SÄ DENA HES OPERATING CORPORATION

SÄ DENA HES MINE

DETAILED DECOMMISSIONING & RECLAMATION PLAN

AUGUST 2015 UPDATE

Prepared by

Teck Resources Limited

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Report Distribution

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NOTICE TO READERS

This revised DDRP replaces the March Update 2013 (dated July 2013) to include amendments approved by the Yukon Government in 2014 and 2015. Teck initiated closure work in 2013, but such work that has been implemented prior to the issuance of this amended DDRP has not been revised to reflect current status.

1.0 INTRODUCTION

The Sä Dena Hes Mine is owned by the Sa Dena Hes Mining Corporation (the Company) which is a joint venture between Teck Resources Limited ("Teck" - 50% ownership) and Pan Pacific Metal Mining Corp (50% ownership, a wholly owned subsidiary of Korea Zinc.) The Joint Venture purchased the Sä Dena Hes lead/zinc property in March 1994. Teck is the operator under the joint venture agreement.

This document contains updates to the Detailed Decommissioning and Reclamation Plan ("DDRP", or the "Plan") for the Sä Dena Hes Mine, Yukon that was originally submitted in February of 2000 and subsequently updated in January 2006, January 2010, January 2012, and Update March 2013 (revision July 2013). In 2013 and 2014, supplemental environmental and geotechnical assessments were conducted to further refine the DDRP. Approvals to conduct work in 2013 and 2014 were provided based on the results of the assessments, consultation with Yukon Government and Liard First Nation. The intention of the 2015 DDRP update is to document the final DDRP scope of work.

This Plan addresses closure issues related to the decommissioning of operations at Sä Dena Hes and reclamation of the site.

The January 2010 amendment to the Water Licence, under "Permanent Closure", Section 78, deems that permanent closure shall commence January 29, 2013. On January 26, 2012 the Company informed the Yukon Government of its intent to comply with the terms of the Water Licence and enter into Permanent Closure and begin to implement the Detailed Decommissioning and Reclamation Plan on January 29, 2013.

The previous versions of the DDRP included two different scenarios related to closure. The first was if the mine was reclaimed without going back into production and the second considered if the mine had reopened and completed mining the remaining mineral reserves. As the mine is

now deemed to be in Permanent Closure, the second scenario is no longer applicable and closure works associated with it have been removed from this update to the DDRP.

The Sä Dena Hes Operating Corporation has a Type A Water Use Licence (QZ99-045, formerly QZ97-025) issued pursuant to the Yukon Waters Act and Regulations for the mine and milling operations. The Company continues to ensure that all Water Licence obligations are fulfilled on behalf of the Sä Dena Hes Operating Corporation. The Company also has a Yukon Quartz Mining Production Licence QML-0004 issued pursuant to the Yukon Quartz Mining Act and Regulations.

A thorough plan, complete with detailed designs, is presented for all activities that need to be undertaken for an environmentally safe and responsible closure of the Sä Dena Hes Mine. The Plan addresses both the long term physical and chemical stability of the site including reclamation of surface disturbances. A program is presented for site management and monitoring both during implementation of closure and after decommissioning and reclamation measures are completed. The Plan is based on the best information available at the present time however additional environmental investigations will continue through the implementation of the DDRP. If the additional investigations identify any issues not adequately addressed in this Plan, then the Plan will be adapted and any required regulatory approvals for the changes will be obtained prior to the revised Plan being implemented. Decommissioning and reclamation cost estimates are provided and financial security requirements were updated to current amounts.

1.1 CLOSURE PHILOSOPHY

In keeping with its recognized worldwide high standards for environmental and social responsibility, the Company will implement an environmentally sound and technically feasible decommissioning and reclamation plan for the Sä Dena Hes mine. Closure planning and the implementation of the DDRP at a minesite must be undertaken with appropriate environmental care, while respecting local laws, traditional land uses, public interest and ensuring that the company's high environmental standards are achieved. This approach is consistent with Teck's Corporate Code of Sustainable Conduct (see Appendix A). Annually, Teck reports on its Sustainability performance and in 2011 was appointed to the Dow Jones Sustainability World Index for the second consecutive year, indicating that its sustainability practices rank in the top

10% of companies in the resource industry worldwide. Copies of Teck's Sustainability Reports can be found on Teck's public web site at

www.teck.com/Generic.aspx?PAGE= +Site/Responsibility&portalName=tc

A principal philosophy followed during the development of this Plan was to work towards an eventual closure that requires minimal long term monitoring and maintenance. This involved an assessment of the key mine components that could potentially place the public or the environment at risk following closure. Mitigation measures have been designed to address public safety issues and environmental concerns with post closure monitoring and inspections planned to ensure that this objective is met. Once the effectiveness of the mitigation measures is assured, the management of the site can be safely reduced to a level that is consistent with final closure. Post-closure monitoring has been designed to ensure that performance objectives are closely monitored and inspected during the initial years following implementation of closure measures. It is anticipated that final determination of the effectiveness of closure measures will be the subject of review and concurrence with regulatory agencies, First Nations and the public.

Performance-based criteria were adopted for the Plan where deemed possible. The Water Licence Plan performance criteria for physical structures have been reviewed and criteria selected to conform to the closure philosophy. Licensed effluent discharge standards were used as criteria for waters emanating from the tailings management facility while CCME Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life were used to assess effectiveness of closure measures to local downstream receiving waters. These same performance based criteria will be used to determine the effectiveness of closure measures during post-closure monitoring. It is expected that post-closure monitoring and inspection results will be reviewed to ensure that closure objectives continue to be met well after decommissioning. If these objectives are not met, maintenance or contingency plans will be developed as necessary to address potential areas requiring further remediation.

To ensure that the closure philosophy can be achieved, the following objectives were emphasized during the development of this Plan:

- Protection of public health and safety;
- Implementation of environmental protection measures that minimize adverse environment impacts;

- Ensuring land use commensurate with surrounding lands;
- Post closure monitoring of the site to assess effectiveness of closure measures for the long term

1.2 FIRST NATIONS CONSULTATION

When the Sä Dena Hes Operating Corporation purchased the Sä Dena Hes Mine in 1994, the venture worked with Liard First Nations and formulated a Socio Economic Agreement that was to guide their joint relationship during the operation of the mine. Unfortunately, the mine did not reopen and remained dormant. Upon the decision to permanently close the Sä Dena Hes Mine, the Company sought to update its relationship with the Liard First Nation. The intent of the relationship between the two parties is for both parties to obtain value from their relationship as well as the optimization of the economic opportunities within the Nation and locally in the Watson Lake area.

Appendix H of this report has a more detailed review of the Company's consultations with LFN up to 2013 and identifies some planned activities going forward. In 2013, a community engagement and consultation plan was developed between the Company and LFN which includes engagement activities such as future community meetings at key times through the reclamation process, community news letters, and participation of LFN appointed community representatives as part of closure project.

In addition to the ongoing communication and engagement between the Company and the LFN, the Company committed the required funds to enable the LFN to have an environmental consultant of their choice conduct a review of the current Plan to identify potential items/issues that require further study during the 2012 field season and going forward. In the review scope, the environmental consultant was required to engage the LFN by way of hiring LFN members to participate in the review process, and provide updates to the LFN leadership. Results of this review were received in draft form on February 6th, 2013 and the Company has endeavored to address the key comments provided in LFN's review. The Approved review was received by the Company on March 22nd, 2013. A listing of revisions made in this DDRP as a result of LFN's reviews is attached in a concordance in Appendix H which were provided to the LFN, the Yukon Government, and the Water Board.

In addition to the Company's ongoing engagement and consultation with the LFN, following dialogue with the LFN, and with their agreement, the Company initiated communication with the Ross River First Nation (RRFN). In December 10, 2012, the Company provided a briefing that included the following:

- *Summary (and copy of the newsletter) regarding the LFN community dinner and meeting attended by the Company's representatives Oct. 17, 2012 in Watson Lake*
- *A suggested Communications Protocol to guide the Company and the RRDC communication activities*
- *Sä Dena Hes Mine site location map*
- *Contact information for Bruce Donald, Manager, Legacy Properties, Teck Resources Limited*
- *The Sä Dena Hes Mine Project Timeline for 2012 – 2015 for review*
- *The offer to provide a hard copy of the draft Sä Dena Hes Mine Detailed Decommissioning and Reclamation Plan for the Nation's review* and interest.

Going forward, the Company has a desire to ensure the RRFN remains apprised of the Sä Dena Hes DDRP, and is committed to providing future project updates for the interest of the RRFN membership.

The Company's approach to working with the Liard First Nation in 2013 and into the future will be based upon the solid working relationship established and maintained between the Company and the LFN to date.

As part of the ongoing consultation with LFN, including the ecological and human health risk assessment processes, traditional land uses and values will be incorporated into the end land use activities considered.

1.3 SCOPE OF PLAN

The scope of the original Sä Dena Hes Mine Detailed Decommissioning & Reclamation Plan was the subject of a Yukon Territory Water Board public hearing held in Whitehorse on November 19, 1997. Following this public hearing and deliberations by the YTWB, requirements for the Detailed Decommissioning & Reclamation Plan were set out as outlined in Water Licence QZ97-025, Section 66. The Plan includes the following components*:*

- *"Detailed designs to address long-term physical stability of all closure structures, including designs for upgrading the permanent tailings management structures to withstand natural events with a probability of occurrence similar to their expected service life (1:1000 year to PMF/MCE);*
- *Plans for addressing any short-term or long-term chemical stability or water quality problems;*
- *Plans for mitigating effects of access and surface disturbance;*
- *Plans for post closure monitoring and maintenance;*
- *Consideration of the need for, and as necessary, the establishment of, water balance and water quality models; and*
- *A cost estimate for decommissioning and post closure monitoring and maintenance."*

To achieve these goals, a complete review of all pertinent historical information regarding the Sä Dena Hes operation was undertaken. Table 1-1 Global Information List, presents a complete listing of reports and other information sources that were reviewed in the writing of this Plan. The Company felt that this review was necessary since the original mine ownership had changed and the mine has not been operational since the property was purchased. Subsequently, this list has been updated to include studies that have been undertaken during temporary closure.

The scope of the Sä Dena Hes Mine Decommissioning & Reclamation Plan remains essentially the same as outlined in the 2000 Plan document to include requirements in Section 66 of Water Licence QZ97-025, and subsequently the renewal of this licence, QZ99-045 and the QML-0004 Sections 15 and 16.

Section 83 of the current Water Licence also stipulates that an update to the Decommissioning Plan be submitted by January 28, 2012 which was done. When reviewing Update Document, the following were considered:

1. relevant changes in technology;
2. changes to the Canadian Environmental Quality Guidelines;
3. any relevant additional information that has been acquired through site monitoring or studies; and
4. a review of the estimated costs of decommissioning.

Table 1-1 Global Information List

Report Title / Topic	Author	Date
Reclamation Guidelines for Northern Canada	Land Resources, DIAND	1987
Mt. Hundere Project - Project Overview and Plan for IEE	SRK	Aug-89
Mt. Hundere Joint Venture IN90-002, Volume I - Report, Volume II - Appendices and Interventions	SRK	Jul-90
Mt. Hundere Joint Venture IN90-002, Transcript of Hearing; Additional Exhibits Entered at Hearing (Oct. 10&11/90)	YT Water Board	12-Oct-90
Mt. Hundere Joint Venture IN90-002 - Geotechnical Investigations and final Design for Mill and Tailing Disposal Facilities	SRK	Dec-90
Mt. Hundere Development, Initial Environmental Evaluation of the Mt. Hundere Development on the Watson Lake Area & Yukon (in drawer B210-B240 Vancouver)[1]	SRK	*1990*
Screening Report under the Environmental Assessment & Review Process Guidelines Order - Mt. Hundere Development	DIAND	16-Dec-90
EARP Decision Report - Mt. Hundere Development Proposal	DIAND	Jan-91
Water Use Licence IN90-002	YT Water Board	31-Jan-91
Sä Dena Hes Joint Mine (Overview)	Curragh	1991 or 19992
Sä Dena Hes Articles (Northern Miner, etc.)	Various	1991 to 1993
Sä Dena Hes Mine IN90-002 - As Built Construction Report for Reclaim Dam Toe Buttress	James B. Edward	3-Jan-92
Mt. Hundere Joint Venture IN90-002 - *Sä Dena Hes* Mine - As Built Report - North, South & Reclaim Dams & Instrumentation SRK Project 1203	SRK	24-Jan-92
Sä Dena Hes Mine Spill Contingency Plan	Curragh Inc.	Mar-92
1991 Annual Report to the Water Board	Curragh Resources	10-Mar-92
Sä Dena Hes Mine IN90-002 - Inspection of Facilities at the Tailings Impoundment and Reclaim Pond	SRK	20-Jul-92
Mt. Hundere Joint Venture IN90-002 - *Sä Dena Hes* Mine, Inspection Report Reclaim Dam Spillway & Camp Creek Diversion Reconstruction SRK S101104	SRK	19-Nov-92
Sä Dena Hes Mine IN90-002 - South Dam Extension Design Report SRK Project 101204	SRK	25-Nov-92
Water Licence and Temporary Closure Plan	G.B. Acott, Environmental Affairs Curragh Inc.	Dec. 1992
Sä Dena Hes Temporary Closure Plan Report #WH9209	Curragh	Dec-92

[1] The IEE consists of 6 volumes as follows:
Volume I - Project Description
Volume II - Mine Access Road Evaluation
Volume III - Socio-Economic Evaluation
Volume IV - Biophysical Evaluation for the Project Site
Volume V - Appendices
Volume VI - Overview & Summary

Report Title / Topic	Author	Date
Sä Dena Hes Joint Venture Concentrator Operation	Curragh	Jan-93
WGM Due diligence report	Curragh	25-Jan-93
Sä Dena Hes Joint Venture 1992 Annual Report	Ewald Pengal	Feb-93
Environmental Assessment of False Creek Canyon - 1992 Study	P.A. Harder & Associates Ltd.	Mar-93
Assessment of Environmental Liabilities *Sä Dena Hes* Mine near Watson Lake	Norecol, Dames & Moore	12-Oct-93
Application for Temporary Amendment to Water Licence IN90-002, *Sä Dena Hes*	Coopers & Lybrand	19-Nov-93
Sä Dena Hes 1993 Annual Report to the YT Water Board Licence IN90-002	Coopers & Lybrand & Cominco	Feb-94
1994 Annual Inspection of Tailings Management Facility, July 27 & 28, 1994 - *Sä Dena Hes* Mine	SRK	7-Oct-94
Construction Report Remedial Work, *Sä Dena Hes* Mine, Yukon Territory	SRK	Nov-94
Environmental Monitoring at False Canyon Creek 1994	LES & White Mountain	Jan-95
Sä Dena Hes 1994 Annual Report - Yukon Water Licence IN90-002	Cominco	Feb-95
North Creek Dyke, *Sä Dena Hes* Mine, Yukon Territory, C104105	SRK	Feb-95
1995 Annual Inspection - Tailing Management Facility - *Sä Dena Hes*	SRK	Oct-95
Sä Dena Hes Preliminary Decommissioning and Reclamation Plan	Cominco	Nov-95
Sä Dena Hes Preliminary Decommissioning and Reclamation Plan	Cominco	Jan-96
Water Use Licence IN90-002 - Amendment	Water Resources	25-Jan-96
Sä Dena Hes 1995 Annual Report Yukon Water Licence IN90-002	Cominco	Feb-96
Environmental Monitoring at False Canyon Creek 1996	LES	Dec-96
Sä Dena Hes 1996 Annual Report Yukon Water Licence IN90-002	Cominco	Feb-97
Submission in Support of the Amendment of Water Licence IN90-002	Cominco	Aug-97
QZ97-025 Sä Dena Hes Operating Corporation Amendment to IN90-002	YT Water Board	26-Sep-97
Review of Reclamation Cost Estimates	DIAND	Oct-97
1997 Annual Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	15-Oct-97

Report Title / Topic	Author	Date
The Sä Dena Hes Socio-Economic Participation Agreement	Cominco	21-Oct-97
Construction Report South Dam extension Toe Buttress	SRK	Nov-97
Review of Application for Water Licence amendment	Gartner Lee	Nov-97
Sä Dena Hes Amendment	Conservation Society	7-Nov-97
Amendment to IN90-002 (Sä Dena Hes)	YT Water Board	19-Nov-97
QZ97-025 Sä Dena Hes Register Public Hearing Amend to IN90-002	YT Water Board	19-Nov-97
Sä Dena Hes 1997 Annual Report - Yukon Water Licence IN90-002	Cominco	Feb-98
Application for a Type B Licence - Reconstruction of a run-off catchment berm	Access Mining Consultants	Feb. 1998
Water Use Application MS97-091, response to Water resources comments	Cominco	Mar. 1998
Water Licence QZ97-025	Water Board	May 1998
QZ97-025 - Amendment to Water Licence IN90-002	YTG Renewable	Nov. 1998
Site Review of October 18, 1993 Tailings Dams & Diversion Channel – Remedial works, Sä Dena Hes Mine, Yukon Territory	SRK	Oct. 1993
Final Report - Assessment of Environmental Liabilities, Sä Dena Hes Mine, Near Watson Lake, Yukon Territory	Norecol, Dames & Moore	Oct. 1993
Addendum to 1997 Construction Report, South Dam Toe Buttress, Sä Dena Hes, Yukon Territory	SRK	Nov. 1997
Aquamin Case Studies - Sä Dena Hes	Working Group 6 (BC & YT)	N/A
1998 Annual Report	Cominco	Feb. 1999
1998 Annual Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	Dec. 1998
Water Licence MS97-091	YT Water Board	May 1998
Sä Dena Hes Water Licence Security	YT Water Board	Mar. 1998
Sä Dena Hes Water Licence Amendments	YT Water Board	Mar. 1998
Reason for Decision - Water Licence QZ97-025 amendment to IN90-002 Sä Dena Hes	YT Water Board	Mar. 1998
Environmental Priorities – Sä Dena Hes	Norecol, Dames & Moore	N/A
Environmental Permits/Licences/ Approvals Needed to Mine in Yukon	DIAND	1999

Report Title / Topic	Author	Date
Environmental Monitoring at False Canyon Creek 1998	LES & Can-Nic-A-Nick	Dec. 1998
1999 Annual Report	Cominco	Feb. 2000
1999 Annual Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	Dec. 1999
2000 Annual Report	Cominco	Feb. 2001
2000 Geotechnical Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	Feb. 2001
2000 Geochemical Studies, Sä Dena Hes Mine	SRK	Nov. 2000
Environmental Monitoring at False Canyon Creek 2000	LES & Can-Nic-A-Nick	Dec. 2000
Land Reclamation and Revegetation Plan. Preliminary Test Program Summary Report, Sä Dena Hes,	Access Mining Consultants Ltd.	Nov. 2000
2001 Annual Report	Teck Cominco	Feb. 2002
2001 Geotechnical Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	Dec. 2001
Results Summary of Phase II Revegetation Test Program -2001, Sä Dena Hes. ,	Access Consulting Group	Feb. 2002
2002 Annual Report	Teck Cominco	Feb. 2003
2002 Geotechnical Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	Mar. 2003
2002 Geochemical Projects Sä Dena Hes,	SRK	Mar. 2003
Results Summary of Phase II Revegetation Test Program -2002, Sä Dena Hes. ,	Access Consulting Group	Jan. 2003
2003 Geotechnical Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	Dec. 2003
Sä Dena Hes – 2003 Dam Safety Review	Klohn Crippen	Nov. 2003
2003 Annual Report	Teck Cominco	Feb. 2004
Results Summary of Phase II Revegetation Test Program - 2003, Sä Dena Hes. ,	Access Consulting Group	Mar. 2004
Environmental Monitoring at False Canyon Creek 2004	LES & Can-Nic-A-Nick	Nov. 2004
Operating, Maintenance and Surveillance Manual, Tailings Management Facility – December 2004	SRK Consulting	Dec, 2004
2004 Geotechnical Inspection Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK	Feb 2005
2004 Annual Report	Teck Cominco	Mar. 2005
Results Summary of Phase II Revegetation Test Program - 2004, Sä Dena Hes. ,	Access Consulting Group	Mar. 2005
Sä Dena Hes Mine Temporary Closure Site Status Report as of January 2005	Teck Cominco	Jan. 2005
Results Summary of Phase II Revegetation Test Program - 2004, Sä Dena Hes. ,	Access Consulting Group	Mar. 2005

Report Title / Topic	Author	Date
Results Summary of Phase II Revegetation Test Program - 2005, Sä Dena Hes. ,	Access Consulting Group	Jan. 2006
Results Summary of Phase II Revegetation Test Program - 2006, Sä Dena Hes. ,	Access Consulting Group	Jan. 2007
Detailed Decommissioning & Reclamation Plan January 2006 Update	Access Consulting Group, SRK & Teck Cominco	January 2006
Sä Dena Hes Mine 2005 Annual Report, Yukon Water Licence QZ99-045	Teck Cominco	March 2006
Sä Dena Hes Mine 2005 Annual Report, Yukon Production Licence QML-0004	Teck Cominco	April 2006
2005 Geotechnical Inspection, Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK Consulting Engineers and Scientists	March 2006
Sä Dena Hes Mine 2006 Annual Report, Yukon Water Licence QZ99-045	Teck Cominco	March 2007
Sä Dena Hes Mine 2006 Annual Report, Yukon Production Licence QML-0004	Teck Cominco	March 2007
2006 Geotechnical Inspection, Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK Consulting Engineers and Scientists	March 2007
Sä Dena Hes Mine – 1380 Portal	SRK Consulting Engineers and Scientists	March 2007
Sä Dena Hes Mine 2007 Annual Report, Yukon Water Licence QZ99-045	Teck Cominco	March 2008
Sä Dena Hes Mine 2007 Annual Report, Yukon Production Licence QML-0004	Teck Cominco	March 2008
2007 Geotechnical Inspection, Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK Consulting Engineers and Scientists	March 2008
Environmental Monitoring at False Canyon Creek, 2008	Laberge Environmental Services & Can-Nic-Nick Environmental Services	November 2008
Sä Dena Hes Mine 2008 Annual Report, Yukon Water Licence QZ99-045	Teck Cominco	March 2009
Sä Dena Hes Mine 2008 Annual Report, Yukon Production Licence QML-0004	Teck Cominco	March 2009
2008 Geotechnical Inspection, Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK Consulting Engineers and Scientists	March 2009
Sä Dena Hes Mine 2009 Annual Report, Yukon Water Licence QZ99-045	Teck Cominco	March 2010
Sä Dena Hes Mine 2009 Annual Report, Yukon Production Licence QML-0004	Teck Cominco	March 2010
2009 Geotechnical Inspection, Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK Consulting Engineers and Scientists	March 2010
Environmental Monitoring at False Canyon Creek, 2010	Laberge Environmental Services & Can-Nic-Nick Environmental Services	November 2010
Sä Dena Hes Mine 2010 Annual Report, Yukon Water Licence QZ99-045	Teck Metals Ltd.	March 2011
Sä Dena Hes Mine 2010 Annual Report, Yukon Production Licence QML-0004	Teck Metals Ltd.	March 2011
2010 Geotechnical Inspection, Tailings Management Facility, Sä Dena Hes, Yukon Territory	SRK Consulting Engineers and Scientists	March 2011
Summary Report – Site Investigation and Remedial Soil Excavation	Access Consulting	April 18, 2012

Report Title / Topic	Author	Date
Technical Memorandum Reclamation Progress Report	Access Consulting	December 18, 2012
Environmental Monitoring at False Canyon Creek, 2012	Laberge Environmental Services & Can-Nic-Nick Environmental Services	December 2012
Phase I and II Environmental Site Assessment, Sä Dena Hes Mine Yukon Territory	Golder Associates	February 1, 2013
Pre-Demolition Hazardous Building Materials Assessment, Mine Infrastructure and Camp Buildings, Sä Dena Hes Mine Yukon Territory	Golder Associates	February 1, 2013
Pre-Demolition Hazardous Building Materials Assessment, Concentrator Complex and Associated Structures, Sä Dena Hes Mine Yukon Territory	Golder Associates	February 1, 2013
Sä Dena Hes – 1380 Portal Discharge Investigation	SRK Consulting	February, 2013
Sä Dena Hes – Water Quality Monitoring Plan and Data Summary Report	SRK Consulting Inc.	January 2014
Sä Dena Hes Tailings Management Facility Decommissioning Design Report	SRK Consulting (Canada) Inc.	March 2014
Waste Rock Dump Stability Assessment, Sä Dena Hes Project	SRK Consulting Inc.	March 19, 2014
Sä Dena Hes Mine: Burnick and Jewelbox Crown Pillar Stability Assessment	SRK Consulting Inc.	March 27, 2014
Sä Dena Hes – Potential for Evaporite Salt Formation on Tailings Cap	SRK Consulting Inc.	March 19, 2014
Sä Dena Hes Quarry Development Plan	SRK Consulting Inc	March 2014
Sä Dena Hes – Performance Evaluation of Jewelbox Pit Waste Rock Soil Cap	SRK Consulting Inc.	March 27, 2015
Sä Dena Hes Mine – Human Health Risk Assessment (HHRA)	Azimuth Consulting Group Partnership	April 2014
Sä Dena Hes Mine Closure – 2013 Analytical Data Summary for Soil Assessment Work	Golder Associates Ltd	April 8, 2014
Sä Dena Hes Mine Closure – 2013 Analytical Data Summary for Hydrogeological Assessment Work	Golder Associates Ltd.	April 9, 2014
Sä Dena Hes Mine – Interim Result of the Ecological Risk Assessment (ERA) to Guide Closure Planning, Draft for Agency and Stakeholder Review	Azimuth Consulting Group Partnership	April 2014
Sä Dena Hes Mine – Data Report in Support of the Human Health and Ecological Risk Assessment (HHERA)	Azimuth Consulting Group Partnership	April 2014
Effectiveness of 0.15 m Cover to Mitigate Potential Human Health Risks at the Sä Dena Hes Mine	Azimuth	May 4, 2015
2014 Environmental Site Assessment Report	Golder Associates	May 7, 2015
Observations on Soil Geochemistry at the Closed Sä Dena Hes Mine Site, Yt	Golder Associates	May 14, 2015
Remediation Options Analysis – Sä Dena Hes, Yukon Territory	Golder Associates	May 15, 2015
Volume 1: Addendum to the Problem Formulation for the Ecological Risk Assessment	Azimuth	August 2015
Volume 2: Addendum to the Ecological Risk Assessment for the Terrestrial Environment	Azimuth	August 2015

Report Title / Topic	Author	Date
Volume 3: Ecological Risk Assessment for the Aquatic Environment	Azimuth	In Progress
Sä Dena Hes Human Health Risk Assessment Update	Azimuth	In Progress

Various closure options were assessed to ensure that closure objectives were met for each mine component.

The approach taken to this Plan is to present a brief description of each mine component and the closure issues related to that component. Closure measures are then presented for the mine, tailings management facility, and infrastructure components. A summary of the environmental setting for the project, complete with results from all ongoing licensed monitoring programs are presented in Appendix B ("*Environmental Baseline Update and Technical Basis for Closure Assumptions*"). This approach ensures that the reader is given a picture of the existing facilities at the site and the local environmental conditions without having to review previous historical information. Previous work or reports on the project have been referenced without repeating details so that this document is focused on decommissioning and reclamation.

1.4 CORPORATE BACKGROUND

Teck is a diversified resource company committed to responsible mining and mineral development with business units focused on copper, steelmaking coal, zinc and energy. Teck is also a significant producer of specialty metals such as germanium and indium and actively explores for copper, zinc and gold in the Americas, Asia Pacific, Europe and Africa.

At Teck, the pursuit of sustainability guides our approach to business. We recognize that our success depends on our ability to establish safe environments for our people and collaborative relationships with communities of interest. Teck is headquartered in Vancouver, Canada, and owns or has an interest in 12 operating mines in Canada, the United States, Chile and Peru, as well as one large metallurgical complex in Canada.

Copper:
In 2011, Teck's share of copper production from Antamina in Peru, Quebrada Blanca and Carmen de Andacollo in Chile, Highland Valley copper in British Columbia, and Duck Pond in Newfoundland was 321,000 tonnes of copper.

Coal:

Teck is the largest producer of steelmaking coal in North America and the second-largest exporter of seaborne steelmaking coal in the world. Six operating coal mines are located in Western Canada with five in southeastern B.C. and one in west-central Alberta. In 2011, Teck produced 22.8 million tonnes of coal.

Zinc

Teck's zinc concentrate production primarily comes from the Red Dog mine in Alaska and the Antamina mine in northern Peru. Teck's operations in Trail, B.C. represent one of the world's largest fully integrated zinc and lead smelting and refining complexes. Teck's share of zinc produced was 646,000 tonnes of zinc contained in concentrates and 291,000 tonnes of refined zinc in 2011.

Energy:

Located in the Athabasca region of northeastern Alberta, Teck's energy assets include a 20% interest in the Fort Hills project and a 100% interest in the Frontier project. In addition, we hold interests in various other oil sands leases in the exploration phase.

The Company has significant experience in exploration and mining, particularly in the north, in Canada, Alaska and Greenland. Exploration crews have been working in the north since the 1920's with successful results.

Teck's northern mines past and present include:

- *Con*, Yellowknife, NWT – Con was the first gold mine in the NWT, beginning production in 1937. The mine was sold in 1986 and continued to operate under several different owners until it was permanently closed in 2003.

- *Pine Point*, Pine Point, NWT – This open pit lead-zinc mine operated between 1965 and 1988. It is located near the south shore of Great Slave Lake. Forty-eight deposits containing approximately 64 million tonnes of ore were mined. The Pine Point mine site was decommissioned in accordance with the standards of the day. The Crown agreed to accept the return of the land leases upon completion of the decommissioning and reclamation

program with the exception of the tailings management area which Teck continues to lease and manage.

- *Black Angel*, Greenland – The Black Angel lead-zinc underground mine operated between 1973 and 1990, although not under Cominco ownership from 1986 onwards. It was located at 73^{o}N in extremely rugged terrain, approximately 500 kilometres north of the Arctic Circle on Greenland's west coast.

- *Polaris*, NWT – The Polaris zinc-lead underground mine began production in 1981 and ceased production in 2002 producing 1 million tonnes of ore per year. It was the world's most northerly base metal mine, located at 75^{o}N on Little Cornwallis Island approximately 100 kilometres northwest of Resolute, NWT. Post closure reclamation is completed and final demobilization from the site occurred in September 2011. Teck continues to provide on-going site monitoring.

- *Red Dog*, Alaska – The Red Dog zinc-lead open pit mine began producing in 1990 and has a projected mine life of at least another 40 years. It is one of the world's largest zinc mines. The mine is located 145 kilometres north of Kotzebue. Red Dog is a joint venture between Teck and the North Alaska Native Association (NANA) Regional Corporation Inc. Teck is the operator of the mine.

1.5 PROPERTY LOCATION

The Sä Dena Hes property is located close to Yukon's southern boundary with British Columbia, approximately 70 kilometres by road from the Town of Watson Lake. The minesite (see Figure 1-1) is reached via the Robert Campbell Highway, north of Watson Lake. At approximately kilometer 47 of the Robert Campbell Highway, a 25 km access road designed to accommodate the safe and efficient haulage of concentrate extends to the property.

Most of the mineral occurrences are near the treeline ranging in elevation from 1,200 to 1,500 metres above sea level. The plant site is below the mine workings and lies in boreal woodlands. Snowfall in the Watson Lake area is approximately 230 cm/year however the mine site receives heavier snow through the winter (anecdotal). Temperatures vary from an average of –26.3 °C

in January, to an average of 14 °C in July. In January mean low temperatures in Watson Lake are -32 C.

The Sä Dena Hes mine comprises the Jewelbox and Burnick underground mines, and two undeveloped mineralized zones – Gribbler Ridge and Attila, and a number of other identified exploration targets within the claims group (see Figure 1-2).

1.6 STATUTORY AND REGULATORY RESPONSIBILITIES

1.6.1. *Regulatory Agencies*

The Sä Dena Hes mine was constructed in 1991 and operated for a 16-month period between August, 1991 and December, 1992 under Water Use Licence IN90-002. The Sä Dena Hes Operating Corporation (SDHOC) purchased the property from Curragh Resources Inc. in March 1994 and the Water Use Licence was subsequently assigned in April 1994. Teck presently manages the property on behalf of the Sä Dena Hes Operating Corporation.

Water Use Licence IN90-002 was amended by the Sä Dena Hes Operating Corporation in August 1997 to address submission of a decommissioning plan for the site. Amended Water Use Licence (QZ97-025) was issued in March 1998 and required the Licensee to submit a Detailed Decommissioning and Reclamation Plan for the site. The licence expiry date remained September 15, 2000.

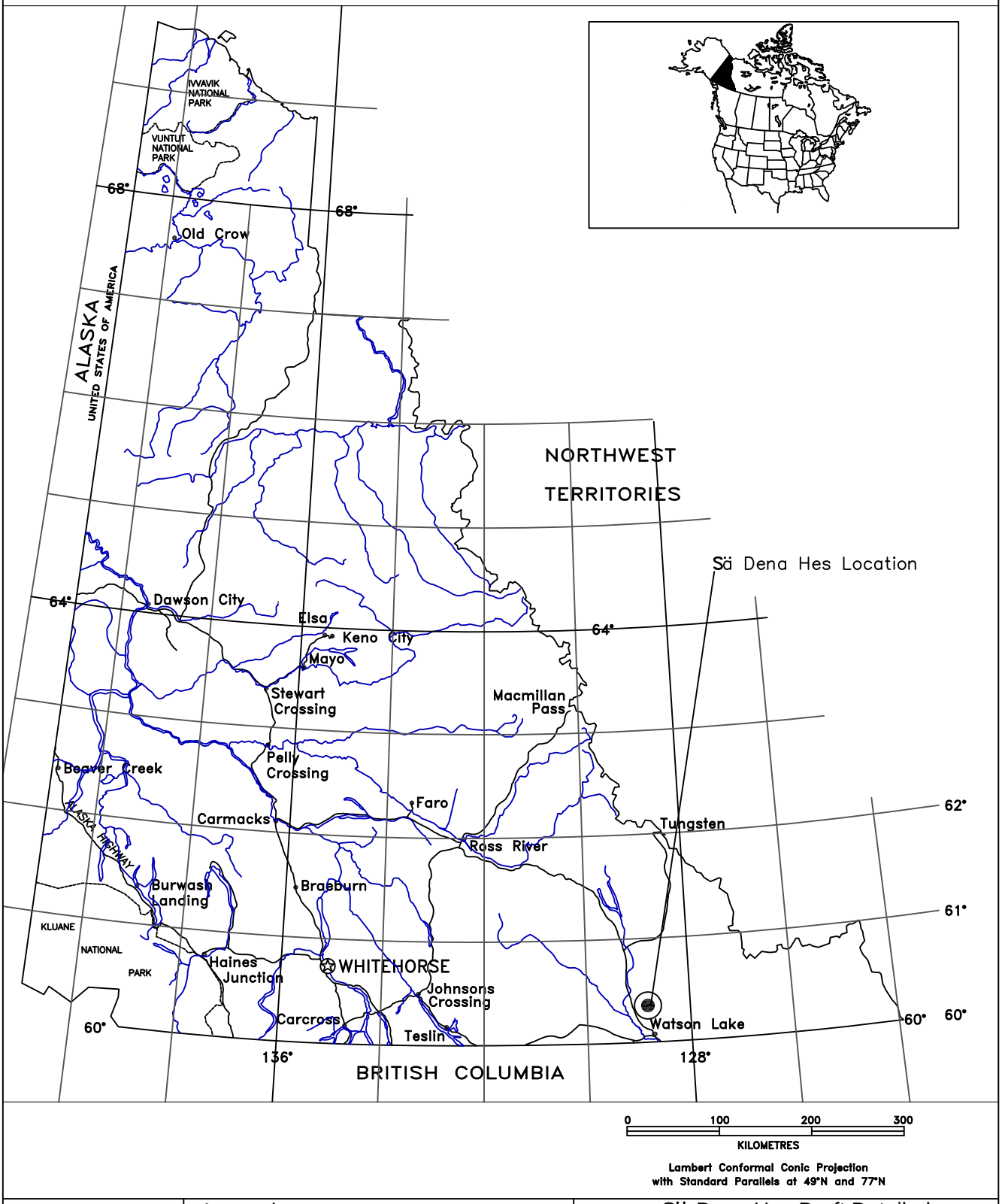
The company submitted a final DDRP in February 2000 after extensive consultation with various interested parties. A Water Use Licence renewal application was also filed (QZ99-045) in February 2000 to renew and extend the existing licence and this application triggered an environmental assessment (EA) pursuant to the *Canadian Environmental Assessment Act* (CEAA). Two further amendment requests (QZ00-047) and (QZ00-048) were made to the Water Board to request an extension to the licence expiry date to ensure completion of the CEAA review. In addition, the company also submitted an application for a Quartz Mine Production Licence pursuant to the *Yukon Quartz Mining Act* that also required a CEAA review.

An extensive CEAA screening was completed in June 2001 while the property was still under Temporary Closure and included an assessment of the DDRP. The CEAA screening enabled the issuance of both the Water Use Licence (QZ99-045) and Quartz Mine Production Licence

(QML-0004) with specific terms and conditions relating to temporary closure and maintenance of the site

The 2001 CEAA screening remains current with respect to the existing property and care and maintenance activities. No new development activities have been undertaken since the screening and all required care and maintenance activities have been implemented by the Company. Required licence studies and monitoring programs have been either completed or continue to be on going as mandated and are submitted on a regular basis to the Water Board and other regulatory authorities. The results of various studies and monitoring programs have been reviewed and an assessment completed regarding the site's effects on the surrounding environment.

Yukon Territory



Teck

ACCESS CONSULTING GROUP

SRK Consulting
Engineers and Scientists

Legend

- Populated Settlements
- Territorial Capital

Sä Dena Hes Draft Detailed Decommissioning and Reclamation Plan

General Location Map (Map of Yukon)

DRAWN BY: ASH	CHECKED BY:	Fig No. 1-1
January 2010	Scale 1: 6, 000, 000	

500000
510000
520000
6720000
6710000
6700000
6690000
N
MH-20
MH-21
MH-19
MH-16
MH-14
MH-18
MH-15
MH-17
MH-12
MH-13
MH-24
MH-11
Stewart Lake
False Canyon Creek Tributary B
Tributary D
Tributary B
False Canyon Creek
Stewart Creek
Tom Lake
Little Tom Lake
Tom Creek
CLAIM BOUNDARY
SEE DRWG. 3.1
GENERAL ARRANGEMENT PLAN
BURNICK ZONE
MT. HUNDERE
NORTH CREEK DYKE
TAILINGS IMPOUNDMENT
CATCHMENT AREAS
MAIN ZONE
JEWELBOX HILL ZONE
MILL SITE
ACCESS ROAD
ROBERT CAMPBELL HIGHWAY
NORTH CREEK
CAMP CREEK
PORTAL CREEK
3000
3500
4000
4500
5000
2500

NTS: 105 A/06, 105 A/07
105 A/10, 105 A/11

CONTOUR INTERVAL 100 FEET

0 1000 2000 3000 4000 5000 metres
1:100,000

NOTE
BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Teck

ACCESS CONSULTING GROUP

SRK Consulting
Engineers and Scientists

LEGEND
- WATER MONITORING STATION
- FISH MONITORING STATION
- BENTHIC MONITORING STATION

Sä DENA HES DRAFT DETAILED DECOMMISSIONING AND RECLAMATION PLAN

SITE LOCATION PLAN

DRAWN BY:	CHECKED BY:	FIGURE NO.	REV.
MH	PMH	1 – 2	
DATE: January 2010	PROJ. NO. 1CC005.05		

FILE REF.:CATCHMENT.DWG

1.6.2. *Approvals and Licences*

The Company currently holds a Type A Water Licence QZ99-045, and Quartz Mine Production Licence (QML-0004) for quartz mining, both of which were issued in 2003 and expire on December 31, 2015. In 2005 and again in 2010, extensions to the Temporary Closure clauses were obtained for both Licences with the 2010 extension specifying that Temporary Closure ends on January 27, 2013. As of January 28th, 2013, the site is deemed to be in "Permanent Closure" which requires implementation of the site DDRP.

The company is required to comply with the terms and conditions of the Licenses and of the Yukon Waters Act and Regulations. Compliance with licence terms and conditions has been monitored by Yukon Environment, Water Resources Division as well as the Ministry of Mineral Resources.

Various other agencies grant the permits necessary to close a project of this nature. A detailed summary of the approvals and Licenses that may be required for this project and the associated permitting bodies are presented in Table 1-2. As part of implementing the Plan, the Company will ensure that the various other Licenses and/or permits that are required for undertaking are secured and complied with during the decommissioning.

Upon review and acceptance of this update to the DDRP, the plans contained will be implemented beginning in the summer of 2013 and will be substantially complete by December 31, 2015.

