TECHNICAL MEMORANDUM

DATE April 9, 2014 **REFERENCE No.** 1210210006-016-TM-Rev1-7000

TO Ms. Michelle Unger
Teck Metals Ltd.

FROM Tamra Reynolds
Gary Hamilton

EMAIL Tamra_Reynolds@golder.com
Gary_Hamilton@golder.com

SÄ DENA HES MINE CLOSURE – 2013 ANALYTICAL DATA SUMMARY FOR HYDROGEOLOGICAL ASSESSMENT WORK

This technical memorandum presents the results of groundwater assessment work that was completed between July 31 and October 24, 2013, at Sa Dena Hes Mine, located approximately 70 km north of Watson Lake, Yukon Territory (the Site, refer to Figure 1 – Key Plan and Figure 2 – Site Plan). The groundwater assessment work was completed by Golder Associates Ltd. (Golder) on behalf of Keyeh Nejeh Golder Corporation (KNG) and Teck Metals Ltd. (Teck).

The objectives of this technical memorandum are to provide a summary of data that was collected as part of 2013 field activities and to support site closure and human health and ecological risk assessment activities. A report including further interpretation will be updated following the 2014 field work.

1.0 BACKGROUND

Sä Dena Hes Mine is permitted under a Yukon Quartz Mining Act Production License and a Type A Water Use License. Both permits are to expire on December 31, 2015. On January 28, 2013, the “Temporary Closure” status of the mine expired, and the mine entered a “Permanent Closure” phase. In 2012, KNG completed a Phase I and II Environmental Site Assessment (ESA) for the Site. The results of the Phase II ESA identified eight Areas of Environmental Concern (AECs) at the Site. Five of the AECs indicated a potential for impact to groundwater. These five AECs are shown in Table A, below.

Table A: Areas of Environmental Concern

AEC	Summary	Potential Contaminants of Concern (PCOC)
AEC 1 – Jewelbox Hill	A former metal shop existed at this location as part of underground mine activities. Above ground storage tanks (ASTs) containing fuel were also located in this area.	**Soil:** arsenic, cadmium, chromium, copper, lead, molybdenum, selenium, zinc, LEPHs/HEPHs/PAH[1], VOCs[2] **Groundwater:** cadmium
AEC 2 – Burnick Zone (1200 Portal)	A metal shop and an AST are still present in this area of the mine property. The shop was used as part of underground mine activities in the Burnick Zone.	**Soil:** arsenic, cadmium, zinc, LEPHs/HEPHs/PAHs[1], VOCs[2] **Groundwater:** cadmium

AEC	Summary	Potential Contaminants of Concern (PCOC)
AEC 3 – Mill Site	Includes the main concentrator complex, former Golden Hill Shop, ASTs containing fuel and former laboratory and warehouses.	**Soil:** arsenic, cadmium, lead, molybdenum, selenium, zinc, LEPHs/HEPHs/PAH[1], VOCs[2] **Groundwater:** cadmium, lead, selenium, zinc
AEC 8 – Tailings and Reclaim Ponds	Tailings generated as part of the mining process were directed to a series of ponds northeast of the Mill Site. Portions of the tailings ponds have been drained, exposing tailings sediment on the ground surface. The tailings contain elevated concentrations of metals.	**Soil:** arsenic, cadmium, lead, selenium, zinc **Groundwater:** cadmium, lead, zinc
AEC 9 – Main Zone Portal	Includes the Waste Rock Dump, the 1250 Portal, Sediment Pond and 1380 Gully.	**Soil:** arsenic, cadmium, lead, selenium, silver, zinc **Groundwater:** arsenic, cadmium lead, zinc

Notes:
1. An assessment of hydrocarbon contamination in soil was not completed as part of Golder's Phase II ESA, though the presence of petroleum hydrocarbon contamination in soil has been confirmed based on previous investigations completed by Access Consulting Group.
2. Volatile Organic Compounds (VOCs) remain a potential contaminant of concern in soil, as test pits were not completed in close vicinity to the Mill Site buildings.

Based on the results of the Phase II ESA, groundwater was assessed for the contaminants of concern at each of the five AECs, and in other areas for coverage across the site and to determine background concentrations. The scope of work that was completed is described in the following section.

2.0 SCOPE OF WORK

The scope of work that was prepared as part of the 2013 field program was described in Golder's letter entitled "*Work Plan and Cost Estimate - 2013 Hydrogeological Assessment, Sä Dena Hes Mine, Yukon Territory*" (dated July 10, 2013).

Groundwater monitoring was proposed to assess whether contamination is migrating from the AECs towards receiving environments. The hydrogeological assessment was designed to:

- Determine the direction and rate of groundwater flow;
- Assess travel times for potential contaminant pathways; and
- Assess the groundwater in AECs for Potential Contaminants of Concern (PCOC).

The primary tasks that were completed during the 2013 field season and summarized in this technical memorandum, included:

- Identifying and monitoring existing wells on site;

- Planning the drilling locations for new monitoring wells to assess the site hydrogeology and the groundwater quality at the various AECs. The drilling was overseen by Golder;
- Monitoring and sampling of the groundwater monitoring wells for the PCOC on subsequent site visits;
- Groundwater response testing at select monitoring wells across the site;
- Surface water sampling at key locations for hydrocarbon analysis (sampling completed by SRK Consulting Inc.); and
- Preparation of a data summary (this memorandum) with recommendations for follow-up work.

3.0 REGULATORY FRAMEWORK

In the Yukon Territory, environmental matters pertaining to contaminated sites generally fall under the jurisdiction of Environment Yukon, pursuant to the *Environment Act.* Matters pertaining to mine closure would fall under the jurisdiction of Energy, Mines and Resources, pursuant to the *Yukon Quartz Mining Act* and *Waters Act.*

The two key regulations under the *Environment Act* relating to the assessment and remediation of contaminated sites are the Contaminated Sites Regulation (CSR) (Environment Yukon), and the Special Waste Regulations (SWR) (Environment Yukon, updated April 1, 2009). Only groundwater was assessed during this hydrogeological assessment. Soil samples collected during the drilling program were not submitted for laboratory analysis due to the drilling technique which highly disturbs the soil cuttings.

3.1 Water Quality Standards

The CSR provides Generic Numerical Water Standards (Schedule 3) for use in the assessment of water quality at sites subject to investigation (Environment Yukon, 2002). Water Quality Standards are divided into four different categories based on water use and include: standards based on the protection of freshwater and marine aquatic life (AW-F/AW-M), standards based on the use of water for irrigation purposes (IW), standards based on the consumption of water by livestock (LW), and standards based on the consumption of drinking water by humans (DW).

Based on the potential discharge of groundwater to surface water bodies near the Site, water quality standards for the protection of freshwater aquatic life were applied at the Site.

Environment Yukon *Protocol 6: Application of Water Quality Standards* (Protocol 6) provides guidance on the application of water quality standards to groundwater or receiving water body (surface water).

4.0 FIELD METHODS

4.1 Existing Wells

Golder completed a site reconnaissance in June 2013 to locate any monitoring wells installed in 1991 as part of a former water supply investigation for the mine site. Ten wells were found, located primarily at the reclaim dam, north dam, and along North Creek. These wells were used to assess the groundwater conditions at these locations. Additional drilling locations were placed to cover the other AECs on the Site.

