November 10, 2015.

The Compliance Plan includes two letter applications to amend the EMA Permit #105719 and Mines Act Permit # M-232 to reflect the project's care and maintenance status while project financing is assembled to continue mine construction and development for this world class project.

Chieftain is committed to this compliance plan and will continue to work with government authorities and the Taku River Tlingit First Nation to properly maintain the site. We request that the Ministries respond and acknowledge that Chieftain would be in compliance with its certificate and permits upon completion of this plan.

Sincerely,

Victor Wyprysky President and CEO

Cc. Eric Telford, Land and Resource Officer, Taku River Tlingit First Nation

Encl. Compliance Plan

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CHIEFTAIN METALS CORP. TULSEQUAH CHIEF PROJECT COMPLIANCE PLAN

FEBRUARY 2016



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- B. Responses to ARD/WQ issues raised at the sub-committee meeting of January 14, 1998
- C. Memo with photos of corrective measures
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- E. Application to amend EMA Permit #105719
- F. MEM Response Letter
- G. Application to amend MA Permit M-232

1. Introduction

On November 10, 2015, Chieftain Metals Corp. ("Chieftain") received a letter and orders from the British Columbia Ministry of Environment (MoE), Ministry of Energy and Mines (MEM) and Environmental Assessment Office (EAO) directing Chieftain to correct certain items of noncompliance as a result of recent inspections and 'to submit, within 90 days of the letter, an overall plan to bring the Mine into compliance. The plan should reflect, and is in addition to, any specific enforcement actions issued by the agencies'. The plan is due on February 9, 2016. The above-mentioned letter and orders are attached as Appendix A.

Chieftain submits the plan described herein in order to to bring the Tulsequah Chief Mine into compliance.

2. TULSEQUAH CHIEF PROJECT HISTORY

CMI ("CMI"), a wholly owned subsidiary of Chieftain, acquired the Tulsequah Chief Mine project, located in north-western British Columbia, out of receivership in September 2010.

The Tulsequah Chief Mine project has an Environmental Assessment Certificate (M02-01) under the BC Environmental Assessment Act and a CEAA Screening (2004, FEAI 36077) under the Canadian Environmental Assessment Act. On February 27, 2009, the Environmental Assessment Certificate was amended to provide for an alternative access to the site via air-cushioned barge along the Taku River. On October 22, 2012, the BC Environmental Assessment Office amended M02-01 as a result of re-routing the access road. Subsequently, Ministry of Forests, Lands and Natural Resource Operations approved an amended SUP and issued a new PUP for the road access route. On January 14, 2015, Environment Minister Mary Polak determined that the Tulsequah Chief Mine project has been "substantially started" pursuant to BC statutes. As a result, the Environmental Assessment Certificate will remain in effect for the life of the project and CMI can continue building the mine.

Redfern was issued Mines Act permit M-232 on February 28, 2008, which approved preconstruction site clean up of historic waste rock dumps in preparation for mine site construction. The specifics of this work included the relocation of historic waste rock dumps to a contained facility, the construction of the containment facility, the installation of an Interim Water Treatment Plant (IWTP) and the construction of required water management structures. This permit was subsequently amended on September 2, 2008 to allow for the development of the Paddy's Flats area for storage of materials and supplies required in construction and two borrow sources. A further amendment was issued on November 7, 2008 approving limited construction activities. These activities were mainly focused on preparatory work at the mill site and underground. Upon receipt of the Mines Act permit, Redfern initiated construction activities at the Tulsequah Chief Mine site and these activities continued throughout 2008.

In January 2010, an amendment requesting the transfer to CMI of Permit M-232 and reclamation liability was approved. Additionally, the amendment reconciled some site disturbances, originally authorized under Redfern's exploration Permit MX-1-355, with the M-232 permit. Disturbances created under MX-1-355 that were transferred to M-232 included the construction of 14.7 km of local access road that includes the north and south causeways, construction of a 1.2 km airstrip (of which 1.06 km has been completed to date) and geotechnical drilling in the area of the proposed tailings management facility. CMI sought an additional amendment to the Mines Act permit during 2011 to revise the location of the IWTP and to construct a temporary lime sludge pond alongside the airstrip. The amendment was approved on July 7, 2011.

3. INTERIM WATER TREATMENT PLANT HISTORY

CMI provided MoE with a detailed discussion of the factors leading up to the Company's decision to curtail operations at the Tulsequah Chief Interim Water Treatment Plant (IWTP) in February 2013. This section summarises the information contained in that February report.

The Tulsequah Chief Interim Water Treatment Plant (IWTP) was engineered by Sanitherm Inc. under the direction of Wardrop Engineering and Redfern Resources. The original Request for Quotes (Rev 0) issued in September 2007 had required:

- 2.1.3 Water treatment plant to be a complete, skid-mounted, Arctic-grade, turnkey system with instrumentation and alarms.
- 2.1.7 Water treatment plant shall be able to operate without constant supervision. Plant shall be provided with sufficient instrumentation and alarms to do so.

However, the final proposal from Sanitherm received in November 2007 and based on Rev 1.0 of the RFQ, committed to:

The IWTP does not include a centralized PLC. If this is required, it can be added at an additional cost, depending on the level of control required.

The flow rates through the Plant shall be manually set and adjusted. Once the flow rate is set and dosing of chemicals adjusted accordingly (and based on the on site lab tests) the Plant shall operate automatically. The specifics of the AMD water treatment require semiautomatic operations rather than fully automatic.

These changes to the operational plans were predicated on an expectation that the IWTP would be operated in conjunction with and adjacent to an operating mineral processing facility. This plant was then designed and built in 2008 and shipped to site in late 2008 for an anticipated 2009 construction program.

The plant was originally envisaged through an EA commitment [ARD Responses, January 15, 1998 – attached as Appendix B] to provide treatment for the incremental loading that might occur when the historic PAG (HPAG) waste rock was removed from the site to facilitate mill

construction. It was anticipated that the plant might need to run for a year or so while mill construction was underway, but at a rate of less than 10 m³/h. Any additional capacity was to be used to treat AMD from the Mine.

The criteria used to design the water treatment unit are discussed below. The treatment unit will be used to treat drainage from the material placed on the PAG waste rock dump. The treatment unit will be self-contained and sized to treat influent at a rate of 8.0 m³/hr. This estimate is based on the expected average annual flow from the PAG dump based on its current configuration and precipitation load as well as the 5400 dump area drainage, exclusive of current minewater discharge. The company feels this estimate is conservative since the PAG dump area has been designed at a 2.5:1 dump configuration suitable for reclamation. Since it is not designated for reclamation, the actual size will be less using a more standard angle of repose configuration for the dump. This will reduce the area of precipitation capture and drainage flow.

Ref. pg 6 of "Responses to ARD/WQ issues raised at the sub-committee meeting of January 14, 1998" submitted by Redfern to EAO on January 15, 1998. See Appendix B for complete document.

The current facility was designed to treat acidic discharge from the historic Tulsequah Chief Mine in conjunction with a full mine project until the upper underground workings could be back-filled as part of the designed operating mine plan, treating both the drainage from the HPAG and also acidic drainage from the historic underground workings.

As part of the acquisition of the Tulsequah Chief property from Redfern's receivers in 2010, CMI acquired the IWTP and delivered it back to the Tulsequah Chief by barge in June 2011 to meet the obligations of the Environment Canada Inspector's Direction dated February 22, 2011. The IWTP was constructed and commissioned onsite between June 2011 and March 2012.

The BC Ministry of Environment issued EMA Permit #105719 on 1 April 2012 upon completion of commissioning activities. Despite meeting the prescribed discharge water quality criteria, design parameters were not being met and operating costs were significantly higher than anticipated. CMI curtailed plant operations on 22 June 2012 due to corporate financial constraints.

4. EXPECTATIONS AND UNANTICIPATED OUTCOMES

The IWTP was designed to treat an average of 40 m³ of influent per hour, with plant throughput expected to be lower during winter months and higher during the Spring snowmelt. Had activities at the plant continued over the course of a year, the expected average flow would have been realised. In the time period from March 1, 2012 to May 31, 2012, sludge was being produced at an average rate of 1 m³ sludge per 52.8 m³ treated water, or 1,200% of design output. Sludge production rates were similar in the 90 days prior to shut down (March 25 to June 22, 2012, at 1 m³ per 56.3 m³ of water). CMI did not anticipate that such large sludge volumes

would be generated as a by-product of water treatment activities nor the additional pressures that such production rates would place on personnel and equipment at the site. A detailed discussion of these unanticipated outcomes was provided to the MoE on 24 July 2012.

On November 6 and 7, 2012, Sohan Basra, a water treatment design consultant who is a specialist in High Density Sludge (HDS) lime treatment systems, evaluated the IWTP. CMI, in response to a need to assess options to improve the water treatment plant performance at the Tulsequah Chief site, tasked Applied Water Treatment Inc. (AWT) to develop a feasibility level cost estimate to convert the existing Acidic Water Treatment Plant (ATP) to a more reliable High Density Sludge (HDS) process.

The feasibility design includes major equipment re-sizing, equipment modification and updated reagent consumption estimates based on the water chemistry and flowrate predictions conducted by CMI .

The HDS treatment process is expected to produce a sludge consisting mostly of metal hydroxide (expected to be ~15-20% solids) and effluent that will meet the discharge water quality target as previously demonstrated at site. Improvements are planned to convert the existing water treatment process to a more reliable HDS process. The peak HDS process design flow is 97 m³/hr and is expected to produce 30 to 40 kg/h of solids that will be included in the paste backfill mix as part of the mining process. The HDS process reduces the unit rate of sludge production due to increased sludge density and improves sludge stability, both chemically and physically (Applied Water Treatment, 2014). The HDS treatment process will produce a sludge consisting mostly of metal hydroxide (expected to be ~15-20% solids) and effluent that should meet the discharge water quality target as demonstrated at numerous sites globally and during IWTP operations in 2012.

Applied Water Treatment ("AWT") summarizes the process as follows: Lime and recycled sludge are added to the lime-sludge mix tank at the head of the process and this becomes the main neutralization agent. This mixture is discharged to the rapid mix tank where it is mixed with influent, thereby achieving neutralization. This mixture is fed to the main lime reactor where a combination of aggressive aeration and high shear agitation ensures optimum process chemistry and clarifier performance. The discharge from the lime reactor is treated with flocculent in the flocculation tank. The clarifier separates the treated effluent from the sludge, a portion of which is recycled to the head of the process. Clarifier overflow will be pumped through the existing polishing filter to ensure total suspended solids meet discharge requirements.

The existing reactor tanks in the IWTP will be modified to improve flow characteristics and include air injection. A small lime-sludge mix tank will be installed on top of the existing tank. The discharge from the second reactor tank will be transferred to a new conventional clarifier located outside the existing building.

The capital cost estimate prepared by AWT in November 2014 indicates that the cost to make the recommended upgrades will be about \$775,000. Significant savings in both labour and reagent costs are anticipated. Detailed design work will commence upon receipt of full project

financing and construction will follow-on immediately thereafter. The upgraded plant will be commissioned by the time water draining from the relocated PAG rock requires treatment.

5. AQUATIC ENVIRONMENTAL RISK ASSESSMENT

At the request of the British Columbia Ministry of the Environment in 2013, British Columbia based independent scientists from Palmer Environmental Consulting Group, Core6 Environmental Ltd. and Triton Environmental Consultants (December 2013, follow-up memo December 2014) evaluated the water quality at four sites on the Tulsequah River near the confluence of the Taku River where the mine is located. The group conducted an Aquatic Ecological Risk Assessment focused on Coho salmon, Sockeye salmon, Dolly Varden/Bull Trout, and Chinook salmon. Based on the seasonal trends of metal concentrations in the Tulsequah River, and the life cycles and habitat preferences of these species, the report concluded that the risk of impacts as a result of the mine discharge is considered low for migratory salmon. The report also determined that the zone of influence of any ecological risk does not extend to the Taku River.

A report published by Joseph P. Hitselberger of the Alaska Department of Fish and Game (2012) (Scannelreported that fish tissue from resident Dolly Varden, captured near the mine, showed low metal levels despite the more than 50 years of historic discharge. The levels of metals found in the fish are below those found in the fish samples collected from vicinity of the Greens Creek Mine in Alaska.

A separate report produced by Phyllis Weber Scannell for the Alaska Department of Fish and Game titled 'Taku - Tulsequah River Mining Activity, Background Environmental Monitoring and Potential Mining Effects' in January 2012 reviewed water quality studies from the Tulsequah and Taku River drainages. Based on the information reviewed, a comparison amongst sites showed that the sampling site that was upstream of mining on the Tulsequah River, had the highest maximum concentrations of Aluminum, Iron, and Nickel compared to downstream near the confluence with the Taku River, and on the Taku River itself. Maximum concentrations of both total and dissolved concentrations of Cadmium, Copper, and Zinc were highest in the Taku River (both upstream and downstream of the confluence with the Tulsequah River). No evidence exists of downstream or ecological effects from the 60 years of mine discharge despite the elevated concentrations of metals in the water immediately downstream of the mine (Scannell 2012). There is evidence that naturally high concentrations exist in the Tulsequah river, upstream of the mine and in the Taku river, upstream of the Taku/Tulsequah confluence.

6. RETURN TO COMPLIANCE

This compliance plan addresses the orders issued November 10, 2015 by the Environmental Assessment Office, Ministry of Environment and Ministry of Energy and Mines.

Non-compliance Issues Addressed- Environmental Assessment Certificate M02-01

- 1) Immediately implement spill prevention measures ensuring that hydrocarbons are not spilled or otherwise released into the environment from any equipment or hydrocarbon storage located on the Project site;
- 2) by November 30, 2015, develop a plan to:
 - remove the hydrocarbons that have been spilled at the four-non compliant locations into the receiving environment; and
 - prevent future spills or other releases of hydrocarbons into the receiving environment at the Project site; and
- 3) develop and implement the plan identified in clause 2 to the satisfaction of the Environmental Assessment Office.

The plan, as requested by the Environmental Assessment Office, is as follows.

To ensure that hydrocarbons are not spilled or otherwise released into the environment, CMI:

- a. on October 16, 2015, moved the AMC Pure Vis, a non-hydrocarbon drilling polymer, from the yard where a pail of the grease had leaked on the ground (bears may have consumed it), to inside the shop for storage.
- b. on October 17, 2015, covered the fuel storage area with tarps so that the secondary containment would no longer collect precipitation and overflow onto the ground. The secondary containment will require a modification to the design prior to future operation.
- c. on October 16, 2015, inspected equipment on site for hydrocarbon leaks. Readily available fuel has been recovered to reduce any potential of accidental leaks.
- d. on October 16, 2015, repaired the fuel line to the incinerator. The incinerator is not being used at this time and will be upgraded prior to resumption from the care and maintenance condition, with a properly designed secondary containment.

Please see the attached memo (Appendix C) for the before and after pictures of the completed corrections.

All soils contaminated by hydrocarbons at the four locations identified during this inspection will be picked up by hand shovel and, if necessary, excavator, and placed in empty drums and then stored temporarily in the secondary containment. The holes left by the removal of the hydrocarbons will be filled with clean rock and gravels from the area. Upon project development and construction of an approved land farm, the soils will be moved to the approved land farm area.

The soils will be picked up after the snow is melted and frost has left the ground. This is estimated to be late April or early May 2016.

All future spills will be prevented with the covers on the secondary containment areas and the storage of the drill grease in the shop. All equipment not in use will be inspected and have fluids removed where necessary to prevent accidental discharge of hydrocarbons. Drip trays will be placed under any undrained equipment. A site inspection is performed when personnel visit the site, to ensure compliance.

CMI corrected the two other non-compliance issues raised in the inspection report:

- a. on October 16, 2015, removed the pipes that were directing the discharge from the 5200 level adit directly to the river. The water is now flowing to the Exfiltration Pond adjacent to the 5200 level waste dump.
- b. on October 16, 2015, water above the 5200 level portal now flows in a ditch (following the Portal Creek diversion pipe that had been crushed by fallen rocks) down the hill. The clean water no longer mixes with the contaminated water from the 5200 level portal. The ditch will be maintained by hand until such time during project development when the fallen rocks can be cleared, the rock face can be properly secured, and the diversion pipe repaired.

Non-compliance Issues Addressed- EMA Permit #105719

The letter to Neil Bailey, P.Eng. dated November 23, 2015, attached, responded directly to the orders from the site visit. Please see the attached letter in Appendix D.

A follow up call on December 1, 2015 occurred with the EAO, MoE and MEM with respect to the action plan to be submitted by Chieftain within 90 days from the date of the orders. Given that the site is on care and maintenance and that the IWTP is not operational, the MoE stated that a permit amendment to EMA Permit #105719 would be consistent with the current state of the project and Mine Reclamation Code for projects under care and maintenance for more than one year.

The attached letter (Appendix E) to the MoE requests an amendment to the EMA #105719 until such time as Chieftain obtains project financing and construction has re-commenced. The supporting documentation requested by the MoE is attached to the request.

Non-compliance Issues Addressed- Health, Safety and Reclamation Code for British Columbia

The orders issued by the MEM were answered within the prescribed 15 days. See attached response (Appendix F).

The Tulsequah Chief site has been on care and maintenance since the shutting down of the IWTP on June 22, 2012. As such, CMI is attaching a request that the Mines Act Permit be amended to reflect the care and maintenance condition of the site (Appendix G). Pre-construction/early construction activities will resume at site upon Chieftain securing project financing.

As part of the application, CMI will provide an as-built drawing and an Operations, Maintenance and Surveillance manual for the Exfiltration Pond on or prior to March 31, 2016. These items will complete the orders issued by the MEM on November 10, 2015 with respect to the Exfiltration Pond.

Upon re-commencement of construction activities on site, the first works to be completed are the completion of the HPAG lined storage area, collection and moving of the HPAG waste to the lined storage and, once completely relocated, the waste will be covered to prevent precipitation from infiltrating through the waste. The IWTP will be retro-fitted with the new equipment outlined in the feasibility study and will then treat the acidic drainage from both the HPAG pile and the underground workings. The sludge from the IWTP will be hauled and stored in the temporary storage pit at the airstrip until such time as the sludge pit can be reclaimed and the sludge sent underground as part of the paste fill.

7. CONCLUSION

Chieftain remains committed to advancing the Tulsequah Chief Project through construction and into production, and maintains its commitment to re-commissioning the Tulsequah Chief Interim Water Treatment Plant at the earliest possible time upon completion of project financing and commencement of project construction.

As demonstrated in the attachments, the scope of the impact is well known, whereby approximately 80% of the acidic drainage is a result of the old underground workings and the remaining 20% is due to the waste piles on surface. The majority of the acid drainage from the waste pile occurs during the spring thaw. Therefore, any solution to deal with the drainage must address the water from the old underground workings.

Studies have concluded that the acid drainage is of low risk to the aquatic life in the Tulsequah with no impact in the Taku River over the near 60 years of drainage. Therefore, the only appropriate and viable solution to the historic drainage is to put the mine into production and fill the old workings.

CMI will continue to work with authorities and the Taku River Tlingit First Nation to properly monitor and survey the site according to the amendment applications enclosed and requests that the ministries acknowledge that Chieftain will be in compliance after amending the permits and following the amended monitoring and surveillance.

REFERENCES

Hitselberger, J.P., 2012. Tulsequah Chief Mine acid rock drainage: whole body metals concentrations in Dolly Varden char. Alaska Department of Fish and Game, Technical Report No. 11-09, Douglas, AK.

Palmer Environmental Consulting Group, Inc., Triton Environmental Consultants Ltd., and Core 6 Environmental Ltd., Aquatic Ecological Risk Assessment Tulsequah Chief Mine, report prepared for Chieftain Metals Inc., December 2013.

Palmer Environmental Consulting Group, Inc., Response to MoE Review of Tulsequah AERA, Memorandum prepared for Chieftain Metals, December 2014.

Scannell Scientific Inc. 2012. Taku – Tulsequah River Mining Activity Background Environmental Monitoring and Potential Mining Effects: Technical Report No. 12-01. Report prepared for the Alaska Department of Fish and Game, Division of Habitat.

TULSEQUAH CHIEF PROJECT COMPLIANCE PLAN

FEBRUARY 2016

LIST OF APPENDICES

- A. Letter and Orders issued November 10, 2015
- B. Responses to ARD/WQ issues raised at the sub-committee meeting of January 14, 1998
- C. Memo with photos of corrective measures
- D. Letter to Neil Bailey, MoE, dated November 23
- E. Application to amend EMA Permit #105719
- F. MEM Response Letter
- G. Application to amend MA Permit M-232

TULSEQUAH CHIEF PROJECT COMPLIANCE PLAN

FEBRUARY 2016

APPENDIX A

Letter and Orders issued November 10, 2015

FEBRUARY 2016

APPENDIX B

Responses to ARD/WQ issues raised at the sub-committee meeting of January 14, 1998

TULSEQUAH CHIEF PROJECT COMPLIANCE PLAN

FEBRUARY 2016

APPENDIX C

Memo with photos of corrective measures

APPENDIX D

Letter to Neil Bailey, MoE, dated November 23, 2015

APPENDIX E

Application to Amend EMA Permit #105719

TULSEQUAH CHIEF PROJECT COMPLIANCE PLAN

FEBRUARY 2016

APPENDIX F MEM Response Letter

APPENDIX G

Application to Amend MA Permit M-232

APPENDICE

A. Letter and Orders issued November 10, 2015



File: 30020-25 TULAC

Reference: 292869

November 10, 2015

SENT VIA EMAIL

Keith Boyle
Chief Operating Officer
Chieftain Metals Corp
Suite 2510, 2 Bloor Street West
Toronto ON M4W 3E2
keith.boyle@chieftainmetals.com

Dear Mr. Boyle:

We are writing to advise you of the results of recent inspections of the Tulsequah Mine by the Ministry of Energy and Mines, Ministry of Environment and the Environmental Assessment Office. The results of these inspections and associated enforcement for non-compliances identified during the inspections are attached. Any questions relating to any specific enforcement requirement should be directed to the agency that issued that enforcement action.

Recognizing their distinct authorities, the three agencies are coordinating regulatory oversight and will work with Chieftain Metals Corp to determine an appropriate path forward for resolving on going non-compliances for this Project. Within 90 days of this letter, please submit an overall plan to bring the Mine into compliance. This plan should reflect, and is in addition to, any specific enforcement actions issued by the agencies.

We are pleased to arrange a meeting to discuss this letter and next steps.

Yours truly,

Diane Howe Deputy Chief Inspector, Ministry of Energy and

Mines

Cassandra Caunce Director, Compliance Ministry of Environment Autumn Cousins
Manager, Compliance,
Environmental Assessment
Office

Auteun Cerson

...2

Attachments (5)

cc: Eric Telford, Land and Resource Officer, Taku River Tlingit First Nation



November 5, 2015

File: 105719

VIA EMAIL (rob.marsland@chieftainmetals.com)

Rob Marsland
Senior Environmental Engineer
Chieftain Metals Inc.
Unit 118, 1515 Broadway St,
Port Coquitlam BC
V3C 6M2 Canada

Dear Mr. Marsland:

RE: Non-compliance Advisory Letter Resulting from Inspection of permit number 105719 for Chieftain Metals Inc.'s Tulsequah Chief mine under the *Environmental Management Act*

On Oct. 15, 2015 the Tulsequah Chief facility near Atlin, BC was inspected by staff from the Ministry of Environment and Ministry of Energy and Mines. Thank you for your time during the inspection.

Enclosed is an inspection record and photo log from that site inspection. Please review the attached inspection record for further details.

Below lists the section, the non-compliance of that section and the action required related to the Permit (105719).

Section 1.1.5 The authorized works include, but are not limited to, a water collection and conveyance system, pumps, an acid water treatment plant which includes a neutralization chamber, rapid mix tank, flocculent tank, inclined plate-type separator/thickener, filters and holding tanks, a discharge line, outfall to the Tulsequah River, and related appurtenances approximately located as shown on Site Plan A. Section 2.1 – Bypasses

Any bypass of the authorized works is prohibited unless the approval of the Director is obtained and confirmed in writing.

Non-compliance: Written Approval for the bypass of the water treatment plant was not obtained and the discharge does not meet the conditions specified in Section 3.6. As a result, Chieftain Metals Inc. is in violation of Section 2.1 Bypasses.

Action: Commission the IWTP immediately once site development occurs.

Section 4. Discharge and Receiving Environment Monitoring.

Commencing July 1, 2014, Section 4.0 of permit 105719 is to read as follows:

- -Sampling monthly from October through February increased to bi-weekly April through May and then returns to monthly in the period from June to September.
- -The sites to be sampled remain W10, W46, SE2, W51 and W31
- -The parameters to be sampled for remain total and dissolved metals, pH, conductivity, turbidity suspended solids, hardness and alkalinity.

Non-compliance: The Permittee did not meet the amended requirements for Discharge and Receiving Environment Monitoring on the following dates and locations:

- -At site W51 for July 29, 2014 pH, conductivity and alkalinity were not monitored for.
- -Monitoring of W46 is suspended in June 2015 as path of river no longer passes through this location.

<u>Action</u>: Ensure monitoring occurs in the locations, frequencies and parameters required in The June 12 2014 Amendment to Section 4.0 Discharge and Receiving Environment Monitoring. Contact Director regarding amending the W46 monitoring location.

Failure to comply with the terms and conditions set out in your authorizations is a violation under the *Environmental Management Act* (EMA). A person who fails to comply with a provision of EMA may be found guilty of an offence and could be liable, on summary conviction, to a penalty. For your reference, EMA and all related and pertinent British Columbia Laws can be found at http://www.bclaws.ca/.

This advisory, the alleged violation and the circumstances to which it refers will form part of the compliance history of Chieftain Metals Inc. and its responsible officials and will be taken into account in the event of future non-compliance. You are directed to do the following:

- 1. Implement the necessary changes or modifications **immediately** to address this situation and to bring it into compliance.
- Notify this office by email or letter within 30 days of this letter, advising what corrective measures have been taken, and what else is being done, to bring this authorization into compliance.

Please note that this authorization is considered out of compliance until such a time as it can be confirmed to meet the authorization requirements. If you have any questions with regard to this advisory, please contact Neil Bailey at 250 847-7456 or email Neil.Bailey@gov.bc.ca.

Yours truly,

Neil Bailey, P.Eng.

Senior Environmental Protection Officer

Attachments: Inspection Record & Photo log

Cc Mark Love (by email), Section Head Mining Authorizations, Ministry of Environment, Mark.Love@gov.bc.ca

Cassandra Caunce (by email), Director Compliance & Integrated Pest Management Ministry of Environment, Cassandra.Caunce@gov.bc.ca

Diane Howe (by email), Deputy Inspector of Mines, Ministry of Energy and Mines, Diane. Howe@gov.bc.ca



Ministry of Energy and Mines

Province of British Columbia MINISTRY OF ENERGY AND MINES

Report of Inspector of Mines Reclamation

(Issued pursuant to Section 15 of the Mines Act)

Inspection No.:

59777

«FILE_NO»

Mine No.:

File:

0100019

Permit No.:

M-232

Emp/Cont: Orders : 1 2

Stop Work:

Mine Name:

Tulsequah Chief

Location:

Atlin MD / 58.737, -133.600

Owner, Manager:

Keith Boyle, Terry Zanger

Company:

Chieftain Metals Inc

Address:

Unit 118, 1515 Broadway Street

Port Coquitlam BC V3C 6M2

Workers Contacted:

1

Type of Mining:

METAL MINE UNDERGROUND

Date of Inspection:

2015/10/15

Accompanying Inspectors:

Mark Love (MOE), Neil Bailey (MOE)

Copies to

Al Hoffman, Doug Flynn, Heather Narynski, Mark Love (MOE), Chris Parks (EAO)

Written response is required from the Mine Manager within 15 days of receiving the report. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

This inspection of Tulsequah Chief Mine, owned by Chieftain Metals Inc (CMI) was conducted on October 15, 2015 by Diane Howe (MEM Deputy Chief Inspector-Permitting), Neil Bailey (MOE Compliance), and Mark Love (MOE Director), accompanied by Terry Zanger (Chieftain Mine Manager) and Rob Marsland (environmental engineer, Chieftain Contactor). Access to the site was via helicopter from Atlin (45 mins). The weather at the site was cloudy/overcast in the morning changing to a drizzle with snow predicted later in the afternoon in Atlin. Access using the helicopter limited the inspection to 3.5 hours.

At the time of the inspection, 2 employees and 1 contractor were in camp, completing their monthly monitoring requirements and preparing the camp for winter. The mine has been on a care and maintenance status since June 2012.

The purpose of this inspection was visit the surface works at the mine and provide an opportunity to become familiar with the site and specifically:

- To assess if the mine is meeting the intent of their mine permit (M-232), the HSRCode and Mines Act,
- To assess if mine monitoring and management practices at the mine are consistent with generally acceptable practices at mines in BC that are on care and maintenance; and

Diane Howe	DHone
Deputy Chief Inspector	Signature - Inspector of Mines
6th Floor, 1810 Blanshard St., Victoria	Report Date: November 9, 2015
Address	

To provide general comment on conditions at the mine.

The following areas were inspected during the mine visit:

- Lime Sludge Pit at Shaza airstrip
- 5400 portal area
- 5200 portal area
- Minesite exfiltration pond
- Mine Acid Water Treatment Plant (AWTP)
- · Cleared areas around Rogers Creek (future location of HPAG, NAG waste rock dumps)

The following reports provided a general understanding of the current conditions of the site: the 2014 Annual Reclamation Report, 2014 Annual Environmental Monitoring report and the 2015 Closure Management Manual submitted to MEM, as well as the observations and discussion that occurred on-site and during the inspection. This report documents MEM's observations related to requirements of the M-232 permit, the *Health, Safety and Reclamation Code for Mines in BC*, and established best practices.

Note space has been provided after each Order/recommendation for the Mine managers response.

Background

The mine is a historical, small, underground base metal operation which saw production from 1951 to 1957; (pre reclamation legislation) at which time the mine closed due to low metal prices. There still remains today legacy metal leaching/acid mine drainage/ (ML/ARD) concerns with water moving through the underground workings picking up contamination and discharging through the lower portals, plus surface drainage from the historical PAG waste rock left on site. There are no tailings facilities on site. Total disturbance reported in the 2014 Annual Reclamation Report was 105.8 ha, with ~50% being road construction.

In 2007 the company (then Redfern Resources Ltd.) applied for and received a Mines Act permit for limited construction works. This application was to allow the company to start with the clean-up of historical waste rock and dumps and construct water management structures to support the water treatment plant (WTP). In 2008 the company applied for an amendment to their mine permit which would have led to a full production permit, however the company went into bankruptcy protection. A limited amount of construction works permitted have been completed to date, critical however was the purchase of the water treatment plant (WTP).

In early 2010 the mine acquired by Chieftain Metals Inc. (CMI), who have now responsible for all liability existing on site under the Mines Act. One of CMI's first actions was to construct and start operating the WTP. The WTP was commissioned in October 2011 but was suspended in June 2012 because the plant had been operating below design levels of efficiency resulting in higher than expected operating costs. The design flaw is in the sludge production not in the quality of effluent being produced. The plant remains idle pending an upgrade to the sludge settling efficiency. Of note is the long term plan for sludge management was to dispose underground, however with the underground not in operation the company had to find an alternative disposal location for high slurry sludge

Date of Inspection November 9, 2015 Initials (Inspector) Initials (Manager)

The mine remains on care and maintenance and remains unattended with only bi-weekly surveillance and environmental sampling visits. Remote monitoring is provided by building alarms and security cameras with satellite communication connections. If alarms are triggered, personal based in Whitehorse or Atlin will attend the site.

Inspection Observations

Lime Sludge Pit at Shaza Strip

The temporary lime sludge storage pit, located just off the airstrip, contains approximate 35m³ of sludge generated from the WTP and is lined with a filter fabric to prevent migration of the sludge to the subsurface gravel. No deposition has occurred since the WTP shut down in June 2012. CMI maintains monitoring from 3 groundwater wells. CMI has committed, should mine operations not resume, to relocating the sludge to a secure location to the Rogers Creek area, which will be capped and re-vegetated.

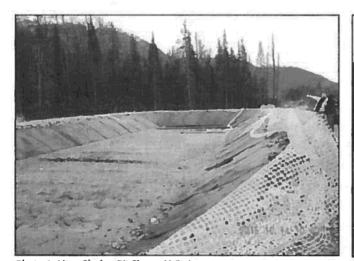




Photo 1: Lime Sludge Pit Shaza AirStrip.

Photo 2: Shaza Airstrip location of Sludge Pit

5400 portal drainage

The 5400 portal, the upper most accessible portal, has been appropriately signed with "Danger No Entry" signage and is currently blocked by locked wooden doors. Limited work has been done at this portal site other than to remove the historic track from the underground and reconfigure the drainage exiting the portal. In 2011 CMI separated the acidic from non-acidic drainage inside the mine and today the non-acidic drainage (in black pipe Photo 3) is conveyed to Portal Creek where they are combined (photo 4) and directly discharged to the Tulsequah River via a buried (partial) 600mm HDPE pipeline.

The acidic drainage seen exiting the mine as an orange flow (approx. 1L/s)(Photo 3) is captured in a pipe near the portal and is directly conveyed by a buried pipeline to the exfiltration pond located near the Tulsequah River. All drainage from the 5400 portal has been directed away from the historical waste thus limiting contaminated flows. (Photos 5 and 6)

Date of Inspection

November 9, 2015

Initials

NC

Inspector)

Initials



Phato 3:. The black pipe is diverting neutral drainage captured underground; The Fe stained drainage (acidic) is flowing freely from the portal and is captured in a pipe in the foreground.



Photo 4: The neutral drainage is combined with the Portal Creek drainage into a HDPE pipe and diverted away from historical waste rock to the Tulsequah River

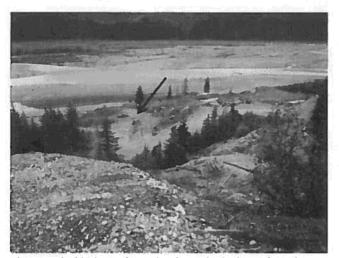


Photo 5: The black pipe (arrow) is the acidic discharge from the 5400 portal. Portal Creek and the combined non-acidic drainage discharge to the left of the picture in an underground HDPE pipe.



Photo 6: showing the historical PAG rock left from early mining. The ~80,000 tonnes of material to be relocated once mining restarts to the PAG dump on Rogers Creek.

5200 Portal

The 5200 portal, the lower most accessible portal is appropriately signed with "Danger No Entry" signs but the wood door is open to allow the passage of the discharge pipe seen in photo (Photo 7). Within 300 meters inside the entrance however, is a 1.8 m high dam used as part of an inactive passive water treatment system and the tunnel beyond is partially flooded. Acidic flow from this portal; which also includes partial flow from the 5400 and 5900 levels, averages ~ 7L/s.

At the time of this inspection, the 5200 acidic discharge was being directly discharged to the Tulsequah River (Photo 8). MOE officials accompanying the author sampled at the end of pipe at this location. It is understood that the direct discharge to the Tulsequah River was also done last year during the high flow period in order to minimize sludge build up in the exfiltration pond thereby and reducing the hydraulic loading on the pond. (MEM understands this direct discharge has not approved by MOE and discussions are ongoing.)

Date of Inspection

November 9, 2015

Initials

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(Inspector)

Initials



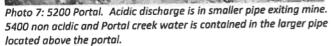




Photo 8: 5200 acidic portal discharge to Tulsequah River

Notable in Photo 7 is the 600mm HDPE pipe over top of the 5200 Portal entrance which is conveying the Portal Creek and 5400 non-acidic drainage to the Tulsequah River. The pipe requires ongoing monitoring and maintenance because of rock falling onto the pipe and at times crushing the pipe causing leakage. From the photo it can be seen the pipe is currently leaking with water spilling down to pond in front of the Portal. This pond drains into the ex-filtration pond via ditching and a culvert under the road.

Ex Filtration Pond

The observed ex-filtration pond was constructed in 2011 and was reportedly built to capture site drainage from the PAG waste dumps (Photos 9-11). Currently it is being used to capture all drainage, including the portal drainage, where the contaminated discharge is allowed to ex-filtrate through the road berm to the Tulsequah River (Photo 12). A filter fabric is used to prevent the migration of the Fe sludge into the dam rock void spaces would effectively block the diffuse flow. As noted in the 2014 ARR the sludge built up in 2013/14 nearly causing the pond to overflow requiring remediation to be taken by the company. (Note this incident was not reported to MEM)

A review of the applications submitted to MEM show the current ex filtration pond has not been built in accordance with the designs provided to the province. (Note MEM has not approved the design, construction or operation of this pond.)

A significant concern is the proper operation of the pond given there is no spillway observed and there is no continuous onsite presence.

Date of Inspection

November 9, 2015

initials

(Inspector)

Initials



Photo 9: Exfiltration pond receiving ditch water from the 5200 portal



Photo 10: Exfiltration pond receiving acidic discharge from the 5400 portal

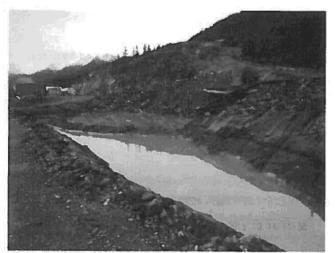


Photo 11 Exfiltration pond. Note high water level of sludge.



Photo 12: Diffuse discharge location through berm onto the Tulsequah river floodplain.

Acid Water Treatment Plant (WTP)

The WTP was constructed in its current location in 2011 after receiving approvals from the province to relocate and upgrade the previously proposed WTP (Photos 13, 14). The WTP is designed to treat acidic discharge on a temporary basis until the upper mine workings could be backfilled as per the mine design proposed in 2009. The plant ran from October 2011 till June 22, 2012 at which time operations were suspended due to operational issues. Since that time the company has sought guidance on process modification strategies to address the high operating costs. CMI has stated they are committed to re-commissioning the WTP at the earliest time upon completion of full project financing.

Noted during the inspection, beside the WTP, was another sludge pond which has not been approved by MEM (Photo 15)

Date of Inspection

November 9, 2015

Initials

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(inspector)

Initials



Photo 13: Acid Water Treatment Plant



Photo 14: Inside the AWTP

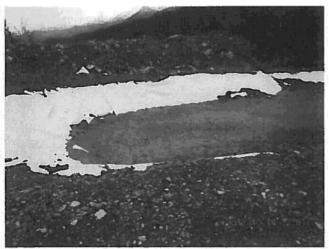


Photo 15:.Temporay Sludge pond beside AWTP

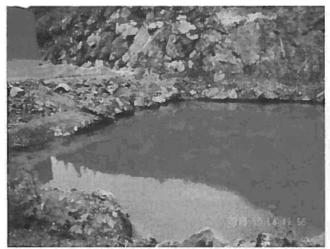


Photo 16: Site Collection Pond

Rogers Creek Area (HPAG and NAG areas)

Other than clearing, and some minor construction of berms the areas reserved for PAG and NAG waste rock storage has been minimal (Photo 18). Access to these areas from the main mine site is good; the causeway remains in good condition (Photo 17).

Date of Inspection

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(Inspector)

Initials





Photo 17; Causeway between mine and Rogers Creek area.

Photo 18: Clearing for the PAG and NAG waste rock areas.

Orders

The following orders are summarized based on observations and discussions that occurred on-site:

1. Pursuant to HSRC 10.5.1 and 10.5.2, the company shall provide to the Chief Inspector by March 31, 2016, or earlier, an asbuilt report for the exfiltration pond signed by a qualified professional engineer.

Managers response:

 Pursuant to HSRC 10.5.2, the company shall provide to the Chief Inspector by March 31, 2016, or earlier an Operation, Maintenance and Surveillance manual for the exfiltration pond operations to include all other water management structures, including diversion structures.

Managers response:

Information Requirements

The following information requirements are summarized based on observations and discussions that occurred on-site

 Prior to resuming operations of the sludge pond located beside the WTP, CMI shall provide to the Chief Inspector a final "as built" for the pond, and an operations, maintenance and surveillance manual. This may be combined with the OMS for the WTP once operations resume.

Managers response:

Date of inspection

November 9, 2015

Initials

DH

(Inspector)

Initials

	Report of Ins	ector of Mines	Page 9	of 9
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 CMI shall provide in the next annual report or upon restart of operations, which ever comes sooner, a plan for the decommissioning of this pond

Managers response:

5. Prior to resuming operations of the WTP, CMI shall provide to the Chief Inspector final electrical line diagrams and building construction plans signed and sealed by a qualified professional.

Managers response:

Conclusion

The October 15th, 2015 inspection provided an excellent overview of the current mine site conditions and ongoing activities. Although the mine is on care and maintenance CMI continues to fulfill their obligations for monitoring and maintenance of the site. While the company does remain vigilant in this regard, this inspection has found that communication with the Province with respect to obtaining approvals and reporting issues need to be improved.

Date of Inspection November 9, 2015 Initials (Inspector) Initials (Manager)



Ministry of Environment Inspection Record

Environmental Protection Division

EP System:	
AMS	Inspection Status: FINAL
System Number:	Inspection No:
105719	23226
EP System Status: <u>Active</u>	Inspection Date: 2015-10-15
Region: Skeena	Office: Smithers
Trigger: Planned Inc	idents of Non-Compliance Observed: Yes
Non-Compliance Decision Matrix Level: Level 1	Non-Compliance Decision Matrix Category: Category B
Inspector Name(s): Neil Bailey	Risk Ranking: 0 to 1 = Low
Audit:	Total Non-Compliance(s):
Regulated Party:	
CHIEFTAIN METALS INC.	
Regulated Party Contact(s):	
Rob Marsland Senior Environmental Engineer	
Mailing Address:	
process and the same and the sa	tive Vice President, Unit 118, 1515 Broadway St, Port
Phone No: (604) 836 7559	Fax No:
Contact Email: rob.marsland@chieftainmetals.co	om
Location Description or Site Address:	
Tulsequah Chief Mine Site mine located approxi	mately 100 kilometers south of Atlin, BC and 64 east bank of Tulsequah River in northwest British
Latitude: 58.71666 N	Longitude: 133.5833
Receiving Environment(s): Surfacewater	

Summary

MONITORING AND REPORTING REQUIREMENTS

Inspection Period:

From: 2014-07-01 To: 2015-10-15

Requirement Source:

Permit

Activity: On Site Waste Type: Effluent

Inspection Summary:

Site inspection was conducted on Oct. 15th by Neil Bailey (MOE), Mark Love (MOE) and Diane Howe (MEM). Site tour was provided by Rob Marsland, Senior Environmental Engineer. Terri Zanger and Rob Motley were also on site from Chieftain. Weather was overcast, 1 deg. C, periods of light rain.

Site currently in care and maintenance, with the water treatment plant shut down until activities resume at the site (moving of waste rock).

2014 Q3 and Q4, 2015 Q1 and Q2 reports were reviewed for compliance with the permit.

The following non-compliances were noted from the Oct. 15th site inspection and data review:

- 1) Written Approval for the bypass of the water treatment plant was not obtained and the discharge does not meet the conditions specified in Section 3.6. The permittee is in non-compliance with section 2.1 of the permit.
- 2) At site W51 for July 29, 2014 pH, conductivity and alkalinity were not monitored for

Monitoring of W46 is suspended in June 2015 as path of river no longer passes through this location.

ACTIONS REQUIRED BY REGULATED PARTY:

- 1)Commission the IWTP immediately once site development occurs.
- 2) Ensure monitoring occurs in the locations, frequencies and parameters required in The June 12 2014 Amendment to Section 4.0 Discharge and Receiving Environment Monitoring. Contact Director regarding amending the monitoring location of W46.

ADDITIONAL COMMENTS:

On June 6, 2012, Chieftain Metals Inc., sent a letter to Mr. Wade, Comin, Inspector, Environment Canada, with copy to Ian Sharpe, Regional Director, Environmental Protection, of the Ministry of Environment. The letter informed Mr. Comin, that the Company intended to cease operations of the mine water treatment plant at the Tulsequah Chief Mine site.

Subsequently, Chieftain Metals notified the Ministry that they had ceased operating the water treatment plant as of June 22, 2012 and were bypassing the authorized works.

Permit 105719 issued under the Environmental Management Act (EMA), on April 27, 2012 requires that water from the 5200, 5400, and 5900 portals and mine site runoff report be collected and treated through prescribed works specified in Section 1.1.5.

Further, Section 2.1 prohibits the bypass of authorized works unless there is written approval from the Director,

2

Response:

Advisory

or that it meets the conditions specified in Section 3.6, which allows for the discharge of neutral mine water from the underground that meets the limits specified in Section 1.1.3 of the authorization.

Permit amendment issued on June 12, 2014 amending Discharge and Receiving Environment Monitoring. Commencing July 1, 2014, Section 4.0 of permit 105719 is to read as follows:

- -Sample monthly from October through February increased to bi-weekly April through May and then returns to monthly in the period from June to September.
- -The sites to be sampled remain W10, W46, SE2, W51 and W31
- -The parameters to be sampled for remain total and dissolved metals, pH, conductivity, turbidity, suspended solids, hardness and alkalinity.

An Aquatic Ecological Risk Assessment was conducted in the Tulsquah River in 2013 by triton Environmental, Palmer Environmental and Core6.

Compliance History:

Advisory issued 2012-05-21 for accidental release of mine water.

2012-12-06 Notice of non-compliance for sludge pond seep.

2013-01-16 Advisory issued requiring permittee to follow monitoring requirements laid out in the Discharge and Receiving Environment Authorization Amendment - specifically the weekly metals sampling required at W10 and W32.

Compliance Summary	In.	Out	N/A	N/D
Discharge	1	0	0	0
Operations	0	1	0	0
Reporting	1	0	0	0
Monitoring	0	1	1	0

Inspection Details

Requirement Type: Monitoring

Requirement Description:

Section 1.1.3 Interim Acid Water Treatment Plant (IAWTP) discharge characteristics:

Maximum allowable concentration in any grab sample

0.5mg/L for Aluminum(dissolved),

0.05mg/L for Arsenic(dissolved), Copper(dissolved) and Lead(dissolved)

0.2 mg/L for Zinc(dissolved)

30mg/L for TSS, 6.0-9.5 pH units

50% Survival in 100% Concentration, Minimum - Rainbow Trout 96 hr Acute Lethality, Single Concentration

These limits apply to treated effluent discharge from the IAWTP and the Neutral pH Mine Water (NMW).

Details/Findings:

IAWTP being shut down since June22, 2012 there was no discharge of treated mine effluent form the plant to sample.

Compliance: Not Applicable

Requirement Type: Operations

Requirement Description:

1.1.5 The authorized works include, but are not limited to, a water collection and conveyance system, pumps, an acid water treatment plant which includes a neutralization chamber, rapid mix tank, flocculent tank, inclined plate-type separator/thickener, filters and holding tanks, a discharge line, outfall to the Tulsequah River, and related appurtenances approximately located as shown on Site Plan A.

Section 2.1 Bypasses

Any bypass of the authorized works is prohibited unless the approval of the Director is obtained and confirmed in writing.

Details/Findings:

Written Approval for the bypass of the water treatment plant was not obtained and the discharge does not meet the conditions specified in Section 3.6. As a result, Chieftain Metals Inc. is in violation of Section 2.1 Bypasses of Permit 105719.

Compliance: Out

Requirement Type: Discharge

Requirement Description:

3.6.1 Uncontaminated groundwater from underground drill holes with characteristics better than or equal to that specified in section 1.1.3, may bypass the treatment plant and be diverted to Portal Creek.

Details/Findings:

Neutral pH water met the criteria for diversion for all data reviewed.

Compliance: In

Requirement Type: Monitoring

Requirement Description:

Section 4.0 Discharge and Receiving Environment Monitoring.

Commencing July 1, 2014, Section 4.0 of permit 105719 is to read as follows:

- -Sample monthly from October through February increased to bi-weekly April through May and then returns to monthly in the period from June to September.
- -The sites to be sampled remain W10, W46, SE2, W51 and W31
- -The parameters to be sampled for remain total and dissolved metals, pH, conductivity, turbidity, suspended solids, hardness and alkalinity.

Details/Findings:

The Permittee did not meet the amended requirements for Discharge and Receiving Environment Monitoring on the following dates and locations:

- -At site W51 for July 29, 2014 pH, conductivity and alkalinity were not monitored for.
- -Monitoring of W46 is suspended in June 2015 as path of river no longer passes through this location.

Compliance: Out

Requirement Type: Reporting

Requirement Description:

5.7 Annual report

The Permittee shall submit an annual report by March 31st of each year, with the first report submitted on March 31, 2013.

Details/Findings:

2014 Annual Report submitted and on file.

Compliance: In

Were the following collected during inspection:

Samples?	Photos? 🗸	S No.	
Other (please	specify)		
Is the Inspect	ion related to an EA Proje	ect?	untificants Niconsham
		EA Project Ce	rtificate Number:
INSPECTION COL	NDUCTED BY:		
Signature			Date Signed
Neil Bailey			2015-11-05
ENCLOSURE(S)	O REGULATED PARTY & DESC	RIPTION:	
			CVIS Archives
REGULATORY CO	NSIDERATIONS:		
DISCLAIMER:			The state of the s
	r guidance and are not the c		practice referenced in this inspection efer to the original permit, regulation
To see the most up to date version of regulations and codes of practices please visit: http://www.bclaws.ca/			
If you require a copy of the original permit, please contact the inspector noted on this inspection record or visit: http://www2.gov.bc.ca/gov/topic.page? id=DF89089126D042FD96DF5D8C1D8B1E41&title=Publicly%20Viewable%20Authorizations			
	the authorization therefore		necessarily reflect each requirement or ly for the requirements or conditions rd.
Ministry		Mailing Address:	
Ministry of Environment	Skeena	Mailing Address: Bag 5000, 3726 Alfred	Phone: (250) 847-7260
	Region Environmental Protection	St	Fax: (250) 847-7591 Website:
I	Division	Smithers, BC V0J 2N0	110001101

CVIS Photo Record pg. 1 of 7

Authorization: 105719	Client Name: Chieftain Metals Inc.
CVIS IR #: 23226	(Date) Site Inspection Photos; Oct. 15, 2015

Photo 1

Site from the air, viewed from the Northwest.



Photo 2

Sludge pond adjacent runway.



CVIS Photo Record pg. 2 of 7

Authorization: 105719	Client Name: Chieftain Metals Inc.
CVIS IR #: 23226	(Date) Site Inspection Photos; Oct. 15, 2015

Photo 3

5400 portal.



Photo 4

Neutral Mine Water discharge.



CVIS Photo Record pg. 3 of 7

Authorization: 105719	Client Name: Chieftain Metals Inc.
CVIS IR #: 23226	(Date) Site Inspection Photos; Oct. 15, 2015

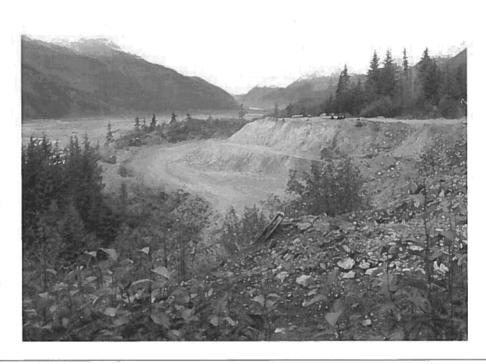
Photo 5

View from 5400 to 5200 level.



Photo 6

Waste rock, view from 5400 portal.



CVIS Photo Record pg. 4 of 7

Authorization: 105719	Client Name: Chieftain Metals Inc.
CVIS IR #: 23226	(Date) Site Inspection Photos; Oct. 15, 2015

Photo 7

Exfiltration Pond.



Photo 8

5200 portal.

Large rock on neutral mine water bypass pipe.



CVIS Photo Record pg. 5 of 7

Authorization: 105719	Client Name: Chieftain Metals Inc.
CVIS IR #: 23226	(Date) Site Inspection Photos; Oct. 15, 2015

Photo 9

5200 discharge location.
Samples for TSS, total metal and dissolved metals taken at this location.

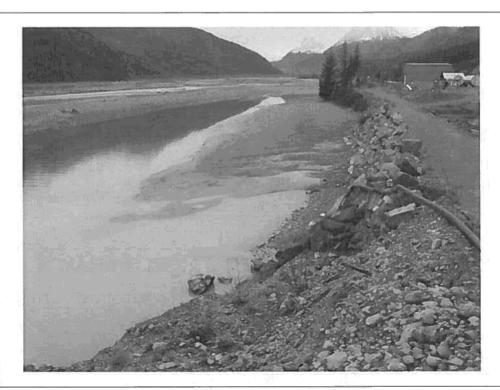


Photo 10

View to IWTP discharge point.



CVIS Photo Record pg. 6 of 7

Authorization: 105719	Client Name: Chieftain Metals Inc.
CVIS IR #: 23226	(Date) Site Inspection Photos; Oct. 15, 2015

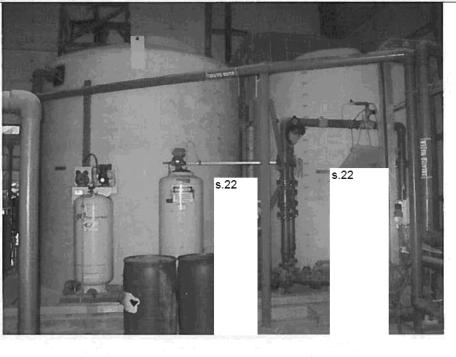
Photo 11

Sludge storage pond adjacent to IWTP.



Photo 12

Water treatment plant holding tanks.



CVIS Photo Record pg. 7 of 7

Authorization: 105719	Client Name: Chieftain Metals Inc.
CVIS IR #: 23226	(Date) Site Inspection Photos; Oct. 15, 2015



Neutralization chamber.



Photo 14

Rapid mixing tank.





Environmental Assessment Office Inspection Record

Project Name: Tulsequah Chief Mine Project	Inspection Status:				
Certificate #: M02-01	Inspection No:				
Certificate Status: <u>Certified</u>	Inspection Date: 2015-07-14				
Region: <u>Skeena</u>	Office: Victoria				
Trigger: Planned Incidents of Non-Compliance Observed: Yes					
Non-Compliance Decision Matrix Level: Level 3 - Moderate temporary impact likely	Non-Compliance Decision Matrix Category: Many NCs, little/not aware/not capable to comply				
Inspector Name(s): Compliance Officer Drew Milne and Senior Comp	liance Officer Chris Parks				
Audit Record(s): Proponents Name: Chieftain Metals Corporation	Total Non-Compliance(s):				
Proponents Contact(s): Chief Operating Officer Keith Boyle					
Mailing Address: Chieftain Metals Corporation Suite 2510 2 Bloor Street West Toronto, Ontario M4W 3E2					
Phone No: 416.479.5417	Fax No: 416.479.5420				
Contact Email: keith.boyle@chieftainmetals.com					
Location Description:					
near its junction with the Taku River, approxima	n northwestern British Columbia on the Tulsequah River tely 100 kilometres south of the town of Atlin, British , Alaska. Access to the mine site is via boat (from				
Lat: 58° 44'12.03	Long: 133° 36'02.60" W				
Sector: Mines					

Summary

MONITORING AND REPORTING REQUIREMENTS

Inspection Period:

From: 2015-07-14 To: 2015-07-14

Certificate or Act:

Certificate under the Environmental Assessment Act

Activity: On Site

Inspection Summary:

This record details the results of an inspection against conditions attached to Environmental Assessment Certificate M02-01 (EAC), currently held by Chieftain Metals Corporation, that occurred on 2015-07-14. The inspection was conducted by Drew Milne, Compliance Officer, EAO, and Chris Parks, Senior Compliance Officer, EAO. The purpose of the inspection was to determine compliance with specific conditions of EAC# M02-01.

Chieftain Metals Corporation Mine Manager Terry Zanger and staff Rob Motley accompanied C&E Milne and C&E Parks during the site inspection. Upon completion of the field component of the inspection, officers conducted an onsite inspection debrief with Mine Manager T. Zanger and R. Motley and noted that they required further information to inform their inspection report.

The mine site inspection and site documentation review was conducted over the course of one field day and several office days reviewing data sets, reviewing requested information, and joint agency information sharing.

After review of observations and information obtained during the inspection and provided subsequent to the inspection by Chieftain Metals Corporation, the following compliance determinations have been made:

- 1. Chieftain Metals Corporation is out of compliance with Conditions 1.4.1 and 1.4.2 of the Table of Conditions (Schedule B of the EAC), with respect to the drainage and collection of contaminated water;
- 2. Chieftain Metals Corporation is out of compliance with Condition 1 of the EAC, specific to requirements of the Construction and Operations Wildlife Management Plan listed in Annex 1 of the EAC amendment # 3 M02-01 (2009).
- 3. Chieftain Metals Corporation is out of compliance with Condition 1 of the Certificate which requires the Certificate Holder to cause the Project to be designed, located, constructed, operated and/or abandoned in accordance with the documents and correspondence listed in Schedule A to the Certificate. Schedule A of the Certificate, as amended, includes "Tulsequah Chief Project Report Volume IV Environmental Management, Redfern Resources Ltd., July 1997", which includes a commitment concerning a Spill Contingency Plan for the Project

EAO COMPLIANCE AND ENFORCEMENT HAS CONFIRMED THAT CHIEFTAIN METALS IS IN NON COMPIANCE WITH CONDITIONS 1, 1.4.1, AND 1.4.2 OF EAC#M02-01, ISSUED FOR THE TULS EQUAH CHIEF MINE PROJECT. PLEASE

Response:

REFER TO THE "ACTIONS REQUIRED BY PROPONENT" SECTION OF THIS INSPECTION RECORD FOR DETAILS OF ENFORCEMENT MEASURES.

Compliance Summary	In	Out	N/A	N/D
Automatically populated upon upload				

Inspection Details

Types of Compliance: Construction

Requirement Description:

SCHEDULE B Commitment 1.4.1

Ensure the underground drainage system transports all contaminated water to the collection location for effluent treatment plant.

Findings:

EAO C&E Officers observed that not all effluent water is being directed to "the collection location for the effluent treatment plant" as required by Commitment 1.4.1. Some of the effluent water observed is being directed to the Tulsequah River (See Attached Photo: IMG_0346, IMG_0394, IMG_0395, IMG_0396).

EAO C&E Officers noted that an Effluent Treatment Plant has been constructed, but is not operational. Mine Manager T. Zanger stated to EAO C&E Officers that the "Waste Water Treatment Plant had not been operation for approximately two years." MOE EPD has requirements for water treatment during construction. EAO C&E has referred this matter to MOE EPD.

Chieftain Metals has been previously warned by Environment Canada that discharge of effluent to the Tulsequah River is contrary to the Federal Fisheries Act. (See attached Appendix A).

Compliance: Out

Types of Compliance: Construction

Requirement Description:

SCHEDULE B Commitment 1.4.2

To reduce treatment costs, wherever feasible divert clean water away from areas of potential contamination and, if possible, discharge separately.

Findings:

EAO C&E Officers observed neutral mine water from the 5400 Portal flowing, due to a system of bypass failures, into the 5200 Portal and mixing with contaminated mine contact water.

The neutral mine water pipe was observed to be damaged in at least five locations allowing for the discharge of the neutral mine water into the mine at the 5200 Portal level (See attached overview Photo IMG_0346).

Neutral mine water flow velocity can be compared at the intake with the outflow in photos: Neutral water Intake: IMG_0402; Neutral water outflow: IMG_0387. Neutral mine water was observed by officers discharging from the bypass pipe and flowing into the 5200 Portal (See Attached pipe damage Photo IMG_0388, IMG_0389, IMG_0390, IMG_0391, IMG_0392 and IMG_0393).

Compliance: Out

Types of Compliance: Construction

Requirement Description:

Condition 1 of the Certificate requires the Certificate Holder to cause the Project to be designed, located, constructed, operated and/or abandoned in accordance with the documents and correspondence listed Annex 1 of the EAC amendment # 3 M02-01 (2009). Annex 1 amendment # 3 M02-01 (2009) includes the Wildlife Management Plan.

Section 2.1.2.4 "Waste Handling and Disposal" of this plan requires that any grease, oils, fuels or antifreeze stored on-site must be stored in bear-proof areas or containers.

Findings:

EAO C&E Officers observed that at Shazzah Camp Site, maintenance/fuel storage area, contrary to the Construction and Operations Wildlife Management Plan:

Two wooden pallets, stacked one on top of the other, full of 20L grease containers (AMC PURE-VIS). These 20L grease containers were not secured in a bear proof-container; Conflict wildlife (assumed to be a bear) had punctured at least two of the 20L plastic containers and consumed some of the grease (See photos IMG_0420 IMG_0421 and IMG_0422).

Compliance: Out

Types of Compliance: Construction

Requirement Description:

Condition 1 of the Certificate requires the Certificate Holder to cause the Project to be designed, located, constructed, operated and/or abandoned in accordance with the documents and correspondence listed in Schedule A to the Certificate. Schedule A of the Certificate, as amended, includes "Tulsequah Chief Project Report – Volume IV Environmental Management, Redfern Resources Ltd., July 1997", which includes a commitment concerning a Spill Contingency Plan for the Project (Appendix C).

Findings:

EAO C&E Officers observed the following at Shazzah Camp Site maintenance and fuel storage area, contrary to the Spill Prevention and Response Plan:

- 1. Two pallets full of 20L grease containers (AMC PURE-VIS) were not stored in a secondary containment unit and were leaking onto/into the unprotected ground (See photos IMG_0420, IMG-0421 and IMG_0422).
- 2. A secondary containment unit is in place, however the unit is not covered with a roof. It is collecting precipitation which is causing the precipitation and hydrocarbons to overflow at the at a low point in the containment unit (See photos IMG_0412, IMG-0413, IMG_0414 and IMG_0415).
- 3. A dump truck, a white transport truck, and the garbage incinerator fuel tank were observed to be leaking hydrocarbons to ground (See photos: Dump truck IMG_0416, IMG_0417 and IMG_0418; Transport Truck IMG_0423 and IMG_0424 and incineration fuel tank IMG_0425).
- 4. The vehicles (white transport truck and dump truck), the secondary containment unit, and potentially the 20L grease container leak have been leaking for some time (months years) and have not been inspected monthly as required by the Spill Prevention and Response Plan.

Compliance: Out

ACTIONS REQUIRED BY PROPONENT(S) & ADDITIONAL COMMENTS:

CHIEFTAIN METALS IS HEREBY WARNED THAT THE PROJECT IS NOT COMPLIANT WITH CONDITIONS 1.4.1 AND 1.4.2 OF EAC#M02-01. AS REFERENCED IN THE JOINT MOE/MEM/EAO NOVEMBER 10, 2015 LETTER, CHIEFTAIN IS REQUESTED WITHIN 90 DAYS TO PROVIDE A PLAN FOR HOW CHIEFTAIN WILL ADDRESS REGULATORY REQUIREMENTS, INCLUDING ENFORCEMENT ISSUED BY THE AGENCIES.

CHIEFTAIN METALS IS IN NON-COMPLIANCE WITH CONDITION 1 OF EAC#M02-01. IN RESPONSE TO THIS NON COMPLIANCE, EAO C&E HAS ISSUED AN ORDER TO REMEDY UNDER SECTION 34 OF THE ENVIRONMENTAL ASSESSMENT ACT (SEE ATTACHED).

EAO C&E MAY CONDUCT A FOLLOW UP INSPECTION TO DETERMINE IF THE TULSEQUAH CHIEF PROJECT HAS BEEN BROUGHT BACK INTO COMPLIANCE WITH THESE REQUIREMENTS. CONTINUED NON COMPLIANCE WITH THESE REQUIREMENTS MAY RESULT IN ADDITIONAL ENFORCEMENT UNDER THE ENVIRONMENTAL ASSESSMENT ACT.

INSPECTION CONDUCTED BY:

Signature

Date Signed:

Compliance Officer Drew Milne

2015-11-10

ENCLOSURE(S) TO PROPONENT(S) & DESCRIPTION:

Inspection Photographs

Appendix A: Warning by Environment Canada 2012

Appendix B: Construction and Operations Wildlife Management Plan (2008)

Appendix C: Tulsequah Chief Project Report Volume IV Environmental Management

REGULATORY CONSIDERATIONS:

The Ministry of Energy and Mines and Ministry of Environment, Environmental Protection Division conducted an inspection on October 15, 2015. The three agencies are coordinating enforcement for noncompliances identified by each agency. On November 10, 2105, the three agencies issued a joint letter, including the results of the agencies' inspections and resulting enforcement.

Environmental

Mailing Address: Assessment Office 1st Floor 836 Yates St PO Box 9426 Stn Prov Govt Victoria BC V8W 9V1

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IN THE MATTER OF THE ENVIRONMENTAL ASSESSMENT ACT S.B.C. 2002, c.43 (ACT)

AND

NON-COMPLIANCES WITH ENVIRONMENTAL ASSESSMENT CERTIFICATE M02-01 ORDER UNDER SECTION 34(1)

WHEREAS:

- A. On December 12, 2002, Environmental Assessment (EA) Certificate M02-01(Certificate) was issued to Chieftain Metals (Certificate Holder) for the Tulsequah Chief Mine Project (Project). Condition 1 of the Certificate requires the Certificate Holder to cause the Project to be designed, located, constructed, operated and/or abandoned in accordance with the documents and correspondence listed in Schedule A to the Certificate. Schedule A of the Certificate, as amended, includes "Tulsequah Chief Project Report Volume IV Environmental Management, Redfern Resources Ltd., July 1997", which includes a commitment concerning a Spill Contingency Plan for the Project (Spill Plan).
- B. On July 14, 2015, in his role as EA Compliance Officer, the undersigned conducted an inspection of the Project. Based on observations during the inspection and review of information following the inspection, the undersigned has determined that the Certificate Holder is not compliant with Condition 1 of the Certificate due to a failure to construct and operate the Project in accordance with the Spill Plan and that non-compliance with this condition has resulted in hydrocarbons spilling into the environment.
- C. On July 14, 2015, the undersigned verbally advised the Mine Manager representing the Certificate Holder of the alleged non-compliances so that the Certificate Holder could begin to remedy the hydrocarbon spillage while the occurrence of noncompliances was being confirmed by the undersigned.
- D. The undersigned has received written delegation of the Minister's powers under Section 34 of the Act.

DEFINITIONS:

In this Order.

(a) "four non-compliant locations" means the four locations at or near the Tulsequah Chief Shazzah Camp maintenance yard identified in the undersigned's report for the July 14, 2015 inspection as being non-compliant with the Spill Plan required by the Certificate; and (b) "to the satisfaction" means, in relation to a provision of this Order that requires the Certificate Holder develop a plan to the satisfaction of the Environmental Assessment Office (EAO). After submitting a draft of the plan to EAO, the Certificate Holder will not need to make further revisions to, or obtain further approval of, such plan unless EAO communicates to the Certificate Holder that further revisions to such plan are required. However, any such required changes or approval must be pursued by the Certificate Holder in accordance with the timelines and in a manner that are acceptable to EAO.