Table 1-2 Summary of Current and Potentially Required Permits and Licenses

Authorization and Legislation	Purpose	Responsible Agency
Current Project Authorizations		
Type A Water Use Licence QZ99-045 (Amendment 2 QZ09-093) Expires December 31, 2015 *Yukon Waters Act*	Water use and deposit of a waste associated with mine construction, production and closure/post-closure.	Yukon Water Board (Licencing) YG Energy, Mines and Resources – Mineral Resources (Inspections)
Quartz Mining Licence QML-0004 Expires December 31, 2015 *Quartz Mining Act*	Mine construction, production and closure/post-closure.	YG Energy, Mines and Resources – Mineral Resources
Special Waste Permit (Permit #4201-41-247) Expiry Date: Dec. 31, 2013 *Yukon Environment Act*, Special Waste Regulations	Temporary stockpiling of soils contaminated with metals and/or petroleum hydrocarbons above special waste thresholds.	Environment Yukon, Environmental Programs Branch
Permit To Install A Sewage Disposal System *Public Health & Safety Act,* Sewage Disposal Systems Regulation	Onsite sewage disposal system.	YG Health & Social Services, Environmental Health Branch
Commercial Dump Permit *Yukon Environment Act*, Special Waste Regulations, Air Emissions Regulations, Solid Waste Regulations Expiry Date: Dec. 31, 2014	Construction and operation of a landfill, transfer station or commercial dump.	Environment Yukon, Environmental Programs Branch
Potentially Required Project Authorizations		
Amendment of Type A Water Use Licence QZ99-045 *Yukon Waters Act*	Water use and (potentially) deposit of a waste associated with closure/post-closure.	Yukon Water Board (Licencing) YG Energy, Mines and Resources, Mineral Resources Branch (Inspections)
Amendment of Quartz Mining Licence QML-0004 Certificate of Closure *Quartz Mining Act*	Mine closure/post-closure.	YG Energy, Mines and Resources, Mineral Resources Branch
Fisheries Act Letter of Advice (an *Authorization* is not likely to be required)	Camp Creek realignment; culvert removal; channel stabilization.	Fisheries and Oceans Canada (DFO)

Authorization and Legislation	Purpose	Responsible Agency
Special Waste Permit *Yukon Environment Act*, Special Waste Regulations	Mixing and dilution, generation, handling, collection, storage, release or disposal of special hazardous wastes. Current Permit #4201-41-247 expires December 31, 2013.	Environment Yukon, Environmental Programs Branch
Land Treatment Facility Permit *Yukon Environment Act,* Contaminated Sites Regulation	Operation of a land treatment facility (LTF) for the remediation/treatment of petroleum hydrocarbon contaminated soils.	Environment Yukon, Environmental Programs Branch
Special Waste Relocation Permit *Yukon Environment Act*, Special Waste Regulations	Relocation of contaminated soil. Previous Special Waste Relocation Permit (#4201-45-033) expired on Dec. 31, 2012.	Environment Yukon, Environmental Programs Branch
Application for Operation, Closure, Abandonment, or Renovations to Storage Tanks *Environment Act*, Storage Tank Regulation	Use of storage tanks.	YG Community Services, Protective Services Branch
Explosives Magazine Permit *Explosives Act*	Storage of explosives.	Yukon Worker's Compensation Health and Safety Board, Occupational Health & Safety
Blaster's Permit *Occupational Health and Safety Act*, Occupational Health and Safety Regulations Part 14: Blasting Regulations	Use of explosives.	Yukon Worker's Compensation Health and Safety Board, Occupational Health & Safety
Burning Permit *Territorial Lands Act* *Forest Protection Act*, Forest Protection Regulations	Burning refuse wood.	YG Community Services, Protective Services Branch
Commercial Use Permit *Territorial Lands Act*, Timber Regulation	Timber cutting less than 1000 m^3 per year.	YG Energy, Mines and Resources, Client Services & Inspections
Over-dimensional or Over-weight Vehicle Permits	Oversize trucking.	YG Highways & Public Works, Transportation Services Branch
Certificate and/or Permit for Transport of Dangerous Goods *Transportation of Dangerous Goods Act*	Transport of dangerous goods/waste.	YG Highways & Public Works, Transportation Services Branch

1.7 DOCUMENT ORGANIZATION

Section 1 of this document introduces the philosophy and scope for the Plan as well as Teck's corporate background. Information is provided on the property and its history and includes a discussion of regulatory responsibilities regarding closure.

Section 2 provides a brief overview of the current status of the Sä Dena Hes mine.

Section 3 provides a detailed description of the decommissioning and reclamation plan for the various components including mine workings, tailings management facility, infrastructure and reagents, and site access and haul roads. This section presents a description of each of the project components and outlines potential closures issues. The plan for decommissioning and reclamation activities for each of these areas is then presented.

Section 4 presents the implementation schedule for the Plan, in the format of a Gantt chart.

Section 5 deals with post closure site management plans and activities. This section presents the environmental management measures proposed for the decommissioning and post closure period.

Section 6 provides the January 2012 updated cost estimate for implementing the DDRP.

Section 7 presents a discussion of the licence financial security requirements and arrangements.

Section 8 provides report references.

ACKNOWLEDGEMENTS:

This report benefited from input by the following companies:

Teck – Provided overall direction for the project as well as the corporate policy framework and senior technical review of the proposed closure measures. Staff members from Teck's Legacy Properties office in Kimberley are the primary authors of revisions in this current update with input from a number of consultants. The key authors of the original DDRP were Access Consulting Group and SRK Consultants.

Access Consulting Group – Access were the primary authors of the original report. In subsequent updates, they provided technical and editing support. In 2012 additional support with regard to regulatory processes was provided by Access.

SRK Consultants Ltd. – Responsible for sections on closure measures and original costing (subsequently updated by the Company) for mine workings and the tailings management facility, and the geochemistry, climate, and hydrology components of the environmental baseline update. SRK has been conducting the site hydrology and geochemistry with additional field work and reporting related to the 1380 Portal discharge.

Laberge Environmental Consultants – Responsible for environmental baseline update for aquatic resources and helped develop the land reclamation closure measures.

Golder Associates Ltd (Golder) – Responsible for environmental site assessment and hazardous building material assessment of the SDH mine site. The work was conducted on behalf of Keyeh Nejeh Golder Corporation (KNG) which is a joint venture with Golder and the Liard First Nation. The environmental site assessment has identified potential environmental impacts at the site. The results will be used to support the ecological and human health risk assessment which will ultimately guide the overall remediation of the mine site.

Azimuth Consulting Group – Responsible for the section discussing the ecological and human health risk assessment and a risk based approach to establishing remedial plans.

2.0 MINING ACTIVITIES

2.1 MINE HISTORY

The original surface showings were discovered in 1962 by prospectors working for the Francis River Syndicate, and for the next few years geochemical and geophysical surveys were conducted, together with some diamond drilling. Between 1979 and 1982, Cima Resources Ltd. and Canadian Natural Resources Ltd. carried out diamond drill programs totaling almost 3,000 metres in 72 holes, and outlined an estimated 250,000 tonnes of zinc and lead mineralization.

In 1984, Canamax purchased the property and began systematic geological and geochemical prospecting, including airborne geophysical surveys, with follow-up ground geophysics. By the end of 1988, Canamax had completed 23,333 metres of drilling in 193 holes and estimated a zinc-lead-silver mineral inventory of over 5 million tonnes in a number of zones.

In 1989, the Mount Hundere Joint Venture (Curragh Resources Ltd. - 80%, and Hillsborough Resources Ltd. - 20%) purchased the property from Canamax and completed 29,000 metres of diamond drilling in 150 holes in order to upgrade reserves in the Jewelbox Hill and North Hill areas. This program resulted in an assessment of proven plus probable mineable reserves of 3.9 million tonnes at 11.5% Zn, 3.8% Pb, and 53 grams/tonne Ag.

In 1990, Kilborn Ltd. prepared a development plan, the project secured financing from the Bank of Nova Scotia, and the property was put into production in August 1991.

The first zinc and lead concentrate shipment to the port of Skagway, Alaska occurred in September, 1991. Mine production rates and mill processing exceeded design capacity of 1,500 tonnes per day during the production period. The maximum mill throughput was over 1,800 tonnes per day. During the 16 months of production, some 700,000 tonnes of ore were mined and processed. Approximately 120,000 tonnes of zinc concentrates were produced with a grade of 59% Zinc and 54,000 tonnes of lead concentrates at a grade of 77% Lead. The concentrates were trucked in covered containers to Skagway for shipment to European and Asian smelters. A sharp downturn in metal prices forced the mine to shut down in December 1992, at which time the property was put on a care and maintenance basis.

Curragh Resources sought and received Court protection under the *Corporations and Creditors Arrangement Act* in 1993. On September 20, 1993, Coopers & Lybrand Ltd. was appointed by the court as Receiver and Manager of the Sä Dena Hes property. In March 1994, the current owners purchased the property through the Receiver according to a Court Order. The property has been kept on care and maintenance except for a brief period in the winter of 1998 when SDHOC began preparations for reopening. A downturn in metal prices forced a re-evaluation, and subsequent suspension of work.

2.2 TEMPORARY CLOSURE

A decision has been made by the owners to begin Permanent Closure activities commencing in 2013. During temporary closure the site was under the care of a full time, onsite caretaker. The caretaker provided security for the site, conducted daily checks of the mill and the general area, daily checks of the Tailings Management Facility, as well as conducting monthly and quarterly environmental sampling.

Geotechnical inspections of the tailings management facility, as required by Water Licence QZ99-045, are conducted on an annual basis. This ensures that any potential geotechnical problems are identified early to enable remedial measures to be undertaken if required. The Company has implemented all recommendations that have resulted from these inspections.

2.3 ENVIRONMENTAL STUDIES AND RISK ASSESSMENT/RISK MANAGEMENT STRATEGY

Since active mining ceased in 1991, environmental compliance monitoring, internal monitoring of earthworks and independent geotechnical inspections has been ongoing at the property and are further discussed in Section 5.3.

In preparation for Permanent Closure, environmental site assessment (ESA) activities were completed from 2011 to 2014 to characterize the environmental conditions of the site. The ESA was conducted to evaluate the spatial extent and magnitude of environmental contamination (primarily by lead and zinc but also by other metals) in the mine disturbed areas and surrounding lands. Several areas of environmental concern (AECs) on the site were identified including:

- AEC 1: Jewelbox Hill
- AEC 2: Burnick, including AEC 2.1: Burnick Waste Rock Pile and AEC 2.4: 1300 Portal

- AEC 3: Mill Site
- AEC 5: Boneyard
- AEC 8: Tailings and Reclaim Ponds
- AEC 9: Main Zone, including AEC 9.1: Waste Rock Dump, AEC 9.2: 1250 Portal, and AEC 9.4: 1380 Gully

The results are based on a series of reports (Golder 2013, 2014a, 2014b, 2015a) and are incorporated within the relevant subsections of Section 3.0 and summarized in Section 3.6.

In addition to the ESA, Azimuth Consulting Group (Azimuth) was commissioned to conduct a Human Health Risk Assessment (HHRA), as well as terrestrial and aquatic Ecological Risk Assessments (TERA and AERA, respectively). The assessments were conducted to evaluate potential ecological and human health risks as a result of contamination from the mine site operations. The overall goal of this work was to support the mine closure process, including providing feedback to the Company over the course of mine remediation and reclamation from 2012 to 2015.

Azimuth has iteratively prepared a series of risk assessment reports alongside site investigation, engagement with local First Nations, and decisions about the DDRP, including: Draft Problem Formulation (PF) (Azimuth, 2013), Data Report (Azimuth 2014a), HHRA (Azimuth 2014b), Interim ERA (terrestrial food chain model; Azimuth 2014c), Updated PF (Azimuth 2014d), Draft TERA (Azimuth 2014e), PF Addendum (Azimuth 2015a), TERA Addendum (Azimuth 2015b), AERA (Azimuth 2015c), and a technical memo to update the 2014 HHRA (Azimuth 2015d).

The approach and key findings for the human health and ecological risk assessments are further discussed in Section 3.6. However, the risk management closure methods are included within the relevant subsections of Section 3.0.

All risk assessment work is underpinned by site assessment work, including both soil and groundwater assessment, conducted by Golder Associates Ltd. SRK Engineers led surface water-related work on behalf of the Company; the AERA and TERA rely on their studies for surface water quality data.

The development of the risk assessment has been an iterative process, which involved different stages of studies to identify and fill data gaps to develop a more refined assessment of the risk. During the mine closure process, the Company liaised with regulators, First Nations and

stakeholders to ensure that the approach was clear and the findings clearly communicated. To assist in the review of the supporting studies, EMR retained an independent third party reviewer to review the Ecological and Human Health Risk Assessments. The third party review identified areas of the DDRP that, in the reviewer's opinion, required amendments in order to address the findings of the studies. Based on the review, amendments are included within this DDRP.

All the environmental supporting technical reports that have been submitted to the Yukon Government for review and approval during the closure process are included in Appendix K.

3.0 DETAILED DECOMMISSIONING & RECLAMATION PLAN

3.1 OVERVIEW

This section presents a detailed discussion of the planned decommissioning and reclamation measures for the various facilities located on the Sä Dena Hes property.

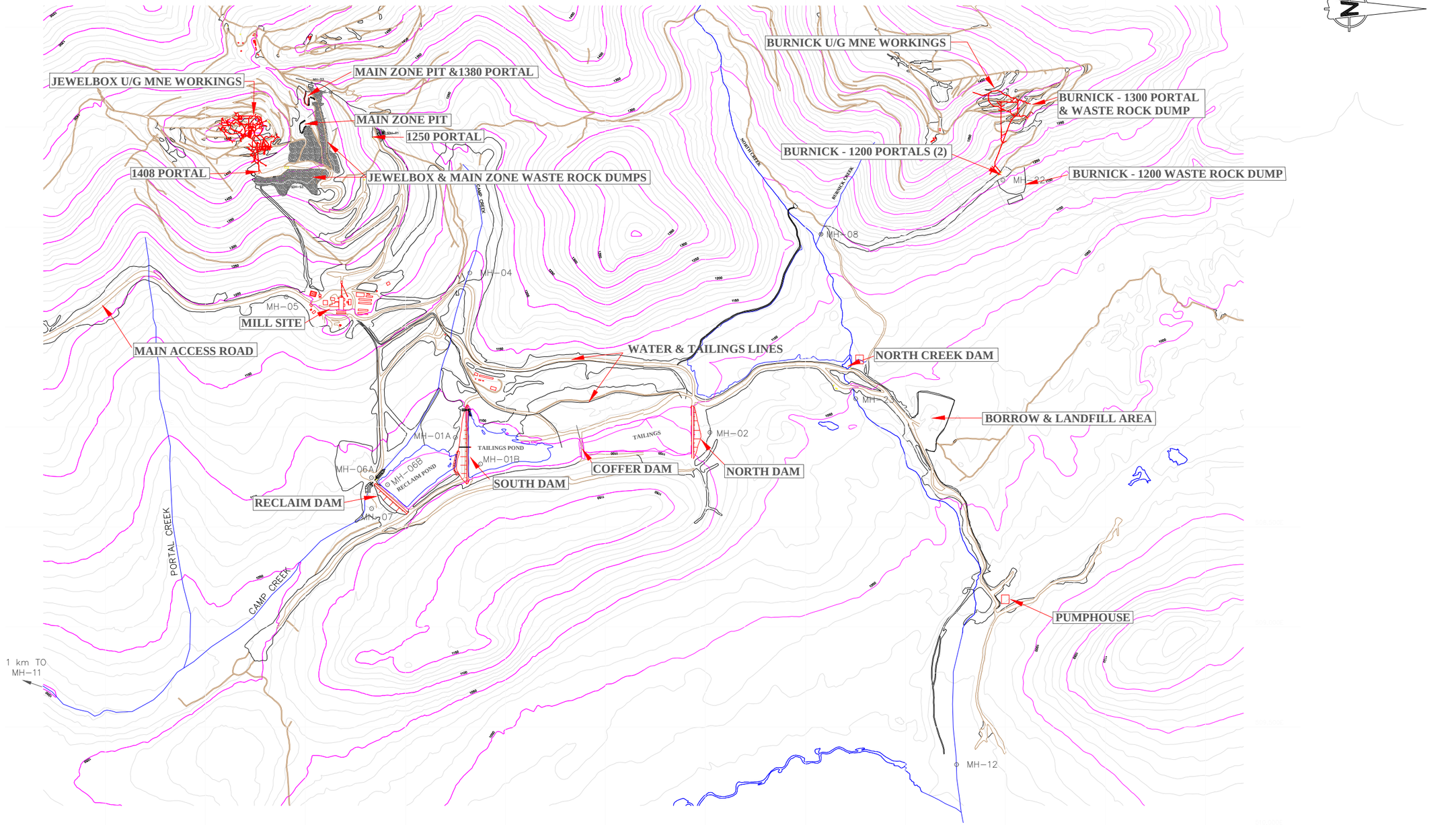
The approach to each subsection is to present a description of each area so readers are familiar with the existing facility and do not have to refer back to previous reports or information. Next, specific closure issues are discussed as they relate to each closure activity.

Finally, planned closure measures are presented. Each section is supported with detailed figures and tables as required. Where needed, references are made to previous reports or supporting documentation. Figure 3-1 provides a general arrangement plan for current conditions at the site. Figure 3-2 presents a summary of the various closure measures for features on the general arrangement plan.

3.2 MINE WORKINGS

This section discusses the mine features that require action upon closure of the operation. This section does not address surface facilities such as buildings, electrical services, air/water services, fuels storage tanks and access roads. These components will be discussed in other sections of this report. Reclamation issues related to these features are discussed in Section 3.7.

Potential water chemistry issues are discussed at length as part of the geochemistry discussions in Section 4 of Appendix B. A summary of site water quality is further discussed in Section 3.6.3.



Teck

LEGEND

EXPLORATION TRAILS

WASTE ROCK DUMPS

HAUL ROADS

CLEARED AREA

CONTOUR INTERVAL=10m

NOTE

BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Sä DENA HES DETAILED DECOMMISSIONING AND RECLAMATION PLAN

GENERAL ARRANGEMENT PLAN CURRENT CONDITIONS

DRAWN BY:	CHECKED BY:	FIGURE NO.	REV.
BJD	BJD	3-1	1
Revised: August 25, 2015	PROJ. NO.		

JEWELBOX U/G MNE WORKINGS
Limit Airflow, install warning signs around perimeter of potential unstable ground surface

1380 PORTAL
Seal portal, add fill, reslope rock slopes near portal entrance.

MAIN ZONE PIT
Reslope pit walls and fill pit.

1408 PORTAL
Seal portal

JEWELBOX & MAIN ZONE WASTE ROCK DUMPS
Reslope tops of waste rock dumps, cap hydrocarbon and metals contaminated rock with soil & revegetate

BURNICK U/G MNE WORKINGS
Limit airflow

BURNICK - 1300 WASTE ROCK DUMP
Reslope top and seed

BURNICK - 1200 PORTALS (2)
Seal mine portals, install rock drain and drain pipe in south portal.

BURNICK - 1300 PORTAL
Seal with coarse waste rock

BURNICK - 1200 WASTE ROCK DUMP
Reslope top of dump, cap hydrocarbon contaminated dump with 0.6m soil and seed.

MILL SITE
Demolish and remove buildings, offsite disposal of hazardous materials, cap metals and hydrocarbon contaminated soils and revegetate area.

WATER & TAILINGS LINES
Remove and salvage or dispose of in onsite landfill

NORTH CREEK DAM
Remove dam, stabilize channel, remove pumphouse, revegetate area.

MAIN ACCESS ROAD
Future decommissioning by removing culverts, recompacting and revegetation (provided not deemed as a public road).

BORROW & LANDFILL AREA
Recontour, cap landfill, install monitoring wells & revegetate

RECLAIM DAM
Remove dam and re-establish Camp Creek back into its original location within an engineered channel. Revegetate disturbed areas.

COFFER DAM
Remove

NORTH DAM
Cap tailings (0.5m minimum)& revegetate

SOUTH DAM
Remove dam, cap tailings (0.5m minimum), create engineered channel to drain north tails area, create small sediment pond and revegetate.

PUMPHOUSE
Demolish and dispose of materials in landfill, remove pipelines & revegetate

MH-01A
MH-01B
MH-02
MH-04
MH-05
MH-06A
MH-06B
MH-07
MH-08
MH-11
MH-12
MH-22
MH-23
TAILINGS POND
RECLAIM POND
TAILINGS
NORTH CREEK
BURNICK CREEK
PORTAL CREEK
CAMP CREEK
1 km TO MH-11

LEGEND

EXPLORATION TRAILS

WASTE ROCK DUMPS

HAUL ROADS

CLEARED AREA

CONTOUR INTERVAL=10m

NOTE
BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Teck

Sä DENA HES DETAILED DECOMMISSIONING AND RECLAMATION PLAN

GENERAL ARRANGEMENT PLAN CLOSURE MEASURES

DRAWN BY:	CHECKED BY:	FIGURE NO.	REV.
BJD	BJD	3-2	2
Revised: August 25, 2015	PROJ. NO.		

3.2.1. *Jewelbox Ore Body*

The Jewelbox ore body is located near the top of Jewelbox Hill (Figure 3-1) immediately west of the mill complex. Curragh Resources started development of this ore body in 1990 and produced ore using several different underground mining methods. These methods included room and pillar, mechanized cut and fill, and longhole stoping.

Jewelbox has a number of features that will require work upon closure. They include the 1408 Portal, the 1250 Portal, two ventilation raises, a small open pit and the associated waste rock dumps. These features along with a plan view of the extent of the underground workings are shown in Figure 3-3.

3.2.1.1. Jewelbox Underground Mine Workings

(i) Description

The majority of mining activity when the mine was operational came from the Jewelbox ore zone deposit. Except for two minor surface pits, the ore production came from underground mechanized mining methods. Mining methods anticipated included room and pillar, cut and fill, and longhole stoping. Access to the ore reserves was through the 1408 Portal and down the main access ramp which was a decline.

(ii) Closure Issues

Dimensions of the mined stopes and their depths below ground surface are key factors which will determine whether any of mine workings pose a significant risk of causing surface subsidence. If subsidence of the ground surface were to occur, it could cause a safety risk to people or wildlife using the area.

(iii) Closure Measures

As part of the closure measures, a geotechnical assessment of the mine workings was undertaken. Based on the results of the SRK study (SRK, 2014a), due to limited information available, a potential of a failure of a Chimney stope wall and three crown pillars cannot be

discounted. As such, as a mitigative measure, the Company will place signage around the potential subsidence perimeter to warn public of the potential safety concern.

3.2.1.2. Jewelbox 1408 Portal

(i) Description

The 1408 portal is located immediately above the mill site, as shown on Figures 3-1 and 3-3. A haul road from the mill provides access to the main ramp of the underground workings at the Jewelbox zone. The portal is roughly 4.5 m by 4.5 m and is set back into the hillside about 8 m. This portal is one of only 3 openings that intersect the underground mine workings at the Jewelbox ore zone.

Dispose mineralized exploration core in Jewelbox mineworkings. Remove core racks and buildings

Main Zone Area Sediment Basin
Remove metals contaminated sediments and deposit down mine raise.

Reslope top of waste dump

JEWELBOX HILL ZONE UNDERGROUND WORKINGS

MH-03

MAIN ZONE PIT AND 1380 PORTAL
Seal portal, leave drainage pipe under coarse rock, reslope walls and partially fill

SDH-S2

SDH-S1

Potential Subsidence Area - Warning signs around perimeter of potential unstable surface area

Ventilation Raise - Cap with engineered concrete seal

Reslope waste rock area, cap with soil and revegetate

JEWELBOX PIT
Partially fill pit and flatten pit walls.

Pull back crest of waste rock

SDH-R

1250 PORTAL
Backfill with coarse rock to fill small adit

Reslope top of dump, cap and revegetate where accessible.

1408 PORTAL
Seal with coarse rock, leave drain pipe and contour into hillside

Reslope as much of rock dump as practical, cap with 0.2m of soil and revegetate.

SDH-R2

SDH-S3

1408 Sediment Pond - *Remove and place into mine workings (down ventilation raise)*

Ventilation Raise - *Cap with engineered concrete seal*

Cap hyrdocarbon contaminated waste rock

Jewelbox Haulroad - decommission and cap with clean fill, revegetate

CAMP CREEK

1500 1450 1400 1350 1300 1250 1200

N

Teck

LEGEND

EXPLORATION TRAILS

WASTE ROCK DUMPS

HAUL ROADS

CLEARED AREA

0 50 100 150 200 250 metres

1:5,000

CONTOUR INTERVAL=10m

NOTE

BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Sä DENA HES DETAILED DECOMMISSIONING AND RECLAMATION PLAN

JEWELBOX HILL AND MAIN ZONE CLOSURE MEASURES

DRAWN BY: BJD	CHECKED BY: BJD	FIGURE NO. 3-3	REV. 3
Revised: Augusg 25, 2015	PROJ. NO.		

(ii) Closure Issues

There are three potential closure issues.

The first and primary concern is the risk of access into the mine by either the public or by wildlife.

The second potential concern is on-going discharge of water from the mine workings. At the last underground inspection in the mine in 2005, the water level in the mine workings was at the 1344 metre elevation and was slowly increasing. Prior to the dewatering of the workings by Cominco in December 1998, the water level had been recorded at the 1350 metre elevation after the mine had been closed for approximately four years. The source(s) of the water is from fractures in the rock below the 1350 metre elevation. As ground conditions underground have not been maintained while the mine has been closed, it is no longer safe to access the mine workings. Consequently there is no current information as to the elevation of water within the mine. The rate of inflow into the mine was very low and originated from the lower levels of the mine. As the water levels increase, the hydraulic head of the water within the mine will result in the rate of inflow of water decreasing and it is expected that the water level within the workings will stabilize at some point. There is not enough information to determine at what elevation that will be. As the main portal at 1408 is approximately 58 metres above the last measured water level, it is unlikely that the water within the mine will reach the portal entrance; but it cannot be categorically ruled out without further information.

The final concern is the uncontrolled release of water from the mine workings from ice plugs forming within the mine workings. A fuller discussion of ice plugs is provided in Section 3.2.3.2.

(iii) Closure Measures

The 1408 Portal will be sealed off using coarse waste rock to at least 5m into the portal beyond the entrance. Within the tunnel, the waste rock fill will be placed as close to the top of the tunnel as possible to help stabilize the collar of the portal. At surface the waste rock will be sloped from above the top of the portal to the base of the portal at a stable slope and will be contoured to tie into the surrounding terrain for aesthetic purposes. The seals will include two minimum 4 inch diameter pipes (high density polyethylene pipe or equivalent so they don't corrode). The

purpose of the pipes is to prevent air from pressurizing within the mine and to provide a conduit for mine water drainage if required. The pipes will be installed at slightly different elevations and one of the two pipes is a backup in case the other becomes plugged. The ground at portal entrance will be sloped away from the portal to ensure precipitation can drain away to prevent ponding of water up against the seal. Similar methods will be used at the other mine portals that access underground workings.

Prior to construction, drawings will be submitted to the applicable regulatory agencies (including the Mines Inspectorate) for review and approval as required in the existing permits. As-built reports documenting the construction details of the seals will be completed and submitted as part of regulatory reporting.

As discussed previously, the potential for mine water discharging from the portal while not expected in the long term cannot be fully discounted. The portal area will be periodically inspected after decommissioning activities have been completed. If water is detected discharging from this area, environmental testing of the water would be necessary to identify if there are any concerns, and based on the results further investigations or actions may be required.

As water in the mine is lower than the main portal at the 1408 Level, there is no concern regarding potential ice plugs forming. Additionally, the proposed portal seals will limit airflow which would eliminate any potential for an ice plug to form.

3.2.1.3. Jewelbox Ventilation Raises

(i) Description

The mine workings at Jewelbox are ventilated by two ventilation raises that extend up from the underground workings to ‘daylight’ on the hillside above the 1408 Portal. One of the ventilation raises is located near the summit of Jewelbox Hill, while the other is located immediately up slope from the1408 Portal.

(ii) Closure Issues

Both raises must be permanently sealed to prevent access into the mine by the public and by wildlife. Additionally, the airflow through the mine must be controlled to prevent the potential for ice plugs.

(iii) Closure Measures

Both ventilation raises will be sealed using an engineered concrete seal in a manner that is in accordance with Mine Safety Regulations. The seals will provide the physical barrier to eliminate the potential for the public or wildlife to access the mine through ventilation raises. In addition, the seals will prevent water and significant airflow from entering the mine workings (the seals will contain a small pipe to allow some airflow through the seal) through these openings. The seal design will be submitted for regulatory approval prior to construction as required in the site's licences. A certified as-built report, complete with drawings will be done and submitted as record to document the details of the seals constructed.

3.2.1.4. Jewelbox - 1250 Portal

(i) Description

The 1250 Portal is located on the north side of Jewelbox Hill, in the Camp Creek catchment as shown on Figures 3-1 and 3-3. Original mine plans called for production to come from this portal, but subsequent diamond drilling and increased knowledge of orebody geometry forced a relocation of the production portal to the current 1408 Portal. The beginnings of a tunnel created by this portal extend only 3 metres (approximately) into the hillside. The tunnel has not exposed any ore and has no water flowing from it. The associated sediment pond near the portal contains only benign material.

(ii) Closure Issues

There are two potential closure issues.

The first concern is the loose rock at the entrance to this short tunnel could be a safety hazard to the public. A small quantity of waste rock produced from starting this short tunnel requires contouring.

The second potential concern is the elevated metal concentrations (including arsenic, lead and zinc) identified in the shallow soil in the vicinity of the 1250 Portal (Golder 2014a, 2015, Azimuth 2014a). The soil samples exceed the HHRA standards for lead as such there is potential for human health risks from metals in soil. The soil samples slightly exceed the ERA standards for zinc but concentrations are not expected to drive risks and no remediation is recommended (Azimuth, 2015b).

(iii) Closure Measures

The opening will be capped with waste rock borrowed locally and the cap will be shaped to form a 2:1 (H:V) slope to ensure stability. The minor amount of waste rock at the portal entrance will be re-graded and revegetated.

The mitigative measure to minimize risks to humans is to deactivate the road to prevent public access to this area.

3.2.1.5. Jewelbox Pit

(i) Description

The Jewelbox Pit is located between the Jewelbox 1408 Portal and the Main Zone 1380 Portal as shown on Figure 3-3. The pit bottom is at an elevation of 1400m and rises steeply to 1430m. Seepage through the fractures in the rock at the pit bottom is restricted and results in fluctuating ponded water levels in the bottom of the pit. Weathering of the rock face in the pit walls result in rock gradually loosening and falling into the pit.

(ii) Closure Issues

The loose rock and steep slope of the pit walls are a safety concern. During the spring freshet water collects in the bottom of this pit and gradually drains through fractures in the ground and waste rock. Actual routing of the water is difficult to determine.

(iii) Closure Measures

The pit walls will be stabilized by re-sloping, and hauling in waste rock from adjacent dumps. Re-sloping will partially fill the pit. Fill at the base of the pit will consist of coarse waste rock so that it will function like a French drain to ensure that water continues to have a route to discharge out of the pit.

3.2.1.6. Jewelbox Waste Rock Dumps

(i) Description

The waste dumps associated with the development of Jewelbox and Main Zone ore bodies make up the bulk of the waste rock at the Sä Dena Hes minesite. Waste rock from the Jewelbox underground workings was placed immediately below the 1408 Portal as shown on Figure 3-3 and covers an area of 2.6 hectares. In the upper section of this dump (1.3 ha), the material was placed in two to three lifts with berms providing an overall slope of about 2:1 (H:V). However, the lower sections were end-dumped on relatively steep slopes leaving slopes at the angle of repose (1.3:1). Since the shutdown of the mine in 1992, there has been no evidence of any instability of the dump. No tension cracks, toe bulges or subsidence have been noted. These dumps have been inspected annually during closure by a geotechnical engineer.

Waste rock mined from the Jewelbox Pit is located on a ridge immediately east of the pit as shown in Figure 3-3. The dump was built in two phases and covers an area of approximately 1.9ha. The ultimate crest is at El. 1442m and the side slopes of the dump are generally sloped at 2:1 (H:V).

Waste rock was also deposited on relatively steep ground immediately below the upper Jewelbox Pit waste rock dump as shown on Figure 3-3. The face of this dump is about 1.3:1 (H:V) and the crest has been over-steepened. The dump covers an area of about 0.4 ha.

Waste rock from the Jewelbox Pit can also be found above and below the access road to the Main Zone Pit. This material sits on relatively steep ground with the dump faces at slopes of 1.3:1 and covers an area of about 0.9 ha. Safety berms are located along the crest of the access road and stand about 1 metre high.

(ii) Closure Issues

There are three primary issues with waste rock dumps for long term closure:

- Physical stability
- Vegetation
- Metals concentrations in surface materials

Long term physical stability is potentially an issue for waste rock dumps at the site as they are located on steep side slopes of the mountains where the mine workings are located. In 2013, SRK conducted a geotechnical review of the long term stability of the waste rock dump to determine appropriate closure measures. The review assessed the potential for failure, and the potential consequences of a failure. Based on the results, the 1408 waste rock dump is considered stable (SRK, 2014d).

All of the mine related disturbances adjacent to the Jewelbox and Main Zone ore zones are in the alpine zone (above the tree line), and as such, vegetation is relatively sparse and any disturbance to vegetation takes a long time to recover. Additionally, the composition of waste rock dumps does not provide good soil conditions to facilitate revegetation.

Metals associated with the sulphide ore body in the waste rock dump above Contaminated Site Regulation (CSR) concentrations have been identified in the environmental site assessment conducted by Golder (2013a, 2014a, 2015a). The extent of the metals contamination includes the Jewelbox 1408 waste rock dumps and beyond the toe of the waste rock dumps into the forested areas, as well as the 1380 Gully. The 1380 Gully is located down gradient of the 1380 Adit and is further discussed in Section 3.2.2.3.

Based on the elevated soil samples identified in the waste rock, toes of the waste rock piles and 1380 Gully, a review of potential exposure of people and wildlife to these metals was evaluated by the HHRA and ERA. The HHRA concluded that there is a potential for human health risks from elevated lead in soil, and from plants and small animals consumed as country foods and traditional medicines. The elevated lead and zinc in soils, and invertebrates and small mammal tissues, also resulting in potentially elevated risks to birds and mammals.

As part of the 2014 ESA (Golder Associates Ltd., 2015a), samples from the waste rock were submitted to quantify the potential for acid rock drainage (acid base accounting [ABA]) and metal leaching, from the waste rock facilities including the including the Jewelbox underground area (1408 Portal), Jewelbox North Pit, and Main Zone (1380 Portal). The mineral compositions differed between the samples, and were generally categorized into the following material:

- Limestone: carbonate waste rock (limestone or marble)
- Waste rock: siliciclastic waste rock (meta-sedimentary rocks such as phyllites, quartzites, and hornfels)
- Ore: sphalerite and galena

Based on the sample results, six of the seven waste rock samples were classified as non-potential acid generating (PAG) due to low sulphide content, and in the case of limestone, elevated carbonate content compared to the other rock types. One sample had a higher ratio but was the result of higher iron sulphide content for the sample. Nonetheless, based on the site geological setting and observed water chemistry, the acid-generating potential from the waste rock is considered minimal.

One sample of ore from Jewelbox North Pit (sample JBOX-NP-WR2) was classified as potentially acid generating, and one sample had an uncertain potential for acid generation.

The results of the short-term leaching test for samples collected at Jewelbox contained concentrations of leachable metals that exceeded applicable CSR standards[2]. These results, plus the mechanism resulting in attenuation of metals in marble-rich waste rock and soils, indicate that the potential for future impacts on down-gradient water quality in the receiving environment is low.

[2] Exceedances of the screening criteria in leachate from the shake flask and SPLP extractions do not imply water quality exceedances on Site, as the simulated conditions in the tests cannot mimic the natural conditions influencing waste rock oxidation and runoff water quality (Golder 2015).

(iii) Closure Measures

The crest of the waste dump below the 1408 Portal will be pulled back and rounded for aesthetic purposes and to improve stability.

Some of the waste rock in the Jewelbox Pit dump on the ridge between the Pit and 1408 Portal will be relocated to the Jewelbox Pit and recontoured as much as practical to provide a slope of about 2:1(H:V). Although the dump was determined to be stable, the filling of the pit was recommended (SRK, 2014d).

The crest of the Jewelbox North waste rock dump is also considered stable (SRK, 2014d), however the crest of the material will be pulled back and used for re-sloping the Main Zone pit walls.

Based on the results of the HHRA and ERA, a Remedial Options Analysis (Golder, 2015c) was completed on the Jewelbox waste rock dumps, toe of Jewelbox waste rock piles, and the 1380 Gully. In summary, Golder developed a list of potential remediation alternatives for each area and evaluated them based on numerous decision-making factors.

In addition to the remedial options analysis, supplemental technical reviews were conducted to assist in evaluating the effectiveness of placing a 150 mm cm cap on a portion of the Jewelbox and Main Zone waste rock dumps. These memorandums include the following:

- Evaluation of the potential for pore water to migrate upwards through the 150 mm cover over the Jewelbox waste rock prepared by SRK (SRK, 2015).
- Summary of the effectiveness of a 150 mm cover to mitigate potential human health risks prepared by Azimuth (Azimuth, 2015e).
- Review of the burrowing depths of small mammals in the alpine and sub-alpine area of the Jewelbox prepared by Gebauer and Associates (Gebauer & Associates Ltd., 2015).

The remedial options analysis and technical memo was provided to Yukon Government and First Nations on June 1, 2015 (Teck, 2015). Based on their review, the thickness of the cap was increased so that a 200 mm soil cover will be applied to the recontoured Jewelbox waste rock areas and a portion of Main Zone bench.

Capping of the area will be conducted primarily by using material from the decommissioned Reclaim Dam. The soils have been characterized by Golder and are considered suitable for capping (Golder, 2015d) as they are considered non-acid generating and the metal concentrations are considered acceptable under the HHRA and ERA. Additional discussion on the characterization of the capping material is provided in Section 3.3.4.

The proposed 200 mm remediation cover is considered an effective remedial option to manage potential human exposures from direct contact with the underlying contaminated soil. However the cover may not mitigate human health risks from the consumption of plants or small animals living in or on the cap that could potentially uptake metals from the underlying contaminated soil. Based on discussions with the local First Nations, it has been agreed to limit access to this area by decommissioning the road and warning signage will be placed to discourage public use.

In the areas at the toe of the waste rock dumps and the 1380 Gully, the ecological risk assessment determined that there are potentially elevated risks for several bird and mammal species from exposure to lead and zinc. Effects from the literature associated with estimated doses included high levels of mortality and reduced growth and reproduction. In addition, there are potential human health risks from elevated lead in soil, plants and small animals consumed as country foods and traditional medicines. A remedial options analysis was conducted to evaluate what potential remediation options were available for these areas to reduce or eliminate the risks identified. Based on the available options and the very steep terrain limiting access, the Company does not intend to conduct additional active remediation in these areas. However, to limit the potential for human health risk, the road to the Jewelbox area will be deactivated with warning signage to discourage public use.

Revegetation efforts will focus on seeding the re-contoured and capped surface of the waste rock dumps. Refer to Section 3.7 where revegetation plans are discussed in more detail.

All safety berms along the access roads will be removed as part of deactivating the roads. The safety berms along the access road will also analyzed for metal concentrations. Soils identified with lead greater than 400 ppm will be capped with a minimum 200 mm cap.

3.2.2. *Main Zone Ore Body*

The Main Zone is located on the south flank of the Camp Creek catchment. It is on Jewelbox Hill just north of the Jewelbox ore zone. Locations of these mine features are shown in Figures 3-1 and 3-3. The Main Zone workings consist of a small open pit, an adit (1380 Portal) and waste rock dumps. There are no significant underground workings associated with this ore zone.

3.2.2.1. Main Zone - Open Pit

(i) Description

The Main Zone Pit is the lower of the two open pits located on the south flank of the Camp Creek catchment. The pit is a side hill excavation with the pit floor at El. 1370m rising to an elevation of about 1400m with relatively steep slopes.

(ii) Closure Issues

Raveling of the pit highwall is occurring and is a dynamic process due to weathering of the rock. This presents a safety hazard for any people that may be present.

(iii) Closure Measures

The pit walls will be stabilized by re-sloping by dozer where possible, and hauling in waste rock from adjacent waste rock dumps. The re-sloped rock material will be used to backfill the pit. The coarser rock fragments will be directed to the base of the fill to allow free drainage from the pit. The area will still present a physical safety hazard, however in order to prevent access to the area the road will be decommissioned and a notification system (i.e., signage) will be placed in areas of any remaining steep walls.

3.2.2.2. Main Zone – 1380 Portal

(i) Description

The 1380 Portal is located within the Main Zone area as shown on Figure 3-3. The portal is approximately 4.5 m by 4.5 m in section and is collared in limestone and skarn. This portal does not connect with any other underground workings. The mining of this relatively short tunnel (adit) was apparently stopped due to very poor ground conditions. Water drains from this portal throughout the snow free period. It likely flows for at least part of the winter but it is not safe to access this area during winter due to avalanche hazards in the area. The water source within the tunnel is from a fault. The groundwater flows out of the fault and onto the adit floor where it comes into contact with weathered mineral rich skarn. The water contacting the weathered scarn results in neutral mine drainage containing total zinc concentrations greater than 30mg/L. The neutral mine drainage then discharges from the portal and flows down slope through the adjacent waste rock dump and into the Camp Creek catchment. For a short period (roughly 3 weeks) each spring during snow melt, some of this water exits to the toe of the waste rock dump as surface water and flows into the invert of the gully joining a surface water flow. The surface water flow in the gully is primarily from melting snow and exists only during freshet. Currently the zinc concentration in the portal discharge is being attenuated by contact with the waste rock in the dump and overburden. Additional attenuation occurs as the portal drainage water mixes with the alkaline surface water in the gully. For the majority of the year, the portal discharge water does not reach the gully as surface water; rather it drains into the ground. During freshet the surface water in the gully flows downslope until about 500m before Camp Creek where it goes into the ground.

(ii) Closure Issues

Physical closure issues related to this site include stability of the opening and prevention of inadvertent access by the public or by wildlife.

This tunnel (an adit) does not connect to any other mine workings so the portal is the only opening to surface. There is no active airflow through the workings and consequently, there is no significant risk of water being retained behind ice plugs within the tunnel.

The water discharged from this portal has elevated zinc levels that are currently being attenuated through its groundwater path but there is uncertainty whether the attenuation may be exhausted in the long-term. Refer to Section 3.6.3 for a detailed discussion of the fate of the portal discharge water.

Elevated metal concentrations were also identified in the gully located downgradient of the 1380 Portal. These issues are further discussed in the following Section 3.2.2.3.

(iii) Closure Measures

The 1380 Portal will be sealed off using coarse site waste rock to at least 5m into the portal from the entrance. Material to seal the portal will come from the resloping adjacent slopes. Within the tunnel, the waste rock fill will be placed as close to the top of the tunnel as possible to help stabilize the collar of the portal. At surface the waste rock will be sloped from above the top of the portal to the base of the portal at a stable slope and that is contoured to tie into the surrounding terrain for aesthetic purposes. At the base of the seal, a rock drain will provide a drainage channel from the mine workings. As a contingency, the seals will include two minimum 4 inch diameter pipes (high density polyethylene pipe or equivalent so they don't corrode). The purpose of the pipes is to provide a backup conduit for mine water drainage if required. The pipes will be installed at slightly different elevations and so that the upper pipe will can drain if the lower pipe were to plug. The ground at the base of the portal entrance is naturally sloped away from the portal entrance so any precipitation will drain away from the seal.

Construction drawings will be submitted to the applicable regulatory agencies (including the Mines Inspectorate) for review and approval as required in the existing permits. As-built reports documenting the construction of the seals will be completed and submitted as part of required regulatory reporting.

The fate of the portal discharge water is further discussed in Section 3.6.3. Monitoring of the discharge water and receiving water will be included within the mine's post closure monitoring plan as discussed in Section 5.3. As such, the portal seal will be designed to prevent access by the public or wildlife but will allow the continual discharge of water from the portal.

3.2.2.3. Main Zone – Waste Dump

(i) Description

Waste rock from the Main Zone Pit was end-dumped on hillside slopes below the pit floor and into the adjacent gully (Figure 3-3). The slope of the dump is about 1.3:1 and consists of very

coarse, broken rock. The dump covers an area of about 0.3 ha. The waste rock is composed primarily of limestone with some mineralized skarn. Some of the skarn has weathered resulting in the release of coarse sphalerite and galena-rich sand. In the spring, water was seen flowing through the dump presumably originating from the Main Zone Pit or the Jewelbox Pit.

Phyllite waste rock was also end-dumped on the hillside of the gulley adjacent to the 1250 Portal. This dump is relatively small (< 0.2 ha) with a slope of about 1.3:1 and contains no mineralized material.