4.2 Drilling Investigation

Golder oversaw the drilling of 14 boreholes across the Site. The boreholes were drilled with an air rotary drill rig from Impact Well Drilling of Whitehorse, YT. The locations are identified in Figure 2 and described as follows:

- To assess AEC 1 (Jewelbox) monitoring well MW13-03 was drilled near the source and MW13-02, and MW13-05 were drilled down-gradient.
- To assess AEC2 (Burnick) monitoring well MW13-06 was drilled near the source. TH01-91, TH10-91 and TH13-91 (existing wells) are also located down-gradient.
- To assess AEC3 (Mill Site) monitoring well TH13-14 was drilled on the north side of the mill, and MW13-08 and MW13-10 were drilled down-gradient.
- To assess AEC8 (Tailings and Reclaim Ponds) monitoring wells MW13-09, MW13-11, MW13-12 and MW13-07 were installed.
- To assess AEC9 (Main Zone portal) monitoring wells MW13-01 and MW13-13 were installed. SRK conducted an evaluation of these wells as part of their conceptual site model for this area.
- Monitoring well MW13-04 was installed as a background location, south of the site.
- Monitoring wells MW13-01 and MW13-13 were installed to assess the groundwater flow in the 1380 gully.

During drilling, the soil and bedrock was observed and a stratigraphic borehole log was kept. Samples were not collected for laboratory analysis due to the drilling method which highly disturbs the soil and rock.

At each drilling location a monitoring well was installed except at TH13-14 where no water was encountered. At this location the bedrock hole was left open and the protective casing was left in place across the overburden and a lid attached. At other locations, the borehole was completed with a monitoring well that consisted of a 2-inch diameter (0.05 m), 20 slot PVC screen across the potential water bearing zone and solid PVC pipe. The depth of the screened section was based on the ground conditions and where water was encountered. Screens were installed in the overburden if groundwater was encountered. If water wasn’t encountered in the overburden, the borehole was extended into the bedrock and the screen was set in the first saturated water bearing zone encountered. Silica sand was placed between the well screen and the sidewall of the borehole and extended to at least 0.3 m over the top of the screen. Coated bentonite chips were placed to at least 1 m above the silica sand with grout extended to near ground surface. A steel casing with a lockable lid was cemented in place to protect the monitoring well. Monitoring well completion details are provided in the borehole logs in Attachment 1. Monitoring well installations were completed as per YCSR Protocol No. 7: Groundwater Monitoring Well Installation, Sampling and Decommissioning with the exception that four of the wells, all installed in bedrock were completed with screens longer than 3 m. The bedrock at these locations (MW13-01, MW13-02, MW13-03 and MW13-12) was highly competent with little to no water-bearing fractures. During drilling through the bedrock, at approximately 6 m intervals, the hole was kept open for a period of time before advancing to determine whether groundwater had been encountered. For this reason the depth of the water bearing zone could not be accurately determined and a longer screen was used to make sure that if water was encountered over the previous drilling interval, that the entire length was screened. At TH13-14 where it was not thought that groundwater was encountered, the casing was left in across the overburden and the bedrock portion kept open to enable monitoring for the presence of groundwater.

4.3 Groundwater Monitoring and Sampling

During the groundwater monitoring program, groundwater samples were collected using standard Golder procedures. The depths to groundwater were initially measured using a water level meter in order to calculate the volume of water in the well. Due to the depth to water in the majority of the wells a dedicated disposable bailer was used to remove water from each well. Approximately three well volumes were removed with the bailer. Water was collected from the outflow at regular intervals and parameters consisting of pH, temperature and electrical conductivity were measured using a handheld meter. Once more than three well volumes was removed and the parameters had stabilized (i.e., changes in pH, temperature and electrical conductivity measurements between three successive readings were less than 10%), samples were collected in pre-cleaned containers supplied by Maxxam Laboratory (Maxxam) for analysis of Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Volatile Petroleum Hydrocarbons (VPHw), Light and Heavy Extractable Petroleum Hydrocarbons (LEPHw/HEPH), Polycyclic Aromatic Hydrocarbons (PAH), and/or dissolved metals and anions depending on the PCOC at each location. The collected samples were stored in coolers with ice and shipped to Maxxam under standard Golder Chain-of-Custody procedures. Response testing was conducted at five locations by using a solid slug and a data-logger. Both rising and falling head tests were completed with the data analyzed upon returning to the office using AQTESOLV™ software.

Surface water samples were collected by SRK Consulting Inc. (SRK) at locations down-gradient of the Main Zone and the Mill Site from seeps and from locations along Camp Creek. The sampling locations are shown on Figure 2. The water samples were submitted to Maxxam for analysis of LEPHw/HEPH and PAHs.

A surveying contractor hired by Teck surveyed the location and elevation of the top of each well at a later date and the elevations were provided to Golder. The surveyed elevation and depth to water allowed the groundwater elevation at each location to be determined and the groundwater flow directions to be assessed.

5.0 RESULTS

5.1 Stratigraphy

The geology encountered during the drilling at Jewelbox consisted of gravelly Sand to approximately 3 m underlain by grey phyllite bedrock to over 30.5 m depth. Fractures were not encountered until approximately 25 m bgs. At Burnick, there was Sand and Gravel to 4.5 m, underlain by silty Sand to 10.4 m followed by black phyllite bedrock to over 49 m. To the east of the Mill Site, there was Sand and Gravel to 2 m, underlain by silty Sand to 12 m followed by grey phyllite bedrock. To the north of the Mill Site bedrock was encountered at 3 m depth. Surrounding the Tailings and Reclaim ponds, silty Sand was encountered to 4 m, underlain by grey phyllite bedrock. Borehole logs are provided in Attachment 1.

5.2 Groundwater Elevations and Flow Directions

Groundwater elevations were measured at monitoring wells across the Site on July 31, August 25, September 26 and October 24, 2013, prior to sampling, and are shown in Table 1. The depth to groundwater ranged between 3 and 50 m below ground surface (bgs). Groundwater levels were generally highest in the July monitoring and lowest in the September and October monitoring with changes of up to 2 m being measured. The groundwater elevation contours and inferred flow direction for the monitoring conducted in September are shown on Figure 3. The groundwater flow direction from Jewelbox hill was inferred to be to the northeast at a groundwater gradient of 0.33 m/m, curving to the southeast at the Reclaim dam with a groundwater gradient of 0.05 m/m. The groundwater flow direction from Burnick was inferred to the southeast with a groundwater gradient 0.15 m/m, curving to the east at North Creek with a groundwater gradient of 0.07 m/m.