NOW THEREFORE:

Pursuant to Section 34(1) of the Act, I order that the Certificate Holder:

- 1) immediately implement spill prevention measures that are adequate to ensure that hydrocarbons are not spilled or otherwise release into the environment from any equipment or hydrocarbon storage located on the Project site;
- 2) by November 30, 2015, develop a plan to:
 - o remove the hydrocarbons that have been spilled at the four-non compliant locations into the receiving environment; and
 - prevent future spills or other releases of hydrocarbons into the receiving environment at the Project site; and
- 3) develop and implement the plan identified in clause 2 to the satisfaction of the Environmental Assessment Office.

Drew Milne,

EA Compliance Officer

Environmental Assessment Office

Dated November 10, 2015

APPENDICE

B. Responses to ARD/WQ issues raised at the sub-committee meeting of January 14, 1998

Redfern Office Copy

Responses to ARD/WQ issues raised at the sub-committee meeting of January 14, 1998

January 15, 1998

Redfern Resources Ltd.

Historic Workings

Water treatment scenarios post-closure and proposed schedule of mitigation during development prior to operation.

See attachment A.

Temporary PAG waste rock dump.

Expected flow and maximum acidity levels.

Redfern's principal ARD consultant, Dr. K. Morin, indicates that peak instantaneous PAG acidity levels could be as high as 2000 mg/l but that the expected max range is likely to be between 500 and 1000 mg/l. Due to the anticipated reduction in size of the area of the PAG dump to reflect a higher dump slope for non-reclaim design, the area of precipitation catchment will be reduced. Average annual flow rates will be approximately 4 m³/hr. This will be merged with the other influent sources from Mine water and tailings supernatant for the water treatment plant at the expected treatment rate of 211 m³/hr. Because of the low relative amount of PAG drainage compared to the other influent sources the effect of higher acidity levels can be readily accommodated within the design capacity.

Commitment for impervious liner system for drainage collection and cost capability.

The PAG storage site can be designed with a double liner for additional security. An estimate by Bruce Geotechnical Consultants, including reduced areal extent to allow for a steeper angle dump suitable for temporary storage, indicates that costs will be similar to the original single liner but larger area design. Redfern will provide final design for this facility at permit stage to meet the security objectives once geotechnical studies are completed.

New Underground Workings

PAG waste rock

Questions concerning the potential for accumulated acidity in the PAG material prior to flooding, calculation of maximum neutralization requirements and cost considerations.

This is provided in Attachment B. A period of 12 years was utilized for the accumulation period assuming 2 years for the mine to completely flood. This was calculated from the estimated new mine void space on closure (workings less backfill volume) at approximately 700,000 m³ and the in-mine estimated flow rate of approximately 47 m³/hr. This yielded a time for flooding of 620 days or two years to be conservative.

Pyrite Concentrate in Whole tailings backfill

Weathering potential of backfill and potential for oxidation of sulphides in backfill.
 Cement required to maintain encapsulation of sulphide material in consolidated, impermeable backfill.

The company recognizes that a large amount of pyrite will be contained in the backfilled tailings to be emplaced in the new underground workings. This represents a significant source of potential acidity if not adequately protected from oxidation.

Experience to date, based on drainage chemistry at Myra Falls, BC, and Louvicourt mine, PQ, (personal communication with mine personnel) indicates that paste backfill technology effectively prevents oxidation, even when backfill occurs in zones of high sulphide rock.

Conditions at Louvicourt closely parallel the Tulsequah chief proposal: high sulphide (30-60%) whole tailings paste backfill, 60m stopes and backfill emplacement in zones of high sulphide content. This has been the mine waste disposal strategy since 1994 and research on backfill with similar average cement content to that proposed at Tulsequah indicates only peripheral oxidation.

However, due to the potential importance of this source and the relative new nature of this technique, Redfern commits to conducting additional research through further case studies to determine if use of lower levels of cement could reduce the effectiveness of the backfill strategy. If such is indicated then additional cement levels will be employed, or suitable alternative methodology, to ensure that little or no pyrite oxidation will occur in the backfill prior to flooding.

Attachment A

Water Treatment Pre and Post Operation

Pre and Post-Operation Water Treatment

Tulsequah Chief Project

The following discusses the conceptual water treatment during the two year pre-production period and contingency plans for post-operational water treatment should the Company's proposed ARD mitigation plans be incompletely effective in eliminating contaminated seepage from the historic mine workings.

In the pre-development phase, treatment of the full volume of mine water discharge from the historic mine workings is not considered possible for several reasons. The principal reason is the lack of a suitable site for secure disposal of the volume of treatment sludge which would be produced, which is considered to be approximately 7 times the volumes (either low-density or filter-reduced) considered in the more limited treatment scenarios presented below. In addition, installation of a water treatment plant suitable for handling all of the current mine water discharge would entail essentially the full-size plant envisaged for operations. This requires more extensive engineering, site preparation, power requirements, and reagent supply and storage considerations during a period when the project development crews will be relying on air and limited seasonal barge transportation for support. The full plant requires installation at a site after full geotechnical evaluation and operational permitting by the Mines Branch. Allowing for arrival of suitable equipment and surveying this cannot be completed in the summer of 1998 (pre-operation year 1). Detailed engineering and supply orders for the necessary equipment would have to be in place by Mar 01/98 at the latest which means that it would have to commence immediately (pre-Certificate). At present, detailed geotechnical evaluation, and surveys are contemplated in 1998 with full site preparation and construction commencing in summer 1999. Site excavation will entail some degree of rock blasting and it is not practical to complete this only for the water treatment plant in advance of the rest of site preparation if only because the presence of an operating plant would preclude effective completion of further blasting requirements. For these reasons, the Company considers that handling all current and development discharge volumes will not be practical until near commencement of operations.

Nevertheless there will be opportunity for site mitigation efforts to attempt to reduce the volume of minewater emanating from the workings through locating and sealing sources of inflow, to the full extent possible. The Company will also endeavour to optimize the proposed smaller treatment plant to handle as much as possible of the current discharge and bring expanded treatment capacity on-line as soon as practical and sludge storage sites are available. This proposed schedule is appended.

During development the Company recognizes that PAG waste rock will be encountered and is contemplated to be stored on surface for an extended period before removal to permanent inmine storage sites. The Company also proposes to move a portion of the existing PAG waste from the waste piles near the 5200 portal (60m Level) and site road area to the new PAG temporary storage site. During the development stage the Company expects to collect drainage from the new PAG temporary waste storage site and also from the residual historic waste piles below the 5400 Level portal. This latter site would be segregated from current minewater discharge emanating from the 5400 portal and only precipitation infiltration and run-off discharge would be collected and treated initially. Two scenarios are presented which consider contaminated drainage from the PAG waste dump and the 5400L waste dump. The first scenario uses a small scale lime treatment unit similar to a EIMCO model #1 HRB reactor-clarifier, the second scenario incorporates a Shriver filter press in addition to the lime treatment unit. Eskay Creek Mine is reportedly using such a filter press to reduce sludge volumes at their operation.

The criteria used to design the water treatment unit are discussed below. The treatment unit will be used to treat drainage from the material placed on the PAG waste rock dump. The treatment unit will be self-contained and sized to treat influent at a rate of 8.0 m³/hr. This estimate is based on the expected average annual flow from the PAG dump based on its current configuration and precipitation load as well as the 5400 dump area drainage, exclusive of current minewater discharge. The company feels this estimate is conservative since the PAG dump area has been designed at a 2.5:1 dump configuration suitable for reclamation. Since it is not designated for reclamation, the actual size will be less using a more standard angle of repose configuration for the dump. This will reduce the area of precipitation capture and drainage flow.

Any additional capacity can be utilized for treating current minewater discharge. The influent water is conservatively estimated to have the capacity to create 0.45 g of solids / litre of influent. In Scenario 1, the unit will produce sludge containing 3% solids. In Scenario 2, using the filter press, the unit would produce sludge containing 50% solids.

The solids in the influent has been calculated by prorating the bench scale test results (60/40 tailings supernatant/mine water) to a scenario of 100% mine water by conservatively assuming that all of the solids produced from the bench scale testing were derived from the mine water. Following this logic, if 40% mine water creates 0.18 g of solids / litre of influent then 100% mine water could create as much as 0.45 g/L solids. Therefore thickened sludge at 3% solids can be removed from the treatment unit at an approximate rate of 0.1 m³/hour producing approximately 1,000 m³ of sludge in one year. This sludge could be piped back to the mine site and stored in an unused heading on the 5400 L that has a storage volume of 3,000 m³. The sludge would be pumped to the backfill plant during Year 1 production. At that time, the total volume of 2,000 m³ of stored sludge could be removed from the heading in 8 days by adding this material to the final mixer pan in the backfill plant at a rate of 10.34 m³/hour. This backfill material would be placed in the new mine workings below present water table in Phase 1 stope voids between the -120m level and the 0 m level. Removing the stored sludge early in the production period will subsequently allow the heading to be used for mine water storage.

Scenario 2, which would incorporate the use of the filter press, would reduce the sludge volume by increasing the solids content in the sludge from 3% to 50%. The rate of sludge volume production would correspondingly be reduced to 0.0048 m³/hour or 42 m³ in a year. This amount of sludge could be transferred to storage drums (~210/yr) and ultimately be placed in a stope that will be filled with PAG waste rock. In similar fashion, the existing precipitate sludges which have accumulated in various areas in the historic workings can be collected, run through the filter press, if necessary, and stored in drums for ultimate storage. Temporary storage areas could include some of the abandoned headings on the 5200 and 5400 levels which are not required for new mine development.

The capital and operating costs associated with each of these scenarios is presented in Table 1

and 2. The operating cost assumptions are based on incremental cost to the overall site support, labour, power and supply costs associated with the development work program.

Due to the extensive efforts which are proposed to mitigate by backfilling and sealing from oxidation all existing sources of ARD in the historic working areas, it is anticipated that any residual drainage from the mine site on closure will meet receiving water quality standards. However, it is recognized that there are few examples at this time of similar scale mitigation of old mine sites. To allow for the low probability situation of incomplete mitigation, the Company has also prepared a cost estimate for contingency water treatment plant post mine closure in the event that the historic workings produced low flow leakage of unacceptable water quality. In this case it is assumed that the required volume will be small as the surface PAG waste dumps (new and old) will be gone, the old workings will be mostly occupied and bulkheaded by solid cemented paste backfill and extensive neutralizing capacity will be present for any groundwater which passes through the mine area..

For the cost estimate it is assumed that the development phase water treatment plant will be suitable for the influent volume at 8m³/hr or less. No additional capital costs are forecast as the components will be available at the mine. Although the influent water quality is very likely to be substantially better than used for the development phase scenario, the volumes of reagents and resulting treatment sludge are conservatively assumed to be the same as for the earlier described scenarios. For conservative operational cost considerations it is also assumed that the access road is de-activated and site access is only gained through continued use of the project airstrip and airstrip access road with appropriate allowance for maintenance. The cost estimate for this contingency treatment scenario is given in Table 2. Disposal of sludge volume is potentially problematic unless a filter press is used to reduce the volume. It is suggested that the disused limestone quarry could be considered for a treatment sludge disposal site, in drums or other media. At closure the limestone quarry is estimated to have a volume of 40,000 m³ which is more than ample for projected sludge volume. It should be noted that sludge volumes would actually be significantly less given that the influent water quality would be unlikely to have the acidity or metal loadings used in the development phase treatment scenarios. An alternative

suggestion, which may be more acceptable from a land-use perspective is to return the sludge to the flooded new workings via a gravity feed pipe.

In order to meet worst-case scenario concerns, the Company has also examined the cost of conducting full-scale contingent water treatment post-closure of the full volume of mine water flows currently discharging from the site. This is presented at the end of the attached tables. It contemplates keeping the operational treatment plant in place post-closure and treating 47m³/hr of influent. To further evaluate conservative cost implications, the operating costs also envisage only air access to site. A Shriver filter press would probably be required to keep sludge volumes as low as possible. In this case the operating cost is approximately \$485,000 annually. Again, in worst-case mode, if water quality was similar to current mine-water discharge then anticipated volumes of sludge at 50% solids, would be 247m³/year. This scenario is considered to have an extremely low probability. As indicated above the probable best disposal site will be the flooded underground workings.

One approach which could be applicable for all of the scenarios discussed is the potential use of a bioreactor that would produce negligible sludge volumes but would require sulphate addition (cost item) during operation. However, detailed information on cost and performance for this alternative could not be obtained because key staff members who are developing the technology through a research program at the Britannia mine have been away on holiday.

In summary, Redfern believes that an operational program is outlined which can allow commencement of mitigation of existing ARD discharge at the Tulsequah Mine site during development, with commencement of full water treatment and mitigation as soon as possible when plant site infrastructure, access and suitable sludge storage locations permit. Contingency plans for post-closure collect and treat are also available in the unlikely event that this is required.

Proposed Schedule of Water Quality Mitigation Procedures

1998:

April

Commence geotechnical investigations at plant-sites and waste storage areas.

June Commence evaluation of upper workings for rehabilitative requirements and

identification of water inflow sources and reduction strategies.

July Barge to site equipment, reagents and supplies for pre-development activities and

water treatment plant. Commence in-mine flow mitigation work and isolation of existing iron precipitates, where required. Commence rough grading of plant and

infrastructure sites.

July - Sept Commence construction of waste rock pads and access. Camp and power re-

furbishment. Construct and commission assay/ABA site lab.

Sept-Oct Complete construction of temporary water treatment plant, drainage collection

systems for PAG and 5400 level dumps.

Nov Move 5200 level dump material to PAG waste pad, commence water treatment of

PAG dump, 5400 dump drainage and as much as possible of minewater.

December- Commence underground development program. Waste rock deposition on pads.

1999:

July-Oct Prepare full effluent treatment plant site, commence construction and

commissioning.

November Treatment plant commissioned. If suitable temporary storage site for treatment

sludge is identified, treatment of mine-waters in advance of full operation may

proceed.

<u> 2000</u>

December Backfill plant in operation. Commence backfill/sludge disposal.

This schedule is predicated on financing and timely receipt of construction permitting authorizations. In the event that delays in any of these components are encountered then the proposed schedule would need to be revised accordingly. Some of the operational in-mine mitigation efforts could still proceed.

If a longer-term delay is anticipated then the Company and the requisite agencies would need to establish a suitable alternate mitigation/site remediation plan.

Table 1. Capital Cost Estimates

Scenario 1 - Pre-production Treatment Plant - No Filter Press for Treatment Sludge

TEM	DESCRIPTION		POWER (Kw)	COST (\$CAN)
1	Reactor Clarifier			
	- 10 ft. diam., skid mounted w	. control panel	3.700	\$100,000
2	Clarifier underflow pumps x 2 - Flow = 2m³/hr		0.375	\$2,000
3	Underflow stock tank - 3m x 3m			\$3,500
4	Equipment installation - 2 persons x 12 hr/day x 5 da	ays x \$50/hr		\$6,000
5	Building - pre-engineered - 9m x 9m insulated, installed	HVAC		\$50,000
	Contingency @ 20%	Subtotal	4.075	\$161,500 \$32,300
	Contangency & 2070	TOTAL		\$193,800
	Scenario 2 - Pre-production Subtotal Capital ite from Scenario 1		lus Filter Press for Tre	atment Sludge \$161,50
6	Filter feed pump x 1 - batch operation, flow=5m³/h - filter pressure = 420 kpa	r	1.500	\$1,500

Redfern	Resources	Ltd.

7 Filter press

- Eimco Model 1000 FB, 25 ft3

Contingency @ 20%

TOTAL

Subtotal

\$70,000

\$233,000

\$46,600

\$279,600

Table 2. Annual Operating Costs

Scenarios 1 and 2 Pre-Operation

ITEM	DESCRIPTION	POWER (Kw)	COST (\$CAN)		
1	Reagents		\$6,205		
	- scaled from Full-size plant				
	- 10t lime, 4.7t Ferric sulphate, .098t floc, 1.3t Sulphuric acid				
	· _				
2	2 Power		\$4,180		
	- est. 39070 kwh/yr @ \$0.107				
	B Personnel		\$31,317		
,	- 3 hr/day using site development crew		ψ51,517		
		Subtotal	\$41,702		
	Contingency @ 10%		\$4,170		
	TOTAL		\$45,872		
	Annual Operating Cost for Contingent Post 8m³/hr.	-Closure Small-scale Treatr	ment Plant to treat		
	Manpower, 2 people 14 days in/ 14 days out rotation, 12 hr./day, 21 \$20/hr base rate, Benefits 43%	90 hr/yr.	\$125,268		
2	2 Rotation and service flights Cessna 207 x 26 flights @ \$350		\$9,100		
;	3 Road and airstrip maintenance		\$16,000		
	•				
	4 Food/lodging/camp maintenance		\$40,000		
,	5 Reagents		\$6,205		
(6 Reagent air transport 16t @ 2t/trip Shorts Skyvan @ \$900 ea.		\$7,200		
	7 Camp power and vehicle fuel cost 250 bbl @ \$140/bbl		\$35,000		
	8 Fuel transport		\$22,500		
		Subtotal	\$261,273		
	Contingency @ 10%		\$26,127		
	,		-		

* All resources to be provided by air transport

* Assumes acidity of 300mg/l

Annual Operating Cost for Contingent Post-Closure Full-scale Treatment Plant Operation Unlikely Worst-Case Scenario of Treating 47m³/hr.

	COST (\$CAN)
	\$125,268 ·
	\$16,000
	\$40,000
	\$36,300
	\$49,500
	\$105,000
	\$67,500
Subtotal Total	\$439,568 \$43,957 \$483,525

^{*} Unlikely scenario for historic workings in which current drainage flow of 47 m³/hr and acidity of 300 mg/l is maintained, on average.

^{*} All resources to be maintained by air transport, allowing road to be de-commissioned.

^{*} Sludge to be disposed of in flooded underground workings using gravity feed

Attachment B Responses prepared by the Minesite Drainage Assessment Group



MINESITE DRAINAGE ASSESSMENT GROUP

(A Division of Morwijk Enterprises Ltd.)

SUITE 2401, 289 DRAKE STREET, VANCOUVER, BRITISH COLUMBIA V6B 5Z5 CANADA

BY FAX AND MAIL

January 13, 1998 FILE: 2015-1

Mr. Terry Chandler Redfern Resources Ltd. Box 40, Suite 900, 999 West Hastings Street Vancouver, British Columbia V6C 2W2

RE: Tulsequah Chief - Additional Responses to MEI Questions

As you requested, I have calculated (1) the equivalent waste-rock tonnage represented by the reactive wall area for the new workings and (2) the total amount of acidity that would be produced by 200,000 t of net-acid-generating waste rock over 12 years. These calculations answer questions raised by Dr. Bill Price of MEI.

Equivalent Waste-Rock Tonnage for Reactive Surface Area of New Workings

Bill asked that we calculate a waste-rock tonnage that would be equivalent to the reactive surface area of the new workings. I was hesitant to do this, because waste-rock tonnage and reactive wall area are two different and distinct concepts, and they really are not comparable. This has been recognized in research for over 30 years, and was the reason for MEND developing the Minewall technique. Nevertheless, at the risk that this information will be taken out of context, I have made the calculations.

As you indicated, the average cross-section of the new workings is 4 m by 4 m. Since the void volume of the new workings has been estimated at 2.4x10⁶ m³, then the total length of equivalent workings is 150,000 m. When converted to exposed surface area, there is 2.4x10⁶ m² of exposed rock. An additional factor for fractures extending into the wall is assumed to be 100, so the total reactive surface area of the new workings is estimated at 2.4x10⁸ m².

This reactive area of 2.4x10⁸ m² can be equated to particle-surface areas of waste rock (conceptually incorrect). For example, Bill asked that we assume the equivalent waste rock has the grain diameter of coarse to very coarse sand (1 mm). Based on the assumptions of a diameter of 1 mm, a cubic particle shape, and a specific gravity of 2.7, then 2.4x10⁸ m² is equivalent to 220,000 t of sandy waste rock. If the grain diameter is assumed to be medium sand (0.35 mm), then the equivalent tonnage is 75,000 t. If the grain diameter is assumed to be gravel to pebbles (4 mm), then the equivalent tonnage is 860,000 t.

Total Amount of Acidity Produced by 200,000 t of Net-Acid-Generating Waste Rock

Bill also asked that we calculated the total amount of acidity generated by 200,000 t of netacid-generating waste rock over 12 years. This is suggestive of the total production of the "PAG" rock in the "PAG" dump including (1) after it is moved under underground and (2) before it is flooded.

As indicated in the Application Report, the average rate from the three acidic humidity cells containing waste rock was 575 mg SO₄/kg/wk, or 600 mg CaCO₃/kg/wk. Therefore, 200,000 t (or 2x10⁸ kg) would generate a total acidity of 75,000 t CaCO₃ over 12 years. Please note that this is total acid generation. The cells showed that roughly half of this acidity is neutralized as it is generated by nearby minerals. Therefore, a better estimate of actual net acid generation is 38,000 t. Additionally, this total assumes that all the rock in the "PAG" dump generates net acidity and at this rate for 12 years, both of which may be incorrect. Furthermore, a significant portion of this acidity production would be released from the rock and not retained, accounting for the proposed treatment of water from this dump. Finally, based on ABA results to date, all of the sulphide in Unit 2a would be oxidized before seven years at this rate, and 90% of sulphide in Unit 1 c,d before 12 years. Therefore, actual retained acidity would likely be much less than 38,000 t.

Sincerely,

Kevin A. Morin, Ph.D., P.Geo.

President



Redfern Resources Ltd.

Box 40, Suite 900 999 West Hastings St. Vancouver, B.C. V6C 2W2 Phone: (604) 669-4775

Fax: (604) 669-5330



FAX COVER SHEET

FAX NUMBER TRANSMITTED TO:

see below

TOTAL NUMBER OF PAGES:

2

To:

ARD/Water Quality Subcommittee Tulsequah Chief Project Committee

Of: From:

Janice Loukras

Subject:

Date:

January 20, 1998

COMMENTS:

Original will NOT follow.

Attached is a correction to the Jan 15,1998 ARD Response from Redfern regarding an error in the proposed interim treatment schedule.

Mr. Garry Alexander, MELP

FAX: 250-356-7183 /

Mr. Stephen Sheehan, EC FAX: 604-666-6858 ✓

Mr. Norm Ringstad, EAO FAX: 250-387-2208

Mr Ian Sharpe, MELP FAX: 250-847-7591

Mr. Herb Klassen, DFO FAX: 604-666-7907

Ms. Glenda Ferris
Phone/fax: 250-845-3177

Mr. Craig Stewart, MELP

Ms. Kerry Howard, Alaska

Mrs. Rosemary Fox

FAX: 250-847-7591 -

FAX: 907-465-3075 /

Ph: 250-847-5150

Mr. Bill Price, MEI FAX: 250-847-7603

Ms. Susan Carlick, TRTFN FAX: 250-651-7714 ×

Mr. Tony Pearse, TRTFN FAX: 250-539-3025

IF YOU DO NOT RECEIVE ALL PAGES, PLEASE TELEPHONE US IMMEDIATELY AT (604) 669-4775.

Contingency plans for post-closure collect and treat are also available in the unlikely event that this is required.

Proposed Schedu	le of Water	 Quality 	Mitigation	Procedures
-----------------	-------------	-----------------------------	------------	------------

1998:

April Commence geotechnical investigations at plant-sites and waste storage

areas.

June Commence evaluation of upper workings for rehabilitative requirements

and identification of water inflow sources and reduction strategies.

July Barge to site equipment, reagents and supplies for pre-development

activities and water treatment plant. Commence in-mine flow mitigation

work and isolation of existing iron precipitates, where required.

Commence rough grading of plant and infrastructure sites.

July - Sept Commence construction of waste rock pads and access. Camp and power

re-furbishment. Construct and commission assay/ABA site lab.

Sept-Oct Complete construction of temporary water treatment plant, drainage

collection systems for PAG and 5400 level dumps.

Nov Move 5200 level dump material to PAG waste pad, commence water

treatment of PAG dump, 5400 dump drainage and as much as possible of

minewater.

December- Commence underground development program. Waste rock deposition on

pads.

1999:

July-Oct Prepare full effluent treatment plant site, commence construction and

commissioning.

November Treatment plant commissioned. If suitable temporary storage site for

treatment sludge is identified, treatment of mine-waters in advance of full

operation may proceed.

2000

December Backfill plant in operation. Commence backfill/sludge disposal.

APPENDICE

C. Memo with photos of corrective measures



Мемо

FROM: TERRY ZANGER To: KEITH BOYLE

CC: ROB MARSLAND

SUBJECT: EAO COMPLIANCE VISIT

Keith,

Please find the attached corrective measures completed as a result of the EAO Compliance visit of July 14, 2015.

Should you have any questions please don't hesitate to call me.

Cheers,

Terry

DATE: NOVEMBER 3, 2015



1.4.1 Summer (High Flow) exfiltration pond bypass pipes removed Oct 16, 2015.







1.4.2 Ditching used to improve neutral water flow past 5200 Portal. Requires on-going maintenance until pipe repair is possible. See before and after photos below.







Condition 1 of the EAC-Construction and Operations Wildlife Management Plan



There were 22 pails of unused drilling products, including 2 partial (20 litre) pails of rod grease. The leaking white bucket contained AMC Pure Vis, a non-hydrocarbon drilling polymer. Bucket likely burst due to freezing conditions. Wildlife may have disturbed grease buckets but un-likely to have consumed any. Green buckets contain AMC K-Ion. Initial clean-up completed July 14. Pallets moved in to storage Oct 16, 2015 (photo below).





2-Secondary containment storage pad. Most of these drums are empty and have been on pad since Redfern operated site in 2008.





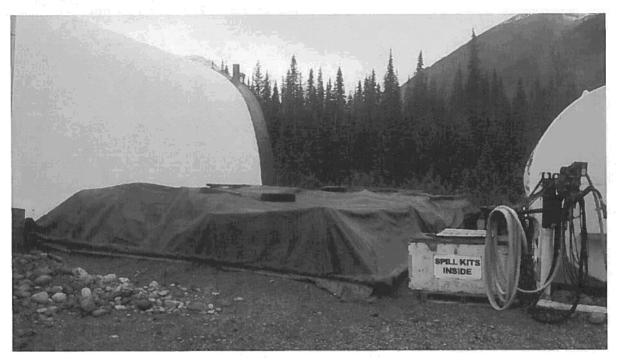
On Oct 17, some of the full 20 litre used oil pails were removed and flown out to Atlin.



On Oct 17, a temporary cover was placed over the empty drums and secondary containment.



The tarps were anchored with heavy filter fabric.





On October 17th, the Glycol storage was covered with landfill liner material.



3-Moxi Dump Truck - site re-treated with oil sponge. White dump truck appears to have leaked diesel from underbody fuel filter due to ice. Fuel tank now empty – but readily available fuel had been previously scavenged from unused vehicles and tanks for camp heat, so only a relatively small volume remained in the lines and bottom of tank. Incinerator return fuel line was repaired Oct 16. The incinerator has not been used since last winter due to fire bans and camp being idled.



4-Monthly inspections for hydrocarbon spills have been implemented. All previously identified problems have been responded to at time of discovery. Spill kits are widely distributed over the site and staff have been trained to use them. All reportable fuel spills have response documents on file.

APPENDICE

D. Letter to Neil Bailey, MoE, dated November 23



CORPORATE OFFICE 2 Bloor Street West Suite 2510 Toronto, ON M4W 3E2

Tel: 416.479.5410 Fax: 416.479.5420

FIELD OFFICE Box 387 Number 1 First Street Atlin, BC V0W 1A0 Tel: 250.651.7662 Fax: 250.651.7606

www.chieftainmetals.com • info@chieftainmetals.com

November 23, 2015

Neil Bailey, P.Eng. Senior Environmental Protection Officer Ministry of Environment - Northern Region **Environmental Protection Division** Bag 5000, 3726 Alfred Avenue Smithers BC V0J 2N0

Dear Sir.

RE: Non-compliance Advisory Letter Resulting from Inspection of permit number 105719 for Chieftain Metals Inc.'s Tulsequah Chief mine under the Environmental Management Act

Please find below, CMI's responses to the orders of November 10, 2015.

For ease of responding, the orders have been copied here and responded to in sequence.

"Below lists the section, the non-compliance of that section and the action required related to the Permit (105719).

Section 1.1.5 The authorized works include, but are not limited to, a water collection and conveyance system, pumps, an acid water treatment plant which includes a neutralization chamber, rapid mix tank, flocculent tank, inclined plate-type separator/thickener, filters and holding tanks, a discharge line, outfall to the Tulsequah River, and related appurtenances approximately located as shown on Site Plan A.

Section 2.1 – Bypasses

Any bypass of the authorized works is prohibited unless the approval of the Director is obtained and confirmed in writing.

Non-compliance: Written Approval for the bypass of the water treatment plant was not obtained and the discharge does not meet the conditions specified in Section 3.6. As a result, Chieftain Metals Inc. is in violation of Section 2.1 Bypasses.

Action: Commission the IWTP immediately once site development occurs.

RESPONSE: Acknowledged. Chieftain Metals will commission the IWTP immediately once site development occurs.



Section 4. Discharge and Receiving Environment Monitoring.

Commencing July 1, 2014, Section 4.0 of permit 105719 is to read as follows:

- -Sampling monthly from October through February increased to bi-weekly April through May and then returns to monthly in the period from June to September.
 - -The sites to be sampled remain W10, W46, SE2, W51 and W31
- -The parameters to be sampled for remain total and dissolved metals, pH, conductivity, turbidity suspended solids, hardness and alkalinity.

Non-compliance: The Permittee did not meet the amended requirements for Discharge and

Receiving Environment Monitoring on the following dates and locations:

- -At site W51 for July 29, 2014 pH, conductivity and alkalinity were not monitored for.
- -Monitoring of W46 is suspended in June 2015 as path of river no longer passes through this location.

Action: Ensure monitoring occurs in the locations, frequencies and parameters required in the June 12 2014 Amendment to Section 4.0 Discharge and Receiving Environment Monitoring. Contact Director regarding amending the W46 monitoring location.

RESPONSE: The required monthly sample at W51 in July 2014 was collected on July 27, 2014. All required analyses were performed on that sample. Supplemental samples were collected on July 25, 26, 28 and 29 and analysed for select parameters.

A letter under separate cover will be sent to the Director regarding amending the W46 monitoring.

This advisory, the alleged violation and the circumstances to which it refers will form part of the compliance history of Chieftain Metals Inc. and its responsible officials and will be taken into account in the event of future non-compliance. You are directed to do the following:

- 1. Implement the necessary changes or modifications immediately to address this situation and to bring it into compliance.
- Notify this office by email or letter within 30 days of this letter, advising what corrective measures have been taken, and what else is being done, to bring this authorization into compliance.



Please be advised that the inspection report quotes incorrect contact information. Please note change of contact information:

Keith Boyle, P.Eng. Chief Operating Officer Chieftain Metals Inc. 2 Bloor W, Suite 2510 Toronto, ON M5W 3E2

Sincerely,

Keith Boyle, P.Eng. Chief Operation Officer

cc. Mark Love (by email), Section Head Mining Authorizations, Ministry of Environment, Mark.Love@gov.bc.ca
Cassandra Caunce (by email), Director Compliance & Integrated Pest Management Ministry of Environment, Cassandra.Caunce@gov.bc.ca
Diane Howe (by email), Deputy Inspector of Mines, Ministry of Energy and Mines, Diane.Howe@gov.bc.ca

Eric Telford, Lands and Resources, TRTFN



23 November 2015

Andrea Doll Environmental Protection Officer BC Ministry of Environment, Environmental Protection Division Bag 5000, 3726 Alfred Ave Smithers, BC V0J 2N0

Dear Ms. Doll:

Re: EMA Discharge Approval 105719 - Amendment to temporarily remove W46

The Tulsequah River water quality monitoring station W46 was established to monitor the near-field dilution of the discharge from the IWTP. Since operation of the treatment plant will remain suspended until site development occurs, Chieftain Metals hereby requests that the requirement to collect samples at W46 also be suspended until plant operations resume.

Sampling at the W46 location became problematic this summer when the river mainstem moved away from the Tulsequah minesite in the vicinity of the W46 sample location and there was no river water to sample (only tributary inflow which has a different characteristic, since it is not glacial meltwater). The attached photos illustrate the condition of the river bed in the vicinity of the W46 sample site in October 2015.

If you have any questions regarding this requested change in monitoring, please do not hesitate to contact us.

Yours Sincerely,

Chieftain Metals Corp.

Keith Boyle, P.Eng. Chief Operating Officer

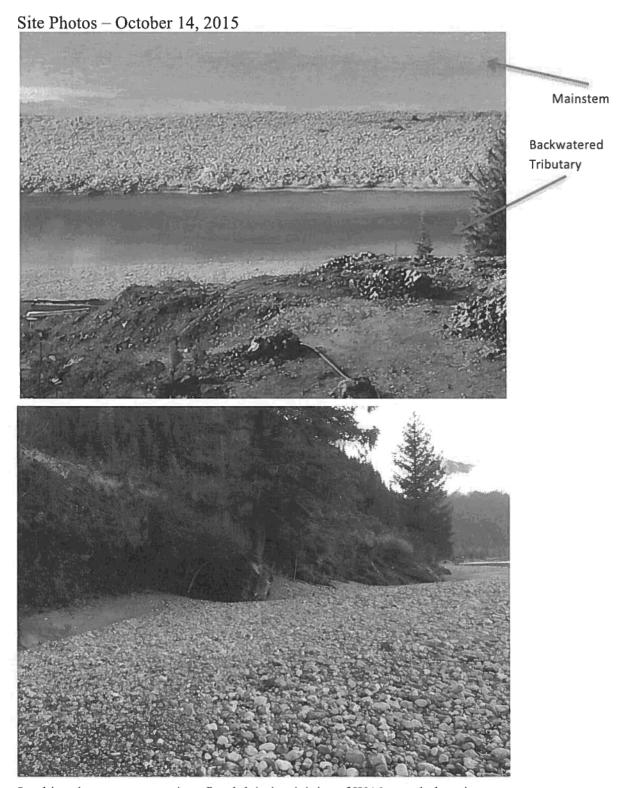
/attach

cc. Neil Bailey, Compliance Officer, MoE Smithers

Mark Love, Mining Operations - Section Head, MoE Smithers

Rob Marsland, Chieftain Eric Telford, TRTFN





Looking downstream on river floodplain in vicinity of W46 sample location

APPENDICE

E. Application to amend EMA Permit #105719



CORPORATE OFFICE 2 Bloor Street West Suite 2510 Toronto, ON M4W 3E2

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Number 1 First Street Atlin, BC V0W 1A0 Tel: 250.651.7662 Fax: 250.651.7606

FIELD OFFICE

Box 387

www.chieftainmetals.com info@chieftainmetals.com

February 08, 2016

Mark P. Love, P. Ag. Mining Operations - North West and Vancouver Island Regions Ministry of Environment, Bag 5000, 3726 Alfred Ave Smithers, BC VOJ 2NO

Re: Tulsequah Chief EMA Permit 105719 - Amendment for current care and maintenance conditions

Dear Mr. Love:

Please be advised that the Tulsequah Chief Mine Project is currently on care and maintenance. Chieftain Metals Inc. ("CMI") is requesting amendment of EMA Permit 105719 related to the effluent discharge and operations of the interim acid water treatment plant ("IWTP"), to reflect the current conditions, until such a time when the IWTP is re-started, under Sec:18(5)(a) of the EMA.

To assist your determination for this activity, the following supporting documents addressing the MoE information request (December 8, 2015), and a revised Environmental Monitoring and Surveillance Plan including amended monitoring, sampling frequency and analysis requirements, are attached:

- Tulsequah Chief Mine ARD/ML Mitigation Assessment 2015 Update.
- EMA Permit #105719 Quarterly Monitoring Report for Q4 2015.

In the Tulsequah Chief Mine Project Environmental Monitoring and Surveillance (EM&S) Plan: Care & Maintenance (2016+), a reduction in sampling frequency to April, May, August and October is supported by the consistency with the historical results and the predictable recurring seasonal fluctuations, combined with zero site activities to initiate new changes. The included Tulsequah Chief EMA Q4 2015 Report fully documents this information.

Concurrently Chieftain is applying to MEM to amend Mine Act Permit M-232 during this period of care and maintenance as directed by Sec:10.6.2(2a) of the HSRC.

CMI is committed to re-commencing operations at the IWTP and implementing engineered solutions to address the previously identified operational deficiencies immediately upon receiving project financing to develop the Tulsequah Chief Mine. The IWTP was initially commissioned in anticipation of project construction activities, to conform with the Mines Act condition to treat contaminated discharges from the new HPAG facility at Rogers Creek and with any excess capacity utilized to treat the existing underground acid mine drainage (subsequently modified by MEM in the July 7, 2011 amendment

approval to include all portal discharges). As previously discussed, new mine development and operations is the only viable alternative for cleanup and remediation of the historic acid mine drainage and metal leaching at the mine site. Permit amendments for new mine activities will follow once financing is in place.

We trust this amendment application meets your requirements at this time, and look forward to reviewing a draft amended permit with you. If you have any questions, please do not hesitate to contact us.

Yours Sincerely,

Chieftain Metals Corp.

Keith Boyle, P.Eng. Chief Operating Officer

/attach

cc. Neil Bailey, Compliance Officer, MoE Smithers Arash Janfada, EPO, MoE Surrey Diane Howe, MEM Victoria Rob Marsland, Chieftain Eric Telford, TRTFN Mark Connor, TRTFN

Tulsequah Chief Mine Acid Rock Drainage / Metal Leaching Mitigation Assessment 2015 Update.

At the request of MoE, a review of the history of past Acid Mine Drainage / Metal Leaching ("ARD/ML") mitigation measures undertaken and recommended at the Tulsequah Chief Mine is presented. The contributions of several key consultants quantifying the sources and identifying possible solutions to mitigate the ARD/ML at the Tulsequah Chief mine site is reviewed.

Geochemical source assessment of ARD loadings

There are two sources for the ARD/ML from the Tulsequah Chief Mine:

- 1. Portal discharges from the 5200, 5400 and 5900 levels.
- 2. Surface waste rock seepage from the 6400, 5900, 5400 and 5200 portals dumps.

Both have remained unchanged for the last 20+ years, with consistent metal loading recorded in water quality analysis from the receiving environment monitoring (Chieftain 2016).

The Steffen, Robertson and Kirsten (SRK) 1992 study evaluated and compared the relative contributions of metal loading from the portal discharge and the waste dumps. They determined that for the contaminant metals of concern entering the receiving environment, 83-87% were contributed from the portal discharge, which it designated the primary rehabilitation objective. The current untreated portal discharge water quality is recorded at the SE-2 sampling location with approximate flow rate 10 L/s and characterized by low pH, high acidity, low alkalinity and elevated concentrations of metals and sulphides. The water quality results from the aquatic environmental risk assessment are still representative (Palmer, Core6 & Triton 2013 Table 2) and updated in the 2015 Q4 water quality report (Chieftain 2016 Table 2). Redfern 2008 measured the 5900 portal discharge flow of near neutral pH water at the rate of 6 L/s the 5400 level about 1 L/s and the 5200 portal discharging 7 L/s of water.

The waste dumps have been sampled in the initial source assessment conducted by Hallam Knight Piesold (HKP) in 1991, SRK in 1992, Rescan 1997 and GLL in 2008 for static and kinetic testing. The majority of the results have a NPR <1 indicating acid generating potential (PAG). The few not acid generating (NAG) sample results were located towards the bottom of the dump piles showing that the dumps are underlain by a NAG layer. HKP 1991 considered mechanically separating the NAG and PAG layers impracticable. All reports acknowledge the seasonal flushing of metals with increased loading to the receiving environment due to extra infiltration during the Spring thaw and also in the Fall with rainfall. The majority of the waste rock is located at the 5400 (56%) and 5200 (19%) portal locations, with much smaller dumps at the 5900 (16%) and 6400 (9%) portal locations (Rescan 1997 Table 4.2-4). Subsequent to the initial work the waste dump at the 5400 portal has cover layer of NAG waste rock from exploration drift development in 1992, 1993 and 2004.

Rescan 1997 quantified the 5400 waste dump seepage water quality from station 60 with a flow rate of 0.96L/s, also characterized as low pH, high acidity, low alkalinity and elevated concentrations of metals and sulphides (Rescan 1997, Appendix C.4-1 and re-stated average in GLL 2008b Table 2-4).

Tulsequah Chief acid rock drainage mitigation work completed

The Acid Mine Drainage / Metal Leaching (ARD/ML) mitigation work completed at the Tulsequah Chief Mine began with numerous consulting studies commissioned by Redfern Resources since it acquired the property in 1992 and continued by Chieftain Metals Inc. ("Chieftain") since 2011. Apart from the reduction of mine inflows, the remainder of mitigation measures implemented to date have struggled to perform as designed. The common issue is excessive precipitation of iron oxyhydroxides plugging and changing the designed water flow regime, reducing the effectiveness of the mitigation measure. The subsequent maintenance required to remove the iron oxyhydroxides to allow mine waters to return to design flow rates have proven to be labour and support intensive, and in some cases ineffective with unsustainable costs. The mitigation work completed to date follows below.

Gartner Lee Limited designed a mine water tile bed and it was constructed by Redfern Resources in May 2000 (GLL 2000). The mine waters from the 5200 and 5400 levels were directed to a sump connected to the tile field / shallow infiltration gallery (28m x18m x2m) adjacent to Tulsequah River. The water was allowed to infiltrate into the ground water and alluvial gravels at the discharge rate of 14 L/s, and upwell into the Tulsequah River. Neutral mine water from the North drift was directed to the Tulsequah River from the 5400 portal over the mine dump and into a small channel. This removed the point source for the mine discharge, but the tile field subsequently failed with mineral precipitates clogging the tile perforations and probable biofouling with iron and manganese bacteria (Klohn 2003b). Redfern's mitigation efforts and consultant report expenditures from 1992-2000 totaled \$406,238.

An underground water source management study conducted by Klohn Crippen and implemented during Fall 2003 changed flows and reduced the amount of water requiring treatment by approximately 50% (Klohn 2003b): at the 6200 Level low pH water was diverted down shaft to the 5400 Level; at the 6100 Level all water was diverted down ore pass to 5900 Level; at the 5900 Level all water from level and received from ore pass diverted to the portal and directed to Camp Creek; at the 5400 level all water diverted down 5245 manway raise to the 5200 level. Diamond drill holes were plugged on the 5900, 5400 and 5200 levels to reduce water inflows.

Klohn Crippen also evaluated water treatment options and recommended a passive sulfide reducing bacteria (SRB) treatment as the most practicable option for Tulsequah Chief mine. Passive options were pursued as it was understood regulators considered the initial 1992 SRK adit sealing plan high risk, due to the potential for plug failure with resultant large volume release incident and probable significant fish mortality (Redfern 2005 December periodic report). A bioreactor development laboratory bench column test with synthetic acid mine water showed that decomposing wood chips removing oxygen and local limestone can neutralize acidic mine water on a short retention time and provide an anoxic neutral pH environment necessary for SRB development (MT 2003). Redfern's expenditures for mitigation option assessment and water diversion efforts in 2003 totaled \$119,350.

Klohn Crippen designed and supervised construction of a pilot passive underground water treatment system with a settling reservoir and bioreactor constructed during July-August 2004 and commissioned 9th, September, 2004. The pilot plant located in the old locomotive charging station 5200 Level (300m from

portal) was constructed as 4 cells: 2m long x 4.8m wide x 1.8m high. Each bioreactor cell has three layers: 0.45m bottom drain of river rock and gravel; followed by 1m organic wood chips and limestone layer with inoculant, bonemeal, sulphur prills and biodegradable plastic; followed by with 0.2m cap layer of organic wood chips and sulphur prills; and topped with filter cloth. Settled feed water was distributed above each cell with perforated pipe at the bottom of each cell collecting the effluent. The reservoir diluted the acid water and retained aluminum and iron precipitates and the bioreactor neutralized acid water and removing metals. Iron precipitates formed on the surface of the filter fabric either by filtering or new precipitation with the increase in pH. The surface mulch layer removes dissolved oxygen for the anoxic environment required by the SRB to from insoluble sulphides. The November 2004 results (MT 2005) show the pilot plant is effective in removing acidity governed mainly by limestone dissolution kinetics and retention time, rather than any biological process, with the increase in pH the main driver for the reduction in metal concentrations from the feed water, removal rates: Aluminum 85%; Iron 88%; Cadmium 65%; Copper 85%; Lead 93%; and Zinc 13%. Modifications were made in November 2004 to improve SRB performance by increasing surface mulch by 6" and adding an ethylene glycol drip system above cells 3 and 4, to react and remove dissolved oxygen, with any excess utilized as a feed source by the SRB to benefit the sulphate reduction reaction. Redfern expenditures for passive water pilot plant design and construction and further underground water assessment and diversion in 2004 totaled \$292,790.

The Klohn March 2005 evaluation showed the pilot plant consistently neutralized the mine waters from 3.1-3.5pH to discharges of 6.0-6.7pH with metal removal efficiency improved from November with copper 85% and zinc 20-35% removal (Klohn 2005). Hydrogen sulphide gas was detected February 2005 suggests SRB were active and forming insoluble copper sulphides. Zinc removal is poor relative to the other metals and Klohn states that "even with an increase in SRB activity Zinc removal is expected to reach 40% at best". The iron precipitates were restricted to the top few centimeters of the mulch and could be easily cleaned off by scraping the filter fabric and flushing the top layer once or twice a year. A 60 litre sample of treated effluent from the pilot plant collected on Feb 5th 2005 for 96hour LC₅₀ rainbow trout bioassay test was still toxic with a dilution factor of 6 times required to render the sample non-toxic.

A vent raise concrete plug was poured at 6550 level July 4-6th, 2005, to prevent inflow of snow melt through the mine to the 5900 level. The success of the plug was noted in winter 2005/6 with the 5900 level flows lower than previously recorded.

Construction of the full scale passive water treatment plant commenced in May 2005 with four pervious sludge-retaining limestone berms 1.3-1.8m high and between 50 and 100m apart on the 5200 level, followed by three anoxic limestone cells (No. 1-3) 20m long, 1.9m high. The limestone cells are lined with 0.2m gravel underdrain material, 1.3m limestone and wood chip mulch(20%) mixture, and topped with 0.05-0.2m inoculated mulch layer seeded by mixing in old mulch from the pilot plant and covered with burlap, the cells are connected in a vertical flow pond arrangement with underdrains in the base feeding the top of the next sequential cell. The SRB cell (No. 4) is 28m long with similar construction to the anoxic limestone cells except the 1.3m limestone and wood chips mulch(33%) layer also contains sulphur prills and bonemeal. Glycol drips were also set up at cells 1 and 4 to react and remove dissolved oxygen. The SRB cell was started on July 19th with only a small flow to encourage SRB development.

After about 40 days the plant started malfunctioning with inconsistent flows noted on August 29th 2005 with 13-50mm iron sludge blocking the burlap and stopping water percolating through the cells and causing overtopping to the next cell. The burlap was replaced with geotextile panels and the 5400 north drift neutral mine water was re-directed to the 5200 level to increase the pH to encourage Fe to precipitate before the cells. Maintenance was again conducted in November 2005 with replacement of the geotextile and installation of Sodium Hydroxide drip(72 L/day) on the 5400 level to increase the pH further and promote Fe to precipitate before the cells (Fe precipitates at pH 3.5, Al precipitates at pH 4.5 and Zn precipitates at pH 8.5). Redfern expenditures for the completion of the pilot plant study and full scale passive water plant design and construction, monitoring, and modifications in 2005 totaled \$771,420.51.

Throughout 2006 the passive water treatment plant continued to operate and required periodic maintenance with washing of the top layer of mulch and replacement of the geotextile due to excessive sludge buildup in: February; April; and October. The April maintenance determined that the deep iron penetration into cell 1 limestone layer could not be cleaned up and permeability restored, so this cell was abandoned after 8 months of operations. The February 2005 results show that the 4-5 L/s flow through treatment cells 1-3 removed: 80% Fe, 84% Al, 87% Cu and 52% Zn; and the 0.3 L/s through the SRB cell removed 88% Cd, 93% Cu, and 63% Zn.

Additional mechanical technical problems occurred throughout 2006 with both the Glycol and NaOH distribution dosing systems, with solutions progressively implemented at the remote mine site. The periodically effective glycol drip combined with the draining of the cells for maintenance impeded the establishment of anoxic conditions needed for SRB development, but the smell of sulphides was noted in September 2006. Inconsistent dosing of the NaOH and subsequent determination that the NaOH was reacting with drill cuttings in the 5400 drift and precipitating calcium carbonate above 8.3 pH reduced the effectiveness of the NaOH in raising the pH and precipitating iron hydroxides, this was corrected in December by redirecting the NaOH with the piped neutral mine water direct to the 5245 raise.

In the May 2007 cell number 2 was abandoned with iron penetrating the limestone layer with ineffective percolation, the mulch was washed and geotextile replaced in cells 3 and 4. With the reduction in the number of functioning cells the flow rate was reduced.

The challenges encountered in the operation and maintenance of the passive water treatment plant are documented in the quarterly confidential reports provided to Environment Canada and BC MOE from May 2005 to October 2007. No further maintenance or monitoring was completed on the passive water treatment plant from October 2007 when Redfern prepared the remaining NaOH in anticipation it would last until the mechanical interim acid water treatment plant would be operational by the end of 2008.

Redfern updated the portal discharge flows in 2008 with the diversion and drill holes plugged in 2003/2005 modified to open the drillhole margo plugs and direct the water to the neutral mine water efforts. This controlled the discharge release point, rather than allowing the excess seepage under high pore pressure to escape through remote fractures, etc. This continues to contribute to reducing the water volume requiring treatment by 50%, conforming to the EA commitments 1.3.1 and 1.4.3.

Chieftain acquired the Tulsequah Chief Project in September 2010 and in preparation for mine construction re-commenced plans to build and operate the same water treatment plant that had been designed by Sanitherm Inc. for Redfern. The IWTP was designed to conform to the initial Mine Act conditions and treat the contaminated discharges from the Rodgers Creek new HPAG facility, with any excess capacity utilized to treat the existing underground acid mine drainage. Chieftain received approval to amended the Mine Act permit on July 7, 2011 and move the location of the IWTP from Rodgers Creek to the permeant location at the mine site, MEM also included the condition that all discharges from the 5200, 5400, and 5900 portals be treated. The interim acid water treatment plant was designed to treat $40 \text{ m}^3/\text{h}$ (11.1 L/s) with peak flow rate of up to $100 \text{ m}^3/\text{h}$ (27.8 L/s), neutralizing the acid mine waste water and removing dissolved heavy metals, precipitated and suspended solids and turbidity, designed to produce an effluent of: Al <= 1.0 mg/l; As <= 0.1 mg/l; Cu <= 0.05 mg/l; Fe <=0.3 mg/l; Zn <= 0.2 mg/L; pH 8.5-9.5; and Turbidity <=0.3 NTU (Sanitherm 2008).

The basic acid mine drainage(AMD) treatment process consisted of neutralization of the AMD by lime slurry and applying sludge recycle followed by pH adjustment and heavy metal co-precipitation, then flocculation and coagulation(enhanced using ferric chloride and Percol 2640 polymer as pH adjustment / flocculent aid), clarification/thickening was to be done using Sanitherm design inclined plate type clarifier/thickener(IPS-T) where suspended solids are removed under gravity force and laminar conditions with concentrated sludge and clear effluent produced. The sludge is removed and the clear effluent filtered through Zeolite filters("polishing") where traces of heavy metals and turbidity are removed, a final pH adjustment is applied if needed and treated effluent disposed of in the Tulsequah river

The Plant was barged to the mine site in May/June 2011 and construction was complete in October 2011 with commissioning in November 2011 to February 2012. The plant was fully operation by early February 2012 with issuance of EMA discharge permit 105719 on April 4th, 2012. Chieftain operated the plant pursuant to its water quality discharge permit conditions until June 22nd, 2012 when operations were curtailed. Chieftain then entered into a period of non-compliance with permit 105719.

It became apparent in Q2 2012 that the operating cost based on actual experience at the IWTP was now estimated to be \$4.4M per annum and not the budgeted \$1M (for a correctly functioning plant). This new operating cost was evaluated with the emerging delays in completing the new feasibility study and subsequent financing timeline. The IWTP was built as integral part of the mine development complex to treat the contaminated discharge from the new Rogers Creek HPAG facility, plus mine discharge to capacity, and not as a standalone facility. The determination was made that mine development was not guaranteed to commence in 2012 and without a firm start date for mine construction continued operation of the IWTP, and in particular with its current inefficient process was not a sustainable option for a junior mining company with zero revenue. A major factor in the cost overrun was the additional handling and transport of thirteen times the designed volume of sludge, which outstripped capacity and necessitated substantial additional support costs. After the operations of the IWTP were curtailed the inefficiencies were investigated during 2012 with consultant reviews concluding inadequate test work prior to plant construction lead to several components being undersized requiring higher reagent consumption and the installed IPS-T clarifier (producing fluffy low density low percentage solids sludge) inappropriate for the application, process improvement were suggested. The total construction cost and operating cost

expended by Chieftain until June 2012 was approximately \$9M. The above is discussed in detail in Chieftain 2012.

No further site ARD/ML mitigation measures have taken place since the curtailing of the IWTP operations in 2012. The additional studies on restarting the IWTP are discussed in the optimization section below.

Evaluation of possible ARD mitigation strategies

The preliminary and conceptual approach to control ARD/ML was recommended by Hallam Knight Piesold (HKP) 1991 and was improved by the Steffen, Robertson and Kirsten (SRK) 1992 report with walk away solutions using best available technology to the ARD/ML problem, with the objective to significantly reduce the contaminant release from the waste dumps and underground mine. The Rescan 1997 Environmental Assessment Project description considered remediation in conjunction with mine operations with mechanical water treatment and disposal and flooding of the waste rock in new underground stopes. This remediation in conjunction with new mine operations has since been refined by Redfern and Chieftain. All cost for the proposed activities are order of magnitude estimates only in the \$ at the time, and useful as a historic reference only.

Remediation plans for the Underground Mine

HKP 1991 suggested segregating the contaminated and clean underground mine water to the maximum amount possible, by first mapping flows in the mine and identifying flows that are of acceptable quality and piping to the surface for direct release. All other underground flows would be collected in sumps to be piped to a water treatment plant. Long term suppression of the ARD would require flooding the mine with plugs as close to the adits as possible, as controlling infiltration of precipitation is not an option. HKP also warned that a few isolated defects around the plugs could results in major water losses under the expected head pressures. The plugs would be constructed by radial curtain grouting and excavation of a keyway, and pressure grouting after the concrete has completed shrinking. After flooding of the mine, springs could occur in the existing waste dumps causing further problems, also uncontrolled surface discharge could occur through unsealed historic diamond drillholes. HKP 1991 estimated costs of \$241K for the underground bulk heads.

SRK's 1992 short term solution involved plugging the 5200 level only and water diversions to the prevent inflow into the mine, including water flushing through the 5600 A zone stope (estimated to reduce loadings by 26%). SRK's 1992 long term plan for ARD/ML involved flooding the mine to prevent oxidation and acid generation with variations on flooding the mine to either the 5900 or 6200 levels. Water is expected to escape via short groundwater pathways in the vicinity of the 6200 level, with small incremental benefit compared to not plugging the 5900 level. SRK also noted that the water quality in the flooded mine will be worse than the existing discharge as oxidation products in unflushed parts of the mine would go into solution. Once flooded the underground mine discharge would be either a flow-through or over flow

system with either: direct pipe point discharge; diffuser discharge; or deep point discharge in the alluvial gravels. The flow-through system through would be best suited to high pressure discharge in a diffuser, but with the higher initial metal concentration from the remnant oxidation products. The SRK cost for 3 UG plugs and diffuser was \$625.6K.

Redfern also evaluated the immediate construction of an underground plug at the 5900 level in 1994 that was not dependent on the construction of a diffuser system or flooding of the lower levels, and "while the plug would not actually impound water, it's construction would provide partial completion of the mine closure plan" (Klohn 1994). An order of magnitude cost estimate for this 5900 level plug was \$210K.

Remediation plans for the Waste dumps

Four remediation options have been proposed for the waste dumps:

- Cover in place;
- Move and flood in bed rock;
- Move and bury and flood in river or;
- Move and dispose underground below the 5200 level in new voids and flood.

HKP 1991 proposed three options: covering the waste dumps with either a low permeability mixture of local fine alluvial sand and bentonite or high density polyethylene (HDPE) liner. HKP noted it would be difficult to cover the 5900 and 6400 dumps due to their steep terrain and difficult access and recommended re-locating them to the 5400 level with an underlay of HDPE liner and sand bedding. Cost of covering and sealing waste dumps was estimated as \$650K in 1991 \$. A bed rock flooding alternative would be to encapsulate the 5200 and 5400 waste underwater in a new bedrock excavation 12m x 120m x 50m below the 5400 level, excavation and moving cost \$615K. HKP also proposed disposal of the waste rock in the Tulsequah river alluvial flood plain with a 6m deep trench covering 20,000m² and piling the waste rock 3m high and covering with 3m of gravel, but noted numerous concerns, cost \$1.225M. SRK 1992 also suggested that the waste could be buried below the low water level in the Tulsequah River, but this option was also not preferred.

SRK 1992 proposed to consolidate and cover the 5400 and 5200 waste dumps by moving the 5200 waste to the north end of the 5400 dump and cover with HDPE geomembrane, cost \$528.6K. SRK also acknowledged that the 6400 and 5900 waste dumps are causing small ARD loads, but it would not be cost effective to reduce further and recommended leaving them in place. SRK also concluded that the because the majority of the discharge ARD/ML source is from the underground workings the incremental benefit achieved by placing a cover on the waste rock at the 5400 level could only be justified if the mine is first flooded to the 5900 level, significantly reducing the relative portion of ARD/ML loading from the underground discharge.

Remediation plans for Surface Runoff

HKP 1991 proposed diversion water control ditches could be constructed above the waste dumps to divert precipitation runoff and discharged to natural drainages. Snow removal from the dumps would also reduce large quantities of water from infiltrating the dumps during Spring thaw, but would likely be cost prohibitive. The runoff from the mine dumps could also be collected in sumps and directed for treatment.

Remediation Treatment of Effluent Mine water

HKP 1991 proposed a conventional lime addition water treatment system and settling pond. The costs quoted as an order of magnitude: \$109K for site piping and \$227 for the water treatment plant. SRK 1992 did not consider chemical treatment as a viable option due to the remoteness of the mine location. Rescan 1997 proposed an effluent treatment plant as part of new mine development. GLL constructed a passive water treatment system as an intervening measure in 2005, and Redfern considered building new cells at the passive water treatment plan to extends its life with: 2 new cells in each of 2007 (\$325K), 2010 (\$345K), and 2013 (\$366K). Operating costs for maintaining the passive water treatment plant were estimated as \$150-180K per year. New cells were not added to the passive water treatment plant, as plans were in place to construct the interim acid water treatment plant during 2008.

Chieftain constructed and commissioned the interim acid water treatment plant in late 2011/Q1 2012.

Remediation in Conjunction with New Mine Development

As part of the 1997 Rescan Environmental Assessment the mitigation and remediation of the existing ARD/ML was considered for the first time in conjunction with new mine development and operations. The drainage from the old mine was to be directed to a effluent treatment plant and the long term management enacted by filling the old Cominco stopes with acid consuming paste backfill (96% desulphurized tailings and 4% cement) to restrict water movement through he mine workings and provide sufficient neutralizing potential to prevent acid forming conditions (Rescan 1997 Vol IV). The historic broken ore would be removed and placed in new empty stopes below the 5200 level, before filling with paste backfill. Rescan proposed backfilling the upper mine with desulphurized tailings as it was uncertain at the time if the higher elevation upper workings would be sealed and flooded upon closure.

Interim acid Water Treatment Plant Optimization Study

The interim acid water treatment plant constructed by Chieftain was audited by Sohan Basra on November 5-8th, 2012 (AWT 2012). A feasibility design estimate based on this work was completed by Applied Water Treatment Inc. November 3, 2014 (AWT 2014). Several recommendations were made to improve the operation, efficiency and availability of the plant. By modifying the process, the idealized 5% solids (actual experience <1%) produced in the lime precipitation system can be improved to 30% solids in the proposed

High Density Sludge (HDS) system, reducing the volume of sludge by over 95%, and additionally producing a higher quality effluent with lower reagent neutralization costs. Specific recommendation were:

- Increase lime slurry concentration from 3% to 15% solids to extend retention time to at least 2 to 4
 minutes in new installed lime/sludge mix tank, this tank, not included in the current plant, is a key
 component of the HDS process for enhancing precipitation with lime coating recycled sludge
 particles to create enucleated sites for new material to precipitate.
- Increase reactor tank capacity and conduct test work to design upcomer separating reactor 1 from reactor 2, and minimizing the potential for short circuiting. Approximately 20% of the sludge produced in the HDS process is recycled to the reactor tanks where it requires a designed retention time of 60 minutes to achieve lime utilization of 90%. The current reactor tanks are undersized for this purpose with a retention size of only 10 minutes at high flows and estimated lime utilization of 60% (no test work was undertaken to design the upcomers by Sanitherm). The velocity through the upcomer needs to be sufficiently high to carry the grit particles through to the clarifier, otherwise the grit will accumulate in the first reactor tank necessitating removal, and correctly understanding this parameter will be a product of the new test work.
- Discontinue use of expensive ferric chloride for use as pH adjustment in lime reactor tank, if pH adjustment needed consider using cheaper ferric sulfate.
- Replace current pump feed IPS-T clarifier with standard gravity fed thickener/ clarifier, simplifying the piping system and using proven technology in common usage for this application.

Three options were presented by AWT to change the operation from a lime precipitation system to a high density sludge (HDS) process with increasing scale of scope and cost:

- Minor upgrades of the existing plant to optimize, enhancing the treatment as much as possible.
 But not improving operating or chemical reagent costs significantly. This is not considered viable by Chieftain, with the high operating costs not justifiable.
- 2. Modification / retrofit of the plant to incorporate higher flows(97-120m³/hr) with installation of new lime/sludge contact tank, replacement of reactor tank to two correctly sized tanks and replacement of clarifier. This will reduce reagent consumption and address the sludge densification problem with subsequent reduction in handling and support costs. This cost was calculated by AWT 2014 as option 1, totaling \$733K. This is the preferred option by Chieftain, modifying the existing plant to be able to function as initially specified with a moderate capital expenditure.
- 3. Design a new effluent treatment plant to incorporate surface and mill water with capacity of 230m³/hr. This cost was calculated by AWT 2014 as option 2, totaling \$1.729M. This will ultimately be built to as part of the mine complex development to treat the production effluent from the mill processes, but this large capital expenditure is premature at this stage.

For options 2 and 3 a three to four week pilot plant study was recommended to gather engineering data required for the planed design and following conceptual engineering design and budget.

Estimated costs for the ARD/ML mitigation options

- Plugging the 5200, 5400, and 5900 portals with an overflow drain discharge directed to exfiltrate
 into the Tulsequah river is estimated to cost at least \$1M, based on previous estimates with Bank
 of Canada inflation adjustments. Chieftain is discounting this option and not providing an accurate
 cost and engineering assessment because of previous understandings that regulators considered
 this an undesirable high risk option, with potential for resultant large volume release incident and
 probable significant fish mortality.
- Re-locating both the 5200 and 5400 HPAG to the temporary lined HPAG facility and covering at Rogers creek is estimated to cost \$1.2M, based on the 2014 JDS feasibility and is included as part of the mine plan and scheduled as one of the first activities. Chieftain is not considering the SRK recommendation of relocating the 5200 portal HPAG waste dump to combine with the 5400 HPAG and covering with HDPE liner with estimated cost of \$500K. This SRK recommendation will only reduce to the ARD/ML loadings by 15-20% and is not considered cost effective, with additionally, the highest impact on the receiving environment receptors from this HPAG contaminant loading only occurring during the freshet when salmon species are not migrating and eggs are not incubating and hatching (Palmer, Core6 & Triton 2013).
- IWTP design fixes to modify the existing lime precipitation system to the recommended high density sludge system is estimated to cost \$733K (AWT 2014), which is Chieftain's preferred option.

Preferred ARD mitigation strategy and recommendations / commitments

Chieftain is in complete agreement with the 1992 SRK report that the underground discharge is the priority in remediation and mitigation of the ARD/ML at the Tulsequah Chief mine site and maintains its preference to implement the design fixes and restart the interim acid water treatment plant in conjunction with new mine development and relocation of the HPAG to Rogers Creek and ultimately flooded underground below the 5200 level. Chieftain is not in a position to and cannot present a business case to operate the IWTP and treat water as a standalone operation without mine development. The only permanent solution to the ARD/ML is new mine operations: removing the broken ore and filling the old stopes with cemented desulphurized paste, ultimately moving the broken ore and existing HPAG material to new voids below the 5200 level where it can be flooded. This will stop the oxidation reactions in the broken ore and HPAG, and significantly reduce the exposed rock surface area in the upper mine available to react with water flowing through the mine. Chieftain is fully committed to this option and is actively pursuing mine financing opportunities. Once funding for mine construction is in place Chieftain will immediately re-commencing operations at the IWTP, and implement engineered solutions to address the previously identified deficiencies. As discussed, this is the only viable long term alternative for cleanup and remediation of the historic acid mine drainage and metal leaching at the mine site.

In the immediate term Chieftain will continue to monitor the water quality in the Tulsequah River with sampling during the open water season and compare with the historic data. The 2013 aquatic ecological risk assessment (AERA) shows that the fish resource downstream from the Tulsequah Chief mine site is at a healthy level and the 60 years of historic discharge posed low risk to fish. Additionally studies on resident Dolly Varden/Bull trout tissues show they are not affected by the mine discharges (ADF&G 2012).

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Tulsequah Chief Mine Project

Environmental Monitoring and Surveillance Plan: Care & Maintenance (2016+)

Chieftain Metals Inc



February 2016

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1. Introduction

The Environmental Monitoring and Surveillance (EM&S) Plan: Care and Maintenance (2016+) is a supporting document to Chieftain Metals Inc.'s (Chieftain) EMA Permit #105719 amendment application for the Tulsequah Chief mine site. All monitoring requirements for the Tulsequah site for have been consolidated in this document. This document has been created as a stand-alone document so that it can easily be modified or updated to address monitoring concerns or issues that may arise at a later date.

The plan is designed to ensure that potential environmental impacts are identified and mitigated before they occur. It is recognized that it may be necessary to change this plan in response to changing site conditions.

Contingency measures are not dealt with in this plan. Contingency measures were provided in the Acid Water Treatment Plant Technical Assessment Report (Chieftain, 2011).