(ii) Closure Issues

There are three primary issues with waste rock dumps for long term closure:

- Physical stability
- Vegetation
- Metals concentrations in surface materials

Long term physical stability is potentially an issue for waste rock dumps at the site as they are located on steep side slopes of the mountains where the mine workings are located. In 2013, SRK conducted a geotechnical review of the long term stability of the waste rock dump to determine appropriate closure measures. The review assessed the potential for failure, and the potential consequences of a failure. Based on the results, the Main Zone Dump did not meet the minimum Factor of Safety (FOS) guidelines. However, it is also considered the smallest of the dumps with a low consequence of failure (SRK, 2014d).

All the mine related disturbances adjacent to the Main Zone ore zone are in the alpine zone (above the tree line), and as such, vegetation is relatively sparse and any disturbance to vegetation takes a long time to recover. Additionally, the composition of waste rock dumps does not provide good soil conditions to facilitate revegetation.

Metals associated with the sulphide ore body in the waste rock dump above Contaminated Site Regulation (CSR) concentrations have been identified in the environmental site assessment conducted by Golder (2013a, 2014a, 2015). The sampling of the Main Zone waste dump was conducted and evaluated along with the Jewelbox waste rock dumps as previously discussed in Section 3.2.1.6. The extent of the metals contamination includes the Jewelbox 1408 waste rock

dumps, beyond the toe of the waste rock dumps into the forested areas, and the 1380 Gully. The 1380 Gully is located downgradient of the 1380 Adit. The Golder assessment initially predicted that the soil impacts in the 1380 Gully were from sediment entrainment and surface runoff from the 1380 portal. However, soils sampled outside of the trough of the gully are also elevated above soil standards. Thus, there is some uncertainty whether some of the area is naturally elevated in metal concentrations, perhaps because of its proximity to the ore body, and/or whether water or dust from the gully or waste rock benches had transported metals more broadly in the gully.

Subsequent to the completion of the ESA, Golder reviewed site geochemistry and evaluated mine related contaminant sources versus natural conditions in the Jewelbox Hill and 1380 Gully areas of the Site. The review concluded that metal concentrations exhibit similar ratios of lead:zinc as mineralized ore samples and, with the exception of a few samples within the 1380 Gully, are within the concentration range presented in pre-mining exploration reports. While the relative contributions of exposed mine wastes versus natural conditions is unclear, the review concludes that a single point source is unlikely responsible for the elevated metals concentrations in the soil around the Site and elevated metal concentrations are a naturally occurring phenomenon in the area from the underlying mineralized bedrock (Golder, 2015b).

Based on the elevated soil samples identified in the waste rock, toes of the waste rock piles and 1380 Gully, a review of potential exposure of people and wildlife to these metals was evaluated by the HHRA and ERA. The HHRA concluded that there is a potential for human health risks from elevated lead in soil, and from plants and small animals consumed as country foods and traditional medicines. The elevated lead and zinc in soils, and invertebrates and small mammal tissues, also resulting in potentially elevated risks to birds and mammals.

(iii) Closure Measures

The crest of the waste dump below the 1380 Portal will be pulled back and rounded for aesthetic purposes and to improve stability.

In June 2013, a geotechnical review of the long term stability of the waste rock dump was conducted. Based on the results, no further remedial action was recommended (SRK, 2014d).

Revegetation efforts will focus on the resloped portions of the waste rock dumps and will be seeded. In some areas, importing of finer materials may be required. Refer to Section 3.7 where revegetation plans are discussed in more detail.

As discussed previously in Section 3.2.1.6, based on the results of the HHRA and ERA a Remedial Options Analysis (Golder, 2015c) was conducted on the Jewelbox waste rock dumps, toe of Jewelbox waste rock piles, and the 1380 Gully. In summary, Golder developed a list of potential remediation alternatives for each area and evaluated them based on numerous decision-making factors.

In addition to the remedial options analysis, supplemental technical reviews were conducted to assist in evaluating the effectiveness of placing a 150 mm cm cap on a portion of the Jewelbox and Main Zone waste rock dumps. These memorandums include the following:

- Evaluation of the potential for pore water to migrate upwards through the 150 mm cover over the Jewelbox waste rock prepared by SRK (SRK, 2015).
- Summary of the effectiveness of a 150 mm cover to mitigate potential human health risks prepared by Azimuth (Azimuth, 2015e).
- Review of the burrowing depths of small mammals in the alpine and sub-alpine area of the Jewelbox prepared by Gebauer and Associates (Gebauer & Associates Ltd., 2015).

The remedial options analysis and technical memo was provided to Yukon Government and local First Nation on June 1, 2015 (Teck, 2015). Based on their review, the Company agreed to increase this to a 200 mm soil cover which will be applied to the recontoured Jewelbox waste rock areas and a portion of Main Zone bench.

Capping of the area will be conducted primarily by using material from the decommissioned Reclaim Dam. The soils have been characterized by Golder and are considered suitable for capping (Golder, 2015d) as they are considered non-acid generating and the metal concentrations are considered acceptable under the HHRA and ERA. Additional discussion on the characterization of the capping material is provided in Section 3.3.4.

The proposed 200 mm remediation cover will be effective remedial option to manage potential human exposures from direct contact with the underlying contaminated soil, however the cover may not mitigate human health risks from the consumption of plants or small animals living in or on the cap that could potentially uptake metals from the underlying contaminated soil. Based on

discussions with the local First Nations, it has been determined to limit access to this area by decommissioning the road and have warning signage to discourage public use.

In the areas at the toe of the waste rock dumps and the 1380 Gully the ecological risk assessment determined that there are potentially elevated risks for several bird and mammal species from exposure to lead and zinc. Effects from the literature associated with estimated doses included high levels of mortality and reduced growth and reproduction. In addition, there are potential human health risks from elevated lead in soil, plants and small animals consumed as country foods and traditional medicines. A remedial options analysis was conducted to evaluate what potential remediation options were available for these areas to reduce or eliminate the risks identified. Based on the available options and the very steep terrain limiting access, the Company does not intend to conduct additional active remediation in these areas. However, to limit the potential for human health risk, the road to the Jewelbox area will be deactivated and warning signage placed to discourage public use of this area.

Revegetation efforts will focus on seeding the re-contoured and capped surface of the waste rock dumps. Refer to Section 3.7 where revegetation plans are discussed in more detail.

3.2.3. *Burnick Ore Body*

The Burnick ore body is located on the North Hill which is approximately 4 km north of the mill site as shown in Figure 3-2. There are 3 portals and a waste dump related to this area of the mine. Very little development has been done to date but future mining was planned.

3.2.3.1. Burnick Underground Mine Workings

(i) Description

The majority of mining activity when the mine was operational came from the Jewelbox ore zone deposit. Mining activities at Burnick were primarily development in preparation for production and as a result, there are very limited underground mine workings at this location. There were no open pits developed at this location.

(ii) Closure Issues

Although underground mining activity was very limited, if any of these development tunnels were too close to surface, there could be risk of causing some settling of the ground surface (i.e. surface "subsidence"). If subsidence of the ground surface occurred, it potentially could cause a safety risk to people or wildlife using the area.

(iii) Closure Measures

Due to the steeply side slopes of the mountain, workings developed into the mountain, quickly increase in distance from the ground surface. This combined with the absence of large stopes provides a high degree of confidence that there is no significant risk of surface subsidence. However, as part of the closure measures, a geotechnical assessment of the mine workings was undertaken. Based on the results of the SRK study (SRK, 2014a), the data available for Burnick indicates a limited 5 m wide development headings has been completed, and outside of the immediate portal areas, as such instability is not considered an issue. No further mitigation measures are required.

3.2.3.2. Burnick Zone – 1200 Portals

(i) Description.

At the 1200 Level of Burnick, there are two portals separated by several metres. They are shown on Figure 3-4. One of the portals is the main access to the Burnick ore body and the second portal is equipped with a propane heater and a ventilation fan for the ventilation air. Water from the mine workings drains through the ventilation portal. The flow rate of this water used to range from approximately 800 L/min during spring to 15 L/min during winter low flows. The source of most of this water appears to originate from fractures and drill holes located near the entrance of the 1300 Portal and from melting ice in the warmer months. The water flows down slope from this portal within the mine workings, exiting the mine from the 1200 Level. The higher spring flows have previously been contributed to by melting ice located near the 1200 Level portal entrance, however temporary sealing of the portals in 2009 have already virtually eliminated the ice buildup.

The water discharging from the portal flows into a culvert beneath the portal pad which directs it over the edge of the existing waste rock dump. As there has only been preliminary mining development work completed at Burnick the underground workings are not extensive. A plan view of the present workings at Burnick is shown in Figure 3-4.

(ii) Closure Issues

The two portals at the 1200 Level must be permanently sealed to prevent public and wildlife from accessing the mine workings. The portals will be sealed in a manner that allows a flow of approximately 800 L/min of water to discharge through the seal to prevent any water from building up behind the seal which could create a safety hazard. Water from the portals must be directed down the face of the hill slope in a manner that does not result in erosion or instability of the slope face. Previous geochemical studies conducted by SRK as required in the Water Licence confirmed that there are no unacceptable environmental issues associated with these discharges.

In the Yukon, there have been instances of ice plugs forming in open portals of mines after closure. The ice plugs have resulted in water being stored behind the plugs and being released in an uncontrolled fashion when the ice plugs break. Ice forming in the tunnels is caused by cold air flowing through the tunnels freezing water that is in the mine workings during the severely cold winter months.

When the Company took over management of the SDH mine, inspections revealed that the Burnick workings had ice building up within the main access tunnels near the entrance to the two 1200 Level portals. It was confirmed that the buildup of ice was the result of cold air moving through the mine. Initially, attempts to stop the air flow with fabric seals proved ineffective because of the need for continual maintenance. In 2009, temporary waste rock seals were installed at both the upper and one of the lower portals to minimize air flow. Inspection at the lower portal is still possible through the ventilation access portal and subsequent inspections since then have shown that the ice is significantly reduced. Upon permanent closure of the mine, the seals will continue to prevent any significant air flows within the mine which will eliminate the potential for ice plugs to form.

N

BURNICK ORE ZONE

1450

1300

1250

1300 PORTAL

Seal portal with coarse rock, cleanup wood & other debris. Reslope top of rock dump & revegetate

Core Racks - *Dispose of mineralized core in Jewelbox mineworkings, dispose of wood structures*

1400

1350

1200

BURNICK SHOP

Remove metal building, cap hydrocarbon contaminated materials with 0.6m soil & revegetate

1150

BURNICK WASTE ROCK DUMP

Reslope top portion of waste rock dump and revegetate resloped area.

1100

North Hill Sediment Basin

BURNICK CREEK

Access Road - Decommission & revegetate

1200 PORTALS

Seal two portals with coarse rock, install rock drain and pipes for drainage exiting on face of resloped waste rock dump. Revegetate.

1050

Teck

LEGEND

EXPLORATION TRAILS

WASTE ROCK DUMPS

HAUL ROADS

CLEARED AREA

0 50 100 150 200 250 metres

1: 5,000

CONTOUR INTERVAL=10m

NOTE

BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Sä DENA HES DETAILED DECOMMISSIONING AND RECLAMATION PLAN

BURNICK ZONE CLOSURE MEASURES

DRAWN BY: BJD	CHECKED BY: BJD	FIGURE NO. 3-4	REV. 2
Revised: August 25, 2015	PROJ. NO.		

(iii) Closures measures

Both of the Burnick 1200 Portals will be sealed off using coarse waste rock to at least 5m into the portal beyond the entrance. Within the tunnel, the waste rock fill will be placed as close to the top of the tunnel as possible to help stabilize the collar of the portals. At surface the waste rock will be sloped from above the top of the portals to the base of the portals at a stable slope. This material will be contoured to tie into the surrounding terrain for aesthetic purposes. At the base of the seal in the ventilation portal will include two 4 inch (minimum) diameter pipes (high density polyethylene pipe or equivalent so they don't corrode). The purpose of the pipes is to prevent air from pressurizing within the mine and to provide a conduit for mine water drainage if required. The pipes will be installed at slightly different elevations and one of the two pipes is a backup in case the other becomes plugged. The ground at the base of the portal entrance will be sloped away from the portal to ensure precipitation drains away to prevent ponding of water up against the seal. The drain pipes will extend from the ventilation portal seal to discharge water onto the face of the re-sloped waste rock dump (where it is currently discharging).

Prior to construction, design drawings will be submitted to the applicable regulatory agencies (including the Mines Inspectorate) for review and approval as required in the existing permits. As-built reports documenting the construction of the seals will be completed and submitted as part of regulatory reporting.

3.2.3.3. Burnick Zone – 1300 Portal and Waste Rock Dump

(i) Description

The 1300 Portal is accessible via an old exploration road (approximately 7 km) that is currently best accessible by quad or a tracked excavator. This portal is at the highest elevation in the mine and slopes downward connecting to the 1200 Level Portals so that there is no potential for drainage out of the mine workings through the 1300 Level Portal.

In 2009 this portal was sealed with adjacent waste rock materials using an excavator. This was done to seal the mine to stop air flow within these workings and to prevent access into the mine workings by people and wildlife. An excavator was used to reach inside the portal as far as possible (in excess of 5m) to place the waste rock materials and then waste rock was placed on the exterior of the portal from above the top of the portal sloping down to the base of the portal.

The associated waste rock dump is small as not much development mining work was done in this area. The waste rock dump is not discussed separately.

(ii) Closure Issues

There are five primary issues with portal and waste rock dump at this location for long term closure:

- Preventing access by people and wildlife into the mine workings,
- Limiting airflows into the mine workings to control ice buildup above the 1200 Portals,
- Physical stability of the small waste rock dump,
- Disturbances to vegetation, and
- The potential concentrations of metals in waste rock dump surface materials

As with all mine openings, there needs to be a secure seal to prevent people and wildlife from entering the mine due to safety concerns.

As previously discussed with regard to the 1200 Portal area, prevention of ice plugs due to cold air flowing through the wet mine workings in the winter months is important.

Long term physical stability of the small waste rock dump needs to be reviewed as it is located on the steep side slope of the mountain.

All mine related disturbances in this area are in the alpine zone (above the tree line), and as such, vegetation is relatively sparse and any disturbance to vegetation takes a long time to recover. Additionally, the composition of waste rock dumps does not provide good soil conditions to facilitate revegetation.

Metals associated with the sulphide ore body in the waste rock dump above Contaminated Site Regulation (CSR) concentrations have been identified in the environmental site assessment conducted by Golder (2013a, 2014a, 2015a). Based on the elevated soil samples identified at the 1300 Portal waste rock, a review of potential exposure of people and wildlife to these metals was evaluated by the HHRA and ERA. The HHRA concluded that there is a potential for human health risks from elevated lead and cadmium in soil. The residual elevated zinc concentrations

in soils, invertebrates and small mammal tissues are also resulting in potentially elevated risks to birds and mammals.

(iii) Closure Measures

Given its length and route through high alpine, it is important to minimize disturbance to the access route to the 1300 Portal area. As the facilities and disturbances at this location are minimal, only minimal traffic into this site is expected to be necessary as to implement closure efforts.

The portal will be sealed off using coarse waste rock to at least 5m into the portal beyond the entrance. Material to seal the portal will be sourced from areas immediately adjacent to the portal. Within the tunnel, waste rock fill will be placed as tight to the top of the tunnel as possible to help stabilize the collar of the portal. At surface the waste rock will be sloped from above the top of the portal to the base of the portal (at a stable slope angle), and that the cover over the seal is contoured to tie into the surrounding terrain for aesthetic purposes. The seal will include two minimum 2 inch diameter pipes (high density polyethylene pipe or equivalent so they don't corrode). The purpose of the pipes is to allow minor airflow into the mine workings. The second pipe is to serve as a backup in case one pipe was to plug. All but a small area of ground at the base of the portal entrance naturally slopes away from the portal entrance so the majority of precipitation will drain away from the seal.

Typical portal seal construction drawings will be developed prior to sealing. The methodology will be the same as reviewed by regulator for other openings and as-build drawings and photographs will document that work was completed consistent with approved methods for the other similar portals. These reports will be submitted as part of required regulatory reporting.

The 1200 Level Portal entrances to the mine workings are the areas where there is concern about the potential for ice dams forming backing water up into the mine workings. As discussed previously, providing a secure seal over the 1300 Level Portal is required to minimize airflow and prevent ice from building up within the mine workings.

In 2013, SRK conducted a geotechnical review of the long term stability of the waste rock dump to determine appropriate closure measures. The review assessed the potential for failure, and

the potential consequences of a failure. Based on the results, no additional remedial work is recommended at the 1300 waste rock dump (SRK, 2014d). However, the waste rock dump will be re-shaped to tie into the original mountain slopes to improve the overall stability of the mountainside.

Revegetation efforts will focus on the reshaped surface of the waste rock dump. Surface will be de-compacted and seeded. Refer to Section 3.7 where revegetation plans are discussed in more detail.

Based on the results of the HHRA and ERA, there are potential for human health and ecological risk from exposure to lead and/or zinc in soil. However, given the small area (3.35 ha including 1200 Portal) it is unlikely to provide enough food or habitat to support populations of common species, or many individual listed birds. As such further remediation of this area is not planned. The mitigative measure to minimize risks to humans is to deactivate and sign the road to limit public access to this area. More detailed discussion of the ERA and HHRA process is discussed in Section 3.6.5.

3.2.3.4. Burnick Zone – 1200 Level Waste Dump

(i) Description

The waste rock dump at the 1200 Level from the underground workings at the Burnick Zone covers an area of about 1.4 ha and is located on a steep side hill immediately below the portal. The dump not been used since the mine ceased operations in 1992.

(ii) Closure Issues

There are three primary issues with the waste rock dump for long term closure:

- Physical stability
- Vegetation
- Metals concentrations in surface materials

Prior to 2000, several tension cracks were identified along the crest of the dump. The top of the dump has subsequently been re-graded to reduce the load near the crest. The dump has been

subsequently monitored annually as part of the geotechnical inspection with no further settlement or slumping being observed. However, the long term stability of this dump must be reviewed.

The presence of the waste rock dump has displaced the vegetation in the area and due to the rocky nature of the material combined with the compaction of the relatively flat surface at the top of the dump, does not provide good soil conditions to facilitate revegetation.

Metals associated with the sulphide ore body in the waste rock dump above Contaminated Site Regulation (CSR) concentrations have been identified in the environmental site assessment conducted by Golder (2013a, 2014a, 2015). Based on the elevated soil samples identified at the 1200 Portal waste rock dump, a review of potential exposure of people and wildlife to these metals was evaluated by the HHRA and ERA. The HHRA concluded that there is a potential for human health risks from elevated lead in soil. The residual elevated zinc concentrations in soils, invertebrates and small mammal tissues are also resulting in potentially elevated risks to birds and mammals.

Samples from the Jewelbox, Main Zone and Burnick waste rock piles were also submitted to quantify the potential for acid rock drainage (acid base accounting [ABA]) and metal leaching. Based on the sample results, the data suggested that the waste samples for the six of the seven waste rock samples were classified as non-potential acid generating (PAG) due to low sulphide content, and in the case of limestone, elevated carbonate content compared to the other rock types. One sample had a higher ratio but was a result of higher iron sulphide content for the sample. The neutralization potential [NP] in waste rock samples from the Jewelbox and Main Zone pit areas is higher than the Burnick Zone. The results of the short-term leaching test for samples collected from the waste rock pile at Burnick 1200 Portal contained concentrations of leachable metals that exceeded applicable CSR standards[3]. Nonetheless, based on the site geological setting and observed water chemistry, the acid-generating potential from the waste rock is considered minimal.

[3] Exceedances of the screening criteria in leachate from the shake flask and SPLP extractions do not imply water quality exceedances on Site, as the simulated conditions in the tests cannot mimic the natural conditions influencing waste rock oxidation and runoff water quality (Golder 2015).

These results, plus the mechanism resulting in attenuation of metals in marble-rich waste rock and soils, indicate that the potential for future impacts on down-gradient water quality in the receiving environment is low.

(iii) Closure Measures

At closure, the top of the Burnick waste rock dump will be re-sloped to further reduce loading on the crest to improve stability. The 1200 Portal drainage, as discussed in Section 3.2.3.1 above, would be constructed at the south end of the dump. In 2007, flows from the portal resulted in toe materials becoming supersaturated leading to a washout downslope of the toe. This was due to excess water discharging from the portal due to melting ice that had built up over the winter months. The portal seals planned will eliminate this issue going forward. Drainage on the dump face was restored to the proper channel and no further erosion has occurred and the washout area is naturally revegetating.

In 2013, SRK conducted a geotechnical review of the long term stability of the waste rock dump to determine appropriate closure measures. The review assessed the potential for failure, and the potential consequences of a failure. Based on the results, no additional remedial work is recommended at the Burnick 1200 waste rock dump (SRK, 2014d). However, the waste rock dump will be re-shaped to tie into the original mountain slopes to improve the overall stability of the mountainside.

Revegetation efforts will focus on the reshaped surface of the waste rock dump. Surface will be de-compacted and seeded. In some areas, importing finer materials may be required if it is too rocky. Refer to Section 3.7 where revegetation plans are discussed in more detail.

Based on the results of the HHRA and ERA, there are potential for human health and ecological risk from exposure to lead and/or zinc in soil. However, given the small area (3.35 ha including 1300 Portal) it is unlikely to provide enough food or habitat to support populations of common species, or many individual listed birds. As such further remediation of this area is not planned. The mitigative measure to minimize risks to humans is to deactivate the road to prevent public access to this area. More detailed discussion of the ERA and HHRA process is discussed in Section 3.6.5.

3.3 TAILINGS MANAGEMENT FACILITY

3.3.1. *General*

The following section presents a description of the existing tailings management facility (TMF), followed by a discussion of the closure measures (see Figure 3-5).

3.3.2. *Description*

The TMF consists of three earth structures, which are referred to as the North Dam, the South Dam and the Reclaim Dam as shown on Figure 3-5. The North and South Dams, which impound the tailings, were constructed between July 1990 and October 1991. The starter dams for both structures were built to a height of about 13 metres. A small, two metre high cofferdam was also constructed halfway between the two dams to control flow of water and tailings from the north end of the impoundment.

In addition to the North and South Dams, a Reclaim Dam was built to retain supernatant water decanted from the tailings pond for reuse in the mill. The Reclaim Dam is about 15 metres high at the maximum section. The mine plan involved recycling of the reclaimed water to the mill with a controlled discharge into Camp Creek from April to October each year. During operations water is decanted from the tailings pond to the Reclaim Pond through a concrete decant tower located adjacent to the upstream crest of the South Dam as shown Figure 3-5. Details of the decant tower are shown on Figure 3-5.

Water is discharged from the Reclaim pond to Camp Creek during the licensed allowable discharge period, April through to October.

During operations, when the pond water level becomes too high, water was decanted from the Tailings pond to the Reclaim pond through a concrete decant tower located adjacent to the upstream crest of the South Dam. The decant tower drained the water through the dam in a 0.5m dia. corrugated steel pipe (“CSP”) culvert into the Reclaim Pond. During temporary closure the decant system is not being used. Instead a siphon arrangement is used to control water levels retained by the South Dam Pond. Prior to the onset of winter, the water level in the tailings pond is drawn down as far as practical to provide extra storage during the spring runoff.

An emergency spillway, consisting of two 900 mm dia. CSP culverts, is located at the west abutment of the South Dam as shown on Figure 3-5. The spillway has the capacity to discharge flow from a 200-year flood event into the Reclaim pond. An emergency spillway is also located on the west flank of the Reclaim pond which would discharge into the Camp Creek Diversion.

In the 2003 Dam Safety Review, the consequence category of the South Dam was revised and as a result the design flood was verified that the dam would meet the 1000-year event under operations, care and maintenance as well as at closure. A detailed discussion on the revised flood hydrology for the site, including the referenced Figures 3-12 to 3-16, is provided in Section 3.1.5 of Appendix B – Flood Estimates.

An extract of this discussion is provided as follows:

To examine the effects of storage on flood magnitude it was necessary to use a rainfall/runoff model that simulates the full flood hydrograph and that provides flood routing capabilities. The model selected for this purpose was developed by the U.S. Corps of Engineers and is known as HEC-HMS.

Figure 3-12 [Appendix B] *shows the results of applying the HEC-HMS model to the Tailings Management Facility (TMF). The instantaneous peak of the incoming flood hydrograph was estimated to be 5.4 m^3/s. The combined outflow through the two culverts would peak at 1.6 m^3/s, or 30% of the incoming flood peak. During passage of the flood, a volume of 53,000 m^3 of water would be temporarily stored within the TMF. The water level in the TMF would peak at an elevation of 1094.9 m, which is roughly at the crown level of the two culverts.*

The reclaim pipeline (≅ 300 mm dia.) is located along the west side of the access road to the mill as shown on Figure 3-5. A short section of the pipe near the reclaim pump house is buried. The tailings pipeline (≅ 250mm dia. HDPE) lies, above ground, along the side of the road as shown on Figure 3-5.

Camp Creek is currently diverted into a channel along the west side of the Reclaim Pond and discharges through a twin culvert spillway (two 1.2m dia CSP's) into a riprap lined channel. The channel is designed to accommodate the 200-year flood event. Although there is no requirement to upgrade the design flood from the current 200-year event for these culverts, the

impact of the 1000-year flood on the culverts was reviewed. A detailed discussion of the hydrological assessment is provided in Section 3.1.5 of Appendix B - Flood Estimates. An extract is provided below.

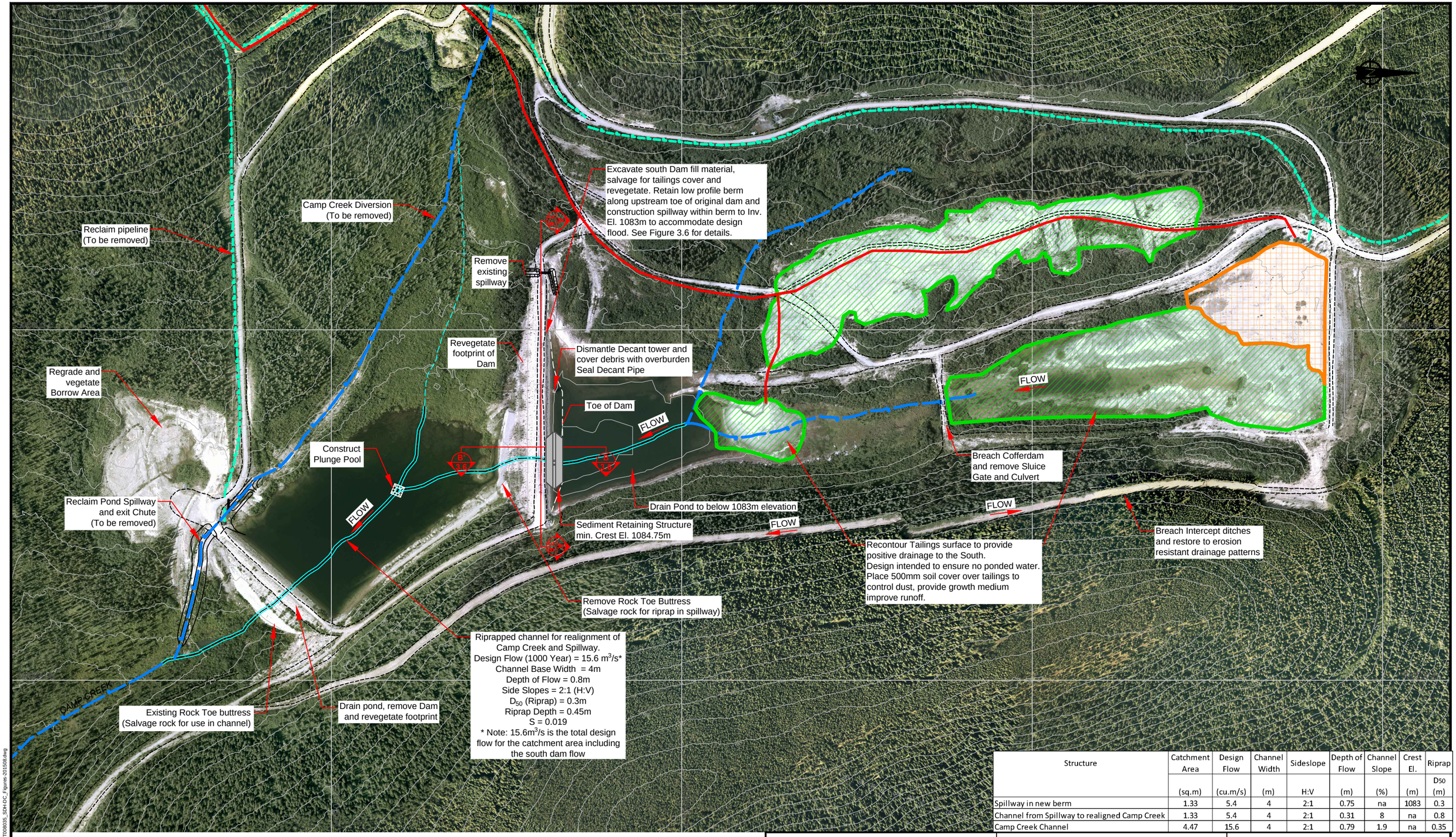
Figure 3-13 [Appendix B] *shows the simulated flood hydrology for the two culverts at the road crossing of the Camp Creek Diversion. The instantaneous peak of the hydrograph generated by the Camp Creek catchment would be 12.7 m^3/s, including outflows from the TMF. The combined outflow through the two culverts at the road crossing would be an estimated 6.0 m^3/s, or roughly half the peak of the incoming flood. In passing this flood, some 66,000 m^3 of water would be temporarily stored in the Reclaim Pond. Another 36,000 m^3 would be stored in the TMF. The water level would rise to 1081.1 m behind the Reclaim Dam, leaving a freeboard of about 0.9 m below the dam's crest.*

In March of 1992, the previous operators, Curragh Resources, built a rockfill buttress along the toe of the Reclaim dam to provide extra protection against sloughing and erosion of the toe. Annual inspections of this buttress show that it is performing as designed.

In September 1992, work commenced on a 2-metre raise in the elevation of the South Dam with the intention of bringing it up to El. 1098m. Work on the extension was shutdown on October 14, 1992 because of the construction difficulties experienced due to sub-zero temperatures. In 2008 it was identified that a short section of the crest of the dam was below the design elevation. Work completed in 2010 added approximately 1.0 meter to the crest elevation in the low spot under the supervision of a Geotechnical Engineer.

In 1997 work was initiated on a toe buttress at the South Dam in advance of the planned reopening of the mine in 1998. Although the decision to re-open the mine was postponed, the buttress was completed in the fall of 1998.

Interceptor ditches are located above the TMF on the east side of the catchment. These ditches direct runoff away from the TMF both to the north and the south. Drainage ditches associated with the access roads on the west side of the TMF direct runoff away from the TMF on the west side. In 2010 work was completed on the brushing and cleaning out of these ditches in order to maintain the design capacities.



Structure	Catchment Area (sq.m)	Design Flow (cu.m/s)	Channel Width (m)	Sideslope H:V	Depth of Flow (m)	Channel Slope (%)	Crest El. (m)	Riprap D50 (m)
Spillway in new berm	1.33	5.4	4	2:1	0.75	na	1083	0.3
Channel from Spillway to realigned Camp Creek	1.33	5.4	4	2:1	0.31	8	na	0.8
Camp Creek Channel	4.47	15.6	4	2:1	0.79	1.9	na	0.35

LEGEND

- Covered Tailings
- Cover and Revegetate
- Sediment Retaining Structure
- Major Contours
- Edge of Road
- Water Pipe
- Realigned Flow Channel
- Tailings Line
- Creek
- Original Creek Channel

0 20 40 60 80 100
Scale in Metres

NOTE

Topographic contour data and aerial photos were obtained from McElhanney and are based on August 15, 2012 LiDAR survey. Coordinate system is UTM NAD 83CSRS zone 9V.

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FILE NAME: 1CT008035_SDH-DC_Figures-201508.dwg

Teck

Sä Dena Hes Project

Reclamation and Closure

TMF Decommissioning

DATE: Aug. 24, 2015
APPROVED: PH
FIGURE: 3.5

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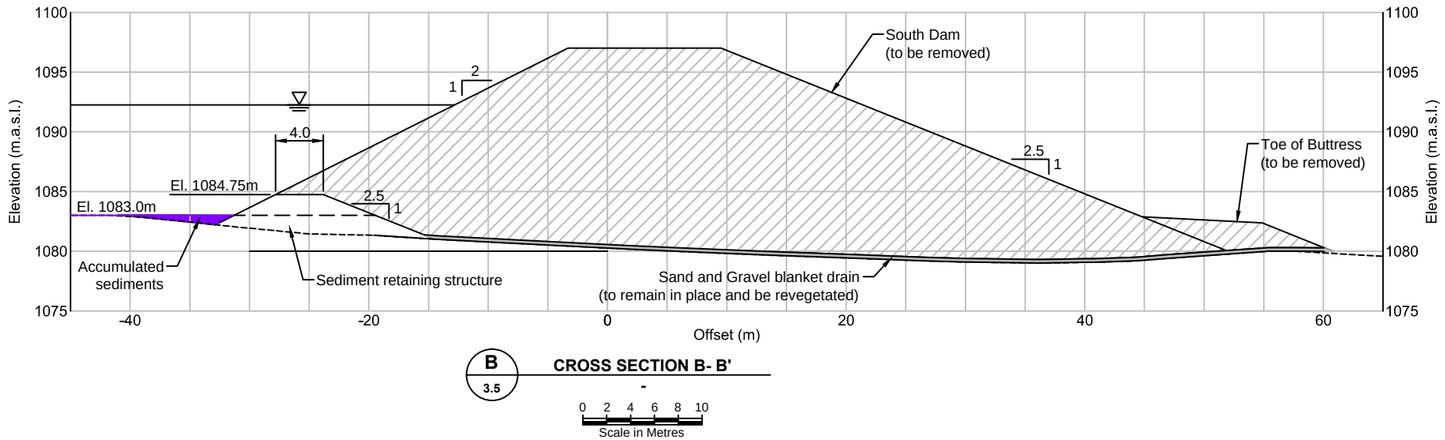
LEGEND

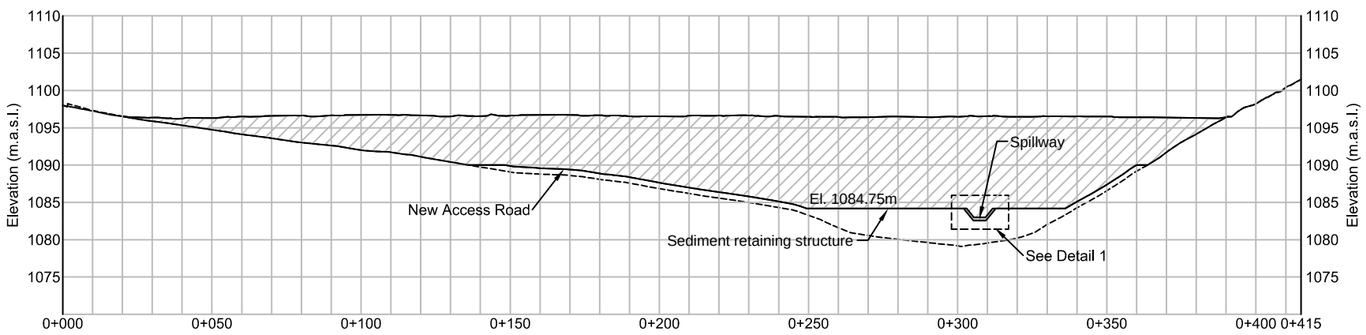
- Existing Ground
- Pre-existing Ground
- Bathymetry
- Remove
- Riprap



B / 3.5 **CROSS SECTION B- B'**

-

0 2 4 6 8 10
Scale in Metres

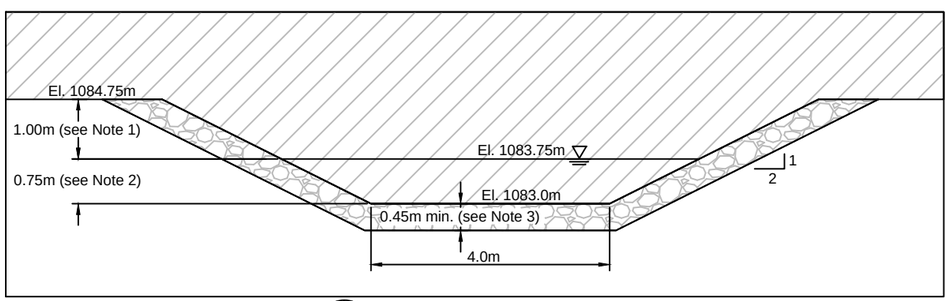


A / 3.5 **Profile A - A'**

2.5x Vertical Exaggeration

Horizontal: 0 10 20 30 40 50
Scale in Metres

Vertical: 0 4 8 12 16 20
Scale in Metres



1 / - **Detail 1**

Spillway

0 0,5 1 1,5 2 2,5
Scale in Metres

NOTES

1. Assume 1m freeboard.
2. Depth of flow based on design flow of 5.4m ^{3}/s (1000 year event).
3. Riprap depth is 1.5 times D_{50}.

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SRK JOB NO.: 1CT008.035	Sä Dena Hes Project	TMF Decommissioning Sections and Detail
FILE NAME: 1CT008035_SDH-DC_Figures.dwg		DATE: Jan. 31, 2013 / APPROVED: PH / FIGURE: 3.6

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3.3.3. *Closure Issues*

The long-term physical stability of the tailings embankments and the chemical stability of the tailings are the key items that have been addressed in this closure plan. The key physical stability issues are related to the design flood and seismic events. The chemical issues are metal concentrations in surface materials and zinc loading from the tailings. Further discussion of water quality can be found in Section 3.6.3.

(i) Physical Stability Issues

As the Reclaim Dam will be removed after closure, the physical stability of this structure is not addressed in the Plan. While the South Dam will also be decommissioned, the physical stability of the current configuration of the South Dam is discussed.

The stability analyses of the north tailings embankment, which is presented in Section 10 of Appendix B, concluded that the dam has an adequate factor of safety under both static and seismic loading.

The Plan calls for the draining of the water behind the South Dam, the removal of the dam and the placement of a minimum 0.5m thick soil cover over the tailings. In order to provide a measure to reduce the risk of any post closure release of the covered tailings, a small sediment retaining structure will be constructed along the existing alignment of the upstream toe of the dam. An armored channel would be constructed at the low point of the structure with an invert elevation of 1083m and a freeboard of 1m. The armored channel would be designed to accommodate the 1000-year peak flow of 5.4 m^3/sec.

The selection of the 1000 year design event for the armored channel in the sediment retaining structure is based on the guidelines presented in Table 8 of the “Mine Reclamation in the Northwest Territories and The Yukon”, Indian and Northern Affairs Canada (INAC), 1992 and the Canadian Dam Association Dam Safety Guideline (2007). In the unlikely event of a spillway failure, limited tailings and embankment material would be released and transported downstream into False Canyon Creek. The tailings are not acid generating, however once the flood levels have subsided, there is potential for a moderate increase in metal concentrations such as zinc in the stream due to oxidation of sphalerite in the exposed tailings. There would be no loss of life expected, no damage to buildings or agricultural land, and no loss to roads.

With the present spillway design, it is expected that minimal maintenance would be required following a 1000 year event. In the event of a 1000 year flood event, an inspection of the site would be conducted to determine if any maintenance work is required.

(ii) Chemical Stability

Based on Golder's environmental site assessment work, metals contamination is present in surface soils of the South and North tailings and Reclaim Pond sediments. The high concentrations of metals in soil could present a health risk to public and ecological receptors. In order to close direct contact, dermal contact and incidental ingestion pathways, capping contaminated soils is considered an acceptable approach (Azimuth 2014b, 2015c). In addition, the Company retained SRK to provide an opinion on the potential for tailings porewater to migrate upward through a 0.45m tailings cap. Based on SRK's review, contaminant wicking is unlikely given the characteristics of the tailings and cap material (SRK, 2014c)

Based on SRK's loading assessment, the tailings loading is 1 or 2% of the total load to False Canyon Creek. As such, it is concluded that the zinc load from the tailings is not having a significant impact on the receiving water quality, and consequently no additional engineered measures to control leaching are required for closure. Further discussion of water quality is discussed in Section 3.6.3.

3.3.4. *Closure Measures*

General closure measures for the Tailings Management Facility are presented in Figure 3-5.

3.3.4.1. Tailings Embankments

At closure, the remaining ponded water above the South Dam will be drained into Camp Creek. Final draining will be by pumping down to a level that will enable the dam decommissioning work to proceed. As the water levels in the Reclaim and South Dam ponds were kept low the last few years, the discharge volume to completely drain the ponds is expected to be within permit levels allowing this activity to be completed in 2014. Discharge rates from the Reclaim Pond are regulated under the Water Licence, so monitoring of discharge rates will be done to ensure compliance with the Licence.

As the stability analyses concluded that the North Dam has adequate factors of safety against failure under both static and seismic conditions, no specific action to stabilize the dam is required. The downstream slope of the North Dam will not be revegetated (and tree and shrub growth will continue to be managed) and the crest of the dam will be contoured to slope down to tie in flush with the cap on the tailings surface.

3.3.4.2. Dust and Contaminant Control

To prevent ponding of water on the surface of the tailings, the latter will be recontoured to provide positive drainage towards the south end of the impoundment. A minimum 500 mm cover of till material will be placed over the contoured tailings to control dust and provide a growth medium for revegetation. Where required (i.e. where there is significant moisture), additional till material will be placed on the tailings to provide a suitable sub-base so that heavy equipment are able to work on the tailings surface without becoming stuck. The capping material will consist of locally available till (including dam fill material from the South and Reclaim Dams) with sufficient fines for seeding and planting.

As the southern extent of the existing tailings deposit is currently covered with water, the proximity of the tailings to the upstream toe of the dam and the depth of the tailings is unknown. However, an estimate of the extent of the tailings was made and is shown on Figure 3-5.

The 500 mm cap cover is also intended to reduce the risks to ecological and human health receptors from metal contaminants in the tailings (Azimuth 2014b, 2014c, 2015c). The Interim ERA (Azimuth, 2014c) included a review and evaluation of the proposed soil cover depths that would be protective of ecological receptors. The cap cover will extend to cover the metals exposed soils based on the delineation completed in the ESA (Golder Associates Ltd., 2015a). The one exception is a small forested area north of the north tailings pond. Based on the results of the berry samples, the human consumption of berries collected within this area could result in exposure to more lead than is permitted under Yukon environmental regulations (Azimuth, 2014b). Access to this area will be limited as the road to the north dam will be restricted.

Capping of the tailings management area will be conducted primarily by using material from the South and Reclaim retaining structures. Some materials excavated during the restoring of

Camp Creek back into it original location will also be used. The material has been characterized by Golder within the structures, prior to its placement as capping material, and collected post-capping samples to document in-place soil quality (Golder, 2014a, 2015a, 2015d). Soil quality results of the cap material are generally less than the applicable CSR standards, though localized exceedances of arsenic, lead and zinc were observed. The post closure soil quality is considered acceptable under the HHRA and ERA.