5.3 Hydraulic Conductivity

Hydraulic conductivity testing was completed at five monitoring wells across the site including MW13-04, MW13-07, MW13-08, MW13-09, and MW13-10. The results for MW13-07 are suspect, and it does not appear to be a valid test. It appears that the data logger was set below its range of capability and there was too much water above the logger to measure changes. For this reason only the results from the other four wells are reported. For each of the four wells a minimum of three rising head tests and three falling head tests were completed and analyzed using the Bouwer and Rice methodology in AQTESOLV™. Due to the static water level being located within the screen, the rising head test results from each of the four wells was considered most reliable and the median test results was used. The response testing is provided in Attachment 2. The median hydraulic conductivity for each well was:

- MW13-04: 1.53×10^{-5} m/s
- MW13-08: 1.56×10^{-5} m/s
- MW13-09: 2.19×10^{-6} m/s
- MW13-10: 7.83×10^{-5} m/s

5.4 Groundwater Velocity

Based on the hydraulic conductivity in MW13-08, MW13-09 and MW13-10, and the gradient between the Mill site and the Reclaim Pond, the estimated groundwater flow rate through the overburden is approximately 2.5×10^{-6} m/s or 80 m/year.

5.5 Groundwater Sampling

The results of the groundwater sampling are shown in Table 2 and 3. Results are shown in comparison to the applicable Yukon CSR AW standards. See attached Laboratory Analysis reports and Chain of Custody forms in Attachment 3.

5.5.1 AEC1: Jewelbox Hill

Groundwater samples collected from MW13-03 in August, 2013 contained concentrations of BTEX, VPHw, LEPHw, and PAHs less than the laboratory method detection limit (MDL) and less than the CSR AW standards. Concentrations of anions, dissolved metals and cyanide were less than the CSR AW standards. The wells located downgradient Jewelbox (MW13-02 and MW13-05) were sampled on August 2 and August 28, 2013 respectively. Both samples contained concentrations of BTEX, VPHw, LEPHw and PAHs less than the laboratory MDLs and the CSR AW standards, and concentrations of dissolved metals and cyanide less than the CSR AW standards.

5.5.2 AEC 2: Burnick

Groundwater samples collected from MW13-06 on August 2, 2013 contained concentrations of BTEX, VPHw, LEPHw, and PAHs less than the laboratory MDLs and the CSR AW standards. The concentrations of dissolved metals and cyanide were also less than the CSR AW standards. The wells located downgradient of Burnick

(TH01-91, TH10-91 and TH13-01) were sampled on August 26, 2013 and all contained concentrations of BTEX, VPHw, LEPHw, and PAHs less than the laboratory MDLs and CSR AW standards. Concentrations of dissolved metals and cyanide were less than the CSR AW standards.

5.5.3 AEC3: Mill Site

Groundwater samples collected from MW13-08, MW13-10 on August 28 and September 27/28 contained concentrations of BTEX, VPHw, and LEPHw less than the laboratory MDLs and CSR AW standards. Concentrations of PAHs, dissolved metals and cyanides were less than the CSR AW standards. Samples were also collected on July 21 and August 1, 2013 from these two wells. Due to the high turbidity levels in these samples, and some concentrations of EPHs and PAHs detected (above the laboratory MDLs and less than the CSR standards), the wells were further developed and re-sampled in August and September. The re-sampling results with much lower concentrations suggest that the original samples were affected by the high turbidity. Seven surface water samples were collected by SRK from locations from seeps above Camp Creek and from along Camp Creek and down-gradient of the Mill Site between September 26 and 28, 2013 and analyzed by Maxxam for LEPH, HEPH and PAH parameters. All parameters from the seven samples contained concentrations less than the laboratory MDLs. The results are summarized in Table 4.

5.5.4 AEC8: Tailings and Reclaim Ponds

A groundwater sample was collected from MW13-11 located down-gradient (south) of Reclaim Dam on August 27, 2013. A concentration of dissolved cobalt was greater than the CSR AW standard. All other dissolved metals and cyanide concentrations were less than the CSR AW standards. A groundwater sample was collected from MW13-07 down-gradient (north) of North Dam on August 26, 2013. Concentrations of dissolved metals and cyanide were less than the CSR AW standards. A groundwater sample was collected from MW13-12 located on the east side of the tailings pond. The concentrations of dissolved metals and cyanide were less than the CSR AW standards.

5.5.5 Background

A groundwater sample was collected from MW13-04 located south of the mine entrance and considered a background location, on August 1, 2013. Concentrations of BTEX, VPHw, EPHw, PAHs were less than the laboratory MDLs and the CSR AW standards. Concentrations of dissolved metals and cyanide were less than the CSR AW standards.

5.6 QA/QC Results

5.6.1 Quality Assurance Review

Standard Golder field procedures were used throughout the investigation. Chain-of-custody procedures were followed during sampling events. Samples were given a unique sample control number (SCN), which was used for identification. Samples were submitted to the laboratory under chain-of-custody protocols using forms that did not identify the sampling locations, expected concentrations, or QA/QC samples, such as field duplicate samples. The samples were stored in coolers prior to submission to the analytical laboratory; appropriately completed chain-of-custody forms accompanied the submissions.

5.6.2 Paired Analyses

A total of 15 samples and 3 field duplicates, were submitted for hydrocarbon analyses resulting in a duplicate sampling rate of approximately 20 percent. A total of 14 samples and 2 field duplicates were submitted for dissolved metals analysis resulting in a duplicate sampling rate of approximately 14 percent. Relative Percent Difference (RPD) and Difference Factor (DF) values were calculated from the detected results of the paired analyses and are presented in the attached Tables 5 and 6.

RPD and DF values were calculated for the parameters analyzed for the duplicate pairs collected. RPDs were all less than Golder's data quality objectives (30% for organics in water and 20% for dissolved metals and inorganics in water) and therefore the associated results are considered reliable.

5.6.3 Laboratory Quality Control

Maxxam performed the chemical analyses of the soil samples collected during this investigation. Maxxam is certified by Canadian Association for Laboratory Accreditation (CALA) for the analytical methods used for this program. Each Maxxam sample analysis batch included at least one method blank, one laboratory duplicate and one reference or control sample.

The laboratory reports contained the analytical results for groundwater samples collected during this phase of the work. The laboratory reports were reviewed by Golder and the following items were noted:

- Laboratory matrix spike for 2-Methylnaphthalene in the B367755 report had a matrix spike that exceeded the QC limits by 2%.
- The RPD was not available for several samples due to the results being below the detection limit.

The review of the laboratory QC analyses suggests the laboratory data is accurate and reproducible and can be relied upon for environmental site investigation purposes.

Copies of the laboratory analytical reports including the laboratory quality control data are provided in Attachment 3.

6.0 DISCUSSION

Figure 4 shows the conceptual site model for groundwater flow from Jewelbox Hill to the Reclaim Pond. The overburden at Jewelbox and towards the Mill site is shallow and groundwater is within fractured bedrock. Between the Mill site and the Reclaim Pond, the water table is within a silty Sand layer between the thin Sand and Gravel and the bedrock. Groundwater discharges to surface water at the Reclaim Pond, which is part of Camp Creek. Groundwater from Jewelbox Hill and the Mill Site flows towards, and discharge at, Camp Creek which flows towards the southeast. There is a groundwater flow divide on the site as shown on Figure 3. The groundwater flow divide is located between the north dam and south dam, and groundwater in this area flows towards the north. North creek at the southern base of Burnick flows to the east, turning to the northeast at North Creek dyke. Groundwater from Burnick flows toward the southeast, turning to the east to follow North Creek.