This document covers the current site care and maintenance activities where the interim acid water treatment plant (IWTP) is non operational. Monitoring and surveillance activities will be occurring approximately quarterly during the open water season, with focused EM&S during the spring freshet/thaw. The specific months where the EM&S activities are scheduled to occur are: April, May, August, and October. The reduction in sampling frequency in the EM&S plan is supported by the consistency with the historical results and repeatable seasonal fluctuation, combined with zero site activities to initiate new changes. The recently submitted Tulsequah Chief Mine EMA Permit Q4 2015 Monitoring Report fully documents this information.

The plan will be updated at the end of the care and maintenance and the commencement of new construction to reflect those new activities. Some on-going baseline monitoring is included in this plan.

2. Monitoring and Surveillance

2.1 General Description

For the purposes of this plan, "monitoring" and "surveillance" consists of two distinct activities. "Surveillance" refers to visual inspections of structures such as surface water pond levels, drains, sumps, ditches, etc. A consolidated table of the surveillance activities is provided in Table 1. "Monitoring" refers to the collection of samples for analysis or field testing.

Surveillance Location	Location Description	Frequency of Surveillance Activities	Maintenance Activities
SE-2	Exfiltration Pond	Four times per year – observe water levels, sedimentation build up, riprap displacement, berm settlement	Clean out sediment build up, ensure pond and spillway are clear of debris and in working order
ATP Feed/ SE-3	Site Collection Pond	Nil, not in use	Pump down pond as required
Airstrip snow	Dispersed sites	Daily data logger: snow fall and snow accumulation; Snow Survey in early April	Maintain glycol precip gauge and HOBO weather station as required
Chasm and Shazah Creek	Bridge crossings	Four times per year – check for build up of logs/branches under bridges and at staff gauges	Remove accumulated debris to ensure free passage of water
Portal Creek diversion	Intake for Portal Creek	Four times per year – Sedimentation build up on intake, check intake screen regularly	Cleanout sediment build up, check intake and repair as necessary
Temporary Sludge Pond	Adjacent to ATP	Four times per year – check for water accumulation	Pump to ATP Feed pond if necessary
Lime Sludge Storage Pit	Adjacent to Airstrip	Four times per year – check for slumping or water ponding; check for erosion from surface water within 30 m of pit	
NAG site soil stockpile	Soil Stockpile Silt Fences	Four times per year – ensure stockpiles are re-vegetated	Apply seed if bare patches are showing signs of erosion.
Shazah Camp	All mobile equipment, genset and incinerator	Four times per year – check drip trays, secondary containment	Remove water, collect spilled product, replace oil sponges as required.

Table 2 provides a consolidated summary of the monitoring activities. Table 3 provides the UTM coordinates for the monitoring locations.

Table 1. Summary of Surveillance and Maintenance Activities

Surveillance Location	Location Description	Frequency of Surveillance Activities	Maintenance Activities
SE-2	Exfiltration Pond	Four times per year – observe water levels, sedimentation build up, riprap displacement, berm settlement	Clean out sediment build up, ensure pond and spillway are clear of debris and in working order
ATP Feed/ SE-3	Site Collection Pond	Nil, not in use	Pump down pond as required
Airstrip snow	Dispersed sites	Daily data logger: snow fall and snow accumulation; Snow Survey in early April	Maintain glycol precip gauge and HOBO weather station as required
Chasm and Shazah Creek	Bridge crossings	Four times per year – check for build up of logs/branches under bridges and at staff gauges	Remove accumulated debris to ensure free passage of water
Portal Creek diversion	Intake for Portal Creek	Four times per year – Sedimentation build up on intake, check intake screen regularly	Cleanout sediment build up, check intake and repair as necessary
Temporary Sludge Pond	Adjacent to ATP	Four times per year – check for water accumulation	Pump to ATP Feed pond if necessary
Lime Sludge Storage Pit	Adjacent to Airstrip	Four times per year – check for slumping or water ponding; check for erosion from surface water within 30 m of pit	
NAG site soil stockpile	Soil Stockpile Silt Fences	Four times per year – ensure stockpiles are re-vegetated	Apply seed if bare patches are showing signs of erosion.
Shazah Camp	All mobile equipment, genset and incinerator	Four times per year – check drip trays, secondary containment	Remove water, collect spilled product, replace oil sponges as required.

Table 2. Summary of Water Quality Monitoring

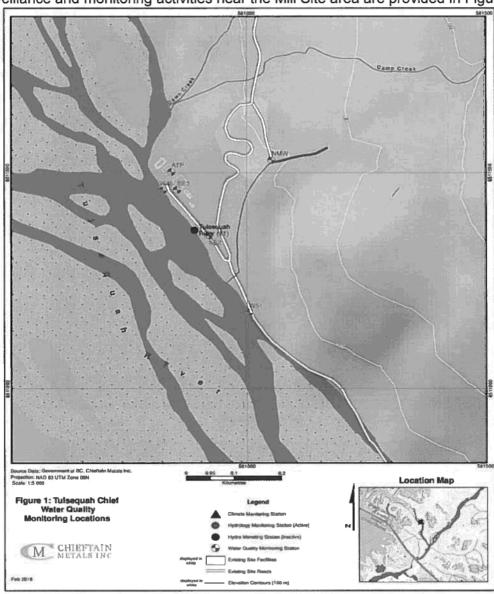
Sampling Location	Location Description/Rationale	Frequency of Field Parameters* and Lab Analysis
Shazah Camp	Climate Data – HOBO weather station and glycol precipitation gauge	April, August and October - download dataloggers; replenish glycol
Chasm Creek and Shazah Creek	Hydrometric stations	April or May, August and October – download dataloggers (including barologger), record staff gauge reading; take manual flow measurements

Sampling Location	Location Description/Rationale	Frequency of Field Parameters* and Lab Analysis
ATP Feed	Site Collection Pond - intake	Nil, not in use
Sump/SE-3	sump to ATP	7
ATP Discharge	Acid Water Treatment Plant	Nil, not in use
E272507	Discharge to Tulsequah	·
	River	
NMW	Neutral pH Mine Water	April/May/August/October: Field parameters,
Discharge	Discharge from 5400 adit to	flow, general chemistry, total and dissolved
E277509	Portal Creek	metals
SE-2	Exfiltration pond spillway	April/May/August/October: total and dissolved
		metals, general chemistry
P-07-03,	Near proposed PAG Facility	Download datalogger and record water levels at
MW11-3 and		least once per year
MW11-5 to		
MW11-7		
MW11-9 to -10	Near proposed NAG Dump	Record water levels at least once per year
SP11-01 to -03	Near Lime Sludge Pit at	April/May/August/October - water levels; April
E287309	airstrip	and October: groundwater field parameters,
E287310		dissolved metals, general chemistry
E287311 W10	Tulas and Diversed atom	Amril/Mary/August/Ostahar, field navamatara, total
E272544	Tulsequah River main stem	April/May/August/October: field parameters, total and dissolved metals, general chemistry
W46	upstream of Project Downstream of ATP	
E272548		Nil, not in use
W32	discharge	April/May/August/Ostabor, field parameters, total
E272546	Tulsequah River mainstream	April/May/August/October: field parameters, total
	downstream of Mine Site	and dissolved metals, general chemistry
W51	Downstream of ATP	April/May/August/October: field parameters, total
E272547	discharge	and dissolved metals, general chemistry
Borrow Pit	Near culvert	April, measure Dissolved Oxygen if ice cover
L	ers and general chemistry are defined	present

^{*} Field parameters and general chemistry are defined in Table 4.

Table 3 UTM Coordinates for Monitoring Locations

Sampling Location	UTM Coordinates Easting	UTM Coordinates Northing
SE-3/ATP Feed	580856	6511455
ATP Discharge	580790	6511500
NMW	581053	6511529
SE2	580920	6511355
P-07-03	581429	6510715
MW11-3	581635	6510593
MW11-5	581459	6510453
MW11-6	581442	6510530
MW11-7	581446	6510603
MW11-9	581519	6510226
SP11-01	579114	6513779
SP11-02	579196	6513375
SP11-03	579173	6513714
W10	578140	6514880
W51	581005	6511177
W32	581140	6507600
W46	580040	6511870
Borrow Pit	579660	6513410
Chasm Creek Bridge	579963	6513883
Shazah Creek Bridge	579556	6513334



Surveillance and monitoring activities near the Mill Site area are provided in Figure 1.

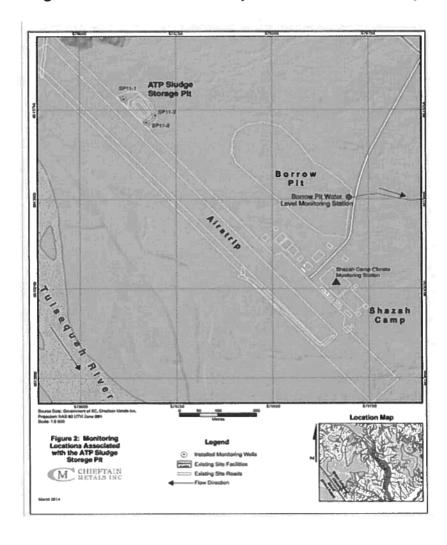


Figure 2 illustrates the lime pit area near the airstrip.

Figure 3 illustrates the PAG/NAG monitoring locations (for baseline purposes only).

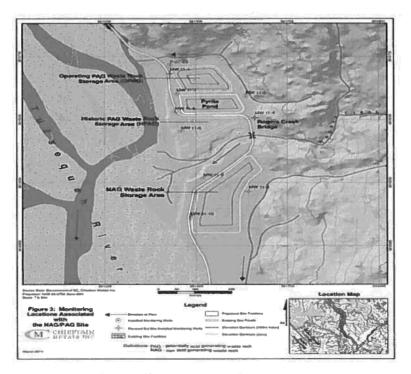


Figure 4 illustrates the receiving environment monitoring locations.

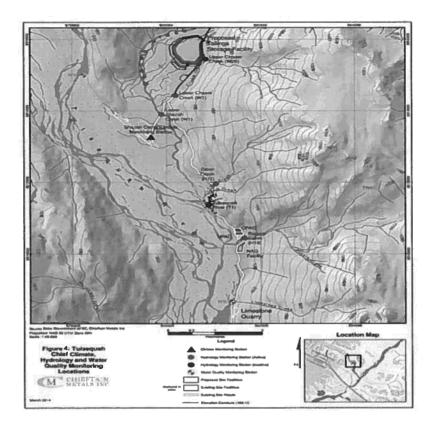


Table 4. Analytical Parameter List

Analysis Group	Parameter List
	pH
Field	Temperature (°C)
Parameters	Conductivity (µS/cm)
	(3), 7
	Alkalinity, Total as CaCO ₃
	Acidity as CaCO ₃
General	Hardness as CaCO₃
Chemistry	Total Suspended Solids
	Sulphate (SO ₄)
	Chloride

Analysis Group	Parameter List
	Aluminum
	Antimony
	Arsenic
	Barium
	Cadmium
	Calcium
	Chromium
	Cobalt
	Copper
	Iron
	Lead
	Lithium
Total &	Magnesium
Dissolved	Manganese
Metals	
	Molybdenum
	Nickel
	Potassium
	Selenium
	Silver
	Sodium
	Thallium
	Tin
	Titanium
	Uranium
	Vanadium
	Zinc

Table Notes:

- 1. Each heading represents a list of parameters that can be analyzed using a single bottle with appropriate preservative and/or sample preparation.
- 2. Detection Limits to meet the requirement of BC Aquatic Life Guidelines

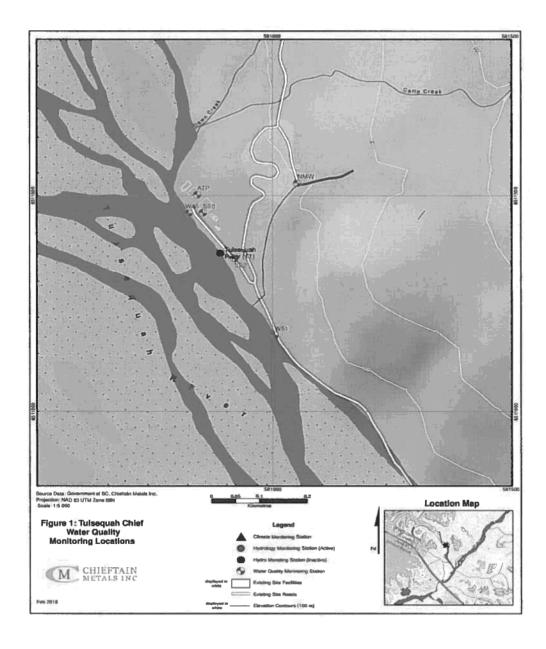


Figure 1. Monitoring Locations Associated with the Mill Site

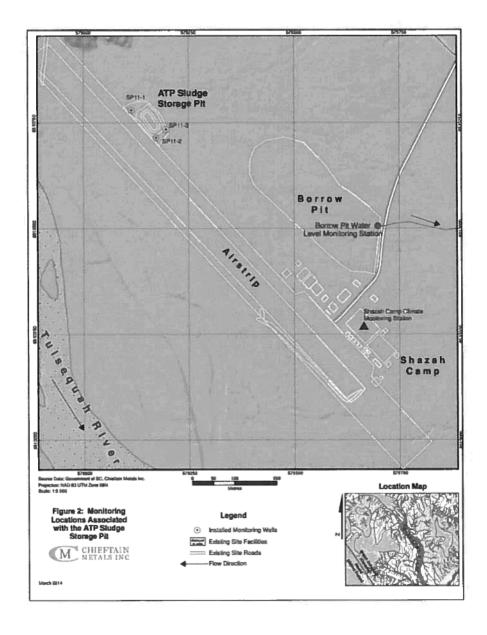


Figure 2. Monitoring Locations Associated with the Lime Sludge Pits

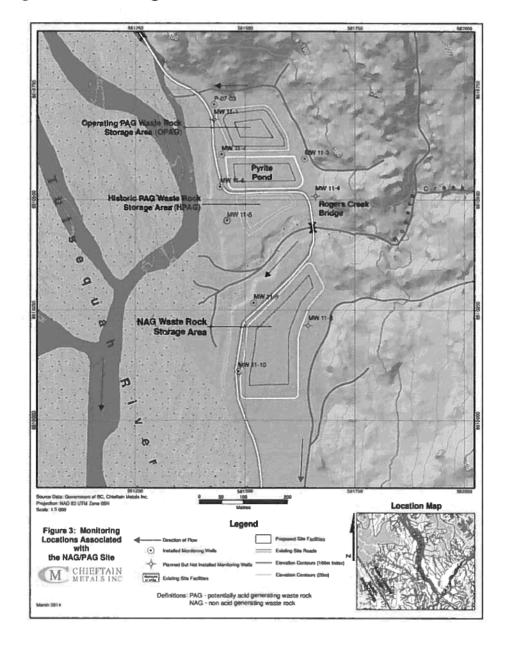


Figure 3. Monitoring Locations Associated with the NAG/PAG Site

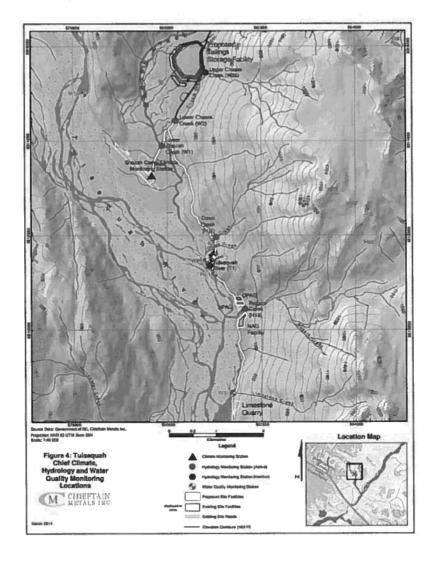


Figure 4. Site Plan and Discharge Locations

2.2 Surveillance Records

A logbook will be maintained to record all surveillance activities. April/May/August/October trip reports will be prepared by the Environmental Supervision team, summarizing all observations and measurements. The logbook will be available onsite for inspection at all times. Follow-up or corrective measures will be taken as needed, and recorded.

2.3 Analytical Parameters

A summary of the analytical parameters that will be tested during each monitoring event is summarized in Table 4. Each heading in Table 4 represents a list of parameters that can be analyzed using a single bottle with appropriate preservative and/or sample preparation. It should be noted that detection limits used for each parameter must meet requirements of BC Aquatic Life Guidelines. Additionally, field meters used to collect in-situ measurements will be calibrated regularly to ensure proper function and data quality.

Field notes will be kept using a standardized field form for each site. Field notes will be kept on file at site and be available for review at all times. April/May/August/October field reports will be prepared by the Environmental Supervision team summarizing field measurements and sample collection details.

2.4 Rationale for Determining Receiving Environment Sampling Locations

For the purposes of this monitoring plan, the "receiving environment" has been defined as the Tulsequah River. Sample sites located along the Tulsequah River are shown in Figure 1 and Figure 4. To provide context for pre-disturbance data, one monitoring location will be utilized upstream from the Mill Site (W10). W51 is situated to assess the water quality after the initial dilution zone for seepage from the Exfiltration Pond and replaces historic site W11. One additional monitoring location (W32) is positioned downstream of the mine site and of the planned facilities. This monitoring location will be compared to the upstream monitoring location (W10).

Due to the natural variability of the watercourse position within the Tulsequah River floodplain, the identified sample sites may be relocated in order to ensure the sites remain within the flow path of the pre-determined monitoring locations. This may involve site monitoring relocation and or the establishment of additional monitoring locations if river conditions significantly change during the construction period.

3. Reporting

As mentioned in Section 2, field data and samples will be collected in April/May/August/October. Laboratory monitoring results will be submitted by email to MoE within 30 days of receipt of the analytical results. Any non-compliances will be reported immediately (within 24 hours) and a summary of non-compliances and corrective action, taken will be submitted the Regional Manager of the Ministry of Environment within 30 days of the month end when the non-compliance was observed. An annual compilation report providing all available data will be submitted by March 31 of the following year. The report for 2016 is therefore due to be submitted no later than March 31st, 2017. The report will present the data in tabular and/or graphical format and will include interpretation comments.

4. References

- Chieftain, 2011. Application and Technical Assessment Report for the Acid Water Treatment Plant at the Tulsequah Chief Site. August 2011.
- Chieftain, 2016. EMA Permit 105716 Quarterly Report for Q4 2015, submitted February 2016.

Ministry of Environment, EMA Discharge Permit 105719, issued April 3, 2012.



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31 January 2016

Arash Janfada **Environmental Protection Officer** BC Ministry of Environment, Environmental Protection Division Bag 5000, 3726 Alfred Ave Smithers, BC V0J 2N0

Dear Mr. Janfada:

EMA Discharge Authorization #105719 – Quarterly Monitoring Report for Q4 2015

Chieftain Metals Inc. (Chieftain) is pleased to submit this quarterly monitoring report in accordance with the revised conditions of Permit 105719 under the provisions of the Environmental Management Act (EMA) for the October-December 2015 monitoring period. No samples were obtained in December. There were too many administrative and logistical hurdles to overcome with Christmas holidays, weather, availability of suitable aircraft and pilot, as well as the exceedingly limited amount of daylight at this time of year. In January 2016, we have brought in a helicopter from Whitehorse and successfully obtained the requisite samples.

Monitoring at the Tulsequah Chief Mine Site is conducted in accordance with EMA Permit 105719, which outlines surface and groundwater quality monitoring locations. While EMA Permit 105719 also details monitoring required for acid treatment plant effluent, and treatment plant sludge, treatment of mine effluent has been suspended and mine-influenced water (5200 and 5400 portals, waste rock runoff and local runoff) are combined in the Exfiltration Pond. Therefore, monitoring of acidic water treatment plant effluent is no longer relevant to the current conditions at the Tulsequah Chief mine site, and hence is not discussed in this report. While temporarily excluded from late 2012 until mid-2014, the neutral pH mine water has been re-added to the reporting schedule because this flow is once again being discharged directly to the environment via the Portal Creek diversion pipe, rather than via the Exfiltration Pond.

Monitoring results for neutral pH mine water, the 5200 portal, the exfiltration pond, receiving environment surface water monitoring stations and groundwater monitoring wells at the Tulsequah Chief Mine site are presented below. Surface water quality sampling is conducted monthly, and groundwater quality and level monitoring is conducted quarterly. Mercury sampling was discontinued in Q4 of 2013, as all samples taken in the 2012 - 2013 monitoring period resulted in values less than the reportable detection limits. The updated complete set of laboratory analytical results is presented in Appendix A.

1 EFFLUENT DISCHARGE MONITORING

As mentioned above, the interim acidic-water treatment plant (IWTP) was shut down in 2012 and is planned to be re-started upon securing full project financing. In addition, the results of an aquatic



ecological risk assessment conducted in late 2013 indicate that the risk to fish is low, whether the treatment plant is operating or not. From September 2012 to July 2014 all effluent from the historical underground workings was directed to the site exfiltration pond. Therefore, sampling of the treatment plant effluent and neutral pH mine water sites had been discontinued.

Earlier in 2014, it was recognized that the water level in the Site Exfiltration Pond was gradually rising, as sludge build-up on the filter fabric was increasing the resistance to flow. In July 2014, it was decided to remove the filter fabric, with the accumulated sludge, from the outer portion of the pond and to replace the filter fabric. To this end, most of the flows to the Exfiltration Pond were redirected around the pond, with the neutral pH mine water (station NMW) introduced to the Portal Creek diversion and the 5200 and 5400 portal discharges piped to the river. The local runoff and seepage from the 5400 waste dump continued to drain to the Exfiltration Pond (station SE-2) – although there was little flow at that time of year. Once the fabric was replaced, the 5400 portal was once again sent to the pond as well. The 5200 portal continued to be piped directly to river, until late October, while there was no activity underground and plenty of flow in the river adjacent to the mine. This is essentially the condition that had previously existed for over 50 years, until late 2011. During the 2015 freshet, the water level in the pond was again observed to be increasing, so in early June – once the Tulsequah River was into summer flow conditions – the 5200 portal discharge was re-directed straight to the river, consistent with historical practices.

The Neutral pH Mine Water (NMW) (Picture 1 and Picture 2) and the Site Exfiltration pond (SE-2) (Picture 3 and Picture 4) were sampled in October and November. Station NMW is the clean, neutral pH water diverted from underground and discharged to the Portal Creek diversion, and so is monitored separately. During this Q4 monitoring period, the site Exfiltration Pond (station SE-2) represents the combined flow from the 5200 and 5400 portals, along with the local runoff (including from the waste rock dumps), as shown in Figure 1. During the summer and early fall, the 5200 portal flow bypassed the Exfiltration Pond and discharged by pipe directly to the river over the riprap as discussed in the previous report. The 5200 Portal flow had been redirected back to the Exfiltration Pond prior to collection of the October sample from the Exfiltration Pond.

Samples from SE-2 and the NMW were analyzed for total and dissolved metals (by ICP/ICPMS) and physical parameters including pH, conductivity, hardness and alkalinity/acidity. Laboratory and field parameter results are provided in Table 1 for key parameters.

Station SE-2 continues to be characterized by high dissolved metal concentrations, and low pH (pH 3.0-3.5), primarily driven by the loading from the 5200 portal discharge. Sample results for sulphate, total and dissolved zinc and cadmium concentrations for the monitoring period are shown in Figure 2, Figure 3 and Figure 4, respectively. Trends at station SE-2 are generally scattered, reflecting the variety of inputs; however, metal concentrations in Q4 2015 are generally comparable to previous concentrations. It should be noted that the highest values for sulphate, Cd and Zn (Aug 2014 and June 2015) both coincided with the times when the 5200 portal flow has been directed to the river rather than through the Exfiltration Pond and thus the reported results are more representative of the small amount of 5400 Portal flow rather than the larger 5200 Portal flow. The complete set of analytical results for station SE-2 is provided in the water quality database in Appendix A. Appendix B provides a number of plots comparing the 5200 and 5400 portal discharge analyses with the more recent SE-2 values, further demonstrating that biogeochemical conditions remain consistent with the past.



The Neutral pH Mine Water (NMW) is characterized by neutral pH with low metal concentrations (Table 1) and low suspended solids concentrations. Metal concentrations are more comparable to receiving environment values (Section 2 below), than to Exfiltration pond (SE-2) concentrations, and are will below the permit limits. Acidity (to pH 8.3) was not analyzed for in the laboratory suite, because of the neutral pH. It is interesting to note that the arsenic values in the NMW are higher than the portal discharges or SE-2, likely because of the absence of iron in the neutral pH water, but still well below the permit limit for the treated water. The complete set of analytical results for station NMW is provided in the water quality database in Appendix A.



Picture 1 – NMW Discharge (Oct 17, 2015)

Picture 2 – NMW Discharge in to Portal Creek
Diversion (November 22, 2015)







Picture 4 – Exfiltration pond (Nov 22, 2015)



Table 1 - SE-2 and NMW Water Quality for Key Parameters for Q4 2015

Domester	¥124	S	E2	NN	4W
Parameter	Unit	17-Oct	22-Nov	17-Oct	22-Nov
Temperature - Field	°C	6.3	4	8.4	8.0
pH –Field	pH units	3.14	3.24	7.19	7.38
pH - Lab	pH units	3.33	3.26	7.94	4.94
Conductivity - Field	μS/cm	487	464.6	226.3	221.6
Conductivity - Lab	μS/cm	846	883	368	374
TSS	mg/L	24.3	22.5	2	2
D - Hardness	mg/L CaCO ₃	210	207	145	145
Acidity (pH 8.3)	mg/L CaCO ₃	183	199		
Sulphate	mg/L SO ₄	310	334	77.3	71.8
Dissolved Metals					
Aluminum	μg/L	10000	13600	10	26.8
Arsenic	μg/L	1.49	1.83	27.7	27.2
Copper	μg/L	9980	8880	0.1	0.1
Lead	μg/L	143	118	0.45	0.1
Zinc	μg/L	45300	40500	13.1	14.1

Red indicates a value reported as less than the reportable detection limit, and presented as 1/2 the detection limit in the table above.



CO,DV, DV-IWTP Mill Site W46 5200 Porta DV.RB-K SE-2 Portal PAG Site NAG Site DV Rogers Slough CO.DV CT-K DV, SK @ CO. CO DV SK DV, SK AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES ALL REPORT AND DRAWNINGS ARE SUBMITTED FOR MORE THAN THE PUBLIC AND OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND FOR PUBLIC ACTION OF DATA. STATEMENTS CONCLUSIONS OR ASSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWNINGS IS RESERVED PENDING OUR WRITTEN APPROVAL PREPARED FOR PROJECT LEGEND TULSEQUAH CHIEF **Glacier** CHIEFTAIN METALS CORP Road Wettand Treatment Plant TITLE Lake Contour (100m) Island Contour (20m) APPROXIMATE MAINSTREAM PREPARED BY **BRAIDS ON MAY 12, 2014** Tulse Mine Mine
Falls
Inferred Spawning
Known Spawning
Current Water
Quality Site
Historic Water
Quality Site Marsland ₩ Inferred Spawning ▲ His Known Spawning ← Qu Fish Sampling wf Species **Environmental** SCALE PAPERSIZE UNITS DATE # **Associates** 7/23/2014 1 30,000 LETTER METRES

Figure 1 - Monitoring Locations Associated with the Receiving Environment



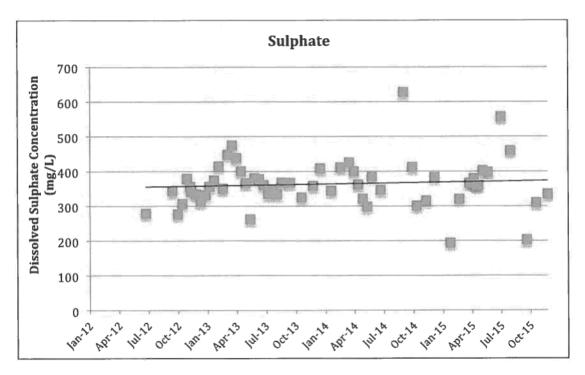


Figure 2 - Sulphate in Exfiltration Pond (SE-2)

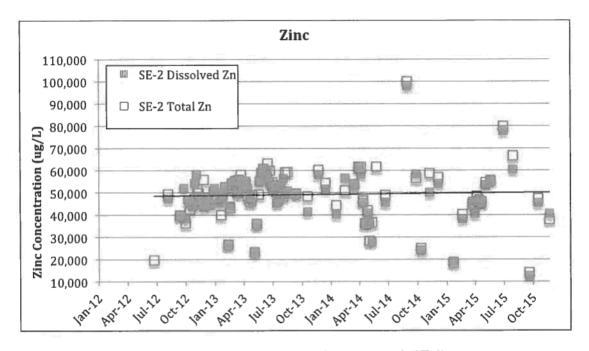


Figure 3 - Zinc in Exfiltration Pond (SE-2)



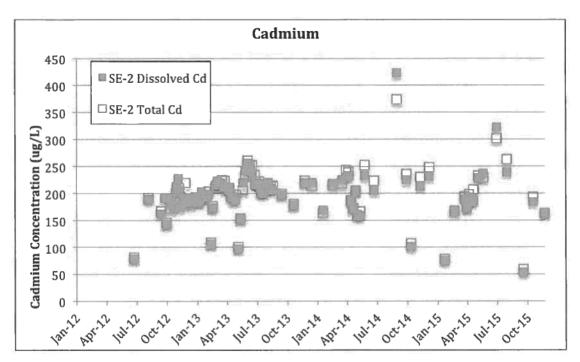


Figure 4 - Cadmium in Exfiltration Pond (SE-2)

2 RECEIVING ENVIRONMENT MONITORING

The latest jokulhaup occurred between June 30th and July 4th, 2015. It was a relatively small flood this year resulting in a peak discharge at Canyon Island on the Taku River of 69,000 cfs on July 2nd. Of that peak daily discharge, just over 40,000 cfs (~1,200 m³/s) would have been the flow from the Tulsequah River.

On-going water quality monitoring in the receiving environment includes four sites along the Tulsequah River (Figure 1).

- W10 (4.5 km upstream from the site) to provide background water quality.
- W46 (directly downstream of the IWTP discharge point) to monitor water quality prior to complete dilution. Also serves as a background station while the IWTP is not operating. This station was discontinued in July 2015, when the river moved away from the bank at this location.
- W51 (~325 m downstream from the SE-2 discharge zone) to monitor water quality after the initial dilution zone (IDZ).
- Station W32 (2.7 km downstream from the SE-2 discharge zone) to monitor fully mixed water quality downstream of the mine site.

Water quality sampling is conducted monthly, with more frequent sampling during spring melt. Laboratory analysis includes total and dissolved metals (by ICP/ICPMS) and physical parameters including pH, conductivity, turbidity, total suspended solids, hardness and alkalinity. Full water quality results are provided in Appendix A, and the results from Q4 2015 for key parameters of concern are



provided in Table 2, compared to receiving environment water quality guidelines. The water quality guidelines for aluminum, copper, and zinc were taken from the site specific water quality objectives developed by AECOM, based on background water quality at W10, and presented in the report titled, "Tulsequah Chief Mine: Site Specific Water Quality Objectives" dated December 2008. These values were revisited in Table 3 of the Q3 2014 monitoring report, which suggests these (or very similar) values are still applicable, other than for D-Al. The D-Al number has been affected by a change in sampling technique, and could be revised downwards to 433 ug/L based on the P95 value for data up to November, 2015. For the same dataset, the P95 values for total copper and total zinc are virtually unchanged, at 13.3 ug/L and 30.2 ug/L, respectively, as would be expected. Water quality guidelines for arsenic and lead were sourced from the BC Water Quality Guidelines for the Protection of Aquatic Life. The lead guideline is hardness dependent and increases with increasing hardness levels. A hardness value between 20 mg/L and 40 mg/L was assumed, based on measured values at W10 in that range. Water quality results for each monitoring site are discussed further below.

Table 2 - Receiving Environment Water Quality Monitoring Results - Q4 2015

	** **	Water Quality	w	10	w	51	w	32
Parameters	Unit	Objective	17-Oct	22-Nov	17-Oct	22-Nov	17-Oct	22-Nov
Temperature - Field	°C		0.7	0.1	2.6	1	7.3	1.1
pH -Field	pH units		7.88	6.93	7.89	7.18	7.95	7.67
pH - Lab	pH units		7.59	7.56	7.71	7.73	7.86	7.91
Conductivity - Field	$\mu S/cm$		29.9	32.4	45.3	53.9	53.6	66.8
Conductivity - Lab	μS/cm		63.2	68.8	89.1	111	101	136
TSS	mg/L		75.3	48.5	40.3	11.3	13	4
Total Alkalinity	mg/L CaCO ₃		20.8	21.9	28.2	35.3	42.8	53.6
Total Hardness	mg/L CaCO ₃		26.8	29.7	57.7	73.6	47.1	61.2
Sulphate	mg/L SO ₄		9.56	10.9	13.4	16.9	7.73	9.89
Metals								
Dissolved Aluminum	μg/L	611*	74.9	64.6	48.1	75.1	32.6	45.5
Total Arsenic	$\mu g/L$	5	3.01	2.51	3.11	1.77	1.91	0.98
Total Copper	$\mu g/L$	13	10.2	8.55	12	20.4	2.88	2.46
Total Lead	$\mu g/L$	6	3.06	2.38	2.22	1.33	0.45	0.2
Total Zinc	$\mu g/L$	31.9	22.2	17.6	42.9	99	8.7	7.1

Red indicates a value reported as less than the reportable detection limit, and presented as ½ the detection limit in the table above. Note: Shaded cells indicate values in exceedance of the Water Quality Objective. *D-Al value based on data from 1994 to 2008.

2.1 Tulsequah River upstream of Mine Site (W10)

The conditions at the station W10 in Q3 are shown in Picture 7 and Picture 8. The jokulhaup has brought the main flow of the river right in to the riprap protecting the northern end of the airstrip and has caused some undercutting there. Concentrations for key parameters are presented in Figure 5 compared to the water quality objectives, for the 2012 - 2015 monitoring period. Generally the water quality at station



W10 is below the water quality objectives, although total aluminum concentrations are often greater than the dissolved aluminum objective (Figure 5). The copper concentration in the September 2015 sample is at the P95 level for the background dataset, and just slightly above the P90-based value determined in 2008. Dissolved fraction metal concentrations (zinc, aluminum, lead) are mostly less than the detection limit. The pH values at station W10 are circumneutral (average pH 7.5). The Q3 2015 sample results are comparable to the 2012-2014 sample concentrations.

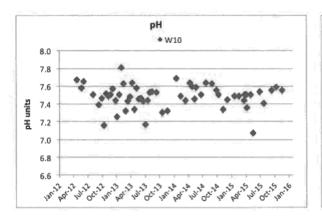
Total metal concentrations exhibit seasonal trends where concentrations are slightly elevated at a certain time of the year, then decrease over the winter. In 2013 the metal concentrations peaked in July, whereas in 2014 the peak concentrations were exhibited in September and October. Total metals levels appear to be highest during the time of year when glacial melt water containing elevated levels of TSS (August – October) is a major contributor to the total Tulsequah River streamflow.

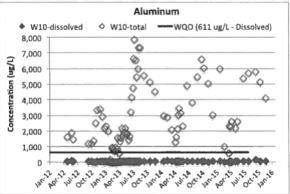


Picture 7 – Station W10 (Oct 17, 2015)



Picture 8 - Station W10 (Nov 22, 2015)







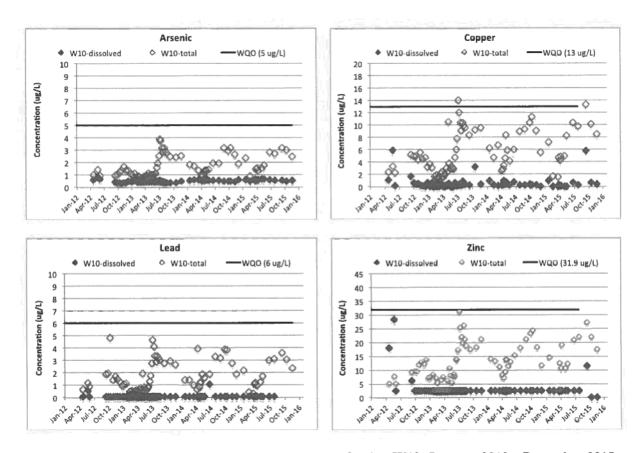


Figure 5 - Key Parameter Water Quality Results at Station W10, January 2012 - December 2015

2.2 Tulsequah River IDZ (W46)

As the acid treatment plant is not operating, station W46 also serves as a background water quality station. The Tulsequah River water quality at W46 is normally partly influenced by the flow from Shazah Creek as well as the local area tributaries of Dawn Creek and Camp Creek. The jokulhaup this summer pushed the mainstem of the river away from the bank at the ATP location, so the only water present near the normal W46 sampling location is from Camp and Dawn Creek. Since this creek water is not comparable to Tulsequah River water at W10 or W51, sampling at this station will be suspended until the river location changes again. Picture 9 and Picture 10 show the stream reach where the ATP would discharge and where the W46 would normally be sampled.







Picture 9 – ATP Discharge location – upstream of W46 (October 14, 2015)

Picture 10 – Looking downstream towards Station W46 (October 14, 2015)

2.3 Tulsequah River Near Field Downstream (W51)

The location of station W51 is shown on Figure 1. Conditions in Q4 are shown in Picture 11 and Picture 12.

Water quality results for station W51 are presented in Figure 6 for the 2012 - 2015 monitoring periods and are compared to the water quality objectives or Toxicity Reference Values (TRV) used in the Aquatic Ecological Risk Assessment. The metal concentrations at station W51 vary widely over the year, mostly in response to available dilution in the channel adjacent to the mine. Peaks in concentrations evident in Q3 decreased in Q4 2014, and continued to decrease in Q1 2015, similarly to trends in early 2014 Generally, water chemistry in 2015 is comparable to concentrations over the same period in 2014, until Q4 (Figure 6). Normally in Q4, the concentrations of Cd, Cu and Zn increase from the summertime values. However, this year the concentrations for these signature parameters remained in the same range.

In Q4 2015, water quality at monitoring station W51 was generally in exceedance of the water quality objectives for total copper and zinc (Table 2), similar to samples taken at station W51 in previous years. The pH values at station W51 are circumneutral (average value pH 7.55). Total suspended solids concentrations are low during April and May but increased in June as the glacier meltwater contribution increased. However, concentrations in Q4 are typically considerably higher than in Q3, as flows decrease with the onset of winter. This year, instead, concentrations only increased slightly, if at all. It is suspected that this is a result of seepage from the Exfiltration Pond entering the gravels of the river floodplain rather than mixing directly with the river water on surface. Photo 13 shows the ground conditions in mid-October. As water levels dropped further in November, even less of the seepage would have been able to mix directly with the river water. The zinc plot in Figure 7 best illustrates the usual trend of increasing concentration over the winter, peaking in April. Concentrations at station W51 increase in Q4 and Q1 as river flows decrease. The size of the peak has been smaller in years subsequent to 2012/13, but this year (winter 2015/16) there is only a barely discernable increase in concentration in October and November. A sneak preview of the January 2016 data, shows the zinc remains below the TRV at W51.



For the past three years, from late May until October, cadmium and zinc concentrations at W51 remain well below the TRV (and often below the WQO), during the time of year with greatest fish utilization of the mainstem.





Picture 11 - Station W51 (Oct 17, 2015)

Picture 12 - Station W51 (Nov 22, 2015)



Picture 13 – Seepage from Exfiltration Pond filtering in to floodplain adjacent to berm (Oct 14, 2015)



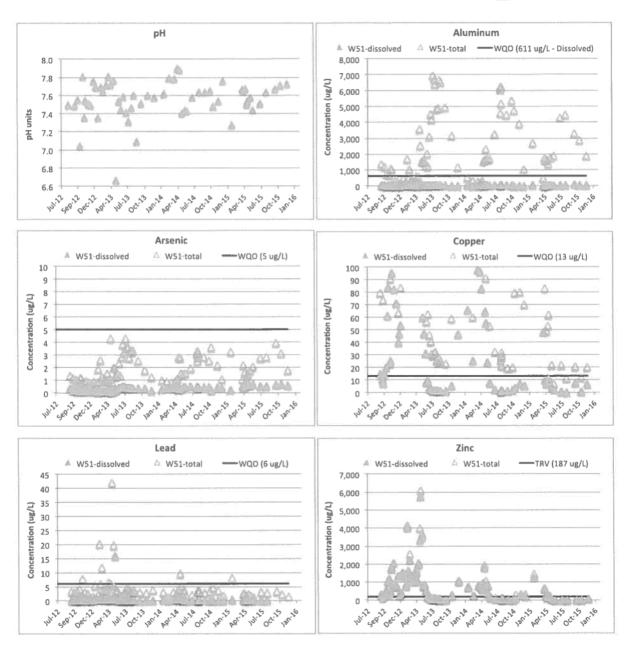


Figure 6 - Key Parameter Water Quality Results at Station W51, July 2012 to November 2015



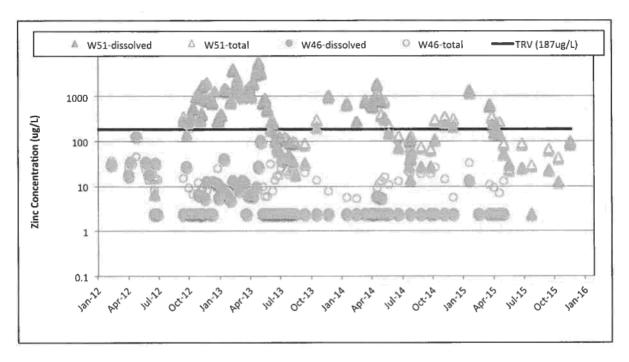


Figure 7 - Zinc Concentrations at Stations W46 and W51, January 2012 to December 2015

2.4 Tulsequah River Far Field Downstream (W32)

Water quality results for station W32 are presented in Figure 8 and are compared to the water quality objectives for the 2012 - 2015 monitoring periods. Station W32 in October and November is shown in Picture 13, and Picture 14, respectively. It is worth noting that the discharge of Limestone Creek entering the river can be seen – which was not typical in the past. Furthermore, the colour of the water at W32 is different than at W10 and W51. This is primarily because of lower turbidity (caused by lower TSS) in the water. Based on visual observations in October 2015, it appeared that most of the water at the W32 sample location is derived from Roger's Slough and Limestone Creek, with some contribution from Roger's Creek and a small braid of the Tulsequah river mainstem. Dissolved metal fractions at station W32 were generally low in Q3 and Q4 2015, and many were less than the reportable detection limit. Similarly, total metal fractions at station W32 were lower than at the other two (W10 or W51) river stations. Total metal concentrations of copper and zinc were also lower in Q3 and Q4 than in Q1 or Q2 2015. Based on the analytical results and observations of the river braiding in October, it appears that the sampling location used for W32 since late 2008 is no longer viable for assessing far-field impacts of the discharge from the mine site. For the November sampling campaign, the sample location was moved across the floodplain and slightly downstream to a river braid that is better exposed to the contaminant loading. Appendix C contains a series of photos to show the river braiding between the minesite and W32. It appears that most of the contaminant load from the mine is being directed away from the outlet of Limestone Creek, where W32 has been located since 2008. It does appear that most of the load should re-combine at about the location where the W32 sample was collected in November (and again in January 2016). However, closer inspection of the water quality data from November suggests that the new location may still have been just a little bit too far upstream to catch the full load from the mine. The February 2016 sample location will again be moved slightly further downstream such that the full mixing of the two braids can be sampled. It should also be noted that the Exfiltration Pond drainage is currently



discharge to the dry floodplain, as was discussed under W51 in Section 2.3. This appears to be reducing the overall loading to the Tulsequah at this time of year.

The paired correlations for sulphate, cadmium and zinc concentrations at stations W32 and W51 are shown in Figure 9, Figure 10 and Figure 11, respectively. The discrepancy in sulphate values in the latest sampling can be seen in the one value located well below the correlation line at the low end of the range of observed sample concentrations. There had initially been (prior to July 2013) reasonably good correlation between W32 and W51, reflecting the dilution occurring at about 30-fold for Cd and Zn. However, after the 2013 jokulhaup flood, which started on July 3rd, and started receding on July 6th, 2013, there seemed to be a change in the concentrations at W51 relative to the prior data. The Cd and Zn data displayed on Figure 12 and Figure 13 make this change particularly evident, by highlighting the year-toyear differences during the snow melt season (March to May). It is not as easy to see the change in the sulphate data since the incremental loading from the seepage is always readily diluted at W51. The 2014 flood occurred in mid July, and the data subsequent to July 2014 have been added to the graphs as a third group. It is clear that the dilution ratio has changed yet again, with even more dilution occurring quickly, between the Exfiltration Pond and W51, while the ultimate concentration at W32 remains unaffected. As mentioned, the 2015 flood occurred around July 2nd, but it now appears that a new correlation trend is not relevant for the sampling location used in Q3, since the flow is not representative of downstream conditions in the mainstem of the river.

The effect of dilution is also evident when comparing sulphate and metal concentrations between stations W32 and W10 (Figure 14, Figure 15, and Figure 16, note the logarithmic scale in the zinc graph). Sulphate and metal concentrations remain relatively stable at station W10 (upstream of the mine workings), however, the concentrations at station W32 (downstream of the mine workings) normally increase as flow diminishes over the winter, and then decrease again with the onset of freshet. During the ice-free periods, the concentrations of sulphate and total and dissolved metals are comparable upstream and downstream of the mine (even without treatment plant operation). The 2014 concentrations at both stations were comparable to historic values, confirming that the changes at W51 relate to river braiding, not to changes in total river flow. The 2015 values have been strongly affected by the changes in river braiding, as discussed above. Additional sampling at W32 over Q1 2016 should help evaluate the cause. Regardless of the cause, the concentrations in the river are lower this quarter than in past years.



Picture 16 - Looking upstream from Station W32 (Oct 17, 2015) - Limestone Creek can be seen entering from right



Picture 17 – New Station W32 looking towards Chief minesite (Nov 23, 2015)



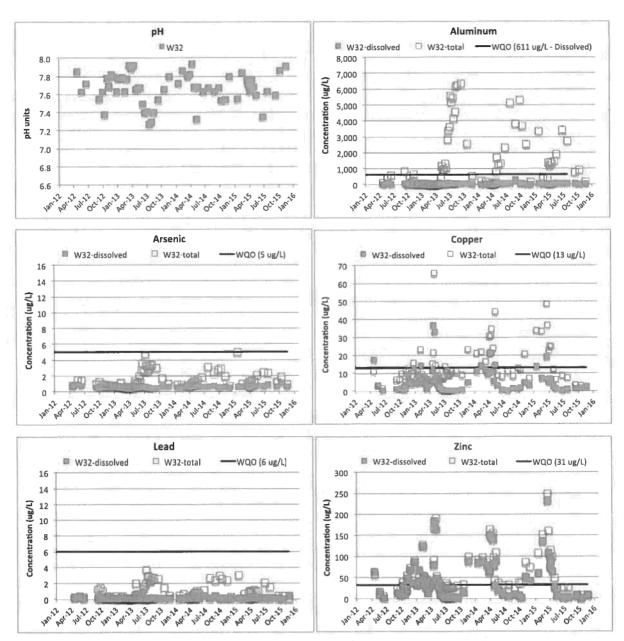


Figure 8 - Key Parameter Water Quality Results at Station W32, January 2012 - November 2015



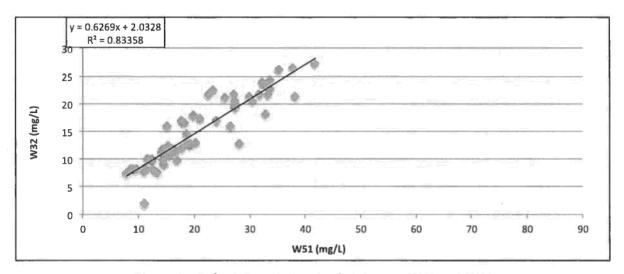


Figure 9 - Paired Correlation for Sulphate at W51 and W32

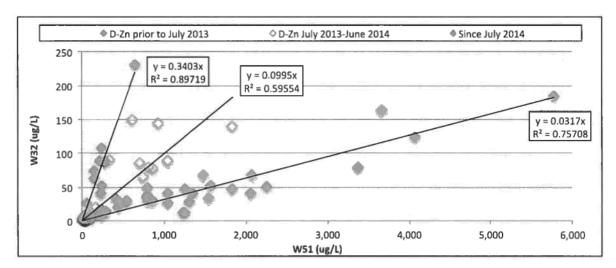


Figure 10 - Paired Correlation for Dissolved Zinc at W51 and W32



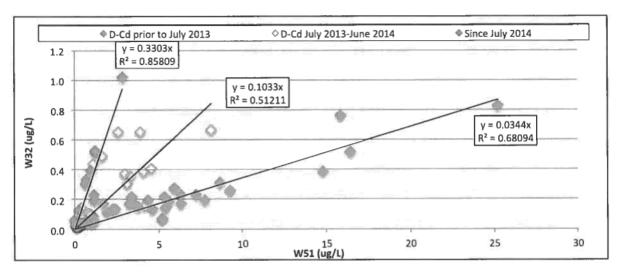


Figure 11 - Paired Correlation for Dissolved Cadmium at W51 and W32

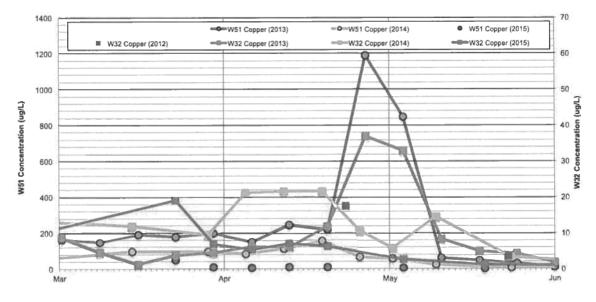


Figure 12 -Dissolved Copper at W51 and W32 during snow melt period from 2012 to 2015



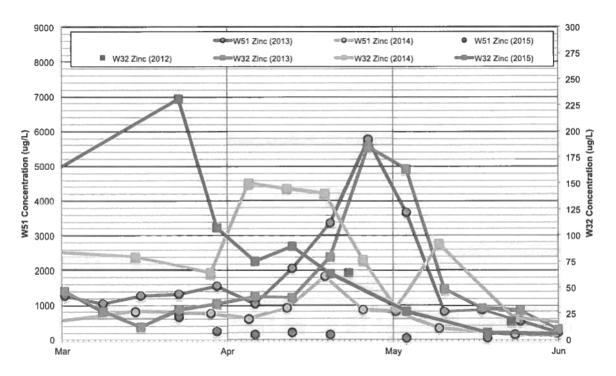


Figure 13 -Dissolved Zinc at W51 and W32 during snow melt period from 2012 to 2015

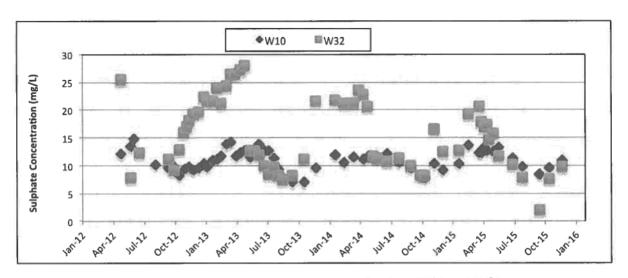


Figure 14 - Sulphate Concentrations at Stations W10 and W32



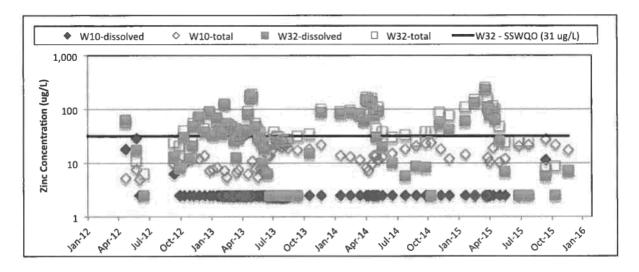


Figure 15 - Zinc Concentrations at Stations W10 and W32

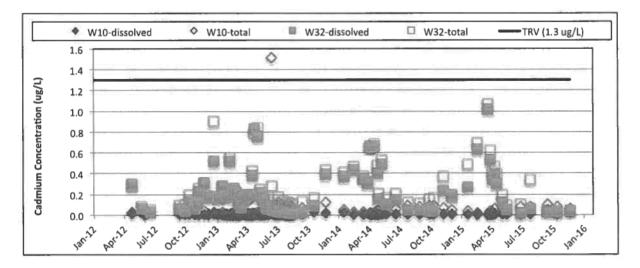


Figure 16 - Cadmium Concentrations at Stations W10 and W32

3 ATP SLUDGE MONITORING

No fresh sludge has been produced since the ATP was shut down. Sludge production (volume) was recorded and reported at the time that the totes were filled and transported away from the ATP, whether to the pond by the plant or the airstrip. No residual sludge has been transported from the sludge pond at the ATP to the sludge pit at the airstrip since the summer of 2012. Additional samples of the sludge were collected from the sludge pit by the airstrip in May 2014, and analytical results were presented in the Q2 2014 quarterly report.

4 MONITORING WELLS AT SLUDGE PIT

Water levels are measured in the groundwater monitoring wells, by measuring the depth of water from the top of the well. Figure 17 shows the locations of the wells relative to the sludge pit and airstrip. The elevation of the surface of the sludge was surveyed in May 2014, and was found to be up to El 58.0 m



near the north end and around El 57.7 m further towards the south end. The bottom of the sludge pit varies between El 57.3 m and El 57.8 m, so the sludge is generally only a 10 cm to 50 cm thick layer.

Groundwater well sampling occurred on September 18, 2015. Water quality results for select parameters of concern are presented in Table 4. The results are compared to the *Contaminated Sites Regulations Schedule 6 Generic Numerical Water Standards for Aquatic Life* (CSR Standards) where applicable, with the most conservative standard (i.e., lowest hardness value) presented. Most values are at least one order below the CSR Standards, with the exception of cadmium at well SP11-1 for which the concentrations fluctuate around the CSR Standard (calculated using baseline hardness). These results are generally comparable to results from samples taken in 2011 - 2014. Graphical representations of samples taken 2011 -2015 are presented in Figure 19, Figure 20 and Figure 21 for dissolved sulphate, zinc and cadmium, respectively.

Results for water levels are presented in Figure 18 and Table 5, as are the water levels from 2011 – 2015, for comparison. Water levels in Q1 and Q2 2015 were apparently affected by beaver activities in the Borrow pit pond. The usual seasonal drop off in water level did not occur over the winter because, with the camp being unoccupied since November 2014, some beaver activity had blocked the culvert draining from the pond and succeeded in storing extra water and runoff over the winter. This apparently increased the elevation of the water table as far away as the sludge pit, a distance of a few hundred metres. By June, the Borrow pit pond was beginning to encroach on the core racks to the east of the pond so the log jam was removed from the culvert and normal pond water levels were restored. However, beaver activity has continued throughout Q3 and the borrow pit pond level has consistently remained above the invert elevation of the outlet culvert. Unfortunately, the pressure transducer in the borrow pit has been lost because the beavers removed the shrub to which the transducer cable was attached, so no continuous record of pond level is available after April 2015. Efforts to remove the beavers from the pond continue.

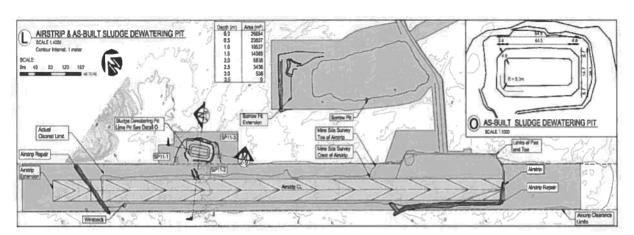


Figure 17 - Sludge Pit Monitoring Well Location



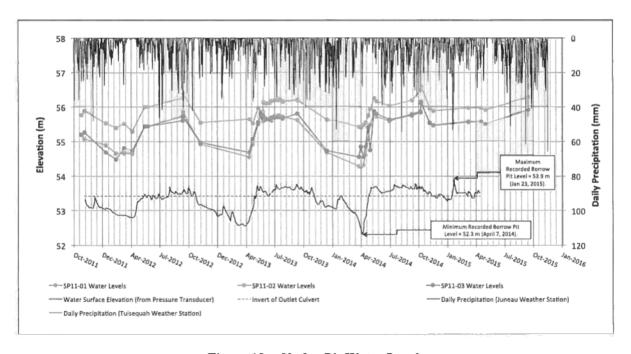


Figure 18 - Sludge Pit Water Levels



Table 4 - Sludge Pit Groundwater Monitoring Well Water Level Monitoring Results

Parameter	Unit	Contaminated Sites Regulations Schedule 6 Generic Numerical Water Standards for Aquatic Life*	A	Analytical Resul	ts
			SP11-1 23-Nov	SP11-2 23-Nov	SP11-3 23-Nov
pH	pH units		7.38	7.47	7.56
Conductivity TSS D - Hardness	uS/cm mg/L mg/L CaCO ₃		185 5.3 82	124 2 54.6	109 2 50.7
Sulphate Chloride	mg/L SO ₄ mg/L	1000 1500	14.9 1.2	16.1 0.51	13.9 0.6
Dissolved Metals					
Aluminum (Al) Antimony (Sb)	ug/L ug/L	200	13.3 0.25 0.94	27.2 0.25 0.13	26.1 0.25 0.05
Arsenic (Cs) Barium (Ba) Beryllium (Be)	ug/L ug/L ug/L	10000 53	94.2 0.05	54.3 0.05	35.1 0.05
Boron (B) Cadmium (Cd)	ug/L ug/L	50000 0.3	25 0.427	25 0.118	25 0.011
Cobalt (Co) Copper (Cu)	ug/L ug/L	40 20	8.09 2.16	0.25 1.9	0.25 0.63
Lead (Pb) Mercury (Hg)	ug/L ug/L	40 1	0.25	0.1	0.1
Molybdenum (Mo) Nickel (Ni)	ug/L ug/L	10000 250	0.5 22.3	0.5 5.3	0.5 0.5
Selenium (Se) Silver (Ag)	ug/L ug/L	10 0.5	0.05	0.23	0.16 0.01
Thallium (Tl) Titanium (Ti)	ug/L ug/L	3 1000	0.025 2.5	0.025 2.5	0.025 2.5
Uranium (U) Zinc (Zn)	ug/L ug/L	3000 75	0.13 14.3	0.05 6.5	0.05 2.5

^{*}Most conservative standard

Values in red were reported as less than the analysis method detection firmit and shown here as 1/2 the method detection limit

Highlighted values indicate exceedances of the CSR Standard



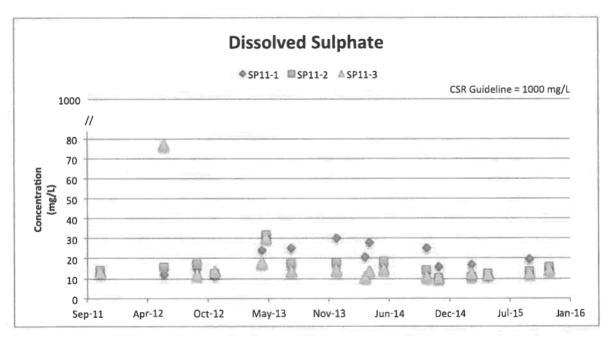


Figure 19 - Sulphate Concentrations at Sludge Pit Groundwater Monitoring Wells

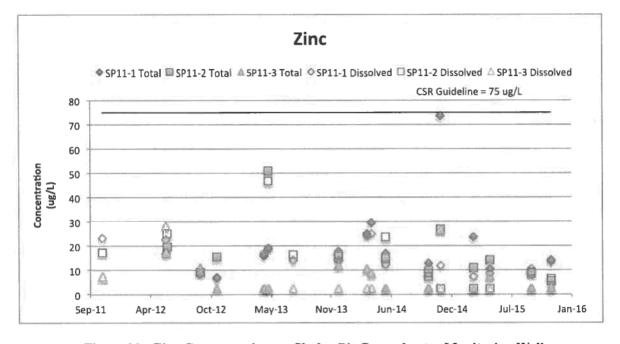


Figure 20 - Zinc Concentrations at Sludge Pit Groundwater Monitoring Wells



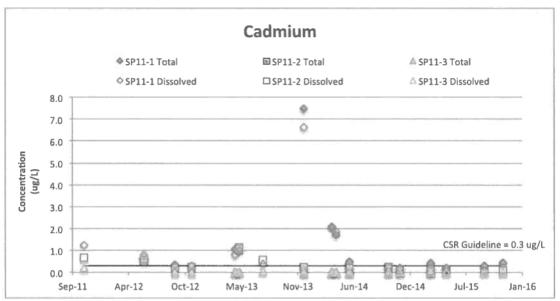


Figure 21 - Cadmium Concentrations at Sludge Pit Groundwater Monitoring Wells

Table 5 - Sludge Pit Groundwater Monitoring Well Water Level Monitoring Results

· Well ID	SP11-1	SP11-2	SP11-3	Well ID	SP11-1	SP11-2	SP11-3
Date Measured	Wate	er Level (1	nasl)	Date Measured	Wa	ter Level (masl)
25-Oct-11	55.77	55.22	55.19	13-Sep-13	56.20	55.63	55.81
04-Nov-11	55.88	55.08	55.26	15-Dec-13	55.64	54.69	54.74
11-Jan-12	55.54	54.90	54.69	27-Mar-14	55.42	-	54.55
12-Feb-12	55.40	54.66	54.84	03-Apr-14	55.41	-	54.86
10-Mar-12	55.51	54.66	54.81	11-Apr-14	55.49	54.33	54.56
04-Apr-12	55.30	54.65	54.73	18-Apr-14	55.54	54.62	54.85
15-May-12	56.01	55.44	55.44	25-Apr-14	55.75	55.06	55.41
24-May-12	56.01	55.44	55.44	02-May-14	55.94	55.49	54.75
11-Sep-12	56.24	55.73	55.60	15-May-14	56.25	55.81	55.87
14-Sep-12	56.37	55.84	55.72	23-May-14	56.17	55.73	55.80
06-Nov-12	55.54	54.93	54.97	03-Jul-14	56.04	55.60	55.63
12-Apr-13	55.65	54.56	54.69	12-Sep-14	56.20	55.80	55.76
23-Apr-13	55.53	54.93	55.07	11-Oct-14	55.82	55.46	55.41
10-May-13	55.98	55.51	55.56	07-Nov-14	55.96	55.54	55.55
18-May-13	55.85	55.81	55.80	19-Nov-14	55.89	55.46	55.47
25-May-13	55.85	55.69	55.68	10-Mar-15	55.97	55.56	55.58
26-May-13	56.13	55.59	55.75	19-Apr-15	55.98	55.58	55.58
04-Jun-13	56.11	55.68	55.64	04-May-15	55.91	55.50	55.50
15-Jun-13	56.12	55.67	55.63	18-Sep-15	56.27	55.92	55.90
22-Jun-13	56.18	55.61	55.69	23-Nov-16	55.87	55.41	55.47
02-Jul-13	56.20	55.74	55.70				
13-Jul-13	56.19	55.76	55.71	Maximum	56.37	55.92	55.90
18-Jul-13	56.21	55.75	55.71	Minimum	55.30	54.33	54.55
28-Jul-13	56.15	55.73	55.66	Average	55.90	55.37	55.36



5 CLOSURE

We trust this quarterly monitoring report meets your requirements at this time. If you have any questions, please do not hesitate to contact us.

Yours Sincerely,

Chieftain Metals Corp.