Additional geochemical characterization of the Reclaim Pond material was conducted to ensure that the material is considered suitable (Golder, 2015d). Based on the results, the proposed cover material is not expected to contain unacceptable concentrations of metals relative to background concentrations at the site. The results of the short-term leaching test identified concentrations of leachable metals generated were generally below applicable CSR standards. The results of acid-base accounting (ABA) testing indicate that the proposed cover material is low in sulfur content and is characterized as non-potentially acid generating (NAG).

3.3.4.3. Interceptor Ditches

The interceptor ditches on the east hillside above the TMF will be breached and regraded to restore original drainage patterns.

3.3.4.4. Tailings Pond Decant Tower

The decant tower will be dismantled to ground level and the resulting debris buried on site. All exposed rebar will be cut off. The decant pipe will be completely removed once the South Dam is decommissioned.

3.3.4.5. Tailings Pipelines

The high density polyethylene (HDPE) tailings pipelines will be salvaged or disposed of, and all drop boxes will be removed.

3.3.4.6. South Dam

As discussed in Section 3.3.3, the South Dam will be removed and a low sediment retaining structure will be left in place to provide a barrier to any tailings migration. An armored channel will be constructed within the retaining structure to accommodate the peak flow of the 1000-year event as shown on Figures 3.5 and 3.6. Details of the hydrology and flood estimate for this event are presented in Section 3.1 of Appendix B. The design flow was estimated to be 5.4 m^3/s. Sections of the proposed armored channel are shown in Figure 3-6.

The channel crest and sideslopes will be riprapped with suitably sized material. Below the retaining structure, a riprapped channel will convey the flow to the restored Camp Creek as shown on Figure 3-5. The channel would be designed for the same event as the channel in the retaining structure but the riprap sizing would be adjusted for the steeper slope. Details of the channel geometry are presented in the table on Figure 3-5. There is limited source of rip rap available on the mine site. However a source of rock has been identified from a sidehill exposure located at km 17 on the main access road to the mine site and is within SDHOC mineral claims. Testing of the rock to confirm that it is suitable was completed by SRK and the rock was confirmed to be non-potentially acid generating. The results are included in the quarry development plan (SRK, 2014b).

3.3.4.7. Reclaim Pond

(i) Reclaim Dam

The water ponded behind the Reclaim dam will be siphoned down as far as practical and the remainder then pumped down to allow the dam to be removed. During the final stages of the pumping process sediment control measures may be required. As discussed above, discharge of the water to Camp Creek will be planned to ensure compliance with Licence requirements. Sediment samples were collected from accessible areas in 2012 and again once it was drained in 2014. Several metals exceed the applicable CSR standards, and as such capping of the area will be conducted with the addition of a 500 mm cap. A riprapped channel will be constructed from the outlet of the sediment retaining structure outlet at the toe of the former South Dam to a plunge pool at the confluence with the restored Camp Creek. A similar riprapped channel will also be required to convey the flow in Camp Creek through the area previously occupied by the Reclaim Dam and would be designed for the 1000-year flood peak flow of 15.6m^3/sec. Details of the channel are provided in the table in Figure 3-5. This channel would be riprapped for a distance of about 70 metres beyond the former Reclaim Dam centerline.

(ii) Camp Creek Diversion

At closure the Camp Creek diversion will be redirected back into its original channel and the diversion contoured to provide natural drainage patterns. Camp Creek will be restored to its

original alignment within a riprapped channel designed to accommodate the 1000-year event. Details of the channel are presented on Figure 3-5.

(iii) Reclaim Lines

The existing HDPE reclaim lines on surface will be removed (and where practical, salvaged) and all culverts used to convey the HDPE line to the mill will be removed. The pump house will be removed, and the buried sections of the reclaim line and the discharge pipe to the existing Camp Creek spillway channel will be left in place.

3.4 INFRASTRUCTURE: BUILDINGS, STRUCTURES AND SERVICES

The approach to the decommissioning of the constructed infrastructure is to completely remove all materials with the exception of concrete foundations, which will be demolished to ground level and buried *in situ*. This will be accomplished by contracting the work to a company experienced in demolition. It is expected that there will be a salvage value for much of the materials (particularly structural steel and other crushing, grinding and processing equipment from the mill). However, salvage values have not been used to offset closure costs. Any non-hazardous materials that are not economic to be salvaged will be placed in an on-site landfill.

In all cases, concrete foundations and other concrete structures will be broken up to ground level and buried under a minimum of approximately half a metre of till material.

The reader is referred to Figure 3-7, for the location of the infrastructure components that are dealt with in this section.

Closure issues related to infrastructure include public health and safety, site stabilization, aesthetics, and restoration of disturbed lands. Hazardous building materials have been identified and will require special handling and disposal during building demolition and salvage. The results are further discussed in Section 3.5.

The approach to closure for the infrastructure components of the Sä Dena Hes Mine is to first salvage any buildings or equipment that may be used at other mining operations that are within

an economic hauling distance, and then assess the remaining facilities and equipment for disposal through demolition and salvage contracts. It is impossible at this time to accurately predict freight haulage costs, and supply and demand economics for salvage at the time of potential demolition. If it is not economical to remove material from the site, it will be disposed of in a permitted industrial landfill. Any hazardous building materials will be removed from site and either recycled or taken to an approved disposal facility.

Freshwater Line to Jewelbox
COARSE ORE STOCKPILE
CRUSHER HOUSE
HAUL ROAD
Hydrocarbon Contaminated Soils
N
FUEL STORAGE TANKS
Gasoline
Diesel
WATER TANK
Process & Fire Water
RECLAIM CONVEYOR
CONVEYOR
COARSE ORE BIN
CONCRETE SLAB
Former Mobile Equipment Service Garage
Containment Area
MAIN ACCESS ROAD TO MINE
WATER DISTRIBUTION PUMP HOUSE
REAGENT BINS
KITCHEN
WATER STORAGE
BUNK TRAILER
MAINTENANCE SHOP
CONCENTRATOR COMPLEX
MCC
MCC
POWER HOUSE
BUNK TRAILER
PROPERTY ACCESS GATE
OFFICE COMPLEX
WAREHOUSE DRY AND LAB
BUNK TRAILER
AMBULANCE GARAGE
Radiator Banks
SEPTIC TANKS
TRUCK LOAD OUT
OUTSIDE CONCRETE STORAGE SLAB
BUNK TRAILER
COLD STORAGE
STEEL BALL STORAGE
Hydrocarbon Contaminated Soils
TAILINGS LINE
CORE RACKS
WASTE OIL TANK
RECLAIM WATER LINE
5,000L CAPACITY WASTE OIL STORAGE

Teck

LEGEND

EXPLORATION TRAILS

WASTE ROCK DUMPS

HAUL ROADS

CLEARED AREA

0 50 100 150 200 250 metres

1:5,000

CONTOUR INTERVAL=10m

NOTE

BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Sä DENA HES DETAILED DECOMMISSIONING AND RECLAMATION PLAN

CONCENTRATOR PROCESS AREA CURRENT CONDITIONS

DRAWN BY:	CHECKED BY:	FIGURE NO.	REV.
BJD	BJD	3-7	2
Revised: August 25, 2015	PROJ. NO.		

Table 3-1 provides a brief dimensional description of the various infrastructure components, and Figure 3-7 depicts the general arrangement of the central office, accommodation and mill site buildings and services. Over the past several years a number of buildings and structures have been removed as they have deteriorated as a result of age and subsequent winter snow damage. These include all facilities previously located at the Jewelbox site, the shop at the Golden Hills site and the First Aid trailer located at the main gate. All waste generated from these demolitions have been disposed of in a permitted landfill site. Figure 3-8 depicts the generalized closure measures for this area.

Other infrastructure and facilities associated with outlying mine components are listed in Table 3-1, and are depicted on the drawing particular to each component (Figures 3-3 and 3-4).

An on-site permitted landfill facility will be constructed for the disposal of non-putrescible industrial waste that has no salvage value generated during closure activities. The reader is referred to Section 3.5.6 for a discussion of this facility.

3.4.1. *Concentrator Buildings*

The ore Concentrator ("mill") is comprised of the mill building itself, the crusher house, conveyors, and truck load out facility. All buildings are steel frame construction on concrete slab flooring. A list of equipment currently located in the mill is found in Table 3-2.

The mill building itself houses what is expected to be the most attractive components from a sale or salvage perspective; in particular, the ball and sag mills and structural steel, as well as other scaffolding and processing equipment.

Buildings and equipment that are not sold or salvaged will be demolished and the debris will be hauled for burial in a permitted landfill site. The concrete foundations will be demolished to ground level, and the rubble will be buried on site and covered with till material.

Table 3-1 Infrastructure Description

Component	Description (see Figure 3-7 for layout)
	(Note all concrete slabs 0.20 m thick)
Concentrator Buildings	
Concentrator Complex	Area of 1761 m^2, 352 m^3 concrete slab
Crusher House	8 m x 12 m, Metal Building, 91 m^3 concrete slab
MCC	6 m x 11 m metal building, 14 m^3 concrete slab
MCC	6 m x 13 m, 16 m^3 concrete slab
Reagent Bins	2 m x 5 m , 2 m^3 concrete slab
Coarse Ore Bin	9 m x 8 m , 14 m^3 concrete slab
Power House	13 m x 27 m, Metal Building, 77 m^3 concrete slab
Service Garage	13 m x 15 m, Metal Clad Building, 41 m^3 concrete slab
Accommodation Buildings	
Bunk Trailer x 10	7 m x 33 m, Metal Trailer
Bunk Trailer x 10	8 m x 64 m, Metal Trailers
Bunk Trailer x 10	8 m x 50 m, Metal Trailers
Kitchen Trailers x4	19 m x 39 m, Metal Trailer
Office Trailers Complex	22 m x 23 m, 98 m^3 concrete slab
Miscellaneous Buildings/ Structures	
Ambulance Garage	13 m x 10 m, Metal Building
Water Distribution + Pump House	Area= 182 m^2, Metal Clad Building
Warehouse	10 m x 8 m, Metal Clad Building
Cold Storage Warehouse	10 m x 16 m, Metal building
Burnick 1200 Portal Shop	40 x 20 m metal clad building, earth floor, concrete footing
Burnick 1200 Portal Fuel Tank	
Miscellaneous Core Racks, Gribbler Ridge	Wooden structures
Water Storage	17 m x 3 m, storage tank
Radiator Banks	5 m x 8 m, 8 m^3 concrete slab
Storage Slab	6 m x 47 m, 57 m^3 concrete slab
Warehouse and Dry Lab	Area of 760 m^2, 152 m^3 concrete slab
Ball Storage	3 m x 5 m, 3 m^3 concrete slab
Diesel – 5,000 l; Gasoline – 2,000 l	Area of 729 m^2, 56 m^3 concrete slab
Decant Tower	50 m^3 reinforced concrete structure
North Creek Dyke	
1480 Portal Electrical Transformer	Power poles, chain link fence
Water Intake Pumphouse/Shop	2 m x 3 m wooden sheds (x3); 1.2 m^3 concrete pad

Table 3-2 Mill Equipment List

EQUIPMENT	MANUFACTURER	QUANT.	SIZE	REMARKS
Grizzly		1	760mm x 760mm	
Rock Breaker	Teledyne	1	30 kW	Hydraulic
Reciprocating Feeder	Universal engineering	1	1525mm x 4267mm	
Jaw Crusher	Allis Chalmers	1	1220mm x 1067mm	Used
Ore Conveyor	Trans-Continental	1	900mm	500 t/p
Belt Magnet	J.F. Comer	1	3 H.P.	
Reclaim Conveyor	Trans-Continental	1	900mm	250 t/h
Reclaim Vibrating Feeder	AISCO	1	1067mm x 2240mm, 5 H.P.	
Ore Bin	GEM Steel	1	200t	
SAG Vibrating Feeder	AISCO	1	1067mm x 2240mm, 5 H.P.	
SAG Feed Conveyor	Trans-Continental	1	900mm	100 t/h
SAG Mill	MPSI	1	5500mm DIA. x 2134mm, 970 H.P., Variable speed.	
Liner Handler	McLellan Industries	1		
SAG Discharge Pumps	G.I.W.	2	150mm x 100mm, 60 H.P.	
Vibrating Screens	Simplicity	1	1525mm W x 3600mm L, 10 Mesh, 25 H.P.	
Ball Mill	Allis Chalmers	1	3050mm DIA. x 3680mm, 900 H.P.	Used
B.M. Disch. Pumps	I.T.T.	2	250mm x 200mm, 60 H.P.	
B.M. Cyclones	Technequip/Krebs	2	D20B	
Lead Unit Flotation Cells	Outokumpu	4	5.1m^3, 25 H.P./Cell	
Lead Unit Cell Blower	Roots	1	297m^3/hr, 24.8 kPa	
Flotation Cells, Lead Rgh and zinc Rgh	Denver	2 sets, 15/set	5.7m^3, 25 H.P./Cell	Used
Lead and Zinc CLNR Flotation Cells	Denver	2 sets, 14/set	1.4m^3, 7.5 H.P./Cell	
Lead Regrind Mill	Taylor	1	1830mm x 2140mm, 150 H.P.	
Lead Rgr Cyclones	Techniquip/Krebs	3	D6B	
High Rate Thickener	Outokumpu/ Supaflo	2	4600mm DIA.	
Lamella Clarifier	Lamella	2	570mm x 55°	
Slurry Storage Tank	GEM Steel	3	5500mm DIA. x 14000mm	
Pressure Filters	Filtra Systems	2	Lead-28m^2, Zinc-32m^2	100 psi
Concentrate Bin	GEM Steel	2	3500mm DIA. x	

EQUIPMENT	MANUFACTURER	QUANT.	SIZE	REMARKS
			9000mm	
Minifab Flocculant Mixer	Allied Colloids	1	$1m^3$	Flocculant Mixing
Lime Grinding Mill	SALA	1	900mm DIA. x 1525, 10 H.P.	
Fresh Water Tank	GEM Steel	1	200,000 USG	
Flotation Air Blower	Spencer	1	21240 lm^3/hr, 14.5 kPa	Used
Air Compressor	Ingersol Rand	2	2550m^3/hr, 750 kPa, 350 H.P.	
Air Dryer	Xebic	1	170 lm^3/hr, 758 kPag	
Pressure Filter air Receiver Tank	Ingersol Rand	1	1830mm DIA. x 4000mm	
Courrier 30 OSA	Outokumpu	1	10 streams, Lead Zinc, Iron, % solids	
DCS	Fisher Controls	1		
PLC	Allen Bradley	1		
Truck Scale	Canadian Weigh Scale	1	100 t	Computerized loading system
Diesel Generator	Midwest	2	2 MW	
Diesel Generator	Midwest	2	1 MW	

Note: Unless otherwise stated, dimensions are in millimeters

Freshwater Line to Jewelbox

COARSE ORE STOCKPILE

CRUSHER HOUSE

HAUL ROAD

Fuel Storage Tanks will be emptied (products used on site or recycled), tanks cleaned & removed from site or cut up and metal recycled. Containment liner cleaned and removed from site to a licensed facility.

After all buildings and materials have been removed from the cleared areas of the Concentrator and adjacent areas, the site will be recontoured and revegetated. Areas where concrete slabs remain at ground level will have a minimum 0.5m cap placed over them and areas where there are metals contamination will be either excavated or capped as recommended in the Site's ERA/HHRA studies

Hydrocarbon Contaminated Soils

WATER TANK
Process & Fire Water

FUEL STORAGE TANKS

Gasoline

Diesel

RECLAIM CONVEYOR

CONVEYOR

COARSE ORE BIN

CONCRETE SLAB
Former Mobile Equipment Service Garage

Hydrocarbon contaminated soils to remain and capped with 0.6m of soil.

Containment Area

MAIN ACCESS ROAD TO MINE

WATER DISTRIBUTION PUMP HOUSE

REAGENT BINS

KITCHEN

WATER STORAGE

BUNK TRAILER

MAINTENANCE SHOP

CONCENTRATOR COMPLEX

MCC

MCC

POWER HOUSE

BUNK TRAILER

PROPERTY ACCESS GATE

OFFICE COMPLEX

BUNK TRAILER

WAREHOUSE DRY AND LAB

AMBULANCE GARAGE

Radiator Banks

BUNK TRAILER

SEPTIC TANKS

TRUCK LOAD OUT

OUTSIDE CONCRETE STORAGE SLAB

BUNK TRAILER

COLD STORAGE

STEEL BALL STORAGE

Hazardous materials survey of the Concentrator buildings completed. Hazardous materials from Concentrator buildings and elsewhere onsite will be appropriately packaged, manifested, and transported off site for recycling and/or disposal at licensed facilities

Hydrocarbon Contaminated Soils

Hydrocarbon contaminated soils to remain and capped with 0.6m soil.

TAILINGS LINE

CORE RACKS

WASTE OIL TANK

Waste Oil Tank will be cleaned, cut up and be recycled or disposed of in on-site permitted landfill. Containment liner will be cleaned and removed from site to a licensed facility.

RECLAIM WATER LINE

5,000L CAPACITY WASTE OIL STORAGE

Teck

LEGEND

EXPLORATION TRAILS

WASTE ROCK DUMPS

HAUL ROADS

CLEARED AREA

0 50 100 150 200 250 metres

1:5,000

CONTOUR INTERVAL=10m

NOTE

BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Sä DENA HES DETAILED DECOMMISSIONING AND RECLAMATION PLAN

CONCENTRATOR PROCESS AREA CLOSURE MEASURES

DRAWN BY: BJD	CHECKED BY: BJD	FIGURE NO. 3-8	REV. 2
Revised: August 15, 2015	PROJ. NO.		

3.4.2. *Power House and Power Lines*

The power house contains four diesel generators which supply power for the mining operation. It is expected that these generators will have an appreciable salvage value. The power is distributed via approximately 6 km of three phase overhead power lines. There is also approximately 600 metres of 60 mm dia. “TEC” cable leading from Jewelbox 1440 portal to the Main Zone pit. The distribution lines will be re-spooled for salvage or placed in the landfill. The power poles (approx. 120) will be removed and either sold for salvage if in good condition, or burned according to Yukon Regulations.

It is not known if the power poles that were installed by the previous operator were treated with a preservative such as creosote. A certified electrical contractor will be retained and responsible for the sampling and disposal of the poles.

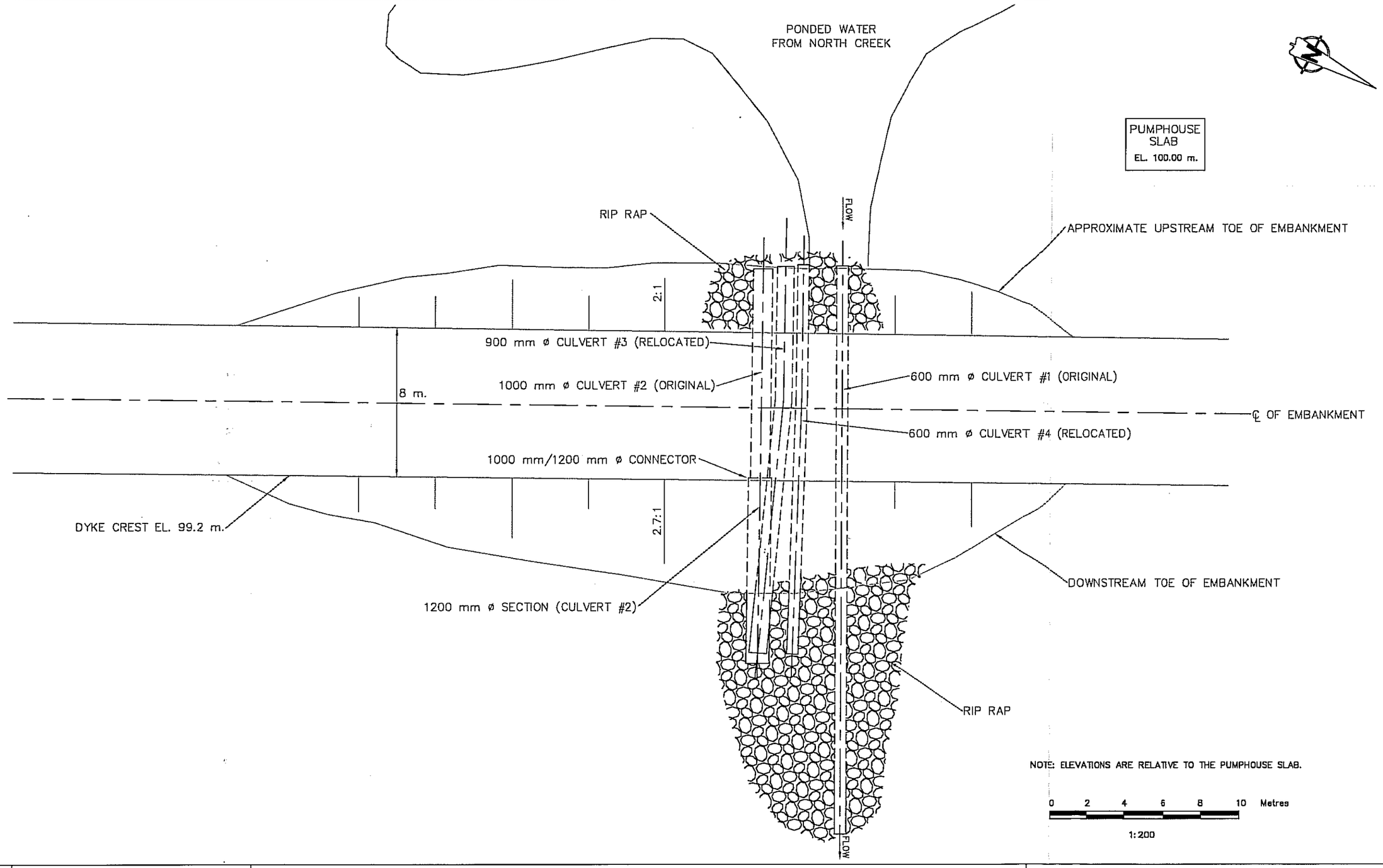
3.4.3. *Water Supply*

The water supply system consists of a series of three electrical 100 hp water pumps housed in 2.5 m x 2 m wooden shacks. These pump houses are located in the lower North Creek drainage (Figure 3-1). The pumps will be removed for salvage/disposal, the shacks removed, and the wells will be properly decommissioned (internally sealed). The approximately 2 km of water line (300 mm dia.) will be removed for salvage or disposal. The entire disturbed area around the pump houses at False Canyon Creek was previously reclaimed (see Section 3.7 *Land Reclamation and Revegetation* for a discussion of this activity) by the original site owner.

3.4.4. *North Creek Dyke*

(i) Description

The North Creek dyke is located about 1 km north of the existing tailings management, as shown in Figure 3-1. The dyke was constructed in the summer of 1991 by Golden Hill Ventures (GHV). The dyke was constructed to provide a reservoir from which water was pumped to the northern end of the tailings impoundment in preparation for the start-up of the mill.



NOTE: ELEVATIONS ARE RELATIVE TO THE PUMPHOUSE SLAB.

0 2 4 6 8 10 Metres

1:200

Teck

ACCESS CONSULTING GROUP

SRK Consulting
Engineers and Scientists

SA DENA HES DETAILED
DECOMMISSIONING AND RECLAMATION PLAN

PLAN OF NORTH CREEK DYKE

DRAWN BY:	CHECKED BY:	FIGURE NO.	REV.
MH	PMH	3-9	
DATE: MARCH 12/13	PROJ. NO. 1CC005.05		

The dyke has a maximum height above original ground of about 5m and is about 50m in length. Fill used to construct the dyke is a silty sandy till and it is estimated that about 2000m^3 of this material was placed.

A 600 mm dia. pipe at the base of the dyke allows flow in the North Creek to pass through the dyke. Three other culverts varying in size from 600 to 1000mm in dia. provide capacity to pass the 200-year event. A plan of the dyke showing the current location of the culverts and layout of the dyke is shown on Figure 3-7.

(ii) Closure Measures

At closure the dyke and culverts will be removed, the area re-contoured and the drainage channel armoured to ensure it is stable.

3.4.5. *Accommodation/Camp Buildings*

The campsite accommodation was provided by approximately 30 sleeping/wash Atco trailers and 6 kitchen/recreation Atco trailers. These trailers are no longer functional and current plans are to demolish them. All piping and cable connections cut at ground level. Any hazardous wastes within the trailers will be managed in accordance with applicable hazardous waste regulations. The remainder of the debris will be placed in the site's landfill.

3.4.6. *Miscellaneous Buildings & Structures*

The office complex consists of six ATCO trailer units set up on wood block footings and joined under a common roof. Useable office furniture and equipment has been removed to secure storage in Watson Lake and where appropriate, will be offered to local service organizations or shipped to other Company facilities where economically feasible. All Company records have been removed to Teck's office in Kimberley, BC for safe storage. Because of the deteriorated state of the office structure, current plans are to demolish it. The trailers will be demolished, and will be burned and/or buried in a permitted landfill site on site and the ground surface recontoured, and revegetated.

At the Jewelbox 1480 Portal, there was a 13 m x 40 m metal shop building with earthen floor and concrete footings. The building collapsed under snow load in 2007 and has been

demolished and its refuse buried nearby in an approved landfill site. In 2011 the remainder of the structures at the site have been either demolished or removed from the property. All demolished material has been disposed of in a permitted landfill. Fuel tanks have been hauled away for salvage. Fuel berms will be assessed for hydrocarbon contamination and will be re-contoured, the liner removed and hauled to refuse landfill. The power transformer and power line will be removed for salvage; power poles destroyed or hauled out for salvage depending on conditions; chain link fencing enclosure will be demolished and landfilled on site. An assessment of hydrocarbon contamination and development of a remediation plan has been conducted in accordance with Special Waste Permit 41-247 issued by Yukon Environment. The approved remediation plan is to leave the hydrocarbon soils in-situ and cap with 600 mm of clean fill. Further details are discussed in Section 3.6.

At the Burnick 1200 Portal, there is a 13 m x 40 m metal shop with an earthen floor and concrete footings. Current plans are to remove this building in 2013 for reuse elsewhere. The concrete foundations will be removed to ground level. An assessment of hydrocarbon contamination was completed and a remediation plan developed in accordance with Special Waste Permit 41-247 issued by Yukon Environment. The approved remediation plan is to leave the hydrocarbon soils in-situ and cap with 600 mm of clean fill. Further details are discussed in Section 3.6.

- At the Burnick 1300 Portal, there is a 2 m x 4 m safety shack which will be demolished and the debris removed to the landfill for burial. The site is to be regraded.

- There are some wood shacks, core racks and core remaining from previous exploration at the property. The cores will be removed from the wood core racks. Plastics and other hazardous wastes will be removed from the wood shacks. All the wood core racks, shelters and buildings will be burnt. The core will be buried on site by a small excavator. All non-wood materials will then be cleaned up and taken to an appropriate permitted landfill. Complete any grading/cleanup of the site. Select core samples have already been donated for archiving.

3.5 HAZARDOUS BUILDING MATERIALS, INDUSTRIAL REAGENTS AND WASTES

A majority of the industrial reagents and wastes were removed from the property in 2011. In 2012 Golder conducted a detailed inventory of the hazardous building materials and substances, however full characterization of these materials will be the responsibility of the selected demolition and hazardous waste contractor. The hazardous building materials and chemical substances identified include process residues, reagents, laboratory chemicals, other chemicals, petroleum products, solvents and paints, lead-based paint, asbestos, mercury containing equipment (fluorescent light tubes), radioactive materials (process flow gauges), and crystalline silica. Details of the hazardous materials surveys can be found in Golder's reports (Golder 2013b,c).

Prior to demolition, a qualified hazardous material contractor will be retained to remove and dispose off-site all the hazardous materials in accordance to the Federal TDG Act and Regulations and Yukon SWR. Any materials classified as industrial waste and non-hazardous will be disposed of at the on-site permitted landfill. The exception being mine ore process residues which are further discussed in Section 3.5.1.

3.5.1. *Process Residues*

As the site is a metal mine, it contains numerous areas and facilities that contain various forms of lead and zinc minerals. These minerals are in significant concentrations in the ore, some waste rock, tailings, and concentrates. Various quantities of these mineralized materials are found throughout the process facilities including the crusher, conveyor galleries, mill building and load-out area. The analysis of the mineralized materials includes; antimony, arsenic, cadmium, molybdenum, lead, selenium, silver, and zinc and are classified as industrial wastes on site. Based on the Toxicity Characteristics Leachate Procedure (TCLP) concentrations would warrant classification as Special (leachable) Waste, if these materials were removed from the site.

These materials will be placed back within the mine workings at Jewelbox where there is no discharge of water from the mine.

3.5.2. *Hazardous Building Materials*

Asbestos-containing and suspect asbestos-containing materials were identified in a number of locations throughout the various buildings. These materials will be handled as per the Yukon Solid Waste Regulations, and either properly disposed of in the on-site landfill (under permit) or transported off site.

Lead-paint was also identified in the various buildings. Prior to demolition, additional samples are required to be tested for the lead leachability potential. The results will determine if the levels are classified as a Hazardous Waste, which will determine the proper disposal requirements.

Other materials including equipment containing mercury will be disposed of in accordance to the Yukon SWR.

3.5.3. *Chemicals*

The process facilities and warehouse areas contain a number of different chemicals. These materials include, but are not limited to: reagents, solvents, paints, cleansers, and battery acid. They will be removed from the mine site and disposed of through a licensed hazardous waste disposal firm. In such an event, the disposal will only take place following consultation with and approval from the appropriate regulatory authorities.

Waste vehicle batteries have been segregated, with periodic shipments to a licensed battery disposal facility. This procedure will continue through the end of mine closure activities.

The mine has an inactive sewage system designed to service a 160 person camp that would consume approximately 40 gal/person/day of water. The current system was installed in 1997 and is comprised of three sewage tanks and a pump-out chamber which then drains to the soil absorption area (septic field) (see Figure 3-8).

The three septic tanks will be pumped out, de-sludged, with sludge hauled offsite to an approved sanitary facility. The pump out chamber would also be removed. The remaining infrastructure (i.e. piping and related materials, including the septic field) would remain buried.

3.5.4. *Fuels and Lubricants*

Currently there are two above ground storage tanks (diesel, gasoline) on site which are currently used by the caretaker. During the closure activities, the Company will decommission these tanks and have temporary double wall fuel tanks brought to site for contractor use. Fuels and lubricants will be required during the three year period for implementation of the closure measures after mine shutdown (as discussed in Section 5.0). Any inventory remaining on site once all activity has ceased will be removed from the site by one of three methods:

- returned to the original supplier for credit wherever possible;
- sold to a third party user; or
- transported to an authorized disposal agency to be recycled or destroyed.

The bulk diesel fuel storage tanks will be emptied of their contents in accordance with one of the above mentioned procedures. The tanks will then be drained and where feasible removed from the site and sold for reuse or their salvage value. For tanks too large to be removed, the tanks will be cleaned out with any sludge being treated or removed in accordance with procedures approved by the Yukon regulatory authorities. The cleaned tanks will then be dismantled and either be salvaged or disposed of as scrap metal and buried in the site landfill area.

All rental propane tanks have been removed by the propane supplier. Associated fuel delivery lines at any portals and at the camp will be removed and disposed of in a manner similar to that of the gasoline and diesel fuels.

Other hydrocarbon products used at the mine site are primarily hydraulic fluids, lubricating oils, greases, antifreeze and solvents and were identified by Golder in their site assessment report (Golder, 2013b,c). All products will be recycled or disposed of through a licensed waste disposal firm.

3.5.5. *Scrap Metal*

Scrap equipment has been stored in various lay down areas (known as "bone yards") located on site and along the access road. This is primarily scrapped equipment that was stored so that it could be utilized on the mine site as a source of spare parts or good recyclable scrap material. Salvageable material from these sites will be sold as scrap and removed from the site. Material that has no scrap value will be disposed of in a permitted landfill on site. Prior to disposal in the

landfill all of this material will be examined to ensure that all hazardous materials have been removed. Non-ore related hazardous materials removed will be shipped off site to a licensed waste disposal site.

3.5.6. *Site Landfills*

The 2000 report proposed the use of the existing landfill for the disposal of non-putrescible wastes that have no salvage value, such as lumber and scrap steel. Schedule A – Solid Waste Management of Sä Dena Hes Operating Corporation's Production Licence QML-0004 requires such a facility to be an "approved engineered landfill area." The company will dispose of materials in accordance with the current Waste Management permit for the disposal of solid waste generated by commercial activities which expires December 31, 2014. The landfill will be managed in accordance with the Production Licence requirements and Yukon Solid Waste Regulations.

Specifically, the engineered landfill facility will:

- be approved by an inspector prior to any waste disposal;
- be compacted and covered with rock or overburden on a regular basis;
- be maintained to minimize attraction of wildlife and water infiltration; and
- be compacted and capped with a liner or a minimum of one meter of low-permeability overburden or soils (sloped and revegetated) to retard the infiltration of water on the completion of landfill activities.

In 2008, in response to the structural failure of the Jewelbox shop, the Company applied for and received approval through Yukon Environmental Programs for a Solid Waste permit #81-020 to landfill the refuse from the shop on site near the Jewelbox portal. This work was completed in late 2009. An amendment to this permit was made in 2010 to locally landfill the refuse of the Golden Hills shop and will include any additional construction materials requiring disposal during closure.

If none of the mill buildings and equipment can be sold or salvaged, and the buildings on site had to be landfilled, the total estimated material quantities have been estimated to be approximately 3500 m^3 bulk disposal volume.

As part of the closure of the landfill, groundwater monitoring wells will be installed. It is proposed that the new Water Licence will specify post closure monitoring requirements for the landfill.

3.6 SITE REMEDIATION AND RISK ASSESSMENT

As previously discussed in Section 2.3, the environmental site assessment (ESA) activities were conducted from 2011 to 2014 to characterize the environmental conditions of the site. Golder conducted the ESA work on behalf of Keyeh Nejeh Golder Corporation (KNG) which is a joint venture with Golder and the Liard First Nation. The site assessments included a preliminary investigation identifying areas of potential environmental concern by reviewing the areas of operation, activities in those areas, and the potential contaminants of concern. The field activities conducted included assessing the quality of the soil, sediment, groundwater and surface water quality at the mine site to conclude the presence or absence of contamination. Ultimately the results have been used to develop mitigative measures to minimize potential environmental impacts for closure of the mine. The results of the ESA are included in Golder's reports (Golder 2013, 2014a, 2014b, 2015a). The 2013 ESA report is attached in Appendix J and the 2014 and 2015 reports are provided in Appendix K.

Petroleum hydrocarbon and metals concentrations exceeding the Contaminated Sites Regulation (CSR) Park Land (PL) use standards were identified in the vicinity of maintenance shops and fuel storage tanks, and metals associated with the mine primary activity areas (i.e., sediment ponds, tailings facilities, waste rock piles) and processing areas (i.e., mill area). The ESA includes assessment of hydrocarbon contamination conducted in accordance with Special Waste Permit 41-247 issued by Yukon Environment. The spatial extent of the hydrocarbon and metal contamination impacts has been fully delineated. A summary of the results are further discussed below.

In addition, the Azimuth Consulting Group was commissioned to conduct a Human Health Risk Assessment (HHRA), as well as terrestrial and aquatic Ecological Risk Assessments (TERA and AERA, respectively) for the site. The overall goal of this work was to support the mine closure process, including providing feedback to the Company over the course of mine remediation and reclamation from 2012 to 2015. The risk assessment approach is further discussed in Section 3.6.5.

3.6.1. *Petroleum Hydrocarbons in Soil*

Areas identified to have petroleum hydrocarbon impacted soils include the Jewelbox, Golden Hill Shop, Burnick Shop, and the drum storage area. Initial assessment and remediation was conducted by Access (2011, 2012) and was further characterized and delineated by Golder (2013, 2015a). Soils in these areas were determined to contain hydrocarbon concentrations exceeding the CSR PL standards and Special Waste standards. Leachable lead has also been identified in three of the four areas which classify the soil as Special Waste.

Under Special Waste permit 41-247, 130 m^3 of special waste contaminated soils were excavated and transported to Tervita's Northern Rockies Landfill in Fort Nelson, BC in 2012. Based on the 2012 assessment results an additional 700 m^3 of soils remained for further excavation and remediation. However, not all the areas had been fully assessed; and as such additional quantities of contaminated soils are likely.

The original remediation plan for the hydrocarbon contaminated areas included excavating, stockpiling, and remediating the stockpiles (e.g., landfill or land farm), but based on further discussions and agreement with Yukon Government, the Company made the decision to risk assess and risk manage hydrocarbon contaminated soils in place which is consistent with the approach for managing metals contamination. As per the Special Waste Permit 41-247 a final disposal plan was developed and submitted to the Yukon Environment to risk manage the hydrocarbon contaminated soils which included capping surface soils and future monitoring.

To inform the decision to risk manage hydrocarbon contamination, a hydrogeological assessment was conducted by Golder (2014b, 2015a). Based on the results of the monitoring and sampling conducted, groundwater quality has not been impacted by hydrocarbons. Additionally, as part of the Interim ERA, Azimuth conducted an evaluation of risk managing the hydrocarbon contaminated soils. Based on the risk assessment review, it was recommended that the hydrocarbon areas located at the Jewelbox, the Burnick maintenance shop, the Golden Hill Shop, and the Drum Storage will be capped with 600 mm of fill material to reduce the pathway and exposure to ecological receptors (Azimuth, 2014c).

3.6.2. *Metals in Soil*

Areas identified to have metals impacted soils include the Jewelbox, Mill Site (including Golden Hill Shop), Burnick Portal, various sediment ponds, waste rock piles and tailings management areas (including the reclaim pond). Additional metals exceeding the applicable CSR soil standards include antimony, arsenic, cadmium, chromium, copper, molybdenum, nickel,

selenium, and vanadium. Leachable levels of cadmium, lead, selenium and/or zinc were identified at the Jewelbox area, Burnick Portal, mill site, and tailings management area.

The full spatial extent of the metals soil contamination has been fully delineated at all the AECs (Golder Associates Ltd., 2015a). A hydrogeological assessment was also conducted and is further discussed in Section 3.6.4. Ultimately the results have been used to support an ecological and human health risk assessment and the remediation of the mine site which were used to ultimately guide the risk management of metals impacted soils. The approach to risk assessment is further discussed in Section 3.6.5.

Based on the results of the ESA and the risk assessment results, areas with metals impacted soils are being risk managed and were outlined previously within the subsections of Section 3 as they relate to each mine area. However, in summary the risk management measures include the following:

1. In order to block direct or incidental ingestion where soils are identified with lead greater than 400 ppm, a cap of suitable material is being applied to the following:
    a. A minimum 20 cm cap to the re-contoured areas of the Jewelbox and Main Zone waste rock dumps;
    b. A minimum 20 cm cap over portions of the Jewelbox haul road;
    c. A minimum of 50 cm cap to the Tailings management facility (including both the North and South tailings storage areas and Reclaim Pond); and
    d. A minimum of 20 cm cap to the Mill Yard /Camp area (outside of the mill building footprint and ore stockpile area).
2. For areas that present a potential human health and safety risk, from accidental ingestion or physical harm, measures will be put in place to limit such potential safety and human health risks. These areas include, but are not necessarily limited to the following: the Burnick 1200 and 1300 waste rock dumps, Jewelbox and Main Zone waste rock dumps, 1250 Portal, the 1380 Gully, the mill site, and the area north of the North Tailings facility. Measures consist of limiting vehicle access by retaining control at the mine site by a locked gate and only allowing authorized personnel on site (this is also being done to limit legal liability for uninvited users who could have an accident and be injured while on site). Roadways will also be deactivated and signage will be used to notify the public of potentially unsafe areas.

In addition to metals contaminated soils on the mine site, the Company conducted an environmental site assessment on its truck shop located at 303 Robert Campbell Highway, Watson Lake, YT (Golder, 2014c). During mine operations, the truck shop was used for the maintenance of concentrate transport trucks. The environmental site assessment identified metals contaminated soils that are consistent with the metals contaminants identified on the mine site. As such, the soils will be relocated to the south tailings pond and capped with 0.5 m of soil which is consistent with the risk management measures for this area under Special Waste Relocation Permit 4201-45-043 (permit issued to Golder on behalf of the Company).

3.6.3. *Site Water Quality*

A site water quality review including a loading assessment is discussed at length as part of the geochemistry discussions in Section 4 of Appendix B. Note that the loading assessment was conducted originally in 2005 and is attached in Appendix F. As such, with the additional monitoring dataset available up to 2012, an update of the loading assessment was conducted in 2013 (SRK, 2014e) to confirm that the results of the 2005 water quality evaluation. The updated loading assessment report is included in Appendix K. Current compliance monitoring includes monthly and quarterly sampling at several receiving water stations and is further discussed in Section 5.3.

The water chemistry review included in Section 4 of Appendix B focused on zinc as the primary contaminant of concern and sulphate as an indicator of mine-related impacts that are not significantly affected by attenuation processes in surface waters. Based on the water chemistry review, the potential site water chemistry issues are associated with the 1380 Portal water discharge and the tailings management area.

Additionally, the Golder ESA report (Golder, 2013a) completed a review and analysis of select surface water discharge points on the mine site from 2011 and 2012. The stations included MH-02 (North Dam seepage), MH-04 (Camp Creek), MH-07 (Reclaim Dam seepage), MH-08 (Burnick Creek), MH-22 (Burnick Portal seepage), and MH-25 (1380 Portal). The samples were compared to the CSR water quality standards for protection of aquatic life and identified cadmium to exceed the CSR standard at all six locations; cobalt, selenium, and zinc to exceed the CSR standards at one or more monitoring location; and lead exceeded at the Main Zone 1380 Portal. Based on the leachability test results for soils, there is also a potential for metals to

have impacts on the groundwater near the Jewelbox Hill, Burnick (1200 Portal), mill site, and tailings management area.

With respect to the Burnick portal, the SRK water quality review and soil column attenuation tests confirmed that the down gradient soils have the potential to significantly attenuate zinc concentrations at the levels observed in the discharge for much longer than 200 years. As such the Burnick Portal water discharge is not considered an environmental concern. Attenuation of metals in soils from the flow path between the Burnick underground and waste dumps is not expected to contribute significantly to downstream zinc concentration, even if attenuation is lost at some point in time.

The water quality issues associated with the 1380 Portal, Tailings Management Area, and groundwater are further discussed in the sections below.

3.6.3.1. 1380 Portal

The fate and transport of water from the 1380 Portal is included within Section 4 of Appendix B and includes additional work that was conducted in 2005 and 2007. In 2012, the Company retained SRK to conduct a tracer study to identify the fate of the portal discharge water as groundwater. The findings are included in SRK's 2013 letter report "1380 Portal Discharge Investigation". This report is included in Appendix G.