In the groundwater sampling conducted in July, August, September and October, 2013, there was only one exceedance of the CSR AW standards. This was a concentration of dissolved cobalt in a sample collected from MW13-11 (located down-gradient of the Reclaim Dam) in August, 2013. Cobalt has not been previously identified as a contaminant of concern in soil or surface water previously for the site. This well will be resampled in 2014 to confirm the result.

It does not appear that there are any impacts to groundwater in the AEC locations where hydrocarbons and metals were identified as PCOC. As a follow-up from the Phase II ESA, the PCOCs for groundwater listed under each AEC (identified from SPLP testing of soil) in Table A in Section 1.0 of this technical memo, have been confirmed to not be present. In a few locations, the groundwater samples collected contained measurable concentrations of HEPH (there is no CSR standard for HEPH in groundwater). It is believed that the presence is associated with higher turbidity in some of the samples, and naturally occurring organics. These wells will be re-sampled in 2014 following further development of the well (to reduce turbidity), and the samples will be submitted to the laboratory with a request to complete the hydrocarbon analysis with silica gel cleanup to reduce the interference from naturally occurring organics. The presence of hydrocarbons was not found in surface water sampling conducted from seeps and Camp Creek in the area up-gradient from the Mill Site or down-gradient of the Mill Site.

7.0 CONCLUSIONS

Golder completed a hydrogeological assessment at the Sä Dena Hes Mine in order to support the overall closure of the Site. The scope of work completed by Golder in 2013 included the placement and supervision during the drilling of boreholes and monitoring well installations across the site and at the AECs, and groundwater monitoring and sampling between July and October, 2013 for PCOC.

It is anticipated that additional groundwater monitoring and sampling will occur during the 2014 field season, in order to confirm the results obtained in 2013. A detailed work plan will be developed for 2014 field activities.

8.0 LIMITATIONS

This Technical Memorandum was prepared for the exclusive use of Teck Metals Ltd. (Teck) and is intended to provide an assessment of environmental conditions at the Sä Dena Hes mine, north of Watson Lake, Yukon Territory. The report is based on data and information collected during investigations conducted by Golder's personnel and the review of reports prepared by others as listed in this report. It is based solely on the conditions of the subject property at the time of the Site reconnaissance and investigation, supplemented by a review of historical information and data obtained by Golder as described in this report, and discussions with Teck representatives, as reported herein.

The Government of Yukon may rely on the information presented in this document for the purpose of review as part of an application for a regulatory instrument. Any use which a third party makes of this Technical Memorandum, or any reliance on or decisions to be made based on it, are the sole responsibility of the third parties. If a third party require reliance on this Technical Memorandum, written authorization from Golder is required. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The scope and the period of Golder's assessment are described in this Technical Memorandum, and are subject to restrictions, assumptions and limitations. Except as noted herein, the work was conducted in accordance with the scope of work and terms and conditions within Golder's proposal. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Technical Memorandum. Conditions may therefore exist which were not detected given the limited nature of the assessment Golder was retained to undertake with respect to the Site and additional environmental studies and actions may be required. In addition, it is recognized that the passage of time affects the information provided in the Report. Golder's opinions are based upon information that existed at the time of the writing of the Technical Memorandum. It is understood that the services provided for in the scope of work allowed Golder to form no more than an opinion of the actual conditions at the Site at the time the site was visited, and cannot be used to assess the effect of any subsequent changes in any laws, regulations, the environmental quality of the site or its surroundings. If a service is not expressly indicated, do not assume it has been provided.

The results of an assessment of this nature should in no way be construed as a warranty that the Site is free from any and all contamination from past or current practices.

9.0 CLOSURE

We trust that the contents of this Technical Memorandum are sufficient for your current needs. Should you have any questions, please do not hesitate to contact Tamra Reynolds at 867-633-6076.

GOLDER ASSOCIATES LTD.

Tamra Reynolds, M.Sc., P.Eng.
Senior Hydrogeologist

Gary Hamilton, P.Geo.
Principal, Project Director

TJR/GJH/lih

Attachments: Table 1 – Groundwater Elevations
Table 2 – Results of Groundwater Analysis – Petroleum Hydrocarbons
Table 3 – Results of Groundwater Analysis – Dissolved Metals
Table 4 – Results of Surface Water Analysis – Petroleum Hydrocarbons
Table 5 – QA/QC Results of Groundwater Analysis – Petroleum Hydrocarbons
Table 6 – QA/QC Results of Groundwater Analysis – Dissolved Metals

Figure 1 – Key Plan
Figure 2 – Monitoring Well and Test Hole Locations
Figure 3 – Groundwater Elevations and Contours from September 26, 2013
Figure 4 – Groundwater Conceptual Site Model

Attachment 1 – Borehole Logs
Attachment 2 – Groundwater Response Testing Results
Attachment 3 – Chain of Custodies and Laboratory Reports

\\golder.gds\gal\burnaby\final\2012\1021 kng\projects\12-1021-0006 sa dena hes - teck metals\1210210006-016-tm-rev1-7000\1210210006-016-tm-rev1-7000-2013 gw assess 09apr_14.docx

TABLE 1
Groundwater Elevations
July through October 2013
Sa Dena Hes Mine, YT

Monitoring Well Location	TOC[1] Elevation (m)	Depth to Bottom[2] (m)	31/07/2013 Depth to Water[3] (m)	31/07/2013 Groundwater Elevation (m)	25/08/2013 Depth to Water[3] (m)	25/08/2013 Groundwater Elevation (m)	26/09/2013 Depth to Water[3] (m)	26/09/2013 Groundwater Elevation (m)	24/10/2013 Depth to Water[3] (m)	24/10/2013 Groundwater Elevation (m)
MW13-01	1200.02	28.44	18.86	1181.17	19.25	1180.77	18.97	1181.05	19.33	1180.69
MW13-02	1304.70	65.26	49.62	1255.08	50.85	1253.85	50.36	1254.34	50.18	1254.52
MW13-03	1409.35	31.21	24.07	1385.28	26.02	1383.33	25.20	1384.15	25.80	1383.55
MW13-04	1200.48	21.48	16.48	1184.00	18.36	1182.12	19.12	1181.36	17.98	1182.50
MW13-05	1196.23	6.18	4.38	1191.85	5.23	1191.00	6.02	1190.21	5.61	1190.63
MW13-06	1210.61	49.34	29.08	1181.53	29.83	1180.79	29.93	1180.68	29.75	1180.86
MW13-07	1098.75	34.76	3.93	1094.82	4.31	1094.44	4.13	1094.63	3.92	1094.83
MW13-08	1142.33	13.05	9.48	1132.85	10.08	1132.25	10.60	1131.73	10.41	1131.92
MW13-09	1091.09	11.49	7.60	1083.49	7.77	1083.32	7.76	1083.33	7.71	1083.38
MW13-10	1125.33	11.09	10.31	1115.02	10.52	1114.81	10.61	1114.72	10.58	1114.75
MW13-11	1081.48	34.80	7.08	1074.41	7.35	1074.13	7.36	1074.12	7.57	1073.91
MW13-12	1128.41	17.70	8.15	1120.26	8.07	1120.34	8.81	1119.60	-	-
MW13-13	1254.13	9.71	-	-	-	-	5.29	1248.84	6.27	1247.86
TH01-91	1031.21	39.94	12.30	1018.91	11.83	1019.38	12.02	1019.19	-	-
TH07-91	1008.49	25.75	-	-	3.22	1005.27	3.46	1005.04	-	-
TH09-91	1008.60	12.12	-	-	5.27	1003.33	5.32	1003.28	-	-
TH10-91	1014.38	18.17	11.33	1003.05	11.30	1003.08	11.33	1003.05	-	-
TH13-91	993.26	22.64	19.70	973.56	19.88	973.39	20.06	973.20	-	-
TH14-91	1101.19	14.11	10.79	1090.41	10.89	1090.30	10.85	1090.34	-	-
TH15-91	977.43	35.26	-	-	10.25	967.18	10.43	967.00	-	-
TH18-91	1084.05	23.99	11.10	1072.95	12.45	1071.60	13.18	1070.87	-	-
TH19-91	959.85	4.56	-	-	3.72	956.13	3.77	956.08	-	-
TH21-91	1074.06	24.96	-	-	3.38	1070.69	3.99	1070.07	-	-