Keith Boyle, P.Eng. Chief Operating Officer

/attach

cc. Neil Bailey, Compliance Officer, MoE Smithers

Rob Marsland, Chieftain Victor Wypyrsky, Chieftain Eric Telford, TRTFN Mark Connor, TRTFN Wade Comin, EC



APPENDIX A

Tulsequah Chief Water Quality Database

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sophuse Silver (Agg sealuse Minestons (Sr) mahose Thellinis (Th	upt.	9 052 236 0 307 2.5		0-877 0 098 0-32 2.5	1 27 E 1 1000 S 60 079 9 60 234 27 1 25 E 2	H 00	29 8.24 80 6.819 80 6.920 81 389 32 9.36 6.7 8.9 6.0 6.9	9 947 2 296 1 9 43	307 367 9.69	9628 8 979 379 8 38	204 204 8.54	63390 6 100 300 9-43	0.047 176 0.50	967 01 967 1	64 6 66 76 39 27 63	9 10 00 0 70 10 10 10 10 10 10 10 10 10 10 10 10 10	3.54P 3.74P 8.34P	78k	100 M	1 50 6 6 100 100 100 100 100 100 100 100 10	14 0.4 im ip 4 in 0.40 ir 40 ir 40 ir 6	13 8.27 80 4080 86 9.568 56 475 27 8.46	0 000 0 000 0 000 0 100	342 936	9-41 75.79 9-964 943	412	6 854 613 9.34	634 E	421 61 630 63	06 6.000 96 428 36 5.020	367	530 636	9.27 0	949 9-0 196 2 194 9-3	12 0 100 21 311 10 0 9	320 0.30	386	100 9-42	300 1 044 9	107 ha	in 111	887	244	144 BH 8-4 BH	Ø 144 M 8 M	95.0 0.36	10.0
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undred Magnesum (Mg) statumers (F) statum (Mg)me (Fin statum (Mg)me (H)	mpt. mpt. mpt	5 M 5 M 708	8.69 8.69 8.61 137	4.9	9.06 1 5.0 3 714 50		95 £ 99 17 6.1 162 159	2 10 2 4 1 170	0 07 5 7 5 7	1 16. c./n 132	0.799 2.99 139	6 95 6 17 129	2 th 0 th 6 th 1 th	2% 891 8 87 192	00 B1	13 73	2 P B	8 40 507	4.7 1 103	1.26 S S S S S S S S S S S S S S S S S S S	B 61	60 0 000 60 1.00 63 0.01 67 540	1 53 1 75 100	8.60 1.62 8.64 146	1 64 5 69 156	1.00 4.20 166	6.77 138	740	1 06 1 1 6 72 6 1 730 9	26 9-766 86 6-76 98 151	E 71	6.71 165	4±1 129	2 in 2 in 1	FZ 441	4.00	1.50	4.73 166	8-80 A 105 1	P 17	75 4.75 76 132	4-54 130	6.71 6 139	127 5.0 129 12	5 121	120	- 171
post-out Suppose princi stativast 3-200-ar (S) Fastal Manala by SCP405 int Adjustrajos (Al) fast Andrewsky (Strick	mgrt.	1200	0010 11 10 5810 PR.S	1,100	7.43		# 160 1 #		10.000		19658 2.5%	01.00 6.5		H 158 H 2	10.74		1010		43	10.00	16	11/800 2.3	15440	21700	17580	1.5		teadro to	416 4.1	24 5.1	1,590	10900	9.1	1 etc 1	HB 10019 34 5.42 1.5 77 1	675	11390 6-8 86-7	61798 1 611 804 731	163	roll (x000 r h & u h 45	2 41	6-22 69-2 26-2	LESSO 14	0 61 6 61	19 5.9	6.5	9548 6.2 76.2 8.85
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of Controvers (Cd) of Chromours (Cr) of Cubult (Cr)	rept.	8.6	120	2.5	1	3	10 10		115		6.43	7.0		19	- 1		10		10	-	11	125	24	17	7	34	716	10.2	548 81	16 21 65 92	2.2	21	2.0	7.74 6	0.01	541	9-6 12160	8.2	292 2 139 1 8.2 :	28 78 7 108 1179		P.35 13 km	5.1 754 :: 1950 15	6-6 6-5 200 1010	9 11689 9 11689	50 214 6.3 6.7 11000	2.1 1650 1260 17
ell Coppy of Chi.) all brain (F-s.)	mpt	16.9 6376 1108 179	1,0040 1	0.640 1.680	6. 7.51 0.31 11	16	9,345 5,636 156 19	2	11,009		11169	17908		2 309 1-609 155	19,16	,	75.690 15.690	10	1400 1600 1317	100	96 96	12000	6106 11216 119 117	1016 54160 +51	12 MO 76460	13408 25408	13356 (%100	74880 E	2300 126 2400 217 130 1	AD 12140 50 1440 31 121	10.486	19630	12400 d 18600 d	10/10 10 16/20 118 16/3 1	DB 10100	2175W	13160 29163 162	21630 1 21630 1	10000 PTS	108 1678 117 13	24 712 to 1,000 to 1200	155mm	148 1	1400 1400 134 15	10 (100m) 17 13J	1560	1260
PLost(PR) PLENSE ES	ugs :	12-0	1.0	12	1		192		196		11.6	19 19		17			10		197	1	ra ra	5.5 394	4272	29.0 ADB	*3 435	14 467	14	14	124 12	74 11	12 137 138	100	179	73 1	14 19 4	71.6	- 402	10	11 1	4.0	12 19 M :3M	10.2	110	12 11	1 18		31
d bispogossas (1874) d bispogos (1889) d bisklabispogos (1884)	upt upt upt	100	100	0.007 0.107 0.103	. (4		174 9.785 8.68		930		579 0 000	0.0%		18	2.01		E740	4	1.8	101 10		696 125	105	985	4	8 20% 9		4	13 1	14 1				(56		180	1105	- 4	125 1	244 E8		1.0	0.5	** **	2 1	534 625 7.1	8.6
of Pitc.mod afting of discharge and Clima	mpt.	20 4	0.37	10 5 (4)		ft PB			927		6.5 6.4 6.05 5.760	10.3		111	82 9.41	,	7.0		7 0 534		m1	940	910	13 I 9 Se	13.6	13.2 6.01 7116	12.1 0.1 7650	12 / 640 / yee	10-9 11 0.21 01 7900 69	79 11	15 F 9 35 7860	11.0 6.7 3640	16.5 5.36 met)	65 1 123 6 636 6 7560 66	16 11 1 79 621 86 6736	49.1 0.21 6670	15.0 0.57 6430	10.5 9.92 6190	95.1 E 1 95.00 M	64 I 125 84 146 68	6 91 61 876 62 6528	86.76 6.768	42.7 0.57 0 6300 6	12 Ht 199 H.1 190 SAR	N5 5720	925 925	12 04 12 09 12 09 12 09
f Sticur (By f Sticur (Aug	equit.	0.170	5.029	8.75 B 27	E.76 8.7 76	19	6,369 6,569 6,006 219 6,25		8 080 8 080 36J		0.075	E 42 7000 0 000 240		0-ac 7-acp 0.24 040	9.45 6.7 17		6.978 6.12 606		1,960 1,960 195		10	59.9 9.42 8779 8.109 421	27,70 E 014 2 20	110	2179 2 600 204	27 VE 9:04 409	1 0m. 4 30	7380 1 6.003 1 6.03	7900 KP 1000 US 411 A	0.796	0.151	8 871 107	5.094 6 301	162 61 179 2	16 6/36 16 E346 23 241	41h	9 mm	170	8 127 W S	244 E E E	e4 m:m57	0.053	9.064 83	853 H-67	N 4195	884	8.0
Broomunicht Traffen (7b	mpt mpt	9.262	3.96	354 6 30	8.0	19	9.21	1	9.54		976	9 34 9 34		9.40	4.1		5.24		256 5.70	8.9	er for f b	6.3ts	8262 2.0	0.366	244	6.21	637	941 : 1	5.341 G.36	64 942 23 1	110	214	927 0	21 1	n 0 70	0.00	11.02	1 1o	5.5	100 E1	12 110	115	25	5 2	3 5	1.07	
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Liberaum (M) Limenalium (M)	ref. ref. ref.	2.6	1.0	1.3	4 I	5			25		2.6 9.47 2.6	106		13		,	5.3 40.000		5.7		100			2.0										24	10 21	26	8		5.5	6 a 100 SAM	5 S	SERVER					
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tel Calcorn ICay tel Magnesia or (Mg) tel Pelesson's (F)	ngl. Augh mgl. mgh mgh	104	0 00 17 0 7 000 6 70 5 72	2.4		-6	, ra	1	12			0.0 01.0 7.00 0.00 5.07		-	2		77		75		15	106 07 4 1 96 0 97 1 176	F 26 57 6 7 30 1 23 3 55	5-45 1 84 3-40	13 407 53 53 54 187 187	104 113	16.2 16.2 1.10	19.4 1.64 6.74	165 1	36 03 P8 864 36 061 36 140 36 5.11	162	8.5 72 + 9.18 1.87 4.16	65 Non 040 117 8 134	625 1 e66 5 160 1 1936 91 240 3	36 9.31 17 63 6 54 F 6 21 9 83 76 4 4	8 547 8 847	5.5 74.3 4.32 6.61 4.60	0.6 77.0 0.20 0.03 4.00	9.85 5 (9.1 7 9.70 9 9.97 9 1.44 5	166 4 15 77 124 71 107 8 157 4	15 H 1 19 77 I 12 727 13 862 17 487	1 49	8 25 2 8 8 200 6 8 5 3 5	900 mell 65 82 95 71 125 74 147 681 147 83	60 7.15 11 6.8 16 5.22	54600- 055 19.4 1.42 8.82 5.40	6976 60 71 63 63
tet Pelassarie (F) tet Sulpture (Ft) tel Sulpture (S)	~	9 64 1 70 2 42 109	5 72 1 14	1 0 5 1 117		9	5 0 5 0 5 1		10		3.76	5.87		11	4	3	7.6		9-9 123		50 40	157	315	340 147	1 86 767	118 647 162	1 10 0 30 129	9.74 194	1.05 S	96 51 56 52	5 48 1 86	4 MF 177	534 58	2.49 3 07.5 1	74 4.49 62 1/4	110	197	175	2.44 S	157 4	21 126	173	189	129 12	9 144	136	12
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TabequeliChef (Ipt@ttl-Sensorsgraphs also M-2

Charitaen Netrala Inc.

PHOMEST COMPANY:	TALFESIA Elastistis il																																							
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Susceptio Mater Subsequier belitable		54.7	56.2 964	M 2	16.2	16.2	5.67	562 868	SL)	244			161 004	42 W	10	98.2	5E 2 /04	96.2 PM	wJ		212	963	79			16.7 77	162 17	77	tr	to the	19		77		162	NAT 1	PHE AND	made section PTS	MM 97.001	V 005A1
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COC Invests PARAMETERS		40E39543	M11561 4	M1650-1 44	0838585	MR 18565	40010507	42924112	62521383 4	225,1384 12	104119-05 40	\$211PL 425	100 march	U-MIG-10	(F) 25-B, 125	specialists of	M198-05-01 M	230 MAG . 0	mm 2:5		rope joint of	RIGHT HAT HE	INDUSTRIES AND	EMP. (14C) (6)	meter w	pmacs e	(mate) a:	more as	proper est	MARKET MET	SHEND 199	metrici, mi	mucht; n	(99-99-5) 45	***************************************					
Operate + Direct panels	P95																																			-				
Short Storgonica	mat.	16.1	24.9	46.7	46	14.4	34.5	53.6		46.2	20°5- 1000			26.5	116	29.5	129	24.5	46.5	11.6	973	201	107	355	94	16.6	26.5	10.0	42.7	66.0	9/5	86.5 275	83.0	42.9	66 B	128 1	41 4	45 40 23 150 167 169	6.6 20 85 46	50
Austria (S) Austria (S)	mark.	18 1 14 1	764	184	176	317 28-6	200	53 0 218		194	pair			phy	110	161	376	110	364	-	239	90.0	199	295	Sile	250	267	294	2100	229	543	275	2.00	369	394	376 3	227 1	150 167 549	85 H	54
Plumte (F) Propuration	NA.	HALP	1-11.0		PROP		16.8	1462		HELE							4704.00	10.0							14.0			2017		ann	NAME OF TAXABLE PARTY.			mun	nuch .					
Figur and HR03 Pressonation		14,02	1413	75,0	1463	HIP	16.0	1467	reco	140	PHO	-	14.55	74.00	- Aug	75.00	741.0	70.0	763	74.9																				
Hotin (N) Colministed Parameters																																				_				
Colonifished Preventory Nitrate (H1 Blass, Intergration Attachedy (Satation CoCOS)	mpl.				_																-							-		-						-				
Attaches (Satur on CoCGH)	mgft.	0.25	9.25	0.25	0.25	0.25	0.23	0.25		11.00	640			4.04	100	9.86	9.71	6.00	0.00	9.94	0.21	0.00	0.85	0.21	4.20	440	0.00	0.40	4.15	9.26	160	41.00	9.14	-0.09	-0.00	0.25 E	0.25 0	0.25 0.25 0.29	0.25 6	56
Total Dryane Certon (C) Attabuty (PP ox CeCO1)	mark mark mark	10	0.25	0.25	0.25	0.25	0.25	6.25		0.25	9.29			0.25	848	6.79	634	440	4,20	3134	10	4.16	0.00	435	9.00	9.00	9.01	0.00	9.00	540	9.00	Nico	4.0	-0.00	46.67	1-25 1	125 6	125 125 125	0.25 0	24
Boarbonete (F/002) Certemete (503)	mgfL	8.25 8.25 8.25	8.25 6.25	0.25	8.25 0.75 0.75	6.25 6.75 8.25	9.25 0.75	9.75 9.75		8.75	9.0			0.25 0.25	1-25	6.75	6.01	0.8L 10.3n	5 do 5 do	6.25 2.46	9.86	10.00	48	9-30 6-31	10	1.01	0 24 0 26 0 26	0.06 7.00 0.01	* 0	8-29 8-49	9.59 9.59 6.29	6-36 8-36	9.39	4.90	ode tak Salasan	9.25 E	6.25 B	1.25 4.25 4.25 1.25 0.25 0.25 1.25 0.25 0.25	0.25 S 0.25 S	24 20
Prijetra velite (DH)	75	1.6	8.75	0.25 0.75	0.75	0.25	8.25	1875		9.75	8.75			6.75	6.75	6.79	6.36	62%	3.85	675	6.75	6.75	6.91	137	h 14	129	626	0.75	6.10	835	10	6.01	10	4 16	44	E25 E	E25 B	125 620 625	0.25 G	54
Artisms Disselved Sutames (SOF)	magh magh	129	158	169	546 2.2	419	481	-		163	321			296	384	347	536	458	96	106	367	294	100	394	96	179	100	164	462	798	107	-	deli	list.	San	97	624 2	264 268 200 4.6 4.9 2.65	104 68	20
Read-of Ollowis ICP Robbrols	- mg/l	-11	2.1		2.2	21	- 15			24	- 11				1.7	11	0.04	- 12	1.47	- 11	_	LF	- 11				7.7		- 11	- 21	- 11	- 11		14	- /1		,, .	11 700	031 71	
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Physical Properties Carehabely	ulicon	794	816	105	883	1420	927	1890		935	750			400	109	800 5-3	11000	110	res	62P 1.75	161	149	140	-	179	100	-	160	ime	and the	1349	1179	549	146	817	1400 1	16 1	10 end Ph7	100 154 10 P14	10
Piquinal Properties	pti Limite	3.45	1.95	134	5.55	121	127	120		3-34	1-01			942	0,34		2.97	114	111		131	10	136	1.26	1.1	1.66	1.02	121	121	1.01	100	811	14/	131	1.86					
Total Suppressed Subta-	HgA.	10	20.8	36	10.7	18 6	17.1	1.0		17.3	18.9			346	38.4	16.9	19.9	Se	26.9	24.5	2011	ш)	10.6	44.8	2.0	34.9	#*	40.1	384	10	30.1			24.5	M I	10	20 2	24 29 14	24 9	79
Total Countred Solds Turismly Blins. Inorganise	myll. HEV																																					0 0 03	6.22 49674	u 1
Chanadonia Hambrison of acidifia	mark.	10s	245	247	191	242	140	25.0	257	224	194	195	945	164	ton	(90)	325	216	179	362	265	110	Jim	201	267	811	.000	200	291	829	pm.	296	516	July 1	2007	329 I	244 2	215 218 181 216 238 181	110 12.5	
Noted Hundreson (E of GIS)	mgA mgA	204	246	711	191	- 110	234	240	26.0	.121	116	191	_UI	199	115	21.6	115	341	CM	716	240	119		196	.86	216	-	£34	112	419	711	-/%	- 535	301	211	304	254	210 230 101	119 34	-"-
Descripted Matein by SCP605 Descripted Assertant LAS	met .	1544	13 100	114/9	MINER	12900	1.0000				14700	11100					17700	111000	1774	1000	1768	6004	***	www	tune	1100	17.99	11700	11000	1000	1700	100	6798	Morre	1 trime.	17.100 12	1 SOV 10	1505 15,707 5,734	1.000 1974	
Disselved Antimumy (Stu)	Hgd.		8.5	6.5	8 54	0.5	0.5	0 140	0.5	0.5	195	110	8.04	117 017	8.70	0.24	9.0	12 ions 6 3	9.25	43	6.9 6.3	6.79	4.21	0.73	01	0.1	625	435	0.1 0.5 0.00	4.77	4 64	8.76	1.11	-0.50	V6.54	6.1	21	12 12 850 18 24 899 24 24 28	8.25. 6.79 8.76. 9.7 17. 3.1	17
Disselves Arsons (As) Disselves Sanuti ultro	upt upt	24.0	24.5	8 16 24 3	21	2 16	767	2 71 21.4 0 36	3 A4 21 S	3 1 I	140	23.0	1 de 10 7	M 1	1.56 75.6	15.7	29	100	1.65	/13	5, 50	76.7	21.0	21.2	17.6	1.36	2 en.	(11	25.4	26	16.9	15.6	7 66 94 8 8.34	1.00 25 4	1 87 25.1 6 86 -1 8	46.7 25	27	10 24 090 24 24 20	17 3.1	47
Dissolved Retybute (Pro Dissolved Rismuth (R.)	101	8.30	87	4.1	8.19	8.55		8.5	9.40	0.40	834	21 4 0.96 0.3	63	# 1 # 17 # 2	91	8.10	9.54	847	0 42 8 3	816	4.90	42	831	61	***	679	8 52 8 5	";		817	81	6.60	4.54	8.15	11.0	9.50	10 0	115 835 626 180 10 850	010 0304 010 0.33	47
Deputy of Person (8)	Hall.	25	100	10	25	50	50	25	50	50) (i	76 179	19	29	15	29	100	10	75	25	100 271	75	16	.29	- 10	58	24	166	100	217	104	211	617	190	166	700 621 14.6	10 1	00 1.0 0.00 00 00 00 01 107 100	70 11	77
Ossalvet Cattrian (Ca) Ossalvet Ehronam (Cr)	rept.	2% 176 1.6	1	298	1.6	234		1.9	1		1.6	2.5	3.5	1.9	10	1.4	21	110	7.0	11	1	5.0	1.0	17	"	7	14	7	1	5.4	9.6	1.6		184	18.1	38.6	11 1	17 12 100	886 117	17
Stematore Culture (Cod Districtions Coderes (Clad	upt.	1.01	4.2 1.344m	9.1	8 74 8190 6340	12100	14279	9 1.7 12600	13400	18 S	9 111 17798	4.77	6.52 9579 71 km	6.66	F-24	7 (m	27.000	12 700	1794	11.000	11200	6. 66 9s.89 J.79a	100	9.17 1054 9668	0.0 No.00 PRES	0.00 0.000 0.000	8.14 16.209 9794	214 7110	8-4 533988 53568	17'40 11-00	19400	1000	6.4 6796 75.86	7770	SET Sealer SET NO	21.400 12			6.0 1.9 0.279 2.340	
Dissalvat fron (Fa) Dissalvat Loat (Ph)	egt egt egt egt egt egt egt egt	1 01 manus 5 100 110 13 5 967	11100	1048	8710	5 1 12 MID 12 MID 15 F 10 4 MID	10100 150 14	167	15290	photo 1346	110 100	110	71 ton 1411	1010	1670 166	52768 52768 1,09	21100 33000 72-6	12 980 15 340- 57	1718	142	676	776	2764 1760	100	144	146	106	910	511669	11-800	1986 1798	14,700 14,700 84 S	75.M 57.6	141	M-400	30 900 12	167 1	1966 5,166 5,746 156 157 163	1,000 E 121 M PS	" "
Dramatour Litroury State	upt.	13.5	170	11	181. 9-6 611.	10	14	12.6	107	12	**	107	**	74	117	3.0	17 57%	13	174	18-2	111	Pre-	127	10.5	10	11	15.4	50	*	15.1	15.1	54	* 1	11.0	111	175 17 066 - 0100 0	1) 1	150 157 160 16.8 11 6.6 264 263 200 6 840 6 525	94 75 98 3.7 250 77 4.30%	**
Decelve Mergenne (Mr) Decelve Mergy Phy	HDT.	9.675	440	444		*10	451		46.7	-			-				104	100			40									-		_				0.109 0	010		4 100	
Deputored Minipheterrary datase Deputored History Stills	Mpt.	1.0	10.3	11.2	0.5	12.5	11	12.5	141	17.4	81	8.5	81	85	81	15	17.5	10.0	81	63 31.7	11.9	18.5	13.5	41	110	11.6	63 342	171	100	**	41	201	164 635	*9.00 31.4	14.7	5.2 31 010 E	10 0	10 10 040 11 12 1 120 127 010	0.588 E.20 F.J. 3.2 0.590 0.11 6.370 [.366 0.920 0.92] 110 J4 0.03 0.906 3.3 E.6 2.6 E.6	F6 .
(Sunstant Salmann (Sa) (Sunstant Silman (Ma)	rept.	6.11	9.2	0.1	9.23	0.79 7530		0-84 2790	8.70	8 14 95.80	0.10 7016	10,7% 60,000	10.0%	5 (a) 5 (a) (b)	6-17 5666	9.27	421	41	446	B 21	8-1 (1486)	6.12	8-21 ac/8	SLEW Philes	#1	9.57 Publi	R:14 Po36	**	9.79	6.57 4540	9.64	610	0.15	6 to 6.754	6.75	0.70 E	0.43 B	13 12 9 120 127 010 290 1,140 1,460 600 9854 8129	9 00/0 P 11 5 10/0 1,000	
Denotord Silver (App.	mp1	9110	77.76 11.04 3.70	B 254	8947	9 state	0.041	0.057	8164	9.079	0.874	E-96	0.00	5.6%	6.071	5-138 B-052	1000	emi	946	States	9.60	100	Stene	0 (MA)	s Pho Huger	8962	6 selec 2712	6.64 (CD)	60 TE 0	9 MA	# WA .	0.000	9544 9485 515	***	0.075	0.156 0	697 0	290 7,160 8,560 680 9.854 8.229 340 342 349	1101 102	17
Donatout Structure (By Broadout Trainer (Th		90.0 90.0 90.0 90.0 90.7 90.7	9.31	617 E 64	179 0 101	402 6 46	915 0-46	8.345	2 to	914 8.4	Paul St. Ob. 7	E 161	84	6.00	6361	600	99& 0.11	11	6754	1340 0.070	9.90	8374	204 5.00	9.260	100	9.27	0.544	0.00	0.00	# 479	W 244	6.29	0.114	6 954 6 756 1 1056	0.75 0.75 0.00 0.07 2.74 0.75 0.07 0.07	979 1	144 6	346 343 249 936 936 936	0.07 0.000	
Grandvert Yn (SA) Onnehvet Theman (To	upt.	2.5	10		1.5	1		11			45.1	4.0	41	15	.11	4.0		- 2:	2.0	14	- :	25	44		:	1	11	10	1	43	25	31	55	4.6		99 9 99 9 34 3	50 5	12 10 21 13 14 25	23 14 23 14 13 48	65
Chanadatad Uniproces (M)	upt.	1.00	7.60	6.77	5.62	115	5 49	2.5 9-m 1.5	8.45	1.0	447	100	140	110	41	42	8.15	+16.	114	6 m		100	11	7 0.0	4.1	4.79	1.05	0-01	+m.	9.00	4.66	249	166	6.00	481	34.3 1	50 0	11 14 14	1.0 4 H	47
Bronshvet Ispanish.com (V) Dronshvet Zein (Zhi)	ngt.	41400	18000	1040	46407	ww	1000		14399	41482	40700	14.000	Name of	22.000		0,75e 0,0	100	34.00	2498	100 E E	24.68	0730F 0.25	825 625	0.25		41340 81	47 MEP R 23	41400	51400	5 MINE (0.25	2 Miles (8.43)	MARKE Built	LIMB	40.000	1000			1312 na 669 3T 241	12,500 11,250	
Dissolvent Extratrain (21) Dissolvent Solon, Pt (Co.)	mpf.	100	12.6	E3-	417	61.1	61	0.25	65 65 7	0.9 74.9	4.25	8.25 6.25	8.2% 66.7	6.25	9.75	9.79	104	85	9.1	m 4	# 1	50.3	86.6	.n	#5. #6.3	7.1	6.25 6.26		141		93.6	61.1	20.5	75 to 2 84	10.1	164	13 3	142 U 10 0 25 21 70 62 92 49 6 7	825 816 36 119	47
Denoted Departure (Mg) Denoted Paterners (II)	日本の日本の日本	7.00	9.37	162	4 AJ 6 WI	61.2 9 lo 100 146	6.54 1.62	9.94	9.73	911	7 to 41 11 12 2 to 40	1 66- 1 69- 1 10	5.0m	6.25 -0.0 5.42 8.50 2.47	0-07 0-701	676 610 513	168 153	114	101	9.945. 9.945.	9.05	6363	5.00	9.55	69.3 6.95 5.81	%.) 6.00 8.1	6.30	47	F-40	8 10	LI P	1.04	96.4 1.65 1.67	2 to 2. d to 2.	60 F 8 F)	1 00 1 100 1 100 1 1 00 7.3	17 1	142 1100 021 73 70 62 92 89 41 18 896 881	0.25 0 16 36 110 44 16 0.75 0.16 3.4 1.21	87
Department Singleres (996)	mgf.	8 94s 4 49 116	411	17	197	140	3 92	0.25 93 994 106 4.27	447	5.7	E 400	1 10	2.79	2 47	+47	539	4.54	897	140	245	1.0	3.40	5.00	179	120	19	2-00	100	242	114	1 dd 1 dd	170	2.61	8-960. 1-94	180	7.3	66 6	142 850 035 75 70 67 62 69 67 18 890 661 47 47 83	84 131	47
Databas Balghai (S) Satab Statula (s) Mil-108	- Topic		100		107	150	100	100	- 100	110			1110				15408	1500		1250	12700	2134	ven	11009	11/90	11700	21,986	52900	1100	11999	11100	11760	36108	99400	1199	15.000 12	Prince 11	1.020 11.000 0.000		
Called Algorithment (AR) Called Andrewsky (Still)	mp*	18150	13769	3.5 PMM 5. 9	111)./wm 1 47	1.11	1,7600	1.6	1.2	\$2900 \$22) No	101	144	44	11360	1.67	142	153	2	1.6	1198	1.09	142	2.46	3.79	8.7	5.60	1.pd	134	1.09	147	17	3.85	1.51	31.3				
forest Armania (Aur) Calad Survey office	signt signt	417	78.6	22.9	27.4	24 3	267	23 3 23 6	33.9	18-7 26-9	26-9 26-2	36.7 21.6	19.4	76-9 26	95 ti	34	173 177 953	200	26.2	27.6	25.6	31. 36.7	(0.5 (0.6 (0.6)	21.7 21.0 3.34	95.1 53.9 9.6	90 4 22 4	32.0	(2.5	25.6	79.A. 90.1	78.6 18.6	10.7 30.7	16.1	46 I. 26 ti	23 84 -1.0	142	40	40 14 40 M 178 27 25 21	825 27 875 21 177 19	77
Calcul Sicrystours (See) Calcul Sicrosoft (St.)	mp1.	8.57	0.35	8.4	8.56 9.5	0.10	8-41	0.00	8.16	84	6.0E	6.5	63	25 624 65	6.04	20-4 0-30 0-2	9.53	20 to 10 to	2.5	0.36	9.65	6.71	10	930	01 01	84 81	#1	0.47	10 36 46 5	81	4.1	897	0.10	110	11.0	20 1		137 937 939	821 8879	- 11
Salad Govern (Br)	mp1	R1 75	10	10	25	8.9 25 213		300	10	50	29	19	per les	310		275	21	15		100	w	27 76.1	75	19	27		25	-79	77	215	11	H	19	rise	150	2-6 1 106 3.14 3 0.3 38 9	14 1	36 26 030 38 26 26	850 E.H 25 '46 60 47 606 11 40 20 En/0 2000	m
Saturi Continuos (Cat) Saturi Chroneson (Cat)	mp*	25 100 2	41	214	184		11	243	2.99	197	166	14	1.7	5.7	113	1.7	324 2.2	25	2.5	200	100	1.0	14	13	17	11	17	11	14	3.6	2.7	11	58-S	8.5	6.7	0.3	27	708 294 167 19 17 146 97 88 88	886 11	27
Turnel Contract (Con) Tested Contract (Con)	up1.	5 84 5990 52709 551 52 452 8 625	9.1	9.2	9.62	8.45	7.07	7.1	17900	10 9 sneme 11 100	0.00 50000	120. 1738 30108 162 1.7	5.00 (MISS) 2756	5.06 HARE	150	0.05 510m 510m 140 154 pat	181	52.90 52.900 25.000	14.5	4 Y 12586	11	6.67 Sales	197	16.29	9 12 9000 14040	9.9°	**	8.67 26.70	0.11 12000	11460	18.0	15.6	9.79 6046 8779 76.9	4-00 10000	101			87 88 88 1673 11,888 9,180	88 28 240 280	27
Satural force: pf-44	mp*	12700	1500P	5.2 9499	9790	18580 18500 167	11268	14759	13760	11500	1014	50500	2150 97.1	11000	Mines.	11076	15294	25400	12948	100	1158	Salte Sude	1738P	36348	14040	11mm 14mm 14mm		94.00	12 Mar La sens	51,600 17,000 150	21.000 m=0 11.0	12900 21900 360	8779 76.9	Embod 1962	11000 1300	24-010 22 200	2.140 10 199 1	1,000 15,760 0.007		
Total Land (Pto Total Library (Li)	mpt.	161	14	175	536	16.9 16.6 474	12.9	1479a 164 30 677	170 101 477	12	176 F-6	47	75	127 527	11	154	25204 21.1 14.2 609	813 312 376	12.9	11	la	41	188	11.2	10	10.1	256 31-3	25.1	35 f.	13.4	110	171	10.7	58 to 618	3.50 12 636	700 1 17 701 4	100 1 50 1	11 11 81 408 409 317 808 6849 6885	71 25 58 22 203 75 6305 6816	77
Yetot Maragement (Mrs. Febal Maragery Briss.	sept.	412 0 073	642	+52	415			639	477	610	160	100	Acres	200	35%				- 100	402	490	381	-		404	436	200	438	-	413	144					0.000 0	250 01	408 AD9 317 1808 E.BHO E.DES	999 EEH	- 44
Satural Managerian Street Satural Managerian	mp*		44	12.1	9.5	0.3	10.1		- 1	127	102	111	88	40	- 22	80	11	85	94	W.F.	11	81	4.0	40	11.0	20.0	322	10.	383	43	16.5	61	61	-10	+10 15.7	F 6	10 1	1.72 1.00 8.00	78 64 996 812	29
Total Solvenson (Do)	mpt.	8.96	911	843	811	0.70	8.29	12.9	9.52	9.15	9.26	9.10	A 16 Same	6.24	E en Sense	624	9 2 B 9 7 3 B	5.10 1796	8.32 Miles	.27	8.00 7019	8.11	825 8679	6.19 (6.00	8:31 7986	9.22	6.21 7666	929	6.24	60a 726e	9.71	9-22	611 611	821	9.23	957 8	29 1	14 1E 90 124 8.30 8.11 141 F270 6.000	9 000 E 12 5 000 E 200	77
Satural districtors (Disp. Natural districts Subgar	mg/L	13.5 8.96 9964 908 8.309 2.5	7400 811	7100 0 075	7676 5.13	7546	8.044	7100 (164 (15	0.000 7700	9176 6/06	776si surin	205	636	5000 0.000	100	524 5238 8479	0.062	41.	9.17	279an (6-62	7019 0.954 770	6768 6.750 256 6.155	0.075	247	9.366	(7am)	6499	955	654	0.00	9-906	91300 #131	00 10 F	****	9 MM 2 MM 2 MM	12.500 S	534 8	100 101 554	9377 bm	27
Total Streetum (2b) Total (Tradition (7b)		508	329 8 66	589	295. B 967	8418	427	655 847	450 9.45	937 936	267	P-602	511 576	256 9.639	310	pre-	806 8 329	9300	924	947 8:40	4.9	150. n 175	113 8.866	107	4317	121 0.170	0.00	651. 630.0	45	494	198	a 196	519	9.110	277 g 345	936 6	624 B	345 344 24J 130 834 830	D16 D5N	
Total Tox (Seg	mp/L	25	5.	19	2.5	2.5	4.3	160	- 4	4.	-9%	1.0 %	2.5	31	15.	13	31	10.0	2.5	5		11	4.09	27	5.5	32	45	41	585	21	100	41	11		45.0	10.0		17 26 26	25 16 25 96 11 48	75
Saint Flores, or (Fly Saint Morroson (M)	mp1.	600	- 15	764	4.6	979	9.77	111	100	100	479	15	21 21 25	120	0.7	10.0	8.14 2.8	101	224	+76	18.7	640	700	7.0	0 M	- 11	4.6	24	411	**	9.06	5.01	194	6.77	11	22.0 1	100	12 19 26 12 /4 44 17 26 24	25 96 11 48	27
Tend Insulan (V) Teld See (Se)	mg/L	25	26100	54400	2.5 44600	115	25	3.0 4.1600	51569	46.400	427000	NAME NAME		16.700	51000	15	2.6	15 1000 815	7500 9,25	100	10700	177 57600 6.77		65.ent 5.27	41 TOR 8-25	454M 9.25	400	40 em	5468 525	13 11980 921	Trice	MACE	1840	450 4700 460	et en	1000 1000 000		1,044 41 793 16.101	2A 16 11999 12414	4 77
Noted Street (Str)	mpl.	0.25	85	03 29.6	6.25	0.35	8.25 79.6	117	0.5	0.5 74.1	6.75	825	875	0.29	61	821	0.73	855	8.25	85 W.2	83	9.74	0.01	9-27 79-7	8-25 66	829	6.25	9.75	6.25 20	925	912	90	10.1	79.3	19	100 0	94 0	739 826 625 71 75 81	9.25 F 16 JP 17.3	
Serial Magmanium (Mg)		825 677 931 116 533	5.2	1.54	2 62	6.25 79.6 9.45 6.957	164	111	181	9.52	750 8990 332	780	5.0 8.129	610 610 610 611	6 52° 6 62°	25.4 6.72 6.85e	973 973 153 168	101 128 142	370 117	10	21.7 2.76 0.95	100	Total	140	1-m 0-m	571 679 619	8.22	185	161	8.91	111	113	0.00	9.94	3.00	19.2 1	100 0	45 45 71	30 11.3 49 17 879 819	77
Saled Philosophy (R) Track Andreas (Mo)	mgit mgit	5.83	3 77	8-94 1-85 3-77	E 962 2.66	8 957 1 87 15d	3 96 154	9 53 0:91 5.36	181 110 437	9.52 1.54 1.26	9.32	780	2.76	126	4.95	5.36	447	+53	110	815	334	457	1.60	140	3.00	147	201	2.17	3.00	23	2.54 2.54	551	134	6 mil. 9 75	2 02	F1	63 4	10 170 002 45 47 28	879 816 25 13	77
Statistical PS	mat.	524	152	154	122	154	154	255	107	146	168	ESE	16.6	FR-6	179	542	210	270	379	349	tie	76.5	131	142	546	537	147	196	111	118	5.00	1311	12.7	100		1.25		pr 140 190	77 - 75	** 1

Tuberpoolition (Selection products 4)

MCT MART:	TVLACOU Chieffun I	Settom (Inc.	han by town	and the same																										Stefer to Apr	of party one	mility Report	/- and.	Ata an sample		_
Die HARR	Pleaded ST	Later to Sent	Ton Po \$400 h	CO-SE										6475NF	percial :	BALESTI. TRAPE	MANUAL .		MCMS.	BINDS	MANUAL PROPERTY.	85701PH NAME	10/30/200 10/20/200 10/30/200		NAPH'	SOUTH THE STREET	MANUT.	MASS AN	MPM (SES	MAL	PM	AMERICA	and better	Piú .	bres .	11 DEV
Serger			199		386	CVT	100	1991 087575	in	DWSSH	(W) Chedge	PETROS.	60M	this synctric	1.63109	icers	14629	101768	72 (70/00)	croses	LTTDAY	77 640,0575	TZ MELTIN		17	407781	17		W52937							lo lo
Managing Dale	1	2646a+05	91-5-sp-11	(96879 1\$-hes-11	11 Dec-11		SEASO SEASON 12	Othorn SZ	China Id	25-blay-12	27-May-12	17-har-12	00-Hen-12	30-Aug-11	11-Que (4	98-han-16	35-Dec-14	22-Jan-15	29 Patr 15	23-Mer-15	25-May-15	Dr. Aug. 15	Hidge III 2	55-Apr-15 I	4 Mary 19 2	5-Apr 13	10-bay-15 II	FOURTS A			. 1					
Sampling Date PARAMETERS			оезерна	8341526	GRHHAT	-	6631971	QRIMANS	08111/2	QETISES	GRITISHE	Q531175	12527184	- minima	494105-1105	CRUM-D-41	and heal	MCF (46.4	m (m. 174) 4	ments (5-8)	E-96-01-01	estended a	milwe-drap or	December of	and the same	mana a	a section in	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,								-
* Thursday		-	-	_	-		-	-	-	\vdash	-	-	-	-	-		_			-						-				+ 1				+ +	-	-
Mor. Inorportes. (pt 4.8)		le:																													1					
(P1 4.3) (P1 6.3) (P1		**										4																		+ +	-	-	-	-	-	
Proposition of 1990) Proposition	***					HELD	PEUB	PELD	nesa	FELD	FIELD	PICLE	rio,a	700	1000	751.0	PEUF	PC 8	10.0	F613	100	100.0	1000	90.0	100	P608	PROF	.7802	nne				-	\rightarrow	_	
AMERICA			190		1305						-																			# HEST	100	0.001	* inter	Fetz	1000	100
Calculated Parameters	mpt		1																																	- 1
mj	ryt	+	8.184	-	6.91	-	1		-		12			-		1.70	1.33	1.00	. 56.	- 100	1 4.0	. 1000	1251	ii.	46	461		41.1	417	64.8	14.1	F2 693		10.11		142
Max. Interpreted dy (Fried on CircCO) Injures Carbon (C)	mark.	15.5	. 10	1	912	- 62	(4)	100	1 4	62.6					9.00	ME	64.9		4114	44.1	ė,	413	40.1					410	-0.30					1	- 7	
Ny PP on Ex005) Writin (HOUS)	myt.		1.0	į.	1.5 71.5	121	100 140 120	123	- 68	5.0 774	76.7		192	1 1	425	125	927	679	114	871	625	9.75	(25	6.25	16.6	907	639	165 1610	40 Se	1,26 79	9.25 77,79	76,829	T6.46	73.81	10	1,67
NAME (COOK)	mpt.		8.0		625	525	6.0	625	198	9.21	5.00		9.35	10 10	# mil	125	0.25	9.13	8.25	621	¥-25	520	23%	700	625	250	8.76	40 10 40 10	40 Se 40 So	125	1,05 1,05	6,250 6,750	6.85	6.27	825	1.00
Annexes	- mt	-	H 25	-	1		183	1.029	- 30	8.71	8.25	-	100	-		120	975	197	475	3.7		-	- 24		1	35				1	1			78.0	96.7	
test Subhate (SO1)	mpt	10.		313	<u> </u>	753		- 25	44.5	98.9	74.2		1 1	4	5 51	101	76.6	16.5	14.5	19.9	17.6	18.1	78.0	76.5	79 69	14.0	16.2	713	21.9	862	188	25 400	8	18.4	- 74	1 15
Notherit	ryt	+	5.00		5 mar	_		1	-						-	- 101						- P 13.			-					0.000	0.00762	6007	0.0075	1,000	1000	1.00
one PO phosphale PT	wyk		1.70	1	1 757																									2.100	8 1449	9127	0 12/	0.3064	D 105	141
e plus Morter (H) Physical Properties	125	-	6.105	-	8.740	-			1					-	1				-												386		2.2			13.79
Lichtly	più Linda	915	100		340 7 80	7.00	300		200		361	236 3.5	10	1 3	6 76	171	145	100	190		710	174	110	7.00	7.0	72	736	796	194	- 7	286	376,11E 2.052	781	7.775	7.66	15.75 0.66
Physical Properties Eusperded Salah Dessired Salah		17	1 "					1											- 1				-		10	10	31	169	- siù	100	,	1.979	. ,			0 (iii
Suspended Solids Drassland Solids	mgd.	254	1 4		1 3	- 13	1 3	1 1]]		350		1	1 1		- 25													100	256 9.75	25A 9 607	759		256 9 67	61.0 10 ACM
Calestand Parameters and Hardway (CaCCO)	HTU	-	4.71	-	6.79	5.64	- 67	-	-	510	840	5.56		-	_		- 0	144										200								139
	mpt		20		127	9.25	is a	1	16.5	191	1981	104	- 0	17	150	760	191	146	117	160	160	194	136	194 294	115	100	346	86	141	196	144,3 152,3			125.1	127	19.00
Perform (Califolia Disputed Material by KPWS April Alamonae (AC)	- 75	1	1 "	- "		- 01					- 2	-				11	14.6		44	193	**	1.0		76	9.7		19.6		26-9	99,1	33.6	13,360	9.0	1.0	4.5	19,77
Ayad Alumanum (AV) dead Antoniony (SA)	ug/L ug/L	94.7			12.6	9,1 36,3	182	13,1	1,01	91.1 96.5	31.3	17		75	100	799.9	31	24.4	24.9	26.5	36.6	10.5	11.1	10.3	19.7	(0.)	199	211 2111	96 F .	A.S	110	32,750	213	75.4	29.1 26.9	
mad Arteropy (Str) mad Artero (Be) med Barton (Be)	ugit.	36.2			25.8 5.55 6.55	26.1	100	6 21.7	6 25.2			, A	- 4	7 26	251	(9)	18.5	11.0	10.00	28 to 13 to 0.05	A19 360 605	19.5	19 1	19 1 19 1	29 Z	67.6 58.0 52.5	14.7	193	28 4 -0.50	734	21.00	24,252	19.4	12,66	16.0	1,80
med thorothers (the)	ng4.	535 ·			4.9	236		(88	6.00	11.4 13.	5,00	500	1,00	- 5	18 18 18 18 18 18 18 18 18 18 18 18 18 1	786	0.00	100	646	65	6.62	0.01 E.3	8.05 8.5-	85	81	8.5	8.00	<58	-0.33 -1.0	21A 9,86 9,0	1,8	0.400	6.0	8,55	6,26	1.65
food Stormath (Str.) Auni Storm (Str.)	ugit.	48							2 (9)		819	100	100 840	1		25	0.00	. 10	1907	8916	29	25	100	45 1 and	D 0.007	4000	4964	100	1968	110	- 25	@ 27,317	1,000	8.0426	0.021	7,36
hed Calmum (Cd) hed Otroman (Cr)	Jan.	0.00	1		1546	1,696	625 525	100	100	0. 41	5.5	1.00	15	- "	5 63	8.5	4.9	.01	0.5	41	9.5	- 61	8.5	0.5	6.5	80	91	-14	110	16,21 M	8.0	0.400	- 11		8.26	2,76
Avail Colonii (Car) Avail Copper (Car)	MENT.	0.00			100	9.25 9.25 8.47	102	144	5 £34	1.00 1.00	5.21	1.00 5.07 5.00	12	- 12	5 835 2 81	135	9.85	941	H25	10.00 10.00	#25 #1 27	100	8.25	4.02	(3)	0.1	A1 1	10.00	40.50	625 635	1.536	6.623	6.13	8,25 8.1 2,3	4.9	136
dual from (Fig.)	ugit.	11.			25 8348 827 827 827 827 827 828 828	1.0	1 .5	5 . 2			30.0	100	60 62 60 60 60 60 60 60 60 60 60 60 60 60 60	1 .		198	2.3		23	21		247	9.5	26	2.6 53	6.7	9.1	6.15	10.00	18,10 287 24,2 83 5895	16,81 8,417	6,139	161	1.5 1.50	876 686 8.9 8.9 7.6	8.19
ment and prop ment of them 6.71	ugit.	5.3			142	10	- 5	- 6	4 41	() : 24.8)	. 343	7.0	. 4	1 E	3 93	*1	- 17	- 11		**	- 4	11		**	- 15	7.0	44	**	10	14.8	139	10.01	- 5	134		1.81
Avoid Managamenn (Mrs Avoid Montaury Briggs	age. Nov	1.75			1,021	1405	A.C.O.	438	A/1	210	190 100 100 100 100 100 100 100 100 100	FRET - 6,2 (6,04	948	}	de di						789		10					- 81	- 46	945	0.005	0.875 5.58	0.005	1.015	6.00 6.1	130
	- Primer	847 935			59	5.4	1	1 3	110	54	M	100	- 5	1 1		100	**	.01	100	(8)	1.00	8.5	41	14	93	900	6.8	6280	10.00	141	8.5	1.49	1 83	4	121	5.85
Apost Market (Mag Send Batterer's (Bra)	194	EE.			6,63	9,52	1.0 100	841	(E.11		4,44	0.46	0,0	1 11	0 011	5 44 2979	4290	pH	8.44	H 66	0.46 Faith	2.14	400	946 4650	6/45 6/25	E-90 6248 525	106 1750 1755	1936 1930 1937	1010	E31	10.00 10.00	4 231	476	20A	2730	205.76
dred Silver (50 had Silver (4g)		6580 C			0.91	1,01	6.61	#101 5,01	1.81	1 AP	E496	889	1 880	- A	2 6 44 6 746 7 2-6 6 17 0 237	-981	581	9.00	- A 41	8618		190	0.01							9.49H	216.4	216.6	8.01		191	1647
Sout Striction (7c) Sout Trailluis (70)	-94	601 6.00 6.00			8,625	9.53 2990 1,01 200 5,010	210	630	100	. x89	479 679 649 361 681	6,46 + 046 EE19 201 6625	180	44 27	410	ARS	1005	200	120	244 0.025	100	100%	8.805	226	9.075 3.5	247 946 2.5	229 6521 2.3	-9:200 -0:50	1500 10050 1500	9.494 9.494 9.895 2.5 5.5 1.80 6.8 6.8 6.8	216.A 0.825 E.B	216.8 0.00%	829 820 23 23	2.5 2.5 0.904 2.5	125 226 686 10 885 68 68 68 68 68	9.61
denic Transports (TR	Appro	M.W.			£.5	25	1 1		H 43	1 2	- 21	100	1 1	1	2 3	120	- 9	5.53	4.5	11	1)	100	15	23	16	40		150	10.0	3.5	1.0	3,000 9,175	- 34	1.5	8.5	9.86
Short Literapetic (L/)	Appe	1.04			8.96	- 108	1 10	6	41	*2	5.00	8,51	1 2	1 :	1 89	15	849	100	107	3.1	384	170		13	13	(40	110	-5.0	5.0	146	7.5	3.436		2.5	. 10	6.31
fred Vanadium (V). And Dre (De)	mpt.	18.8			(98	100 100 100 100	- 10	16.0 12.0	f 3lml		35.1	707			9 91 6 62 6 61	271 271	14 P 9.31	0.99	145	945	0.0	18.6	4.7	124	16.9	184	825	10'50	40.10	4.29	6.25	0.210	8.21	13.1 6.25 47.70	10.N 9.2%	1,01
nost Drawnum (Dr) nost Calcour (Co)	mg/L	16.0			8.80 6.51 201 6.52 7.5 8.62 8.66 7.7 8.66 47.9 8.67 8.68	164	40	40	210	6.25 48.5	611	- 4	N.	50. 54.			36.5	52.0	11.0	11	59.1	18.0	10.7	1.61	34.4	49.2	365	75.5	95	16.1	1,960	61,36 L861	1.96	47.76	130	5,01
hed Magnesur (Mgs hed Patassum (R)	经销售 医电子 医电子 医电子 医电子 医电子 医电子 医电子 医电子 医克勒氏试验检检验检检检检检检检检检检检检检检检检检检检检检检检检检检检检检检检检检	2.00			8,825	10.0 1.00 1.00 1.00	10 10 10 10 10 10 10	100	6 1.71 6 8.743	116 144	181 174 163	240	88	6 1 2 0,00	100	4427	0455	140	11 T-15	9.77	1,54	170	0.794	5941	9776	4240	4 965	0.796	6766	2.76	9.07	6.871 11.30	9,415	1,864 6,753 66,3 21,11	305 826 856 136 8716 18	7.74 (20) (20) (20) (20) (20) (20) (20) (20)
Aved Bodyers-Play		26.9			14.6 26.1	744	180	150 6,80 15.1	480	196 2.84 14.6 25.7	107	14	1	4 15 4 27	A 250	14.6	(1.4	24.0	79.7	187	189	14.5 27.6	10.5	10.0	71.	813	34.6	16.5	114	2.76 15.9 27.6	9.87 76.8 25.5	11.30	13.79	21.11	16.1	7.16
Solal Measur by ICP900	egt								24		w)				191	204	162	10.1	281	193	171	**	0.0	. 18.2	104	1.00	151	15+	12.5	200	64.00	45,479	11	11.3	100	4581
Adjungstypes y/All: Anglessony (Site)	uget.	21.A	35	75	7 29.5 2 27.1	10	- 4	1 1	d: 163	35.6	29.4	34	,	21	el ii	184	93 (91.0	12.5	11.7	119	91.7	821	99.7	10.0	812	10	10.0	27 6 26 5	16,5	34,36	13,219	31.8	29.56	27.6 75.6 17.6 19.6 4.75 6.95 6.95 6.95 6.95 6.95	£11
Arbenio (Aes Barero (Be)	way!	17.8 25.8	783	25.1	27.1	274	300	d	1 23	5 204	25.0			. gs	3 29.1	29.1	203	29 E	20.7	29.8, 39.9	20	39.8 105	284	14 545	16.5	20 6 1 100	20.7	201	173 vii 10			19 22,176	763	1530	17.6	1.29
Barara (Ba) Barytum (Ba)	100°C 100°C 100°C	829	100	100	65	33 53	1 1	- 10	844	1.30	21.5 5.00 5.00 5.00 2.00 2.00 2.00 2.00 2.	72M	1		3 01	046	0.00	835	85	43	15	106	87	81	43	6.5	93	44.60	+1.0	1.00 1.00	100	0.400	6.1	1,00	4.2%	211 5.86 5.86 6.86 5.86 6.80 6.80 6.80 6.80 6.80 6.80 6.80 6
Beredi (B)	- apr	A4:	- 21	(. a	1 76	76	1	- 3	3	(C			. 3		n p	1.00	1946	- 60	11.00	27 9199	100	4.07	2.144	15	200	9384	100	100	#10 #500	4.5	1410	25,530		25	185	186
Cotrours (C4) Chemistra (C4)	*********	88.45	A.M		1 14	10 10 10 10 10 10	1	1 1	1	364	1.16	20 200 200 200 27 27 20 27 20 20 20 20 20 20 20 20 20 20 20 20 20	10 10 10 10 10	- 1	3 61		7.5	1.06	818	#194 #1	43	45	99	9 Mg	9412	9141	9198-1 915 925	100 100 100	# 500. -1.0 9.36		- 13	6,516 6,756	0.835 0.835 31 0.835	25 6.1266 8.3 6.25 9.25	4.24	911
Cated ICs	No.	9.87	6.25 (F) (R)	9.0	(4.06) (4.06)	1965	-43	0.00	1 10	146	-10 -0,0 1,0	9.71	1		4 P	4.8	#1 W	935	2 86	911	9.75		- 64	9.5	N.Y	1.11	835	mit Mr	114	586 200 217 1.6	25.00	12.102	1.816	9.25	429	1180
Capper (Coll Iron (Fa)	491	110	1 3	3 3	M NO	3		2	5 50 121	38.6	199.2	- 50	- 3	1	34		66. 677		17	411	96	425	4.00		475	8.00	***	100	4.00	187	129.8	5,864	1 47	9.79	4.79	5.34
Litters S-II	ugel.	19		1 1	7	1 7	3 %	3 5	100	(A)	- 11	83	. 7		4 3	1	89	91		**	!!	- 44	44	10	31	**	87	9.0	M.S.	11	11.0	E.504 Lef7			19	9.82
Morganizes (Mn) Mercury (Ptg)	werk.	1000	630	110	6 (S	1000	100	- 10	100	0 - AN	- 685 N	1.01	300	1 "												4	7.0	140	51	1,000	1,625 3,679	5,672	0.829	8.85v	180	5.00
Mayadomam (Ma.) Nacioni (Mili	Pages Pages	set .	100	4	1 62	- 1		1 . 2		133	1 N	54 530 840	4.00 6.00 6.00 6.00 6.00 6.00 6.00	40 3	A) 14	14	17	767	11	- 17	14	- 4	17		887	100	- 85	4.10	1.000	5.01		SE BLAND	N.	- 84	125	8.86
Setertan (Sr)	wart.	0.25 0.0	Alle Alle Alle	3 .	4	100		499	5.3		0.41	6 840	***	100	**	- 010	411	544	E 44	1.04	8 MI 4239	211	1906	170e	6 47 4766 15 5 1	#190 971	6 N/ 9439 4491	9.50 5000 -0.500	4100	5476	107	1 426	407	980 981	3000	749,75
Silver (Sr)	upt upt upt upt	0.001	14	A6 A8 30 100	1 1730 1 6.80	9179 0.01		10	- 62			1290 1211 1211 1211	8.81	6.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.85	6.81	941	674 611 229		4280 9.00	1100 243					200			\$424 \$26 \$25 8.865 7.5	1876 1876 746 1.80	5,814 221,6	6.4 6.4 6.6 6.6 6.6 7.2 7.3 7.3 7.3 7.3 7.3 7.3 7.3 7.3 7.3 7.3	0.61 294.6	Marie 2 4 4 5 5	19.50
Streeture (Sr) Thellium (Ti)	sept.	0.00	116	9 100	918 6 A.REA 2.3	1,825	100	1.50	10.00	180	, po	7,000	433		19 188	5.015	980	196	3 675	256 11,015	224 9.075	9.000	214	0.005	10075	1964	8625	4 355	4154	1 1885	0.00	221.6 0.036	1,80	294.6	4.00	0.81
Do (Seg	Pige	0.00	170	- 20	7.5	- 53	0.00		M	E 28	- 11	110	2	g - 2	3 -13	31	25		73	15 15	13	13	13	25	2.5	13	100	44	10.0			E 2,790 L019	< 41	2.5	4.5	181
Through (T) Section (U)	upt.	1.00	84	- 1	H 13		3	3 3	- 6	136	19	9.87	1	- 1	16	100	158	140	210	146	897	9.46	1 62	25	23	100	23	100	9.00	1.10	5	1,819 2,846	1.00	4,81 2.6	10	3,01
Vanadum (V) Zimi (Zin)	****	29	39	0 0	el mi	1 7	1. 3	4 1 1	294	17,6	11)	1 1	- 5	9 19	16.	46.7	211	941		35.9	36.9	.01	86.1	74	119	423	169	***	-0.10	1910 9-25	62,62	16,359	.2	0.25	10	201.01
Section (Cs)	mp4.	54.4	6.25	0.2	936	100 100 100 100	6 67	1		625	413	935 48 68	- 12	. 4	5 9.5 7 W	925	11.25 34.5	66.0	1.6	38.4			91.7	94.5	9.25	Ser	10.00	90	10.7	903	14.46		(80)	47,32	635 636 137 6345	436 436 921
Magnessen (Mg) Pelament (K) Bester Des		2.74	13	10	4 48 1 5 5.91 7 6.877	7.0	13 6,86	13. 136 14.	175 5.800	1.84		1.22		9 30	16	197	176		(85	186	120	+177	1.66	0.904	136- 1661 0-1	1987	179	0.005	8 165	90.9 7.80 5.67	5,914 6,904 16,79	1,915	180	47.12 1,779 8.7952 11.0	6745	3.99 1,94 2,13
Commerce (g)	mpt.	pp. 2	1.0	0,00	6 54.97 80 54.91	940	1 1		2	318	14.7	1 77		2	4 10	16.0	10.1	15.7		12.0	19.4	100	1117	20.0	D. 1	200.0	26.7	25	18.6	36.5	E 14.79	15,001	11	10.0	11.5	1,946

Contract Metals No.

PROJECT	The SERVICE Communication (SERVICE)	note:																																										
SAMPLES AND B Samples And B	WHO T/L/300	CAN RIVER WHISTERS	IS OF PROJEC	,												_	_						-																	874	P722 9154	F22 8064182	PR-152 91	100 BASIN
Surryton Selledon Surryton Selledon Submetterry ID		PERSON PERSON IN	w tw	1994	EW	Lave	LW	DAY.	LW I	pre t	LF LF		RTW	RTW DATE:	RTM	TZ 8	The Country	110	FFTTP6	4TM			R FMSN1	ene o	Mu .		7 Fr-8865	ew.	MIN BY	a en	Par	464 N	w				PM	EM I	1 11	W.	GB 147	12	WIR I	THE REST
Sampling Same & Toron		Take Calician se	are IT as	of Physics	F1 6mp 60	restrate t	Pagit 6	Hidepitt (I	9-De-11 Sec	Dept 11 234	tyr 12 2540s	"F Thought	2 60-0-012	12-Rep-17 2	19-Eup-12 13:	Don 17 78-0	pp. 17 19 mar	-17 F5-Sep-17	7 88-Dec-17 27	10m11 91	hame 17 18h	and Bur	of President	194 ep 13	104 pt 13 31	H#11 @44	m 15 88-Mp-1	17 19-70-15	794kg-13.1	Biller 13 Diving	-15 154gr-11	20-Apr-17 2	T-rige-T3 864	tiony-15 15-44	my-12 18-Mms	-15 25-May-	15 65-bm1	1.00-Lm11	13-Jun 15 JD	WATE PAN	un-13 06-4	M-12 15-84 T	25-64-1 (5	STRAFFE STRAFFE
COST STATEMENT TO THE			7.196	1000175	2000	#718F7 D	EMPSE C	DERIVE O	NUMBER OF	1967 CE	1041 (301)	Me CRITTI	ORITHA	1-136661	2-1/9660 10	PROFES (18)	2507	- 151/16	210M2F S	TOTAL D	10	CHINE DELIN	CS CRIPTIS	aratres :	25/7 SM 32	M198 2007	- Paris	250196	201791.3	W- 1950	BP_07501500	350799.3	ACT NO. 253	156 250	10. 2011	on ordering	2010	States &	Carried Bo	100	AU NO	10° 10°	Min's B	citres satisfaces
Eperson y Throuperates Mant-basepantes	- 196												144.5	-																											-			
Action ages & St.	mpt.		11	125 29 1100	10 173 104	. 51	125						1.00																															
Acting good III Plantes (F) Proportion	195					1165																						Carrier I																
Figur and (490) Physiotechia A480m6	- 44			LAB			HOLD	PELN	regar r	KU	es). Pes	r 152		MED)		Car P	Ch. LECT.	PELE	PROJE	PECE.	men men	in section	PELE	ncue	reson re	tip AGE	- PCA	190,3	HT.	NA PER	rega	rear r	508		190	PEGE	PCSS	reg .	100	100	7469	NIO FIL	HMD	1910 1910
Calculated Personners	_		MIM																																		-							
Columbial Personalists Magazinetty When, Incorporate Amagazinet Colonial Amagazinet Colonial			MEN DOL			6940	-	2,,			201 240	VI 03-11			200			F10 1 .	-111	T.Com	177	to a se	2000		Softman		10.7	-		2.5	- 14		100		29.0		5	- 201	_	0.5	_		21.52	176.1
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Enterprised Thompson (The Enterprised University (ET)	MgC.		24 1.3 24 826 27 810	2 B	841	841	110	630	**	22	20 20	100		Œ.,	629	(a) 4		19 25 88 880 13 15	634	2.5 6.81	430	W40 1	21 25 10 88	***	0.10	0.07	\$15 W	(0 25 0 A)00			11 () 106: 83	4.00	* 14	400	AR S	6. 4	ir	- 40	610	0.01	08	23 25 100 HH 21 23	186	56 10 10 10 10 10 10 10 10 10 10 10 10 10
Disserted Street, on (15) Disserted Zinc (20)	MET.		12 27	E 44	9.65	1.0	7.0	15	24	43 FE 9	15 12	7.5		4.0	24	08 1 11 25 86 1 10 1	1.5	13 75	24	134 134 138	0.0	1.5	25 25 25 20	2.5	4.5	28	10		-24			2.5	86		80 1 2	(5 g	15 15	1 25	2.2		2.5	19 25	2.5	#86 KW 11 11 11 11
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Countries Magnesum (Mg) Countries Polymore (F)	7		17 8.79 10 8.60	15	***	14	100	8.81	640	138 1	139 45	12		1 19	100	10 1 250 8			9.63	11	0.02	8 623 W	136 136 984 6175 666 6175	£952	1.44	181	168 61 188 13 181 13	10 100 01 101 00 100	1.61	7400 F	16 1.46 172 6 167	132	T 34	196 (1975 81	in is	60 126 40 126 80 140	190	114	100	6891	1851 8961	981	127 150
Stransferri Santura (Finc)	795			8.62	10	44	44	(3)	1.0	45	104 53	- 11		1.0	33	alfa Y	130 0	13 FT.	942	8 M	19	1142 F	14 30	- 08	14	8795 B	100 174	40 E E E E E	1.77	10	40 MP	44	****	1.7	(6e) 6.8**	31 6	(E) (M)	1.00	1.14	4.1	6.0	thi ea	9544 A	121 421 140 8-m 121 114 100 115 110 121 110 121
Designer Substant (S) Total Streets by SCP405 Total Supervisor (A)			919. 3,590	5 made	2.010	1,240	5 329	+ lue	Z 369 2	1 25 E	pas 188 125 6.2	1 400		1961	UN 1	M 2	w	100 100 100 100	2 109	2.560	2300	zima 1830	945 126	### 0.33	934 0.25	801 9.26	712 67 625 62	P6 874 25 6.35	1949 6.25	942 1 125 1	1940 125 5.27	279	1736 0.25	1000 0:35	508 H	100 Mar 120 9.2	as (44)	1 1479 1 125	3090 (25	4188 6 9.25	6768 9.25	100 No.	61946 0.25	
Total Antonomy (Sile) Total Ansonin u/le)	1000		100 100	811	5.0	1.3	19	9.26	2.2	10 1	95 10	9 25		897	100	10 1	37	184 . 14	120	2 160 8 (c) 1 1	100	150	0.77	0.00	8.00	0.79	825 82 862 87	25 6.36 29 994	500		25 625 88 594 89 483	119	rive.	16e	100		E 13	19	142	105 105 107	415	125 F.(6) 186 - 189	8.25	\$358 \$25 \$25 \$25 \$34 \$18 \$53 \$86 \$31 \$24 \$3 \$3
1986 Berush (Bes Leigh Berushum (Bes	100		819	8.040	400	54 0 040	67 6.19		# PPC 1	M 6	100 100	5 550		101	9.0n	P	23 m	874 48 500 ESS	99	0.000	1014	47 101 110		20.4	36.8	37.3	75 13	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	10	27.10	18 183 (N 385 80 83	8.85	8.05	8.05	46.7 E	100 To 5.0 40	84 4.85	4.00	603	16.0	***	415 (6)	919 915 915	99.9 586 831 634
helpf (Research 199)	40		W 10	1984	907	994*	E 50 25	6 10 De	25	26	Ph 26	20		89	25	9.1	iii .	89 850	24	11 60 26	26	3n	0 LH 2m	0.5	9.5 Ph	To .	85 B	12 65 19 29-	29	36	No. 15	1,616	25	9 A 29	29	10 1	1.8 81 15 26		8 5 29	9.8	6.5	21 61		75 75
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State Company (Cod)	mpl.		11	- 1	.13	12	14	14	26	14				5.02	100	29 1	27 1	160 13 150 43	11	4.62	10	9-91 3-91 10-0 1-11 2-3	9.5 9.25 9.50	9.25	199	0.29- 6+6	122 14	25 525 65 2.62	1,58	140	54 04E	147	246	101	277	(6) (f)	34 691	836	476	1 66	197	14 12 1	18.4	9.72 70+ 5.64 3.75
Substitute of the	-	1	487 491	1989	2 429	1.090	4 500		1298 1	1100 1	536 152	1 1980		1150 1 01 2-3	1900 7	12W 21	190 3	1 629	2540	1 ade	1 929	The	114	800	1225	T-sk	674 M2 017 64	17 166	1200	607 1	100 1325 152 616	17wk	951	1639	1926 Pr 934 9	600 161 174 87	OF TAXABLE	2250	2 m/s (30	3670	5408 279	62 H 110	18.4 FP08 3.34 2.3	1829 6918 134 3.4 23 25
FREET, Property 18,15	-	,	(5 . 32	- 17	10	14	12		97	# : i	H 12	19		3.3	2100 1 210 1	17 1	2	23 18	18	18.	100	21	3.7	100	183		110 1		111	21 1	() () (4) ()		211	23		17 79	(# 24 12 M3	V 68	23	414	100	29 25	1.00	11 15
Total Management (1874) Total Mountary Prope Total Mobilestown (1864)	****************		H2 171 010 0004 17 20	0 0000	007E	58 0.00% 0.47	198	190	(85 E	im i	63 311 67 64	-130		54.0 6.00 5.0	8.80% - 6	825 91	201 8	on ray	111	190	100	WARS	11 MIN 2 4 7 4 4 32 11 4	120	4 665		10	64 125	i it little	1825 8		0.025	1925	1621	1825 61	E1 14	P 6301	1985	100	9.005	1.001	1.00% P.025	8.025	8021 0025 47 67 H 4 281
Total Microsl Pring	10°		17 74 17 74 29 949	40	1.6	4.1	13	**	/4		10 31	74			10			2 2	47	29	- 33	14	71	17	2.5	14	10 1	12 12	2.1		17 19		10	120	4.1	31 4	16 45	133	14	10	**	102 PT		
Total Menut pag Total Solumen (Srd Total Menut (Srd	MPS.			0 14 2,648 Rpg5	8 12 3.498	2,064	10,000 10,000	5 16 5 619 5 619	Fine 2	87 9 7000 4 1210 1	120 0.10 100 mil	1,540		3000	2100 I	in s	100 7	100 816 908 7149 809 7149	4.149	1 966	1.000	6 22 4219 11 6115	1100	1310	\$10 500 5 00 5 00	3446	626 63 2148 204 5148 63	25 5750 25 678	4200	1530 1	ene acts	1218	4250			159 #1 798 980 101 #2		-	871F	1000	**** :	016 021 2000 1000 1000 5001 550 753	215mm	1930m 37mm
Trind Giber (Age Total Commune (Tr) Trind Thettern (Tr)	70			Hors No.	94	8 DE25 6 PEZ	Sec	72	54	** *	91 M	1 21		40.0	464 3	600 () 640 () 650 ()	() E		4516	44	9.627	14.1	49.8	46.7	89.5	9.549 E	21.98 38- 10.38 0.0 21.98 38-	61 19.6	81 E	91.1	131 128 14 128 141 128	5250 515 51.0	54.8	67.7	611 - 9	6 s : m	10 MA	10.0	58.1	54.6	6.054 6.15 0.025	1071 B-013 10:0 F13 1077 B-007	0 000 40 J	18 10 10 1 8 10 10 1 8 10 10 1
Trained Fire (15/4)	100		111 Sout 21 Sout 141 Jan	8094	9932 9 656	9903 97000	Food:	115 115 1107	750 T	(62 A	101 E10 11 :33 12 76	1 105		9105 110 26.2	9805 8 511	625 T	100 E	125 HEET (5 25	110	1 E23	100	117	4 905 15.6 16.5	100	9,605 73 481	1125 F	TE T	(2) 25	2.5	11	101 (182 23) (1	1805	6 925 J.S	210		105 4 8	6 Am		1.1	-11	11	85 143		27 23
Triple 1-domain (19) Triple Womain (27)	107		11 010	966	167	9 000 0 47 8 62	324 Fee	747 738	176 Fee	** *	9 85	957		0.66	\$5.0 6.00 5.0	94 92 4	47	15 25 160 156 150 8.60	129 8 49	9.40	6.40	60.4 6.56	100	8.7	43 T 5 30	***	70 S 20	14 M.S.	9.0	Sec.	22 21 87 41 86 56 23 6	95 T	63 g	Tird Reg	100 T	10 N	15. P19 61 946 (5. E1		146	230 636	252 672	129 1452 671 684	915 675	955 566 641 843
Hall Son (20)	100		11 A1	1 22	1.7	26	19	ű.	7.6			116		47	51	(A)	13	48 77	**	**	**	100			9.6	14	24 2	(3 (35 (3 86	D 1000	18	2641	1.88	16	20	14	D 15	0	. 11	79	124	12 4 17 4	16.1 18.1 11.1 15.1	26.6	15.5 14.5 20 76.7
Next Simplest (2):	-	.	21 96	52	830	tites.	190	11		**	10 10 16 01 16 11 16 12		. 100	+25	120	201 10	92	100 110	10	1130 10 p	4.7	144	194	19.4	5.8 6.25 11.2	940	470 13 112 H	1 11 11	100 100 130 130	12.00	74 63 68 113 78 187	946 109 2.86 146 146	114	0 80 11 d	19.9	100 (II) 113 (II) 120 (II)	1 Hz	125 184 214 142 132	121	207	117.	094 129 11-1 313	997	197 185
Total Magazine (Mg)	-		13 85 15 16 16 683	28	26	20 12	14	25	10	200 J	66 E1	110	100	+25 +25 177 181	142	60 1 60 2 34 3	16 1	62 10 10 10	43	28	17	9-30 9-86 8-77 1-54	142	170	199	120	129 19 121 12 121 13	98 1 90 29 1 29	136	192	26 1 10 26 134	3.86	18 a 2 3 a 1 5 a	142	114 1	iae (1 33 (1	15 210	EH (42	2.51	11 d 2 00- 2 34	354 858 8.51	11-1 313 4-12 671 2-11 791	11.2 445 3.0 110	10 10 10 10
Total Seatows (Pits.)			9 99	840	110	058	14	12.	45 1	1901	0 13	18		0.340	450 1	944 · · · ·	100 6	13 (4 ma dim	***	8.75	***	HATT	***	9727	1279	****	17	2 490	1911	Fred 1	36 134 en 191	(30	150	142	120	50 (S	50 146 30 130	192	171	124	£ 51 £ 67	16 IN	110	18 19
Value of the party required as 100 o	Transport of the	aj domeno di ber	med province	18	1.0	48	28		29	25 4		48		15	-11			.5 12		54		-11		- 11	14	- 42	-	- 11	1000			- 19	14			«			41				116	-11