The 1380 Portal has been identified as having elevated levels for lead, cadmium and zinc. The lead, zinc and cadmium concentrations have been reported to be higher than 0.2 mg/L, 30 mg/L and 0.4 mg/L, respectively. The discharge from the portal infiltrates into the adjacent waste rock dump and eventually into the Camp Creek catchment. Some of this water exits to the toe of the waste rock dump as a surface flow and for a short period (roughly 3 weeks) each spring during snow melt, it joins a surface water flows in the invert of the gully. The surface water flow in the gulley is primarily from melting snow and exists only during freshet. Currently the zinc concentration in the portal discharge is being attenuated by contact with the waste rock in the dump and overburden. Additional attenuation occurs as the portal drainage water mixes with the alkaline surface water in the gully. The portal discharge water also mixes with other groundwater along this flow path. Sulphate loading is also observed to be greater in Camp Creek than the loading from the 1380 Portal, meaning sulphate is added to Camp Creek from

sources other than the 1380 Portal. The current monitoring in Camp Creek at MH-04 shows that there are no impacts from the 1380 Portal.

The primary risk is that the strong attenuation of zinc in soils within the gully flow eventually disappears. Based on the current prediction and assuming loss of zinc attenuation capacity of the soils, zinc concentrations in Camp Creek would remain below MMER standards and by MH11 could almost meet the CCME criterion (SRK 2007). A review as part of an updated loading assessment has been conducted in 2013 (SRK, 2014e) to support the post closure water licence application.

The 2012 tracer study was conducted to determine a) if the flow in the gully did not report to Camp Creek and the sulphate load in Camp Creek is from some other source or b) if the flow in the gully reports to Camp Creek, but zinc is attenuated and sulphate loading is from unimpacted groundwater discharge to Camp Creek. The tracer test was conducted over 4 weeks, at which time the tracer was not detected within Camp Creek. Based on a range of groundwater travel times, it is estimated that the tracer could take between 36 days and 10 years to arrive at the downstream monitoring location within Camp Creek.

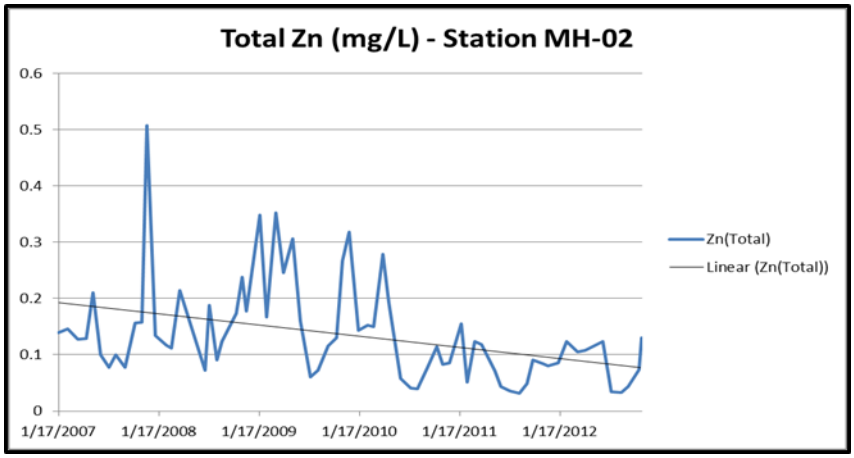
Based on the recent study, the fate and transport of the 1380 Portal water remains unclear. To better refine the groundwater travel times, in 2013 monitoring wells were installed between Camp Creek and the 1380 Portal. The monitoring wells will also verify estimates of the sulphate concentration in groundwater from the loading assessment. The wells would also be used as sentinel wells to monitor the migration of zinc and cadmium from the 1380 Portal.

Beyond closure in 2015, an adaptive management approach will be undertaken for addressing the potential breakthrough of zinc or cadmium from the 1380 Portal discharge. Breakthrough would occur after the attenuation capacity of the subsurface material is consumed. Monitoring wells and surface water locations would be monitored annually during base flow conditions. The data would be analyzed to assess zinc and cadmium concentration trends. A sustained upward trend in concentrations would trigger an assessment of mitigation alternatives. An adaptive management plan would set action levels and mitigation for exceedances of an action level.

3.6.3.2. Tailings

Based on SRK's loading assessment, the tailings loading at MH-02 is 1 or 2% of the total load to False Canyon Creek. As such, it is concluded that the zinc load from the tailings is not having a significant impact on the receiving water quality at MH–11 or MH–16, and consequently no additional engineered measures to control leaching are required for closure. Furthermore, since temporary shutdown of the mine in 1992, effluent water quality levels have been in compliance with the Water Licence. Confirmation that tailings seepage does not significantly impact water quality will be evaluated in the planned 2013 updated loading analysis.

A short term increase in total zinc levels at MH-02 in 2009 was noted in the 2010 update, however further data collected to the end of 2011 and 2012 continues to show a decreasing trend. The following graph shows that zinc concentrations appear to increase over periods of low flows i.e., winter, however there is a definite downward trend still continuing. Significant higher total suspended solids readings associated with the elevated zinc levels suggest that the high readings are likely the result of sampling problems (i.e. sediments collected accidently in water samples due to the low creek levels).



Beyond closure in 2015, post closure monitoring will continue as discussed in Section 5.3. Concentration trends will be monitored and a sustained upward trend in concentrations would trigger an assessment of mitigation alternatives.

3.6.4. *Groundwater*

Based on the leachable soil results, there is a potential for metals to have impacts on the groundwater near the Jewelbox Hill, Burnick (1200 Portal), mill site, and tailings management area (Golder, 2012a). The development of a hydrogeological assessment plan and implementation of the plan has been conducted (Golder 2014b, 2015a). The scope of work included drilling and installation of monitoring wells at the site, groundwater monitoring and sampling four times between July 2013 and September 2014. Based on the results of monitoring work in 2013 and 2014, groundwater quality has not been impacted by former site activities as the contaminants of concern in soil do not appear to be leaching into groundwater.

3.6.5. *Summary of Risk Assessments*

The Yukon Mine Site Closure and Reclamation policy (Energy, Mines and Resources 2006) formally recognizes that "*risk management may be utilized in the development of the reclamation and closure plan by the mine operator. This approach should take into consideration ecological, human health, socioeconomic considerations and engineering factors and be designed to enable the mine operator and Yukon government agencies to fully understand the likelihood and consequence of failure in order to assess reclamation and closure options and to ensure that risks associated with implementing the mine DDRP are addressed to the satisfaction of the Yukon government*."

Yukon Environment (2010) recognizes that the presence of contamination at a site does not necessarily constitute a risk. As per this fact sheet: "*In order for a risk to exist, three things need to be present:*

- *Contaminants - that can cause toxic or adverse biological effects;*
- *Receptors – any person, animal, or plant that may be vulnerable to the effects of the contaminant; and*
- *Exposure pathways - by which receptors may be exposed to the contaminants."*

A risk assessment evaluates the interaction between these three basic components at a specific site and determines the resulting risk to receptors.

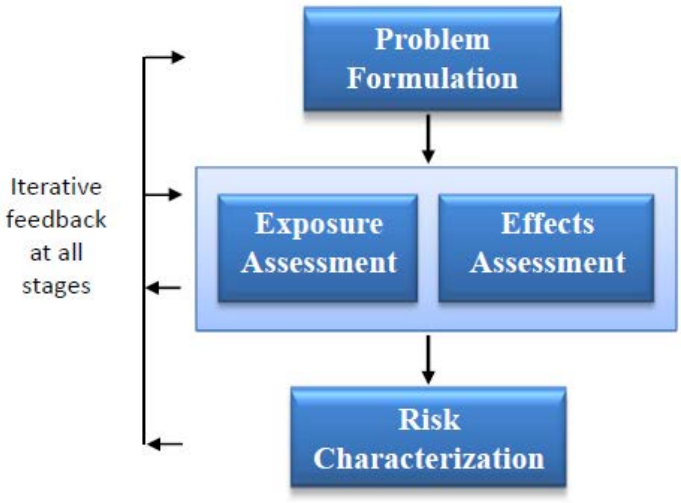
When contamination is identified at a site, risk assessment (human health and ecological) can be used to determine whether, and to what extent, remediation or other risk management efforts

are warranted to mitigate current or future risks. There is a considerable amount of guidance on how to conduct both human and ecological risk assessment; although there are some differences in practice, assessment of risks to human health and ecological systems can be conducted in parallel since they rely on similar principles.

According to Protocol 12 (Yukon Contaminated Sites Regulation; Yukon Environment 2011): *"The goal of a risk assessment is to determine whether the contaminants present at a site pose an unacceptable risk to the humans, plants and animals that may be exposed to those contaminants. If unacceptable risks are found, it may be possible to mitigate the risk to an acceptable level through risk management measures".* Removing or covering/containing the contaminants, eliminating exposure pathways (e.g., prevention of access by wildlife to adit water), or installing engineering solutions are examples of how risk can be reduced, depending on the nature of the site and its contaminants.

To support closure of Sä Dena Hes mine, the most up-to-date Canadian (Health Canada, various years; Environment Canada, 2012) and BC guidance will be used in the absence of detailed risk assessment guidance for the Yukon Territory. Figure 3-10 below shows a generic risk assessment framework for ecological risk assessment which is over-simplified but consistent with frameworks for human health risk assessment.

Figure 3-10. Generic framework for ecological risk assessment (simplified). Taken from Environment Canada (2012), but similar in principle to frameworks for human health risk assessment.



Azimuth was commissioned by the Company to conduct a Human Health Risk Assessment (HHRA), as well as terrestrial and aquatic Ecological Risk Assessments (TERA and AERA, respectively) for the Site. The overall goal of this work was to support the mine closure process, including providing feedback to the Company over the course of mine remediation and reclamation from 2012 to 2015.

Azimuth has iteratively prepared a series of risk assessment reports alongside site investigation, engagement with local First Nations, and decisions about the DDRP, including: Draft Problem Formulation (PF) (Azimuth 2013), Data Report (Azimuth 2014a), HHRA (Azimuth 2014b), Interim ERA (terrestrial food chain model; Azimuth 2014c), Updated PF (Azimuth 2014d), Draft TERA (Azimuth 2014e), PF Addendum (Azimuth 2015a), TERA Addendum (Azimuth 2015b), AERA (Azimuth 2015c), and a technical memo to update the 2014 HHRA (Azimuth 2015d).

In the sections that follow, the approach and key findings for the human health and ecological risk assessments are summarized. All risk assessment work is underpinned by site assessment work, including both soil and groundwater assessment, conducted by Golder Associates Ltd. (Golder 2015a). SRK Engineers led surface water-related work on behalf of the Company; the AERA and TERA rely on their studies for surface water quality data.

3.6.5.1. Conceptual Approach to Ecological and Human Health Risk Assessment Engagement with Liard First Nation

While undertaking a risk assessment, it is important to liaise with the people who will use the site in the future. During the mine closure process, the Company will liaise with regulators, First Nations and other stakeholders to ensure that the approach was clear and the findings clearly communicated. It is important to recognize that the Sä Dena Hes mine lies within the Traditional Territory of the Kaska First Nation, specifically Liard First Nation (LFN). In accordance with the Yukon Mine Site Closure and Reclamation policy (2006), the Company will engage with LFN and also Ross River Dena Council to understand their interests in the site and its future management.

In order for the LFN leadership and community to remain informed on mine closure, an engagement strategy is being planned. In conjunction with the Company's broader engagement strategy, the following will be proposed a basis for the engagement strategy for environmental assessment and planning and will be adapted and detailed after discussions with LFN:

1. Request that LFN leadership identify a person within their community to be the lead contact in regard to the ecological and human health risk assessment process. This person would preferably have some environmental sciences training. This person would assist in organizing or identifying other community members that can provide traditional knowledge of mine area in regard to LFN member land use, wildlife use, and country foods utilized from the area. The contact person would work with the ERA/HHRA risk assessors in developing sampling plans, participating in the field studies, and reviewing resulting reports.
2. Participate in Community Meetings to:
    a. Ensure that information on the mine closure process is disseminated broadly to the LFN community
    b. Hear first-hand about any environmental concerns of the community with respect to the Sä Dena Hes mine and its closure
3. Involve community members with risk assessment work at the mine site. Every field program will have a minimum of one LFN community member to provide guidance on LFN customs on the land and to assist in conducting field work. Health and Safety training will be provided to the LFN community member regarding site-specific hazards and the work being undertaken.

3.6.5.2. Human Health Risk Assessment

Samples of soil, water, berries, and key plants used as traditional medicines (caribou weed and Labrador tea) were collected from the various areas of the mine site. Members of the LFN assisted in sample collection and elders were consulted to identify plants and animals that might be used from the site as country foods or traditional medicines. The samples were analyzed for metal concentrations.

In a series of meetings and site visits, LFN elders advised the Company and Azimuth how they might use the site after the mine is closed. This is important because the amount of exposure people can have to environmental contamination at the site depends on how much time they will spend at the site and what kind of activities they are doing there. This information was used to estimate exposure to metal concentrations from spending time at the mine and/or consuming country foods or traditional medicines from the mine following closure. Azimuth compared these estimates to the maximum levels of human exposure allowed under Yukon environmental regulations.

The following is a summary of the findings for post-closure conditions:

Soil

Lead is a well-known contaminant and is one of the potentially more harmful metals present in environmental media at the site. Consequently, the HHRA focused on this metal and remediating the site to make it safe from exposure to lead would also make it safe from exposure to other metals such as copper or zinc. During the mine closure process, it was identified that high concentrations of lead in soil at the Mill Site, Tailings Management Facilities, Jewelbox/Main Zone mining areas, Burnick ore zone, and the 1380 Gully are elevated sufficiently that depending on use/exposure, could present a health risk to public that visit these areas. Therefore, as described in the DDRP, soil covers will be placed in the more accessible areas where lead concentrations are greater than 400 ppm[4]. While these remediation covers are an effective remedial option to manage potential human exposures from direct contact with the underlying contaminated soil, the cover may not mitigate human health risks from the consumption of plants or small animals living in or on the cover that have bioaccumulated metals from the underlying contaminated soil. In addition, there are less accessible areas of the site with residual lead concentrations >400 ppm, which means that other risk management measures for the site are necessary. As discussed with regulatory agencies and First Nation, these measures include signage, road decommissioning and physical barriers to restrict access. Another reason to restrict access to the Jewelbox area is that there are physical hazards related to areas of potential subsidence and steep terrain (with drop-offs); the Company will install specific signage to discourage access to these areas.

Water

Current water testing shows that the majority of the time, water quality in Camp Creek, (the main stream that flows through the site), is below the Guidelines for Canadian Drinking Water Quality for all metals. Intermittently, there have been water samples that exceed some of those guidelines. Putting aside the potential for naturally occurring microbial pathogens, such as the microorganism that causes “beaver fever”, this does not necessarily mean that the water is not safe to drink. In order for the water to be

[4] The YT CSR standard residential soil standard for lead for protection of human health is 500 ppm, but Teck chose to use 400 ppm to be consistent with the recently amended BC CSR standard and in recognition that some agencies are reviewing and revising their environmental standards for lead.

potentially harmful for drinking, guidelines must be exceeded for an extended time period; conditions that are not observed in Camp Creek. To track water quality, post-reclamation water quality monitoring will occur. People should not use the water from on or near the site as a long-term source for drinking water unless there is regular testing to confirm that it meets the Guidelines for Canadian Drinking Water Quality. Aside from concerns such as beaver fever, occasionally drinking water from the site (e.g., filling a water bottle from a creek), is not a health risk.

*Country Fo*ods

Berries from most areas of the mine site are safe for human consumption. However, human consumption of berries collected from some areas of the Jewelbox Hill, 1380 Gully, Mill Site, and a small area just north of the tailings pond could result in exposure to more lead than is permitted under Yukon environmental regulations. Testing has not been done for any other types of plants or animals that people may consume as food and consumption of small animals or other types of plant material from these same areas of the site may also be a risk. Although they haven't been tested, larger animals like moose and deer are expected to be safe for humans to eat because they don't spend a lot of time at the site. Access to these areas will be limited as the majority of the on-site roads will be deactivated and warning signage will be used to discourage public use.

Traditional Medicines

Herbal teas made from samples of caribou weed and Labrador tea from the mine site were tested. The levels of metals in herbal teas made from Labrador tea leaves were all below the maximum levels allowed under Yukon environmental regulations. The levels of metals in herbal teas made from caribou weed leaves were also below the maximum levels allowed under Yukon environmental regulations for all areas of the mine site except for Jewelbox Hill.

Based on the results of the human health risk assessment, the table below summarizes conclusions for the mine site related to the need for risk management.

Summary of Updated Human Health Risk Assessment Conclusions for the Sä Dena Hes Mine Site

Area	Direct contact with residual contaminated soil	Consumption of plants and small animals[1]	Consumption of large animals[2]	Consumption of surface water or groundwater as drinking water[3]
Jewelbox & Main Zone Waste Rock	✗	✗	✓	□
1380 Gully	✗	✗	✓	□
1250 Portal & Waste Rock	✗	✓	✓	□
Burnick Portal & Waste Rock	✗	✓	✓	□
1300 Portal & Waste Rock	✗	✓	✓	□
Mill Site	✗	?	✓	□
Boneyard	✓	✓	✓	□
North Tailings Pond	✓	?	✓	□
North of North Tailings Pond Dam	✓	✗	✓	□
West of North Tailings Pond	✗	✓	✓	□
South Tailings Pond	✓	?	✓	□
Reclaim Pond	✓	?	✓	□
West of Reclaim Pond	✓	✓	✓	□

✗ Human health risks in excess of those allowed under the YT CSR - risk management measures required
? Potential human health risks in excess of those allowed under the YT CSR - risk management measures may be required, depending on future conditions
□ Potential human health risks for water consumption may be in excess of those allowed under the YT CSR - risk management measures may be required, depending on water use and future conditions
✓ Human health risks within those allowed under the YT CSR - risk management measures not required

[1] Plants includes mushrooms and berries; small animals includes marmots (LFN refer to as gophers) and ground squirrels
[2] For example, moose, deer, lynx, etc.
[3] Occasional consumption of small quantities of water, such as filling a water bottle from a creek, are not expected to present a health risks from exposure to metals, but consumption of untreated surface water may present a risk to health from exposure to naturally-occuring microbial pathogens, such as *Giardia lamblia* (i.e., the protozoa responsible for "beaver fever").

3.6.5.3. Ecological Risk Assessment

Contaminants of potential concern for the TERA included antimony, arsenic, cadmium, copper, lead, molybdenum, nickel, selenium, silver, vanadium, and zinc. Hydrocarbon contamination is present in deeper soils in some areas (any area with hydrocarbon contamination at surface contamination has been covered with a 60 cm soil cover), but is not in contact with plants and animals, nor has it impacted groundwater (will be tracked over time through monitoring).

The TERA for the Sä Dena Hes Mine evaluated the risks to ecological receptors inhabiting terrestrial ecosystems from exposure to metal-contaminated soils, water and other media (i.e., food sources such as plants, invertebrates and small mammal prey that may have accumulated higher levels of metals from areas with contaminated soil). Ecological receptors included in the

TERA were microbial communities, terrestrial plant communities, terrestrial invertebrate communities, 17 bird species (e.g., Wilson's warbler, American kestrel and boreal chickadee) and 16 mammal species (e.g., common shrew, hoary marmot, and moose). The selection process targeted birds and mammals that are both common and rare or endangered ("listed") and species with different foraging strategies.

The AERA evaluated potential risks to aquatic plants, benthic invertebrates, fish and amphibians from exposure to metals. Receiving environments included Camp Creek (drains the Jewelbox/Main Zone area and former Tailings Management Facilities and flows into False Canyon Creek), False Canyon Creek, and Burnick/Tributary E (which drains the Burnick area). A number of lines of evidence were used for aquatic receptors including: water and sediment chemistry (reference vs exposure sites; sites along spatial gradients), field surveys for receptor groups, fish tissue chemistry, and water toxicity testing (including specialized testing to determine toxicity under site-specific conditions). These lines of evidence were augmented by observations and information about aquatic habitats. Amphibians were evaluated using separate lines of evidence, as their habitats are both aquatic and terrestrially-oriented.

Both the TERA and AERA provided a risk and uncertainty rating under post-reclamation conditions for each ecological receptor group and AEC or aquatic receiving environment, respectively. The post-reclamation scenario assumed site conditions and habitats 25 years after mine closure for the TERA (e.g., Tailings Management Facility and Mill are covered and reclaimed, Burnick is recontoured and reclaimed, Jewelbox/Main Zone is recountoured with a partial cover and reclaimed). For the AERA, the 20-year water quality monitoring data set showed that water chemistry is fairly consistent over time, so it was used to represent future conditions.

The ERAs used a weight of evidence approach ("WOE"), where lines of evidence ("LOEs"; i.e., analytical tools and information) were collectively assessed to reach risk conclusions. Generalized effect-size ratings for LOEs are shown in the table below.

Effect-size Rating for Various LOEs	Description
Negligible	Concentrations are below standards or no effects are observed/predicted
Low	Concentrations are 1-3 times above standards or low-level (e.g., 10-20%) sublethal effects are observed/predicted
Moderate	Concentrations are 3-10 times above standards or moderate-level (e.g., 20-50%) sublethal effects are observed/predicted
High	Concentrations are more than 10 times above standards or high-level sublethal (>50%) or lethal (>20%) effects are observed/predicted

LOEs were then integrated to determine a WOE risk conclusion for each receptor group. Risks were also categorized as “negligible”, “low”, “moderate” or “high”, based on the effect size ratings for individual LOEs (above), causal linkage between contaminants and effects, and the weighting assigned to various LOEs. Uncertainty in risk conclusions were rated as low, moderate or high and considered several factors including sensitivity of the method to detect effects, confounding variables such as habitat, level of resolution of the tool, data quality, spatial and temporal representativeness of the data, natural variability and uncertainty in mathematical models.

Terrestrial Ecological Risk Assessment Findings for Post-Closure Conditions

Overall, risks to mammals and birds with large home ranges and/or plant-based diets are generally considered negligible or low. Reclamation/remediation actions such as applying soil covers (e.g., at the Tailings and Reclaim Ponds [AEC 8] and Mill Site [AEC 3]) reduced risk ratings for many receptors under post-closure conditions. When risks were predicted for birds and mammals under post-closure conditions (described below), they tended to be driven by incidental ingestion of soil, as well as ingestion of ground invertebrates and small mammal prey (but not vegetation).

Microbial communities, plant and invertebrates:

- Risks are considered negligible or low in all AECs (uncertainty ratings varied by receptor group and AEC).

Birds and mammals:

- Potential risks at the Mill Site (AEC 3) are considered negligible or low, with low uncertainty.
- Potential risks at the Tailings and Reclaim Ponds (AEC 8) are considered negligible or low, with low or moderate uncertainty, depending on the receptor.
- After regrading in 2014, zinc concentrations remain elevated in soils (and invertebrate tissues) in the Burnick/1300 Portal area (AEC 2), resulting in potential

risks to individual birds and mammals. At intake doses of zinc estimated using a food chain model, potential effects to individual organisms, based on the literature, included high levels of mortality and reduced growth and reproduction. However, the small area of Burnick (3.35 ha), makes it unlikely to provide enough food or habitat to support populations of common birds or mammals, or many individual listed birds. Two listed bird species (i.e., yellow-bellied flycatcher and white throated sparrow) are likely to have 1 to 3 individuals exposed to contamination at Burnick. Because listed species are given a higher level of protection (i.e., protecting individual birds), risks are rated as high with high uncertainty for these two bird species. Risks to all other listed birds and common birds and mammals at Burnick are considered low with low uncertainty due to limited occurrence/abundance in that specific area.

- Based on characterization of 2014 conditions at Jewelbox/Main Zone (AEC 1/9) (i.e., after regrading but before the cover was added (see next bullet)), lead and zinc concentrations are very elevated in soils and tissues, resulting in potentially elevated risks to birds and mammals. At intake doses of lead and zinc estimated using a food chain model, potential effects to individual organisms, based on the literature, included high levels of mortality and reduced growth and reproduction. Potential risks to two common species (Arctic ground squirrel and common nighthawk) that may occur in the Jewelbox/Main Zone area were considered to be high with high uncertainty; about half of the individuals that are expected to be present on the overall mine site, based on habitat, could be affected. Potential risks to six listed bird species (yellow-bellied flycatcher, American kestrel, white-throated sparrow, American redstart, Townsend's warbler, and golden-crowned kinglet) were considered high with high uncertainty, based on 1 to 10 individuals of each species potentially exposed and affected by contamination in this AEC. Potential risks were considered low with low uncertainty for all other common and listed bird and mammal species, due to limited occurrence/abundance in the area.
- The TERA evaluated the benefits of additional remediation in the Jewelbox Hill/Main Zone AEC (application of a soil cover on the re-contoured bench); overall, a soil cover is expected to reduce dietary exposure and incidental soil ingestion for individual birds and mammals, and reduce the number of organisms exposed, given a smaller contamination footprint. However, residual areas of contamination and potential risks to some birds and mammals will remain and are uncertain.

Aquatic Ecological Risk Assessment Findings for Post-Closure Conditions

Unlike the TERA, which was a significant driver for closure planning due to soil contamination, the AERA had a lower profile role. Yukon's water license process was the main driver for decisions about post-closure water quality monitoring. In addition, although the long-term water quality dataset for the vicinity of the mine indicated exposure to metal concentrations exceeding standards in a pattern that suggests it is mine-related, the exceedances were typically minor, often related to turbidity, and often intermittent. The Company undertook the AERA for due

diligence purposes by building on years of water quality data and pre-existing aquatic environmental effects studies. Augmented with some 2014 on-site data, this information was used to describe aquatic risks. If high risks with reliable certainty had been identified, options for managing those risks would have been considered.

Based on the AERA, risks to aquatic receptors ranged from negligible to moderate, with low to high uncertainty. When risks were identified for aquatic receptors, as described below, their cause was often uncertain (i.e., could not differentiate between influences of habitat vs contamination) or the dataset was not robust (e.g., small sample sizes or spatial coverage). This was anticipated and consistent with the secondary role of the aquatic risk assessment.

Aquatic plants

- Potential risks to aquatic plants (e.g., periphyton, as habitat characteristics do not favour macrophytes) are generally considered negligible (False Canyon Creek) to moderate (Camp Creek), with a moderate degree of uncertainty. Where risks were considered moderate, zinc concentrations at near-field locations in Camp Creek were within the range reported for effects to the algae laboratory test species. However, based on the diversity and abundance of secondary consumers (i.e., benthic invertebrates), there appears to be a functional primary producer community capable of supporting a diverse assemblage of benthic invertebrates.
- Because the proposed post-reclamation monitoring program will be tracking water and sediment chemistry in Camp Creek and biological monitoring (benthic and fish survey programs) will be ongoing in downstream systems, no further risk assessment work for aquatic plants is recommended at this time.

Benthic invertebrate community

- The benthic invertebrate community in Camp Creek appears healthy based on the presence of several sensitive taxa, primarily mayflies, stoneflies, and caddisflies. However, the total abundance varied among some stations, with the lowest abundance occurring in Camp Creek immediately downstream of the former Reclaim Dam. But at that location, the proportion of sensitive taxa was similar to reference locations and upstream locations in Camp Creek. The cause of the lower abundance, but similar richness among stations, is unlikely related to contamination because effects due to metals would first manifest in the loss of sensitive taxa. Toxicity testing did find effects to cladocerans (not a benthic species, but a common freshwater test organism) at concentrations similar to those measured in Camp Creek but, for reasons detailed in the AERA, this line of evidence was not weighted as heavily as the field-collected benthic data.
- Negligible effects to the benthic invertebrate community were observed in False Canyon Creek, with low uncertainty.

- Moderate effects to the benthic invertebrate community, with moderate uncertainty, were observed in Tributary E based on a limited program, but those effects are unlikely to be contaminant-related as metals in sediment and water are below standards and/or reference locations.
- In summary, the effects to benthos in Camp Creek, which has the highest exposure to metals, were found to be negligible to low with moderate uncertainty. A number of factors contributed to uncertainty including the lack of time series data, differences in the season for sampling, sample locations, and the fact that the Reclaim Pond was being dewatered at the same time the Camp Creek benthic work was being conducted. No further risk assessment work for benthos is recommended at this time, beyond the post-reclamation monitoring that is already planned.

Fish community

- Years of fish monitoring has been conducted in waters downgradient of the mine site and there is good evidence to suggest that habitat drives fish distributions. Fish are naturally not present in the upstream/headwater reaches of the near-field Camp Creek receiving environment. The most prevalent fish species within the study area is slimy sculpin, and their distribution reaches upstream from False Canyon Creek to within about 10 km downstream of the site (in beaver pond habitat). Arctic grayling are only present at the furthest downstream locations sampled in False Canyon Creek (from about 33 km downstream of the Site), presumably moving up from Frances River. Upstream migration of other species in False Canyon Creek is prevented by many barriers including active beaver dams.

- A number of lines of evidence were used to evaluate risks to fish in Lower Camp Creek, False Canyon Creek and Tributary E including: water and sediment chemistry (for exposure), fish tissue, toxicity testing, and fish surveys. Risks to fish were found to be low with moderate uncertainty in all receiving waters, including Camp Creek, False Canyon Creek and Tributary E. Specifically for Camp Creek/False Canyon Creek, while 2014 data show higher concentrations of lead and some other metals in fish tissues closer to the site, relative to a far-field location, overall risks to fish are not considered elevated. No further risk assessment work for fish is recommended at this time, beyond the post-reclamation monitoring that is already planned.

Amphibians

- An amphibian survey was conducted on-site, targeting terrestrial areas at lower elevations near aquatic habitats. However, no amphibians were observed likely due to low abundance and/or survey timing; however, they are expected to be present on-Site. Based on lead concentrations in soil, some terrestrial areas of the site may pose elevated risks to amphibians (rated as high with high uncertainty). However, the areas identified were the same as those driving potential risks to birds and mammals, and, therefore, areas recommended for risk management for amphibians are consistent with those identified in the TERA for birds and mammals.

- No further risk assessment work for amphibians is recommended at this time. Water and sediment quality post-reclamation monitoring is already planned and will be used for screening purposes.

From the perspective of managing aquatic resources, the Company will be undertaking a post-reclamation monitoring and adaptive management program (AMP) under a new Water Licence in 2016 that will monitor post-reclamation surface water, sediment quality and groundwater quality. Thresholds triggering responses are linked to trend analysis and comparison with licenced water quality limits. This can provide information to allow the development of appropriate responses which are based on a 'weight of evidence' and not solely a limited number of data points. Responses to such triggers could also include expansion of the aquatic resource monitoring network, adjustments to the frequency or intensity of monitoring efforts, or both. In summary, risk management for aquatic receptors is being delivered through the water license and AMP.

3.7 LAND RECLAMATION & REVEGETATION

The primary objectives of the land reclamation and revegetation activities at the Sä Dena Hes minesite are to provide short and long term erosion control, to ensure a final land use compatible with the surrounding lands, and to leave the area as a self-sustaining ecosystem.

Thus the overall goal is to conduct Ecological Restoration of the complete site. Ecological Restoration is the process of assisting the recovery of an ecosystem that has been altered. The intent is to initiate and accelerate the recovery of this boreal environment with respect to all the components of its general ecosystem: species composition (flora and fauna) and functionality (productivity, energy flow and nutrient cycling). The revegetation program will include establishing an early seral plant community that will meet short term objectives of controlling erosion and initiate the re-establishment of ecological function. The initial plant community will allow the establishment of additional native plant species over time and will result in the development of a plant community with similar ecological function as to what existed prior to disturbance.

This section describes the current areas slated for reclamation, and the closure issues and measures proposed. Previous reclamation activities that have occurred on the property are observed as part of annual site inspections by the Company's personnel. The extent of natural

revegetation on previously disturbed areas is also observed. These observations have been instrumental in developing the final overall reclamation and revegetation strategy for the site. Reclamation options for various types of disturbed lands were developed and are discussed below. Figure 3-11 provides a summary of the reclamation and revegetation plan for the Sä Dena Hes property.

Previous Revegetation Initiatives

The only intentional revegetation to date occurred in 1992 when the disturbed land around the freshwater pump house and its access route was revegetated by the former mine owners. It is understood that the area was cleared of debris, de-compacted and seeded with a fertilizer mixture (R. Flanigan, pers. com.); however, no records are available on this reclamation work.

The site was inspected in July 1999 and it was observed that a robust growth of graminoids and legumes covered the area. The most prevalent graminoids here now are creeping red fescue (*Festuca rubra*), reed fescue (*Festuca arundinaceae*), polar grass (*Agrostis latifolia*), small-flowered wood-rush (*Luzula parviflora*) and sedges (*Carex* spp). Legumes include alsike clover (*Trifolium hybridum*). Other colonizing plant species in this area are little-tree willow (*Salix arbusculoides*) and annual hawk's-beard (*Crepis tectorum*).

Natural Revegetation

Natural revegetation of numerous sites at Sä Dena Hes has been occurring since the mine closed and includes disturbed lands adjacent to the tailings management facility; old borrow sources, exploration trails, mine roads and along the main access road. Natural revegetation of a site is the preferred method since the local seed sources and rhizomes are from plants already adapted to the various characteristics of that site. This will be encouraged at Sä Dena Hes wherever possible.

The SDH footprint lies within the Liard Basin ecoregion. This ecoregion is characterized by low hills surrounded by mountains with a white spruce (Picea glauca) dominated boreal forest, and subalpine fir (Abies lasiocarpa) in the subalpine regions. Wetlands are common particularly in the lowlands and stream margins. The moderate precipitation (400 mm to 600 mm annually)

coupled with relatively long and warm summers results in vigorous vegetation growth (Smith et al, 2006).

Although a recent extensive survey has not been conducted to document the complete extent of natural revegetation, the following observations have been noted:

- The primary colonizing plant species now found around the minesite are willows, alder, various poplar species and graminoids. The most prevalent willows are little-tree willow (*Salix arbusculoides*), Alaska willow (*Salix alaxensis*), blue-green willow (*Salix glauca*), diamond-leaf willow (*Salix planifolia*) and Barclay's willow (*Salix barclayi*). Arctic willow (*Salix arctica*) occurs above treeline in the Jewelbox adit area. The colonizing graminoid species in the mine area include small-flowered wood-rush (*Luzula parviflora*), spike tristeum (*Tristeum spicatum*), and blue grass (*Poa* spp.). Other herbaceous pioneering species include annual hawk's-beard (*Crepis tectorum*) and arrowleaf senecio (*Senecio triangularis*). Alfalfa (*Medicago savita*), orchard grass (*Dactylis glomerata*), timothy (*Phleum pratense*) and smooth brome (*Bromus inermis*) also occur and have presumably been introduced.

- The extent of recolonization at each location is dependent on local conditions, including soil conditions (type, moisture content and compaction) and aspect. Generally, revegetation is occurring more extensively next to areas that have not been disturbed in recent years. Most of the exploration trails are in the process of becoming completely recolonized with native species. There is also significant evidence of native shrub recolonization of all disturbed areas in particular access roads and corridors as well as increasing invasion occurring throughout the Tailings pond area.

Mill/Camp Area

N

Teck

Sa Dena Hes
Proposed
Revegetation Treatments

Legend

- Seeded - Native
- Planted-1500/ha, & Seeded
- Planted-2500/ha
- No Treatment
- Recontoured
- Capped
- Decompact/Scarify
- Roads
- No Treatment

Scale = 1:11,000
500 Meters

Figure 3-11

Revegetation Options

The establishment of an initial ground cover of graminoids has historically been viewed as a desirable initial objective on most disturbed areas to stabilize slopes and control soil erosion and the subsequent loss of important soil fines. Reclamation and revegetation efforts on site will ensure that this objective is achieved; however, the re-establishment of near natural vegetative communities and native species is the primary objective. Based on recent reclamation research and on site observations, it is apparent that there is an abundance of natural seed and reproductive plant material sources available from local undisturbed ground and that these naturally occurring sources will be a significant component of the reclamation program.

The natural vegetation found on undisturbed sites around the mine generally indicates the underlying soil properties, including texture, drainage, pH, and the level of available nutrients. Revegetation prescriptions are being formulated for the Sä Dena Hes minesite using knowledge of the naturally occurring vegetation and soil conditions and end land use criteria. Additional soil sampling on disturbed sites is being carried out in order to determine areas of localized nutrient deficiencies or mineral anomalies.

Evidence indicates that revegetation by the seeding of sod-forming grass species will inhibit the invasion of the area's natural colonizing species by competing for space, light, nutrients, sunlight and moisture (Craig, et al., 1998.). Seed mixtures will be designed for site specific areas based on the results of research, local conditions and prescription requirements.

The nutrient uptake by northern native seed varieties on nutrient deficient soil is usually more effective than nutrient uptake by agronomic species. Native species will form the majority of plant species utilized in the revegetation program while recognizing that there may be some use of agronomics in site specific applications, in particular any areas identified as having a high erosion potential near water courses.

Currently there is periodic use by wildlife, mainly moose throughout the mine site. As part of the ongoing vegetation test plot program, the Company continues to test various plant species for metals uptake to assess if there are any potential concerns of ingestion of the plants by grazing and/or browsing animals.

In order to establish a successful revegetation program, the Company will conduct the following:

a) Locate available soil/till materials around the site - Soil was stripped from the tailings pond area as part of the initial site preparation process. Unfortunately there are no records existing as to the location of this material; however suspected locations will be investigated. The current Plan is to utilize till material from the deconstruction of the two dams as capping material wherever required on the site. This material was initially stripped from onsite borrow pits which are currently being invaded by native shrubs and trees. This indicates that the till material is suitable for revegetation plans. Plans are to place a minimum 500 mm soil/till cover over the tailings facility and other areas identified by the surveys as having elevated metals content to improve the growing conditions.

b) The nutrients in the available soils - Initial testing indicates nutrient deficiencies in the surrounding soils. Fertilizer formulations utilized in the reclamation program will be based on soils sample analysis. The use of nitrogen fixing species i.e. Alder, native trees and native grasses that have lower nutrient requirements than agronomic species will help ensure long term success.

c) Seeding blends - While it is known what seed mixes have been used at the site previously and what species of plants have been naturally revegetating the site, further assessments will confirm the appropriate seed blends. The intent is to utilize appropriate native species throughout the reclamation program at the site; however there may be situations where agronomic species may be more suitable. Unfortunately native species often take several years to become fully established and in highly erodible situations they may not be the ideal choice, particularly if sediment control is an issue. In these cases various options will be evaluated including the use of nurse crops (i.e., Fall Rye) and the use of nonaggressive agronomics that would eventually permit the ingress of natives.

d) Metals uptake by plants - Different plant varieties and species, tailings characteristics, cover designs and other environmental conditions are all factors influencing uptake of metals by plants. Metal analysis of both twigs and leaves was carried out in 2011 and again in 2012. Samples were taken from plantings and native invaders on tailings, on capped till and also from undisturbed areas adjacent to the tailings ponds. Results to date indicate that uptake of metals in alder is much lower than in willow. As would be expected, metal uptake was greater in plants growing directly on the tailings as opposed to the plants growing on the capped portion of the tailings. Capping of all areas covered by tailings will reduce metals

uptake by vegetation and the selection of a higher component of alder will help reduce browsing impacts.

Revegetation research plots were established on a number of sites in 2001 and assessments were carried out annually terminating in the 2007 season. Each summary report has been included in the annual production reports submitted to regulators. Because there was minimal change occurring in the plots between years, the decision was made in 2008 to step out the assessment period from annual to every 5 years. This will allow for a better assessment of changes. Information gleaned from the annual assessments to date will aid in the final selection of appropriate seed mixes for the different areas.

Soil testing of the plots confirms that the soils of this region are generally near neutral (pH ranging from 6.2 to 7.9) and are low in all nutrients.

In the larger, more open disturbed areas at the mine site (tailings ponds, borrow areas, mill and camp site area), where natural seed sources are less available, the seeding/planting of indigenous shrub and tree species (primarily willows, alder, poplar and white spruce) is also proposed to encourage the later seral stages of plant succession on these sites.

3.7.1. *Linear Disturbance - Roads and Trails*

3.7.1.1. Exploration Trails

The exploration trails outside of the immediate mine site have not actively been used for several decades. These trails are in the process of being invaded by native species and will not require further treatments. Additional stabilization may be required in a few locations to correct identified erosion concerns. These exploration trails include approximately 6.0 ha of boreal and 1.5 ha of alpine area (see Table 3-3).

Table 3-3 Summary of Spatial Disturbance for Sä Dena Hes Property

Component		Approach	Approximate Area of Disturbance (ha.)
Exploration Trails	Boreal	Natural Revegetation	6.0
	Alpine	Natural Revegetation	1.5
Main Access Road (including pullouts and borrows)		Decompact, recontour, pull culverts, active revegetation	65.0
Site Mine Roads		Decompact, recontour, pull culverts, active revegetation	20.7
Non-Linear Disturbances	Tailings Management Facility	Till Cover, Scarify and Revegetate	14.2
	Reclaim Pond	Till Cover and Revegetate	5.8
	Borrow Pits & Refuse Areas	Scarify and Revegetate	13.7
	Mill & Camp	Recontour, Till Cover, and Revegetate	5.6
	Jewel Box Portal Area	Pull back crest of Dumps, Till Cover & Revegetate	8.2
	Burnick Portal Area	Pull back crest of Dumps, Decompact & Revegetate	1.8
		Total Area in Hectares:	**142.5**

3.7.1.2. Main Access Road

The 25 km main access road to the property was constructed in 1990. Figure 1-2 illustrates the overall routing for this road. This road was constructed to facilitate industrial traffic to and from the minesite. The road routing was over land where the mine owner held mineral titles but no surface lease. The road was constructed using cut and fill methods with a road width of 8 m and associated ditch drainage and culvert installations.

At this time, long term responsibility/liability for the road is not clear to the Company. The public has been regularly using this road since the early 1990's. If it is determined that the Company has responsibility or liability for the road, the following approach to managing the road is proposed. The plan would be to reclaim the road after it is no longer required for access to the site.

The road is 25 km long with six stream crossings and 57 culverts, some of which must be deiced prior to spring breakup each year to avoid being blocked during freshet. The Company will continue to use the road until it is established that the reclamation/revegetation program has been successful and that the physical structures at the site are stable. It is assume that this will be 7 to 10 years after completion of the reclamation work before there is sufficient confidence that the road is no longer required for the Company's purposes. Long term monitoring for dam stability (the North Dam will remain in perpetuity) and water sampling will be conducted via helicopter if the access road is removed. Discussions regarding the potential closure will occur with LFN prior to finalizing any plans to decommission it.

Closure measures related to road decommissioning include developing a final timeframe for road closure, stabilization of slopes and prevention of erosion, and stabilization of all stream crossings. Decommissioning of this road would include recontouring including safety berm removal, de-compaction, and removal of all stream culverts. All necessary permits required for working near a water course would be obtained from the appropriate Regulatory Agencies prior to commencement of this work. On steeper slopes, erosion control structures may be required to ensure stability until revegetation cover is established. As near to original drainage patterns as practical would be reestablished.