Notes:
1. TOC = Top of Well Casing
2. Depth to bottom measured from TOC
3. Depth to water measured from TOC

TABLE 2
Results of Ground Water Analysis
- Petroleum Hydrocarbons
Sä Dena Hes Mine, Yukon

Location	Aquatic Life	MCS	MW13-01	MW13-02	MW13-03	MW13-03	MW13-05	MW13-06	MW13-08	MW13-08	MW13-08	MW13-08	MW13-09	MW13-10	MW13-10	MW13-10	TH01-91	TH10-91	TH13-91	TH13-91
Sample Control Number	CSR-AW		24340-01	24336-09	24324-05	24324-06	24324-04	24324-07	24324-03	24337-01	24340-02	24340-03	24324-02	24324-01	24337-02	24340-04	24336-01	24336-05	24336-03	24336-04
Date Sampled	(freshwater)		27-Sep-13	28-Aug-13	2-Aug-13	2-Aug-13	1-Aug-13	2-Aug-13	1-Aug-13	28-Aug-13	27-Sep-13	27-Sep-13	31-Jul-13	31-Jul-13	28-Aug-13	28-Sep-13	26-Aug-13	26-Aug-13	26-Aug-13	26-Aug-13
QA/QC					FDA	FD					FDA	FD							FDA	FD
Volatile Organic Compounds																				
Benzene	4,000		< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	48	-	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Ethylbenzene	2,000		< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Methyl t-butyl ether (MTBE)			< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	-	< 4.0	< 4.0	< 4.0	< 4.0	-	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Styrene	720		< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Toluene	390		< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	4.6	-	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
ortho-Xylene			< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	0.44	-	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
meta- & para-Xylene			< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Xylenes, total			< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	0.84	-	< 0.40	< 0.40	< 0.40	< 0.40	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Hydrocarbons																				
EPH10-19	5,000		< 200	< 200	< 200	< 200	< 200	< 200	< 200	-	< 200	< 200	< 200	320	-	< 200	< 200	< 200	< 200	< 200
EPH19-32			< 200	330	1100	1100	< 200	770	< 200	-	< 200	< 200	810	12000	-	210	< 200	< 200	< 200	< 200
LEPH	500		< 200	< 200	< 200	< 200	< 200	< 200	< 200	-	< 200	< 200	< 200	320	-	< 200	< 200	< 200	< 200	< 200
HEPH			< 200	330	1100	1100	< 200	770	< 200	-	< 200	< 200	810	12000	-	210	< 200	< 200	< 200	< 200
Volatile Hydrocarbons (VH6-10)	15,000		< 300	< 300	< 300	< 300	< 300	< 300	< 300	-	< 300	< 300	< 300	< 300	-	< 300	< 300	< 300	< 300	< 300
VPH (C6-C10)	1,500		< 300	-	-	-	-	-	-	-	< 300	< 300	-	-	-	< 300	-	-	-	-
Polycyclic Aromatic Hydrocarbons																				
2-Methylnaphthalene			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.82	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	60		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.052	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acridine	0.5		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.13	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Anthracene	1		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.078	< 0.010	< 0.010	< 0.010	< 0.010	< 0.050	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benz(a)anthracene	1		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.14	0.021	0.014	0.015	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(a)pyrene	0.1		< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	0.052	0.0092	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090
Benzo(b,j)fluoranthene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.14	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(g,h,i)perylene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.053	< 0.050	< 0.050	< 0.050	< 0.050	0.16	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(k)fluoranthene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.20	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)anthracene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.48	0.060	0.042	0.041	< 0.020	0.12	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	120		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.59	0.052	< 0.050	< 0.050	< 0.050	0.057	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Indeno(1,2,3-c,d)pyrene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene	10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	5.8	0.34	0.20	0.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	3		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	1.4	0.13	0.082	0.084	< 0.050	0.14	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pyrene	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	0.21	0.029	0.022	0.023	< 0.020	0.26	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Quinoline	34		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Notes:

Results are expressed in micrograms per litre (µg/L), unless otherwise indicated.

Standards shown are from the Yukon Contaminated Sites Regulation (updated to September 30, 2002).

SCN = sample control number

AW = standards for the protection of freshwater aquatic life

MCS: most conservative standard based on applicable site-specific standards

QA/QC = Quality Assurance/ Quality Control

FDA/FD = field duplicate available/field duplicate

TABLE 3
Results of Ground Water Analysis
- Dissolved Metals
Sä Dena Hes Mine, Yukon