SubsequaliCited SASRUS Requiri graphs of

Countries Notice 1 of Countries Notice 1

PROJECT EGGPARY	TALDEDON BY																																										
PROTECTION NAME.	WIR TULSE	6174300	p5.7486s	9184754	specials 6	10006	1463/s A	H1073	HAZET B	H 18492 94									WH I			W M	9452MA B1	mills (91.50MP 55									Walt True	M16 304/196	W-00-210	,						
Descripto Sono.		** ***	W 30 72	W 30	m 13	NAME OF TAXABLE PARTY.	900	1010	es Lo	W-18 W-1	A-w		***	***	and .	64		WH W	-	and the same				19	n			TE NAME OF		61 403 403	11	NE		16		NG 24 10		WW P	as with	of Milans	Pile	UN STEEV	LOUPET
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Constant Common (C/I)	100°	0.009	0.004 0.5 0.25	0.5	9.5	1815	91	8.5	25 1006 115	9:005 6.5	635 95 93	8-25 81 625	9:05 9:5	8780 81	9 330 E S	4-25 6-5	9 THS	6.307	6.00	(40.	4 601	8305 65. 935	63 63	- 1005 100 100	1.00	8.00 8.11	95	15	41	827	6.0	41	4.0	100	100		11.0		40 0.14	1 110	9.40	0-06 1 30 1 20 1 20 1 20 1 20	**
Constant County (Co.)	mps.	0.75	8-25 9-45 86.7	ID 25		0.25 0.85 10.7	100	825	8.75	825	0.00	425	900	975	9.71	825	491	821	621	4.00	10.0	6.6	10	- "	61	11	***	847	611	0.1	193	644-	9.60	5.85	944			40 1	2h 434			20 10	
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Charles Management (Adv.)	MB/L	85	9.5	3.5 0.5	3.5 9.5	01 2.5 6.5	25	25 65	2.5	25	2.5 0.5	41	11	45	21	43	*1	61	**	89	65	89	35	. 44	85	81	39	79		43	11	95	61	4.9	11.0		-5.0 +1.0	400 40	95 466	0 8 805	8 S 6 9 0 8 S		81. 37
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(Districted Streetune (Dr) (Districted Thellows (To (Dissertant Tor (Dry	mg/r	36. E	0.825	0.035	# 625	833	983	6625	0.625	0.005	0.025	100 N	200	430	6401	105	F201	WHEN	6.00	681	985	900 610	190	665	100	6801	0.005 A.3	16.65	100	445 697 63	885	405	2.00	100	110.00	-	right.	27 2	15 24	2 500	0 8250 2 8000	30 1.6 0203 0.908 0007 0.0 1.1 2.3	62
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Districted University (IV) Districted Springsyne (IV)	wage.	9.25	E 24	-25	13	3.5	25 25	13	27	25	23	25	25 25	25	23	- 23	- 13	10	15	11	11	.19	25	21	19	24	- 25	25	4.9	15	100	23	21	35	15.0	- 3	15.0 15.0	19 2	9 37	79	1 50 7 50	8 70 0 0 0 1 8 70 0 0 0 8 70 0 0	83
Constitute Francisco pico	regit.	2.5 0.75 788	2.5 6.25 F.48	2.5 8.75 8.98	8.25 F76	825 914	9.25 9.39	625	25 95 99	D25	8.35	923 968	175 176 136	875 9 12 146	#23 TIN	5-15 9-85	100	100	625	0.25 9.79	9.75	911	237	911	0.0	15.3	975	60% 38.7	125 165	Nes.	99	876	8,68. 197	985	10 Sc 5 19		if to	126 B	25 834 15 94		9.750	70 12	
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Statute of Section (State	mpt.	0.40	0.00	8 617 6 602	9.65	934	8294	935	636	940	8.754	44%	9901	20	#W.	144	1.78	140	F1.66	#341 #341	6.0	#851	40	0.00	4.7	1111	100	ijale Es	101	111	107	1.00	PMZ 13	944	91H		89. T	61 4	94 95 6 14	17	-13	16 18	63
Chesatory Substant (S) Total Specie by SCP985 Salai Abendrum (A)		rim	7540	94.70	1430	4540	29.80	James	1000	1290	1589	1000	7539		-	tital	***	***	9479	1418	-	See and the second	-	10	(m)	940	100	3189	Time:	336K.	200 100	5.094	1000	Siene	1100		-	Tesa Si	\$40 FM	19 2 446	162	141 (alle 1000 0.002	64 67
Salad Antonomy (Sites Salad Antonomy (Sites Salad Antonomy (Alle)	1954 1964	0.15	9.15	0.35	6.75	9.25 3.34		0.25 1.7	0.25 1.89 51.7	0.71 0.71 140	0.25 8.97	9.25	4.90 LB6	100	186	10	187	10	100	796	9.00	146	100	2.84	829	987	4.9	198	120	2.67	4.79	225	17	114			2.54	9.26 8 5.0 9 129 9 0.98 8	25 024	111	8.0 8.0 34	88 894	84
Total Barrett effect	70	174	116	188	911	91.5	89.7	200	937	96.1	0.07	875	M1 601	56 A 645	96 H	9.65	440	86.0	384 240	967 9-25 9-7	6 / 2	984	423 165	94.6	541	0.07	240	0.05	697	500	585	84.0 834	100	138	41		# 10 10 m	0 M B	115 65 115 642 160 Ran	24 6.956	0.060	08 844 108 27 8000 80×7 1007 80×7 25 23 8006 0100 2400 31 925 187	**
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Nami Calmitt (Cor)	49 L	109	910	111	946	2 to	6.38	241 4/9 984 344 05	5.73	122	0 Ma 2 Mi	647	190	8.40	1 m	2,00	100	244	9.60	364	234 111	199	110	31	167	140	476	4 10 20 W	100	10	#1 2 (8e	100.4	9.79	117	10:3		9.15	17	10 4.5	1 14	1.6	68 25	Di
Total Cont (Fe)	91	6480 5-21, 7-5	64/0 8/65 2.5	Lites J Tr	1336	246	1.44	2040	5.75 2138 141	0.60	149 149 146	1479	1-20	8.44 2750 3.00	100	3.62	185	130	112	7798 7.6 7.9	70.00 3.65	4.79	1.00	211		190 400 11	31.00	2.84	947 115	120 120	179	in.	132	1200	8.00		3.00		11 11	17	2.4	010 12 010 033	64
Tokat I, dhuare at ti Tusat Manganesas (Mns	100		552	174	136	63	93	174	141 13 463	13	33	10	- 1	94.9	44	46	814	100	198	100	116	115	67	F1.1	174	10.4	40	W1	40	44.6	617	188	161	196	136		MI	177 1	100 GA 1005 H HA	36	19	12 40 12 40 1000 1000 100 10 100 10 100 107	82 84 81
Lobel Montey (Page Today Madel-Moreum, (Page	100	0.80%	1424	6.075	0.825	,	1.0			12	,	.04		,	58	11	27	5.0	12	14	14.	**	17	14.	27	./1	19	7.0	19	34	21	11	117				1-7 # 1.	62 F	F7 F1		1.0	EM 81	Est .
Total Microsof (FIS) Total Selection (See	100	100	10	8.14	11 7	117	911	6-4 93/	111	410	7.0	100	45	16	816	51	# 9 # 14	211	81	421	6.24	8.2	6.17	641	16.14	416	412	8.07	6.2	6.01	5.0	812	9.22	0.04	011		8.37	0 50 0 10 000 15	30 01			1 140 3.605	65
Tree falls or play	MES.	Peli-	1409 1409	\$1800 8-825	1880	0.00	0.01	6.65	114 5189 842	961	921 4979 600		140	0.01	101	121	101	1918 1911	9-852	100	N(N)	0.904	No.	\$1400 9100 910	0.01	1636 1651 16.0	62.49 0.01 15.2	See And See An	9.00	200	940	0.001 10.1	160	940	40.00		MANAGEMENT AND A STATE OF THE S	1.240 01	954 9 92 99 54	4 55	40	93. 9 B	12
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Total Tip (Time) Select Starman Re	101	170	311	2.5	107	497 497	115 186 0.36	6.3	2.5	25	42.6	20	10	23 per 846	100	96.5	25	110	276	-0	100	254	13%	236 236	- 47	91	81	111	95	84.7°	124	796	-	109	917		1.00	439 5	25 24 No. 147 177 05	7 118 7 118	2.5 10 9.39	Hold 61 8-19 107 8-32 8-14	62 86 84
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Sale Jon Street	mg/s	25.4 25.4	140		385	114 0.25	0.75	18 a 0.25	16.6	44	7 S	8.8	174	916	95.9	10	126	600	25.5	447	945	679	914	177	48	886	625	6.29	1 IN	0.05	500	850 26.5	8/29	14	1.77		6.50 11	#25	29 840	12 0.26	6.2mb	5000 ESS ESS ESS	96) 92 95
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Not Paterners III)	opt opt opt	2.89	0.36	2.51	1.23	219	E 554	148	100	8.624	6.5a 9.5ta	196	1.01	1.16	160	197	3100 581	431	327	140	917	130	9.915	100	1.00 0.20s	135	112	1,1	1.00	1.66	181	110	136	126	124		1.01	39. 3	10 11	100	179	652 E31	62
See See 21		23k	- 11	- 1	11	- 11	1.8:	3.7	15	14		7.5	10	- 11:	115	- 14	- 10	-11	. 11		(88)	.53	- 4	16	. 19	11		-17	52	17	- 12		- 15		- 10	_		74					-4-3

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	Photograft 2: Aprillate: 4	Mary Mary 1	MIT S	10013 N/S	M SPA	m sterio	MI VALUE	7. Games	9 152mm1	E Shrunda	2 61/46-17 086921	CERTAIN	CBS*NE*	DEPTHY 1	Difference of	CREATE S	M150	The Library	Airole 17	THE PER	450 JT JS	M1 1729	6 202TH	14,000	District I	USUPH AN	prince M	ALC: NO. 24	NEW ARES	W. ASS. W	e/ Etails	j prpent	31-2000	hymm. 111	proper \$11/9	nete IT-JN	19 1926	ECHINE I	WITTE AND	THE SALTH	Marie	Marries 1	egrav ag	ECH IN	CHO MAN	H. AMETER	NUTRY N	gree Mili	W MUTH	B 600-90	MALM Y	M and Ma	direct.
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Leveland Statute Page	195	0.00 2.4 0.7 0.9 0.9 0.9 0.9	1.00	110	ren 4-6	5 660			14	+ 650	90/3	# 100 h																					4.7		41		24	201 1 201 1 201 1 401 4 401 4 401 4 401 4 401 4	### ##################################	1 0000 1 0000 1 1 17 0 10 0 000 6,34 6 146 1 3.07 2 10 0 1 100 2 2 000 50 00 00	E-DUSTRION E-DU 1 to 6.5 E-100mm 6-1 E-100mm 6-1 G on G-100mm 6-1 G on G-100mm 6-1	
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Ensured Solverers (Es)	100	0.54	6.75	0.10	A.15 E	9.1	1 114	# 917 8 547 6 981	8.17	616 541 610	79.1 0 LF 179 9-65	8.15	8.11	8.15	8.10	0.41 1/10 1/10	5 46 3859 5-21		10 8 8 No. 04 10 8 8	0-1 0-5 100	120	2.24			9 x8 440 5 cc	100	6.74 675 8.67	8 UT 8 UR 8 UR	8 H	9 17 9040 647)	0.00 0.00 0.00	(14t)	334r 883	149	11.69 14.69	1000	100	117 11	AND 1219	1.00 100	0 100mm 0.1	40 00
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Amendment Phononse (**) Executived (**)constr (64)	100	P-10	0.44	0.4 7.5	932 F			1 27 2 11	1.0	8.25	9.66	0.70	0.67	9-54	610	# to	0.68		m ##	15	6 as	110	2.00	100		4.95	11	5.4	6.00	21	2 e d / 2 3 2 3	11.60	33	812	410	4.00	8.00	71 1	10 10 10 13 10 20	200 E12	\$ 100mm - 6	1 10
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Drommont Propries 420	195	2.6 2.6 2.6 11.6 2.61 0.01 0.01	0 41 2 4 2 5 1 7 6 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	6.75	625 63	n ar	1 1/1	0.25	0.75	9.75	6.75	8.25	E 16	8.75	875	6.71	0.66 2.5 0.16 36.6 2.06 3.12 5.12 5.12		11. 1- 25 0.27 8.8 27 28 21 112 118 30 1.3	8.0	10.1	10.0	827	10.7%	961	96.7	3.75	100	107	8.99	9.0	21.5	146.00	111			11.5			7 000 7 0000 210 2 000 211 2 00 210 2 000 211 2 00 11 2 00 11 2 00 10 10 10 10	6.000 0.0 6.000 0.0 6.0 0.0 6.0 0.0 6.0 0.0 6.0 0.0	No. No.
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Directived Patentine (%) Countries between plant	mgd	6,611	1 100	**	679 65	9 584		0 000	e /	0.000	24/7	0.715		4 000	1.01	1.0	1.25		Ja 13	140	***	***	615	190	4100	0.764	9.50	6.194 6.396	9 860	100	9.000	636	110	E-10.0	117	9.95	3	11	19	9.99 5.50	F-10 5.5	40 10
Description below fly	195	- 17	4.5	11	17 1			. 1+	11	1.5		1.0	4.7		4.2						1.0	_	4.7	115	- 11		3.7	1.0	11	- 15	- 11		- 17		-				41			
Sold threats by Rither Sold Microscop (RP	MPL	green	46.60	MAR	16.00 10 10.73 01	AN 4500		0 1,550 5 27,75	.79700	MAR	15mb 9.25	L/ sit	1,35.0 9.25	294	.00	471	m7	1	5.2 B1 29 B2	90°	140	100	1175	1.0	1.0	9676	170	0.00 d (** 96.7	100	5760 6473	895 120 120 141 140	870	9550 9.75	100	9.79	6 m 5 m 6 m 6 m 6 m 6 m	1.7	1 min	170 121 128 11 11	694 21 636 6396 13 679 69 32	10 4.70 0.00mm - 4.70	UT 07 10 07 10 07 27 07
State Antonomy 2017 State Antonomy 1/41*	mg/L	9:31 2:07 341 0 9:46 9:5 35	0.00 2.71 01.7 0.00 0.00 0.00	9000 1-21 1-2 24.7 0-46 0-3	113 11 6.15 11 6.15 12 6.15 15	0 10	0 010 0 170 0 046 2 046 5 43 5 35	1 17	0 (0 0 40 140 0 25 4.5 4.5 25	925 1 46 1,06 8 (3 8.5	121	5/10 625- 285 76 - 846 65- 25	9.25	6.75 6.75 6.61 6.05 6.05	8.75 0.79 07 0.05 0.05	675 825 907 10 836 81	96.25 6.67 15.4 6.09 8.3 J2		5.2 db 25 d.2 100 1.0 11 db 11 db 12 db 13 db	100	448 1-9 447 647 648	1.00	1.50	3.54	100	1.00	242	4.00	19	100	1.00	1.00	3.00	1.00	1 40 49 4 0.81	244	110 640 61	Part 1 1 1 1 1 1 1 1 1	11 11	1.3 6.79	6 toppe	4 #
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Solid Buryllum dis-	HIGH HIGH HIGH	11	7.4	53	10 1	5 81	5 61	3 83	4.5	0.3	81	8.5	6.5	41	81	- 11	11			9.2	80	10.	82	5.0	42	43	4.5	85/	8.0	61	6.6	81.	41	**	**	6.7	E1	23F 67	0.745 0.745 0.58 0.77 35 08	5.000 5.0000 5.000 5.0000 24 36 5.47 6.000	0.000 0.0 00.000 10	2 87
Sold (Solfs SS) Sold Laplace (Cd)		36	26		.00		5 35	n 25	25	29		25	.13						D /	4962	4.00	100		100	100		100	88%	*10	100	9 651	6.01	9.015	444	994		3-pH.	000 00 000 00 00	64 121 67 31 24 19	E-MAR E-MARKS E-MARK E-MARKS D-MARK D-MARKS D-MARK D-MARKS D-MARK D-MARKS D-MAR	0 00000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	47
	mg/L mg/L mg/L mg/L	10	7.0 2.29 4.07 7.17 7.17 7.17	2.7 2.75 2.26 2.26 66-60	8117 B 182 14 163 14 153 17 154 17 156 70 4 ph 11 33 3	10 0 000 15 10-1 17 100 17 100 100 740 15 2-1	0 00.0	0 000 0 147 0 147 0 140 0 140	6-81 13 F 13 F 13 F 13 F 14 F 15 F 14 F 15 F 14 F	93. 930 930 942 254 254	9-047 12-1 3-14 1-16 1-740 1-100 2-5	4.5	2 7 6 52 1 10 100 0 to 2 3 10 6	4 8/5 6.25 6.25	89 82 829 834	81 82 1 m 1 m 1 m	85 825 843 164 91 25		15 100 50 41 21 62 13 64 14 15 14 15	854 836 216 606 829 129 13	2 (1) 2 (2) 1 (2) 1 (2) 1 (3)	2 10 1 0 1 0 1 0 1 0	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		1.0	610 110 121 160 180 21	11	15 19 19 19 19 10 10	10	100 100 100 100 100 110 110 100	0 007 0 00 0 00 0 00 0 00 0 00 0 00 0 0			9.0	994 93 984	9 EM 2 A4 2 A4 2 A4 2 A4 2 A4 2 A4 2 A4 2 A4	84	17	24 19	5 to 6298	6.813 1	4 17
Sond Copedi (Cop Sond Copper (Cor	negri.	1.00	4.00	7.00	123 1	7 10	1 11	9 942	1,0 4	9.30	5.94	3.93	136	116	874	11	941	- 1	25 8.6	716	100	10	5.46	116	1 10 1 10 100	9.20	140	***	1 h 21 e 1/10	1.04	2.66	54.7 (Date:	. £ 15	5.07	8 75 9900 9 81	2.64	1.05	197	80 10 800 1307	20 0.00 0.2 0.0 0.0 0.79 20 290 30 14	17 3 3	0 87
Sond have Pinc. Speed over differ	Mark.	2900	4.17	40-60 7.14	7940 TO	m na	4 120	n 100	110	1120	1.00	N155	10.00	8.1		10	91		(A J)	120	100	100	100	840 25	1-0	1.60	2.00	4.07	177	4.70		4.6"	411	9.1	9.81	140	1.01	12 7	60x 15x2 21 13 21 27 130 30	8.0 8.19	17 2.74 6.607 1 6.2906 g	3 97
Three Charter E.S.	right.	17	14	25	15 1	9 11	1 22	3 33	13	2.5	25	1.9	2.9	7.1	41 71	11	25		M 40		-	75	20	15	23	24	2.5	15	11	71	25	**	Pro	28	25 445	91	111	965 7	190 96	30 19	4.00	5 0
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Filtra and HRQ3 Preservation AveDors	N/A	-								rpen	1810	7800	PETO PE	10 101		7210	1210		1010	-			12.10											81.6								
Marine (Wo	April .		E 00050	6.829	F.0025	R3005	P.0025	8.0079	6.0025		_										-													7				7				
Calculated Parameters Mine, burganies Abaltysy (Total on GACOTS	- net		0.0576	6.030	0.639	0.090	8,11	9.29	815		<u>. </u>																17.5						7.	-								
Amariyay (Total on (GeOOTs	mgt.		23.4	34	27	30	47	56	54	56	91	33.	423 - 46	# 293		36.8	\$5.3	28.4	+0.0	40.9	44,4 6		5 1	и т	1 10.8		12.9		30.7		6.8.	16.8		16.3		55.5	44.2		87.7		m)	26.7
Neal Organic Cartiers (C) Malerty (PP or CoCO3)			0.25	6.25	0.75 33	2.7 0.75 37	9.25	6.79 9.25	9.25 9.25 84	9.75	0.25	0.25	0.75 6.7			0.25	9.25	15.8	0.25 #9.7	5.25 49.9	0.25 12 54,3 5	25 02	15 II.3	5 5.21 18:	5 0.25 6 01.8		943		K25		25	825		8.35		471	No. 6		10.8		36.3	11.3
Briefmate (HOOS) Cartonials (COS)	ngt Jen Jen			9.25	0.25	37 0.25	67 8.25	64 5.21	925	37 0.25	625	48	51.2 59 0.25 0.3	2 95		0.25	833	14.8	9.25	0.25	0.25 h	25 %	5 0.	15 S.21	5 6.25		35		9.25		126	1.01		1025		6.25	9.09		6.25		6.28	9.25 9.25
Particular (CFS				6.50	0.25	. 8.25	1.25	0.21	0.25	9.25	0.25	0.25	0.25 0.3	n 02		425	5.24	62%	62%	134	825 3	25 E	h 62	5. 57	0.75	-	15.		135	_	2	126	_	821	-	8.75	- 12		100			
Antono Seeukent Kolphain (SCH)	met		64	4.0	39	14	46.7	. 24	23	15		12	22 25	a 22		+1.2	9,54	268	16.8	115.0	162		10	16	217		24.9		21.3		8.5	26.5		200		25.5	261		12.4		12.6	120
Dissolvesi Chloreto (Cly	mys		9.25	0.79	0.25	1#	825	- 11	1.6	-	-		- 1	6.85	8.62	13	13.	875	2-11	- 1,8	(3: 1	A	1 7				- 10		- (*		47					-					-	
Responses (PC)	mpt. mpt.			8,0650	0.0050	8.809	8,8960	8.0050	0.0050	0.016																																
Orthoprospripts (P) retrate plus Monto (M)	795		6.0011	8,060 8,650	6,0003 ARM	8,837 8,930	8.0025 8.16	0.0025 0.34	9.15												-				_			-			-		_				_					
Physical Properties Conficiently	uliform		62,0	67	84	95	140	179	160	16	75	89	134 15 7 81 7.0	e rai	90	79.2 	75.4	67.9	125	129	110 1		2 1	IE 19	E 161		159		168	- 9	ist.	193		364		167	790		67.4		47.7	44.5 1.50
	pittinin		7.56	.11	7.7	7.6	74	1.8	16	2.7	7.7	7.4	241 73	574			743	7.38	7.74	7.70	744 1	-		170		7	77.5	-	7.00		-	7.62		7.89					1.50		150	
Physical Properties Sent Busperated Solds	mpt.		15.5	42	2	37	15	4.8	100	68		15	18.3		16	28.8	34.7	18.0	8	18	1. 1	P)	9 9	* 1	A 10		- 1		10		4	16		Site		3	21		1.8		6.5	11.5
Trial Disselved Sobre	mg/L HTM		88.6	11.2	42	72	96 5.7	50	1.2				. 21	9 21	-10																							_	. 122			-
Colculated Parameters				36		42	58	76.	n	37	41	42	62 /1	a 30.	43	31.6	31.6	42.0	67.8	10.0	96.7 6	6	'n	N B	9 53,0	61.5	49.0	62.2	16.8	75.6 2	u n	93.4	85.0	81.8	94.3	100	78.2	908	40.0	37.9	37.2	32.0 34.0
Dissiries Horbross (CoOOS) Total Horbross (CaCOS)	mpt.		426	- 42	:32	44 .	.17		- 49	. 52	-63		61 71	A . 431	42	34.8	33.8	44.6	54.1	53.6	60.2 6	5 (ab 1	72 P	9 681		73.5	67.6	69.3	74.8 7	69 75	60.3			12.4	76.2 6	13.3 (7.1	137	41.8	30.9	39.7	36.5 41.9
Disselved Metals by ECPMS Consident Abstracts (A)		401	1100	125	16	- 29	26	10	4.8	58	155	4	56.1 36	a 116	30	18.9	45.6	26.6	16.9	29.7	19.7	T	n 1	19 1	5 19.9	134	12.7 0.25	29.6	9.25	16.9 1 9.25 0	50 12 25 62	6,4 0,25	11.8 0.25	91,8 9,25	16.2	12.6 I 0.25 II	19.8 187 1.25 0.25	56.4 5.25	0.25	453		17.8 St.1 536 125
Discolant Antenny (Shi)	upt. upt. upt. upt.		1 100 9.25	6.17 8.17 8.75	9,040	8.19	8.24 9.79	8.33 6.64	6.26 6.53	F.25	9.25 1.8	6.75 6.79	8.25 0.2 8.31 8.3	5 6.21 5 6.31	8.25 8.77	0.25 8.36	9.55	0.25 0.60	6.25 6.79	945	0.25 G	25 E2 E7 B2	5 0.2 d 6.6	5 52	S 0.20	6.37	0.25 0.56	9.79	942	9.56 6	34 6.5	300	0.54	0.53	9.50	0.57 6	8.53 - 674	9.56	8.64	0.62	0.61	9.60 9.6J
Dissultate Arsonic (As) Dissultate Borson (Bo)	ug/L ug/L		47	11,79 22 11,0050	0.57 66	8.55	31	42	38	20	28	19	27.4 32	2 17.	1 14	18.4	15.1	19.8	27.3 0.05	26.7	28.1 2		H 3	ie 3	E 26.8	30,1	958 968 925	92.0	34.8 0.05	457; 4 626 0	ZA 41 U6 82	38.7 8.75	48.8 0.05	9,05	9.05	66.1 d 6.05 6	43.5 17.2 8.01 0.01	25.0	12.7	16,7	16.1 8.25 8.6	12.1 15.8 0.05 0.05 0.0 0.5
Considered therythorn (Sim) Considered Starrooth (SiQ	upt.		0.50	1,0050 3,0025	8.7650 8.0503	0.0059	8,8025	0.0050	8.0950 8.0826	8.850 8.50	0.050	0.50	8.60 B	6 5.01 5 8.5	8,50 8,50	9.5	0.6	8.5	8.5	-50	28.1 3 6.0 0.0 6.0 0.0	10 F.0	ic 8/			9.5	904	.69	43	53	30 0		0.5	8.5	89	8.5	0.5 0.5	8.6	8.6	0.5	8.6	6.5
Disched Borm (B)	-pt.		. 50	25	25 8.652	25	25	25 8261	25 BJ60(1)	25 6.070	23 8.19	25 9.10	25 27 6.475 8.2	5 25	25 L 6007	25 8,854	25 6841	25 8.136	25 4.009	25 8,119	25 3 9,792 G	5 S	5 : 10 14	25 E.S	% 23 7 9.7%	25 0.191	25 0,171	25 9.51y	25 B.279	25 9258 BJ	25 2 718 6.13		\$.96E	8.0%	6,196 T	514. S	Sec. Aug	0.7%	4,276			25 25 850 6,000
Deached Codrouts (Cd)	197. 197. 197. 197. 197. 197.		2.3	0.013	0.20	11,040	8.000	0.060	0,060	0.50	6,50 6.25	0.50	6.30 BJ 6.25 BJ	5 0,5	8.50	10.5	9.5	19.6	4.5	0.5	9.5 0	50 8.	0 0.5 5 0.5	50 5(5 25 6(2	6 9:50 5 9:25	9.3 1 1.25	11,5 6,75	6.5 9.25	8,799 65 521	625 I	55 62 125 62		8.25	8.25 8.25	6.5	0.3	NA 9.5	10.8	0.8	0,5	8,5 8,25	0.5 P.3 9.21 9.25
Dissolved Cobolt (Co)	work.		9.0	8.64	8.895	6,029	8.830 2.2	9.62	9.83	9.25 8.40	4.1	3.0	9.25 H2 58.6 17	6 0.21 # 3.5	0.26 6.46	1.26	0.25	1.85	6.15 6.95	0.25 2.12	0.25 0. 3.86 Z 2.5 Z	35 63 36 4	ă i	0 6 0 8	A 9.17	5.01	5.21	54.3	0.01	7,85 6	153 4.6	1.24	3.65	6:66 5.1	6.29	8.60 1	16.8 37 7.8 96	33.9 46.8	0.25 6.44 23.3	5.02 17:5	6.25 4.31 1/2.5 8.1	0.25 0.25 1.89 2.06 26.3 14.7 0.1 185
Elewetyee Copper (CM) Elewetyee tron (Fe)	196		1,600	110	9.92 199 14.0	15	34	13	4.0	6.46 22 0.10	275 8.30	0.10	92.5 36 923 92	.9 170	12	74.3	17.6	30.4	7.8	83	6.1 %	10 1 1 m	5 6	10 15.9	in	9.00	9.0	95	9.1	36.5	2.5 2. 0.1 6.	0.1	15 TA	0.0.	0.1	2.5	0,1 (0,6)	8,54	381	6.1	8.1	8.1 185
Describes Lond (Pt) Describes Liftners (LI)	ugit.		1.55	6,11 0.23	1,5	6,83+ 6,60	9.50	0.60	9,601 8.60 7.2	3.5	2.5	2.5	2.5 2.	b 7.4	2.5	0.1 2.9	2.5	2.6	2.6	5.0	14 1	5	à 2 à 4	a 3	3 23 in 44	2.5	2.6 6.8	217	2.9		1.5 Z. 6.6 G.	2.5	2.5	2.5	0.1 2.6 0.5	2.6	2A 2A	47	18	2.5	3.5	25 25
Descrived Mangarons (Mr.)	upt.		6.810	0.005	29 0.095	4.8 0.005	2.9	0.006	0,005	9.679	9.075	0.075	26.7 19 0.025 618	3 54	5.573	12	2.4 0.625	5.1 1.075 2.8	8.825		5.075 5.0	P1 5.6	5 65	N 682	15	8.075	5.623	0.025 &1	4,005	tiones as	0.87	0.625	6.075	0.025	0.001 3.8	A275 10	9005 9,005	0.025 1.7	1.875	1,025	0.079. 0	105 1,025
Dissurbest Mortery (1931 Dissurbest Molyholysuum (Mu)	100% 100% 100% 100% 100% 100% 100% 100%		1.3	5.3	0,11	2.1	0.000. 2.F	2.9	2.0	3.00	9,075 1,8 0,50	9.625 9.66 9.50	2.6 S 2.6 S 9.50 S	1.0		1.0	0.5	2.8	2.4	3.2	24 2	# 3 60 0.	# 2 0 to	19 A			2A 2A 63	2,1	4.5	65.	23 Z 15 %	E 10%	28	8.0		8.5	2.8 2.3 0.6 0.5	0.5	9.6	68	9.5	0.6 0.5
Ejeguitore (Straut y14) Ejeguitore Solonturo (Sol)	ugrit.		0.00	8.45 8.17	0.820	B.44 B.14	9.32 9.32 1.329	0.23 8.45 1.450	9.21 9.41	9,30 9,29 1,949	6.19	3:161 1,279	9.29 S) 1849 19	87 H.T.		8,17- 736	5.79	6.19	0.32	9.27	630 K	32 9.	16 R.	25 0.4	6 634	8.58	6.36° 1360	1650 1650	8.33 1630	9,41 1	149 8.3 570 153	9.51	9.59 1660	8.52	8.61	8.67 8 1560 11	E.66 E.34 779 1970	8,19 1750	6:18 1310	6.15	6.12 1000	837 937 864 989
Dissolved Shoon (St Elegatived Shoot (Ag)	ugit.		8.825	91e 55025	0.0028	1.479	0.0025	1.458	1,530	9.040 9.010	1.296	1,279	1849 18 8.510 8.1	127	9 9300 5313	9.51	0.01	984	1419	1260 5.31 Fa.F	0.81 DJ	16 13	10 9.0	12 8.61	10 1915 15 0.012 17 862	1460 0.01 97,5	0.01	0.01	0.01 86.6	6,01 4	0.0	1560	5.01	1960	0.01		0.01 - 0.01 100 - 00.0	1891	0.01	9,91 96.7	0.01 81.4	5.01 5.01 55.6 61.7
Dissolven Stronture (fry	ugh.			58.	295	86	87	115	189	9.1	96	46	8,010 8,1 96,7 18 8,005 0,0	D 54.		12.2	0.025	94.F	411	78.F 0.025	6328 To	10 I.O	n 1	16 F	F 864 15 0.021	97,5	0.025	63.8 8.625	0.005	160 6.553 III	594; 94. 535 0.63	0.075	110		394 0.009	0.525 Ro	EDS 1.825	0.625	6.625	8.825	8.005 6	858 8.825
December Studium (19) December for (16)	sapři.		8,10 8,25	8.80F 9.0050	8.19	0.0050	8.085 9.840	4,0050	0.0050	8.029- 2.6	8.805	28	2.5 %	5 25		2.6	2.8	2.3	2.5	2.5	2.5 2	5 3			5 24 3: 14	2.5	2.5	2.5	2.5	2.6	2.6 2 2.5 2	2.5	2.6	2.5	2.5	2.5	2.6 2.6 2.6 2.6	108	7.5	2.5	8.025 6 2.5 7.5	7.5 7.5 7.5
Dissertime Thereum (Tr)	Mg/L		43	6.8	1.5 8,917	0.25 6.52	2.7 FA1	0.25 8.75	0.25 9.61	9.56	34	9.5 9.00	7,5 Z. 0.60 R.	5 53 M 63	2.5	7.5 9.30	2,5 8,30	2.5 9.39	2.5	9.45	2.5 2 #(42 B)	5 S		50 9,5		11.54	15.	9,61	7.5	9.54	DH 616		6.79	9.86	115	state of	6.62 6.94	841	904	0.43	8.42	9.32 9.37
Description (Assessment (V)	ugit.		4.0	6.46 6.60	0.15 4.8	6.10	0.10	0.79		48.	2.0	2.6	28 2	h 7.5	2.9	2.0	2.b 6.8	2.5 30.6	2.5 11.8	2.6 21.5	2.5 2 47,7 6	n 2	.5 M	(S) 2.	5 EA	2.5	2.5 35.0	124	7.6 63.2		2.5 2. 6.9 M	1 2.5 12.8	25	2.6 34.4	41.8		2.5 2.5 80.8 198	Es.	46.9	2.5	26.2	5.6 HE 5.8 17.9
Depotem Zer (2r) Depotem Zeomen (2r)	upt		14.6	9.18	9.050	3.4 E.090	28 0.050	6.6 0.050	8.6	2.5 0.25	9.25	21 0.25 14				0,75 HB,7	5.25	0.25	0.75	0.25	8.25 E	75 C.	75 6,	25 22	15 8,25	0.25		6.75	8.25	0.25	126 0.2	6.75	5.25 89.8	0.25 27.6	0.25	0.79 6	0.25 0.25 27.3 24.5	6.75	0.25	0.75 52,4	0.25 12.8 1.43 0.730 II 0.834 II	0.75 0.75 11.3 12.2 1.12 1.70 .063 0.700 1709 0.800 1.3 5.0
Denotions Calcury (Ca)	mpt.		13.0	11	4.5 1.8	16	.26	24	2.5 2.5	925 19 3.6	14	14	0.75 0.1 21:3 24 3:16 2.1	UF 15. 52 1.3) 15 } 15	121	15.0	1.56	21.5 Z,88	10.2	19.6 J 1.82 J 8.979 S		an .	28 3 (3 1 (2 2	# 29.3 # 230	2.54	255	213 219 138 249	22.6 2.42 1.20 2.55	26.8	N.5 24, 1277 2,8 1,86 1,6 7,89 3,5	31,3 3,19 1,51	2.80	2.85	3.06	266 2 1.61 1 1.23 2	2.70 2.41	1.83	9,737	5.40 9.778	1.41	1.12 1.10
Dissensed Magnisouri (Mgs Dissensed Polysonum (M)	mgt.		1,0	15 1.5 6.84 8,72	1.8	9,90	1.2	1.2	1.3	5.5	8.48 9.57	1.4 0.60 0.74	3.16 2.1 8.865 5.1 1,29 di	14 6.M 18 16.71	9 B.52	266.8 268.8	1 15 8.636 9.569	1,56 6,823 6,791	2,11 1.06 1.31	6.973 1.04	1,24	3	.1 1	3 1	2 2.5	1,38	1.34	1.00	1,30	2,73	1,6 1,89 3,5	1.61	2:80 1:46 2:54	2.85 1.43 9.00	3.09	3.89 2	2.76 2.41 1.36 1.22 2.43 1.87	1.00	9,737	9.95F	8,730 E	.863 8,766 1709 8,899 3.3 5.8
Described Sodiers (No.	mgt.		1.0	4.0	W,94	5.62	1,2	7.3	1.0	3.0	3.6	4.0	7.2 8	8 N	47	h.i	14	5.1	1.0	14	8.6 7	7	i 1	y t	436	1.1	1.1	61	7.8	**	1.1	7.0	8.7	**	**	**	62 61	- 41	- 4	- 44	3.9	
Consident Substant (%) Total Notable by SCPMS Total Alarmore (A)	10.00		2,500	1.100	540	724	94	29	27	2.019	11529	944	687 VI 8.25 0.2	H 48	167	942 0.73	1300 (E)	546 0.75	598 625	9.25	306 7	16	M :	64 3 75 12	30 39.4 15 0.21		24.3 0.75	77 f 9,25	38.8 9.75	25,4 £	B.3 23.	29.8 5 6.25	21.8 0.75	19.8	91.7 0.75	27,6 4 0.25 6	64.7 34.3 0.25 0.21	412 6.25	0,25	968 0,25 1,10	6.75	1340 1070 0.25 8.29 2.64 1.29 34.4 32.8 0.05 8.05 0.5 0.5
Todad Austronomy (Disc)	upt.		9.25 2.7	0.10	6.14	8,17	8,34 8,83	6.32	8.57	9.25	0.25 Z.B	964 5.25 1.3	1.25 0.1 1.6 0.1	M 489 25 0.2 62 15	6.25 F E4	0.75	5.25	0.75	8.25 8.00	0.25 1084	366 7 025 S. 844 8 36.6 7	25 C.	7s. 8.	75 5.4	17 6.76		0.75 982	1.12	6.60	1641 1	1.62 51.6	9.54	8.56	8.51 44.2	0.57	9.57 4	8.58 (6.44			1,10	1.16	127 103
Total Amore, (As) Total Borum (Sir)	Jegor Jegor		74	54	41	1.1 42	35	46	29	68	38	34	12 24	A 22:	23	34.1	1.29 42.7	26.1	28.4	16.7 26.7	39.6	79 8. H :	55	58 5	10 0.050	1	982 463 0.050	38.4 0.05	96.3			6 43.2 8.00	45.B	0.05	14.9	44.8 4 0.05 0	49.1 79.8 0.05 0.05	0.05	0.05	11.7	26.8 0.05 0.5	2.04 1.23 34.4 32.0 0.05 8.05
Total Burytum (Se)	upt.		6.50	9.040	9,042 938.0	9.627	0,8050	0,0050	0.3052 6.3075	9.060 9.50	0.010	8,050 8,50	0.050 S. 0.50 B.			0.09 6.5	9.05	0.05 0.3	0.05 0.5	9,25	0.5 0.	50 ft	50 0:	50 1.3	10 8.795 30 0.50		0.50	8.5	6.5	0.5	1.05 0.0 0.1 0.		0.5	6.5	63	6.5	0.5 0.1	0.5	9.5	6.5	9.6	0.5 0.5
Tuest Berryn (III)	ugt. ugt.		50	35	25	25	25	26	25	25 8.17	25	25	25 2 847 83	5 25	25	25 8.694	25 8,109	25 8.291	25 Water	6.181	20 I	rt	15	25	(5 21 (6 8.29)		25	25 8.541	9.234 9.234	25	25	5 25. F. 9.786	8.954 - 0.5	9378	5792	30 M	25 21 1428 4.791	1,444	E246	0.101	8172 E	25 25
Sold Codmium (CH) Total Chromium (Cr)	wet.	8,184	4.0	8,862	1.1	8,93	8,010	0.050	0.850	5.0	3.8	1.0	2 8	b 9.1	8.50	1.2	2.0	6.5	0.6 0.25	181	8.5 6	50 K	si) B.	56 9.5 25 8.7	ND: 0.30		9.50	8.54K 6.5 6.25	9.5	8.5	0.5 0	B.5	9.25	0.25	6792 0.5 6.25	6.5 6.25 E	0.5 0.19 0.25 0.29	6.5	1.2° 1.25	9,60	636 8,61	2.8 3.2 8.85 966 8.83 532 1760 (4.18 9.85 860 2.5 2.3
Print Cohnil (Co.) Take Copper ICut	wp4.	100	1.9	1.7 1.2 1.3 1.438 2.1	4.8	8.63	0,10 0,005 0,05	6.82E 6.75	8,821	2.0	9.1 9.2	6.79	0.25 0. 22.6 11	3 15	0.35 E 1.8	8.62 6.62	9.80	0.25 18,1	2.60	5.0F	11.5	25 6. 15		25 27 16			6.25 6.36 58.1 9.28 2.5 1.2	23.6	9.56	9.25 9.83 97.8 9.7	fan 64	9,63	4.65	5.09	5.47	631 1	16.0	1 10.0	14.5	13,1 967	18.1	6.63 T.S.A.
Soluti (Fan (Fa)	upt. upt. upt.	8.295	3.100	1,420	929	778	135	36	6.042 6.042	4,529	12	9.6 1,216 1,2 2,5	10 3 11 3	rs 64 29 6.4	47Y	1130	1349	942 1.04	9.7	586	375 9.50 S	76 K	65 6.	44 5.1	15 0.16		10.1	29.6 254 6.46	93.8	5.7	(6,4) 33 (1,1) 0	2 6,63 2 13,1 1 0.1	22.7 0,1	5.66 17.7	8.47 2.5 6.1		95,1 HL1 0.1 0.1		9.72	6.65	980 EAZ 2.5	9.85 960
Total Local (Play Triagi Library (Lit	upt.		2.2	1.4	1.8	1.0	6,17	9.25	6.50	2.5	2.5	2.5	25 2	S 2.5	125	2.5	13.2	25.9	2.0	2.6				1.5 E	5 21 T 4		2.5	2.5	2.5	2.5	2.5 Z 5.5 S	5 2.5 6 0.5	2.5 0.6	7.5	2.5 0.5		2.5 2.5 5.6 9.6			2.5	2.5 20.8	2.5 2.3 34.3 27.3
Talel Marquiroso (Mrs)	opt.		8.010	61	43	39 0.0050	8,4	3.1 szmto	0,0053	8,075	10.025	38 0.025	1,625 03	(A 16. (26 6.0)		49.2 9.029	0.025	35.9	6.025	19.4	163 2 5.505 S			05 B.R2	15 0.00	9	9.825	9.825	1,8		9.80	6.825	6.625 Z.6	5.505 3.8	0.025 2.9	6.525 6.1	825 9.875		0.025	0.025		935 BA25
Toled Memory (Pty) Tassif Malyhalamum (Mo)	ugh.		2.3	6.79	0.029	1.3	2.8	2.6	2:0	3.8	1.8	1.0 2.0	3 2	# 14	1.6	5a 33	1.1	13 13	2.6	2.4	23 3	025 0.0 (.8 (50 0.0	130 0	19 3 60 0.0	18 E) 10 0.31		0.825 8.5 8.50 8.46 7580 6.013	2.8	2.3	2.6	2.7 Z 8.5 S	1 0.5	2.6	3.B 0.5	0.6	5.5	6.5 0.1	5 5,8	2.2	2.5	2.4	1.8 2.2 3.5 2.8
Trial Nobel (NE) Nate Secondary (Sec.)	ugt.	2,1	8.60	0,17	3.2 0.14	2.8 6.17	9,33	6.29 6.46	8.29 8.43	9.30	4.8 8.30	9.36	62 6	A 1.6 25 (6.1	6.37	8.15	2.06	8.34	6.39	5.30	8,17 9	Ja 4	N 4	34 5.4	6 9.2		8.46	16.07	9.36	6.53 I 1660 I	956 95 768 161	7 9:54	0.6 6.45 18.79	0.53 0.53	0.5 6.54 9630	5.5 8.47 6 1530 5	8,53 S.N 1790 1850	8.26 2290	3879	9.10	8.12 2990	8.13 8.15 5216 2750 0.01 0.01 36.0 66.0
Total Schoon (SI)	ugh.		0.020	2,436	1,650 0.000s	1,760	1,290	0.0526	1,790	9.540 9.636	0,678	9,36 2,479 0,613 76	2790 26	29 6.1 60 261 61 0.0 67 63	6,913	1640	2759 5.01	1799-	0.61	2179	9.81 0.	570 1,2 110 6,6	50 E.5 10 G.8	10 0.31	13 9,511	9	6,813	9.01	0.01 81.7	0.01	1.51 0.5	E. 0.51	9.01	0.01	0.91	0.01	1790 1450 0.01 0.01	5,723	9.81	8.31	0.01	0.01 0.01 56.0 56.0
Total Street (Ag) Total Streetson (Sr)	ugit. ugit. ugit.			60	54	68.	94	106	29	75	56	76	8,910 0. 87 M	17 63.		9.51 52.1	49.3	79.3	25.6	91.6	865 S	¥11	90 1	42 1	15 19	0	190	61.5	98.7	784	100 18 5/5 0.60	2 (86	189	9,625	95.2 6,075	50F 0.0F5 0.	113 94.0 (029 0.00)	96.6	0.075		5.50% 1	UK75 8.075
Total Thathurn (TT) Total To (So)	ugit.		9.70	8,879	0,0050		8,8999	0,0000	9,0940	6,925 2,8	9.050	0.026	0,025 0.0	25 9.00 5 2.1	4.5	0.625 2.5	8.025 2.3	2.075	8.925 2.5	0.005 2,5	2.8 2	1.5	.5	1.3 2	5 23		2.5	2,5	2,9	2.5	2.5 2		2.6	2,5	2.5	2.5	2.6 2.1		2,5	2.5	2.5	2.6. 2.5
Transit Tanasan (To	HIPS.		187	14 8.63	54 6.67	30	1.0	1.0	8.90	176	2.5 57 6.39	2.0 86	23 2 37 2 62 6	16 Ma 65	6 29	42.6 9.49	60.6 0.44	32.1 6.49	9.3	22.6	15.9 7		(a) 1	2a 2 35 0.5	15 Z.I	,	2,5 6,55	2.5 8.43	2.0 8.52	0.58 d	25 2 162 98		2.6 0.67	5.6F	2.5	7.5: 880: 1	1.5 1.5 8.62 9.31	0.02	0.62	6.46	9.47	54.7 42A 8.42 8.46
Trimi Uroroum (U)	MPS.		876	0.63 2.8	1.6	8.63 13 10	8.62	8.65	0.61	9.50	2,3	2.5 26	7.5 2	A 12	-319	2,5	2.5	2.5	7.5	2.5	2,3 2	.5	1.5	1,5 2	5 2	5	2.5	2.5	2,3 95,0	2.5	2.6 .2	5- 25 E 444	2.5	2.5	2.5	2.5	2.5 2.5 86.9 100	2.5	2.5	42.6	2.5 17.9	7,5 7.5 28.8 28.6
Notal Zave (Zel)	ugit.	31.9	7:9- 14.8	9,000	9,6 9,000	.19 0.050	8.70 8.81 8.850	5.5 0.010	9.9	90	1.3		907 SS 9,25 S			25,6 0.25	3100 5003	49.3 9.25	18/1: 0.25	34.7 0.25	925 B	71 : 25 9.	43 25 8	90 3 26 02 24 2	36 (4) 25 (2)	5	41.8 9.25	8.25	0.25	B.25	LIS EL	6.25	0.29	6.75	825	6.25	0.25 0.25	0.25	0.25	0.25 10.8	0.25 12.6	6.25 6.25 11.8 13.1
Total Camero (Cit)	ngt.		15.6	12	12	14	10	27	23	16	14 2.9	0.25 16 1.8 9.72 6.79	29.2 24	25 0.2 1.7 15 40 1.5	1 1s 5 1.0	11.1	19.7	2.00	18.2	233	29.4	25	1.31			2.	24.8 2/21 1.30 2.80	21.6	23.7 2.49),21 2.57	25.6 124	SLP 25 744 83 1,69 13 235 1	4 27.7 3 E73	28.0	27.8	29.2	25.8 1 186 1 145 1	25.6 23.1 780 7,5	1.05	1,82	1.84	12.0 13.0 0.002	6.25 6.25 11.6 13.1 1,09 1.67 1,04 (-0.16 1,006 1,00 4.1 -4.6
Total Glosmoners (SAr)	mpt. mpt.		271 18 18	1.2	12 1.0 1.1	2,5	19	7.8 1.4 2.3	7.6 1.2	28 28 1.7	9.79 9.69	1.0	2.43 Z 1,13 L 1,13 L	40 1.5 14 8.9 36 8.7	5 L0 11 664 8 5/7	8.672 8.634	4,002 0.1/5	2,000 8,000 8,015	120	129	3.37 1.16 1.34	(2)		1,5 1	13 13		1.30	1,00	(21	124 1.35 2.86	1,000 13 1,000 13	1.44	2,00	7.99 1.46 3.09	1845 2.61	1.45	250 2,50 2,50 1,51 2,50 1,51	5 0,845 5 1.65	1,82 1,82 1,94	136-	0.092	12H 15 (59)
Solid Potanoune (E) Solid Bothum (May	mgt.		1.00	6.00	8.51	8.67	6.91 T.E.	2,3	1.5	4.9	11	6.79	1.13 Z. 6.1 F	34 K.P.	9,72	2.6	- 11	7.6	126	1.00	134	1.9	3	11 7	16 K		7.0	17	7.5	5.0	8.7 9	2 93	9.4	2.6	13	1.9	8.7 7.1	1 13	AZ	37	4.2	41" - 46
Total Bilgitur (2)	Phot Debugge	and shows he	a at 17 the s	wheel depart	2.0															177											7 - 7											

PROJECT: COMPANY: £1ATION NAME:	TULBERUM Christolm III WILL TULBE																																			UH178 812	F160 P7	20129 801	HSSM
Schausern John E Scientific Disc	11.00 1100.00		8358	722 8354 12 W	8722 8364 032 W	282 8364183	2 0366405 W32	9 E168489 W13	8374300 Wr 33	0 8374300 W-12	D 8384754 W-12	9357451 W 32		8485356 W92 864	8412571 W12 RM	9422275 W 32 RM	9425962 WS2 BM	\$4304 WS2 Sb8	62 54) 2 4	852 1 9045 M	9521 H	41812 4 932	198713 44 1892 1	M25 M25 M25	12 W 12 T2	W 32	951 951	9477054 W 32 PM	W12 89	M/2	9 12	W 12	W2 W2	966 85 96 12 W7 1 E		M [5 A	Las A	12 M25 A 59154 BO	azi neri arom
Sumpler Initials		72 73 GT9979 GT9	Wi Ban GWS	12 W: W RI 1232 GWS	152 W1 M Ti 5297 HA3	12 W152 1 TZ 063 HA1216	MUSS HCN/5	W12 W12 RM 6 PC9280	We 33 TZ H68340	W-12 T2 HG8141	HG1119			854 947505 15-Jan-14	186 175457 15-Feb-14	854 303437 15-58s-14	854 97139 25-Mar-14	2736 2734 05-Apr	9 16	884 17486 74 dge 14 13-		etiez Aprili II	TM PG25 #	794 Ps267 May 14 24	72 26307 1-332y-16 2	1 aun 10	494 478391 27-Jul-14	794 73/7996 30-Aug-14	#1536.3	EW1405 11-0ts-14	CCM60 06-Hos-14	179611 05-Dec-14	1062	1 179 154 179 151 79-54	13 1451 17 1451 17 1751	71.845 LP Major-15 30-A	1370 SG	TZ 41676 544 5ep.15 13.4	12 01705 Apri-18
Eaterotory ID Sampling Date & Time ODC Humber PARAMETERS		72 72 GT8824 GT8 15-Ap-13 22- 32527186 375	Am-13 29-A 27100 1252	ph-53 06-J 7189 3252	34-12 13-3 12109 1252	613 29-361 110 325711	1 27-Jul-11 0 6877-110	3 85-Aup-13 9 6077438	3 13-Aug-1 G877+11	13 17-Aug-1 7 GE72431	13 13-6-ep-1 2 4061050	2 13-0xs-1 2 4061050	3 23-Hrs-13 11 40614563	16-Jan-14 40616565	15-7 ab-14 40618506	15-blue-14 40619567	25-Mar-14 42514312	42524)	101 124 101 479	age 16 13- 924304 42	1000 OT	April 12 (5.1145 425	H140-81 175	H149-01 67	1045-1940 42	9134741 A	E-85-21-014	100105-01-01	NESSES 18-81	HBE 105-11-01	400105-17-03	400105-14-81	408.105	16-01 409 105	5-17-81 e851	65-15-07 4L199	masas 4679	96-94-81 15-79	96-65-81
Cysrate - Therrysnate	mpt.																																						
Aculty (pH 4.5)	mgt.																																						
Audity (pH 8.3) Plushtip (F) Phylandilloh Plijus and HMG) Preservation	mgt. mgt.																																						
Properation Piller and HHG3 Preservation	1616	PIPLD PRI	D	HED.	RELD F	eto res	D FELL	p (101)	D FIET	0 60	D HE	D RE	no reno	7610	rend	ne ne	o RELO		REID	HED	His	1413	PEID	resp	1617	HEID	1405	PELD	1610	18.5	14.9	- 1	F CD	HELD	1610	7 E LB	1518	HEIR	1610
ANDRES Piters (V) Calculated Parameters	ngt																																						
Calculated Parameters Prirate (N)	mgt																																						
Miles, Brangentes Albahya (Total as CaOO3)	met.		24.9		24.5	29	9	2	1	24	9 22	6 16	99 476	41.6	49.2	56	1 56.1			56.6		461		22.6	27.9	25.9	34.0	26	25	23.7			46	.26	67.2	49	17	54.7	37.0
Total Organic Carbon (C) Abadroly (PP on CaCUS)	mpl. mpl		0.25		0.25	0.7	15	0.2		9.3	25 0.2	15 0.	25 0 25 77 58 25 0 25	G.25 55.6	0.25 sp ?	0.	5 0.75			0.75		0.75		679	9-21	8.75	0.75 ANJ	0.25 31.7	0.75 30 f	6.71 26.1			0 24 16 6	6.21 9x 7 9x25	1/6	E 25	675	0.75 41.9 0.35	6.75 66.1 8.75
Securiorania (HCD1) Carbonata (CD1)	mpl.		90.4 6.25		834	0.2	15	0.2	5	0.3	25 B.	5 6: 5 6:	25 0 25	0.25 0.25	6 25 6 25	6. 0. 6.	6 65 4 5 0.25			0.25		6,75 6,75		276 625 625	916 9.25	914 921 921	825 825	31.7 6.75 6.25	6.25 6.25	28 1 9 21 9 21	60 T 6 25 6.75		16.6 R.25 6.25	0.25 0.25	6.25 6.35	6 25 6 25	45.2 6.25 6.25	9.75	H 25 H 25
Hydrosolia (CBII) Anlama	mg-L		0.79	-	0.25	0.2		0.7		41					312		3 21.1			22.8		794		11.0	114	10.7	11.7	1.09	0.20				17.6	12 0	19.6	20 6	į i	16.9	17.6
Danotresi Sulphate (SG4) Dissolved Objecto (G)	mg/L mg/L		9,93 6.77		8.5 6.73	97	79	8 T 0 S	7	7 d 0.7	41 S. 25 G.	27 11 75 61	1.2 21.7 62 1.5	21.8	312		5 21.1			17 8		1.2		11	- 11	1.0		7.1	041	0.75			0.61	16	0.5	5.1	1	15	1.2
Nutrients Asymptos (N1)	mpt.																																						
Orthophosphote (P) htdrafe place N May (M)	mg/L mg/L																																						
Physical Properties Conductivity	uilden		73.5		65.9 7.65	79.	.4	66.1	6	62	13 11		E 3 125 66 7 E	129	346 7 86		0 166 8 765			176		1.14 P 44		44.9	26.2	77	115	29.4 7.63	99 S	06.7 7.53	386		334 7.8	24 S	199	1 %	122	119	114
Physical Properties	get Units		7.40											7 12			2 2			792		42		111	11	214	55			174				91	,		7.8	10.5	6
Setal Suspended Solds Sold Decelored Solds	mg/L		37.8		67.5	•	47	44	7	1	79	10 14	6.3 5	,								**					35	-	_							-			
Turndity Collectated Purposetors	NTU													,	5.6	-			76.8	76.7	66.3	54.6	56.7	25.6		12.4	81.7	21.5	29.6	38 5	- 61		Sa i	29 A	61.5	66.1	52	50.1	\$1.3
Dasselved Herbhess (CaCOS) Setal Hardrees (CaCOS) Discotived Metals by ICPMS	mg/L mg/L	32.1 43.0	36.7 42.2	18 Z 61 6	27.9 46.5	29 8 29 67 9 54	7 10	3 281 1 41.7	, ,	17 . 44 .44	26 24 12 19	.a 11	7.9 S4.4 7.4 S3.6	60.1 61.3	96.3	1	7 76.1 6 73.1		76.2	79.5	861	10.3	165	411		12 th	41.5	19.7	41.1	201	111		69.7	51.4	86.7	714	16.8	545	16.9
Ebssohverd Abunvinum (Al)	ugt.	341,5	10.0	10.5	55-0	665 66	4 44	4 5	5 46	16 1 25 0.	54 44	.7 41	15 21.9	26.9	11.3		a 17.5		31.4	54 E 6 25	6.25	-61	56 c 6.25	15.4	6.25	67.0	35.0	279	40.2	6/2	9.75		12.1 6.25	54 Z 6.25	24 0 0.25	94.6 0.35	94.2	90.1	39.6 8.25
Dissidual Antonony (St.) Dissidual Antonos (An.)	upf.	94.1 0.75 9.67	0.25 0.47	8.43 12.7	0.25 8.67 13.5	0.25 B2 835 B3	5 82 14 85 13 8 25 80 15 81	25 0.2 15 0.5 15 13-1 16 0.0 15 0.5	5 0.1 12 0.1 6 12 15 0.0 5 0	25 B. 13 B.	25 0.1 e3 8: 17 11 05 0.0 5 0.0	15 B.	25 0.25 66 0.64 85 29.1 05 0.05	0.75 441 27	0.25 0.57 10.1		5 025 8 675 8 37,2		0.25 0.63 10.2	9.74 17.5	6.26 98.3	6.75 6.73 34.5 0.05	6.75	8.25 8.77 19.9 8.95	E 16 11.2 60%	0.25 6.72 64.2 0.05 6.5	35 0 0.25 0.96 17 7 0.05 0.5	9.79	9.5	0.54	9.46		264	6 72 17 2	8-94 F1.1	0.73	6.55 36.5	23.7	8.06 30.1 8.05 8.5
Dissolved Serium (Str.) Dissolved Serythan (Sr.)	upt.	13.1	13.0 5.05 9.b	0.05 0.5	0.05 0.9	0.05 0.0 0.5 0.0	13 E	15 13.1 16 0.0	6 12 15 01	15 12 15 12	17 II 05 84	.5 B	66 0.64 15 29.1 09 0.05	8.02	0.05		5 005		0.05 0.5	0.05	641 63	845 83	16-0 0:05 0.5	805 65	685	9.05	805	29.8 8.05 9.5	0.05 0.5	111 0.00	65		9.5	8.5	81	65	6.85	835	0.05
Dissolved Statruth (S4) Dissolved Seron (S)	ugit.	9.6 25	26	0 S 25	0.9 25	25 2							25 0.5 25 25	0.5 0.5 25	0.5 25		5 25		0.5 25	0.5 25	27	25	25	25	25		25	25	25	21	25		36	25	25 0 670	25	25 65/4	25	.25
Dissolved Codmum (Cd) Dissolved Chrurosm (Cr)	sqrt.	9.053	8.5	0.5	3.0	054 949 05 0 0.25 0.2	5 8	12 0-02 15 E.	7 985	27 6-01 1.5 6 25 6:	19 66 25 6 25 6	5 2	2.3 0.5	0.5	8.434		6 B 306 5 G.3		25 845 0.5	0.5	85	9.405 9.25	0.154	9.55	0 LB7	#141 #25	0.040 6.15 6.75	8.049 8.5 6.25	6.15 6.25	0.04 0.1 6.21	8.3		96.5 B.25	8-254 8-25	8.11	6.5 6.25	8.5 8.25	6.5	6 292
Dissiphent Colorit (Co) Dissiphent Colorier (Co)	495, 495, 495, 495, 495, 495, 495, 495,	1,00	8.5 9.25 1.84 77,8	0 25 0 5 1 20 1	0.64	0.51 B4	46 95	15 62 15 62 16 84 14 15:	5 6.3 6 8.3 3 24	25 6.7 5-2 0.4	25 G.I 66 B. 35 I4	15 B. 14 I	25 8.25 1.2 5.1 4.6 15.8	6.25 IL I (7.1	0.75 34.3 34.5	0.	5 0.25 8 145 3 84		0.25 15.3 16.5 0.1	0.25 21 h	0.75 21.0 94.7	18.7	6.25 5.76	34.6	936 936 93 93	106	4.75	1.79 529	1.27	1.00	11.0		154	11.9	7 59	19	6.64	5.54	9.25 3.1 17
Disselves iron (ff o) Disselves Lend (fft)	Page.	0.1	0.1	0.1	0.7	.19 16 0.1 0	3 8	1 0	3 24	14 1	15 14 h1 0 Lh 2	15 6	91 0.1	8.1	0.1		1 61		6.1	0.13	9.04	10.1	61	61	27	4.45	3.5	9.4	91	91	- 61		01 15	0.1	431	#11 23	01	6.1	#1 25
Depolved Street (U)	ugit.	2.5	2.5	2.5	1.5	25 2	5 Z	5 2.	5 1	15 2	4.8		6.2 7.0	2.5 15.6	2.5		5 2.5 4 BM		2.5	2.5	20.7	13.7	2.5	2.5	1.1	11	23 4	1/3	13	4.1	9.1		11	17	10.9	18 6	14-1	9.4	10 1
Disselved Sternary (Hg) Disselved Stelvinismen (Stel	ugh mgs.	0.075	1.0	3.3	0.075 0	025 0.02 27 7	5 802	2 0.02	5 888 4 1	25 86	25 0.00 (1)	15 6.0	51 21	2 S	1 4 0.5		6 J1		0.5	1.6	2.5	2 h 6 h	18.	8.6		1	17	1.5	is.	1.0	14		12	14	. 25.	24	14	2.1	8.5
Umacived Hernel (M) Disastreet Seteram (Se)	upt. upt. upt. upt. upt. upt.	9.5	9.5	0.5	9.14	47 1	15 21	PS 0.02 2 1: 8 0: 11 0:1 10 64 11 0:0 13 49:	5 8	25 8-51 13 1 15 3 12 6: 17 34	05 01 07 01 07 11	12 11 15 . B	1.1 0.5	0.1	0.25		9 9 46		841	0.36	* 0.	0.27	9.19	0.10	619	842		0.5 0.14	*11	0.14	-0.54		0.16	0.1	9.25	9.25	N.21.	621	0.21
Dissolved Billion (St) Dissolved Billion (Ap)	sept.	992	934 934	8.15 676 681	0.14 8/1 0.01	845 P1 045 P1 047 08	11 0-0	76 661 E1 0.0	10 41 10 84	19 M	er 81	68 9 11 6	137 6.25 189 3370 41 0.01	9.01	9.01	1.0	19 1566 11 0.01		8.40 1680 9.01	1/90	910	0 27 1548 0 01	0.00	6 20 6260 1 111	8.38 886 1001	940 940	010 764 001 477	0,14 1958 8,81	661	104 6-01	0.01		1M0 6 R1	1792	3456	15 30 6 0 1	8.41	6.61	6.61
Descrived Streethers (Sr) Discovered Thailbern (FB		0.01 57,3 9.025	6.81 66.6 0.025	6-01 44 d 4-025	41.1	46 45 025 9.02			5 A2 5 B40				4.2 87 0 125 0.023	801 93.7 9.625	10 625	94	2 58k 5 0.025		0.025	0.025	182	M.1	194	9625	1605	52.2 8825 2.5	9.805	50.3 6.125	6821 2.1	45 I 6.821	# 025		62 S. 1825	65.6 8.621	91 4 6-625	0.003	6403	71.9 8 603	0.25 1300 6.60 77.6 6.60 3.5 2.5 0.44 2.5 0.25 17.5 1.65 1.65
Department Tim (Se)	upt.	2.5	2.5	15	2.5	25 2	5 2	5 2 5 2 17 43 5 2 5 2	5 P40	15 2	15 2 15 2 15 2 15 2 15 2 15 2 15 2 15 2	5 2	25 0.025 25 2.5 25 2.5	2.5 2.5 8.46 2.5	2.5		5 25		2.5	25	1.6	23	73	25	25	1.6	31	3.A 13.2	2.6	2.1	4.5		2.5	15	3.5	2.5	2.5	2.5 2.5 8.66	23
Dispulsed Unpresent (U)	upt.	9,34 Z.h	8,30 2.6	0.33	25 25 83 35	819 83 23 2	20 02	17 63	9 01	12 0	15 6	19 6	32 641 35 2.5	2.5	2.5		5 2.1		2.5	2.5	01 15	25	35 -	8.41	0 36 2 5	8.37 2.5	2.5	8.5 2.6	0.29	821	2.5		8.76 2.5	113	2.5	2.5 9.47 2.5	H 42 P.5	1.5	2.5
Disserved Zeri: (Zr.) Physiologic Z expressor (Zr.)	rept.	6.2	2.5	3.5		2.5 2.			5 2	15 0	1.5 2 1.5 2 25 6	5 11	14 974	83.4 0.75	0.25		9 64.1 5 0.75	,	150 0 25 25 7	0.25	140	974	90 d 0.75	93 4 8 25 13 5	872	38-1 8-25 30-9 1-45 6-813 6-910	5.7 0.25 10.5 1.3 0.89 8.781	0.25 19-4	625	£1 8.21	6,25		61.e 6.75	80 Y 0 25	0.25	9.25	6.25	25.4 0.75	9.25
	mg/L	6,25 16,9 1,22 8,760 8,632	6.35 16.4 1,13 6.709 6.762	9.25 7.81	8.25 9.68 8.900 8.704 G 8.668 B	0.25 0.2 18.1 1 3.2 1.1	25 0.2 10 10 14 1.2 75 0.73 76 0.50	75 0.2 11 95 13 11 11 0.75 16 0.49	5 0.1 6 7: 0 0% 0 0%	21 11	97 B P5 67 04 95 14 80	73 1	25 0.25 11 33.5 27 2.11	81.4 0.25 30.5 2.17	22.6 2.3 1.34 1.41	2.	9 26.1		25.7	26.8	35.6	0.25 15.6 1.50 0.004	11.7	13.5	3.9	1.65	10 5	1,32	1.11	9 P	1.4		176	1145	21.7 2.89	24 2 22 1 04 1,17	177	1.76	1 85
Observed Magnessum (Mg) Oscalese Pelassum (M) Oscalese Sedum (Mr)	mpt.	9.799 9.437	0.709	8 665 8 675 1 5	0.704 (33 11 1733 83 1534 84	75 0.71	11 0.71	B 04	42 88 29 84	04 95	M 84	H6 1.04 Id4 1.5	R 919	1.14	1	9 26.1 18 2.62 12 1.14 13 2.01		2.6 1.15 1.96	2 67 1 06 1 51	1.17	0 384 1 0b	5.54 8.747 8.751	1, 44 8:750 6:800	5.9 8.742 8.925	6.875	0.89 9.793	1,33 6,135 6,660	6.327 6.60b	0.17	8.794 6.766	:	1941	8 5.36 8 78h	1.85	1.17	11	1.03	1.05
Disserted Bulghur (S) Total Metals by ICPNR	regt.	3.9	1.2	16	14	44 4	1 1	1 1		, ,	14		12 12	6.7	7		9 51		14	7.7	7.0	1.6	4.2	- 47	91	1.7		1,8	1.7		5.1		-11	-0	4.1	- 6	16	- 11	6.6
Total Metals by ICP49 Total Attenues (84) Salai Animany (84)	upt.	2050	3460	3650 6.25	1169	Saw 541 8.25 8.2	79 (13 75 (13	15 45.00	10 63 ³	70 62i	10 61	70 25 75 E	39 522 25 0.25 34 1.06	246 0.25 6.91 11.5	176 6.23		6 15-1 5 0.71		549 (0.25	75.9 0.75	9.25	824 625	9.75	5338 9.25	9.73	9.72	0.25	3#18 6,25	5348 825 217	0.21 2.10	2570		179 0.25	037 5-87	0.75	6.25	0.75	8.25	6.75 1.37 4) 4. 0.75 8) 5 75
Tetal Artems (Au) Tetal Renews (Au) Tetal Barton (Br)	upt. upt. upt.	2858 6.25 2.75 55.8	6.76 1.84 63.7	6.25 2.58 14.8	0.25 4 75 99.1	147 11 76.7 M	25 0.2 31 1.6 82 75 18 0.0 15 0.0	5 67 66 25 19 62	5 6: 12 3 1.1 11 15 6: 15 6:	75 I 1 6 2 - 17 H 14 O.	11 0. 43 3: 69 1: 14 E. 65 6	87 E	25 0.25 26 1.00 8.6 27.1	891	B 54		2 01 7 19.2	,	8 5 36.8 6 05	1 06.	1.12 15.4 0.05	6 11 56.1 8-05 0.9	45	1 11 91 7 0 85	2 5 L 36 6 6-85	1 79 49 3 8 85	10M 10 4 0 23 0 3	2.45 75.7 9.85	94.6	71.4	615		8.77 24 3	85.9	81.1 1.90	16	416	1.29	40.4
Total Banus (84) Total Burydnin (84) Total Burydn (84)	upt.	8.65 : 8.5	9.5	0.05	8.13 8.5	147 31 96.9 M 0.1 01 0.9 0	18 0.0	9 62. 95 B.8	5 6	14 0.	14 B	11 6	8.6 77.1 85 7.65 83 0.5	0.05	8.05	0.	5 0.05 5 0.5		9.3	0.05	415	8.05	6.0%	0.0%	6.85 8.5	63	933	9.5	6.5	61	0.05		0.05 0.5	0.05 6.5	9.9	8.05	9.05 9.5	0.05	83
Total Baron (R) Total Gatroum (Cit)	upt. upt. upt.	.75	25			25 2				25 E W	75 87 81	75 29 B.1	25 25	6.5 25 8409	25 8.463		5 25		25	25 #455	25	25 0.479	25 6.006	15 6 3 6 7	25 #162	0.306 4	8 121 9 9	8,11Z	21 0.150		Ph # 172		29	25 8.486	8 679	23 1 07 6.5	9422	6419	25 8 466
Tetal Elizanium (C1)	upt.	4.5	3.6	5.7	9.5	9.7 9	1 1	13 7	S 18	12	10	11	. 1.	8-409 0.5 0.25	0.21	41	9 83 5 925		0.5 0.25	0.5	9-681 6.5 9.25	1 à 8.25	6.304 2.7 4.65	6147 14 657	0163 21 872		2.60	6,112 6,3 2,1	36.7		4.2		8.3 6.25	4.0 2.71	0.25	0-25	2.1	1.9 0.40	8.668. 2 1 857 25.2 1160 8.66 2.5
Tensi Cobell (Co) Tensi Copper (Co)	upt.	1.31 0.29	1.79 7.79	1.87 8-83	1.53 15.9 4340 1.34	2.76 2.7 11.6 11	13 1 21 2 2 12 9 1 10 470 91 2.1 15 2 17 18	15 7: 25 2.4 15 93 10 513 12 2.6 10 2.7 10 513 12 2.6 10 2.7 10 2.7	5 10 21 12 13 15 15 15 15 15 15 15 15 15 15 15 15 15	66 21 10 16 10 63 76 21	100 23 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	18 1	94 715	21.3	0.21 21.5 24.6	. 1	3 ([.4		0.25 30.4 181	22.2	9.25 34-5 279	24.1	114	9.57 44.7 1896	0.72 9.21 2480	3:29 3:24 2488	2 de 61.5 5 PRO 2 67 2 5 1.0	8.97 6640 2.36 3.5	15 L 51 HO	2 17 17 1 448	30 4		7 64 525	34 3430	91.7 461 67	48.8 928 6.89 3.5	56.7 1980	1170	25.E 1100
Sedad Bron-(F-e) Tested Local (Phy	upt. upt.	2798 1.36; 2.8:		1790 2.63	176	2.86 21 2.86 21 2.9 2	91 11	27 2.4	4 L	76 2	64. 2	64 L	100 527 140 635 25 25	21 5 297 0.32 210 19 7	. 667 3.7 179		5 25		181 6.46 2.5 19.9	854 2.5	279 6 72 2 5	81.5 8.79 2.5	1630 1166 23	3.05	0.77 2.5	2489 1-21 2-5	2.67	2.56 2.6	296	00M 2.51 2.3	2 5		6.29 E.5	194	2.9	25	2.09	1170 11.99 2.5	2.5
Tetal Library (Lib Tetal Manganese (Mn)	upt. upt. upt. upt.	54.F 8.025	79.7	86.7 9.675	2 % 155 8.023 (6	27 2 127 12 025 0.00	37 18	11	1 1	29 1 25 66	140 I	29 61 25 00	19 19 7				9 10.1	1		29.2	34.5	25.0	36 1	26.7	99.3	34.3	538	95.9	121	46.1			6.2	47.4	18.8	1.7	25-4	95.7	
Solal Munary (1955 Total Marytotonum (Mrs)	upt.	8.825 2.2 5.7	22	2.2	24	41 1		13 15	6 I	16 / 16 / 16 R	21 1		2.1 14	13 11 829	.25		7 21 5 05		2.7 0.5	2.9	24	2 P 5 T	17	17	2.5	1.1	1 38	1.9	2 9	3-1 71	5.0		1.5	18 67 636	1.0	17	35	2.0	1.2
Februi Fibinhari (195) Todal Sebranum (Se) Fobel Sebrana (Se)	upt. upt.	9.7 9.21 9930	6.52 6.10 6.51	8 16 7880 1	2.6 11.8 0.21 18100	19 2 12 9 22 9 1 9429 1100	18 94: 24 02 80 836 23 00 83 58: 74 1802	N 81	3 8	16 8: 00 125	17 13 13 8	17 B	23 6.25	8.29	6.74 1,790		4 9.21		8.46 3670 6.01	8 41 1790 0.81	6 21 1938 6-85	8 25 1/90 8 81	0.3 0.00 0.01	8 25 56.76 9 E3	010 010 000 000	0.15 5530 0.05	38 821 9290 685	8.15 6440 8.634	0.24 145ee 0.81	8.21 6.85 6.85	8.34 8.550 9.605		1.5 0.71 1860 0.01	6.16 1400 0-035	8.29 2456 8.81	9.23 2158 0.91	8 2 1179 6-01	8.29 3290 6.01	824 4880 885 797 8875 25 567 854 23
Total Silver (Aq)	upt.	1575	8.61 68.8	9.029 59.4		1825 6-81 64 2 76	23 0.0	M 0.02		85 88 63 51 P6 81	121 9.8	H - 3	790 2330 irt 0.01	1990 0.01	1,790 6,01		N 133		110	117	96.7	# ET.	9.5	963	523	885	57.6	8.834	97.8	541	87.6		0.01 65.5 1.025	0-036 79-7 0-063	98.5 985-	0.01 360 3.625	0.7.0	90.01 29.6 0.025	79.7
Total Strentium (Sr) Total Thellum (TI)	wart.	9.079	8,656	005 25	9066 I 25	94 2 76 1065 881 23 2	74 1102	18 57 25 8.05 15 2:	4 89 5 1	76 8	200 153 211 4/8 213 4/6 213 4/6 215 2	G 38	99 90 125 9.625 25 2.5	98 5 0 025 23	0.025	0.0	5 0.021		0.025	0.025	9.075	9875 25	8 825 7 5	66.7 8625 2.5	59.5 4405 7.5	98.2 8825 2.5	606	6.026 2.8	2.0	6.8v	189		2.5	2 1.	115	:11	8 825 2 5	0 025 2 5	25
Testal Tire (Sire) Total Titarmare (To	upt. upt.	2.9 120	167	199	25 511 8.73	25 Z 250 31 044 91	67 18	16 25	5 6 3 2 01	15 2 12 8 56 6:	65 J	10 1 10 1	25 25 125 266 85 83a	38 844 13	21		5 25 5 25		2.5 2.5	25 23 842	25 23	28-6 E 8 2.5	59.6	43.4	33	534	21.0 0.61 316	196 6,5 9,3	269 6.99	28	111		23	112 9.75	19' 0:50	8-1 950	19.7 0.54	25 0.56 2.5	502 850
Total Universal (U) Total Vanedum (V)	upt. upt.	6.50 7.3	9.47 4.9	199 854 9.6	16.2	13 / 13	:4 10	16 25 19 05 13 1 10 26	11 15	16 8: 19 15 78 21	5.6 16	12 5	63 25 63 992	13	95 2.1 971		5 21 6 61		961 7.5	842 2.5	0.99 2.5	25	15	11	25 37	4		25.2	14.2	91	1 57		25 h	100	25.0	115	142	971	216 3.82
Total Zinc (Zh) Solul Zincurum (Zr)	ugt.	26.7	23.0	24 S 8 63	0.05	876 21	17 05 37 05	50 07	9 1	63 1	76 31 53 1	53 6.	125 18.25	0.75	0.21 22.1		5 02		0 25	0.25	8.25 21.7	87.7 4.18	46.5 825 53.5	625	9.25	90 5 0.25	949	9.25	1.12	49	6.25 16.7		0.25 17.4	0-62 15-7	0.35	535 248 237 148 148	0.25 18.6	17.3	3 82 16 6
Total Calcum (Co) Total Magnesson (Mg)	upt. mpt. mpt. mpt.	13.4 2.53	12.6	33.6	404	12 6 14 164 63	17 05 17 15 17 1 24 11 24 10 21 094	50 07 11 11- 32 3- 10 17 47 1.0	4 1	63 1: 14 1: 25 3: 14 2: 14 1:	82 3	15 14 35 7 35 1 35 1 32 04	4.5 21.7 52 2.27 35 1.23 69 1.31	0.75 21.3 1.99 0.092 1.12	224 124 144	3	1 25 13 25 10 10 10 19		25.9 2.71 1.13 1.68	274 111 157	237 0809 1,23	28-4 2-24 5-1 5-58	5.46	14.1 1.85 8.96 8.965	1.09	114 33	8 60 1,7 1 2 76 2 16 1,45	16.3 3.39 1.70 6.947	13-5 11-77 2-25	17	2 91 1 15 1 15		1 54 1 877 1 884	296 132 0.996	2 20 1 10 1 11	2.57	1 44 1 61 1 62	2 10 1 17 1 29	16 6 2 42 5 4 5 4
Setal Protosporus (K) Sessi Seellum (Hist)	mpt. mpt.	1.57	1.72	1 74	2.13 1.17	116 2 136 1	21 094	17	N 1	1 1	25 I	37 I 32 04	99 E39	1.12	129		4 19		1.68	117	1.23	1.58	5.00 5.01	8165	118	119	1.45	6,947	115	6.8	1 11	-	111	476	131	5.66 5.5	1.63	129	3 19 6.7
Year belotur (8) Values or red were reperted as HD	regit.	4.3. h	19	16	53.	41 4	14)	-	-	-	1.5			5.7																									