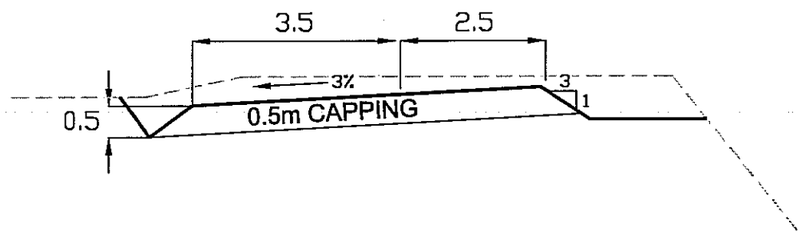
All culverts will be removed upon final closure of the road. Figure 3-13 shows the location of the culvert crossings along the access road. For culvert removal the road bed would be cut down to

the culvert invert and the original stream bed elevation with side slopes brought back original grades or to a minimum of 2:1. Till material removed during culvert removal would either be spread in the immediate vicinity or hauled to the nearest borrow area and spread. Of key importance is the removal of culverts at stream crossings which are fish bearing. The detailed final designs for each removal would be supplied with the appropriate approval application. However, the intention would be to restore the stream channel to the original grade, width and channel configuration so that historic flows are accommodated as they were prior to road construction. Stream banks would be stabilized and slopes revegetated. A typical section outlining closure measures at stream crossings appears in Figure 3-14.

The intent of the reclamation program would be to encourage natural succession to occur after first preparing the road surface by scarifying and decompacting the road surface. Decompaction is a fundamental step in preparing the site prior to any revegetation work as this allows aeration, water infiltration and root penetration. It also prepares the site for natural invasion by significantly increasing the number of micro sites for seed and moisture retention. Visual assessments of existing roads and trails in the area confirms that natural invasion by woody species is rapid even on areas that to date have not had any site preparation. For the purposes of long term budgeting, the DDRP assumes that the access road will be seeded.

TYPICAL SECTION
SINGLE LANE WITHOUT BERM

Sta. 0+000 to 2+413



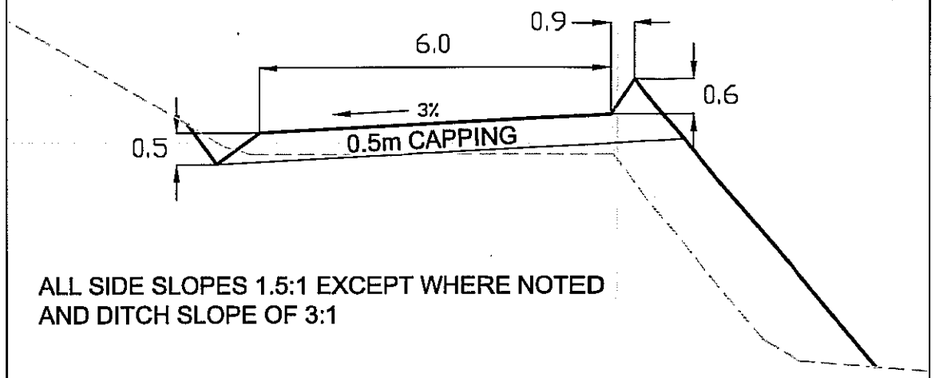
ALL SIDE SLOPES 1.5:1 EXCEPT WHERE NOTED
AND DITCH SLOPE OF 3:1

H= 1:200 V= 1:100

HAUL ROAD - TYPICAL

TYPICAL SECTION
SINGLE LANE WITH BERM

Sta. 0+000 to 1+400



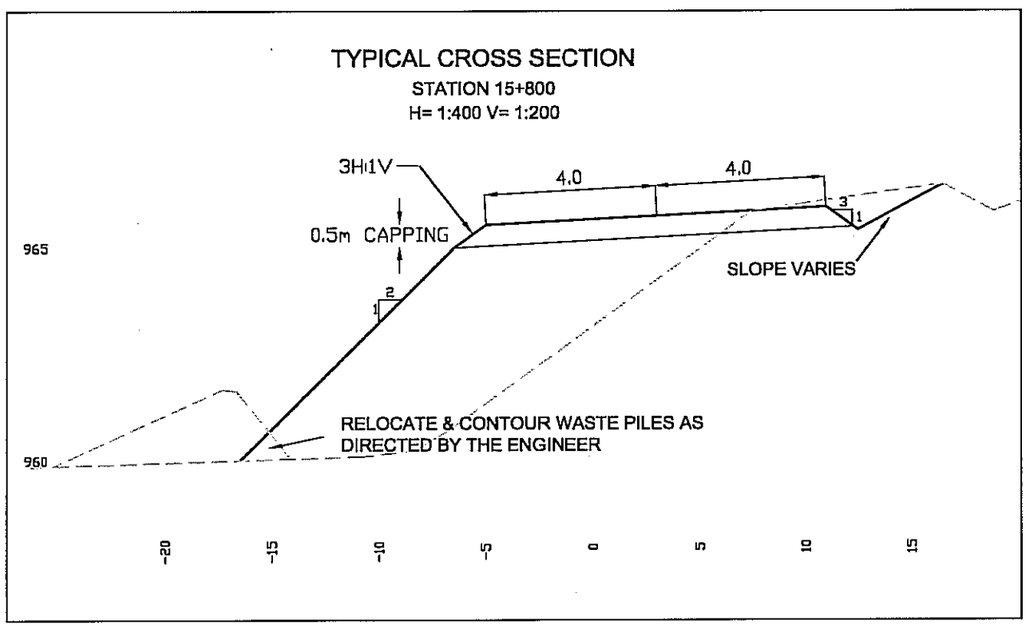
ALL SIDE SLOPES 1.5:1 EXCEPT WHERE NOTED
AND DITCH SLOPE OF 3:1

H= 1:200 V= 1:100

HAUL ROAD - TYPICAL

TYPICAL CROSS SECTION

STATION 15+800
H= 1:400 V= 1:200



ACCESS ROAD - TYPICAL

Teck

ACCESS CONSULTING GROUP

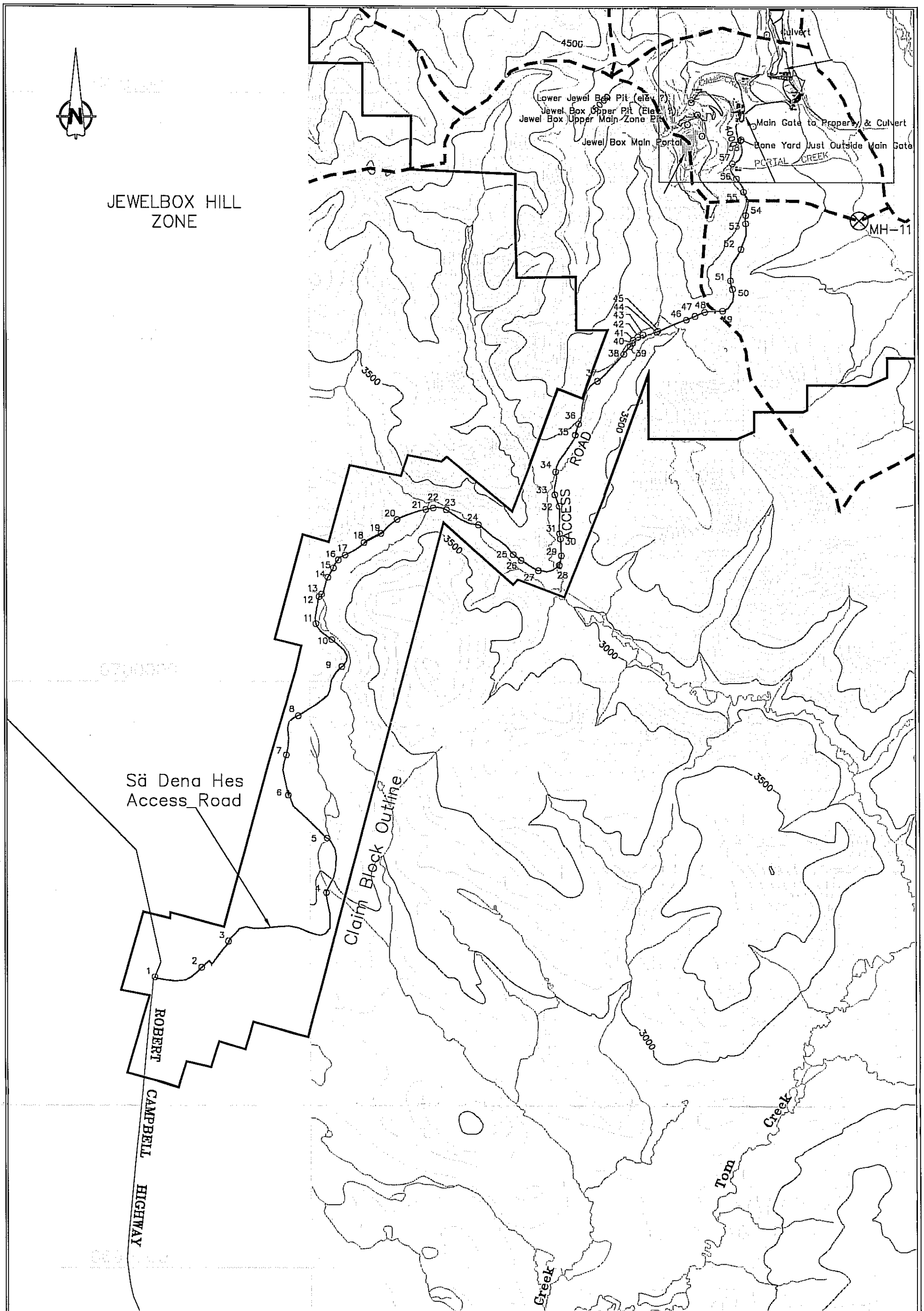
SRK Consulting
Engineers and Scientists

Sä Dena Hes Detailed
Decommissioning and Reclamation Plan

Typical Road Sections

DRAWN BY: ASH	CHECKED BY: RLM
DATE: MARCH 2013	

Fig No. 3-12



NTS: 105 A/06, 105 A/07
105 A/10, 105 A/11

CONTOUR INTERVAL 100 FEET

0 600 1200 1800 2400 3000

1: 60, 000

NOTE
BASE TOPOGRAPHY FROM NORTH AMERICAN DATUM 1983
ALL SURFACE FACILITIES AND BOUNDARIES HAVE BEEN ADJUSTED FROM NAD 1927

Teck

ACCESS CONSULTING GROUP

SRK Consulting
Engineers and Scientists

LEGEND

○ Culvert Location

Sä DENA HES DETAILED DECOMMISSIONING AND RECLAMATION PLAN

Access Road Culvert Locations

DRAWN BY:	CHECKED BY:	FIGURE NO.	REV.
MH	PMH	3-13	
DATE: MARCH 2013	PROJ. NO. 1CC005.05		

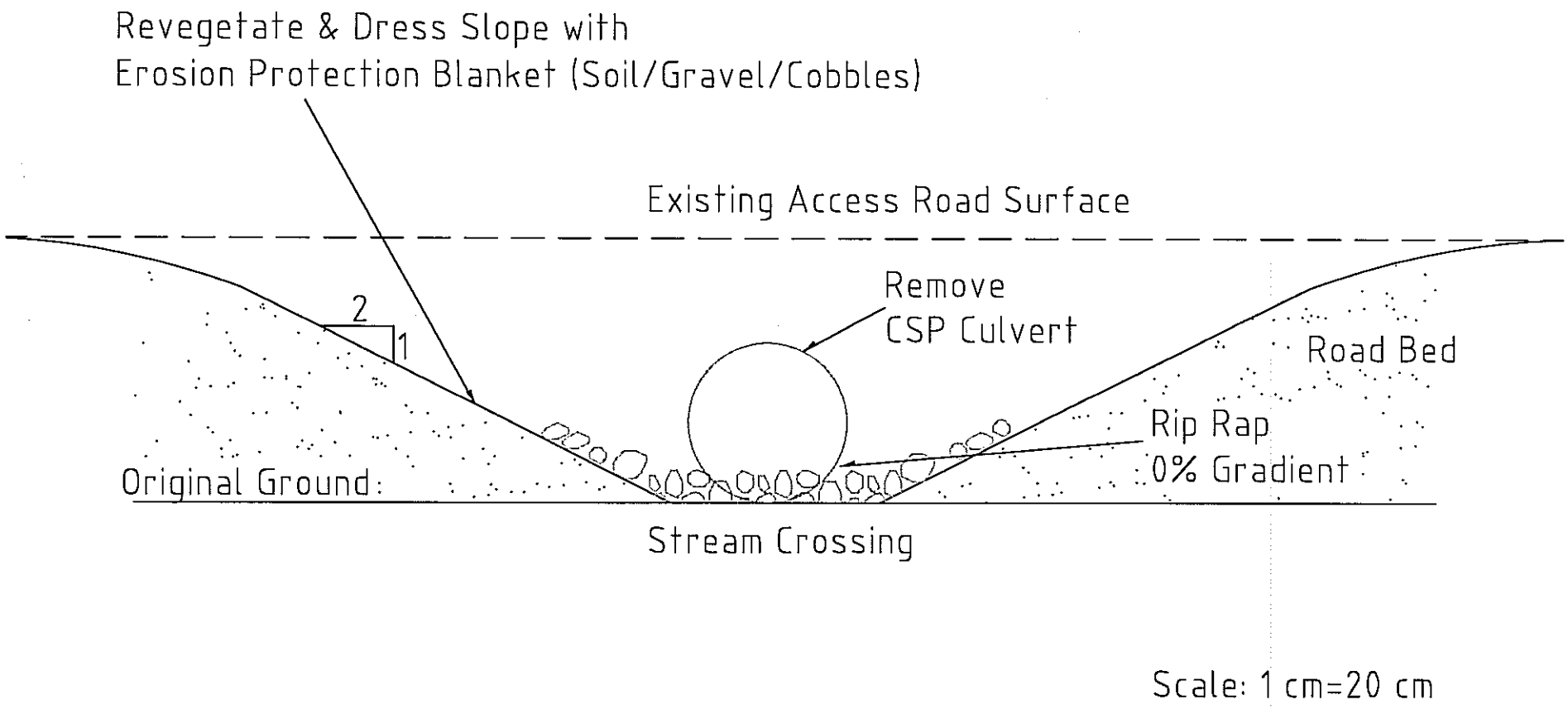
The road surface (approximately 65 hectares) would be revegetated with native graminoids and legumes at an application rate low enough not to hinder native shrub and tree invasion but still control erosion. Stream crossings would be treated appropriately so as not to allow sedimentation of the waterway. The seed mixes used for revegetating this road would include an approved native species. When deemed to be required to reduce erosion, non-native agronomic species, such as Fall rye, may also be seeded on the access road to act as a nurse crop for the native plants. Fall rye provides fast, vigorous growth and provides shelter for the developing native species and also adds much needed organic matter to the soil. The application rate of Fall Rye would be no greater than 25kg/ha.

A seed test plot was established at Km 22 of the access road in 2001. Violet wheatgrass was documented as the most successful seeded species over the six years of annual assessments. Spike trisetum was a volunteer grass species on the seeded and control plots as well as on the adjacent areas to the plots.

From the revegetation trials conducted throughout the site since 2001, a commercial fertilizer similar to 18-18-18 at rate of approximately 120 kg/ha may be applied during the initial seeding only. An increased rate tended to inhibit the growth of the native species which are adapted to nutrient poor soils. The final fertilizer formulation and application rate would be based on actual soil analysis data which would also indicate what important micro nutrients are required.

Seed rates would be relatively low to allow gradual encroachment of native forbs, shrubs, trees and grasses from the adjacent undisturbed lands. Currently white spruce, willows, poplar and alder are naturally re colonizing the right of way.

After completion of reclamation and the monitoring period, the access road would be blocked by installing large boulders near the highway entrance or other substantial means of preventing uninvited access. The entrance would be recontoured to make it less apparent from the Robert Campbell Highway. Shrubs, such as willows, aspens and poplars, would be planted near the entrance to further reduce the visibility of the entrance to the deactivated road.



Scale: 1 cm=20 cm

Teck

SRK Consulting
Engineers and Scientists

ACCESS
CONSULTING GROUP

Sä Dena Hes Detailed
Decommissioning and Reclamation Plan

Typical Access Road Culvert Removal

DRAWN BY: ASH	CHECKED BY: RLM	Fig No. 3-14
March 12 2013		

3.7.1.3. Service and Haul Roads within the Minesite

Once all the decommissioning work is completed, access to the mine site will be restricted by placing a locked gate at the mine entrance and signage will be used to discourage public use.

A network of service and haul roads exist on the property (Figure 3-1). These roads provided access to the mine workings, tailings management facilities, and site infrastructure. Figure 3-12 (Typical Section Haul Road) provides a typical section through a haul road, with and without safety berms.

Closure objectives for the site access roads include slope and drainage stabilization, erosion prevention and revegetation.

Figure 3-15 depicts the typical treatment of haul road and service road closure measures.

All of the service and haul roads within the minesite will be decommissioned as part of the DDRP, with the exception of one access road to the North Tailings Dam. All culverts and berms will be removed and the roadbeds will be recontoured to restore original drainage patterns and to provide stability and long term erosion control. On the steeper slopes, where required, erosion control structures will be utilized at suitable intervals to reduce erosion potential. These site access roads cover an area of approximately 20.7 ha (Table 3-4).

The road surfaces will be decompacted and revegetated. Based on current observations it is expected that natural invasion with local species will occur fairly rapidly. To assist in this process, seeding with a light application of native graminoids and legumes will occur. The seed mix for these areas will be as outlined in Table 3-5 which was derived from the Yukon re-vegetation manual and will be based on availability. Steeper areas susceptible to erosion will have increased application rates of sod forming species to offer control.

Table 3-4: Low elevation seed mix

Common Name	Scientific Name	Weight %	Composition %
Violet Wheatgrass	*Agropyron violaceum*	47	13
Northern Fescue	*Festuca altaica*	24	18
Glacier Alpine Bluegrass	*Poa alpina*	11	37
Sheep fescue	*Festuca ovina*	18	32

Higher Elevation Sites

Many of these service roads are located within the subalpine fir vegetation community. These areas, including subalpine sites such as the haul roads leading to the Jewelbox and Burnick, will use a site specific seed mix that accounts for the higher elevation. One of the test plots for the revegetation trials was set up on the haul road at Jewelbox Hill in 2001. Six years of assessment showed that annually, Alpine Bluegrass was the dominant species in these plots. Alpine Bluegrass, a native perennial bunchgrass, is a good colonizer but spreads by seeds rather than rhizomes and thus is not a very strong competitor. It prefers rocky soils and habitats and grows on dry slopes, and in alpine and subalpine environments. It tolerates low nutrients and drought.

Spike Trisetum has naturally colonized the control plot and has invaded the seeded plots at the Jewelbox site. It is a short perennial bunchgrass and a good colonizer with vigorous seedlings. It is tolerant to drought, low nutrients, permafrost and high elevations and is adapted to cold summers and short growing seasons. For all of the above reasons, Spike Trisetum will form part of the seed mix. Bear root and/or lupine, both of which were found voluntarily growing in the control plot will be the legume(s) within the mix.

Subalpine fir has invaded both the control and seeded plots. Due to the narrow nature of the disturbance to be reclaimed and the voluntary growth of Subalpine fir in and around the site, seedlings of this tree will not be part of the revegetation program at the higher elevation sites.

A potential seed mix is shown in the following table.

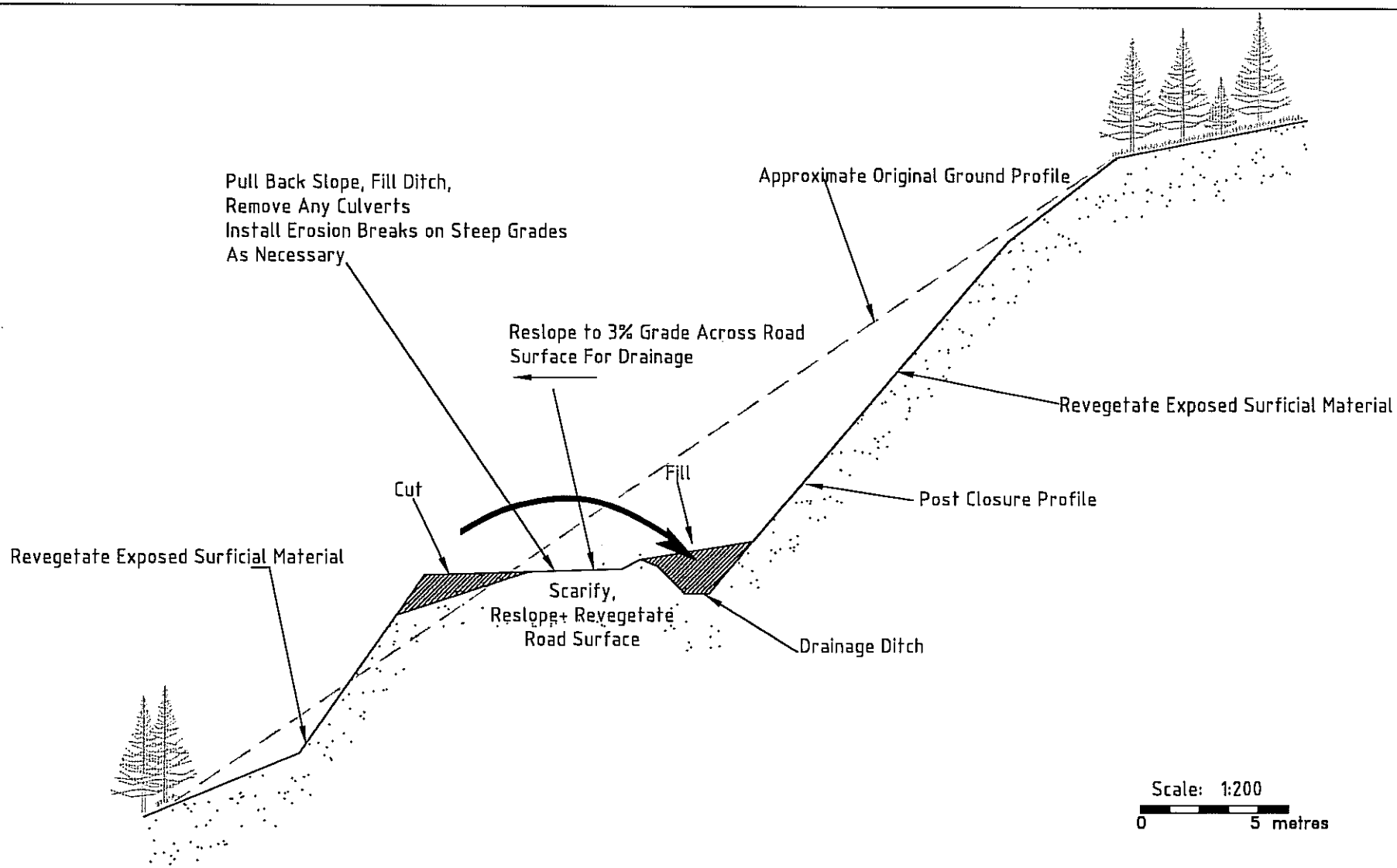
Common Name	**Scientific Name**	**Weight %**	**Composition %**
Violet Wheatgrass	*Agropyron violaceum*	45	12
Rocky Mountain Fescue	*Festuca saximontana Rydb.*	15	17
Chariot Hard Fescue	*Fesuca brebipila*	15	21
Tufted Hairgrass	*Deschampsia caespitosa*	14	14
Glacier Alpine Bluegrass	*Poa alpina*	10	23
Spike Trisetum	*Trisetum spicatum*	1	13

Due to the documentation of voluntary colonization of the linear disturbed areas, the seed rate will remain low (Approximately 25 kg/ha) to encourage and enable encroachment of native revegetation.

3.7.2. *Non-Linear Disturbances (Mill Site, Accommodations Camp, Tailings Management Facility, and Mine Workings)*

Non-linear disturbances include the areas around the mill and camp, tailings management facility, mine workings including open pits and waste rock dumps, and the refuse landfill site and borrow pit areas. They require special treatment in this revegetation plan because they are not as conducive to natural revegetation as are roads, etc., because of the increased distance from seed sources. The TMF and reclaim pond covers an area of approximately 20 ha, and the remaining non-linear disturbances include an area of approximately 29.3 ha (Table 3-4).

A complete description of the facilities associated with these non-linear disturbances is presented in previous sections. Closure objectives include slope and drainage stabilization, erosion control, and revegetation.



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Engineers and Scientists

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CONSULTING GROUP

Sand & Gravel

Existing Vegetation

Sä Dena Hes Detailed
Decommissioning and Reclamation Plan

Typical Haul Road Closure Cross-section

DRAWN BY: ASH	CHECKED BY: RLM	Fig 3-15
March 12 2013		

3.7.2.1. Mill Site and Accommodations Camp Area

Once all structures are removed these areas will be prepared by decompaction and recontouring where necessary. Foundations from the mill will be either removed above grade or when near steep ground slopes, filled to be able to contour into the surrounding ground features and covered with a minimum of 0.5 meters of till material. The metal contaminated soils adjacent to the mill site identified in the environmental site assessment (Golder Associates Ltd., 2015a) will be capped with a minimum of 0.2 m of soil material to eliminate ecological and human health risks. A low rate of seed application (similar seed mix as for the main access road) will be applied to increase the biodiversity plus provide a seed source to enhance the revegetation of the areas that are some distance from the seed sources in the adjacent undisturbed areas.

In addition, plugs of seedlings (shrubs and trees) will be planted to increase and enhance the rate of return to a natural forest ecosystem. Unlike the methodology to be used on the TMF (see section 3.7.2.2), the planting density will be lower (approximately 1500 stems/ha) as the intent is not to create a dense forest.

Species collected near a disturbance tend to be more biologically suited for revegetating the site than those collected far away. Seed collections for the growth of the seedlings will begin in the 2013 season from selected areas at SDH. Willow and Poplar seeds will be collected from the appropriate catkins in late May/early June, 2014. Seed cones from white spruce will be collected (if available) in August 2013. Seeds will also be collected from alder in late August to early September. All collected seed will be grown at a nursery in Langley, BC. The plugs will be shipped to SDH for spring planting in 2015. Each plug will be planted with 2 fertilizer biopacs to ensure they have sufficient nutrients to become established. Seedlings will be planted in a general random pattern to more accurately reflect natural growing conditions. The overall density will be approximately 1000 to 1500 stems/ha to provide initial growth of a diverse plant community as well as to allow for natural encroachment.

Willow will have the highest planting concentration followed by alder and white spruce and the following distribution is suggested for the 1500 stems/ha scenario:

Common Name	Scientific Name	Rate of Application
Willow/Poplar	*Salix & Populus sp.*	800 plants/ha
Alder	*Alnus crispa*	400 plants/ha

Alder is an aggressive colonizer at the SDH site and is a nitrogen fixer. To allow other plants to establish in these non-linear sites, the planting intensity will be reduced. By including white spruce, the restored site won't be completely dominated by deciduous plants (those that colonize more readily), but will support a community more like the adjacent forest, providing additional habitat for local wildlife species.

3.7.2.2. Tailings Management Facility

The tailings will be covered with a minimum 500 mm soil/till cover from the overburden originally stripped from the pond area and from the till materials generated from the decommissioning of the earthen dams. The Company's experience at its other operations indicates that a 200 mm soil cover is adequate for plant growth. However, based on experience gained at the former Sullivan Mine in Kimberley, B.C., it is felt that it would be more practical from a constructability perspective to place a 500 mm thick cover. The soil will eliminate tailings dusting and contaminant concerns and provide a suitable growth medium for revegetation. The current plan is to decommission both the South Dam and the Reclaim Dam in 2013 thus allowing the ponds to drain and lower the water table in the tails. Capping of the tailings will commence in 2014 followed by final revegetation of the tailings area commencing in 2015.

Starting in 2001 a number of test plots were established on the tailings managment area in order to determine the optimum soil treatments and seed mixtures. These test plots included applications of till material, fertilizers, as well as different seed mixes. A control plot with no treatment was used to measure the success of the test plots and to monitor any natural revegetation that occurs. Annual assessments of these plots were carried out until 2007 when it was decided that annual changes were so low that changes were insignificant.

In 2009 an alder planting trial was established on the tailings pond. This was initiated following observations that native alder and willow/popular species were volunteering throughout areas on and adjacent to the Tailings Pond. Seed from local plants was collected in the fall of 2008 and sent to a nursery for growing. A total of 1200 plants were planted on the pond in August of

2009. Planting sites varied from on approximately 300 mm of till material to directly on tailings right up to the water edge. Despite the late planting, following three full growing seasons, plant survival remains over 95%. An assessment in 2012 showed that all plants (on the capped areas) were healthy, showed no sign of stress and had significant growth. In 2011 and 2012, leaves and twigs were recovered from alder and willow growing on both the Tailings Facility as well as from undisturbed areas adjacent to the ponds and sent to the lab for metal uptake analysis.

Results to date indicate that uptake of metals in alder is much lower than in willow. As would be expected, metal uptake was greater in plants growing directly on the tailings as opposed to the plants growing on the capped portion of the tailings. During the first two seasons of growth there was little difference between the vigor of plants growing on till versus those growing directly on the tailings. However, observations conducted in 2012 showed that the plants growing on the till exhibit significantly increased vigor (plant height approximately 2 feet) and those growing directly on the tailings showed definite signs of stress. The following photos show the results of three years of growth.

Alder test plots – 2010

Alder test plots – 2011

Alder test plots – 2012

Following capping of the entire tailings management facility, the surface will be planted with alder and willow seedlings at the following rate:

Common Name	Scientific Name	Stocking Rate (#/ha)
Willow/Poplar	*Salix/Populus ssp*	500
Alder	*Alnus crispa*	2000

Alder grows prolifically in this region, is less palatable to moose than willows, and uptakes metals to a lesser degree than willow and poplar, making this shrub species an excellent revegetation candidate for the tailings area. Local seed will be collected in late summer/early

fall 2013 and sent to NATS nursery in Langley, BC for growing. The seeds will be germinated and the plugs of seedlings will be shipped to the site in readiness for planting during the spring of 2015.

The goal here is to produce a very thick cover of alder with a minor component of willow/poplar. Seedlings will be planted at a rate of 2500 stems/ha.

3.7.2.3. Reclaim Pond

After the reclaim pond has been drained and the original drainage channel of Camp Creek has been restored, the sediments will be characterized for metals content and if found to pose an unacceptable ecological risk they will covered with till and revegetated. The area required for cover and revegetation is approximately 5.8 ha. Analyses of soil samples taken from the south end of the overburden stock pile (the end closest to the reclaim pond) show that this overburden is deficient in available phosphorous (3.2 mg/kg phosphate) and available potassium (40 mg/kg potassium), but has marginally adequate available nitrogen (41 mg/kg nitrate) and available sulfur (150 mg/kg sulfate). The revegetation prescription used for the reclaim pond will be similar to that recommended for the TMF (see Section 3.7.2.2).

3.7.2.4. Pits and Waste Dumps

As pits and waste dumps are primarily in the alpine zones where there was little original vegetation. Where areas are resloped and/or capped, a low rate of seed application will be applied.

3.7.2.5. Sediment Ponds

There are four sediment ponds corresponding to the Jewelbox 1408, Main Zone Pit, Burnick 1200 Portal, and the Jewelbox 1250 Portal (see Figures 3-3 and 3-4). They are all approximately 4 m x 3 m, constructed of unlined locally available materials, except the Jewelbox 1408 portal sediment pond which is lined. They were used to provide retention time to mitigate suspended solids levels in the water draining from the mine workings. While confirmatory soil testing has not been conducted, it is expected that three of the sediment ponds (all but Jewelbox 1250, which saw virtually no production), may contain elevated metals levels. The metal contaminated soils will be either capped with a minimum 1m thick till cap or excavated deposited in the open ventilation shaft at Jewelbox mine workings, and the sites will be

regraded and revegetated. The Jewelbox 1250 sediment structure is very small and was constructed out of the natural stream channel. The water will be redirected back into the natural channel and the pond regarded and revegetated.

3.7.2.6. Landfill Sites and Borrow Pits

The site presently has one main landfill area and a number of smaller mining related disturbed sites. A number of borrow areas also exist on the property both related to mining activities and the access road construction. The location of these mine site disturbances is shown in Figure 3-11: Reclamation & Revegetation Plan.

Closure issues associated with these areas are similar with other disturbed lands discussed previously. All landfill, refuse and borrow pit areas will be graded to prevent ponding of water and permit positive drainage, decompacted (if required) and revegetated with a suitable seed and fertilizer mix such as those previously recommended. Capping of the landfill will comply with associated landfill permit requirements.

3.7.3. *Follow-up Monitoring*

Assessments of the revegetation program will be conducted in midsummer for a minimum of five years. As the final reclamation objective is to establish a self-sustaining ecosystem on the site, the main focus of the monitoring will be to ensure that the prescriptions applied to the disturbed sites on the mine are successful. Metals uptake by the new plant community will be assessed at the same time to determine any changes in the plant community.

During the assessments, assessments will be made on seedling survival, especially on the TMF. The previous success of alder growth on the capped tailings indicates that it is likely that there will be little need to make any adjustments in this area.

General observations will be made on the growth of the seeded species and those naturally invading throughout the site. Wildlife use will also be noted.

3.7.4. *Reclamation Schedule*

2013

- Continue assessment of metals uptake in plants on site
- Commence decommissioning of minor site roads no longer required
- Alder catkins will be collected for shipping to nursery for cleaning and sowing

2014

- Additional assessment of metals uptake in vegetation
- Spring seed collection for poplar and willow
- The NATS nursery will sow and grow the required seedlings.
- Site preparation and seeding of designated roads and borrow pits

2015

- Site preparation activities on the Tailings Management Area and Reclaim Pond prior to planting
- Seeding and planting of Mill/Camp site
- Site preparation and seeding of designated roads and trails that are no longer required

2016+

- Assessments of site reclamation activities to identify potential areas that require remedial work.

3.8 ADAPTIVE MANAGEMENT PLANNING

The closure measures in the previous sections have been developed and proposed based on the relevant current information collected at the site, and the best interpretations of these data with respect to the conditions on the site as the site reclamation work is scheduled to begin in 2013.

As most of the work proposed in this Plan is relatively straight forward, there are limited areas where changes to the approved Plan are likely. Adaptive management planning (AMP) is a recognized and effective way to ensure that changing conditions during closure are not subject to static reclamation initiatives, and that closure programs can be adapted to these conditions to achieve desired performance. The Company is committed to AMP in the context of closure of some of the higher risk features on the site. The Company sees the application of AMP for the following mine component/conditions:

- **Tailings Storage Facility**
  - The most likely difficulty in reclaiming the tailings facility area will be due to the low load bearing capacity of saturated tailings. This could result in a thicker layer of till or a till/rock combinations being required to be place on the tailings in order to support equipment placing the till cover on the tailings. An option may be to place the till cover in the winter months when the tailings surface is frozen. Due to significant snow cover and low temperatures adversely affecting working conditions, this would increase the costs and would only be used as a measure of last resort.
  - Uptake of some metals into the vegetative cover will occur. What is not currently certain are the long term concentrations of heavy metals in the vegetation. Periodic post-reclamation monitoring of metals concentrations (until determined they are stable) combined with wildlife habitat assessments will be undertaken to assure that no unacceptable risks occur to wildlife using the site. If the assessments indicate unacceptable risk levels, additional mitigative actions will be taken to mitigate the risks to acceptable levels.

- **1380 Portal Discharge**
  - The primary risk is that SRK's prediction that zinc loading discharging from the portal ultimately has an unacceptable effect on the water quality in Camp Creek. While this is

not being predicted, monitoring wells proposed to be installed in 2013 will provide a mechanism to forecast the potential for this. The additional assessment will assist in developing an adaptive management plan if any unacceptable conditions are expected in the future.

- **Contaminated Soils** –
  - The landfarming treatment process for treatment of hydrocarbon contamination is not effective for the removal of metal contamination, and the nature of the site and the confirmed geochemical signature of area surficial soils make it likely that some of the materials treated will have metal contamination that would designate it as special waste. This has been confirmed by recent testing of contaminated soils around the site. This material, once successfully treated for hydrocarbons, could be placed in the tailings facility and reclaimed in keeping with the implemented measures at that location, as similar metals are stored within this facility. This approach has been approved in principle by Environment Yukon at the site. Alternately, the materials could be deposited into the Jewelbox Mine workings. This adaptive management plan will refine these measures based on remediation success and discussion and agreement with the Environment Yukon. A less attractive option from a cost perspective is the complete removal of the hydrocarbon/metals contaminated material from the site and transported to an approved hazardous waste disposal site that will handle both the hydrocarbon and the metals. This would only be considered if the final quantities of metals/hydrocarbon contaminated soils is small due to the high transportation costs to the nearest suitable hazardous waste landfill site. The preferred option may be to evaluate the hydrocarbon contaminated areas under the ecological and human health risk assessment and determine what level of remediation is required to reduce any unacceptable risks, if any (e.g., cap the surface soils or monitor the groundwater quality). Leaving the soils in-situ could reduce the cost and movement of metal contaminated soils from one source area to another which may not completely reduce the risk of the existing conditions (i.e., metals contamination remains).

These and other adaptive management plans will be developed if and when the needs arise. Where adaptive management plans need to be implemented, they will be modelled on accepted AMP features, such as:

- performance monitoring programs, threshold levels for data from the monitoring programs and associated triggers for action items, and
- response actions for expanding or refining the monitoring initiatives, implementing extended closure measures, and/or
- conduct further studies to develop mitigation measures for conditions that are divergent from those expected.

4.0 IMPLEMENTATION SCHEDULE

With the implementation of Permanent Closure of the site starting in 2013, additional engineering and environmental assessments have been conducted in 2012 to facilitate the detailed project planning.

It is anticipated that three years will be required to substantially complete all significant aspects of the DDRP. Detailed planning and weather conditions may result in some adjustments of the conceptual implementation schedule presented in Table 4-2. At the time of preparing this DDRP, the project management team developing the detailed execution plans. The work would be conducted seasonally during the snow-free period (June to September). If detailed planning shows that some winter activities are economic they will be considered in order to shorten the schedule. During the first year of Permanent Closure (2013), site decommissioning works would be initiated.

It is our belief that the process and other facilities on site may have sufficient market value such that they can be salvaged rather than demolished. If the complete mill can be sold, ideally it would be removed in 2013. If not then complete removal will occur in 2014.

In 2013 the focus of work will be building removal (if sold) and major earthworks, such as dewatering the reclaim and tailings pond, decommissioning the Reclaim and South dams, channel construction, recontouring and portal closure works. A program of post closure monitoring and inspection will be carried out during the implementation of closure measures. While the details of the post reclamation monitoring program are discussed in Section 5.0, they will be subject to the terms of a new Water Licence that will replace the current one which expires on December 31, 2015.

Liard First Nation's environmental consultant has reviewed an earlier draft of this Plan and their comments have been considered in this updated Plan. Additionally through community meetings as well as engagement of our environmental consultants with community members and using LFN's community members in the field assessment work will all assist in ensuring that LFN's concerns are given full consideration in the reclamation work being planned and executed.

The general schedule for closure of the mine is summarized in Table 4-1. A more detailed schedule for closure measure implementation is presented in Table 4-2 in Gantt chart format.

The Gantt chart displays closure issues that follow directly with the discussion in the body of the text. The associated section numbers are shown where appropriate.

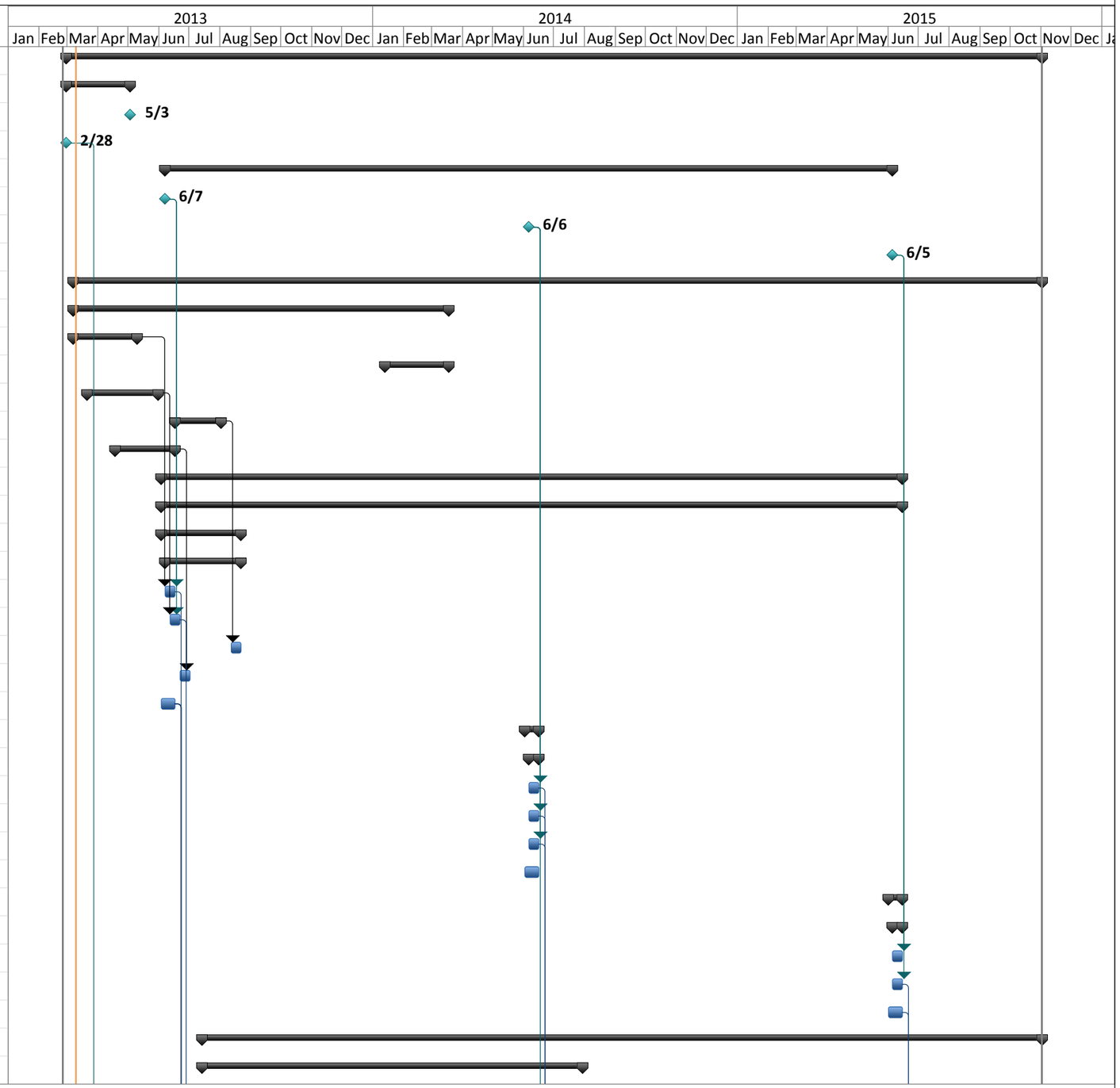
Table 4-1 General Closure Schedule for the Sä Dena Hes Mine

Phase of Operation	Key Triggering Event or Timeline	General Reclamation Activity
Current Conditions	Continued through ongoing care and maintenance	- Continued environmental monitoring programs - monitoring of vegetation test plots - site caretaker on site
Closure Implementation	3-year period is required to implement the various site closure measures. Work to be done seasonally (June-September)	Dismantling of site infrastructure and implementation of the tailings management facility closure measures will commence in year 1. Work will then begin on the reclamation of the open pits, waste rock storage areas and haul roads not required and that have not been previously reclaimed. Reclamation and revegetation of disturbed lands will occur throughout the 3-year period but primarily in year 3.
Main Access Road Closure	Main property access road will remain open during closure implementation and for a period following post reclamation. Decision to permanently close the main access road will be reconfirmed following consultation with regulatory agencies and Liard First Nation.	The current Plan is that the Main Access Road may be blocked, recontoured and sloped, decompacted, culverts removed and revegetated about 7 - 10 years after mine reclamation has been completed.
Post Reclamation Monitoring	Post closure environmental monitoring will continue during closure implementation. Once environmental monitoring results are reviewed and performance of reclamation objectives demonstrated a final certificate of closure will be sought.	Environmental monitoring and inspection frequency will reduce with time, assuming sampling results are satisfactory. Data review to determine that reclamation objectives have been achieved. Post reclamation monitoring will be done following expiry of the current Water Licence.