Location			MW13-02	MW13-03	MW13-03	MW13-04	MW13-05	MW13-06	MW13-07	MW13-08	MW13-09	MW13-10	MW13-11	MW13-12	TH01-91	TH10-91	TH13-91	TH13-91
Sample Control Number	Aquatic Life	MCS	24336-09	24324-05	24324-06	24336-08	24324-04	24324-07	24336-02	24324-03	24324-02	24324-01	24336-07	24336-06	24336-01	24336-05	24336-03	24336-04
Date Sampled	CSR-AW		28-Aug-13	2-Aug-13	2-Aug-13	27-Aug-13	1-Aug-13	2-Aug-13	26-Aug-13	1-Aug-13	31-Jul-13	31-Jul-13	27-Aug-13	27-Aug-13	26-Aug-13	26-Aug-13	26-Aug-13	26-Aug-13
QA/QC	(freshwater)			FDA	FD												FDA	FD
Physical Tests																		
pH (field)			7.48	6.66	6.66	7.74	7.7	6.88	7.08	7.2	6.76	7.15	6.82	7.34	7.2	7.52	7.55	7.55
Hardness (as $CaCO_3$)			201000	52700	53600	131000	166000	394000	254000	266000	296000	228000	784000	404000	290000	179000	194000	189000
Anions and Nutrients																		
Nitrate (as N)	400,000		491	155	158	274	1650	27	< 20	279	104	371	< 20	41	250	89	111	117
Nitrite (as N)	200,000 - 2,000,000	Cl	12.9	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	6.2	8.1
Nitrate and nitrite (as N)	400,000		504	155	158	274	1650	27	< 20	279	104	371	< 20	41	250	89	118	125
Ammonia Nitrogen			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	31.7	155	< 5.0	37.7	< 5.0	777	< 5.0	< 5.0	< 5.0	11.2	14.1
Sulfate (SO_4)	1,000,000		47900	8860	9380	8280	49000	166000	48600	8360	49800	42400	389000	52100	3250	10200	12100	12800
Cyanides																		
Cyanide, Total	50		1.12	0.74	0.83	1.12	1.19	1.23	0.94	1.24	1.15	1.25	1.16	1.06	0.90	0.96	1.00	0.98
Dissolved Metals																		
Aluminum			5.5	6.3	7.2	4.6	< 3.0	7.2	8.1	< 3.0	4.7	3.5	9.0	5.1	< 3.0	< 3.0	< 3.0	< 3.0
Antimony	200		0.92	< 0.50	< 0.50	< 0.50	< 0.50	0.51	< 0.50	< 0.50	< 0.50	< 0.50	1.83	0.61	< 0.50	< 0.50	< 0.50	< 0.50
Arsenic	50		0.26	0.85	0.90	0.26	0.50	38.7	1.19	0.12	0.26	0.49	1.13	0.37	0.34	0.44	0.55	0.55
Barium	10,000		16.0	18.1	18.0	26.8	42.6	25.2	34.3	139	35.6	34.2	22.6	28.4	201	70.4	61.5	61.5
Beryllium	53		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bismuth			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Boron	50,000		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	95	< 50	< 50	< 50	< 50	< 50
Cadmium	0.1 - 0.6	H	0.192	0.258	0.257	0.090	0.049	0.673	0.038	0.064	0.160	0.531	0.411	0.050	0.047	< 0.010	< 0.010	< 0.010
Calcium			71100	18000	18500	47000	61000	139000	73300	91300	99800	78100	197000	67900	94400	60100	64500	62900
Chromium	$10^{VI}/90^{III}$	V	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cobalt	9		0.58	1.42	1.42	< 0.50	< 0.50	5.03	0.85	< 0.50	4.30	1.51	16.9	1.29	< 0.50	0.57	0.54	0.54
Copper	20 - 90	H	0.45	0.71	0.69	0.37	0.23	0.82	< 0.20	0.27	0.43	0.27	0.74	0.39	< 0.20	< 0.20	0.22	< 0.20
Iron			18.8	10.7	10.8	< 5.0	< 5.0	235	74.0	5.4	29.4	< 5.0	236	8.6	66.3	1160	346	344
Lead	40 - 160	H	0.92	< 0.20	< 0.20	0.25	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.95	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Lithium			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	8.7	9.0	< 5.0	< 5.0	< 5.0	25.1	8.5	< 5.0	< 5.0	< 5.0	< 5.0
Magnesium			5750	1910	1790	3290	3280	11500	17100	9340	11400	8020	71200	56900	13200	7010	7990	7830
Manganese			55.5	116	114	35.8	4.3	528	146	41.3	631	185	2850	130	49.3	123	113	114
Mercury	1		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Molybdenum	10,000		1.1	6.3	6.2	< 1.0	< 1.0	41.3	3.0	< 1.0	1.6	2.3	1.5	< 1.0	1.9	3.0	2.9	2.9
Nickel	250 - 1,500	H	4.9	8.5	8.3	< 1.0	< 1.0	31.8	3.6	1.7	13.3	3.2	64.8	4.7	1.6	2.8	7.9	8.0
Potassium			1220	564	577	477	486	2450	2870	649	1260	1270	3130	840	641	476	541	536
Selenium	10		1.26	4.83	5.09	1.09	3.11	1.73	< 0.10	1.14	0.90	2.01	0.46	1.46	0.58	0.57	0.67	0.54
Silicon			4120	4220	4370	4190	4920	16600	7780	3940	4440	4270	7690	2960	4910	3570	3510	3580
Silver	0.5 - 15	H	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Sodium			2860	548	531	1540	767	8260	5390	941	1620	8770	9310	13600	1140	1060	1110	1160
Strontium			358	42.8	42.5	108	163	403	480	280	298	331	1180	433	303	215	220	234
Sulphur			15600	< 3000	3300	< 3000	18000	61200	17500	< 3000	18500	15100	165000	17500	< 3000	4000	4400	4400
Thallium	3		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Tin			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Titanium	1,000		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Uranium	3,000		2.27	< 0.10	< 0.10	0.54	0.71	25.0	4.83	1.22	0.89	2.36	3.20	1.67	1.75	1.07	1.58	1.59
Vanadium			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Zinc	75 - 2,400	H	8.8	8.1	8.4	< 5.0	< 5.0	147	< 5.0	< 5.0	< 5.0	10.6	7.2	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Zirconium			< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Notes:

Results are expressed in micrograms per litre (µg/L), unless otherwise indicated.

Standards shown are from the Yukon Contaminated Sites Regulation (updated to September 30, 2002).

SCN = sample control number

AW = standards for the protection of freshwater aquatic life

MCS: most conservative standard based on applicable site-specific standards

QA/QC = Quality Assurance/ Quality Control

FDA/FD = field duplicate available/field duplicate

H = Hardness-dependant; V = Valence-dependant guideline

TABLE 4
Results of Surface Water Analysis - Petroleum Hydrocarbons
Sä Dena Hes Mine, Yukon

Location	Aquatic Life CSR-AW (freshwater)	MCS	MH-04	MH-11	MH-27	MH-28	MH-28A	PH-01	SDH-S5
Date Sampled			9/26/2013	9/27/2013	9/28/2013	9/26/2013	9/26/2013	9/26/2013	9/26/2013
QA/QC									
Hydrocarbons									
EPH10-19	500		< 200	< 200	< 200	< 200	< 200	< 200	< 200
EPH19-32			< 200	< 200	< 200	< 200	< 200	< 200	< 200
LEPH	50		< 200	< 200	< 200	< 200	< 200	< 200	< 200
HEPH			< 200	< 200	< 200	< 200	< 200	< 200	< 200
2-Methylnaphthalene			< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	6		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acridine	0.05		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Anthracene	0.1		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benz(a)anthracene	0.1		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Benzo(a)pyrene	0.01		< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090	< 0.0090
Benzo(b,j)fluoranthene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(g,h,i)perylene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo(k)fluoranthene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)anthracene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	0.2		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Fluorene	12		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Indeno(1,2,3-c,d)pyrene			< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene	1		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	0.3		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pyrene	0.02		< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
Quinoline	3.4		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Notes:

Results are expressed in micrograms per litre (µg/L), unless otherwise indicated.

Standards shown are from the Yukon Contaminated Sites Regulation (updated to September 30, 2002), Protocol 6.