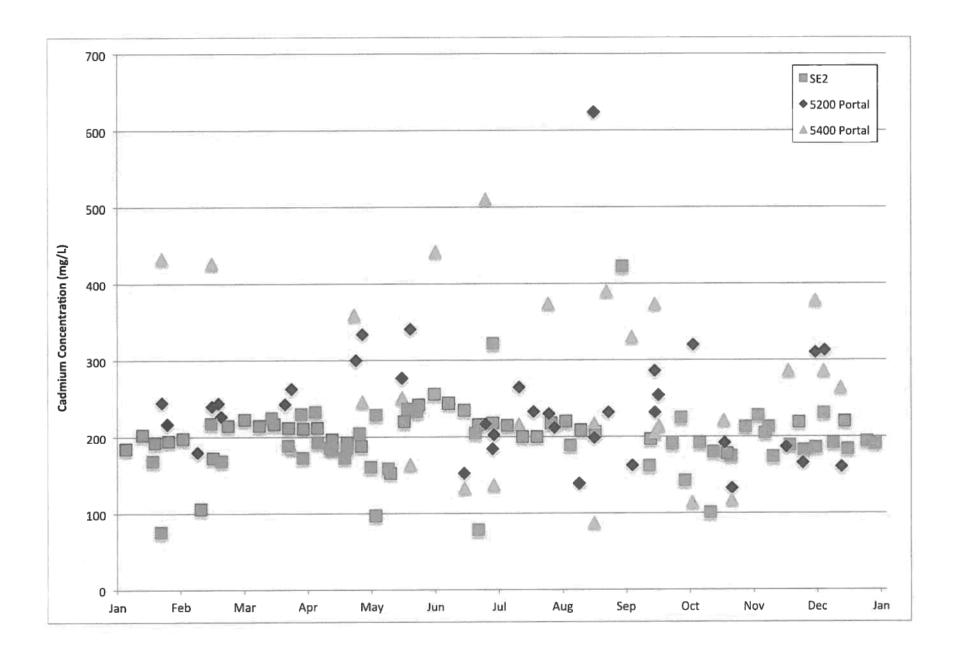
PROJECT:	TULSEQUAN Chiefole Me-																
ETATION NAME.	W32 FLE.SEC																
Maximum Job P Sample Site		M32611 W32	9537792 W32	9542817 WGJ	\$5667CI W\$Z	Mon251 W32	9562716 953	815275E	WU 33								
Sample Site Sampler Indials		M25	W52	12	12	ws	12	****		MAX	P90	AVERVICE.	MEDIAN	P10	MIN	STDEV	THUGO
Extraoration (ID)		95-Apr-15	MISST9 84-May-15	5040834	MORNE	580,7752	MENDET	944518	153940 23-Inov-15								
		26-Apr-15 44-1979-42-41	06-160y-15 462996-83-83	19-May-15 94-799-99-91	29-Jun-15 rs.189s-07-01	29-33-15	15-Exp-13 ex.(70s-65-61)	17-0rs 15 49:799-09-81	23-989-15								
COC NAVIOUS PARAMETERS		-															
Cygrate - Thoryonas	mgl.					_				-	_						_
Miss. Inorganies Acutty (pH 4.5)	mg/L									9.25	8.25	9.25	8.25	0.75	0.75		7
Austry (pH 6.3)	mpt.									1,8	1,4	0.72	0,50 8,579	0.25	0.25	0,5%	7
Fluoride (F)	mpt.							-		8,090	6,540	9.000	NAT-V	8,043	8,040	4.004	_
Preparation Pilips and HRQ3 Presentation	MA	HEIR	HELD	000	1919	1613	1610	1610	1613								
AMEDIVE										8,029		0.0004	0.0025	6,0017	8.0005	0.010	,
Calculated Personners	mpl									2007	6.210	8.367-9	0.0013	4.0071	0.04007	2210	_
Milrate (N)	mgt									0.29	8,19	0.10	0.090	0,930	1:530	6.001	
Miss. Inorporis i					20.6	26.5	21.7	4/3	334	59		36	36	24	21	12	71
Ababhis (Tistal as CoCCI); Total Organic Carson (C)	mpl. mpl.	95.3	29.9	36.0	30 %	26.5	21.7	44.0	511	2.8	2.7	1.1	8.79	9.25	0.25	1.1	7
Altabrity IPP os CaCD3)	mpt.	6.75	0.25	9.35	9.75	0.71	875	6.75	0.75	6.50	8.75	8.25	8.25	0.75	8.75		79
Blocarbunate (HCIDS)	mp1.	49.1	96.4	12 P 0.25	25.4 4.25	52.4 0.25	9.25	1/2 S 6.25	625	21 6.50	9.25	46 8.25	8,75	30 0.25	,/1 8.25	15	79 79
Carbonate (001) Hydrajejin (010)	mpt.	6.23	9.25	9.25	935	675	8.75	8.25	0.25	6.54	8.25	0.25	8,29	0.25	0.25	· i	79
Annung																	
Descrived Sulphote (SG4)	mp1.	14.6	15.9	17.6	181	1.60	100	2.79	9.04	26	34	18	14	6 9-41	2.06	0.85	T2 86
Datasebroat Chilorepo (CS) Husterinia	mg/L		1.3		16	6.25		13		1.0	2.0	1.41	1.25	0.41	9.25	0.05	
Arromorea (ND	mg/L									6.020	0,010	0.0097	8,0060	9.0050	6,0058	8.0064	7
Orthophosphalu (P)	regt.									8.29	8.21	0.015	8.0825	8,0013	8.0011	9.063	7.1
N-Grade plant NI Stille (115) Physical Properties	mg/L					_	-				8.21			3,000			
Corolasilivity	ubitre	pare	538	62	L/ E	15	14.0	386	136	184	164	113	184	79	52.0	38	72
pet .	pir Units	7.86	Pall	7.50	2.85	748	716	7 86	7%1		7.4	7.7	7.7	7.4	7,3	8,17	. 72
Physical Properties	met.		**	16	41	41.7	25.1	11	i i		34	16		2.0	6.16	.22	71
Solid Supported Solds Solid Disorbed Solds	mg/L				-		244			96	90	24	73	54	49	19	7
Furbidity Colculated Parameters	HTU									113	- 00	34	17	1.2	0 60	41	10
Colculated Parameters Disselved Hiddensi (CoOSS)	met.	40.7	62.6	24.9	29.9	27.6	523	67.1	46.2	83	74	61	44	29	23.6	16.	80
Tutal Hardrees (CaCOS)	mg/L	1/ 8	52.7	18 5	79.5	414	26.9	16.2	63 /	6.3	75	55	63	40	27.5	14	87
Discolved Metals by ICPNIS Disturbed Abstrovers (AL)	upl.		19.7	14.7	21.5	10.5	77.6	14.6	45.3	1.180	- 11	54	30	13.3	6.4	125	80
Dissolved Abstrovers (A1) Dissolved Artemory (Sh)	MPT.	# 25	9.75	0.11	9.75	6.25	8.75	6.75	6.25	0.33	4.21	0.26	9.25	0.250	9.04	6.61	80
Dissalved Arsenic (As)	HIPS.	8.60	845	9.74	947	6.84	F-140	8.14	9.73	1.9	0.76	0.66	9.64	6.54	8.43	0,17	90
Drawn-ed thorson (file)	sept.	176	17.9	11.9	114	117	944	100	105	9,500	42 8,850	9.862	9,659	13	19.8	11	90
Distribut Bringham (84)	upt.	191	945		63	11	- 65	9.5	45	9.10	9.10	8.47	9,100	6.160	6,0605	8,13	80
Disastred Borns (8)	upt.	- 25	.15	26	29	25	29	25	75	50	25	25	25	29	25	2.6	90
Dissatived Codresm (Cd)	ug/L	0.019	9147	0.047	894	100	881	94/9	444	1.07	8,50	6.718	0.136	6,601	8,812 6,050	0.211	89
Dissolved Chromium (Cr)	ug/L	6.22	9.1	0.0	97	875	41	875	10	137	6.25	0.25	0,250	9,350	8,011	0.13	60
Useachred Cirtholl (Cirt) December Circholl (Cirt)	ugh.	0.35	211	1.24	944	- 11	197	1100	2.01	37.8	14.3	6.9	3.96	8.05	0.40	6.9	90 90 90
Dispatros transff st	ng4.	15.7	7.0		184	10.0	41.6	31 0	49.7	1,500	.79 6.28	9.13	6.17	9.189	2.6	171	90
Dissolved Lead (P9)	upt.	33	13	21	23:	81	E1	7.5	8.94	2.0	2.5	2.4	2.50	2.50	8.25	6.46	90
Descrived Litrary (Li) Consilved Marqueron (Mr.)	HOT.	44		12	- 17	111	11	74	374	43	17	7.4	4.6	0.5	0.6	6.0	90
Deserved Mertary (198)	ve4									9,825	8,625	0.821	9.875	1,20	6,006	9,74	90 56 90
Circumbrant Malefytaliumann (Ma)	upt.	21	11	1.5	- 41	- 11	- 27	17	100	15,30	2,8 9,50	2.1 8.83	2.1 0.50	9.50	0.31	1.92	99
Dissolved Nonel (M) Dissolved Setenium (Se)	ugit.	9.10	8.00	6.17	- 11	411	0.05	0.15	0.10	9.81	9.46	9.25	6.29	6,110	0.02	9,14	90
Disselves Streen (Str	ug/L	1298	1310	1843	871	. 100	1346	1679	1790	1,470	1,680	1.257	1,780	758	550	365 6.0925	9/3 9/9 9/0
Deserved Stree (Ag)	ugh.	98.6	213	1141	0.01	2.01	211	564	44	8.625 295	186	9.09v7 7s	8.610 79	45	8,8625 24	6,0929	
Consolved Strontum (Sr) Consolved Thellium (TR)	ugt.	3.875	1423	750	1425	1157	8.60	680	2 955	8,100	9.625	9.8049	8,8254	0.605	0.061	0.018	66
Department Tire (Sirc)	was.		11	2.5	13	2.5	2.5	2.5	13	2.5	2.5	2,31	2.50	Z.96	0.005	6.7	90
Dispolved Titoman (Ti)	upt.	2.5	11	2.5	41	25	9.62	621	0.17	83.5 6.73	2.5 B.M	3,3	9.42	7,54	8,75	6.5	99 99
Descrive Venedum (V)	upt.	81	647	e 16 2.5	- 11	419	41	35	3.5	4.8	La	2.34	2.50	2.60	8.10	9.0	00
Dussives Zec (Zr)	ug/L	117	25.6		1.5	.25	5.6	3.5	71	231	162	43.8	26.0	2.5	8.00	47.5	90 69 60 80
Dusahud Zaranum (21)	ug/L	0.29	9.75	6.25	8.75	6.71	8.75	6.75	6.75 31.7	9,25	8,25	9,24	9,250	9,750	0.060	8.019	**
Disselved Californ (Co) Disselved Massassium (Ms)	regit.	1.57	1 46	11.0	997	36.5 6.794	3.00	11.7	149	43	26	1.0	1.7	1.1	0.567	8.69	80
Doughest Retourner (K)	mg/L	8349	142	6.773	0.745	0.467	0.74		0.759	1.7	1.4	4.0	6.0	0.00	8.24	8,50	90
Cheselved Sadum (No.)	Progett.	1.89		0.017	9.767	85/9	844	6717	276	2.0	2.6	9.4	9.1	6.53	1,5	7.4	89
Department Safethur (S)	mg/L			**	16	- 11		- 11		_							
Total Aurynum (Al)	wat.	1379	1460	1962	3470	2729	7 60	254	141	6,379	4,271	1 466	794	27	12	1.775	86
Total Automory (Str)	upl.	8.25	425	9.75	8.25 2.45	970	6.5	6.0	4.99	1,19	8,75	9,75	8.25	9.25	8.16	9,096	49
Total Areams; (An) Total Borners (Bn)	ugit.	5.40 41.0	9 4.9	411	50.5	55.9	29.9	34.0	37.6	112	3,1	46	40	31	29	21	40
Total Burylant (Be)	ug/L	9.95	0.05	5.05	049	8.60	4.05	9.65	1.05	0.500	0.018	9.040	8,050	0.050	9.096	9.053	80
Total Biometir (Bit)	ugit	0 5 2 5	6.5	#3 75	85	**	81	75	85	9.50	9.50 25	9,47 25	9,500 25	0.500 25	0.0075 25	2.6	**
Sulei Baron (B) Intel Cedrose (Cit)	ug/L ug/L	8 191	8197	8 092	0 105	9.190	8.871	9.944	4 279	1,87	8.54	6,791	6,180	8.07%	0.010	0.217	80 80 10 10 17
Solid Chromium (Cr)	ugf.	2.9	2.0	1.0	5.9	5.2	3.5	. 19	43	13.0	7.8	3.4	1.3	0.500	8.850	2.1	86
Total Casual (Cx)	sept.	8.76	447	1 05		1.04	8,25	2 66	# 25 3.66	3.3	2.3	13.3	9.25	9.250	8,821	11,0	10
Subst Coppert (Cut) Subst Iron (Sub)	uspft.	74 E	12.1	6 NE	461	1240	944	1190	219	6.740	4,790	1 816	102	22	3	1.938	10
Sold Free (P+) Sold (Load (Ph)	ug/L	1.7	1.01	11	214	1.57		9.0	4.1	3.7	2.8	1.1	8.0	8,190	9.043	6.96	86
Triggl L frauers (EJI)	ug/L	25	19.2	23	15	n2	21	111	125	2.5	2.5	2.4	2.5	2.58	8.25 8.5	6.44	19
Tutad hiterageeroons (filter) Suitad hiterageey (1981)	upt.	17.1	75.2	44.2	*115	117	- 1	-	-	9,625	8.625	9,823	9.625	0.012	0,005	0.008	53
Fetal Melyhdunum (NA)	upt.	2.9	2.4	1.9		1.7	9.1	- 61		0.3	2.0	2.5	2.1	1.26	9,50	1.0	89
Total Histori (NO)	upt.	3.5	6.5	41	17 612	6:25	1.00	9.10		9.57	9.7	4.9 9.27	9.34	9.50	0.70	5.7 8.13	10
Total Settinum (Se) Suid Edicon (SI)	upt.	8.26 96.00	8.11	83 4213	8 12 7460	Laces	2498	2436	, Joseph	15,500	8,515	2 00%	2,415	1,577	1.250	3.225	69
Senal Silver (Arg)	ugt.	5.03	5.89	6.01	881	5.69	8.04	2.00	160	9.236	8,024	8.8123	0.610	9.010	0.0025	9.007	69
Tutol Strontown (Sr)	upt.	76.7	79.5	58.8	124	547	124	672		113	167	9,871	6,625	56 6.825	33 8,093	20 8.816	66
Total Tredhers (TB) Total Ter (Se)	ugit.	8605	8625	0.005	0.625	2.40	21	(1)	13.	2,5	2.5	2.21	2,50	2,50	8,003	9.7	89
Total Titoman (To	upt.	52.1	62.7	11.2	178	158	34.6	10.2	57	365	196	6.0	30	2.5	6.00	81	
Total Uranary (U)	upt.	0.19	910	9.46	9.52	9.17	6.16	8.0	1.0	0.00	0.65 19.6	9.54	2.5	2.50	0.14	9.11	89
Total Vanadum (V) Tetal Zire (Zn)	upt.	110	21	211	217	100	- 2	27		215	19.4	4.3	2.5	11.2	4.0	48,5	07 88
Detail Zimmenum uZth	upt.	0.25	w 31	0.35	3.17	0.85	425	W 25	0.76	4.2	1,01	8.44	8,250	0.250	0.005	0.61	88
Total Calcium (Ca)	mpt.	17.8	16.9	11.6	13	18.8	9.81	15.1	32.2	29	29	10	17	13	*	9,61	89
Tetal Magnestum (Mgs Total Petersium (K)	mgt. mgt,	2 26 5.17	140	2.11	276	2.48	0.00	100	2.80	4.7	3.4	2.5	1.2	0.00	0.41	0.41	49
Total Sodium (Na)	mg/L	1.25	111	131	13	0.036	6.581			3.6	2.6	13-	1.29	9.60	8.60	6.72	=
Total Sulphur (S)	mpt.		- 11	11	63	11	15	- 11	14	1 11	6.5	6.2	1.2	. 15	1.6	2.6	
reputes as red were reported as HD	(President Denoctor) is																

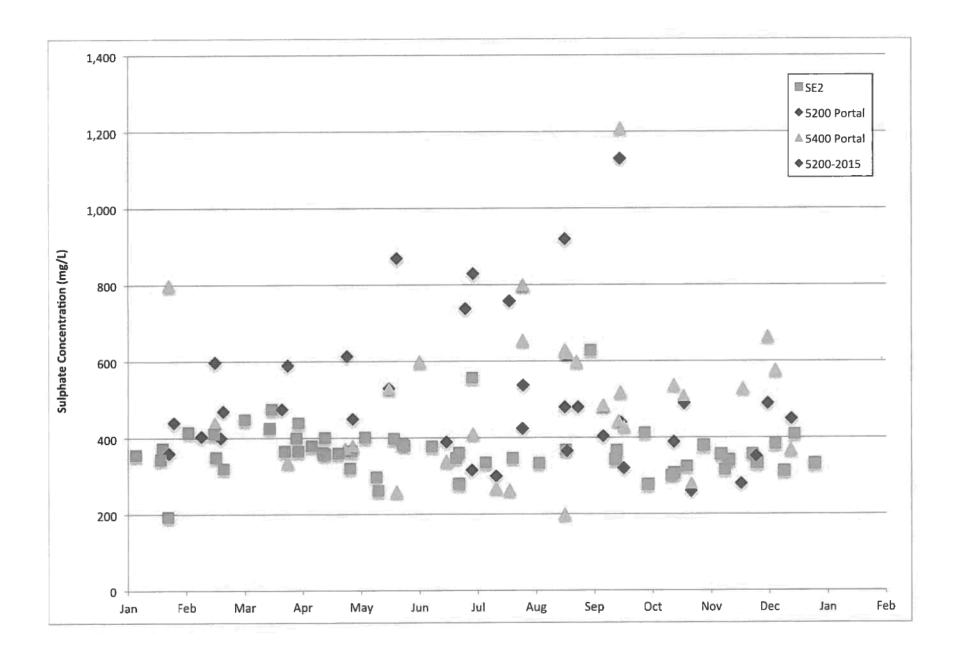
Temperations (PATRIS) Properting codes since 13 lot 3 lot 3

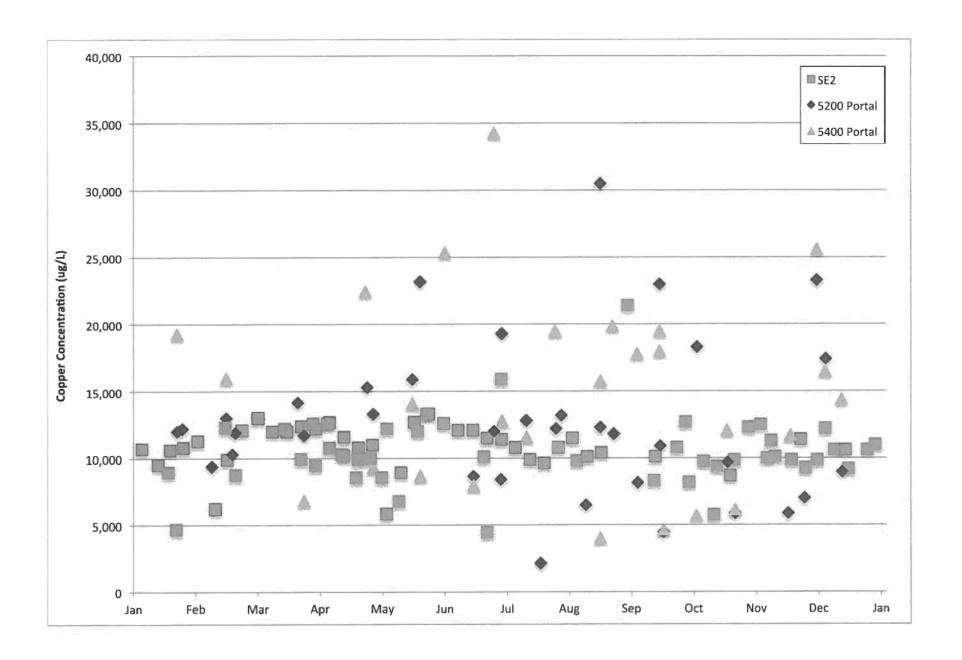


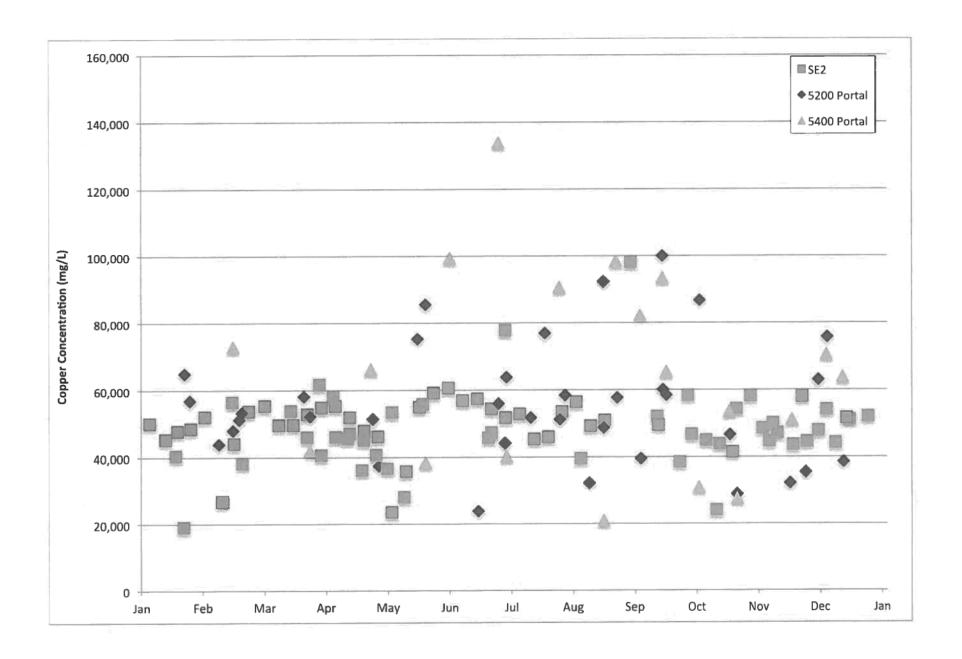
APPENDIX B

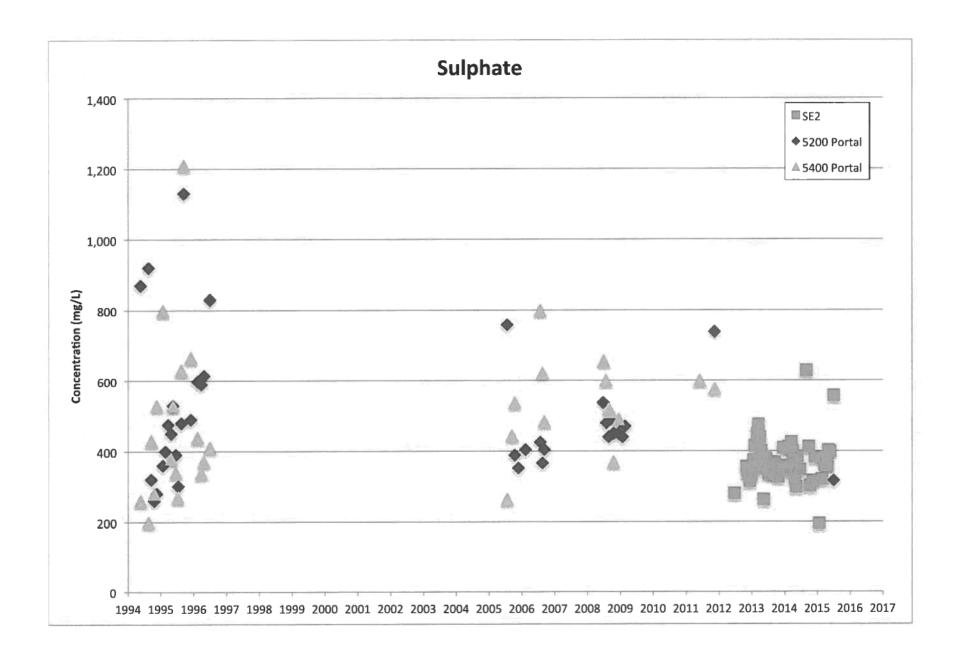
Tulsequah Chief Portal Discharge Quality

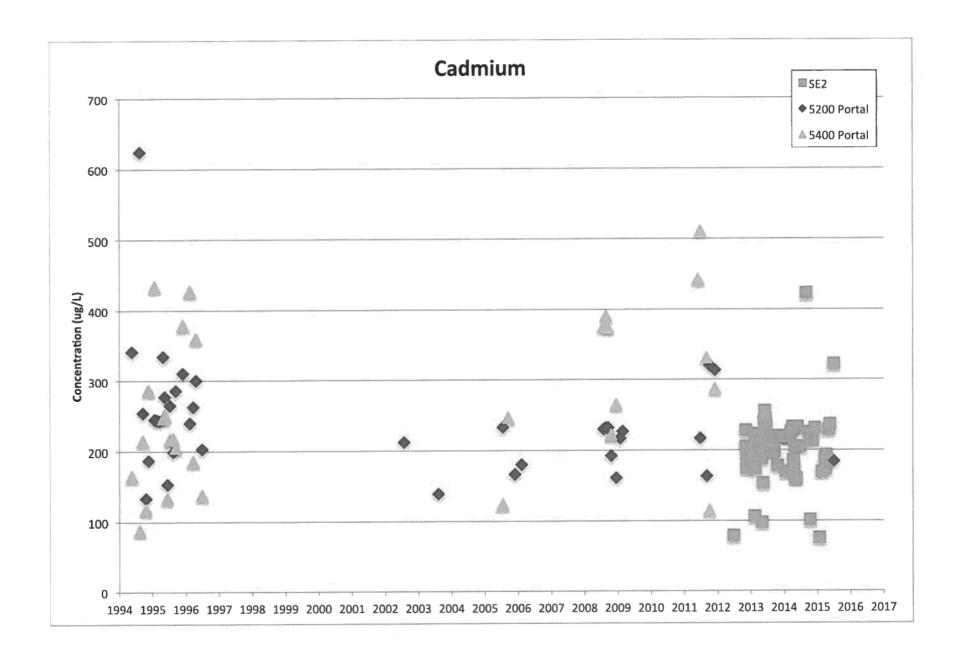


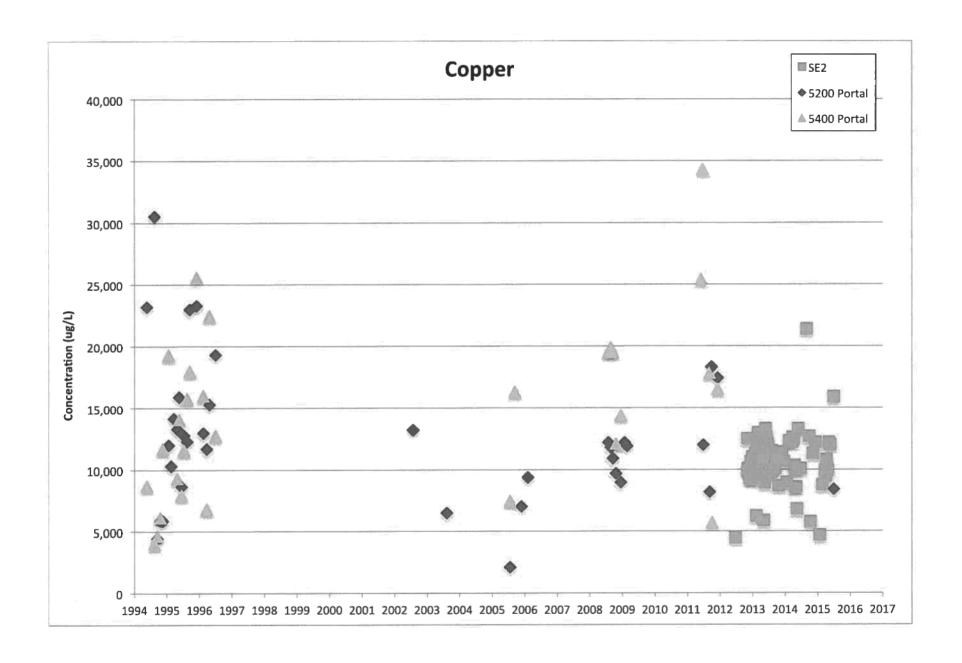


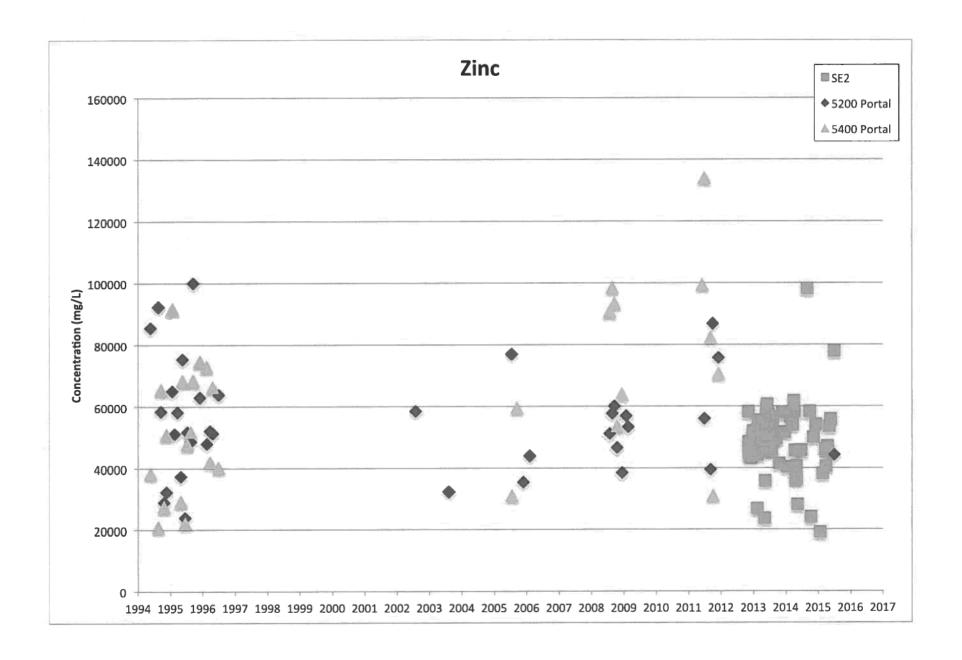












TULSEQUAH CHIEF REDPERN RESOURCES LIMITED \$400 PORTAL OUTFLOW Hessical

Initials sam ID		PERMIT	CRITERIA							04.4. 74	7710 77	15 5 77	12.57.55	17.4 47	16.00	A1 D : 17	18 5 - 47	55 44 24	24.67-76	36.40.00		400 PORTAL	\$400	5400 Portal	5400 Portal 25-Jul-06	5400 18-Aury-06	5
name of the order		-		21-May-84	17-Aug-94	17-Sep-84	22-Oct-94	15-Nov-94	23-Jan-85	26-Apr-85	17-May-95	16-Jun-95	12-34-95	17-Aug-95	15-Sep-95	01-Dec-95	18-> eb-96	75-Mer-96	24-Apr-96	30-Jun-90	15	19-348-05	14-Sep-03	2	5	2	1
TERS																								-			
Thioryanate	mg/L													-												-	
Janics 451									-																		
8 3)	mg/L	-																				3.5	217	262	479	354	
0.77	mg/L mg/L																						1.32	-			_
n Non biom																					-					-	-
n INO3 Preservation	N/A						-																				
	mo/L																						0 0005				_
E Parametera																							0.162	_			-
nanta	mg/L	_				_							-										0.102			1	
Total as CaCO3)	mg/L																						1				
ruc Carbon (Č)	mgt. mgt. mgt. mgt.																				-		46.1				_
PP as CaCO3)	mg/L	_				-																	40.1	<u> </u>	-	-	_
PP as CaCO3) to (HCO3)	mort.																										
	mgt.																							_		_	-
A - 4 - 4 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1				120	50A	430	280	630	836	380	530	343	270	630	1,210	665	439	3.38	372	411	- 5	64	444	538	800	621	
Sulphate (SO4)	mg/L mg/L	_		260	200	4,00	400	230	000	360	-504	219	270	030	1,210		777	2.00					13.7	-			
Sulphate (SO4) Chloride (CI))																										_
(N) phale (P)	mg/L																									_	_
phate (P)	mg/L mg/L												-														-
n Notes (N) Proportion	mg/L	-																									
фу	uSiom																					17	1010 3 32	1190	1660	1420	_
Barrary and a second	pH Linits																				5	2.17	3.52	3.15	2. 93	2.99	_
Properties ended Solids olved Solids	mg/L											_										18.2	75	81.3	106		
olyad Solids	mg-L																				- 5	100	671	845	1250		_
	MTU																							_			_
ganies Hardness (CaCO3)	mg/L																					18		298		315	
ness (CaCO3)	mg/L																										
Netale by ICPM'S																						6.30	4710				_
Aluminum (Al)	ug/L																					1530	8210 10u				-
Antimony (Sb)	Jugit.																					00	100				
Barsam (B4)	July 1																				- 12	75	72				_
Banum (Be) Beryffum (Be) Bemuth (Bi) Boron (B)	U9/L																				- 2	(6)	100			_	-
Bernuth (Bi)	ug/L										-										- 1	W	50				
Boron (B) Cadmium (Cd)	ugt, ugt, ugt,			105	88.2	215	118	287	434	247		134	217	218	205	379	427.5	186	360	138		24	247				Ξ
Chromium (Cr)	ug/l.																						5				
Cobelt (Co)	ug/L																				- 5		3			-	_
Copper (Cu)	ug/t,			8720	4040	4670	6140	11700	19300	9320	14100	7990	11600	15800	16000	25600	16000	6850	22500	12800		7450	16300	-		-	_
Iren (Fe)	ug/L																					2280	3440	_		-	-
Load (Pb)	ug/L																					1.4	10	-		_	-
Lithium (LI)	ug/L				_								_										261				-
Manganase (Mn)	ug/L.		_			-																					_
Morcury (Hg) Molybelenum (Mo)	ug/L ug/L			_																		5	15				
Norther (No) Nichel (No) Selenium (Se) Selen (Sc) Selver (Ag)	ug/L ug/L																					25	25 100			-	_
Selenium (Se)	ug/L																						8190	_		_	-
Selver (Arr)	ugf, ugf, ugf, ugf,																				- 5		5				
Strontum (Sr) Thatturn (Ti)	ug/L		-																			135	100				_
Trubum (TI)	ug/L																					15	15				-
Tin (Sn) Transum (Ti)	ugr. ugr. ugr.								-			-											9				
Uranum (U)	LIFE C	-																					18				
Vanadium (V) Zinc (Zn)	ug/L					65 500			47.650	100 1000	18 180	53.500	47.000	11.650	48 150	14 455	71.000	43.000	66 300	40.300		11000	19600			_	-
Zinc (Zn)	ugrt, ugrt, ugrt, mgt,			38 400	21,000	65 500	27,600	51,100	91,800	29 300	68,400	72.200	47,990	51,900	68,500	(4,600	13,000	42.000	00,300	-1.70	- /		-				
Ziroonsum (Zr) Calcium (Ca)	mort.	1									-										7	77.1	80.5 9.21		-		Ξ
Magnesium (Mg)	mg/L																				-	5,14	9.21		-	4	_
Poteseium (K)	mg/L																					19.5	12.6			-	-
Sudebur (S)	mg/L	_																									
ds by ICPMS	-9)																					10.00	A NA	11000	La Son	13000	_
inum (AI)	ug/L			-																	- 1	1930	100	11000	18700	13000	-
ony (5b)	ug/L	-					-															130	430	470	626	508	
m (Ba)	yar.																					79	22	26	24.3	22.2	
lum (Be)	ug/L																				- 2	100	100	100	3	1	-
uth (SI)	ug/L	-									-											90	50	50	100	100	
num (Cd)	uart.			171	102	222	125	290_	351	268	300	158	224	228	165	408	440	204	403	138		129	250	323	505	366	_
meem (Cr)	ug/L																	-			- 1		3	5	14.2	10.5	_
it (Co)	ug/L			8011	65.00	1,510	7910	1850	26,640	18490	16600	86.50	12700	24500	18700	29000	16600	8640	22500	21200	- 13	7900	1840Ó	20700	32900	21100	
er (CV)	ug/L	_		9440	5580	5820	7210	1900	25500	10400	10000	05,00	12700	21300	10700	73000	.0000	0010	25.700	2.1500	- 1	7900 25,200	35400	20700 48100	32900 80400	21100 54500	
Treportions (22) Calcilorin (Ca) Calcilorin (C	- Ver																					17	29	37.3	61.3	433	_
m (l.l)	ug/L																					138	17 263	334	564	445	-
sanese (Mn)	ug/L	-														\vdash	-				- 1	- 64		-			
ory (reg)	unt.					1															- 1	15	15	15	1.1	2.3	
d (No	ug/L												-									Ö	25	125	18	13	_
hum (Se)	ugt																				1	100 5730	5330	100 6850	7370	7510	-
n (Si)	ug/L			_		-	_									=						5	5	5	0.29	0.26	
dsm (Sr)	uart	_										-										132	435	498	677	666	_
um (TI)	ug/L																					100	100	100	3	12	_
in)	Ug/L																				- 1	5	5	5	5	15	-
um (TI)	195	_		_	_		-																		12.4	8.92	
dium (V)	ugh.																					15	15	115	10	87000	Ξ
(Zn)	Jeu Jeu			42500	24500	76600	30800	51700	122000	33600	83300	32400	49400	79600	73100	104900	76500	41900	66800	40600	-	11500	19680	82900	127000	107000	-
num (Z/)	ug/L				-	_						_										77.1	91.2	101_	113	105	
um (C8)	mq/L			-		_	-														- 6	1 06	9.28	10.9	14.9	12.9	
usium (K)	mg/L																				1	19.2	12.7	4.2	4.6	5.9	
	mot.												-									10.6	16.7	74	F*	7.2	-
en (Na)	-92																										

LW	LVV	LVV	LVV	FW	LVV N18375	LVV ARSS68	LW	LW	LW	TZ	LVV	MAX	P90	AVERAGE	MEDIAN	P10	MIN	STDEV
L650132-1 27-Jun-08	K91981 26-Jul-05	L31301 23-Aug-08	15-Sep-08	LVV M26571 18-Ocs-68	13-Dec-08	02-Jun-11	LVV AW9567 28-Jun-11	BL5400 04-8-ep-11	870212 03-Qs-11	CH8878 15-Nov-11	CI0148 95-Dep-11							
11.40	28-Jul-05 F115071	23-Aug-08 8209378	15-Sep-08 F117964	8210371	8213212	68215711	8334401	G039268	G039287	8341528	G039975							
														-				
	141	135	123	56	0.25	50	_	-	0.25		65.3	341	137	75	74	0.25	0.25	56
	141 385 1,1	135 379 1.1	123 359 1.3	56 198 0.71	267	317			52		2/1	385	381	279	294	0 25 154 0 83	52 0.71	112 0 20
						FIFT	F-F1 A	FELD	FIELD		FIELD							
	LAB	LAB	FIELD	FELD	FIELD	FIELD	FIELD				PELD				0.0080	0 0015	0 00050	0.0051
0.00050	8 0680	0.0025	MD	0.0080	0.0090			0.0025 (1)	0.015			0.015	0.012	0.0072				
0.238	. 0 23	0.25	0.27	0.20	0.30			0.29	0.17		0	0.30	0.29	0.24	0.24	0.19	0.17	0.042
1.0	0.25	0.25	ND	NO	0.25 1.6 0.25	ND	0.25	0.25	0.25		0.25	1.6	0.48	0.34	0.25	0.25	0.25	0 0 61 0
	0.25	0.25	0 60 ND	0 50 NG NG	0.25	ND ND	0.25	0.25	0,25		0.25	1.5 5.25	0.25 0.25	0 90 0 25 0 25	0 60 0 25	0 52 0 25 0 25	0.50 0.25 0.25	0
	0 25 0 25 0 25	0.25	ND ND	ND ND	0.25	ND ND ND	0 25 0 25 0 25 0 25	0.25 0.25 0.25	0.25 0.25		0.25 0.25	0.25	0.25	0.25	0.25	D 25	0.25	0
-		U.25		ND	0.25		0.75	0.25	0.25		0.25		0.25	0.25	0.25	0.25	0.25	
655 0.95	500 1.4	520	510	370 ND	490	600				577 0.6		855 2.5	617 2 0	540 1.3	549	454 0.78	376 0.60	88
0.95	14											0.070	0.054	0.027	0.018	0.0070	0 0050	0.026
0 0048	0.058	0.0050	6 670	0.010	0 0090 0 30			0.052 (2)	0.018			0.068	0.044	0 020	0.005	0 0061	0.0048	0 075
		0.25	0.27	0.010			0.0025-(1)	11	0.18			0.30	0.28					
1420	1,400	1.500	1,450	1,000	1,100	1,250	1,510	1,400	567 4.8		1176	1 510	1,500	1,247	1.400	1,000	567 3.0	260 0.53
3 02	117.1						- 11				81		112	- 1		44		
62.7	5.3 990 187	53 960	ND 920	92 690 378	60 870 295	160 980			30		81	160 1,070 378	1.022	940	61 670 252	828 194	30 690 187	39 119 87
209		_											353					
343	321	306 290	267	223	232	327	401 361	219 262	196	250	252 245	451	337	272 281	252 285	214	196	- 85 58
343												26,500	21,190	12,810				6,847
	13 400	13,600	12,300	7,290	8.750	29.600	26.500 2.0	11,900	1,660		12 H06 0.65	26.500 21 297	5.3 267	3.5	12,200 1.8 58	6,727 0.39 4.5	1 660 9 30	8.2 116
	0.40 5.7 22 0.52 0.015	4.7 23 0.47	3.6 267 33 0.50 ND	143	2.4 197 30 0.35 0.015	21 256 6,810	53	59 18 0 50 5 0	2.4		57.0 21.5	297 6,810	729 0 81	709 0 48		22	18	
	0.52	0.47	0.50	0 31 NO	0.35	0 50 ND	0.90	0.50	0.10 1 0		31.5 0.35 1.25	0.90	2.8	1.2	0.49	0 29 0 015	1.8 0.10 0.015	0.23 1.8 73
	150 375	150	NO 374	ND		ND 443	50	750	50		68. 287	250	190	124	150 353	50 211	50 115	73
	2.3	2.8	4.0	1.2	265	13	511	250 331 5.0	1.0		5.3	13	9.4	4.5	3.3	1.2	1.0	3.0
	11	10	9.3	5.9	6.6	15	29	9.0	5.710		8.0	29 34,300	16 26,290	18.511	9.2	5.6	3.0 5.710	7.653
	19.500	19.900	19:500 49:500	12,100	14,400 30,000	25,400	34.300 25.900	32,300	1 950		28000		38,610	27,135	26.950	18 915	1.950	12,304
	36	37		25	32	2.010	1,270	123	6.0		137	2.010 25	1,344	373	14	7.9	6.5	6.0
	15	14 461	13	8.0 232	10 263	683	21 2.220	25 371	128		358		837	560	398	222	128	. 603
	0.025	0.025	ND	ND	0.025	0.010	0.050	0.25	0.050		0.065	0.25	0.12	0.063	0.038	0.021	0.010	0.078
	0.50	0.15	9.50 16	ND	0.30	ND 28	10	5.0	4.0		1,25 12.6 0.31 7310	5 0 4) 0 60 16 300 4 5 736	2.4 30 0.52 15,130	1.2	0.75 1.3 0.31	0.26	0.15 4 D 0.10 5,190	1.6 11 0.17
	6,210 0.080	0.50	9.40 7,870	ND 5.630	0 30 5 (00	0.60	0.10 15,000 0.42	0.50	5.190		0.31 7316	16,500	0.52	0.35 8,200 0.58 520 0.32	6.535	0.10	5,190	4.023
	0.060	9,040	0.11	5 s20 0 080	0.090	4.5 738	0.42 649	0.10 299	5 100			4 5 71A	0.8	0.58	0.11 514	5,559 0.056 382 0.14	0.020	13/
	632 0 24 0 025	0.25 0.025	8 22 8 20	0.15 NO	0.18	1.1	2.1 (2)	0.25	326 6.10 5.0 5.0		434 0.37		0.52	0.32	0.24 2.60	0.14	0 020 328 0.10 0.075	0 30 8 4 23 4 0 8 7
	1.5	0.025	0.20	12 12	29	NE) 79	5.0	25 25 6 0	5.0		6.5	25	12 34	19	2 60	0.025	1.5	23
	8.6	8.3	7.8	4 B	9.50	15 ND	14 5 0		5.0		6 56		14	7.8 6.1	5.0	0.50	0.50	8.7
	90 700	98,500	93,500 NO	53,600	63,900	99,500 ND	134,000	62,300	31,000		78600 0.65	2.5	102,950	81,760 0.75	86.500 0.50	0 50 51,340 0 25	31,000 0.25	28,587
-	0 25 107	0.25 102	99	75	77	105	125	76	70		83.4 10.6	13	189	91	91	70 8 2	70	0.79 19 4.4 1.0 2.5 60
	13	12	1.3	8.5	9.4	16	4.1		5.2		1.36	4.1	3.4	12	1.3	1.2	1.2	1.0
	4 9 258	4.8 217	4 B 222 (2)	3.1	163	4 4 221	5 6 294	1.2 3.9 197	1.3 84		3.30	794	6.3 249	5.3	1,3 4 8 197	131	3.1 84	60
17.100	13 500	13,600	12,200	6,920	9.360		24,900	13,500	3,360		11100	24,900	14,730	12,074	12,250	6,564	3,360 5 0000	5,565
12,360 5.6 270 10	5.9	12 652	9 9 528 45	6.5 360	7,0 410		8.0	9 0	147		9.5 392 645	14	12	8.7	12,250 8.5 376 44	5.8	5 0000	2.5 152 366
10	22	27	45	42	4.3		8 0 130 975 1 0	199	46.		645	975	858 1.90	367 225	64 0.25	20	130	366
	0.50 0.60	0.50 0.025	9:40 NO	9.33 0.030	0.36 0.015		1.0	0.50	0.10 0.50		0.4 0.5	100	1.5	0.51	0.270	0.307	0.100 0.015	3 03 0 64
50		250 413	ND 370	ND 225	150 296		50	50 385	96 9.50		25 283	1.5 250 487	160 420 10.1	94 331 4.3		25 212 1.31	25 000 96	81
387 10	369	3.0	4.0	6.0	2.0		11 26	3.0	0.50		63	11 26	13	4.3	370	1.31	0 500	3.5 6.1 8,649
19.000	19 900	19,900	19,800	6 0 12,200 40,200	18,200 51,600		31,200	21,200 63,300	2 6 5 210 12,900		18700	31,200 84,100	72,200 67,270	18,131 50,850	19,400 51,560	5.6 11,501 35.670	2.6 5.210 12,900	8,649 18,645
52,500 33	48 500 37	84,100	65,400 76		51,800		31,200 38,200 1,379	182	30		51300 178	1,370	301	202	51,590 40 13	30	26 8 000	
478	15	450	13	8.0 232	270 0.025		1.950	13 423 0 060	12		373		626	520	418	220	1.14	12.2 526 0.018
0.010	0.025	450 0.050	412 ND	232 NO	0.025		0.050	0.060	0.025		0.005	1,980 0,060 10,0	0.050	0 630 2.J	0.025	220 0.009 0.86	0.005000	2.78
10	1.4	1.5	1,1	0 90 11	10		36	13	3 0 4 0 0 50		13	38 10 00	18	14	13		0 500 4 000	
	0.30 7,100 0.14	0.50 7,970 0.17	0.50 7,000 0.18	0.40 5,690 0,11	9.40 5,700		36 0 50 14,600	0.60 0.090	5.190		7700	14 600	9,392	7,671	0.50 7,100	0 39 5,590 0.108 378 0.135	0 300 5,190	3 02 2,807 0.52
0.20	612	0.17 580	557	0,11	0.18 477		663	8.090 0.58 474	0 090 313		0 64 448	1.6	620	0.41 502 0.46	0.18	0,108 378	313	111
2 0 5 0	0 23	0.17 0.10	0.27	392 0.14 0.960	0.20		1.0	0.20	0.090		0.25 2.5	2.0	1,10	2.1	0.22	0.135	0.0900	0.60
5.0	6.0	33	9 20 24	39 4 B	30		29 14	17	25		19	39	34	20	7.3	4.8 4.6	0 0600 2 5000	2.2 13 3.0
5.0 9.4 10	8.6 0.50	83		I MD	6.1 0.50		5.0	7.g 5.0	2.5 2.5		5.5	10.0	6.5	3.4	2.5	0.50	2.5 0.500	3.2
99,700	92.400	105,000	ND 93,500 ND	58,400 0.70	73,900		123,000	97,200	20,800		71200	1.0	106 600	83,310 0.66	92,950	52,840 0.43	20,600	28,984 0.26
115	184	96	93	74	80		119	83	65		79.7	119	1.0 115	91	12	7%	65 5.1	18
10	1.3	1.2	1.3	1.2	1.2	-	3.7	1,3	1.7		11.1 1.36 2.96 173	21 3.7	1.6	1.5 5.0 193	1.3	6.2 1.1	1.0	0.79
5.2	4.9 232	239	217	130	3.6 152		5.4 290	227	79		173	290	249	193	4.6 217	3.1	3 0 79	2.5 65

PROJECT: TURBĒŅIAM CHREP
COMPANY: REDPERM RESOURCĒS LIBOTĒD
STATION MAME S200 PORTAL DUTYLUM

	Helorical	TAL GUTFLOW	4																																	
A	,	I proper	- mrmaer			1	_				5		_				_	1						F					1				LW	LW	LVV	LVV
Al Selaccom ID	1	1,047	PERMIT				-																	-		5200 PORTAL	UMD Persol	UNE PORTAL	SJ00 Persyl	S290 Pertail	NAME PORTA	5790 Portal.	L450132-2	K31987	131294	1 /19919
Sampling Date & Time			-	21-May-84	17-Aug-94	17-Sep-94	22-04-91	17-itus-94	73-/an-85	19-1-ep-85	22-Mar-85	25-Apr-95	17-May-95	15-Jun-95	12-34-85	17-Jug-95	15-Aup-45	81-Des-85	157 49-66	25-blue-86	25-Apr-NI	30-Jun-94	09-Jup-61	29-3442	18-Aug-83	19-34-05	13-0045	25-Hov-85	09-7 mp-06	26-34-06	18-44-08	2 DB-5ep-08	06-06-27	59-97-26 F115071	8299178	F117964
COC PARTNEY PARAMETERS	-	+			_		+									-										-										
Cyande - Thorygrate	mg/L														_		_							-	_			_	_							-
Mec. Inergenics Arsety (pt) 4.5)	met.	_		-		_	+									-																		-10	50	46
Aniety (set 6.3)	- Park	-																								911	72 B	85.5	134.0	119	107	122		224	212	217
Fluencie (F)	mes.	-	-	-		-	-		-						-		-	_			-			_	_				_					1.1	3.1	1.2
Preparation Fibra and HNO3 Preservator	H/A		_			+	_		_																									LAS	LAB	DELD
AMONS	-																_	_						-					_		-	_	8.00050	0.0000	0.0006	ND ND
States (N)	mgs	-	-	_	_	-		-		_						-	_		_					_									R. SORESO			
Colcolated Parameters Paramy (H)	ergri.				=				-																								8,22	9.27	8-050	0.30
Wisc, Ingrandica		-				_			-						-			_			-		_	_	_			_	_				1.0	0.25	825	ND
Albatinity (Total as CaCO1) Total Organic Carbon IC)	mgs.	-	_	_		_	+									_	_										-						- 11			ND
Alliabrity IPP as CaCCN)	mgs,		-											-												Sto	11,8	5.8	51 B	,	1	1		0.75	8.25 0.25	
Binarbengels (HCDT)	mas		-		-		-		-		_		-		-	_	_	-	_				-											8.25	125	ND
Certificate (COS) Philipping (CH)	mgs.																								-									8.25	0.25	ND.
Anises.									400			100		200	-	400	Erita.	490	500	586	614	830		_	_	75a	303	162	101	426	264	404	537	170	440	490
Ossolved Sulphate (NOH) Observed Chloride (O)	rest.	+	_	670	470	120	790	200	191		4/5	150	- 04	- 40			11.50		-78							-			100				17:9	18		
Waterings						-									-																	_			9.0960	B.040
Anompres (N)	mes	-		-	-	+			_	_		-		_		-	_	_	_	-				-									8.00050	0.0090	9.5000	
Cirthophangmato (P) Nestra situs Nestra (N)	mgt.																-														-			9.27	9.050	9,22
Physical Properties		_	-																							1450	967	900	neu	917	879	936	1228	1,700	1,160	1,100
Complicativity:	gill Units	_			-													-								6.86	0.58	5.41	4.92	4.71	4.11	4.12	1,23	- 25	3.1	
Physical Properties	-																											10.0	22.6	22.4				31		
Fetal Burganited Entity	mys						-				-						_				-					1300	24 S 858	10 A 61)	27.9	73,4 163		17.2 676	36.7 847	6/39		4.0 950
Total Descrived Ealth Furtherly	MTU HTU	_		1			-																										127	13		
Miss, Inorganics	-	-					-	-															-			Tas	200				103			MF	131	317
Characterist Hardways (Ca/CO1)	met.			-		1	-	_				_									-					785					21		355	311	391	
Sand Hardress (CaCOS) Disaphred Motels by ICPMS	mas																																		13.555	
Cheeshood Alummigm (AE)	tg1_				-	-										-					-				_	100		1540	2.4					9,23	12.000 B.20	4.1(.1)
Desolved Arbridge (19)	upt.	-			+	+							-													100		7.6	75					0.97	8.96	11,8 (1)
Cranshad Barlem (Re)	v95					-									_				-							2.5		23.9	77.8					17	18	25
Chroshed Brodlem (Bs)	wst			_		-	-								_	-		_	-			_		_	_	199		2.5	1.5						0.015	
Osselved Borns (B)	195				_																					110		10	10					25	150	MO.
Department Codemoin (Cat)				341	A24	254	123	187	245	244	247	334	277	153	245	199	286	219	249	.243	200	249		212	179	213		186	160		_			1.7	232	232
Chesched Chryman (Cr)	- 194		-	-	-		_		_	_			_													18		6.9	4.2					0.2	0.0	7.6
Chapathred Colodit (Cn) Omsehred Gozgar (On)	195			21719 00	10509.00	4450.00	1405.00	1409.00	12000.00	19.109.00	14159 99	13300.00	15505-00	HE56.50	12979.00	12789.00	2 9900,02	23190.00	12090,00	11790.00	15300.00	19.100.06		1,1279.69	6430 00	2129		repo	4970					17,200	11,900	19 190
Chasehod Jron (Fe)	195	-			-	-							_			<u> </u>		-	-	_	_			_	-	71 E		20.1	158					186	7 //80	177
Orearhyd Leid (Pt) Passing (19thm 8.)	vot.	+	-	-	-	_	_						_													12		76	14					97	16	13
Cheeshard Management (Mn)	USS.																	-								1990		797	537					317	310 9 804	312 MD
Descrived Merry (193)	1/9/5		_		_	_	-		_		_	-	_		_		-	1	_		-			-	_	14		0.25	17 24					0.24	8.15	MD
Classified Molyhderson (Mn) Cryschydd Nickel (M)	und.		_		-		-																			14		5.5	7.5					8.1	1.2	4.1
Dreschard Enfontum (Se)	ust.	-													_			-	-				-		_	1460		n. Nelli0	19,20			-			9.40 5.430	
Oysashred Editors (Si) Overselevid Silver (Ag)	195		+	_	-	-	+		\vdash	_	_		_					_					-			1		0.85	n 66					0.043	0.063	0.079
Dearbred Rivetture (5r)	195																									105		ngs	551					510	9,74 9,74 9,005	124
Disselved Thillian (Th	_vst.		_		_			_									-	-	_	_				-	-	1150		0.4	10.5	_	_			0.0000	0.025	0,70
Cheeshood Tits (Tits) Cheeshood Titsenson (Tit)	uns.	_	_		-	-			_																	1		4	4					0.29	1.5	13.
Cheanford Utensen (U)	LF94										-						_	_			-			_	-			3.61	19.42			_	_	8.19	8 50	HD HD
Descrived Venerium (V)	125	-	-	84.000	- HOARD	12400	27900	11300	84900	0.1300	1,0000	37480	75,960	19989	L1860	48790	109700	E37900	Allmoo	5,2290	54400	63490		58450	12290	16800		19490	43390						57,708	80,190
Orseshied Zinc (Zn) Dissolved Zimonium (Zn)	VSS.			639,4	20110	63-10	0.100	- NOS	44.00	2.2.0	25.0	J-500		Line	-		-		17.7		-													0.050	8.25	MD
Dresehred Catesum (Ca)	mgt.	-			-																-					17.1			113 7,69					9.7		8.3
Descrived Magnesture (Mg) Descrived Protessum (K)	mg/L	_	_		_	-	1		1																	5.1		4	+					1,1	1,1	1.2
Dranchard English (Na.)	mgf																								-	10.4		73.5	12.9			_		11	12	101 [2]
Cheesbrad Fullation (%) Total Motals by ICPMS	rings]_			-	_	-	-	-			_		-		-	-				-				-										185		
Treat Means by ICPIES Treat Aparticum (AI)	USS.																									619	2950	4840	5440	R780		Araki)	13,100	11,589	11 600	11 700
Telaf Antersony (Sh1)	wos.	-			-	-	-	-	-									-	_							190	190	6	19,7	5.5		9.7	1.0	3.7	13	1,5
Tetal Aramis (As) Setal Bersen (Ps)	Peu	-	_				-																			106	10		19.3		10.7	29.1	10	- 19	17	24
Petal Bereflum (Be)	195						-											-								2.5	2.5	7.5	2.5	2.5	19	2.6	19	8.25	8.30 0.0%	8,30 MD
Polal Starneth (R.O.	195		-			-				-	-				-											90	10	140	110	50	100	100	50	150	295	MD 1
Setal Baron (B) Setal Cedinium (Cd)	US\$			341	844	255	136	194	291	245	296	:586	371	199	270	294	393	312	250	274	221	295		722	166.5	229	165	179	196	115	7191	158.	29-6	227	229	. 234
Real Chromon (C1)	195	-			-				_								-	-	_		-					10.		7.5	4.2	2.5	54	7	10	1.6	8-50 7.5	7.9
Rolel Cottell (Cn) Selel Copper (Cs)	. vos	_		25799	39900	21790	7489	6900	17200	19400	18600	15500	201e0	8600	13290	15400	23290	.25000	14700	12900	19000	19190	11900	11750	6895	1290	7100	75.10	4130			7319	14,300	12,906	11,500	11,300
Total fron (Fe)	vos.				-																					1250	1010	e145	19060	9980	7140	9190 97.7	24.600	19,419	17.700	13,600
Total Lond (Pir)	955	_	-	-		-		_														-				29.6	79.5 27.	26	24	3	MI 5 50	3	195 50		193	
Tytol Litners (L.) Total Mangerman (Mr.)	195.			1	-																					1630	176	101	142	16.2	274	246	362	309	299	310 ND
Total Memory (Hg)	495				-										-			-			_		_			15	15	0.68	1.76	075	2.6	1.25	10	0,79	8.25	ND ND
Tetal Molyhdenum (Mo) Sutal Nortal (No)	ugt ust	-	-	+	-	+	-				-								-							25	29	6.0	7.9	125		1.7	10	4.7	7.6	0.0
Total Extension (Sp)	195																							_		150	180	is .	5	4	19	5	10	9.40	9.50 7.090	8.40
Telal Silmon (SI)	ugs		-			-				_				_				_	-		1					5	1,210	11.05	4480 1186	0.05	5870 5-1	5910	0.70	0.010	g 055	ND ND
Total Stimmum (Sr)	-uns	1			1																					916	413	124	579	578	478	494		459	\$10 8.64	518
Spigi Tripoliture (67)	1 195						-												-							100	190	715	25	0.5	1	15	5.0	9.67	8.64	8.65 HD
Polei Tin (Sn)	195	-	-	-		+	-				-		_			-				_					-	4	4	K	4	6	4	4	1.5.	1.9	8 0%0 27	11
Total Trianners (Tr) Tesal Uranium (U)	104 105		1								-							-										5.7	9.42	9.07	7,15	4.75	16	. 12	10.0	9.9
Tetal Vanadum (V)	hev	-	1		4		4-7		-		1111	41000	mar to	26000	63000	Sycan	-	74000	Apreso	- tjeso	tyme	417***	System	- Borne	yytac	76700	41900	36600	44800	47200	14500	15300	19 61.900	9.55 54,700		
Tetal Zinc (Zn) Tetal Zinceman (Zn)	195	-	+-	1,7000	97200	84700	34708	32300	87900	\$1300	74199	41900	99400	27900	55990	1,2990	100000	reego	- sande	37900	527900	27720	100	10000	27990			To Bree			-		_	0.25	0.50	100
Total Crimmen (Cr) Total Calmen (Ca)	med.																		-							279 17,5	142	112	118			182	125	109	105	160 9.1
Telaj Magnessem (Mg)	mys		1		-	-	_											-	-	-				-	1	5.2	1.90	0.15	9.67	11.77	5.80	9.61	1.00	109 9,3 1,8	8.91	1.2
Tetal Polasseum (K) Tetal Sedium (Me)	mod.	_			1																					10.7	12.2	23.9	15.3	29.4	52.0	13.3	12.8	1 12	. 11	12
Total Sulphur (1)	met		ì	1		1																			1									174	178	173
Values in red were reported as MD fit	Net Deberted	County Street, by	network 177 the	method dates	atron lend																													e .		