Table 4-2: Closure Measures Implementation Plan

SA DENA HES

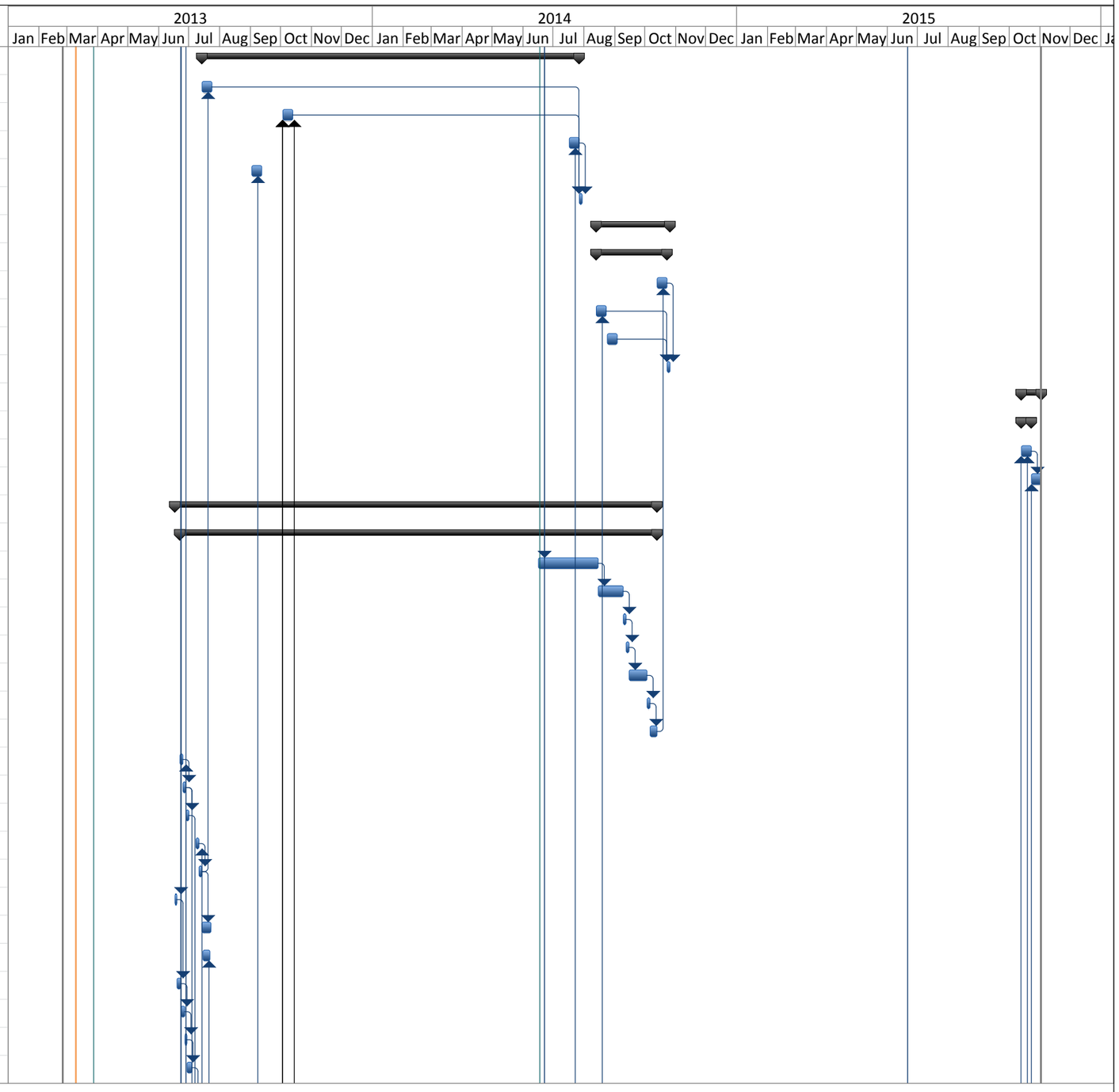
ID	Te	Task Name	Duration	Start	Finish
1		**Sa Dena Hes Min Closure**	**825 days**	**Feb 28 '13**	**Nov 1 '15**
2		**Permits & Approvals**	**46 days**	**Feb 28 '13**	**May 3 '13**
3		MER Approval	0 days	May 3 '13	May 3 '13
4		Notice of Award PM & CM Contract	0 days	Feb 28 '13	Feb 28 '13
5		**Road Bands**	**604 days**	**Jun 7 '13**	**Jun 5 '15**
6		2013	0 days	Jun 7 '13	Jun 7 '13
7		2014	0 days	Jun 6 '14	Jun 6 '14
8		2015	0 days	Jun 5 '15	Jun 5 '15
9		**PM Company**	**820 days**	**Mar 7 '13**	**Nov 1 '15**
10		**Construction Tender Documents**	**310 days**	**Mar 7 '13**	**Mar 17 '14**
11		**Demolition I**	**46 days**	**Mar 7 '13**	**May 9 '13**
18		**Demolition II**	**46 days**	**Jan 13 '14**	**Mar 17 '14**
25		**Earthworks I**	**51 days**	**Mar 21 '13**	**May 30 '13**
32		**Earthworks II**	**46 days**	**Jun 17 '13**	**Aug 1 '13**
39		**Earthworks III**	**46 days**	**Apr 18 '13**	**Jun 16 '13**
46		**Mobilization & Demobilization**	**618 days**	**Jun 3 '13**	**Jun 14 '15**
47		**Mobilization**	**618 days**	**Jun 3 '13**	**Jun 14 '15**
48		**2013**	**80 days**	**Jun 3 '13**	**Aug 21 '13**
49		**Contractors**	**76 days**	**Jun 7 '13**	**Aug 21 '13**
50		Demolition I	10 days	Jun 7 '13	Jun 16 '13
51		Earthworks I	10 days	Jun 12 '13	Jun 21 '13
52		Earthworks II	10 days	Aug 12 '13	Aug 21 '13
53		Earthworks III	10 days	Jun 22 '13	Jul 1 '13
54		PM/CM Team	14 days	Jun 3 '13	Jun 16 '13
55		**2014**	**14 days**	**Jun 2 '14**	**Jun 15 '14**
56		**Contractors**	**10 days**	**Jun 6 '14**	**Jun 15 '14**
57		Demolition II	10 days	Jun 6 '14	Jun 15 '14
58		Earthworks II	10 days	Jun 6 '14	Jun 15 '14
59		Earthworks III	10 days	Jun 6 '14	Jun 15 '14
60		PM/CM Team	14 days	Jun 2 '14	Jun 15 '14
61		**2015**	**14 days**	**Jun 1 '15**	**Jun 14 '15**
62		**Contractors**	**10 days**	**Jun 5 '15**	**Jun 14 '15**
63		Earthworks II	10 days	Jun 5 '15	Jun 14 '15
64		Earthworks III	10 days	Jun 5 '15	Jun 14 '15
65		PM/CM Team	14 days	Jun 1 '15	Jun 14 '15
66		**Demobilization**	**717 days**	**Jul 14 '13**	**Nov 1 '15**
67		**2013**	**319 days**	**Jul 14 '13**	**Jul 29 '14**



PM/CM | Demolition II | Earthworks II | Trees & Shrubs | Misc. Contracts
Demolition I | Earthworks I | Earthworks III | Specialty Contracts

SA DENA HES

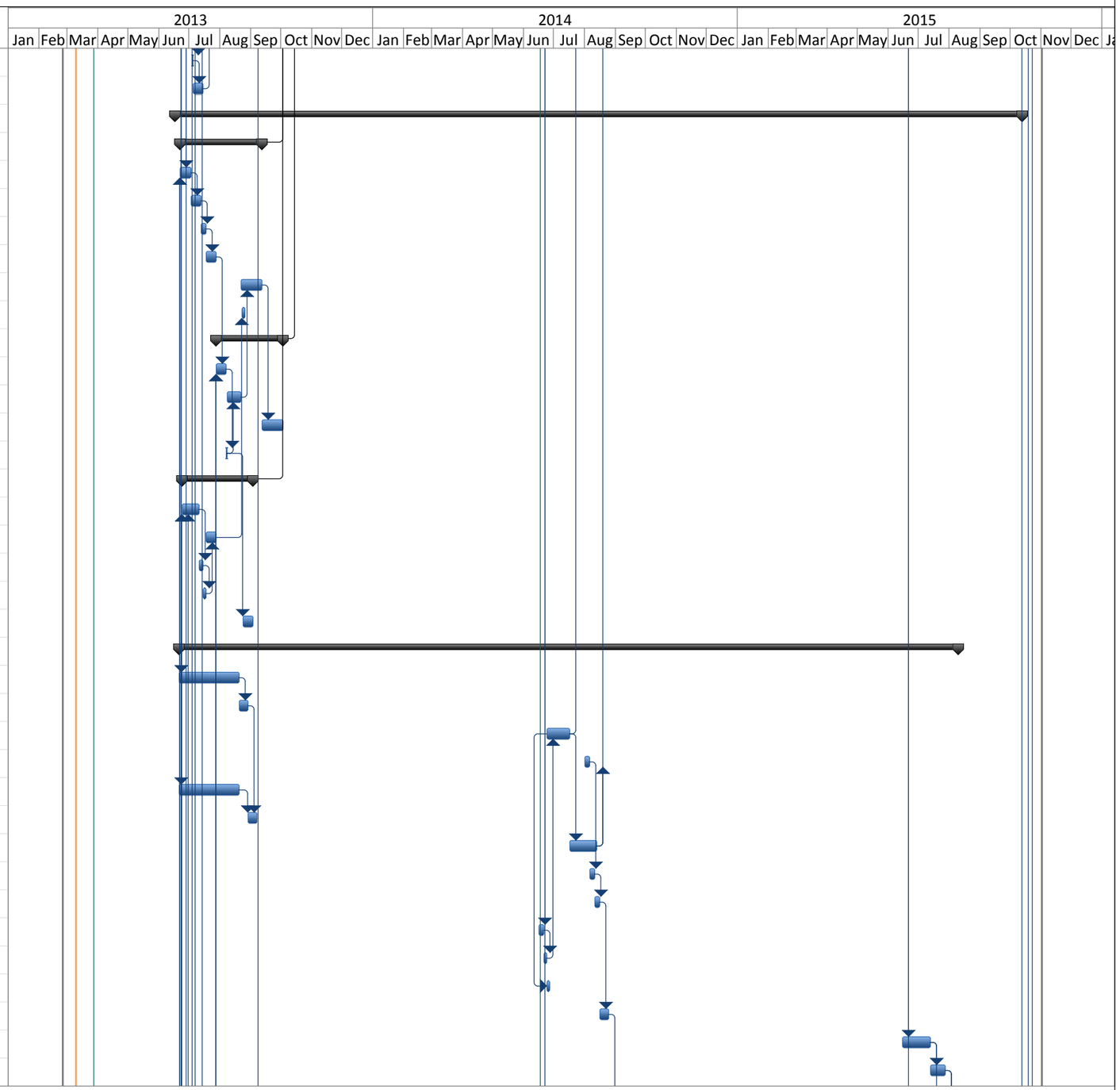
ID	Te	Task Name	Duration	Start	Finish
68		**Contractors**	**316 days**	**Jul 14 '13**	**Jul 26 '14**
69		Demolition I	10 days	Jul 14 '13	Jul 23 '13
70		Earthworks I	10 days	Oct 3 '13	Oct 12 '13
71		Earthworks II	10 days	Jul 17 '14	Jul 26 '14
72		Earthworks III	10 days	Sep 2 '13	Sep 11 '13
73		PM/CM Team	3 days	Jul 27 '14	Jul 29 '14
74		**2014**	**74 days**	**Aug 13 '14**	**Oct 25 '14**
75		**Contractors**	**71 days**	**Aug 13 '14**	**Oct 22 '14**
76		Demolition II	10 days	Oct 13 '14	Oct 22 '14
77		Earthworks II	10 days	Aug 13 '14	Aug 22 '14
78		Earthworks III	10 days	Aug 24 '14	Sep 2 '14
79		PM/CM Team	3 days	Oct 23 '14	Oct 25 '14
80		**2015**	**20 days**	**Oct 13 '15**	**Nov 1 '15**
81		**Contractors**	**10 days**	**Oct 13 '15**	**Oct 22 '15**
82		Earthworks III - 2015	10 days	Oct 13 '15	Oct 22 '15
83		PM/CM Team	10 days	Oct 23 '15	Nov 1 '15
84		**Demolition & Disposal**	**421 days**	**Jun 17 '13**	**Oct 12 '14**
85		**Mill Area**	**416 days**	**Jun 22 '13**	**Oct 12 '14**
86		Hazardous Material Removal	60 days	Jun 16 '14	Aug 14 '14
87		Concentrator Complex	25 days	Aug 15 '14	Sep 8 '14
88		Coarse Ore Bin	3 days	Sep 9 '14	Sep 11 '14
89		Reagents Bins	3 days	Sep 12 '14	Sep 14 '14
90		Crushing & Grinding	18 days	Sep 15 '14	Oct 2 '14
91		Interbuilding Conveyors	3 days	Oct 3 '14	Oct 5 '14
92		Power House	7 days	Oct 6 '14	Oct 12 '14
93		Office Trailers	3 days	Jun 22 '13	Jun 24 '13
94		Diesel, Gasoline & Oil Storage	3 days	Jun 25 '13	Jun 27 '13
95		Accommodation, Camp Trailers & Kitchen	3 days	Jun 28 '13	Jun 30 '13
96		Warehouse, Dry, Lab and Ambulance Garage	3 days	Jul 8 '13	Jul 10 '13
97		Mill Site Facilities & Services	3 days	Jul 11 '13	Jul 13 '13
98		Jewelbox Zone	2 days	Jun 17 '13	Jun 18 '13
99		Burnick Zone	9 days	Jul 14 '13	Jul 22 '13
100		Tailings Mgt. Facility	7 days	Jul 15 '13	Jul 21 '13
101		Trapper's Camp	4 days	Jun 19 '13	Jun 22 '13
102		Gribbler Ridge Exploration Camp	4 days	Jun 23 '13	Jun 26 '13
103		Upper North Creek	2 days	Jun 27 '13	Jun 28 '13
104		Lower North Creek	5 days	Jun 29 '13	Jul 3 '13



PM/CM
Demolition I
Demolition II
Earthworks I
Earthworks II
Earthworks III
Trees & Shrubs
Specialty Contracts
Misc. Contracts

SA DENA HES

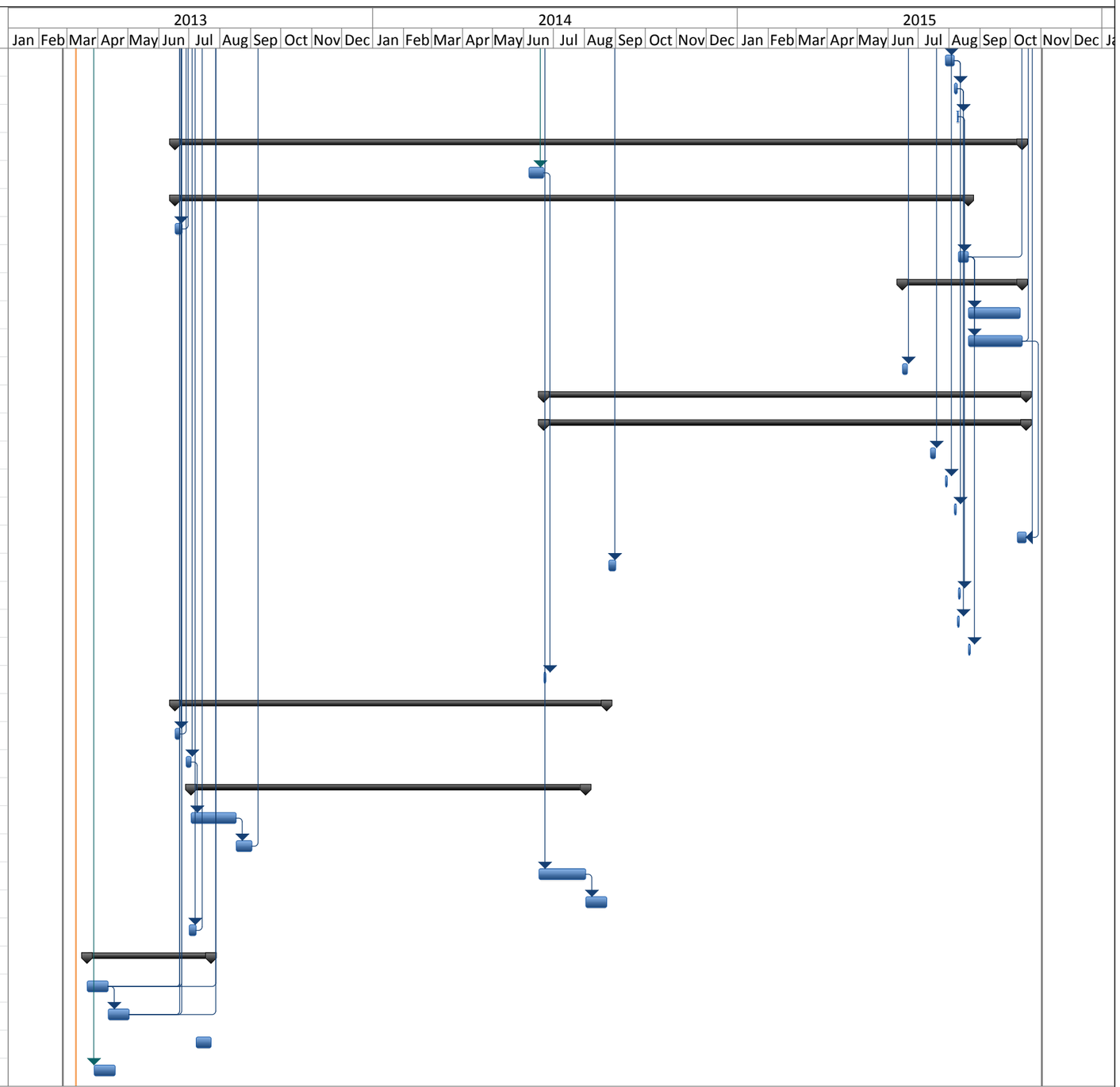
ID	Te	Task Name	Duration	Start	Finish
105		Camp Creek Diversion	1 day	Jul 4 '13	Jul 4 '13
106		Power Poles/Lines & Railway Ties	10 days	Jul 5 '13	Jul 14 '13
107		**Earthworks**	**724 days**	**Jun 17 '13**	**Oct 12 '15**
108		**Jewelbox Zone**	**82 days**	**Jun 22 '13**	**Sep 11 '13**
109		1408 Portal	11 days	Jun 22 '13	Jul 2 '13
110		Ventilation Raises	10 days	Jul 3 '13	Jul 12 '13
111		1250 Portal	5 days	Jul 13 '13	Jul 17 '13
112		Jewelbox Pit	10 days	Jul 18 '13	Jul 27 '13
113		Jewelbox Waste Dumps	21 days	Aug 22 '13	Sep 11 '13
114		Capping & Sloping of Portal	3 days	Aug 23 '13	Aug 25 '13
115		**Main Zone**	**67 days**	**Jul 28 '13**	**Oct 2 '13**
116		1380 Portal	10 days	Jul 28 '13	Aug 6 '13
117		Main Zone Pit	14 days	Aug 8 '13	Aug 21 '13
118		Main Zone Waste Dump	21 days	Sep 12 '13	Oct 2 '13
119		Sediment Ponds	1 day	Aug 7 '13	Aug 7 '13
120		**Burnick Zone**	**71 days**	**Jun 24 '13**	**Sep 2 '13**
121		1200 Portal	17 days	Jun 24 '13	Jul 10 '13
122		1300 Portal	10 days	Jul 18 '13	Jul 27 '13
123		Burnick Waste Dump	4 days	Jul 11 '13	Jul 14 '13
124		North Hill Settlement Basin	3 days	Jul 15 '13	Jul 17 '13
125		Capping & Sloping of Portals	10 days	Aug 24 '13	Sep 2 '13
126		**Tailings Mgt. Facility & Capping**	**656 days**	**Jun 21 '13**	**Aug 9 '15**
127		Drain Tailings	60 days	Jun 21 '13	Aug 19 '13
128		Breach South Dam	9 days	Aug 20 '13	Aug 28 '13
129		Remove South Dam	23 days	Jun 24 '14	Jul 16 '14
130		Recontour South Dam Area	5 days	Aug 1 '14	Aug 5 '14
131		Drain Reclaim Dam	60 days	Jun 21 '13	Aug 19 '13
132		Breach Reclaim Dam	9 days	Aug 29 '13	Sep 6 '13
133		Remove Reclaim Dam	27 days	Jul 17 '14	Aug 12 '14
134		Recontour Reclaim Dam Area	5 days	Aug 6 '14	Aug 10 '14
135		Cofferdam	5 days	Aug 11 '14	Aug 15 '14
136		North Dam	5 days	Jun 16 '14	Jun 20 '14
137		Interceptor Ditches	3 days	Jun 21 '14	Jun 23 '14
138		Tailings Decant Tower	3 days	Jun 24 '14	Jun 26 '14
139		Camp Creek Diversion	9 days	Aug 16 '14	Aug 24 '14
140		Mill Area	28 days	Jun 15 '15	Jul 12 '15
141		Jewelbox Zone	15 days	Jul 13 '15	Jul 27 '15



PM/CM
Demolition I
Demolition II
Earthworks I
Earthworks II
Earthworks III
Trees & Shrubs
Specialty Contracts
Misc. Contracts

SA DENA HES

ID	Te	Task Name	Duration	Start	Finish
142		Burnick Zone	9 days	Jul 28 '15	Aug 5 '15
143		Landfarm	3 days	Aug 6 '15	Aug 8 '15
144		North Creek Areas	1 day	Aug 9 '15	Aug 9 '15
145		**Pits & Refuse Area**	**724 days**	**Jun 17 '13**	**Oct 12 '15**
146		Rip Rap Pit	15 days	Jun 6 '14	Jun 20 '14
147		**Refuse Area**	**670 days**	**Jun 17 '13**	**Aug 19 '15**
148		2013	7 days	Jun 17 '13	Jun 23 '13
149		2015	10 days	Aug 10 '15	Aug 19 '15
150		**Misc. Areas**	**120 days**	**Jun 15 '15**	**Oct 12 '15**
151		North Creek Dyke	52 days	Aug 20 '15	Oct 10 '15
152		Roads & Trails	54 days	Aug 20 '15	Oct 12 '15
153		Weather Station	5 days	Jun 15 '15	Jun 19 '15
154		**Revegetation & Final Reclamation**	**421 days**	**Jun 21 '14**	**Oct 16 '15**
155		**Seeds & Fertilizers**	**421 days**	**Jun 21 '14**	**Oct 16 '15**
156		Mill Area	5 days	Jul 13 '15	Jul 17 '15
157		Jewelbox Zone	2 days	Jul 28 '15	Jul 29 '15
158		Burnick Zone	2 days	Aug 6 '15	Aug 7 '15
159		Roads & Trails	9 days	Oct 8 '15	Oct 16 '15
160		Tailings Mgt. Facility	7 days	Aug 25 '14	Aug 31 '14
161		North Creek Areas	2 days	Aug 10 '15	Aug 11 '15
162		Landfarm	2 days	Aug 9 '15	Aug 10 '15
163		Refuse Area	2 days	Aug 20 '15	Aug 21 '15
164		Rip Rap Pit	2 days	Jun 21 '14	Jun 22 '14
165		**Contaminated & Hazardous Material**	**370 days**	**Jun 17 '13**	**Aug 22 '14**
166		Chemical Disposal (Site Work)	5 days	Jun 17 '13	Jun 21 '13
167		Fuels & Lubricants	5 days	Jun 28 '13	Jul 2 '13
168		**Hydrocarbons Products**	**333 days**	**Jul 3 '13**	**Aug 1 '14**
169		Test Pitting	45 days	Jul 3 '13	Aug 16 '13
170		Landfarm	16 days	Aug 17 '13	Sep 1 '13
171		Processing of Hydrocarbons	47 days	Jun 16 '14	Aug 1 '14
172		Hydrogeological Drilling	21 days	Aug 2 '14	Aug 22 '14
173		Lead/Zinc Disposal	7 days	Jul 1 '13	Jul 7 '13
174		**Engineering Services**	**102 days**	**Mar 21 '13**	**Jul 22 '13**
175		Portal & Ventilation Seals	15 days	Mar 21 '13	Apr 10 '13
176		Portal Drainage	15 days	Apr 11 '13	May 1 '13
177		Camp Creek Diversion	15 days	Jul 8 '13	Jul 22 '13
178		Refuse Area	15 days	Mar 28 '13	Apr 17 '13



PM/CM
Demolition I
Demolition II
Earthworks I
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Earthworks III
Trees & Shrubs
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Misc. Contracts

5.0 SITE MANAGEMENT DURING DECOMMISIONING AND RECLAMATION ACTIVITIES

During the active decommissioning phase which will take 3 years, the number of personnel required will vary depending on site activities, however as the major decommissioning and reclamation tasks are completed the number of site personnel required will decline.

Of primary importance to the Company, is that the work is conducted and reflects our expectation that all people working on the site will conduct their work in a manner that everyone goes home safe and healthy every day from the job site. All work must also be conducted in compliance with all environmental and other applicable regulations.

It is recognized that final engineering designs and control procedures for water related geotechnical structures must be sealed by a Professional Engineer licensed to practice in the Yukon and must be submitted to the Water Board for their review and approval prior to implementing work on these structures.

The Company has a close working relationship with Liard First Nation and are committed to provide opportunities for contracting and employment as part of the decommissioning and reclamation activities and for the environmental monitoring of the site. At the same time, the Company expects that other residents in the area of Watson Lake will find ample opportunity to provide labour, contracting, and supply services to the project.

5.1 SITE ORGANIZATION, ACCESS & SECURITY, AND LAND TENURE

The Company will contract the onsite management of the project to a company that has experience in providing professional project management services. The contracted management team will provide onsite management services, as well as home office technical support and administrative functions. The contact management team will establish office facilities on site to support their daily presence on the project site. The Company's Legacy Properties staff who are currently familiar with the site and have been involved with the

development of this DDRP will continue to take an oversight role throughout the duration of the project.

At present, a caretaker remains on site year round to provide site security, site maintenance, monitoring, and inspection requirements. It is anticipated that this will continue in modified form through until decommissioning is completed in the fall of 2014. While site management and contractors will be on site during work days, it is not anticipated that any of those personnel will be housed on site. Work crews are also expected to be absent through the winter periods. Consequently, the caretaker will continue to have a role until decommissioning of site assets are completed on the property.

Access to the site will be limited to those people preapproved to be onsite and controlled by the presence of a security person stationed at an access gate.

It is expected that the peak employment will be during 2013 and 2014 with site activities reduced during the summer of 2015. Peak employment in 2013 and 2014 is expected to be in the order of 30 to 50 people on site for periods of time. The work will generally be seasonal to avoid periods of snowfall which would reduce efficiencies with planned civil works. It is assumed the work season will generally be from late May to early October but will be adjusted based on conditions at the site in any particular year. It is possible that some indoor preparation work related to decommissioning of the mill facilities could be conducted regardless of the season.

The Company will retain the site's surface lease and some mineral rights for the site for the foreseeable future. Despite the reclamation activities, reclamation structures including portal seals and tailings management structures are believed to remain the responsibility of the Company. As an example, the North Dam will remain a dam and as a result require monitoring and perhaps, occasional maintenance into the future. As a result, control of land use in these areas and the ability of access this land base is important so that the Company has the ability to control and manage these works.

5.2 SUPERVISION AND DOCUMENTATION OF WORK

All decommissioning and reclamation works will be properly supervised to ensure that works are constructed according to their design and that this work is properly carried out and documented. The site project manager or the construction supervisor will oversee all closure works. Daily inspection procedures will be completed to document work progress, deficiencies and completion. Existing plans for spill response or other site internal procedures for fuel handling, waste disposal, fire control and suppression, health and safety and environmental management systems will be followed.

For the tailings management facility, construction plans for all earthen works will be prepared and submitted to the Yukon Territory Water Board for review and approval prior to construction. These plans would be submitted in a timely manner to facilitate agency review and Board approval prior to implementation. A competent engineer following standard quality control and assurance procedures would also inspect and document this construction work. As built plans and drawings will be completed and the results of the closure work completed on the tailings management facility and any other designed or engineered structures.

Mine records and other historical site related records, files and plans were removed from site in 2010 and are being stored in the Company's office in Kimberley, BC. Plans are to store all key records and plans electronically to ensure that they are not lost. Where plans or drawings are required for mine safety reasons, these plans would also be submitted to government mine safety offices.

5.3 COMPLIANCE MONITORING AND REPORTING

Environmental compliance monitoring, internal monitoring of earthworks and independent geotechnical inspections are presently ongoing at the property. The environmental monitoring at the Sä Dena Hes mine employs a number of types of scheduled periodic inspections to ensure that the facility is meeting environmental performance objectives and complying with appropriate regulatory standards. These inspections entail:

- Scheduled inspections of the tailings management facility and mine components to monitor environmental performance;

- Scheduled water quality sampling and flow measurements of effluent streams and local receiving water streams;
- Scheduled receiving water programs for benthic invertebrates, stream sediments and fish to monitor downstream environmental quality;
- Scheduled piezometric monitoring of water levels in wells and the decant structure at the tailings management facility;
- Annual summer inspections by a qualified geotechnical engineer of tailings management facility, diversion channel and waste rock storage areas for structural stability; and,
- Scheduled environmental tours of the property by Company staff to look for environmental hazards and site stability.

In the past, the site caretaker used to undertake scheduled environmental monitoring and inspection programs with the exception of the annual geotechnical inspection and the benthic invertebrates, stream sediment and fish monitoring programs, which are conducted by qualified professionals. Through closure and post closure the environmental monitoring will be taken over by other trained personnel. All results from the licensed compliance monitoring programs are reported to the Yukon Territory Water Board.

During the closure phase environmental compliance monitoring and inspections will continue utilizing site based personnel. A summary of the present environmental compliance and inspection program as outlined in Water Use Licence QZ97-025 is shown in Table 5-1, with monitoring station locations described in Table 5-2. Figures 1-2 and 3-1 provide the station locations for the environmental monitoring programs. The amount of environmental monitoring and inspection (frequency and quantity) will comply with current Water Licence requirements until closures measures have been completed at the end of 2015 which coincides with expiry of the Water Licence. As this monitoring is outlined in the Water Licence it is not repeated in detail in this Plan. An Environmental Monitoring Plan for site closure activities, and an Erosion and Sediment Control Plan for when the dams are being decommissioned will also be adopted and implemented during the reclamation project to ensure minimal erosion and sediment release occurs during reclamation. This is particularly important while doing the final draining of the south tailings and reclaim ponds, and when the deconstruction of the dams and cover construction activities take place. The plan will include physical controls (i.e., such as silt

curtains) and an environmental monitoring plan consisting of water chemistry and daily turbidity measurements when work around water is occurring.

Details of the decommissioning and reclamation activities occurring each year will be reported in detail in the annual Quartz Mining Licence report. The Water Licence requires reporting on a semiannual basis during permanent closure (March 30th and November 30th). Reporting will include a summary of activities for each of the areas where the DDRP describes closure measures and will include as-built drawings for all engineered structures.

As further discussed as part of Section 6.2 Reclamation Security, a comprehensive post reclamation long term monitoring program will be developed at the end of the DDRP program. It will include proposed monitoring locations, monitoring parameters, and frequency of sampling which is expected to vary (i.e., reduce) over time. During implementation of the DDRP, some of the existing permitted monitoring locations will be reclaimed making them obsolete. Additionally, new monitoring stations will be created (e.g., new groundwater monitoring wells) that may need to become part of the longer term site monitoring program. With these changes the long term monitoring program will be developed to reflect the changing site conditions and to collect the data needed to ensure that the site meets the end land use objectives including site environmental monitoring, geotechnical monitoring, and physical site monitoring requirements (e.g., site stability and erosion). It is anticipated that the long term monitoring frequency and scope will be reduced over time as satisfactory closure performance is confirmed. Table 5-3 provides an outline a preliminary scope of a monitoring plan for post 2015 to identify the scale and frequency of monitoring anticipated. It is recognized that the long term monitoring plan will be the primary objective of new licensing and so its development should reflect evolving site conditions as a result of site reclamation activities and input and reviews by government regulators and from the LFN community.

Table 5-1 Licenced Surveillance Program during Temporary Cessation of Operations

		Stations																			
		MH-1	MH-2	MH-3	MH-4*	MH-5	MH-6a	MH-6b**	MH-7	MH-8	MH-9	MH-10	MH-11	MH-13	MH-14	MH-16	MH-18	MH-19	MH-20	MH-22	MH-24	MH-25
	Water Quality Monitoring																					
WATER QUALITY PARAMETER	pH (Field)	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Flow Rate	Q	M	M	Q	M	M	Q	M	M	M	M	M/C***	Q	Q	Q	--	--	--	M	--	M
	Temperature	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Conductivity	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Alkalinity	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	pH(Lab)	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Tot. Sus. Solids	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Dissolved Solids	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	ICP Scan - Total	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Ammonia - Total	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Sulphate	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Hardness	Q	M	M	Q	M	M	Q	M	M	M	M	M	Q	Q	Q	--	--	--	M	--	M
	Cyanide - Total	Q	M	--	--	--	M	Q	M	--	--	--	M	Q	Q	Q	--	--	--	--	--	--
	Bioassay - LC50	--	--	--	--	--	Q	Q	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MONITORING PROGRAMS	**Environmental Monitoring**																					
	Benthic Invertebrates	--	--	--	--	--	--	--	--	--	--	--	--	2Y	2Y	--	2Y	2Y	--	--	2Y	--
	Stream Sediments	--	--	--	--	--	--	--	--	--	--	--	--	2Y	2Y	--	2Y	2Y	--	--	2Y	--
	Fish Monitoring	--	--	--	--	--	--	--	--	--	--	--	--	2Y	--	--	2Y	--	2Y	--	2Y	--
	Physical Monitoring																					
	Internal Monitoring (Earthworks)	Monthly internal inspection of all earthworks on site																				
	Annual Geotechnical Inspection	Annual Geotechnical Inspection of all earthworks																				
	Piezometers Monitoring	Monthly piezometric readings from wells located in tailings management facility																				
	Settlement Marker Monitoring	Annual readings taken during geotechnical inspection																				
	Seepage Monitoring	Monthly seepage readings from seepage weirs located in tailings management facility																				

LEGEND: Q = Quarterly; M = Monthly; 2Y = every second year during September; C = Continuous

NOTES:

-- Monitoring for this parameter at this station is not required as per water use licence schedule

* To be monitored as an alternative site to MH-3 only when there is no discharge from the Camp Creek Sediment Pond.

** To be monitored as an alternative site to MH-6a only when there is no discharge from the reclaim pond.

*** Monitor a minimum of monthly or continuous flow recording year round.

Table 5-2 Licenced Surveillance Network - Water Quality Monitoring Site

MH-1:	Tailings Pond Outflow – discharge from the tailings pond, through the decant tower, to the reclaim pond or if no discharge, the pond water.
MH-2:	Tailings North Dam Seepage – seepage water collected immediately below the downstream face of the north tailings dam.
MH-3:	Camp Creek Pond Outflow – discharge from a sedimentation pond located in upper Camp Creek which drains the Jewelbox Hill 1250 Portal and Main Zone Waste Dump. Note that there has not been any discharge at this location since cease in operations.
MH-4:	Lower Camp Creek – on Camp Creek located immediately above the West Interceptor Ditch sample.
MH-5:	Portal Creek – a small intermittent stream which drains the East face of Jewelbox Hill, immediately below the 1408 portal, to False Canyon Creek; releases discharge from the portal sedimentation pond and water from the Jewelbox Waste Dump.
MH-6a:	Reclaim Pond Outflow – discharge from the reclaim pond through the overflow spillway.
MH-6b:	Reclaim Pond – To be monitored as an alternative to MH-6a only when there is no discharge from the reclaim pond.
MH-7:	Reclaim Pond Seepage – water accumulating within the seepage collection system located immediately below the downstream face of the reclaim dam.
MH-8:	Burnick Creek – a small intermittent drainage south of the Burnick pit and portal sites which will consolidate drainage within a sediment pond from those sites as well as Burnick pit access road runoff; the drainage contributes to the upper end of Tributary E, east fork, of False Canyon Creek.
MH-9:	Burnick West Pond Outflow – discharge from a small sediment pond, which collects drainage from the west and north faces of the Burnick Dump and drains to the upper end of Tributary E, west fork, of False Canyon Creek. Note that there has not been any discharge at this location since cease in operations.
MH-10:	Burnick East Pond Outflow – discharge from a small sediment pond, which collects drainage from the east face of the Burnick Dump, to a branch of Tributary E, west fork, of False Canyon Creek. Note that there has not been any discharge at this location since cease in operations.
MH-11:	Upper False Canyon Creek located one kilometre downstream of the tailing management facility.
MH-12:	Tributary E, east fork – of False Canyon Creek, approximately 2 kilometres downstream of the north tailings dam.
MH-13:	The main channel of False Canyon Creek, approximately 10 kilometres downstream of the reclaim pond.
MH-14:	The main channel of False Canyon Creek, approximately 20 kilometres downstream of the reclaim pond just upstream of the confluence with Tributary E.
MH-15:	Tributary E, west fork, upstream of the confluence with Tributary E, east fork, approximately six kilometres downstream of the North Hill development.
MH-16:	The main channel of False Canyon Creek, downstream of the confluence of Tributary D, approximately 22 kilometres downstream of the reclaim pond.
MH-18:	Lower reaches of Tributary E, approximately one kilometre above the confluence with False Canyon Creek.
MH-19:	The main channel of False Canyon Creek, approximately four kilometres downstream of the Tributary D confluence.
MH-20:	The main channel of False Canyon Creek, approximately 13 kilometres upstream of the mouth and immediately above the Tributary B confluence.
MH-22:	Burnick portal discharge, the end of pipe discharge point into the North Hill Settlement Basin.
MH-23:	North Creek immediately downstream of the impoundment.
MH-24:	The east tributary that joins False Canyon Creek just downstream of MH-13.
MH-25:	The Main Zone 1380 Portal discharge.

Table 5-3 Environmental Monitoring and Inspection Program - Post Closure

		Post Closure Monitoring Year									
	Calendar Year	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**>2025**
	Elapsed Years	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**>10**
MONITORING PROGRAMS	**Environmental/Ecological Monitoring**										
	Benthic Invertebrates, Stream Sediments, Fish Monitoring, Surface Water Quality (False Creek Canyon)	2Y	--	2Y	--	2Y	--	2Y	--	2Y	--
	Surface Water Quality	2/Y	2/Y	2/Y	A	A	A	P	P	P	P
	Groundwater	A	A	A	A	A	P	P	P	P	P
	Ecological Risk Assessment Monitoring Terrestrial - wildlife, plants, insects	--	--	--	--	5Y	--	--	--	--	5Y
	Physical Monitoring										
	Portal Seals	A	A	A	A	A	A	A	A	A	A
	Subsidense	A	A	A	A	A	A	A	A	A	A
	Road Erosion	A	A	A	A	A	A	A	A	A	A
	Cover Integrity on Tailings	A	A	A	A	A	A	A	A	A	A
	Re-vegetation	A	A	A	A	A	P	P	P	P	P
	Geotechnical Monitoring										
	Annual Geotechnical Inspection including piezometer monitoring	A	A	A	A	A	A	A	A	A	A
	Waste Dump Stability	A	A	A	A	A	A	A	A	A	A
	Dam Safety Review	--	--	--	--	5Y	--	--	--	--	5Y

LEGEND:

2/Y - Twice a year; A = Annually; 2Y = every second year during September; 5Y = every five years; P = Periodic Inspection

Notes: Specific locations, parameters, and frequency to be determined

6.0 CLOSURE COSTS & RECLAMATION SECURITY

6.1 CLOSURE COSTS

The January 2012 estimated costs to implement the Detailed Decommissioning and Reclamation Plan represent a significant upgrading relative to the cost estimate Included in previous updates to the Plan. These are presented in Tables 6-1 through to 6-7. Table 6-1 presents the summary of cost estimates for various mine components including mine workings, tailings management facility, infrastructure, land reclamation and revegetation, and post closure monitoring and maintenance. However, based on the results of the 2012 field work, further technical studies combined with consultants preparing formal "construction" level cost estimates, the cost estimates have increased substantially.

As the work outlined in this DDRP will be implemented in the near future, there are concerns with releasing detailed cost estimate calculations as there is a significant possibility influencing commercial aspects of this work as tendering/contracting of this work begins. As a result, the details of the updated cost estimate have been provided to the Ministry of EMR under separate cover for their confidential review.

To provide an understanding of the scope of work and level of consideration previously developed to implement the 2012 update to the DDRP, these costs have been included for reference.

- Table 6-1 provides a summary of all cost estimates;
- Table 6-2 sets out unit rates used in the calculations;
- Table 6-3 provides closure cost estimates for the existing mine workings
- Table 6-4 presents cost estimates for the tailings management facility
- Table 6-5 provides cost estimates for Demolition and Reclamation
- Table 6-6 provides cost estimates for Land Reclamation & Revegetation
- Table 6-7 outlines costs associated with the site management during closure implementation and presents post closure costs for compliance monitoring and maintenance for 8 years of post-closure monitoring.