AW = standards for the protection of freshwater aquatic life

MCS: most conservative standard based on applicable site-specific standards

QA/QC = Quality Assurance/ Quality Control

FDA/FD = field duplicate available/field duplicate

TABLE 5
QA/QC Results of Ground Water Analysis
- Petroleum Hydrocarbons
Sä Dena Hes Mine, Yukon

Location		MW13-03					MW13-08					TH13-91				
Sample Control Number	**Method Detection Limit**	24324-05	24324-06	**Mean**	**Relative Percent Difference**	**Difference Factor (DF)**	24340-02	24340-03	**Mean**	**Relative Percent Difference**	**Difference Factor (DF)**	24336-03	24336-04	**Mean**	**Relative Percent Difference**	**Difference Factor (DF)**
Date Sampled		41488.61111	41488.61111				41544	41544				41512	41512			
Quality Assurance		FDA	FD				FDA	FD				FDA	FD			
Volatile Organic Compounds																
Benzene	0.4	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA
Ethylbenzene	0.4	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA
Methyl t-butyl ether (MTBE)	4.0	< 4.0	< 4.0	NC	NC	NA	< 4.0	< 4.0	NC	NC	NA	< 4.0	< 4.0	NC	NC	NA
Styrene	0.4	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA
Toluene	0.4	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA
ortho-Xylene	0.4	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA
meta- & para-Xylene	0.4	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA
Xylenes, total	0.4	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA	< 0.40	< 0.40	NC	NC	NA
Hydrocarbons																
EPH10-19	200	< 200	< 200	NC	NC	NA	< 200	< 200	NC	NC	NA	< 200	< 200	NC	NC	NA
EPH19-32	200	1100	1100	1100	0	NA	< 200	< 200	NC	NC	NA	< 200	< 200	NC	NC	NA
LEPH	200	< 200	< 200	NC	NC	NA	< 200	< 200	NC	NC	NA	< 200	< 200	NC	NC	NA
HEPH	200	1100	1100	1100	0	NA	< 200	< 200	NC	NC	NA	< 200	< 200	NC	NC	NA
Volatile Hydrocarbons (VH6-10)	300	< 300	< 300	NC	NC	NA	< 300	< 300	NC	NC	NA	< 300	< 300	NC	NC	NA
VPH (C6-C10)	300	-	-	NC	NC	NA	< 300	< 300	NC	NC	NA	-	-	NC	NC	NA
Polycyclic Aromatic Hydrocarbons																
2-Methylnaphthalene	0.10	< 0.10	< 0.10	NC	NC	NA	< 0.10	< 0.10	NC	NC	NA	< 0.10	< 0.10	NC	NC	NA
Acenaphthene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Acenaphthylene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Acridine	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Anthracene	0.01	< 0.010	< 0.010	NC	NC	NA	< 0.010	< 0.010	NC	NC	NA	< 0.010	< 0.010	NC	NC	NA
Benz(a)anthracene	0.010	< 0.010	< 0.010	NC	NC	NA	0.014	0.015	0.015	NA	0.020	< 0.010	< 0.010	NC	NC	NA
Benzo(a)pyrene	0.009	< 0.0090	< 0.0090	NC	NC	NA	< 0.0090	< 0.0090	NC	NC	NA	< 0.0090	< 0.0090	NC	NC	NA
Benzo(b,j)fluoranthene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Benzo(g,h,i)perylene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Benzo(k)fluoranthene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Chrysene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Dibenz(a,h)anthracene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Fluoranthene	0.020	< 0.020	< 0.020	NC	NC	NA	0.042	0.041	0.042	NA	0.020	< 0.020	< 0.020	NC	NC	NA
Fluorene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Indeno(1,2,3-c,d)pyrene	0.05	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Naphthalene	0.10	< 0.10	< 0.10	NC	NC	NA	0.20	0.21	0.21	NA	0.20	< 0.10	< 0.10	NC	NC	NA
Phenanthrene	0.050	< 0.050	< 0.050	NC	NC	NA	0.082	0.084	0.083	NA	0.040	< 0.050	< 0.050	NC	NC	NA
Pyrene	0.020	< 0.020	< 0.020	NC	NC	NA	0.022	0.023	0.023	NA	0.010	< 0.020	< 0.020	NC	NC	NA
Quinoline	0.5	< 0.50	< 0.50	NC	NC	NA	< 0.50	< 0.50	NC	NC	NA	< 0.50	< 0.50	NC	NC	NA

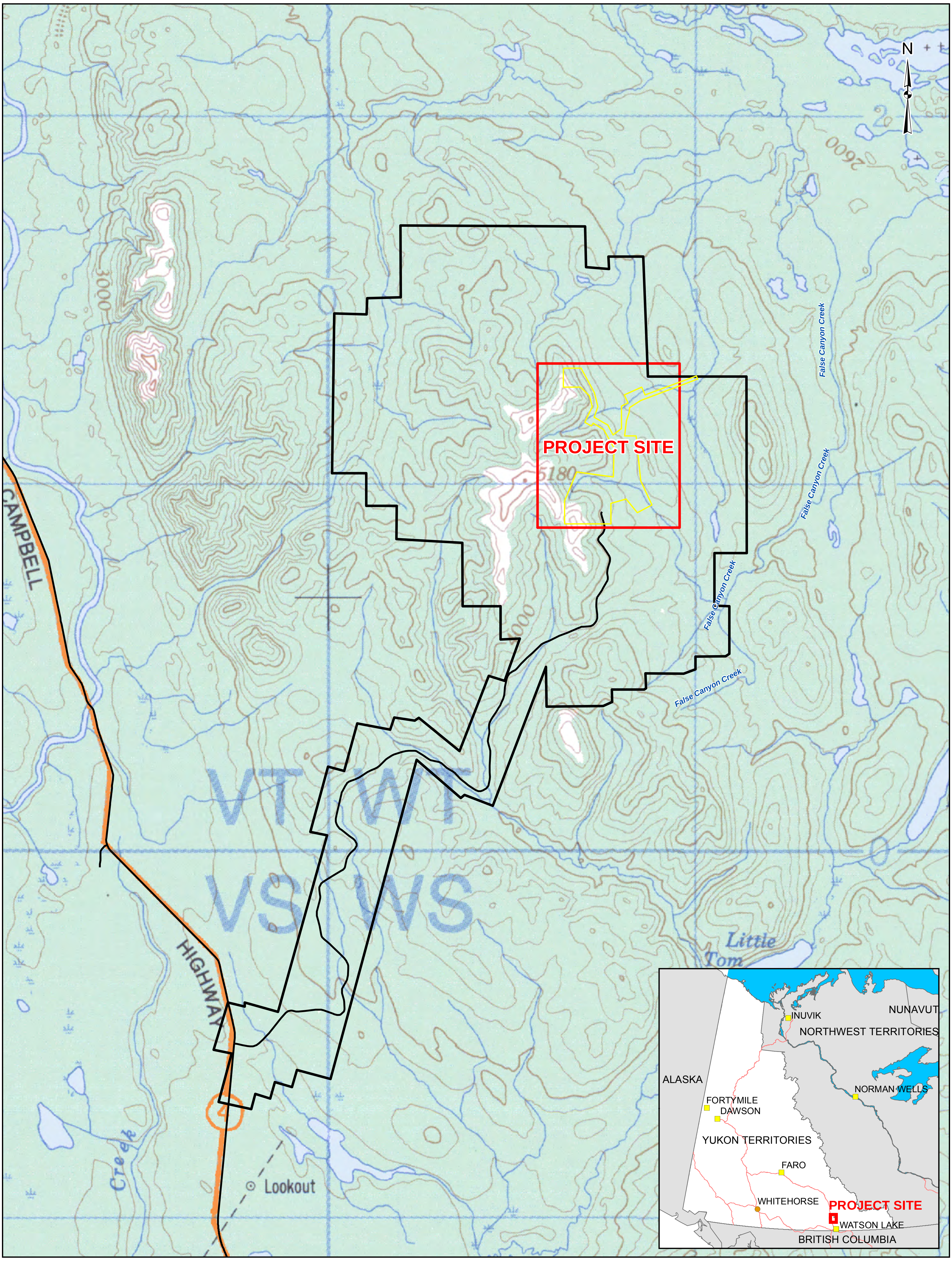
Notes:
Results are expressed in micrograms per litre (µg/L), unless otherwise indicated.
Mean = average of two values.
Relative percent difference = the difference between two values divided by the mean of the two values.
Difference factor = absolute difference between two values divided by the method detection limit.
Difference factor is calculated when the concentration is within five times the detection limit.
Bold text indicates that the RPD or DF exceeds Golder's internal QA/QC guidelines.
FDA = Field Duplicate Available; FD = Field Duplicate