Teled Solphor (S) mgs.

Values in rad were reported as HD Pold Detacled) and shown have at 1/2 the resetted dessition land.

Greater than Pormit Limit

Orester than Pormit Criteria.

										8565811 5290							
March Marc	[W				LW			12		17	SAX	P90	AVERAGE	SPECIAN	P10	MN	81 DEV
Section Sect	M26577				ANTENES			CHRRRS	C89147	MORSHS ISAN 79				_	_		-
	8216371			6215050	8334401	11-09-04 G039298	G091297	8341526	Gennals	461399-07-01							
The color The														_			
The color The			-		-	-											
The color The	40	0.25		-48						38.9	106	81		-48	30	8.25	29
The color The	167	154	166	176			214		528	175	 1.7	3.7	217	200		2.04	0.074
1499																	
1.	PELD	FIFT 0	rjn n	PELO	ntb	FIFLD	FIFT D		FIFT.D	PFID							-
1.	9 0050	0.0025	9.0029	0.0001	8.0025	0.7825	0.012		9		 6,2140	8.9120	0.0213	8.8525	4.8025	0.01050	8 0644
The color of the											 6.04			0.90	0.15	0.050	0.000
	9.10	0.25	8.24	0.16		9,19	6.20				120	9.21	1.0	4.67			
	ND	0.2%	8.25	0.25	0.25	0.2%	0.25		9.75	9.25					0.25		
	7.2		0.75	0.25	0.25	0.75	0.75	_	0.75	6.25	 F.25	0.25	0.25	0.75	0.25	0.25	
Column C	147)	9.25	8.25	9.25	0.29	0.25	6.75		9.25	0.25	 0.25	0.25	0.25	0.35	0.25	9 25	
The color The		0.25	9.25						8.25	8.25	0.25	0.25	0.25	0.25	0.25		
Table 1999		* 77															
Table 1999		418	440	470				716		116	 750			17			
								- 17									
1.		0.0010	8.10	9 0060		8.017 (2)	0.025										
			# CDC#			8.19	9.21							0.29	0.15	0.050	0.045
1.																	197
18	1,000	1.000	1090	1,100	1,129					3.41	 1.440	3.4	3,3	3.3	3.1	3.8	
The color of the														1			
190	. 34	27	27	25			?		67	23.5	910	43	32	905	767	750	36
				774								116		19			
190 190											sits	141	Min	117	141	218	- 40
1. 1. 1. 1. 1. 1. 1. 1.		210	200		211	779	- 101	162	332		 182		309				
1.1											 tin from	10.700	13.600	11.000	4.750	4 6 2 0	1.001
1		9 200			13,690	2:5			1.6	8.6	2.5	1.9		1,1	9.27	1.21	PA1
	7,0		2.6	2.5	2.7	8.50	12		24.6	8,6	 24.5	12.4	4,9	2.7	0.00	8.50	7.3
Column C	22	21	20			6.50			29.7						0,29		
15	HD	0.013	0.025	9.015	0.50	5.9	1.6		1,25	6.5	 6.000	1.625	0.837	0.763	0.9138	0.0075	1 5375
1	HD	110	250	150	75	290								100		151	50
1	1.2	1.2	0.060	1.1						8.5	 6.1	4.9	1,00	1.2	9.54	0.010	1,04
1979 1979	6.0	6.3	7.0	7,9	18	5.0	13.		12.4		 13-9	11.0	8.1			5.0	
15		9.500	12,299			7 199			17499		15.700					2.669	19.584
1	150	125	141		146	115			218	140		. 214			.124	115	
	14	17	19	14					19	8.7	 29	29		167			87
1	ND ND	0.025	9.960	0.025	8.625	0.25	0.097		0.065		 6.298	0.110	1.067	8-02-5	0.015		0.67%
1.49	NO.	8 15	8.24	R-15	0.10		1.0		1.25	84					2.7		
\$\frac{4.90}{6.90}		9.40	0.30		9.20								9.37	0.40	9,29	9.20	0.11
	0,430	3,100	6.000	6,710	7,750	5.940	A 300		6290	4343		0.740					
\$\frac{1}{10}	0.040	469	4 /40 523	556	581		430						404	421		148	86
1	0.64	8.47	9.55	0.52	0.73	9.00	1.0		8.67	9.587	1.00	9.74		0.66	0.51	0.47	0.14
March Marc	ND ND	8.621	8.090	0.025	7.9										1.6		6,7
14-09	9.5	9.5	10	11	17	7.0	18		19.7	7.81	29	. 17	- 11	10	7.3	7.0	3.91
Column C			1.0	0.50	7.5	2%			75,700		25.8 86.990						
17		0.25			0.25	2.5			0.61	9.75	 2.50	0.03	0.01	0.75	0.23	0.000	0.71
1.5	97	- 60	186	195	113	165	120		119	5.61	 129	17.4	199	9.7	7.2	5.0	2.71
15	1.0	7.9	1,1	3,1	4.2	1.5	1,5		1,33	0.779	 4.2	7.6	1.6	1,1	1.0		1.00
\$\frac{1}{2} \begin{align*}{cccccccccccccccccccccccccccccccccccc	8.6	11	13	9.4	12				6.21	1,77	17						
1	152	- 111	199														
The color of the									16719	8776							
Part 15		18	21	75			64		112	22.4	 113	34	24	20	13.6	3.7	29.1
\$\(\frac{1}{2}\) \$\(\frac{1}\) \$\(\frac{1}\) \$\(\frac{1}\) \$\(\frac{1}\) \$\(\frac{1}\) \$\(\frac{1}\) \$\(\fra	- 29		19	18	154	21	1/		132	27.8	 154	118	42	21	17	19.000	49.1
Second Proc. Pro	0.30	0.33	0.005	9.925	9.40	0.30				0.1	1900		0.361	0.563	0.015	6.015	B.4458
198 179	_ND	150	250.	290	-10	26	24		25	25	250	250	114	-50	25		99
The color of the	209	195	229	230		192			210	143	 290		232	130	9.50		2.15
1 1999 1 1 1 1 1 1 1	7.1	7.5	0.8	7.4	16	6,7	13		12.0	0.09	12.7	11.7	8.5	7.4	6.7	8.1	2.18
150 151 152 151 152 151 152 151 152	19,500	11,180	11,200	12 100	12 000	9.629	17,506		14700	9050	 17 500	18,729	12.321		14.000	17.600	
15	19.999		17,200	17,900	25,590	19,079	281		235	152	261	227	172	129	129	137	. 30
\$\frac{1}{2}\$ \$\	15	14	13	15	20	15	18		19	10.0	. 50	, pu	18	.16	13.2	18,990	9.0
\$\frac{1}{2}\$ \$\	26.3	0.025	295	295	8.050	0.025	0.405		0.022	314	4.010	0.060	5 933	0.525	6 821	0.010000	0.015
\$\frac{2}{2}\$ 78 17 22 17 42 17 42 17 42 17 48 14 12 19 25 18 18 18 18 18 17 17 1700 12 18 18 18 18 18 18 18 18 18 18 18 18 18	9.50	1.3	4.2	9.93	1.9.	9.16	8.90		2.6	0.5	19.0	9.7	1,9	0.60	8.68	8.750	3.9
	0.2	7.9		9.3	17	6.0		-	19								
1.50 1.50	6.718	8.540	7.490	6.850	4,900	6.129	8.620		8240	\$560	F.529	8,174	6.951	8.855	4.814	5.560	924
1.50 1.50	0.009	0.079	0.079	9.797	0.066	9.050	0,29	_			0.519						0,139
NO	0.69			0.51	0.79				8.80	0.557	2.00	6.67	9.75	0.05	0.52	9.1900	9.39
	NO	8.058	0.050	8 010	5.0	2.5	2.5		2.5	2.4	 5.00	5.00		7.500		0.0500	1,926
19 19 15 18 19 19 19 19 19 19 19		21			5.0			_		6.33	20	18	12	18.5	14	9.7	3.9
10 10 10 10 10 10 10 10	MD	8 50	10	1.0	1.4	7.5	7.5		76	2.6	18.8	5.0	2.64	2.90	8.40	8.100	7.78
69 69 69 198 198 199 199 192 172 172 172 139 122 185 189 47 72 114 4.4 7.9 8.1 4.2 7.9 14 12,6 2.6 14.3 1.2 2 2 2.1 1.2 2.1 1.2 2.1 1.2 2.1 1.2 2.1 1.2 1.3	50 900	45,000	55,906			46,400	79,600		710000 8 24	9.25		9.50	87,300	0.25	8.25 8.25	8 25	9.13
84 7.79 81 98 17 65 16 12,6 7,67 14,3 12,4 2,8 2,1 4,8 7,9 2,8 2,1 1,3	99	113	195	50	109	97	129.		112	72.4	 129	122	195	190	97	F2	11.0
	8.4	7.9	9.7	1.1	12	6.9					14,3	12.4	13	1.1			
146 141 184 181 113 116 1189 245 215 122 245 215 124 140 140 122 25	9.4	9.4	11	9.1	12	19	4.4		1.59	4.18	 13	12		10	4.7	4.2	2.9
	149	141		191[1]	199	150	245		215	122	 .245	215	124	174	140	122	1 24

PROJECT: COMPANY: STATION NAME: External Lab Analysis TULSEQUAH CHIEF REDFERN RESOURCES LIMITED S400 PORTAL OUTFLOW Historical

r Instituts szam IO		LIMIT	PERMIT								-1			-2	- F B	W. B	15 5-1-57	50 May 60	51.685	10 >- 01		5400 PORTAL	5400	5400 Portal	\$400 Portal	5400 18 Ave 06	541
g Dele & Time				21-May-84	17-Aug-84	17-Sep-94	22-Oct-04	18-Nov-94	23-Jan-85	28-Apr-95	17-May-95	16-Jun-95	12-3:4-95	17-Aug-85	15-Sep-05	01-Dec-95	15-Feb-96	25-Mar-96	24-Apr-96	30-Jun-96		19-346-05	14-Sep-05	13-Oct-05	26-Jul-06	18-Aug-05	1
mbat ETERS																											=
Thesevanare	mg4.																							-		-	+
anics (5)	mg/L				_		-									-							-				\pm
33)	mg/L				-	-																73.5	217	262	479	354	- 2
	mg/L																						1.32	-		-	+
NO3 Preservation	N/A						-			_												_		_			7
BIO3 Preservation	TWIS					-																					7
	mg/L																						0 0005	-		_	-
Parameters						-																	0.182	-		-	-
ganics lotal as CaCO3) nec Carbon (C) PP as CaCO3) te (HCO3)	mg/l.	_		_	_	-																	0.102				
Total as CaCO3)	mg/L																						3				_
rvc Carbon (C)	mg/L mg/L							-								_		-				0.5	45.1	1		1	-
PP es CaCO3)	mg/L mg/L					-	-										_						1			<u> </u>	
(CO3)	mg/L																										Д
(OH)	mg/L mg/L																						-	_			-
Sulphale (SO4)		_		260	200	430	280	530	800	380	530	342	270	630	1.210	685	439	338	3/2	411		264	444	5.38	800	621	
Chlorida (CI)	mg/L mg/L			4100		430	2.00	200	440			-	-										13.7				Ξ
																								-			-
Chloride (CI)	mg/L																							_			\dashv
priate (P)	mg/L mg/L																										d
phate (P) s Némie (N) Properties																							1010	1100	177.5	1476	
fy -	ušiłom																	_				5.11	3 32	3.15	1660	2.99	-
	pH Units																						2 3E	2.10		. 77	
reperties ended Solids éved Solids	mg/L																					28.2 501	75	61.3	106		=
lived Solids	mg/L NTU																					501	0/1	045	1250		Н
panica	NTU				-																		_		1		-
Hardness (CaCOS)	post.	_																				218		29a		315	J
ress (CaCO3)	mg/L mg/L																										_
tertiness (CaCO3) ress (CaCO3) Metals by ICPMS Aumenum (Al)						_																1530	8210	_	-		-
Adumenium (AI)	ug/L																					100	100			-	
hremony (Sir) hreenic (Ae)	ug/L ug/L											-										100	100				_
Banum (BA)	ug/L																					25	2.5	-			-
Barum (Ba) Baryflum (Ba) Baron (B)	ug/L ug/L					_					_											100	100				
Soron (B)	ugh.					-																	50				_
Caldurum (Cit)	ugit.			185	68.2	215	118	287	434	247	252	134	217	216	205	379	427.5	156	560	135		124	247	-			-
Chromium (Cr)	ug/L																	\vdash				4	15	-			-
Cobalt (Co)	ug/L			4777	40.00	40.70	8117	11700	19700	0330	14100	7800	11500	15000	18300	25600	16000	6850	22500	12800		7450	16300	-			-
Copper (Cu)	ug/L			6720	4040	4870	6140	11700	19300	9320	14100	7990	11600	15800	10,000	25600	16000	0030	22900	12000		2280	13440	_			-
ron (Fe)	ug/L		_																			1.4	(23		1		-
Lead (Pb) Lithium (U)	ug/L					-																15	19				J
Menganeea (Mn)	ugit.	-																				140	261				_
Mercury (Hg)	ug/L																										
Mercury (Hg) Molybelenum (Mc)	Ug/,																					19	15	-		_	4
Nechal (Ni)	ug/L					-												_				100	100				
Silicon (Sr)	ug/L																					5360	6190				Ξ
Selver (Ag)	Light,																					135	230	-			4
Strontium (Sr)	ug/L																	-				335 100	100	-	-		-
Mohyddenum (Mo) Nechal (No) Satemum (Se) Satemum (Se) Satemum (Se) Satemum (Se) Satemum (Se) Satemum (Se) Thaillum (Ti) Tin (Se) Talanhum (Ti)	ug/L ug/L																					15	15				
hanken (Tr)	1995																	-				5	5				_
Jesenson (U) Asnedium (V) Zinc (Zn)	ug/s					-																16	116	_	_		_
Anadiym (V)	ug/L ug/L			38 455	21 000	65 150	27.686	51,100	91.850	29.300	88.400	22,200	47.650	51,650	68,560	74.800	7.3 (900)	42,000	66,300	40 300	-	31000	19900				
Zironnium (Zr)	USA.	1		36 400	21,000	93 300	27,000	31,100	11,000	13.000	25, 100	77.700		2.,100													Ξ
Zirosnium (Zr) Calcium (Ca)	ngt.																					77.1 6.14	89.5		-		_
Magneslum (Mg)	mg/L mg/L																					1 1	9.21	_	-	-	-
Fosteren (Ma)	mg/L					_														-		19.5	12.6		-	-	
Sulphur (S)	mg/L mg/L																										_
in by ICPMB																						3930	£290	11000	18700	15000	
Circonam (CF) Cistleton (CA) Listingonabam (Ma) Lis	Jet.	_				_		-														100	100	100	12.6	12.6	J
sc (As)	Ug/L Ug/L																					330	430	470	626	508	
m (Be)	Ug/L Ug/L Ug/L																					29	22	26	24.3	22.2	_
ium (Be)	ug/t,	_												-								100	100	100	3)	
an (60)	ug/L																					50	50	50	100	100	Ξ
num (Cd)	ug/L			171	102	222	125	290	351	268	300	158	224	228	165	408	440	204	403	138		125	250	323	505	386	_
num (Gr)	ug/L ug/L																					5	5	15	(14.2	10.5	-
er (Cu)	ug/L			9440	5580	5826	7210	1800	25500	18400	18500	8630	12700	24500	15700	29000	16600	8640	72500	21200		7900 25200	16400	20700	32900 60400	21100	
Fe)	ug/L																					25200	35400	48100	50400	54800	_
(Pb)	ug/L ug/L																					15	17	115	31.3	50	-
m (Li)	ug/L	-				-																138	263	334	344	445	
ary (199)	ugt, ugt, -																					16		-			_
denum (Mo)	ug/L																					12	25	125	118	113	-
(NI)						-						-										75 160	100	100	10	10	
num (50) n (50)	ug/L ug/L	_																				5730	6330	6850	7370	7510	
IAGI	ugt,																					5	(5	5	10.79	10.26	_
tum (Šr)	197,																					332 160	100	496 100	1	1	-
um (Ti)	ug/L ug/L																	-				15	15	15	i	1	_
ym (Ti)	ugr.									-												5	5	5	19	5	_
um (V)	ugrt.																					16	15	15	112 4	10	-
dsum (V)	ug/L			43400	24500	76600	30460	51700	122000	33600	83300	32400	49400	79600	73100	104000	76500	41900	66800	49600		31500	59600	82900	12/000	67000	
num (Zr)	Jugu.	-		44800	64300	10000	34,900	31/90	122000	2,500	72390	25,100	7,5400		10790											1	_
um (Ca)	mg/L																					77.1	91.2	101	113	105	_
iny (Hy) dependent (Mo) d (NO) seam (Se) n (Se) n (Se) (HA) seam (Se) n (Se) (HA) seam (Th)	mg/L mg/L						-															6 55	9.28	10.9	14 9	12.9	_
ialum (K) im (Na)	mg/L					_																19.2	12.7	4.2	4.5	5.9	
	mg/L				_	_	_																		L		J
dphur (S) n red were reported as N	mg/L iD (Not Detected) a																										

Column C	LVV	LVV	LVV -	LVV	LW	LVV N1837S	LVV ARSS65	LVV AVV9567	tw	LVV BT0212	T2	LW	 MAX	P90	AVERAGE	MEDIAN	P10	MIN	ST DEV
1980 1980	LVV L650132-1 27-Jun-08	K91981 26-Jul-08	L31301 23-Aug-68	L70980 15-Sep-08	M26571 18-Oct-88	N18375 13-Dec-08	ARS565 02-Jun-11	AW9567 26-Jun-11	8L5400 04-Sep-11	BT0212 03-Ocs-11	CH8878 15-Nov-11	Ci0148 05-Dec-11							
188	K1 400 40	F115071	8209378	F117964	8210371	6213212	E8215711	8334401	G038268	G039267	8341526	G039975							
188													-						
188		141	135	123	56	0.25	5e			0.25		88.3			75		0.25	0.25	56
188		385	379	350	198	267	317			52		271	385	1.2	1.0	294	154 0 83	0.71	0.20
1988 1985				,	1		6516	52.5	EE D	- 6610		DE 5							
132 133 135 136				3			PELD	retp				FREED	0.015		0.0013	0.0080	0.0016	a posta	0.0061
12					I														
	0.238		0.25		0.20														0.042
186 186	1.0	0.25	0.75	ND	ND	0.25	ND	0.25	0.25			0.25	 100	0.48	0.34	0.25		0.25	0 61
186 186		0.25	0.25	ND	NO	0.25	ND	0.25	0.25	0.25		0.25	0.25	0.25	0.25	0.25	0.25	0.25	
186 186		0.25	0.75	NÜ.	ON	0.25	NO.	0.25	0.25	0.25		0.25	 0.25	0.25	0.25	0.25	0.25	0.25	Ü .
Table Tabl			0.25		ND	0.25	ND NO	0.25	0.25	0.25		0.25					0.25		
Table Tabl	655	600	520	510	370	490	600				577		 655 2.5	817	1.3	549	454 0.78	370	88 0 66
Page 1,656	4.00								0.043 -3-							0.016			0.028
188 188	0.0048	0.058			0 010	0 0090							 0.068	0.044	0.020	0 0095	0.0061	0 0048	0.025
1						4													
1	1420	1,400	1,500	1,400	1,000	1,100	1,250	1,510	1,400	567 4.8		1170	 1.510	1,500	1,247	1 400	1,000	567 3 D	0 53
100		- 63		NO.	6.2				- 17					112	74	61	46		39
10 10 10 10 10 10 10 10	1070	950	960	920	690	970	960						 1,070	1,022	940	970	828	690	119
14-90	209	-																	
14-90	343	321	306 290	297	223	232	327	401 381	219	196	290	252 245	491 381	337	272 28 i	252	214	196	54
1093 150 160		11.450							-										6.847
1093 150 160		0.40	0.30		1.5	2.4		2.0	2.5	10		0.65	21	5.3	3.5		0.39	0.30	8.2
1093 150 160		22	23	33	41	30	6,810	53	16	25		31.6	6.510		709	31	22	18	2.144
1093 150 160		0.52	0.47	9.50 ND	0.31 ND	0.35	0 60 ND	10		1.10		1.25	5.0	2.6	1.2	1.00	0.015	0.10	1.8
11 10 13 13 15 16 18 19 18 18 19 18 11 12 14 3.9 17		150	150	ND 374		150		50	331	50 115		5E7	250 511	190	331		211	115	114
19.500		- 2.3	2.6	4.0	1.2		13	9.0	5.0	1.0		5.3	 13	9.4	4.5	3.3	1.2	1.0	
No. 19.000 19.000 19.000 19.000 29.0									17,800		-				18,511				
13		24 500	20,800	49,500	20.900	30,000	37.400	25.900	32,300	1 950		28000	49.500	38,610	27,135	28.950	18 915	1.950	
General Color			3.7	51	25	32_		1,270	123	6.0					373		7.9	8.5	6.0
1		464	461	424	232	263	683	2.220	371	128		258	 2.220	837	560	398	222	128	603
		0.025	0.025	OND DAR	ND ND		0,010	0.050	0.25			1.76	 0.25	0.12		0.038	0.021		
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APPENDIX C

Tulsequah River Floodplain Braid Photos

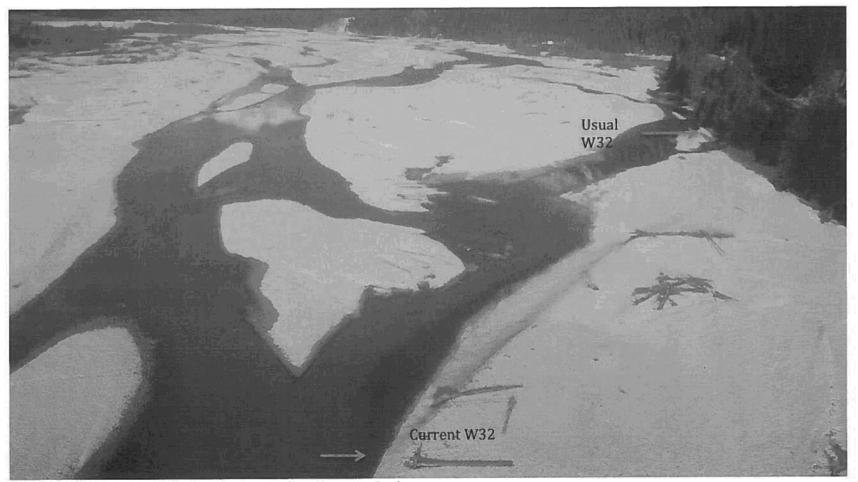
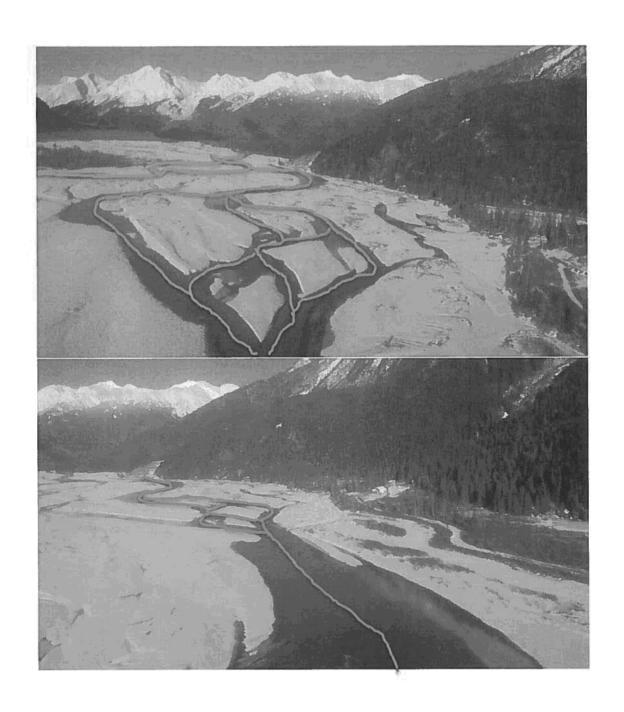
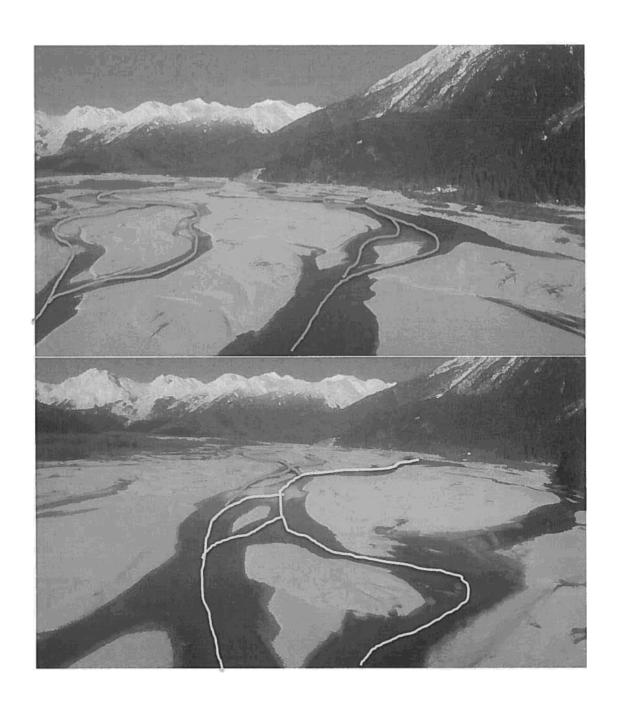
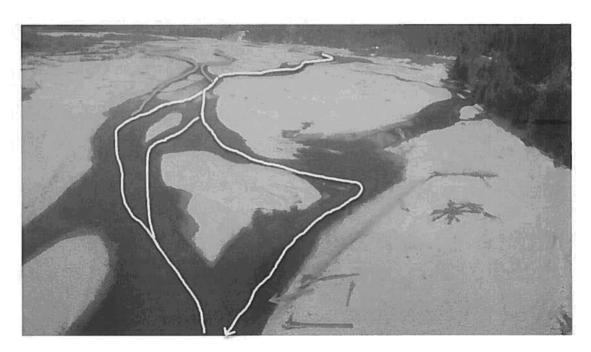


Figure 1 - Revised W32 sample location, downstream from Limestone Creek







The location used to collect the W32 sample in November and January is just upstream of the confluence of two braids. The February sample will be collected downstream of the confluence instead. The recent measured concentrations have been lower than historical values for this station. This may be a result of the braids having differing concentrations. However, it may also be a result of the Exfiltration Pond now discharging to the dry flood plain rather than in to the river water.

APPENDICE

F. MEM Response Letter



Province of British Columbia MINISTRY OF ENERGY AND MINES Report of Inspector of Mines

Reclamation

(Issued pursuant to Section 15 of the Mines Act)

Inspection No.:

59777

File:

«FILE_NO»

Mine No.: Permit No.: 0100019 M-232

Emp/Cont:

1 2

Orders :

Stop Work:

Mine Name:

Tulsequah Chief

Location:

Atlin MD / 58.737, -133.600

Owner, Manager:

Keith Boyle, Terry Zanger

Company:

Chieftain Metals Inc

Address:

Unit 118, 1515 Broadway Street

Port Coquitlam BC V3C 6M2

Workers Contacted:

1

Type of Mining:

METAL MINE UNDERGROUND

Date of Inspection:

2015/10/15

Accompanying Inspectors:

Mark Love (MOE), Neil Bailey (MOE)

Copies to

Al Hoffman, Doug Flynn, Heather Narynski, Mark Love (MOE), Chris Parks (EAO)

Written response is required from the Mine Manager within 15 days of receiving the report. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

This inspection of Tulsequah Chief Mine, owned by Chleftain Metals Inc (CMI) was conducted on October 15, 2015 by Diane Howe (MEM Deputy Chief Inspector-Permitting), Nell Balley (MOE Compliance), and Mark Love (MOE Director), accompanied by Terry Zanger (Chieftain Mine Manager) and Rob Marsland (environmental engineer, Chieftain Contactor). Access to the site was via helicopter from Atlin (45 mins). The weather at the site was cloudy/overcast in the morning changing to a drizzle with snow predicted later in the afternoon in Atlin. Access using the helicopter limited the inspection to 3.5 hours.

At the time of the inspection, 2 employees and 1 contractor were in camp, completing their monthly monitoring requirements and preparing the camp for winter. The mine has been on a care and maintenance status since June 2012.

The purpose of this inspection was visit the surface works at the mine and provide an opportunity to become familiar with the site and specifically:

- To assess if the mine is meeting the intent of their mine permit (M-232), the HSRCode and Mines Act,
- To assess if mine monitoring and management practices at the mine are consistent with generally acceptable practices at mines in BC that are on care and maintenance; and

Diane Howe	
Deputy Chief Inspector	Signature – Inspector of Mines
6th Floor, 1810 Blanshard St., Victoria	Report Date: November 9, 2015
Address	

To provide general comment on conditions at the mine.

The following areas were inspected during the mine visit:

- · Lime Sludge Pit at Shaza airstrip
- 5400 portal area
- 5200 portal area
- Minesite exfiltration pond
- Mine Acid Water Treatment Plant (AWTP)
- Cleared areas around Rogers Creek (future location of HPAG, NAG waste rock dumps)

The following reports provided a general understanding of the current conditions of the site: the 2014 Annual Reclamation Report, 2014 Annual Environmental Monitoring report and the 2015 Closure Management Manual submitted to MEM, as well as the observations and discussion that occurred on-site and during the inspection. This report documents MEM's observations related to requirements of the M-232 permit, the Health, Safety and Reclamation Code for Mines in BC, and established best practices.

Note space has been provided after each Order/recommendation for the Mine managers response.

Background

The mine is a historical, small, underground base metal operation which saw production from 1951 to 1957; (pre reclamation legislation) at which time the mine closed due to low metal prices. There still remains today legacy metal leaching/acid mine drainage/ (ML/ARD) concerns with water moving through the underground workings picking up contamination and discharging through the lower portals, plus surface drainage from the historical PAG waste rock left on site. There are no tailings facilities on site. Total disturbance reported in the 2014 Annual Reclamation Report was 105.8 ha, with ~50% being road construction.

In 2007 the company (then Redfern Resources Ltd.) applied for and received a Mines Act permit for limited construction works. This application was to allow the company to start with the clean-up of historical waste rock and dumps and construct water management structures to support the water treatment plant (WTP). In 2008 the company applied for an amendment to their mine permit which would have led to a full production permit, however the company went into bankruptcy protection. A limited amount of construction works permitted have been completed to date, critical however was the purchase of the water treatment plant (WTP).

In early 2010 the mine acquired by Chieftain Metals Inc. (CMI), who have now responsible for all liability existing on site under the Mines Act. One of CMI's first actions was to construct and start operating the WTP. The WTP was commissioned in October 2011 but was suspended in June 2012 because the plant had been operating below design levels of efficiency resulting in higher than expected operating costs. The design flaw is in the sludge production not in the quality of effluent being produced. The plant remains idle pending an upgrade to the sludge settling efficiency. Of note is the long term plan for sludge management was to dispose underground, however with the underground not in operation the company had to find an alternative disposal location for high slurry sludge

Date of Inspection November 9, 2015 Initials (Inspector) Initials (Manager)

The mine remains on care and maintenance and remains unattended with only bi-weekly surveillance and environmental sampling visits. Remote monitoring is provided by building alarms and security cameras with satellite communication connections. If alarms are triggered, personal based in Whitehorse or Atlin will attend the site.

Inspection Observations

Lime Sludge Pit at Shaza Strip

The temporary lime sludge storage pit, located just off the airstrip, contains approximate 35m³ of sludge generated from the WTP and is lined with a filter fabric to prevent migration of the sludge to the subsurface gravel. No deposition has occurred since the WTP shut down in June 2012. CMI maintains monitoring from 3 groundwater wells. CMI has committed, should mine operations not resume, to relocating the sludge to a secure location to the Rogers Creek area, which will be capped and re-vegetated.





Photo 1: Lime Sludge Pit Shaza AirStrip.

Photo 2: Shaza Airstrip location of Sludge Pit

5400 portal drainage

The 5400 portal, the upper most accessible portal, has been appropriately signed with "Danger No Entry" signage and is currently blocked by locked wooden doors. Limited work has been done at this portal site other than to remove the historic track from the underground and reconfigure the drainage exiting the portal. In 2011 CMI separated the acidic from non-acidic drainage Inside the mine and today the non-acidic drainage (in black pipe Photo 3) is conveyed to Portal Creek where they are combined (photo 4) and directly discharged to the Tulsequah River via a buried (partial) 800mm HDPE pipeline.

The acidic drainage seen exiting the mine as an orange flow (approx. 1L/s)(Photo 3) is captured in a pipe near the portal and is directly conveyed by a buried pipeline to the exfittration pond located near the Tulsequah River. All drainage from the 5400 portal has been directed away from the historical waste thus limiting contaminated flows. (Photos 5 and 6)

Date of Inspection

November 9, 2015

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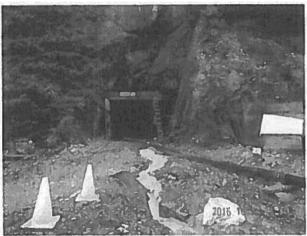


Photo 3:. The black pipe is diverting neutral drainage captured underground; The Fe stained drainage (acidic) is flowing freely from the portal and is captured in a pipe in the foreground.



Photo 4: The neutral drainage is combined with the Portal Creek drainage into a HDPE pipe and diverted away from historical waste rock to the Tulsequah River



Photo 5: The black pipe (arrow) is the acidic discharge from the 5400 portal. Portal Creek and the combined non-acidic drainage discharge to the left of the picture in an underground HDPE pipe.



Photo 6: showing the historical PAG rock left from early mining. The ~80,000 tonnes of material to be relocated once mining restarts to the PAG dump on Rogers Creek.

5200 Portal

The 5200 portal, the lower most accessible portal is appropriately signed with "Danger No Entry" signs but the wood door is open to allow the passage of the discharge pipe seen in photo (Photo 7). Within 300 meters inside the entrance however, is a 1.8 m high dam used as part of an inactive passive water treatment system and the tunnel beyond is partially flooded. Acidic flow from this portal; which also includes partial flow from the 5400 and 5900 levels, averages ~ 7L/s.

At the time of this inspection, the 5200 acidic discharge was being directly discharged to the Tulsequah River (Photo 8). MOE officials accompanying the author sampled at the end of pipe at this location. It is understood that the direct discharge to the Tulsequah River was also done last year during the high flow period in order to minimize sludge build up in the exfiltration pond thereby and reducing the hydraulic loading on the pond. (MEM understands this direct discharge has not approved by MOE and discussions are ongoing.)

Date of Inspection

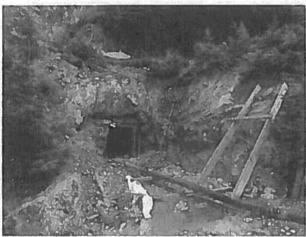
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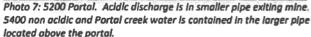




Photo 8: 5200 acidic portal discharge to Tulsequah River

Notable in Photo 7 is the 600mm HDPE pipe over top of the 5200 Portal entrance which is conveying the Portal Creek and 5400 non-acidic drainage to the Tulsequah River. The pipe requires ongoing monitoring and maintenance because of rock falling onto the pipe and at times crushing the pipe causing leakage. From the photo it can be seen the pipe is currently leaking with water spilling down to pond in front of the Portal. This pond drains into the ex-filtration pond via ditching and a culvert under the road.

Ex Filtration Pond

The observed ex-filtration pond was constructed in 2011 and was reportedly built to capture site drainage from the PAG waste dumps (Photos 9-11). Currently it is being used to capture all drainage, including the portal drainage, where the contaminated discharge is allowed to ex-filtrate through the road berm to the Tuisequah River (Photo 12). A filter fabric is used to prevent the migration of the Fe sludge into the dam rock void spaces would effectively block the diffuse flow. As noted in the 2014 ARR the sludge built up in 2013/14 nearly causing the pond to overflow requiring remediation to be taken by the company. (Note this incident was not reported to MEM)

A review of the applications submitted to MEM show the current ex filtration pond has not been built in accordance with the designs provided to the province. (Note MEM has not approved the design, construction or operation of this pond.)

A significant concern is the proper operation of the pond given there is no spillway observed and there is no continuous onsite presence.

Date of Inspection November 9, 2015 Initials (Inspector) Initials (Manage



Photo 9: Exfiltration pond receiving ditch water from the 5200 portal



Photo 10: Exfiltration pond receiving acidic discharge from the 5400 portal



Photo 11 Exfiltration pond. Note high water level of sludge.



Photo 12: Diffuse discharge location through berm onto the Tulsequah river floodplain.

Acid Water Treatment Plant (WTP)

The WTP was constructed in its current location in 2011 after receiving approvals from the province to relocate and upgrade the previously proposed WTP (Photos 13, 14). The WTP is designed to treat acidic discharge on a temporary basis until the upper mine workings could be backfilled as per the mine design proposed in 2009. The plant ran from October 2011 till June 22, 2012 at which time operations were suspended due to operational issues. Since that time the company has sought guidance on process modification strategies to address the high operating costs. CMI has stated they are committed to re-commissioning the WTP at the earliest time upon completion of full project financing.

Noted during the Inspection, beside the WTP, was another sludge pond which has not been approved by MEM (Photo 15)

Date of Inspection

November 9, 2015

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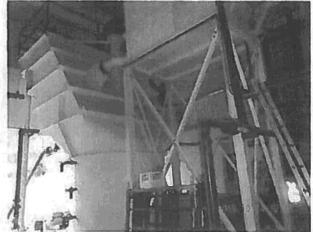


Photo 13: Acid Water Treatment Plant

Photo 14: Inside the AWTP

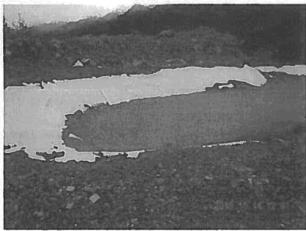




Photo 15: Temporay Sludge pond beside AWTP

Photo 16: Site Collection Pond

Rogers Creek Area (HPAG and NAG areas)

Other than clearing, and some minor construction of berms the areas reserved for PAG and NAG waste rock storage has been minimal (Photo 18). Access to these areas from the main mine site is good; the causeway remains in good condition (Photo 17).

Date of Inspection

November 9, 2015

Initials

(Inspector)

Initials







Photo 17; Causeway between mine and Rogers Creek area-

Photo 18: Clearing for the PAG and NAG waste rock areas.

Orders

The following orders are summarized based on observations and discussions that occurred on-site:

 Pursuant to HSRC 10.5.1 and 10.5.2, the company shall provide to the Chief Inspector by March 31, 2016, or earlier, an asbuilt report for the exfiltration pond signed by a qualified professional engineer.

Managers response:

Acknowledged. Chieftain will provide an as-built report for the exfiltration pond signed by a qualified professional engineer by March 31, 2016.

 Pursuant to HSRC 10.5.2, the company shall provide to the Chief Inspector by March 31, 2016, or earlier an Operation, Maintenance and Surveillance manual for the exfiltration pond operations to include all other water management structures, including diversion structures.

Managers response:

Acknowledged. Chieftain will provide an Operation, Maintenance and Surveillance manual for the exfiltration pond operations which will include all other water management structures, including diversion structures by March 3),2016.

Information Requirements

The following information requirements are summarized based on observations and discussions that occurred on-site

 Prior to resuming operations of the sludge pond located beside the WTP, CMI shall provide to the Chief Inspector a final "as built" for the pond, and an operations, maintenance and surveillance manual. This may be combined with the OMS for the WTP once operations resume.

Date of Inspection November 9, 2015 Initials (Inspector) Initials (Manager

Report of Inspector of Mines Page 9 of 9
/lanagers response: Acknowledged
 CMI shall provide in the next annual report or upon restart of operations, which ever comes sooner, a plan for the decommissioning of this pond
Managers response: Acknowledged. Chieftain will provide a plan for the decommissioning of the sludge pond located beside the WTP in the next annual report or upon restart of operations, which ever comes sooner.
 Prior to resuming operations of the WTP, CMI shall provide to the Chief Inspector final electrical line diagrams and building construction plans signed and sealed by a qualified professional.
Alanagers response: Acknowledged. Chieftain will provide final electrical line diagrams and building construction plans for the WTP signed and sealed by a qualified professional prior to resuming operations of the WTP.
Conclusion The October 15 th , 2015 inspection provided an excellent overview of the current mine site conditions and ongoing activities. Although the mine is on care and maintenance CMI continues to fulfill their obligations for monitoring and maintenance of the site. While the company does remain vigilant in this regard, this inspection has found that communication with the Province with respect to obtaining approvals and reporting issues need to be improved.
Date of Inspection November 9, 2015 Initials (Inspector) Initials (Manager)

APPENDICE

G. Application to amend MA Permit M-232

Page 217 to/à Page 218

Withheld pursuant to/removed as

DUPLICATE

Metcalfe, Megan MEM:EX

From: Keith Boyle <keith.boyle@chieftainmetals.com> Sent: Monday, February 22, 2016 8:03 AM To: Janfada, Arash ENV:EX Love, Mark P ENV:EX; Howe, Diane J MEM:EX; Leta McCulloch; Rob Marsland Cc: Subject: Application form for EMA Permit Amendment 001.pdf; ATT00001.txt **Attachments: Categories:** d Filing Arash, Please find attached the permit application form for the EMA permit amendment. Should you have any further questions, please feel free to contact me. Cheers, Keith



Ministry of Environment Pre-Authorization# Tracking#

Environmental Management Branch Business Services Section PO Box 9377 Stn Prov Govt Victoria, BC V8W 9M1 Fax: (250) 356-0299

Courier delivery address: Ministry of Environment, Environmental Management Branch, Business Services Section 3rd Floor, 2975 Jutland Rd., Victoria BC V8T 5J9

Application for an Authorization to Discharge Waste under the Environmental Management Act

This Application Form can be submitted to the Ministry of Environment by mail or courier. If paying by CREDIT CARD, the signed Payment Form and Application Form can be faxed.

INSTRUCTIONS:

- 1. If you are completing this form by hand, please PRINT clearly. All fields marked with an asterisk* must be completed. Please visit http://www.env.gov.bc.ca/epd/waste_discharge_auth/index.htm to review the information and Guidance Documents that will assist you in understanding the application process and any other documents that may be required.
- 2. If a New Permit, New Approval or New Operational Certificate is required, please use this application form.

A **Permit** is an Authorization to discharge waste to the environment.

An **Approval** is an Authorization to discharge waste to the environment for a maximum of 15 months. An **Operational Certificate** is a set of conditions issued by the Ministry of Environment for facilities included in a solid or liquid Waste Management Plan.

A new application is a multi-step process that requires submission of a preliminary application, followed by meetings with Ministry staff, followed by submission of a final application together with the application fee and Payment Form (\$200 for a Permit; \$100 plus variable fee for an Approval).

Preliminary Application: All fields on Pages 1 to 3 marked with an asterisk * must be completed for the submission of a preliminary application.

Final Application: Sign and date your final application at the bottom of Page 3. Include your Pre-Authorization# and Tracking# in the fields on Page 1. Pages 1 - 4 and 6 must be completed for the submission of a final application. Page 5 is only required if your regional representative advised that a Technical Assessment Report is not required.

3. Your regional representative will advise you of any additional documents (such as Environmental Protection Notice, Site Plan(s), Location Map, Consultation Report, Technical Assessment Report) that are required for your application.

*Purpose or
Application
[e.g., to discharge air
emissions from
a sawmill)

The Tulsequah Chief Mine Project is currently on care and maintenance. Chieftain Metals Inc. ("CMI") is requesting amendment of EMA Permit 105719 related to the effluent discharge and operations of the interim acid water treatment plant ("IWTP"), to reflect the current conditions, until such a time when the IWTP is re-started. A revised Environmental Monitoring and Surveillance Plan including amended monitoring, sampling frequency and analysis requirements is requested as outlined and included in the application with attached" "Tulsequah Chief Mine Project, Environmental Monitoring and Surveillance Plan: Care & Maintenance (2016+)"

requested as outlined and included in the application with attached" "Tulsequah Chief Mine Project, Environmental Monitoring and Surveillance Plan: Care & Maintenance (2016+)"					
ls this Authorizat	tion require	ed for remedia	tion of a contamir	nated site? 🖂 Yes 🗌 No	
Authorization T	ype:	Permit	Approval	Operational Certificate	

		d Agent Information an Authorized Agent for the	Applicant)
Agent's Company Name OR First and Last Name			
Agent Numbers [e.g., (999) 999-9999]	Phone:	Cell:	Fax:
[cig., (222) 222)			
E-mail Address			
	Applicant's A	uthorization for Agent	
I / we (applicant) hereby authorize			
to deal with the Ministry directly on	all aspects of this application	Դ.	(Agent)
Applicant's Name		**	·
•			
Signature of Applicant (not Agent or	Representative)		Date (month dd man)
.,		orizing an agent or represe	Date (month.dd.yyyy) ntative to act on your behalf.)
(Must be th	Applicate name of the company of	ant Information r person seeking author	ization, NOT the Agent)
*Company Legal Name (as registered with the BC Registrar of Companies) O Individual's Full Legal Name			
Doing Business As (if applicable)		-4-	
*Applicant Numbers [e.g., (999) 999-9999]	Phone:	Cell:	Fax:
	(416) 479-5410		(416) 479-5420
E-mail Address			
*Legal Address (as registered with BC Registrar of Companies) Suite 2000 Toronto, ON M4E 3E2			
*Mailing Address (if different from above) 2 Bloor Street West Suite 2510 Toronto, ON M4E 3E2			
*Billing Address (if different from abo	ve)		
Nearest Municipality to Facility/Site none - Stikine Region is unincorporated; closest town is Atlin (unincorporated)			own is Atlin (unincorporated)

	(Name of pers		ation for this Application contact for this Application,		t)
*Contact First and Last N	ame Keith Boyle				
*Contact Numbers	Pho	ne:	Cell:		Fax:
[e.g., (999) 999-9999]	(416) 479-5414	(416) 627-0659		(416) 479-5420
E-mail Address	keith.boyle@ch	ieftainmetals.com			
		Facility Loca	tion and Information		
*Facility Type and Description (describe the primary activity of the facility) Interim acid water treatment plant that is currently inactive in care and maintenance producing zero effluent and zero byproduct sludge. When in operation the plant receives acid mine drainage water and uses lime and flocculants to precipitate metals to produce treated effluent and iron oxyhydroxide sludge byproduct.					ainage water and uses lime and
NAICS Code		Regional District	Stikine Region (unincorp	orated)	
*Facility Location:				Source of	Data: GPS Survey
*Latitude 58.73607865	;		N		443
*Longitude 133.6036194			W	Other (Ple	ease list)
(Must	be in decimal degree	s format)			
*Either Legal Land Descr	iption or PID/PIN/Cro	own File Number is	required.		
Legal Land Description (Lot/Block/Plan)	Mineral Claim Title	ID: 590422; Owner:	248384 CHIEFTAIN METAL	S INC. 100.0%	Mines Act Permit M-232
OR					
PID/PIN/Crown File No.	(If necessary, attach	a separate page.)			
*Facility Address (civic address) [e.g., 1234 Main Street, Vancouver, BC, V8W 9M1 OR if no civic address, describe location e.g., 3 km North of Sechelt, BC on Highway 101]					
*Is Applicant Legal Land	Owner?	es 🛛 No (*If No, p	olease provide details below)	
Legal Land Owner Name	Crov	vn, Province of Briti	sh Columbia		
Legal Land Owner Numb	pers Phoi	ne:	Cell:		Fax:
[e.g., (999) 999-9999]			7		
E-mail Address			11		H.
		1997			
*Facility Operator/Site Contact First and Last Name		y Zanger			
*Facility Operator/Site Contact		ne:	Cell:		Fax:
Numbers [e.g., (999) 999-	(867) 667-7499			u d
E-mail Address	terry	zanger@chieftainn	netals.com		Н
111				Feb 12,	2016
1//	/				nonth.dd.yyyy)
Signature of Applicant (9	r Agent, if applicable)	_			*****

Application for an Authorization to Discharge Waste under the Environmental Management Act

Page 3 of 6

				nd Associated De age for each Disch			
*Description of Discharge Source	Untreated acid r	mine drainage wat	er effulent				
*Discharge Type: (select all that app	ly) 🗌 Air	☑ Effluent ☐ R	efuse	_ = = +-	orbogy"		
Proposed Treatme (effluent disposal r identified, i.e., subs	nethod must be		effluent to Tulse	equah River throu	gh exfiltration pon	d	
*Discharge Locati	on (if different fro	m facility location):	1 5)		*Source o	of Data: GPS	☐ Survey
*Latitude 58.73	602524		N				
*Longitude 133.6			W		Other (Pl	ease list)	
,	(Must be in dec	imal degrees forma	t)				
*Fither Legal Land	d Description or P	PID/PIN/Crown File	Number is requ	iired			
Legal Land Descri (Lot/Block/Plan)					TALS INC. 100.0% -	Mines Act Pern	nit M-232
ÓR							
	le No. (If necessa	ıry, attach a separa	te page.)				
		44	Rate of Disc	charge (Flow)			
Minimum Discharge Rate	Average Discharge Rate	Maximum Discharge Rate	Units	Duration	Duration Units [e.g., hrs/day]	Frequency	Frequency Units [e.g., days/week]
		Contam	ninants or Para	meters in the Di	scharge		
Parameter	or Contaminant	Name	Minimum	Average	Maxi	mum	Units
			**				
<u> </u>	<u></u>						
			Addan	other page	Pemove page		

Application for an Authorization to Discharge Waste under the Environmental Management Act

Receiving Environment

Complete all pertinent fields.

CHAR	ACTERISTICS OF RECEIVING ENVIRONMENT
Distance to nearest surface water (metres)	
Low water dilution ratio	
Name of water body	
Flushing rate (years)	
Precipitation (mm/y)	
Distance to highest water table (metres)	
Soil Type and profile (to 3 metres depth)	
Other	
	DISTANCE TO SPECIFIED FEATURES
Water Well (metres)	
Reservoir (metres)	
Dwelling (metres)	
Serviced Lot (metres)	
Recreational Area (metres)	
Residential or Health Care Facility (metres)	
Other Distance (metres)	
	LAND USE/AMBIENT GUIDELINES
Background water/air Quality	
Plume/Dispersion modeling results	
Other Discharges near your location	

Payment Form \$200 Amount of Payment Submitted **Form of Payment** The Ministry of Environment accepts AMERICAN EXPRESS, MASTERCARD or VISA as well as cheque or money order. Please indicate how you will be paying: ☐ Cheque ☐ Money Order ☒ Credit Card (Please provide your credit card information in the area below) **Cheque or Money Order Payment Option** For payment by Cheque or money order please make payable to Minister of Finance and mail to the appropriate address below. Name as it appears on cheque or money order: **Credit Card Payment Option** Do not complete this section if you are paying by cheque or money order. Please bill my: AMERICAN EXPRESS MASTERCARD Name as it appears on Credit Card Keith Boyle, Chieftain Metals Inc Name of applicant if different than name on Card Contact telephone number for Cardholder 416 479-5414 s.21 Credit Card Number s.21 Credit Card Expiry Date Signature Credit card information provided on this form will not be retained. Upon authorization of payment request, this page will be destroyed. Mailing and Contact Information You can MAIL your completed application form with a cheque, money order or this credit card payment form to: **Environmental Management Branch** Ministry Of Environment PO Box 9377 Stn Prov Govt Victoria, BC V8W 9M1 Or **DELIVER** by courier to: 3rd Floor, 2975 Jutland Road, Victoria, BC V8T 5J9 You can FAX your completed application form and this credit card payment form to: (250) 356-0299

Application for an Authorization to Discharge Waste under the Environmental Management Act

Print Form

Reset Form

Metcalfe, Megan MEM:EX

From: Keith Boyle <keith.boyle@chieftainmetals.com>

Sent: Tuesday, March 29, 2016 11:53 AM

To: Howe, Diane J MEM:EX; candace.caunce@gov.bc.ca; Cousins, Autumn EAO:EX

Cc: Telford Eric; Love, Mark P ENV:EX; Rob Marsland

Subject: Chieftain Metals Corp's Compliance Plan - Tulsequah Chief Mine

Attachments: 20160329 Letter Exfiltration Pond OMS.pdf; 20160329

Exfiltration_Pond_OMS_Asbuilt_Checklist.pdf

Dear Ms. Howe, Ms. Caunce and Ms. Cousins;

Please accept our submission as per the compliance plan submitted on February 8, 2016.

Regards,

Keith Boyle

COO

Chieftain Metals Corp.

CHIEFTAIN METALS INC. TULSEQUAH CHIEF PROJECT EXFILTRATION POND OMS MANUAL

MARCH 2016



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LIST OF APPENDICES

Appendix A	Exfiltration Pond As-Built Description and Spillway Design
Appendix B	Exfiltration Pond Site Surveillance Checklist

1 Introduction

This document is provided to fulfill the following requirement issued by MEM on November 9, 2015:

Pursuant to HSRC 10.5.2, the company shall provide to the Chief Inspector, by March 31, 2016 or earlier, an Operation, Maintenance and Surveillance Manual for the Exfiltration Pond operations, to include all other water management structures, including diversion structures.

The Tulsequah Chief Mine Exfiltration Pond was built initially to provide sediment control during site construction activities. The original structures were put in place in the summer of 2008. An internal berm was created to trap most of the sediment and then the road base, constructed of rockfill overlain by filter fabric, was used to serve as a "polishing" pond. This limited facility remained in place until the summer of 2011.

That summer, as construction of the Interim Water Treatment Plant began, the road was raised to its current elevation of roughly El 47.0 m. In addition, a layer of coarse riprap was placed along the downstream face to provide additional stabilization against the force of jokulhaup derived flooding in the Tulsequah River. The 'As-built' condition of the Exfiltration Pond is described in SNT (2016) and is included in Appendix A.

At the same time, Portal Creek was directed into a 900 mm diameter HDPE pipe and diverted across the mine site to discharge to the river without contacting PAG waste rock. Furthermore, the 5400 adit discharge was separated underground and brought to surface as separate acidic and neutral pH mine water flows. The neutral mine water (NMW) is combined with the Portal Creek flow and routed directly to the river. The acidic discharge is conveyed across the 5400 waste dump in an HDPE pipe and currently discharges to the Exfiltration Pond, along with seepage water from the 5400 dump and other site runoff.

The 5200 portal discharge can be collected in an HDPE pipe, but most of the time simply flows in a shallow trench across the 5200 waste dump until discharging in to the Exfiltration Pond.

2 DESIGN BASIS

2.1 Design Criteria

There were no specific criteria for the Exfiltration Pond. In 2011, it was conceived to detain excess runoff that exceeded the pumping capacity to the ATP Feed Pond. The rockfill construction, wide (4.0 m) dam crest, low dam height (max 4.5 m) and stable slopes (1.75:1 upstream, 1.1:1 downstream) ensure a geotechnically and hydraulically stable structure. The

planned spillway is oversized and will be able to handle any predictable flows. By having a spillway, if the increasing hydraulic resistance resulting from a gradual buildup of sludge causes the pond level to rise, the excess water will simply flow through the designated channel, rather than over the lowest point in the road. Again, the pervious rockfill ensures stability.

2.2 Consequence of Failure

SNT Engineering estimated the maximum storage volume of the pond to be 1760 m³. Guidance for dam failure consequence classifications are provided by the BC FLNRO (2011). The exfiltration pond could be considered to have a "low" consequence of failure for the following reasons:

- There is no possibility of loss of life other than through unforeseeable misadventure.
- Minimal short-term loss or deterioration and no long-term loss or deterioration of (a) fisheries
 habitat or wildlife habitat, (b) rare or endangered species, or (c) unique landscapes or sites of
 cultural significance.
- Minimal economic losses mostly limited to the dam owner's property, with virtually no preexisting potential for development within the dam inundation zone.

3 OPERATION

There are no operating procedures, per se. Redirecting the 5200 Portal discharge to the Tulsequah River seasonally, to bypass the Exfiltration Pond, helps reduce the rate of sludge building on the filter fabric which in turn reduces likelihood of spillway discharge and the need to replace the filter fabric.

4 SURVEILLANCE

A checklist for surveillance is provided in Appendix B. The key items to monitor for are:

- dam stability
- · diversion works integrity
- · conveyance capacity of the filter cloth

4.1 Surveillance Frequency and Trigger Levels

The Exfiltration Pond and associated water diversion appurtenances are inspected daily/weekly when personnel are based at site or whenever site visits are scheduled, if less often.

4.2 Dam Stability Monitoring

Dam Crest

 Evidence of settlement of the dam crests must be checked for regularly, and confirmed by survey as required.

Dam Toe

 Evidence of abundant seepage must be checked for regularly. Unusual amount of seepage at a single location, may be evidence of pending dam stability issues and must be brought to the attention of SNT or another qualified civil/geotechnical engineer.

Dam Face

- Evidence of cracking or slumping on any of the dam faces may be an indication of a dam stability issue and must be brought to the attention of a geotechnical engineer.
- Check for erosion of berm by jokulhaups scour/undercutting, displacement of riprap or rockfill.

4.3 Monitoring of Diversion Works

Portal Creek Diversion

- Ensure inlet remains clear especially in autumn (late August/September when leaves drop from trees and the build-up of organic matter and coarse sediment washing down creek can obscure the inlet screen).
- Ensure flow remains in diversion pipe/channel at least until flow has passed beyond the 5200 portal area so that the hydraulic loading to the Exfiltration Pond is minimized (especially during snow melt period).
- Look for increased damage to the pipe due to rock-fall.

Neutral Mine Water (NMW)

Ensure NMW discharge is directed to the inlet of the Portal Creek diversion.

5200 Portal Discharge

 Re-route 5200 portal flow away from pond and into the Tulsequah River by an alternate route during summer months, when river flows are higher and TSS in river is naturally elevated (June to October) to reduce rate of sediment build-up on filter fabric,

5400 Portal Discharge

Ensure acidic flow can enter the collection pipe, rather than flowing over the waste rock,

 Ensure pipe integrity is maintained when freezing conditions decrease portal discharge flow and potentially cause ice blockage in pipeline,

4.4 Conveyance Capacity of the Filter Cloth

- Check for blinding of filter cloth leading to overtopping (prior to spillway construction) or discharge through the spillway (once spillway is installed in May 2016)
- Ensure no iron staining in spillway (evidence of surface discharge). If pond level enters spillway, it is time to make arrangements to replace the filter fabric on the upstream face.
- Ensure diffuse discharge to river bed during snow melt in March/April and in to May
 when pond flows are highest but river flow is still relatively low. If all seepage flow is at a
 single location, that suggests damage to the filter cloth resulting in a preferential
 flowpath, and it is time to make arrangements to replace the filter fabric on the upstream
 face.