All of the individual mine component cost estimate tables provide the detailed breakdown of the costs to implement each of the main elements of the works as described in the Detailed Decommissioning & Reclamation Plan.

6.2 RECLAMATION SECURITY

Based on the 2012 DDRP cost estimate for decommissioning and reclamation of $15,912,000 the owners of the joint venture submitted this amount in reclamation security to the Government of the Yukon. Further technical assessments based on the revised work scopes included in this March 2013 Update (Final) of the DDRP, were used in developing updated cost estimates. The 2013 revised cost estimates have increased substantially from the January 2012 estimates. The decommissioning and reclamation costs for 2013 to 2015 are estimated to be $25,200,000. With the implementation of the DDRP beginning this summer, EMR will determine the process to assess progress on reducing this estimated liability and the process to determine adjustment to the reclamation security. This is consistent with the Yukon Mine Site and Reclamation Closure Policy Financial and Technical Guideline #F-07 Practice states that "the security held will remain commensurate with the outstanding reclamation and closure liability". The same policy includes Guideline #F-10 that the Yukon government may enter into an administrative agreement with the mine owner to adjust security. This administrative agreement may include the development of a security schedule that will be adjusted as reclamation work is implemented.

It is proposed that the Ministry of Mineral Resources consider an agreement with the SDHOC to review and adjust security based on the following basis:

- Annually near the end of each year's reclamation activities (i.e. late September), that the Yukon government conduct a site inspection to verify what reclamation activities have been accomplished during the year.
- That in the annual Quartz Production Licence reporting (due each March 31st), the Company provide documentation of the work completed and make a proposal for the amount of reclamation security to be released based on the cost estimate contained within this DDRP.
- The Yukon government will review the Company's request based on the documentation provided and the Yukon government's own site inspection assessment of the work completed, and based on the outstanding site liabilities make a preliminary determination of the amount of security to be released or increased.

- The Company then be given up to 60 days to review and comment on the Yukon government's assessment of residual liabilities. The Yukon government will give fair consideration to these comments and within 30 days of receiving the Company's comments, finalize the security requirements. The parties will then be required to adjust the outstanding security to match the requirements within 60 days.
- The Yukon government will not reduce the reclamation security to less than 15% of the original reclamation security until:
    - The Company has submitted a detailed long term post-reclamation monitoring plan complete with associated cost estimates for review by the Yukon Government, and
    - The Yukon government has reviewed the submission (and obtained comments from the appropriate interested parties); and attempted to resolve any differences in the monitoring plan and costs with the Company, and
    - The Yukon government will then approve both the long term monitoring plan to be implemented and the associated costs, then
    - The Yukon government would then specify the security requirements for the post-reclamation site monitoring and management program using an assessment of net present values of the required security.
- The proposed post-reclamation long term monitoring plan shall be submitted by the Company as part of the new Water Licence application in 2015. This will allow time for the DDRP to have been fully implemented which will provide a better understanding of post-reclamation conditions required to develop the monitoring plan.
- Subsequent to the Yukon government approving the monitoring plan, from time to time (but no more frequently than annually), The Company or the Yukon government may propose revisions to the monitoring plan for consideration (including associated adjustments to the reclamation security provisions).

Table 6-1 Estimated Decommissioning Costs, Summary Table

January 2012 Update

Table	Description	Cost
6-3	Mine Workings	$537,000
6-4	Tailings Management Facility	$3,122,000
6-5	Infrastructure	$1,861,000
6-6	Land Reclamation and Revegetation	$3,138,000
6-7	Post Closure Site Management (Including Monitoring & Maintenance)	$4,602,000
	Sub-total	**$13,260,000**
	Contingency Allowance @ 20%	$2,652,000
	SDH Decommissioning, Reclamation & Monitoring Cost Total	**$15,912,000**

Table 6-2 Unit Costs

EQUIPMENT RATES		
Bulldozer-small (Cat D6)	$200	per hr
Bulldozer-large (D9H)	$400	per hr
D250E Haul Truck	$250	per hr
235 Excavator	$240	per hr
235 Excavator w Hammer	$300	per hr
16H grader	$325	per hr
Loader-large (Cat 988B)	$300	per hr
Loader-small (Cat 950)	$225	per hr
Drill Rig (Estimated)	$240	per hr
Compactor (Walk behind)	$125	per day
Tractor Trailer (lowbed)	$185	per hr
30 ton Crane	$200	per hr
Hiab Flatdeck truck	$150	per hr
Pickup Truck	$4,500	per month

PERSONNEL RATES		
Blaster	$100	per hr
General Labourer	$60	per hr
Trades Labourer	$70	per hr
Site Supervisor	$150	per hr
Design Engineer	$130	per hr
Environmental Scientist	$95	per hr
Project Manager	$20,000	per month
Camp Labourer	$6,000	per month
Site Caretaker	$6,100	per month
Environmental Monitor	$10,000	per month
Analytical Costs	$750	Unit cost

REVEGETATION RATES		
Revegetation Seed Mix	$13	per kg
Fertilizer	$1	per kg
Seed/Fertilizer Application	$8,000	per ha

CONTRACTOR UNIT RATES & CAMP COST		
Excavation of Soil	$35	cu.m
Supply and place Geotextile	$10	sq m
Load, haul and place soil cover	$15	cu.m
Haul & Place rock cover	$15	cu.m
Drill, Blast and Screen Rip Rap	$65	cu.m
Load, Haul and Place Soil/Rip Rap	$20	cu.m
Erosion barriers	$8	sq m
Camp Cost	$125	per day per person
Power and Heat	$5,500	per month
Sundry equipment maintenance	$5,000	yearly
General Administrative expenses	$10,000	per month

Table 6-3 Estimated Decommissioning Costs – Mine Workings

Item No.	Work Item Description	Equipment/ Labour	Units	Quantity	Unit Cost	Cost	Total Cost
1.0	**MINE WORKINGS**						
1.1	**JEWELBOX ZONE**						
1.1.1	**Jewelbox Zone - 1408 Portal (4.5m x 4.5m)**						
	Permanent Portal Seal - Based estimate on using Tires but alternate methods may be used	235 Excavator	hrs	20	$240	$4,800	
	Supply of used large truck tires	Misc.	ea	30	$100	$3,000	
	Place waste rock cap over tires	235 Excavator	hrs	10	$240	$2,400	
		D250E Haul Truck	hrs	10	$250	$2,500	
	Supply broken rock for drain at base of plug and discharge channel riprap	235 Excavator	hrs	10	$240	$2,400	
		D250E Haul Truck	hrs	20	$250	$5,000	
	Construct rock drain at base of plug	235 Excavator	hrs	5	$240	$1,200	
	Supply till to seal discharge channel	235 Excavator	hrs	4	$240	$960	
		D250E Haul Truck	hrs	4	$250	$1,000	
	Construct lined open channel for discharge from portal	235 Excavator	hrs	15	$240	$3,600	
	Load, haul & place sand for liner bedding	Load, haul and place soil cover	cu m	100	$15	$1,500	
		Compactor (Walk behind)	days	1	$125	$125	
	Supply & install liner material	Misc.	l.s.		$5,000	$5,000	
	Misc. Supplies & Shipping	Misc.	l.s.			$5,000	
	Labour to assist with placing tires & cap	General Labourer	hrs	40	$60	$2,400	
	Supervision to design & install tires & cap	Site Supervisor	hrs	40	$150	$6,000	
	Sub-Total						**$46,885**
1.1.2	**Jewelbox Zone - 1250 Portal**						
	Place waste rock cap in opening	235 Excavator	hrs	10	$240	$2,400	
		D250E Haul Truck	hrs	20	$250	$5,000	
	Supervision of work	Site Supervisor	hrs.	10	$150	$1,500	
	Sub-Total						**$8,900**
1.1.3	**Jewelbox Zone - Ventilation Raises**						
	Construct Concrete cap over upper vent openings (both upper & lower)	235 Excavator	hrs	40	$240	$9,600	
		General Labourer	hrs	40	$60	$2,400	
		Misc.	l.s.		$30,000	$30,000	
	Contour Slope around opening	235 Excavator	hrs	10	$240	$2,400	
		Site Supervisor	hrs	40	$150	$6,000	
	Design and Site Supervision of Cap	Design Engineer	hrs	75	$130	$9,750	
	Sub-Total						**$60,150**
1.1.4	**Jewelbox Zone - Open Pit**						
	Drill and blast highwall	Drill Rig (Estimated)	hrs	40	$240	$9,600	
		Blaster	hrs	40	$100	$4,000	
		General Labourer	hrs	40	$60	$2,400	
		Misc.	l.s.		$2,500	$2,500	
		Bulldozer-large (D9H)	hrs	20	$400	$8,000	
		235 Excavator	hrs	40	$240	$9,600	
		Drill Rig (Estimated)	hrs	40	$240	$9,600	
		Blaster	hrs	40	$100	$4,000	
		General Labourer	hrs	40	$60	$2,400	
		Bulldozer-large (D9H)	hrs	10	$400	$4,000	
		D250E Haul Truck	hrs	10	$250	$2,500	
		Site Supervisor	hrs	80	$150	$12,000	
	Sub-Total						**$70,600**
1.1.5	**Jewelbox Zone - Waste Dumps**						
	Reslope Upper Zone of Dump below Portal (1.3ha)	Bulldozer-large (D9H)	hrs	30	$400	$12,000	
	Reslope Jewelbox pit waste on ridge (1.9 ha)	Bulldozer-large (D9H)	hrs	**30**	$400	$12,000	
	Pull Back crest of waste dump and road cut below access road to Main Pit (0.5ha)	235 Excavator	hrs	30	$240	$7,200	
	Reslope Jewelbox pit waste dump above road (0.8ha)	Bulldozer-large (D9H)	hrs	30	$400	$12,000	
	Supervision	Site Supervisor	hrs	55	$150	$8,250	
	Sub-Total						**$51,450**
1.2	**MAIN ZONE**						
1.2.1	**Main Zone - 1380 Portal (see also Main Zone Pit) (4.5m X 4.5m)**						
	Plug 1380 Portal with concrete plug	Misc.	l.s.			$50,000	
	Sub-Total						**$50,000**
1.2.2	**Main Zone - Open Pit**						
	Drill and blast highwall and cover Portal 1380	Drill Rig (Estimated)	hrs	40	$240	$9,600	
		Blaster	hrs	40	$100	$4,000	
		General Labourer	hrs	40	$60	$2,400	
		Supplies			$2,500	$2,500	
		Bulldozer-large (D9H)	hrs	40	$400	$16,000	
	Sub-Total						**$34,500**
1.2.3	**Main Zone - Waste Dump**						
	Pull Back crest of waste dump below pit (0.3ha)	235 Excavator	hrs	40	$240	$9,600	
	Pull Back crest of waste dump below 1250 portal	235 Excavator	hrs	25	$240	$6,000	
	Supervision	Site Supervisor	hrs	40	$150	$6,000	
	Sub-Total						**$21,600**
1.3	**BURNICK ZONE**						
1.3.1	**Burnick Zone - 1200 Portal**						
	Permanent Portal Seal - Based estimate on using Tires but alternate methods may be used	235 Excavator	hrs	30	$240	$7,200	
	Supply of used large truck tires	Misc.	ea	45	$100	$4,500	
	Supply & Place waste rock cap over tires	235 Excavator	hrs	20	$240	$4,800	
		D250E Haul Truck	hrs	40	$250	$10,000	
	Supply broken rock for drain at base of plug and discharge channel riprap	235 Excavator	hrs	20	$240	$4,800	
		D250E Haul Truck	hrs	40	$250	$10,000	
	Construct rock drain at base of portal plugs	235 Excavator	hrs	10	$240	$2,400	
	Supply till to line discharge channel	235 Excavator	hrs	10	$240	$2,400	
		D250E Haul Truck	hrs	20	$250	$5,000	
	Construct lined open channel for discharge from portal	235 Excavator	hrs	20	$240	$4,800	
	Load, haul & place sand for liner bedding	Load, haul and place soil cover	cu m	100	$15	$1,500	
		Compactor (Walk behind)	days	1	$125	$125	
	Supply & install liner material	Misc.	l.s.		$5,000	$5,000	
	Misc. Supplies	Misc.	l.s.			$4,500	
	Labour to assist with placing tires & cap	General Labourer	hrs	80	$60	$4,800	
	Design of rock drain and channel	Design Engineer	hrs	40	$130	$5,200	
	Supervision installation of tire plug & rock drain	Site Supervisor	hrs	50	$150	$7,500	
	Sub-Total						**$84,525**
1.3.2	**Burnick Zone - 1300 Portal**						
	Portal Size the same as 1200 Portal so use Burnick Zone - 1200 Portal Costs					$84,525	
	Adjustment for to balance with agreed cost review						
	Sub-Total						**$84,525**
1.3.3	**Burnick Zone - Waste Dump**						
	Reslope Dump below Portal (1.4ha)	Bulldozer-large (D9H)	hrs	50	$400	$20,000	
	Supervision	Site Supervisor	hrs	25	$150	$3,750	
	Sub-Total						**$23,750**
Total Estimated Cost in Reclaiming Mine Workings							**$537,000**

Table 6-4 Estimated Decommissioning Costs – Tailings Management Facilities

Item No.	Work Item Description	Equipment/ Labour	Units	Quantity	Unit Cost	Cost	Total Costs
2.0	**TAILINGS MANAGEMENT FACILITY - CURRENT CONDITIONS**						
2.1	**South Dam**						
2.1.1	Pump down Pond	Pump & minor pre-treatment	cu.m	220,000	$0.25	$55,000	
2.1.2	Remove Existing Spillway	235 Excavator	hrs	10	$240	$2,400	
		D250E Haul Truck	hrs	20	$250	$5,000	
2.1.3	Breach Dam	Excavation of Soil	cu.m	16,300	$35	$570,500	
2.1.4	Construct Spillway and Exit Channel						
	Excavate Channel	Excavation of Soil	cu.m	4,125	$35	$144,375	
	Geotextile Spillway and Channel	Supply and place Geotextile	sq.m	4,250	$10	$42,500	
	Rip Rap Spillway and Channel	Drill, Blast and Screen Rip Rap	cu.m	2,625	$65	$170,625	
		Load, Haul and Place Soil/Rip Rap	cu.m	2,625	$20	$52,500	
	Design Spillway & Channel	Design Engineer	hrs	50	$130	$6,500	
	Site Supervision Spillway and channel	Site Supervisor	hrs	60	$150	$9,000	
	Sub-Total						**$1,058,400**
2.2	**Decant Tower**						
2.2.1	Dismantle Decant Tower and Bury debris	235 Excavator w Hammer	hrs	20	$300	$6,000	
		235 Excavator	hrs	30	$240	$7,200	
		General Labourer	hrs	30	$60	$1,800	
2.2.2	Specifications/Design Plug for Decant Pipe	Design Engineer	hrs	24	$130	$3,120	
2.2.3	Plug Decant Pipe	General Labourer	hrs	80	$60	$4,800	
		Materials	l.s.			$5,500	
2.2.4	Supervision	Site Supervisor	hrs	60	$150	$9,000	
	Sub-Total						**$37,420**
2.3	**Tailings Surface**						
2.3.1	Recontour tailings surface (11ha)	Bulldozer-large (D9H)	hrs	200	$400	$80,000	
2.3.2	Remove Cofferdam and bury culvert	Bulldozer-large (D9H)	hrs	16	$400	$6,400	
2.3.3	Supervision	Site Supervisor	hrs	50	$150	$7,500	
	Sub-Total						**$93,900**
2.4	**Reclaim Dam**						
2.4.1	Pump down pond	Pumping (all-inclusive)	cu.m	340,000	$0.25	$85,000	
2.4.2	Remove Existing Spillway and exit channel. Regrade	235 Excavator	hrs	80	$240	$19,200	
		Bulldozer-large (D9H)	hrs	80	$400	$32,000	
		D250E Haul Truck	hrs	80	$250	$20,000	
2.4.2	Breach Dam	Excavation of Soil	cu.m	21,800	$35	$763,000	
2.4.3	Construct Spillway and Exit Channel						
	Geotextile Spillway and Channel	Supply and place Geotextile	sq.m	1,700	$10	$17,000	
	Rip Rap Spillway and Channel	Drill, Blast and Screen Rip Rap	cu.m	1,050	$65	$68,250	
		Load, Haul and Place Soil/Rip Rap	cu.m	1,050	$20	$21,000	
	Design Spillway & Channel	Design Engineer	hrs	50	$130	$6,500	
	Site Supervision Spillway and channel	Site Supervisor	hrs	160	$150	$24,000	
	Sub-Total						**$1,055,950**
2.5	**Camp Creek Diversion and Restoration**						
2.5.1	Breach existing diversion, remove culverts, regrade	235 Excavator	hrs	80	$240	$19,200	
		Bulldozer-large (D9H)	hrs	80	$400	$32,000	
		D250E Haul Truck	hrs	80	$250	$20,000	
2.5.2	Realign Camp Creek and riprap						
	Excavate Channel	Excavation of Soil	cu.m	9,250	$35	$323,750	
	Supply and place Geotextile	Supply and place Geotextile	sq.m	6,290	$10	$62,900	
	Supple and place Rip Rap	Drill, Blast and Screen Rip Rap	cu.m	3,885	$65	$252,525	
		Load, Haul and Place Soil/Rip Rap	cu.m	3,885	$20	$77,700	
	Design of Channel Realignment	Design Engineer	hrs	40	$130	$5,200	
	Site Supervision of channel realignment	Site Supervisor	hrs	160	$150	$24,000	
	Sub-Total						**$817,275**
2.6	**Interceptor Ditches**						
2.6.1	Breach ditches and recontour	Bulldozer-large (D9H)	hrs	30	$400	$12,000	
	Sub-Total						**$12,000**
2.7	**Tailings pipeline (1.9km)**						
2.7.1	Remove Pipeline	235 Excavator	hrs	50	$240	$12,000	
		D250E Haul Truck	hrs	50	$250	$12,500	
		General Labourer	hrs	100	$60	$6,000	
		Site Supervisor	hrs	20	$150	$3,000	
	Sub-Total						**$33,500**
2.8	**Reclaim pipeline (0.8km)**						
2.8.1	Remove Pipeline	235 Excavator	hrs	20	$240	$4,800	
		D250E Haul Truck	hrs	20	$250	$5,000	
		General Labourer	hrs	40	$60	$2,400	
		Site Supervisor	hrs	10	$150	$1,500	
	Sub-Total						**$13,700**
Total Estimated Cost in Reclaiming TMF							**$3,122,000**

Table 6-5 Estimated Decommissioning Costs – Demolition and Reclamation

Item No.	Work Item Description	Equipment/ Labour	Units	Quantity	Unit Cost	Cost	Total Cost
3.0	**INFRASTRUCTURE: BUILDINGS, STRUCTURES AND SERVICES**						
3.1	**Concentrator Buildings (incl. Whse, crusher building, load out)**						
	Remove salvageable equipment	General Labourer	hrs	704	$60	$42,240	
		Trades Labourer	hrs	880	$70	$61,600	
	Dismantle Building - Manpower	General Labourer	hrs	1200	$60	$72,000	
	Dismantle Building - Manpower	Trades Labourer	hrs	720	$70	$50,400	
	Dismantle Building - Equipment	235 Excavator	hrs	120	$240	$28,800	
	Dismantle Building - Equipment	30 ton Crane	hrs	120	$200	$24,000	
	Concrete Demolition	235 Excavator	hrs	80	$240	$19,200	
		235 Excavator w Hammer	hrs	80	$300	$24,000	
	Reslope, contour & bury	Bulldozer-large (D9H)	hrs	48	$400	$19,200	
	Misc. Supplies & Tools	Misc.	l.s.			$11,000	
	Scrap haul to landfill	235 Excavator	hrs	160	$240	$38,400	
		D250E Haul Truck	hrs	240	$250	$60,000	
	Subtotal:						**$450,840**
3.2	**Power House and Power Lines**						
	Remove salvageable equipment	General Labourer	hrs	240	$60	$14,400	
		Trades Labourer	hrs	240	$70	$16,800	
	Salvage and remove powerline and poles		l.s.			$27,500	
	Dismantle Building - Manpower	Trades Labourer	hrs	160	$70	$11,200	
	Dismantle Building - Equipment	235 Excavator	hrs	80	$240	$19,200	
	Concrete Demolition	235 Excavator	hrs	40	$240	$9,600	
		235 Excavator w Hammer	hrs	40	$300	$12,000	
	Reslope, contour & bury	Bulldozer-large (D9H)	hrs	24	$400	$9,600	
	Misc. Supplies & Tools	Misc.	l.s.			$1,650	
	Scrap haul to landfill	235 Excavator	hrs	30	$240	$7,200	
		D250E Haul Truck	hrs	40	$250	$10,000	
	Subtotal:						**$139,150**
3.3	**Water Supply**						
	Remove salvageable equipment - pipeline/pumps	General Labourer	hrs	48	$60	$2,880	
		Trades Labourer	hrs	98	$70	$6,860	
	Remove pipeline	D250E Haul Truck	hrs	100	$250	$25,000	
		235 Excavator	hrs	100	$240	$24,000	
		General Labourer	hrs	200	$60	$12,000	
	Dismantle Building - Manpower	General Labourer	hrs	20	$60	$1,200	
	Dismantle Building - Equipment	235 Excavator	hrs	16	$240	$3,840	
	Misc. Supplies & Tools	Misc.	l.s.			$550	
	Reslope, contour & bury	Bulldozer-large (D9H)	hrs	16	$400	$6,400	
	Subtotal:						**$82,730**
3.4	**North Creek Dyke**						
	Excavation of Soil	Unit cost basis	cu.m	1600	$35	$56,000	
	Remove culverts	Misc.	l.s.			$4,400	
	Drill, Blast and Screen Rip Rap	Unit cost basis	cu.m	20	$65	$1,300	
	Load, Haul and Place Soil/Rip Rap	Unit cost basis	cu.m	20	$20	$400	
	Subtotal:						**$62,100**
3.5	**Service Garage**						
	Dismantle Building - Manpower	General Labourer	hrs	48	$60	$2,880	
		Trades Labourer	hrs	24	$70	$1,680	
	Dismantle Building - Equipment	235 Excavator	hrs	10	$240	$2,400	
	Concrete Demolition	235 Excavator w Hammer	hrs	10	$300	$3,000	
	Reslope, contour & bury	Bulldozer-large (D9H)	hrs	8	$400	$3,200	
	Misc. Supplies & Tools	Misc.	l.s.			$550	
	Scrap haul to landfill	235 Excavator	hrs	6	$240	$1,440	
		D250E Haul Truck	hrs	8	$250	$2,000	
	Subtotal:						**$17,150**
3.6	**Accommodation/Camp Trailers Buildings/Office**						
	Remove salvageable equipment	General Labourer	hrs	140	$60	$8,400	
		Trades Labourer	hrs	48	$70	$3,360	
	Dismantle Buildings - Manpower	General Labourer	hrs	380	$60	$22,800	
		Trades Labourer	hrs	32	$70	$2,240	
	Dismantle Building - Equipment	235 Excavator	hrs	20	$240	$4,800	
	Remove septic tanks & clean line	General Labourer	hrs	24	$60	$1,440	
	Reslope, contour & bury	Bulldozer-large (D9H)	hrs	48	$400	$19,200	
	Misc. Supplies & Tools	Misc.	l.s.			$825	
	Scrap haul to landfill	235 Excavator	hrs	12	$240	$2,880	
		D250E Haul Truck	hrs	20	$250	$5,000	
	Subtotal:						**$70,945**
3.7	**Explosive Magazine**						
	Remove from site	Misc.	l.s.			$2,500	
	Subtotal:						**$2,500**
3.8	**Miscellaneous Buildings & Structures**						
	Remove salvageable equipment - Manpower	General Labourer	hrs	280	$60	$16,800	
		Trades Labourer	hrs	280	$70	$19,600	
	Remove salvageable equipment - Equipment	Hiab Flatdeck truck	hrs	280	$150	$42,000	
		Loader-small (Cat 950)	hrs	280	$225	$63,000	
	Dismantle Building - Manpower	General Labourer	hrs	280	$60	$16,800	
		Trades Labourer	hrs	140	$70	$9,800	
	Dismantle Building - Equipment	235 Excavator	hrs	40	$240	$9,600	
	Concrete Demolition	235 Excavator w Hammer	hrs	40	$300	$12,000	
	Reslope, contour & bury	Bulldozer-large (D9H)	hrs	80	$400	$32,000	
	Misc. Supplies & Tools	Misc.	l.s.			$2,750	
	Scrap haul to landfill	235 Excavator	hrs	30	$240	$7,200	
		D250E Haul Truck	hrs	40	$250	$10,000	
	Subtotal:						**$241,550**
3.9	**Industrial Reagents, Fuels & Waste**						
	Industrial Reagents	Misc.	l.s.			$16,500	
	Fuels	Misc.	l.s.			$11,000	
	Wastes	Misc.	l.s.			$11,000	
	Subtotal:						**$38,500**
3.10	**Spill Clean**						
	Concentrator haul out	lump sum	l.s.			$82,500	
	Other Building/Site spill clean up	lump sum	l.s.			$82,500	
	Hydrocarbon Contaminated Soils clean up	lump sum	l.s.			$385,000	
	Subtotal:						**$550,000**
3.11	**Demolition Overheads**						
	Supervision	Site Supervisor	hrs	1000	$150	$150,000	
	Mob/Demob	Misc.	l.s.			$0	
	Office/Admin Costs	Misc.	l.s.			$5,500	
	Subtotal:						**$155,500**
3.12	**Landfill**						
	Design/build new landfill facility	Misc.	l.s.			$50,000	
	Subtotal:						**$50,000**
Total Estimated Cost in Infrastructure: Buildings, Structures and Services							**$1,861,000**

Table 6-6 Estimated Decommissioning Costs – Land Reclamation & Revegetation

Item No.		Equipment/ Labour	Units	Quantity	Unit Cost	Cost	Total Cost
4.0	**LAND RECLAMATION & REVEGETATION**						
4.1	**Roads and Trails**						
4.1.1	**Exploration Trails**						
	stabilize slopes - erosion barriers	Erosion barriers	per linear m	4000	$8	$32,000	
	Revegetation- use a per ha. cost that includes application	Seed/Fertilizer Application	ha	10	$8,000	$80,000	
	Subtotal:						**$112,000**
4.1.2	**Main Access Road**						
	road barrier	Misc.	l.s.			$3,300	
	culvert excavation	235 Excavator	hrs	500	$240	$120,000	
	culvert removal	D250E Haul Truck	hrs	500	$250	$125,000	
	scarify	16H grader	hrs	200	$325	$65,000	
	recontour slopes	Bulldozer-large (D9H)	hrs	200	$400	$80,000	
	stabilize slopes - erosion barriers	Erosion barriers	per linear m	5000	$8	$40,000	
	Revegetation- use a per ha. cost that includes application	Seed/Fertilizer Application	ha	65	$8,000	$520,000	
	Subtotal:						**$953,300**
4.1.3	**Service and Haul Roads within the Minesite**						
	road barrier	Misc.	l.s.			$3,300	
	culvert excavation	235 Excavator	hrs	200	$240	$48,000	
	culvert removal	D250E Haul Truck	hrs	200	$250	$50,000	
	scarify	16H grader	hrs	48	$325	$15,600	
	recontour slopes	Bulldozer-large (D9H)	hrs	60	$400	$24,000	
	stabilize slopes - erosion barriers	Erosion barriers	per linear m	3500	$8	$28,000	
	Revegetation- use a per ha. cost that includes application	Seed/Fertilizer Application	ha	16	$8,000	$128,000	
	Subtotal:						**$296,900**
4.2	**Non-Linear Developments**						
4.2.1	**Tailings Management Facility**						
	Cover installation - rock fill for base in wet areas (**33%** of 11.8 ha, 1 m depth)	Haul & Place rock cover	cu.m	38,940	$15	$584,100	
	Cover installation - haul soil and place (300 mm depth over entire area)	Load, haul and place soil cover	cu.m	35400	$15	$531,000	
	Grading of surface	Bulldozer-large (D9H)	hrs	100	$400	$40,000	
	Revegetation- use a per ha. cost that includes application	Seed/Fertilizer Application	ha	11.8	$8,000	$94,400	
	Subtotal:						**$1,249,500**
4.2.2	**Reclaim Pond**						
	pond clean up	Misc.	l.s.			$11,000	
	Cover installation - rock fill for base in wet areas (25% of 4 ha, 1 m depth)	Haul & Place rock cover	cu.m	10000	$15	$150,000	
	Cover installation - haul soil and place (300mm cover on rock cover area)	Load, haul and place soil cover	cu.m	3000	$15	$45,000	
	Grading of surface	Bulldozer-large (D9H)	hrs	40	$400	$16,000	
	Revegetation- use a per ha. cost that includes application	Seed/Fertilizer Application	ha	4	$8,000	$32,000	
	Subtotal:						**$254,000**
4.2.3	**Waste Dumps**						
	Revegetation- use a per ha. cost that includes application	Seed/Fertilizer Application	ha	6	$8,000	$48,000	
	Subtotal:						**$48,000**
4.2.4	**Sediment Ponds**						
	Jewel Box sediment pond - recontour and slope	235 Excavator	hrs	12	$240	$2,880	
	Main Zone sediment pond - recontour and slope	235 Excavator	hrs	6	$240	$1,440	
	Sediment Pond solids haul	D250E Haul Truck	hrs	20	$250	$5,000	
	Burnick sediment pond - recontour and slope	235 Excavator	hrs	10	$240	$2,400	
	Revegetation- use a per ha. cost that includes application	Seed/Fertilizer Application	ha	1	$8,000	$8,000	
	Subtotal:						**$19,720**
4.2.5	Disturbed Sites (incl. Mill), Landfill Areas and Borrow Pits						
	LTF-prepare detailed closure plan		l.s.			$2,000	
	Characterize final soil hydrocarbon concentrations		l.s.			$3,000	
	Re-grade & compact LTF area (0.5 ha)	Bulldozer-large (D9H)	hrs	5	$400	$2,000	
	Re-grade & compact landfill areas (2 ha)	Bulldozer-large (D9H)	hrs	50	$400	$20,000	
	Cover installation-haul soil & place (250mm cover over compacted landfill & LTF areas)	Load, haul and place soil cover	cu.m	6250	$15	$93,750	
	Compact cover over landfill areas	Bulldozer-large (D9H)	hrs	50	$400	$20,000	
	Revegetation of all misc disturbed sites - use per ha cost including application	Seed/Fertilizer Application	ha	8	$8,000	$64,000	
	Subtotal:						**$204,750**
Total Estimated Cost in Land Reclamation and Revegetation							**$3,138,000**

Table 6-7 Estimated Decommissioning Costs For Current Site Status – Post Closure Management

Item No.	Work Item Description	Equipment/ Labour	Units	Quantity	Unit Cost	Cost	Total Cost
5.0	**POST CLOSURE SITE MANAGEMENT**						
5.1	**Organization, Site Access & Security, Overhead Costs**						
	Pre-Closure Planning/Organizing	Project Manager	monthly	4	$20,000	$80,000	
	Overall Off-stie Project Manager Incld. Travel	Project Manager	monthly	28	$20,000	$560,000	
	On-Site Management Team (Site Superintendent, Safety, Environmental, Survey/Drafting, Clerk)	Turn Key Cost	monthly	15	$170,000	$2,550,000	
	On-Site Offices, Lunch Rooms, Wash Rooms (Mob/Demob/Rental)	Rental	monthly	36	$7,600	$270,000	
	Safety Supplies	Materials	l.s.	1	$75,000	$75,000	
	Main Access Road Maintenance	Misc.	per year	3	$55,000	$165,000	
	Allowance for other Undefined Site Costs		l.s.	1	$150,000	$150,000	
	Misc. Office/Supply/Misc. Costs	Misc.	per year	3	$10,000	$30,000	
	Subtotal:						**$3,880,000**
5.2	**Supporting Studies**						
	Water Quality Modelling for Selected Closure Plan	Misc.	l.s.	1		$10,000	
	Preparation of required AMPs	Misc.	l.s.	1		$20,000	
	Subtotal:						**$30,000**
5.3	**Supervision and Documentation of Work**						
	Site environmental monitoring, reporting, documentation (5 yrs of p-c)	Environmental Monitor	quarterly	20	$10,000	$200,000	
	Document Reviews/Storage	Misc.	l.s.	1		$10,000	
	Final as built plan	Design Engineer	hrs	160	$130	$20,800	
	Subtotal:						**$230,800**
5.3	**Compliance Monitoring and Reporting**						
	Water Quality Monitoring - During Closure implementation (3yrs) - analytical	Misc.	l.s.			$64,900	
	Water Quality Monitoring - During Closure implementation (3 yrs)- Heli	Misc.	l.s.			$18,480	
	Water Quality Monitoring - Post Closure - Analytical/Collection	Misc.	l.s.			$76,560	
	Water Quality Monitoring - Post Closure - Heli/Travel	Misc.	l.s.			$77,880	
	Geotechnical Inspection - During Closure implementation (3 yrs)	Misc.	years	3	$13,200	$39,600	
	Geotechnical Inspection - Post closure	Misc.	years	5	$13,200	$66,000	
	Biological Monitoring - Professional fees - Closure implementation	Misc.	per event	1	$11,000	$11,000	
	Biological Monitoring - Helicopter & Lab Analysis - implementation	Misc.	per event	1	$6,050	$6,050	
	Biological Monitoring - Professional fees - Post closure	Misc.	per event	3	$11,000	$33,000	
	Biological Monitoring - Helicopter & Lab Analysis - Post closure	Misc.	per event	3	$6,050	$18,150	
	Subtotal:						**$411,620**
5.4	**Post Closure Maintenance**						
	Misc. Maintenance work related to the site after closure	Misc.	per year	5	$10,000	$ 50,000	
	Subtotal:						**$50,000**
Total Estimated Post Closure Site Management							**$4,602,000**

7.0 REFERENCES

Table 1-1, in Section 1, provides a complete list of documents and reports that were reviewed in updating of the Detailed Decommissioning and Reclamation Plan for Sä Dena Hes Mine.

Azimuth. (2013). *Sa Dena Hes Mine: Problem Formulation for the Human Health and Ecological Risk Assessment, dated June 2013.*

Azimuth. (2014a). *Sa Dena Hes Mine - Data Report in Support of the Human Health and Ecological Risk Assessments, dated April 2014.*

Azimuth. (2014b). *Sa Dena Hes Mine Human Health Risk Assessment (HHRA), dated April 2014.*

Azimuth. (2014c). *Sa Dena Hes Mine Interim Results of the Ecological Risk Assessment (ERA) to Guide Closure Planning, Draft for Agency and Stakeholder Review, dated April 2014*.

Azimuth. (2014d). *Volume 1: Updated Problem Formulation for the Ecological Risk Assessment, September 2014.*

Azimuth. (2014e). *Volume 2: Draft Ecological Risk Assessment for the Terrestrial Environment, dated Sept. 2014.*

Azimuth. (2015a). *Volume 1: Addendum to the Problem Formulation for the Ecological Risk Assessment, August 2015.*

Azimuth. (2015b). *Volume 2: Addendum to the Ecological Risk Assessment for the Terrestrial Environment, August 2015.*

Azimuth. (2015c). *Volume 3: Draft Ecological Risk Assessment for the Aquatic Environment. In Progress.*

Azimuth. (2015d). *Techical Memo: Sa Dena Hes Mine Human Health Risk Assessment Update, In progress.*

Azimuth. (2015e). *Memorandum: Effectiveness of 0.15 m Cover to Mitigate Potential Human Health Risks, dated May 4, 2015.*

Canadian Council of Ministers of the Environment, (CCME), 2007. "*CCME Canadian Water Quality Guidelines*".

Coopers & Lybrand and Cominco Ltd., 1994. "*Sä Dena Hes 1993 Annual Report to the Yukon Territory Water Board, Licence IN90-002".*

Craig, D.B., Craig, J.E., Pelletier, K., Emond, D. and Copland, H., 1998. "*Reclamation Practices and Research on Mineral Exploration Properties in the Yukon Territory".* Mineral Resources Directorate, Yukon Region, Indian & Northern Affairs Canada, 36 p.

Energy, Mines & Resources, Government of Yukon. 2006. *Yukon Mine Site Closure and Reclamation policy. January 2006.* ISBN 1-55362-273-1

Environment Canada. 2012. *Federal Contaminated Sites Action Plan (FCSAP) Ecological Risk Assessment Guidance. Prepared for Environment Canada by Azimuth Consulting Group Partnership.*

Federal Contaminated Site Human Health Risk Assessment in Canada, published by Health Canada, as amended from time to time. Available at http://www.hc-sc.gc.ca/ewh-semt/contamsite/risk-risque-eng.php. See specifically:

- Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA)
- Part V: Guidance on Complex Human Health Detailed Quantitative Risk Assessment for Chemicals (DQRAchem)

Gebauer & Associates Ltd. (2015). *Technical Memorandum: Sa Dena Hes Mine - Burrowing Depths for Common Shrew, Deer Mouse, and Arctic Ground Squirrel in Subalpine and Alpine Habitats, dated Feb. 3, 2015.*

Golder Associates Ltd. (Golder), 2013a. *"Phase I and II Environmental Site Assessment Sä Dena Hes Mine Yukon Territory, February 1, 2013".*

Golder Associates Ltd. (Golder), 2013b. *"Pre-Demolition Hazardous Building Materials Assessment, Mine Infrastructure and Camp Buildings, Sä Dena Hes Mine Yukon Territory, February 1, 2013".*

Golder Associates Ltd. (Golder), 2013c. *"Pre-Demolition Hazardous Building Materials Assessment, Concentrator Complex and Associated Structures Sä Dena Hes Mine Yukon Territory, February 1, 2013".*

Golder Associates Ltd. (2014a). *Technical Memorandum - Sa Dena Hes Mine Closure - 2013 Analytical Data Summary for Soil Assessment Work, dated April 8, 2014.*

Golder Associates Ltd. (2014b). Technical Memorandum - *Sa Dena Hes Mine Closure - 2013 Analytical Data Summary for Hydrogeological Assessment Work, dated April 9, 2014.*

Golder. (2014c). *Phase I and Phase II Environmental Site Assessment, 303 Robert Campbell Hwy, Watson Lake, YT, December 11, 2014.*

Golder Associates Ltd. (2015a). *Environmental Site Assessment Report, Sa Dena Hes Mine, Yukon Territory, dated May 7, 2015.*

Golder. (2015b). *Observations of Soil Geochemistry at the Closed Sa Dena Hes Mine Site, Yukon. Technical memorandum prepared for Azimuth Consulting Group. May 14, 2015.*

Golder. (2015c). *Remediation Options Analysis - Sa Dena Hes Mine, Yukon Territory. dated May 15, 2015.*

Golder. (2015d). *Results of Soil Characterization - Former South Reclaim Dam Material, Sa Dena Hes Mine, Yukon Territory, dated August 27, 2015.*

INAC, 1992. *Mine Reclamation in Northwest Territories and Yukon*. Northern Water Resources Studies, Indian and Northern Affairs Canada.

Steffen Robertson and Kirsten (Canada) Inc. (SRK), 2000. *" Geochemical Studies Sä Dena Hes Mine, November 2000."* Report 1CC005.06.

Steffen Robertson and Kirsten (Canada) Inc. (SRK), 2002. *" Geochemical Reports Sä Dena Hes Mine, March 2003."* Report 1CT008.000.

Steffen Robertson and Kirsten (Canada) Inc. (SRK), *"Sä Dena Hes Mine Water Quality and Loading Re-Assessment. January 2005."* Report 1CT006.008.

SRK. (2014a). *Sa Dena Hes Mine: Burnick and Jewelbox Crown Pillar Stability Assessment, dated March 27, 2014*.

SRK. (2014b). *Sa Dena Hes Quarry Development Plan, March 2014.*

SRK. (2014c). *Technical memorandum Sa Dena Hes - Potential for Evaporite Salt Formation on Tailings Cap, dated March 19, 2014.*

SRK. (2014d). *Waste Rock Dump Stability Assessment, Sa Dena Hes Project, dated March 19, 2014.*

SRK. (2014e). *Post-Closure Surface Water Quality Predictions, September 2014.*

SRK. (2015). *Sa Dena Hes - Performance Evaluation of Jewelbox Pit Waste Rock Soil Cap, dated March 27, 2015.*

Teck Cominco Ltd. 2001. "*Sä Dena Hes, 2000 Annual Report, Yukon Water Licence QZ97-025."*

Teck Cominco Ltd. 2002. "*Sä Dena Hes, 2001 Annual Report, Yukon Water Licence QZ97-025."*

Teck Cominco Ltd. 2003. "*Sä Dena Hes, 2002 Annual Report, Yukon Water Licence QZ99-045."*

Teck Cominco Ltd. 2003. *"Sä Dena Hes Mine 2003 Dam Safety Review."* November 2003. Report M09171 A01.500. Prepared by Klohn Crippen Consultants Ltd.

Teck Cominco Ltd. 2004. "*Sä Dena Hes, 2003 Annual Report, Yukon Water Licence QZ99-045."*

Teck Cominco Ltd., 2004. *"Environmental Emergency Response & Procedures Plan."* Sä Dena Hes Mine, Yukon Territory. Prepared by Access Consulting Group.

Teck Cominco Ltd. 2005. *"Temporary Closure Site Status Report as of January 2005."* Sä Dena Hes

Teck Cominco Ltd. 2005. *"Sä Dena Hes, 2004 Annual Report, Yukon Water Licence QZ99-045."*

Teck Cominco Ltd. 2006. *"Sä Dena Hes, 2005 Annual Report, Yukon Water Licence QZ99-045."*

Teck Cominco Ltd. 2007. *"Sä Dena Hes, 2006 Annual Report, Yukon Water Licence QZ99-045."*

Teck Cominco Ltd. 2008. *"Sä Dena Hes, 2007 Annual Report, Yukon Water Licence QZ99-045."*

Teck Cominco Ltd. 2009. *"Sä Dena Hes Mine, 2008 Annual Report, Yukon Water Licence QZ99-045."*

Teck Metals Ltd. 2010. "*Sä Dena Hes Mine, 2009 Annual Report, Yukon Water Licence QZ99-045."*

Teck Metals Ltd. 2011. "*Sä Dena Hes Mine, 2010 Annual Report, Yukon Water Licence QZ99-045."*

Teck Metals Ltd. 2012. "*Sä Dena Hes Mine, 2011 Annual Report, Yukon Water Licence QZ99-045."*

Teck. (2015). *Memorandum: Briefing Note in support of DDRP - Review of 2014-2015 Human Health and Ecological Risk Assessment Results and Proposed Risk Management Approach for the Sa Dena Hes, Sa Dena Hes Mine Closure, dated May 29, 2015.*

Yukon Environment. 2011. *Protocol for the Contaminated Sites Regulation under the Environment Act. Protocol 12: Risk Assessment Methods. March 2011.*

Yukon Environment. 2010. *Fact Sheet: Risk Assessment and Risk Management. CSR#3. May 2010.*