4.5 Documentation and Reporting

Documentation is to be prepared by the Site Inspector as part of the Annual Inspection report, incorporating all surveillance and maintenance data and results of all water sampling. The Site Inspector is to submit completed Inspection Forms with the Annual Inspection report.

5 MAINTENANCE

The maintenance objective is to ensure that all facilities remain in good condition and are capable of functioning as designed under severe conditions, up to and including their design events.

5.1 Routine and Preventative Maintenance

Routine maintenance at Tulsequah is predicated on response to items noted during routine surveillance and environmental monitoring of the facilities. There is no need for any regularly scheduled maintenance, per se.

5.2 Event-Driven Maintenance

There are four primary event driven maintenance activities:

- Repairs to the berm following a jokulhaup.
- Replacement of the filter fabric on the berm face if water levels rise to the point of surface discharge through the spillway.
- Clean-out of the Portal Creek diversion inlet if there is an excessive accumulation of gravel and organic detritus.
- Repairs to Portal Creek diversion when additional rock falls further damage the pipe.

5.3 Documentation and Reporting

Documentation and reporting is the responsibility of the Site Inspector:

- For routine maintenance note any maintenance activities undertaken for inclusion with annual inspection report; and
- For event-driven surveillance and associated maintenance, prepare incident report appropriate to the severity of impact.

6 EMERGENCY PREPAREDNESS AND RESPONSE

Information provided in this section is extracted from Chieftain's Emergency Response Plan (ERP), dated June 2015. These procedures are intended for use when an incident occurs that seriously affects the environment, property, and infrastructure or endangers lives.

An Environmental Emergency is defined as a release of contaminants to the environment without authorization. This could be a loss of iron sludge as a result of berm failure. It also would include the loss of sludge-containing water over the spillway during a major storm event,

or anything that may have an adverse effect on the receiving environment.

In addition to potential environmental emergencies, where a release of solids has occurred, there are also "structural emergencies" where evidence of potential physical instability is observed but no release has yet occurred. These include major blockages in the spillways or diversion channels, slumping or cracking on the berm, major seeps or boils. Such items need to be brought to the attention of the Mine Manager immediately and may necessitate implementation of remedial action. The Emergency Response Protocol is summarized in Table 6-1.

Table 6-1 Emergency Response Protocol

Person Responsible	Action Required	Urgency	Comments
Person finding the problem.	Take appropriate action.	Immediate	Take steps to contain and minimize the impact on the environment.
	2. Notify Mine Manager	Immediate	Provide information: 1. Type of emergency. 2. Product involved. 3. Location of emergency. 4. Measures being taken
Mine Manager	 Decide on action necessary to mitigate Notify appropriate Regulatory Agencies Notify other MEM staff. 	Immediate As soon as practical	The agency notified will be as per legal requirements for the type of emergency involved.
	Notify geotechnical engineer (e.g., SNT) if deemed necessary	practical	
MEM	Decide on action necessary to mitigate impacts.	As soon as possible	

Provide information as follows:

- a) the reporting person's name and telephone number;
- b) the location and time of the discharge or failure;
- c) the type and quantity of the substance released;
- d) the cause of the discharge;
- e) action taken to stop, contain and minimize the effects of the discharge;
- f) time discharge was contained and stopped;
- g) a description of the discharge location and of the area surrounding the discharge, i.e., location relative to watercourses;
- h) the names of the agencies on the scene; and
- i) the names of the other persons or agencies advised concerning the discharge.

For all incidents:

- Keep a record of information reported to PEP, MoE, and MEM;
- Collect samples that parallel those taken by the Environmental Protection Officer/Conservation Officer; and,
- Prepare and submit a report describing the discharge to the Environmental Protection Officer, MoE, and to the Manager, Reclamation and Permitting.

6.1 Regulatory Contacts

Table 6-2 Contact Information for Regulators

Agency	Contact
Ministry of the Solicitor General Provincial Emergency Program	1-800-663-3456 (250) 354-6395
Ministry of Environment	Mark Love Section Head, Smithers (250) 847-7416 (office) (250) 877-9237 (mobile)
Ministry of Energy and Mines	Diane Howe Deputy Chief Inspector of Mines (250) 952-0183 (office) Doug Flynn Senior Inspector of Mines (250) 847-7386 (office) (250)-877-9747 (mobile)
Environment Canada	(604) 664-9100 (phone) (604) 713-9517 (fax) enviroinfo@ec.gc.ca
Department of Fisheries and Oceans	(604) 666-0384 (phone) (604) 666-1847 (fax)

6.2 Mine Support Contacts

The personnel responsible for the management and operation of the Tulsequah Chief Mine during the care and maintenance period and responsible for security and integrity are:

- Chief Operating Officer
- Mine Manager
- Environmental Engineer
- Environmental Technician

The responsibilities are listed in Table 6-3.

Table 6-3 Roles and Responsibilities of Tulsequah Chief Mine Personnel

Position	Responsibilities
Chief Operating Officer	Responsible for overall project management and site performance. The COO has the ultimate responsibility for ensuring that all aspects of project operation are in compliance with Chieftain Metals' environmental policies and the site is operated within the provisions of all applicable environmental regulations and guidelines.
Mine Manager	Responsible from implementing Chieftain Metals environmental policies and the Tulsequah Chief mine Closure Management Manual; and ensures site activities are carried out in compliance with the BC Mines Act and Health, Safety and Reclamation Code.
Environmental Engineer	Responsible for developing and implementing Chieftain Metals environmental policies with integration of all permit requirements. Evaluating mitigation activities, communicating effectiveness to the mine manager and modifying where appropriate. Overseeing periodic reporting obligations and notifications in instances of noncompliance. The environmental engineer also has the authority to shut-down the site in the event of any potentially hazardous event that involves undue risk to the safety of people or the environment.
Environmental Technician (Environmental Monitor)	Responsible for site monitoring and sampling activities and inspecting facilities as defined in the closure maintenance manual and site operating practices. The Environmental Technician is responsible for reporting events of non-compliance to the Mine Manager and Environmental Engineer and assisting in mitigation activities where appropriate. The monitor will have the authority to stop any activity that is deemed to pose a risk to the environment; work can only proceed when the identified risk has been addressed and concerns rectified.

Source: Chieftain 2015

Reclamation activities are not anticipated for 2016, but if undertaken will be carried out by a contractor, who will follow Chieftain's Closure Maintenance Manual to minimize any disturbances. The Environmental Technician (monitor) who will be either an employee of Chieftain Metals Inc. or independent contractor will observe these activities and compliance.

Table 6-4 Contact Information for Mine Support

Mine Personnel		
Chief Operating Officer	Keith Boyle keith.boyle@chieftainmetals.com (416) 479-5414 (office) (416) 627-0659 (mobile)	
Mine Manger	Terry Zanger terry.zanger@chieftainmetals.com (403) 648-3721 (mine site) (867) 336-3293 (mobile) s.22	
Environmental Engineer	Rob Marsland rob.marsland@chieftainmetals.com (604) 836-7559 (mobile)	
Civil/Geotechnical Engineer	Les Thiessen SNT Engineering, Nelson les@snteng.ca (250) 551-0654 (mobile)	
Hydrotechnical Engineer	Rob Griffith MEA, Pemberton rgriffith@meabc.ca (778) 926-2022 (mobile)	
Construction Contractors – supply of equipment and materials for repairs		
Arctic Construction (excavator, dump truck)	Whitehorse (867) 393-2980	
Swede Martensson	Whitehorse (867) 333-0192 (mobile)	
Air Charter		
Helicopter	Discovery Helicopters Whitehorse 250-651-7569	
Fixed Wing	Atlin Air Charters 250-651-0025	

6.3 Directions to Site

Table 6-5 Marshalling Locations with Helicopter Landing Zones

Site	Coordinates (NAD83 UTM Zone 8V)	
Shazah Camp	579,600 E	6,513,200 N
Tulsequah Chief Mine	581,000 E	6,511,600 N
Big Bull Mine	584,400 E	6,503,900 N
Barge Camp	584,900 E	6,501,400 N
Site	Coordinates (NAD83 Lat/Long)	
Shazah Camp	133.62° W	58.75° N
Tulsequah Chief Mine	133.60° W	58.74° N
Big Bull Mine	133.54° W	58.67° N
Barge Camp	133.54° W	58.64° N

6.4 Site Radio Frequencies

Radio Repeater: 159.540 Rx, 154.540 TX tone 97.4,

Simplex: 159.540 tone 97.4

REFERENCES

Chieftain (2015). Emergency Response Plan, June 2015.

MFLNRO (2011). Dam Failure Consequence Classification Conversion Guideline for Dams in British Columbia (BC Reg. 163/2011, November 30, 2011).

SNT (2016). Tulsequah Exfiltration Pond Berm Stability. Prepared for Chieftain Metals. Prepared by SNT Engineering. March 6, 2016.

APPENDIX A

EXFILTRATION POND AS-BUILT DESCRIPTION AND SPILLWAY DESIGN



Suite 3- 385 Baker St. Nelson, BC, V1L 4H6 250 354 7683

Email: info@snteng.ca www.snteng.ca

March 3, 2016

Keith Boyle, P.Eng. Chief Operating Officer Chieftain Metals Inc. Toronto, ON

By email: keith.boyle@cheiftainmetals.com

Dear Mr. Boyle:

Re: Tulsequah Exfiltration Pond Berm Stability

SNT Engineering is pleased to provide our opinion regarding the stability of the road/berm that forms the detention structure for the acidic water draining from the Tulsequah Chief Mine site. The berm was raised to its current configuration in the summer of 2011 and has performed successfully for 4 years, with water levels fluctuating widely throughout the year on both sides of the road. Our assessment concludes that, as long as water levels inside and out remain within the historic range, and the rip rap and other granular construction materials remain in place, the berm is likely to continue to function as expected.

Our understanding is that this roadway was designed and constructed in two stages. The initial stage was in 2008, and the second stage was in 2011. The road base was initially installed in 2008 to detain the drainage of water from the mine site to the river and allow the solids in the runoff to settle out. The road was originally going to be a retaining wall, in the 2008 design, and construction of the road base and the initial lift was completed in the summer of 2008. The original design from 2008 is shown in Appendix A. Appendix B provides a series of photos (1 through 10) taken during 2008 showing the pond and berm.

After the current design was drafted by SNT in early 2011 (Appendix C - Figure 1-2), there was a change in respect to the exfiltration pond location, as the open water river channel ran through the design footprint at the time construction was scheduled to begin. While the as-constructed facility does not have the same water detention capacity as the proposed pond, it is what the site allows for at present. While the road has been in place since 2008, it was to be incorporated into the 2011 detention pond design. However, the river had encroached on the proposed berm location so the existing road was raised instead in summer 2011. Earthwork preparation for the installation of a pipe running from the 5200 Portal to the site collection pond also began at this time. Appendix B photos (11 through 17) show the construction of raising the berm elevation. The 2011 AS-BUILT drawings are included as Appendix C – sheets CMI-16-01-101 and 102.

Between September 2012 and July 2014 all effluent from the historical underground workings was directed to the site exfiltration pond. Since that time water level has risen and dropped seasonally and the filter fabric was replaced in 2014 and accumulated sludge removed from the berm face. Based on empirical evidence the berm can retain water to at least a level within 30-40 cm of the lowest point on the road crest. (Appendix B – Photos 18 through 23).

We recommend regrading the top of the berm to establish a controlled spill point over the existing rip rap apron. This will direct surface discharge from the pond to keep the road from overtopping, in case of exceptional high water level in the pond. The 2011 design had envisaged a spillway with a 5 m base width, 2H:1V side slopes and a depth of 0.5 m. The D3 dozer on site should be capable of scraping down the existing road surface to provide this drainage channel. Filter fabric will need to be place over the entire excavated footprint, extending down both the upstream and downstream faces of the berm. The channel should be directed in to the coarsest riprap on the downstream face of the road prism. See Appendix C – Sheet CMI-16-01-103 for the new spillway design layout.

The water in the Exfiltration Pond is monitored in accordance with EMA Permit Authorization #105719 as site SE-2. Any discharge through this spillway would be monitored as the SE-3 monitoring location.

We trust the information included in this report meets your requirements at this time. Please do not hesitate to contact the undersigned should you have any questions.

Yours truly,

SNT Engineering Ltd.

Les Thiessen, P.Eng.

Civil Engineering Division

full.

Attachment:

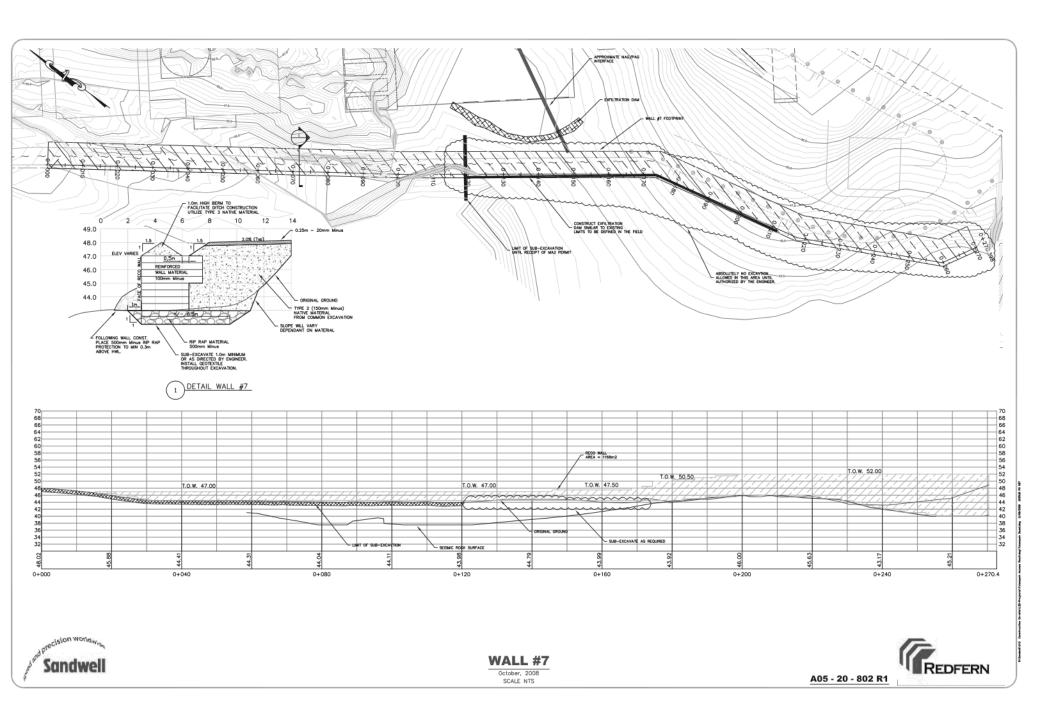
Appendix A – 2008 Wall #7 Design by Sandwell

Appendix B – Photo sheets – Construction and Pond Performance

Appendix C – 2011 As-built Road, 2016 Spillway Design and Photo Sketch

Appendix A

2008 Wall #7 Design by Sandwell



Appendix B

Photo Sheets – Construction and Pond Performance



1 - June 28, 2008

Site cleared but no earthworks started.



2 - August 27, 2008

Interior Filtration Berm and small pond/sump excavation.



3 - Sep 22, 2008

Pond area filled with water, internal Filtration Berm unchanged.



4 - September 27, 2008



5 - September 28, 2008

View looking down river. Note site drainage isolated from river.



6 - September 30, 2008

Construction of road/berm has commenced



7 - October 3, 2008

Sedimentation Pond berm in service as road.



8 - October 3, 2008:

Berm in use as road to access water treatment plant area.



9 - October 5th, 2008

Looking south along Chief site at the new lower bench access berm constructed to control both sediment and water flow.



10 - October 17, 2008 Note large area of floodplain between road and river.



11 - July 13, 2011

Prior to 2011 construction. Sedimentation/Exfiltration Pond has been receiving site drainage for 3 years by this point.



12 - July 20, 2011



13 - July 27, 2011



14 - August 8, 2011

Earthwork Activities along the 5200 Portal level.
Note that the river is now adjacent to the berm and toe of 5200 waste rock (compare with Oct 2008 photos). Berm construction completed and riprap placed.



15 - September 12, 2012

View north along road towards treatment plant.



16 - May 2014

Aerial view north along Tulsequah River



17 - July 29, 2014

View south along road towards 5200 waste dump





18 - July 2014

Upstream face. Sludge dug out and filter cloth replaced.

19 - July 2014

Upstream face. Sludge dug out and filtration cloth replaced



20 - July 2014

Upstream face. Sludge dug out and filter cloth replaced.



21 - May 19, 2015

View downstream of full pond.



22 - June 2, 2015

Pond full.

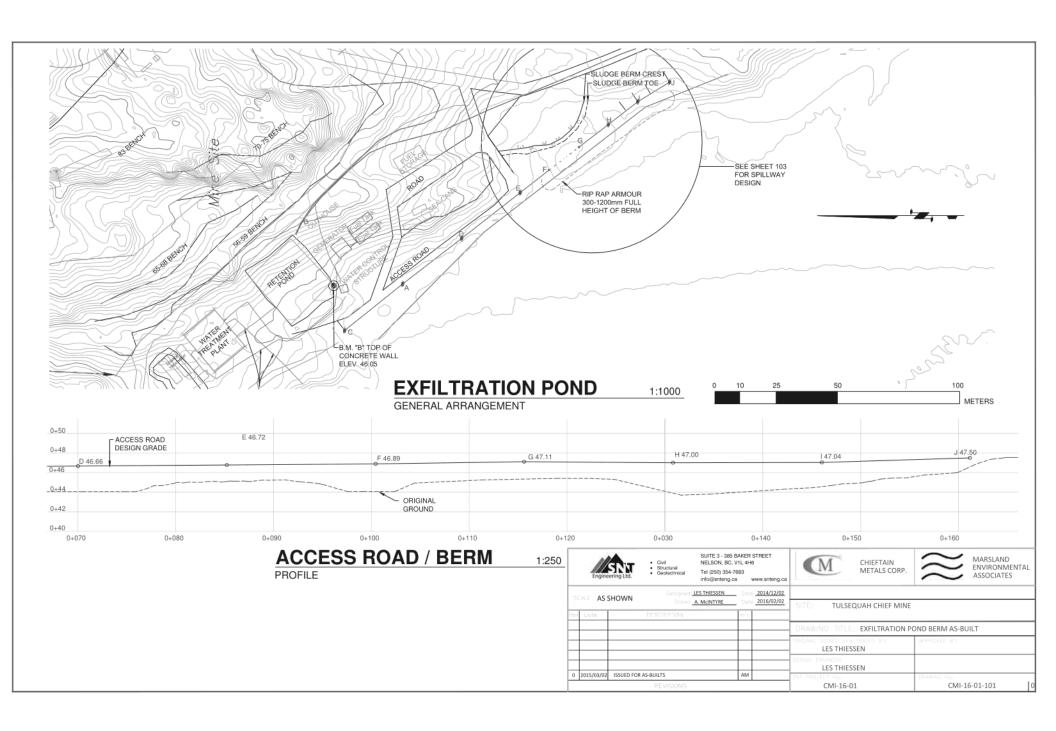


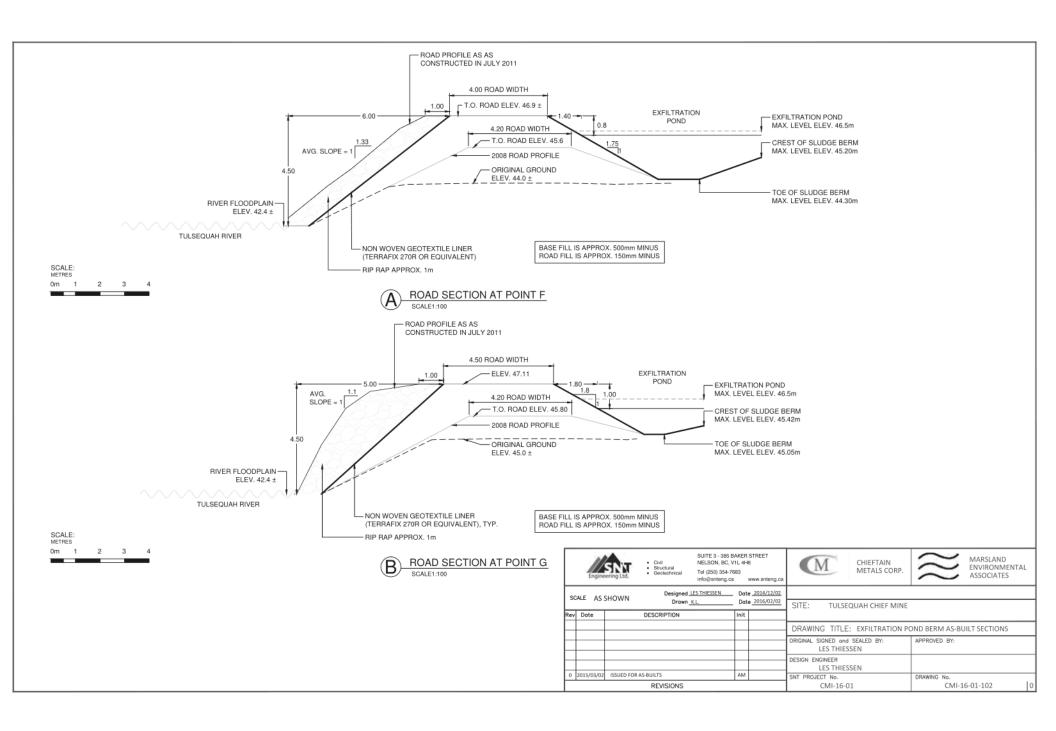
23 - June 2, 2015:

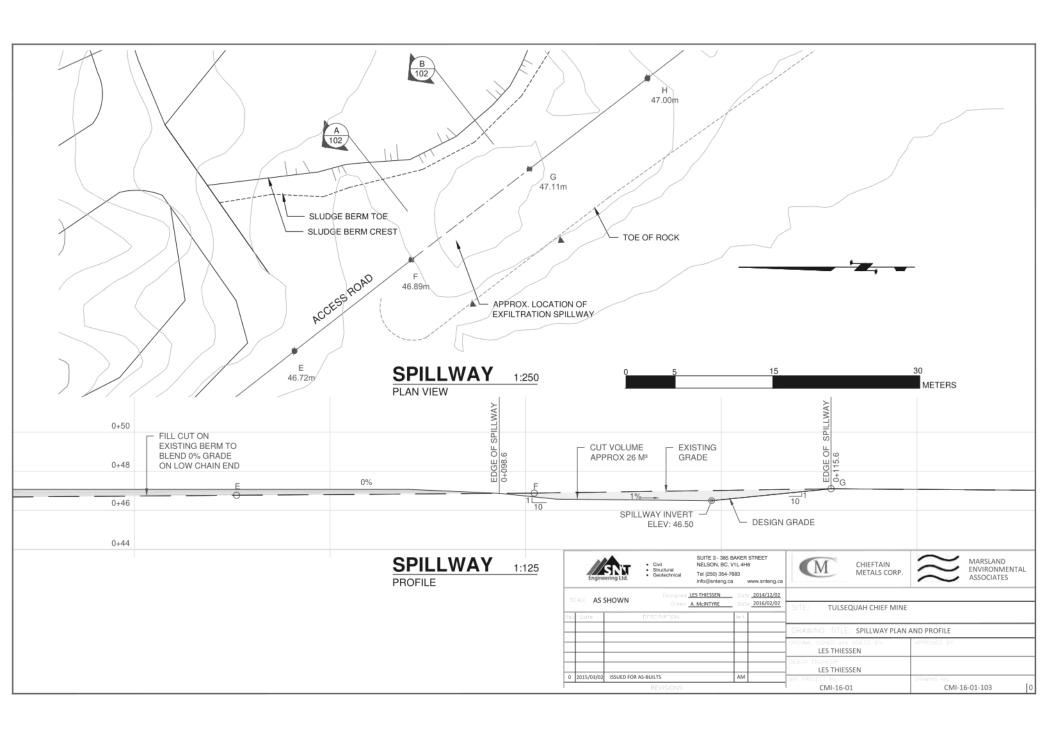
Pond after 16 hours without 5200 Portal flow.

Appendix C

2011 As-Built Road, 2016 Spillway Design and Photo Sketch







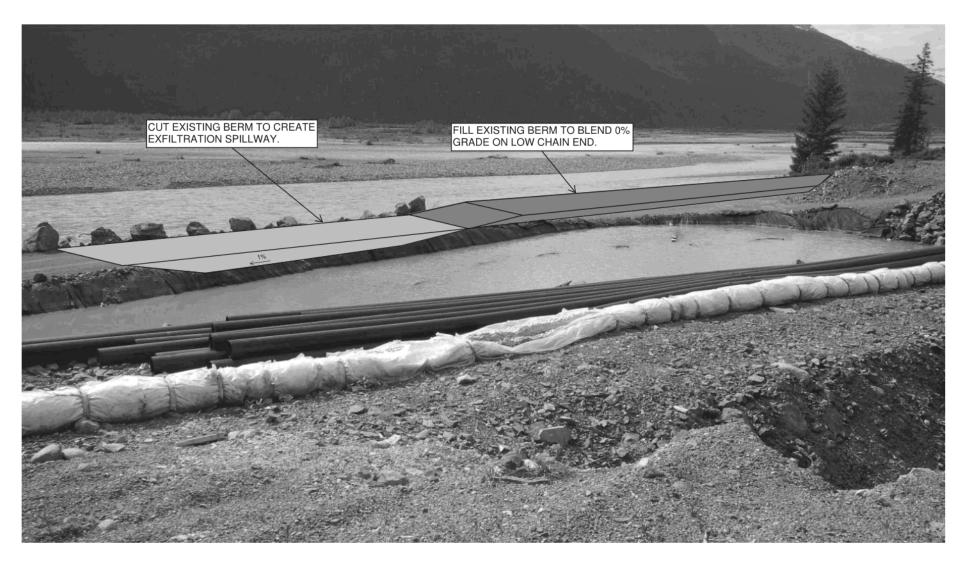


FIGURE: VISUAL REPRESENTATION OF EXFILTRATION SPILLWAY

APPENDIX B

EXFILTRATION POND SITE SURVEILLANCE CHECKLIST



SITE SURVEILLANCE

(For Dams with Earth or Rock Embankments)

	Dam Name: Tulsequah Chief Inspection Date: Your Name: Was the spillway flowing?	Berm Dam File #: Frequency of Inspections: Quarterly Other Participants: we water depth over the spillway sill?					
		If no, how far was of your dam in <u>SA</u>	the water below	w the spillwa	ny sill level? <u>N</u> ? Yes or No?		
	EMBANKMENT	OUTLET	SPILLV	VAY	DIVERSIO)NS	
1.	U/S N 1. Seep at to		1. Entrance	$\begin{array}{c c} Y & N \\ \hline \end{array}$	1. Inlet Apron	Y N	
 3. 4. 5. 	Crest		 Sill Apron Channel Channel Slopes 		 Inlet screen Pipe integrity Water losses 		
6.	Rip rap 6.		2.07.0				
	Were any of the following <u>POTENTIAL PROBLEM INDICATORS</u> found?						
	INDICATOR	EMBANKMEN	\overline{VT} OU	TLET	SPILLWAY	7	
	 a) Seepage (other than along toe) b) External Erosion c) Cracks d) Settlement e) Sloughing / Slides f) Animal Activity g) Excessive Growth h) Excessive Debris 	YES NO		NO	YES NO	0	
	Comment on any problems, co	oncerns or deficient	cies found:				

• Complete and file this report form as required in your OMS manual.

• This form may be used for quarterly inspections for low failure consequence dams (see Schedule 2 of the Dam Safety Regulation).

• Documentation of your site surveillance may be requested by a Provincial Dam Safety Officer.

Updated: September 2014



SITE SURVEILLANCE (For Dams with Earth or Rock Embankments)

Sketch					

Updated: September 2014





March 29, 2016

Diane Howe Deputy Chief Inspector, BC Ministry of Energy and Mines British Columbia diane.howe@gov.bc.ca

Candace Caunce
Director, Compliance
Ministry of Environment
British Columbia
candace.caunce@gov.bc.ca

Autumn Cousins Manager, Compliance Environmental Assessment Office British Columbia autumn.cousins@gov.bc.ca

Dear Ms. Howe, Ms. Caunce and Ms. Cousins;

Chieftain Metals hereby submits the "Tulsequah Chief Project, Exfiltration Pond OMS Manual" which includes the as-built report for the Exfiltration Pond, fulfilling Orders 1. and 2. from the November 9, 2015 Ministry of Energy and Mines Report of Inspector of Mines.

This document is also included in the 2015 Annual Reclamation Report (ARR). The ARR includes the plan for decommissioning the emergency sludge pond located beside the IWTP and forms part of the Mines Act Permit amendment application putting the mine on care and maintenance that was submitted as Appendix G of the February 8, 2016 "Compliance Plan."

When site conditions allow, likely in May, Chieftain will complete the works outlined in the "Compliance Plan" that address the deficiencies identified during the site visits last year and subsequent orders issued by the various departments.

Sincerely,

Keith Boyle, P.Eng. Chief Operating Officer

Cc. Eric Telford, Land and Resource Officer, Taku River Tlingit First Nation Mark Love, MoE Smithers

Rob Marsland, MEA

Encl. Exfiltration Pond OMS Manual

From:	Keith Boyle <keith.boyle@chieftainmetals.com></keith.boyle@chieftainmetals.com>
Sent:	Tuesday, March 29, 2016 12:33 PM
То:	Howe, Diane J MEM:EX
Cc:	Flynn, Doug MEM:EX; Terry Zanger; Marsland Rob
Subject:	Report of Inspector of Mines
Attachments:	20160329 Exfiltration_Pond_OMS_Asbuilt_Checklist.pdf; ATT00001.txt; 001.pdf;

ATT00002.txt

Diane,

Please find attached the Report of Inspector of Mines issued Nov 9, 2015 with notes (hand written) stating that Orders 1, 2 and 4 have been fulfilled.

The attached document contains the as-built drawing/report of the exfiltration pond and OMS manual for the exfiltration pond. The Annual Reclamation Report, to be forwarded shortly, includes the plan for the decommissioning of the pond next to the IWTP.

Terry will post the Inspection report on his next site visit.

Regards,

Keith

Page 267 to/à Page 313

Withheld pursuant to/removed as

DUPLICATE

From: Love, Mark P ENV:EX

Sent: Monday, April 4, 2016 11:04 AM

To: Howe, Diane J MEM:EX

Cc: Hill, Douglas J ENV:EX; Janfada, Arash ENV:EX; McConnachie, Jennifer MEM:EX

Subject: Tulsequah Chief - Next Steps

Hi Diane,

Your favorite topic: Tulsequah Chief. Are you and Jennifer able to find some time to get together and discuss the status of MOE and MEM's regulatory next steps?

Regards,

Mark P. Love P. Ag.
Mining Operations - North West and Vancouver Island Regions
Ministry of Environment, Smithers
Phone# 250-847-7416
Cell # 250-877-9237
mark.love@gov.bc.ca

From: Love, Mark P ENV:EX

Sent: Monday, April 18, 2016 10:03 AM

To: Howe, Diane J MEM:EX

Cc: McConnachie, Jennifer MEM:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Hi Diane,

FYI – your minister is likely to discuss Tulsequah Chief with Lt. Governor Byron Mallott Friday, April 22nd.

I have been asked to prepare a few bullet by tomorrow morning. Perhaps this is a crazy idea but our position should be co-ordinated with yours. Peter seems to think we had plans for an enforcement order which is not accurate. In fact I thought that MEM was going to issue "requirements" to update their interim closure plan that would (we hoped) addressing some of MoE issues.

Do you have a few minutes to discuss?

Regards,

Mark P. Love P. Ag.
Mining Operations - North West and Vancouver Island Regions
Ministry of Environment, Smithers
Phone# 250-847-7416
Cell # 250-877-9237
mark.love@gov.bc.ca

From: Hill, Douglas J ENV:EX

Sent: Monday, April 18, 2016 9:34 AM

To: Love, Mark P ENV:EX Cc: Graham, Mark ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark L, could you assist Mark G on putting some bullets together. I am thinking by tomorrow morning would be good.

djh

From: Zacharias, Mark ENV:EX

Sent: Monday, April 18, 2016 9:26 AM

To: Graham, Mark ENV:EX; Hill, Douglas J ENV:EX

Cc: McGuire, Jennifer ENV:EX; Gooderham, Coleen E ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Doug/Mark:

Can I get a quick couple of bullets on where we are wrt Tulsequah?

Regards, MZ

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Sent: Monday, April 18, 2016 9:01 AM

To: Zacharias, Mark ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark,

We should probably have a quick call on this ahead of MBB call with LT Mallott. Where is MOE at with respect to the enforcement orders at Tulsequah as that will be a question I am sure he will be asked.

Cheers,

From: Rioux, Luke MEM:EX

Sent: Thursday, April 14, 2016 12:46 PM

To: Bennett, Bill MEM:EX

Cc: Wallace-Deering, Eric MEM:EX; Denniston, Tristan M MEM:EX; Lewis, Ted MEM:EX; Costa, Sarina MEM:EX; McKnight,

Elaine L MEM:EX; Robb, Peter L. MEM:EX; Cochrane, Marlene MEM:EX Subject: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

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The letter was forwarded to us by Mr. Peter Chodos, Executive VP for Corporate Development at Chieftain Metals Corp., who wants to speak with you about this letter as it "appears to deviate from the recently signed Alaska/BC MOU" (incoming email also attached).

I have updated your calendar with the details for this conference call as well.

Please let me know if you need anything further.

Thank you,

Luke Rioux

Administrative Assistant to the Hon. Bill Bennett | Ministry of Energy and Mines Room 301, Parliament Buildings | Victoria, BC | V8W 9E2 | 250-387-5896

From: Love, Mark P ENV:EX

Sent: Monday, April 18, 2016 10:54 AM

To: Howe, Diane J MEM:EX

Cc: McConnachie, Jennifer MEM:EX; Graham, Mark ENV:EX; Janfada, Arash ENV:EX

Subject: RE: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

I'll set up the meeting.

I recall MEM was working on drafting a letter that would require CM to update their Closure Plan and perhaps implement closure should the project continue to look like it won't go forward. Is that correct?

Is MEM going to send in an update / bullets to Peter Rob?

Regards,

Mark P. Love P. Ag.
Mining Operations - North West and Vancouver Island Regions
Ministry of Environment, Smithers
Phone# 250-847-7416
Cell # 250-877-9237
mark.love@gov.bc.ca

From: Howe, Diane J MEM:EX

Sent: Monday, April 18, 2016 10:48 AM

To: Love, Mark P ENV:EX

Cc: McConnachie, Jennifer MEM:EX

Subject: Re: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Hi Mark,

I am travelling today and tomorrow, however the company has submitted (asked by government) a permit amendment for the care and maintenance period. I believe MOE got a similar request at the same time.

We are reviewing the as builds for the exfiltration pond now. (MEM orders)

Can you set up a meeting request for this Thursday or Friday so we can discuss.

Regards, Diane

On Apr 18, 2016, at 10:02, Love, Mark P ENV:EX <Mark.Love@gov.bc.ca> wrote:

Hi Diane,

FYI – your minister is likely to discuss Tulsequah Chief with Lt. Governor Byron Mallott Friday, April 22nd .

I have been asked to prepare a few bullet by tomorrow morning. Perhaps this is a crazy idea but our position should be co-ordinated with yours. Peter seems to think we had plans for an

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Do you have a few minutes to discuss?

Regards,

Mark P. Love P. Ag.
Mining Operations - North West and Vancouver Island Regions
Ministry of Environment, Smithers
Phone# 250-847-7416
Cell # 250-877-9237
mark.love@gov.bc.ca

From: Hill, Douglas J ENV:EX

Sent: Monday, April 18, 2016 9:34 AM

To: Love, Mark P ENV:EX Cc: Graham, Mark ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark L, could you assist Mark G on putting some bullets together. I am thinking by tomorrow morning would be good.

djh

From: Zacharias, Mark ENV:EX

Sent: Monday, April 18, 2016 9:26 AM

To: Graham, Mark ENV:EX; Hill, Douglas J ENV:EX

Cc: McGuire, Jennifer ENV:EX; Gooderham, Coleen E ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Doug/Mark:

Can I get a quick couple of bullets on where we are wrt Tulsequah?

Regards, MZ

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Sent: Monday, April 18, 2016 9:01 AM

To: Zacharias, Mark ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark,

We should probably have a quick call on this ahead of MBB call with LT Mallott. Where is MOE at with respect to the enforcement orders at Tulsequah as that will be a question I am sure he will be asked.

Cheers,

From: Rioux, Luke MEM:EX

Sent: Thursday, April 14, 2016 12:46 PM

To: Bennett, Bill MEM:EX

Cc: Wallace-Deering, Eric MEM:EX; Denniston, Tristan M MEM:EX; Lewis, Ted MEM:EX; Costa, Sarina MEM:EX; McKnight, Elaine L MEM:EX; Robb, Peter L. MEM:EX; Cochrane, Marlene MEM:EX Subject: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

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The letter was forwarded to us by Mr. Peter Chodos, Executive VP for Corporate Development at Chieftain Metals Corp., who wants to speak with you about this letter as it "appears to deviate from the recently signed Alaska/BC MOU" (incoming email also attached).

I have updated your calendar with the details for this conference call as well.

Please let me know if you need anything further.

Thank you,

Luke Rioux

Administrative Assistant to the Hon. Bill Bennett | Ministry of Energy and Mines Room 301, Parliament Buildings | Victoria, BC | V8W 9E2 | 250-387-5896

From: Love, Mark P ENV:EX

Sent: Wednesday, April 20, 2016 8:58 AM

To: Howe, Diane J MEM:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

FYI - Our bullets set to Peter Rob

Mark P. Love P. Ag.
Mining Operations - North West and Vancouver Island Regions
Ministry of Environment, Smithers
Phone# 250-847-7416
Cell # 250-877-9237
mark.love@gov.bc.ca

From: Zacharias, Mark ENV:EX

Sent: Tuesday, April 19, 2016 11:59 AM

To: Hill, Douglas J ENV:EX; Robb, Peter L. MEM:EX

Cc: Love, Mark P ENV:EX; Graham, Mark ENV:EX; Gooderham, Coleen E ENV:EX Subject: RE: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Thx Doug: Over to you Peter.

Regards, MZ

From: Hill, Douglas J ENV:EX

Sent: Tuesday, April 19, 2016 11:41 AM

To: Zacharias, Mark ENV:EX

Cc: Love, Mark P ENV:EX; Graham, Mark ENV:EX; Gooderham, Coleen E ENV:EX Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark, here are the bullets put together by Mark Love and Mark Graham:

KEY MESSAGES:

- An aquatic Ecological Risk Assessment report from 2013 concluded that acid rock drainage at this site is
 considered a low overall risk to the receiving environment. To date, the impact to fish resources from this
 site are minimal;
- Cleanup of historic ARD drainage could be addressed by 1) commencing mining production or 2)
 implementing an appropriate closure plan that includes water treatment and capping of historic waste rock;
- Re-commissioning mining production is contingent on Chieftain receiving adequate financing.

CURRENT STATUS:

 MoE continues to work with MEM to take a co-ordinated approach to the review of the Compliance Plan, the review of Chieftain Metals application for amendment to their EMA and MA permits, and the determination of next steps in respect to compliance.

UPDATE:

- Chieftain Metals submitted a Closure Management Manual in June 2015 that summarizes closure activities
 planned for the site, including options for addressing /mitigating impacts from unabated Acid rock drainage.
 MEM has yet to undertake a co-ordinated review of the document.
- On November 10, 2015, MoE, EAO and MEM sent Chieftain Metals a joint letter that detailed the noncompliances with the EMA, MA and EAC. The letter required that they submit a compliance plan within 90 days.
- Chieftain Metals submitted a Compliance Plan (Plan) in February of 2016. The Plan proposed that the non-compliances be addressed in part through permit amendments to both the EMA and MA permits to reflect the fact that the site never became operational and is in a state of extended care and maintenance.
- The Plan included a request to amend the EMA permit to remove the requirement to operate the interim water treatment plant until such time as financing is acquired and the project moves into construction.
- The rational for the amendment is that:
 - The initial requirements for interim water treatment were intended only to address impacted water associated with construction of the project. Since the project never got underway, those requirements need not apply.
 - Impacts to the fishery resources from the current discharge of untreated ARD are minimal, the influence of untreated discharges on water quality is relatively small, and no impacts are expected in the Taku River. This is supported by an Aquatic Ecological Risk Assessment conducted in 2013
 - The feasibility of operating the treatment plant is contingent on the project receiving financing and proceeding to production.
- Chieftan was advised by MOE that submission of a permit amendment application is expected to include:
 - A feasibility assessment of mitigation measures that could be implemented to reduce metal loadings to the Tulsequah River during this extended interim care and maintenance phase. This should include at a minimum the following:
 - A review of geochemical source assessment of ARD loadings.
 - An accounting of all ARD mitigation work completed to date
 - An evaluation of possible ARD mitigation strategies for the site including a review of those previously proposed (starting from the 1992 SRK document entitled "Tulsequah Chief Mine Site Assessment and preliminary Rehabilitation Plan for Acidic Mine Drainage Abatement".
 - A summary of the water treatment plant optimization study undertaken and an accounting of the costs for necessary upgrades.
 - o A review of estimated costs for ARD mitigation strategies presented.
 - Proposal of the preferred ARD mitigation strategy and recommendations / commitments for implementation of the strategy moving forward.
 - A review of the water quality data from the end of June 2013 (end of treatment) to present and an assessment as to whether water quality objects are being met at downstream monitoring stations.
 - An update of the Aquatics Ecological Risk Assessment based on recent water quality data and site conditions (braded nature of the river).
- Chieftain argues it has limited financing to effectively operate the water treatment plant or cap waste rock
 without the project moving forward, and that Chieftan should not be responsible for operating a treatment
 system unless the project proceeds into construction;

From: Zacharias, Mark ENV:EX

Sent: Monday, April 18, 2016 9:26 AM

To: Graham, Mark ENV:EX; Hill, Douglas J ENV:EX

Cc: McGuire, Jennifer ENV:EX; Gooderham, Coleen E ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Doug/Mark:

Can I get a quick couple of bullets on where we are wrt Tulsequah?

Regards, MZ

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Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

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Cheers,

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Cc: Wallace-Deering, Eric MEM:EX; Denniston, Tristan M MEM:EX; Lewis, Ted MEM:EX; Costa, Sarina MEM:EX; McKnight,

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I have updated your calendar with the details for this conference call as well.

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Thank you,

Luke Rioux

Administrative Assistant to the Hon. Bill Bennett | Ministry of Energy and Mines Room 301, Parliament Buildings | Victoria, BC | V8W 9E2 | 250-387-5896

From: Graham, Mark ENV:EX

Sent: Thursday, April 21, 2016 11:14 AM

To: Zacharias, Mark ENV:EX; Robb, Peter L. MEM:EX

Cc: Love, Mark P ENV:EX; Gooderham, Coleen E ENV:EX; Hill, Douglas J ENV:EX; Howe,

Diane J MEM:EX

Subject: RE: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST) (CLARIFCATION)

Hi Mark Z. and Peter,

I just want to clarify one point about the bullets below for the call on Friday. Based on our discussions with MEM today, water treatment and capping of waste rock is <u>not a</u> realistic option for Chieftain's closure plan due to lack of financing. The only realistic option for full treatment is for production to commence. I've made changes the bullets to reflect that below:

Regards

Mark G

From: Hill, Douglas J ENV:EX

Sent: Tuesday, April 19, 2016 11:41 AM

To: Zacharias, Mark ENV:EX

Cc: Love, Mark P ENV:EX; Graham, Mark ENV:EX; Gooderham, Coleen E ENV:EX Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark, here are the bullets put together by Mark Love and Mark Graham:

KEY MESSAGES:

- An aquatic Ecological Risk Assessment report from 2013 concluded that acid rock drainage at this site is considered a low overall risk to the receiving environment. To date, the impact to fish resources from this site are minimal;
- Cleanup of historic ARD drainage can only realistically be addressed by commencing mining production.
 Chieftain does not have adequate financing to manage water treatment and capping of historic waste rock as part of a closure plan;
- Re-commissioning mining production is contingent on Chieftain receiving adequate financing.

CURRENT STATUS:

 MoE continues to work with MEM to take a co-ordinated approach to the review of the Compliance Plan, the review of Chieftain Metals application for amendment to their EMA and MA permits, and the determination of next steps in respect to compliance.

UPDATE:

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Sent: Monday, April 18, 2016 9:26 AM

To: Graham, Mark ENV:EX; Hill, Douglas J ENV:EX

Cc: McGuire, Jennifer ENV:EX; Gooderham, Coleen E ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

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Thank you,

Luke Rioux

Administrative Assistant to the Hon. Bill Bennett | Ministry of Energy and Mines Room 301, Parliament Buildings | Victoria, BC | V8W 9E2 | 250-387-5896

From: Hill, Douglas J ENV:EX

Sent: Wednesday, April 27, 2016 4:45 PM

To: Karn, David GCPE:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX; McGuire, Jennifer ENV:EX; Hoffman, Al

MEM:EX; Howe, Diane J MEM:EX

Subject: RE: media request - Juneau Empire - Tulsequah Chief Mine clean up



David, the email attached has the latest MOE bullets for this file. Some specific answers from MOE perspective in red to the questions posed:

Back in Nov. BC officials told Chieftain Metals to clean up the Tulsequah Chief Mine (

http://www.cbc.ca/news/canada/north/tulsequah-chief-mine-inspection-1.3323686). The company was given 90 days to submit a plan. Did the company ever submit one?

A plan was submitted to address non-compliance with the EA Certificate, MEM permit and EMA permit.

If so, what is the plan and where is Chieftain at in regards to the clean up?

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I have not had a chance to check in with MEM on these responses so am copying Al and Diane.

dih

From: Karn, David GCPE:EX

Sent: Wednesday, April 27, 2016 2:16 PM

To: Hill, Douglas J ENV:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX

Subject: media request - Juneau Empire - Tulsequah Chief Mine clean up

Doug,

Our Mines ADM Peter Robb said this should be sent to MOE for response and that you would have the latest on it.

Also, see the attached email.

<< Message: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST) >>

reporter: Lisa Phu, Juneau Empire <u>lisa.phu@juneauempire.com</u> 907-523-2246

deadline: 5pm

request: Questions re: Chieftain Metals

Back in Nov. BC officials told Chieftain Metals to clean up the Tulsequah Chief Mine (
http://www.cbc.ca/news/canada/north/tulsequah-chief-mine-inspection-1.3323686). The company was given 90 days to submit a plan. Did the company ever submit one?

If so, what is the plan and where is Chieftain at in regards to the clean up?

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From: Robb, Peter L. MEM:EX

Sent: Wednesday, April 27, 2016 2:05 PM

To: Dalal, Suntanu GCPE:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

From: Zacharias, Mark ENV:EX

Sent: Tuesday, April 19, 2016 11:59 AM

To: Hill, Douglas J ENV:EX; Robb, Peter L. MEM:EX

Cc: Love, Mark P ENV:EX; Graham, Mark ENV:EX; Gooderham, Coleen E ENV:EX Subject: RE: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Thx Doug: Over to you Peter.

Regards, MZ

From: Hill, Douglas J ENV:EX

Sent: Tuesday, April 19, 2016 11:41 AM

To: Zacharias, Mark ENV:EX

Cc: Love, Mark P ENV:EX; Graham, Mark ENV:EX; Gooderham, Coleen E ENV:EX Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark, here are the bullets put together by Mark Love and Mark Graham:

KEY MESSAGES:

- An aquatic Ecological Risk Assessment report from 2013 concluded that acid rock drainage at this site is considered a low overall risk to the receiving environment. To date, the impact to fish resources from this site are minimal:
- Cleanup of historic ARD drainage could be addressed by 1) commencing mining production or 2) implementing an appropriate closure plan that includes water treatment and capping of historic waste rock;
- Re-commissioning mining production is contingent on Chieftain receiving adequate financing.

CURRENT STATUS:

 MoE continues to work with MEM to take a co-ordinated approach to the review of the Compliance Plan, the review of Chieftain Metals application for amendment to their EMA and MA permits, and the determination of next steps in respect to compliance.

UPDATE:

- Chieftain Metals submitted a Closure Management Manual in June 2015 that summarizes closure activities
 planned for the site, including options for addressing /mitigating impacts from unabated Acid rock drainage.
 MEM has yet to undertake a co-ordinated review of the document.
- On November 10, 2015, MoE, EAO and MEM sent Chieftain Metals a joint letter that detailed the noncompliances with the EMA, MA and EAC. The letter required that they submit a compliance plan within 90 days.

- Chieftain Metals submitted a Compliance Plan (Plan) in February of 2016. The Plan proposed that the non-compliances be addressed in part through permit amendments to both the EMA and MA permits to reflect the fact that the site never became operational and is in a state of extended care and maintenance.
- The Plan included a request to amend the EMA permit to remove the requirement to operate the interim water treatment plant until such time as financing is acquired and the project moves into construction.
- The rational for the amendment is that:
 - The initial requirements for interim water treatment were intended only to address impacted water associated with construction of the project. Since the project never got underway, those requirements need not apply.
 - Impacts to the fishery resources from the current discharge of untreated ARD are minimal, the influence of untreated discharges on water quality is relatively small, and no impacts are expected in the Taku River. This is supported by an Aquatic Ecological Risk Assessment conducted in 2013
 - The feasibility of operating the treatment plant is contingent on the project receiving financing and proceeding to production.
- Chieftan was advised by MOE that submission of a permit amendment application is expected to include:
 - A feasibility assessment of mitigation measures that could be implemented to reduce metal loadings to the Tulsequah River during this extended interim care and maintenance phase. This should include at a minimum the following:
 - o A review of geochemical source assessment of ARD loadings.
 - o An accounting of all ARD mitigation work completed to date
 - An evaluation of possible ARD mitigation strategies for the site including a review of those previously proposed (starting from the 1992 SRK document entitled "Tulsequah Chief Mine Site Assessment and preliminary Rehabilitation Plan for Acidic Mine Drainage Abatement".
 - A summary of the water treatment plant optimization study undertaken and an accounting of the costs for necessary upgrades.
 - A review of estimated costs for ARD mitigation strategies presented.
 - Proposal of the preferred ARD mitigation strategy and recommendations / commitments for implementation of the strategy moving forward.
 - A review of the water quality data from the end of June 2013 (end of treatment) to present and an assessment as to whether water quality objects are being met at downstream monitoring stations.
 - An update of the Aquatics Ecological Risk Assessment based on recent water quality data and site conditions (braded nature of the river).
- Chieftain argues it has limited financing to effectively operate the water treatment plant or cap waste rock without the project moving forward, and that Chieftan should not be responsible for operating a treatment system unless the project proceeds into construction;

From: Zacharias, Mark ENV:EX

Sent: Monday, April 18, 2016 9:26 AM

To: Graham, Mark ENV:EX; Hill, Douglas J ENV:EX

Cc: McGuire, Jennifer ENV:EX; Gooderham, Coleen E ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Doug/Mark:

Can I get a quick couple of bullets on where we are wrt Tulsequah?

From: Robb, Peter L. MEM:EX

Sent: Monday, April 18, 2016 9:01 AM

To: Zacharias, Mark ENV:EX

Subject: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Mark,

We should probably have a quick call on this ahead of MBB call with LT Mallott. Where is MOE at with respect to the enforcement orders at Tulsequah as that will be a question I am sure he will be asked.

Cheers.

From: Rioux, Luke MEM:EX

Sent: Thursday, April 14, 2016 12:46 PM

To: Bennett, Bill MEM:EX

Cc: Wallace-Deering, Eric MEM:EX; Denniston, Tristan M MEM:EX; Lewis, Ted MEM:EX; Costa, Sarina MEM:EX; McKnight,

Elaine L MEM:EX; Robb, Peter L. MEM:EX; Cochrane, Marlene MEM:EX Subject: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST)

Hi Minister,

A conference call has been scheduled next Friday, April 22nd at 2:10pm (PST) for your meeting with Lt. Governor Byron Mallott, regarding the letter the Lt. Gov. sent to Mr. Chris Sandrolini of the U.S. State Department Office of Canadian Affairs (attached).

The letter was forwarded to us by Mr. Peter Chodos, Executive VP for Corporate Development at Chieftain Metals Corp., who wants to speak with you about this letter as it "appears to deviate from the recently signed Alaska/BC MOU" (incoming email also attached).

I have updated your calendar with the details for this conference call as well.

Please let me know if you need anything further.

Thank you,

Luke Rioux

Administrative Assistant to the Hon. Bill Bennett | Ministry of Energy and Mines Room 301, Parliament Buildings | Victoria, BC | V8W 9E2 | 250-387-5896

From: Karn, David GCPE:EX

Sent: Wednesday, April 27, 2016 5:00 PM

To: Hill, Douglas J ENV:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX; McGuire, Jennifer ENV:EX; Hoffman, Al

MEM:EX; Howe, Diane J MEM:EX

Subject: Re: media request - Juneau Empire - Tulsequah Chief Mine clean up

Doug, I will share with MEM as they requested. Thank you.

Sent from my BlackBerry 10 smartphone on the TELUS network.

From: Hill, Douglas J ENV:EX

Sent: Wednesday, April 27, 2016 4:44 PM

To: Karn, David GCPE:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX; McGuire, Jennifer ENV:EX; Hoffman, Al MEM:EX; Howe, Diane J

MEM:EX

Subject: RE: media request - Juneau Empire - Tulsequah Chief Mine clean up

David, the email attached has the latest MOE bullets for this file. Some specific answers from MOE perspective in red to the questions posed:

Back in Nov. BC officials told Chieftain Metals to clean up the Tulsequah Chief Mine (

http://www.cbc.ca/news/canada/north/tulsequah-chief-mine-inspection-1.3323686). The company was given 90 days to submit a plan. Did the company ever submit one?

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I have not had a chance to check in with MEM on these responses so am copying Al and Diane.

djh

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Sent: Wednesday, April 27, 2016 2:16 PM

To: Hill, Douglas J ENV:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX

Subject: media request - Juneau Empire - Tulsequah Chief Mine clean up

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Also, see the attached email.

<< Message: FW: Conf. Call with Lt. Gov. Mallott Friday, April 22nd at 2:10pm (PST) >>

reporter: Lisa Phu, Juneau Empire lisa.phu@juneauempire.com 907-523-2246

deadline: 5pm

request: Questions re: Chieftain Metals

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From: Hill, Douglas J ENV:EX

Sent: Thursday, April 28, 2016 2:10 PM

To: Karn, David GCPE:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX; McGuire, Jennifer ENV:EX; Howe, Diane J

MEM:EX; Graham, Mark ENV:EX

Subject: RE: media request - Juneau Empire - Tulsequah Chief Mine clean up

David, attached is the first letter from last fall that we received in response to the inspections. The February submission that we have would have to be requested via FOI since it includes information, including costing information, that is likely protected under the FOI provision preventing disclosure harmful to business interests of a third party, and so would have to go through the harms assessment process.

Douglas Hill, P.Eng. Regional Operations Director - Mining **Environmental Protection** Ph: 250-398-4542



From: Karn, David GCPE:EX

Sent: Thursday, April 28, 2016 12:33 PM

To: Hill, Douglas J ENV:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX; McGuire, Jennifer ENV:EX; Howe, Diane J MEM:EX

Subject: RE: media request - Juneau Empire - Tulsequah Chief Mine clean up

Doug, the reporter has asked for a copy of the compliance plan submitted by the company. Was that sent to MoE or MEM?

From: Hill, Douglas J ENV:EX

Sent: Wednesday, April 27, 2016 4:45 PM

To: Karn, David GCPE:EX

Cc: Smith, Curtis ENV:EX; Cotton, Brian GCPE:EX; McGuire, Jennifer ENV:EX; Hoffman, Al MEM:EX; Howe, Diane J

MEM:EX

Subject: RE: media request - Juneau Empire - Tulsequah Chief Mine clean up

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deadline: 5pm

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CORPORATE OFFICE 2 Bloor Street West Suite 2510

Tel: 416.479.5410 Fax: 416.479.5420

FIELD OFFICE Box 387 Number 1 First Street Toronto, ON M4W 3E2 Atlin, BC V0W 1A0 Tel: 250.651.7662 Fax: 250.651.7606

www.chieftainmetals.com • info@chieftainmetals.com

November 23, 2015

Neil Bailey, P.Eng. Senior Environmental Protection Officer Ministry of Environment - Northern Region **Environmental Protection Division** Bag 5000, 3726 Alfred Avenue Smithers BC V0J 2N0

Dear Sir.

RE: Non-compliance Advisory Letter Resulting from Inspection of permit number 105719 for Chieftain Metals Inc.'s Tulsequah Chief mine under the Environmental Management Act

Please find below, CMI's responses to the orders of November 10, 2015.

For ease of responding, the orders have been copied here and responded to in sequence.

"Below lists the section, the non-compliance of that section and the action required related to the Permit (105719).

Section 1.1.5 The authorized works include, but are not limited to, a water collection and conveyance system, pumps, an acid water treatment plant which includes a neutralization chamber, rapid mix tank, flocculent tank, inclined plate-type separator/thickener, filters and holding tanks, a discharge line, outfall to the Tulsequah River, and related appurtenances approximately located as shown on Site Plan A.

Section 2.1 – Bypasses

Any bypass of the authorized works is prohibited unless the approval of the Director is obtained and confirmed in writing.

Non-compliance: Written Approval for the bypass of the water treatment plant was not obtained and the discharge does not meet the conditions specified in Section 3.6. As a result, Chieftain Metals Inc. is in violation of Section 2.1 Bypasses.

Action: Commission the IWTP immediately once site development occurs.

RESPONSE: Acknowledged. Chieftain Metals will commission the IWTP immediately once site development occurs.



Section 4. Discharge and Receiving Environment Monitoring.

Commencing July 1, 2014, Section 4.0 of permit 105719 is to read as follows:

- -Sampling monthly from October through February increased to bi-weekly April through May and then returns to monthly in the period from June to September.
 - -The sites to be sampled remain W10, W46, SE2, W51 and W31
- -The parameters to be sampled for remain total and dissolved metals, pH, conductivity, turbidity suspended solids, hardness and alkalinity.

Non-compliance: The Permittee did not meet the amended requirements for Discharge and

Receiving Environment Monitoring on the following dates and locations:

- -At site W51 for July 29, 2014 pH, conductivity and alkalinity were not monitored for.
- -Monitoring of W46 is suspended in June 2015 as path of river no longer passes through this location.

Action: Ensure monitoring occurs in the locations, frequencies and parameters required in the June 12 2014 Amendment to Section 4.0 Discharge and Receiving Environment Monitoring. Contact Director regarding amending the W46 monitoring location.

RESPONSE: The required monthly sample at W51 in July 2014 was collected on July 27, 2014. All required analyses were performed on that sample. Supplemental samples were collected on July 25, 26, 28 and 29 and analysed for select parameters.

A letter under separate cover will be sent to the Director regarding amending the W46 monitoring.

This advisory, the alleged violation and the circumstances to which it refers will form part of the compliance history of Chieftain Metals Inc. and its responsible officials and will be taken into account in the event of future non-compliance. You are directed to do the following:

- 1. Implement the necessary changes or modifications immediately to address this situation and to bring it into compliance.
- 2. Notify this office by email or letter within 30 days of this letter, advising what corrective measures have been taken, and what else is being done, to bring this authorization into compliance.



Please be advised that the inspection report quotes incorrect contact information. Please note change of contact information:

Keith Boyle, P.Eng. Chief Operating Officer Chieftain Metals Inc. 2 Bloor W, Suite 2510 Toronto, ON M5W 3E2

Sincerely,

Keith Boyle, P.Eng. Chief Operation Officer

cc. Mark Love (by email), Section Head Mining Authorizations, Ministry of Environment, Mark.Love@gov.bc.ca

Cassandra Caunce (by email), Director Compliance & Integrated Pest Management Ministry of Environment, Cassandra.Caunce@gov.bc.ca

Diane Howe (by email), Deputy Inspector of Mines, Ministry of Energy and Mines, Diane.Howe@gov.bc.ca

Eric Telford, Lands and Resources, TRTFN

From: Marques, Victor MEM:EX

Sent: Thursday, May 12, 2016 11:09 AM

To: Howe, Diane J MEM:EX
Cc: Constable, Lowell MEM:EX

Subject: RE: REVIEW: Tulsequah Chief OMS

Categories: a Priority

Hi Diane, you can forward my comments on the OMS:

Project Description

- 1. Location map is needed showing mine location. They have only provided coordinates to a helipad location.
- 2. A site plan is needed showing the pond, access roads, water diversion structures related to the pond (inflow, outflow, diversions, etc)
- 3. Need a description of how to access the pond.
- 4. The following design details are missing:
 - a. Does the embankment meet CDA guidelines? What is the design earthquake and design flood event?
 - b. A statement regarding the objective / purpose of the facility. What are closure requirements? It is understood it is a leaky structure and is only to contain the sludge.
 - c. Crest width, height, and slopes are provided but the length of the embankment is not provided nor is it obvious looking at the drawings.
 - d. What is the embankment constructed of? What are the foundations?
 - e. What is the watershed area that reports to the pond, normal operating water level, freeboard requirements, inflow design flood, design seismic event, etc.
 - f. Downstream rip rap design requirements i.e. what is the minimum rip rap sizing required for a design flood event of the Tulsequah River?
- 5. What are the downstream consequences / significance of a failure?

Operations

- 6. Org Chart of Mine personnel responsible for the Exfiltration pond including any consultants and contractors plus phone numbers and emails.
- 7. Details on operation is lacking. i.e. It states that portal discharge is to bypass the pond seasonally more detail is needed on this for the OMS. How and where is this done? Is this permitted?
- 8. Is there a contingency location to divert water and sludge in case the pond is full or requires repair?

Maintenance

9. When is sludge cleanout and/or filter replacement needed?

Surveillance

- 10. Downstream toe erosion along the river should be included in the monitoring section i.e. needs more emphasis outside of the dam stability section.
- 11. What frequency are inspections to be conducted? This should be specific weekly, monthly, annually, etc. and what about after freshet, flood or earthquake?
- 12. What time of year should formal annual inspections be conducted?
- 13. Who is called when the inspector sees something outside of normal? Is it the mine manager or is it the engineer? Provide names and phone numbers and make sure they are up to date.

Appendix: As-Built

- 1. How was the berm built? What equipment? What foundation preparation was done? What are the foundations?
- 2. Two construction materials are noted in the drawings: Base Fill (500mm minus) and Road Fill (150mm minus). How thick were the material zones? How many lifts were they constructed? Were there any compaction requirements?
- 3. Need more details on the materials used. Where did the granular fill come from? Has piping been considered? Was there any QA/QC on the construction and if so where are the records?
- 4. A statement in the as-built is needed indicating the berm was "built in general conformance with the design".

Additional notes / concerns

- 5. Spillways are typically not aligned over a dam crest unless erosion of the dam crest and downstream face is addressed and a safer alternative alignment is not practical. If water is flowing over the spillway what measures are in place to prevent erosion of the embankment?
- 6. The OMS is to be updated, as well as an as-built, after the spillway is constructed.

Feel free to contact me with any questions,

Victor Marques, P.Eng.

Sr. Geotechnical Inspector Ministry of Energy and Mines O: 250.952.0843 C: 250.889.1593 www.gov.bc.ca/minepermitting

-----Original Message-----From: Howe, Diane J MEM:EX

Sent: Thursday, April 7, 2016 7:58 AM

To: Marques, Victor MEM:EX

Subject: RE: REVIEW: Tulsequah Chief OMS

Thanks Victor,

Happy to spend some time with you going over the file just so you are not having to start from scratch!

0-1-1--1

----Original Message-----

From: Constable, Lowell MEM:EX

Sent: Wednesday, April 6, 2016 4:40 PM

To: Howe, Diane J MEM:EX

Subject: Re: REVIEW: Tulsequah Chief OMS

Hi Diane,

Victor is going to review this. Thanks, Lowell Sent from my iPhone > On Apr 6, 2016, at 11:20 AM, Howe, Diane J MEM:EX < Diane. Howe@gov.bc.ca > wrote: > Hi Lowell, > I know its a crazy week for you, but I wanted to put this on your radar to assign someone to review. > Tulsequah Chief, a small, historical underground mine located south of Atlin, is on care and maintenance and last year myself, MOE and EAO paid a visit to the site to check on reports of non-compliance. A few things came up on the environment side, however on our end, the company constructed an exfiltration pond on the side of the hill adjacent to the River to collect the discharge from the old underground workings. The flow is minimal most of the year, but has a distinct red colour to it that makes everyone nervous. Anyway the pond observed was not the pond they had originally applied to construct (which was not approved anyway) so in my inspection report I had asked the company to provide an as-built and OMS as the pond looked like it could potentially overflow and I did not observe a spillway. > Attached is the OMS and as-built reports. Who ever this gets assigned to I'm happy to share the history of the site as I recall it. My ultimate goal is to amend the MEM permit approving their care and maintenance program, so critical to this is approving the OMS and or making sure the OMS is up to standard. >

> My inspection report is in MMS (also the project files).

> Thanks Lowell,

> Regards, Diane

> <2016 03 29 Exfiltration Pond OMS Manual.pdf>

From: Sent: To: Cc: Subject:	Love, Mark P ENV:EX Wednesday, May 18, 2016 12:39 PM 'Keith Boyle' Rob Marsland; Howe, Diane J MEM:EX; Janfada, Arash ENV:EX; Bailey, Neil ENV:EX RE: Permit amendment applications					
Hello Keith,						
The MOE is only now beginning the screening review of your application. You should expect to have screening level review comments back by the end of May. At that time we will arrange a conference call to discuss our comments and next steps.						
Regards,						
Mark P. Love P. Ag. Mining Operations - North West and Vancouver Island Regions Ministry of Environment, Smithers Phone# 250-847-7416 Cell # 250-877-9237 mark.love@gov.bc.ca						
Original Message From: Keith Boyle [mailto:keith.boyle@chieftainmetals.com] Sent: Tuesday, May 10, 2016 6:52 AM To: Love, Mark P ENV:EX; Howe, Diane J MEM:EX Cc: Rob Marsland Subject: Permit amendment applications						
Mark and Diane,						
It has been a couple of months since Chieftain submitted its applications for the Mines Act and EMA permit amendment to reflect care and maintenance.						
Who should we speak with on its status.						
To let you know, Chieftain representatives will be on site this week to clean up the hydrocarbon stained ground identified by the EAO. This activity completes the action plan except cutting of the proposed spillway in the exfiltration pond which requires the amended permit.						
Thanks for your attention to this matter.						
Regards,						
Keith						