TABLE 6
QAQC Results of Ground Water Analysis
- Dissolved Metals
Sä Dena Hes Mine, Yukon

Location	Method Detection Limit	MW13-03		Mean	Relative Percent Difference	Difference Factor (DF)	TH13-91		Mean	Relative Percent Difference	Difference Factor (DF)
Sample Control Number		24324-05	24324-06				24336-03	24336-04			
Date Sampled		41488.61111	41488.61111				41512	41512			
Quality Assurance		FDA	FD				FDA	FD			
Physical Tests											
pH (field)	0.10	6.66	6.66	6.66	0.00	NA	7.55	7.55	7.55	0.00	NA
Hardness (as $CaCO_3$)	500	52700	53600	53150	0	NA	194000	189000	191500	0	NA
Anions and Nutrients											
Nitrate (as N)	20	155	158	157	0	NA	111	117	114	0	NA
Nitrite (as N)	5.0	< 5.0	< 5.0	NC	NC	NA	6.2	8.1	7.2	0.3	NA
Nitrate and nitrite (as N)	20	155	158	157	0	NA	118	125	122	0	NA
Ammonia Nitrogen	5.0	< 5.0	< 5.0	NC	NC	NA	11.2	14.1	12.7	NA	0.6
Sulfate (SO_4)	500	8860	9380	9120	0	NA	12100	12800	12450	0	NA
Cyanides											
Cyanide, Total	0.50	0.74	0.83	0.79	0.11	NA	1.00	0.98	0.99	0.02	NA
Dissolved Metals											
Aluminum	3.0	6.3	7.2	6.8	0.1	NA	< 3.0	< 3.0	NC	NC	NA
Antimony	0.50	< 0.50	< 0.50	NC	NC	NA	< 0.50	< 0.50	NC	NC	NA
Arsenic	0.10	0.85	0.90	0.88	NA	0.02	0.55	0.55	0.55	NA	0.00
Barium	1.0	18.1	18.0	18.1	0.0	NA	61.5	61.5	61.5	0.0	NA
Beryllium	0.10	< 0.10	< 0.10	NC	NC	NA	< 0.10	< 0.10	NC	NC	NA
Bismuth	1.0	< 1.0	< 1.0	NC	NC	NA	< 1.0	< 1.0	NC	NC	NA
Boron	50	< 50	< 50	NC	NC	NA	< 50	< 50	NC	NC	NA
Cadmium	0.010	0.258	0.257	0.258	NA	0.001	< 0.010	< 0.010	NC	NC	NA
Calcium	50	18000	18500	18250	0	NA	64500	62900	63700	0	NA
Chromium	1.0	< 1.0	< 1.0	NC	NC	NA	< 1.0	< 1.0	NC	NC	NA
Cobalt	0.50	1.42	1.42	1.42	NA	0.00	0.54	0.54	0.54	NA	0.00
Copper	0.20	0.71	0.69	0.70	NA	0.02	0.22	< 0.20	NC	NC	NA
Iron	5.0	10.7	10.8	10.8	0.0	NA	346	344	345	0.0	NA
Lead	0.20	< 0.20	< 0.20	NC	NC	NA	< 0.20	< 0.20	NC	NC	NA
Lithium	5.0	< 5.0	< 5.0	NC	NC	NA	< 5.0	< 5.0	NC	NC	NA
Magnesium	50	1910	1790	1850	0	NA	7990	7830	7910	0	NA
Manganese	1.0	116	114	115	0	NA	113	114	114	0	NA
Mercury	0.050	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Molybdenum	1.0	6.3	6.2	6.3	0.0	NA	2.9	2.9	2.9	NA	0.0
Nickel	1.0	8.5	8.3	8.4	0.0	NA	7.9	8.0	8.0	0.0	NA
Potassium	50	564	577	571	0	NA	541	536	539	0	NA
Selenium	0.10	4.83	5.09	4.96	NA	0.26	0.67	0.54	0.61	NA	0.13
Silicon	100	4220	4370	4295	0	NA	3510	3580	3545	0	NA
Silver	0.020	< 0.020	< 0.020	NC	NC	NA	< 0.020	< 0.020	NC	NC	NA
Sodium	50	548	531	540	0	NA	1110	1160	1135	0	NA
Strontium	1.0	42.8	42.5	42.7	0.0	NA	220	234	227	0.1	NA
Sulphur	3000	< 3000	3300	NC	NC	NA	4400	4400	4400	0	NA
Thallium	0.050	< 0.050	< 0.050	NC	NC	NA	< 0.050	< 0.050	NC	NC	NA
Tin	5.0	< 5.0	< 5.0	NC	NC	NA	< 5.0	< 5.0	NC	NC	NA
Titanium	5.0	< 5.0	< 5.0	NC	NC	NA	< 5.0	< 5.0	NC	NC	NA
Uranium	0.10	< 0.10	< 0.10	NC	NC	NA	1.58	1.59	1.59	NA	0.00
Vanadium	5.0	< 5.0	< 5.0	NC	NC	NA	< 5.0	< 5.0	NC	NC	NA
Zinc	5.0	8.1	8.4	8.3	0.0	NA	< 5.0	< 5.0	NC	NC	NA
Zirconium	0.50	< 0.50	< 0.50	NC	NC	NA	< 0.50	< 0.50	NC	NC	NA

Notes:
Results are expressed in microgram per litre (µg/L), unless otherwise indicated
Mean = average of two values.
Relative percent difference = the difference between two values divided by the mean of the two values
Difference factor = absolute difference between two values divided by the method detection limit
Difference factor is calculated when the concentration is within five times the detection limit
Bold text indicates that the RPD or DF exceeds Golder's internal QA/QC guidelines.
FDA = Field Duplicate Available; FD = Field Duplicate

N:\Bur-Graphics\Projects\2012\1021\12-1021-0006\GIS\Mapping\MXD\General\20130123\Figure-01_Keyplan.mxd



LEGEND

- PROJECT SITE
- CLAIM BOUNDARY
- SURFACE LEASE

2,000 0 2,000

SCALE 1:100,000 METRES

PROJECT

TECK METALS
SÄ DENA HES MINE ESA
YUKON TERRITORY

TITLE

KEY PLAN

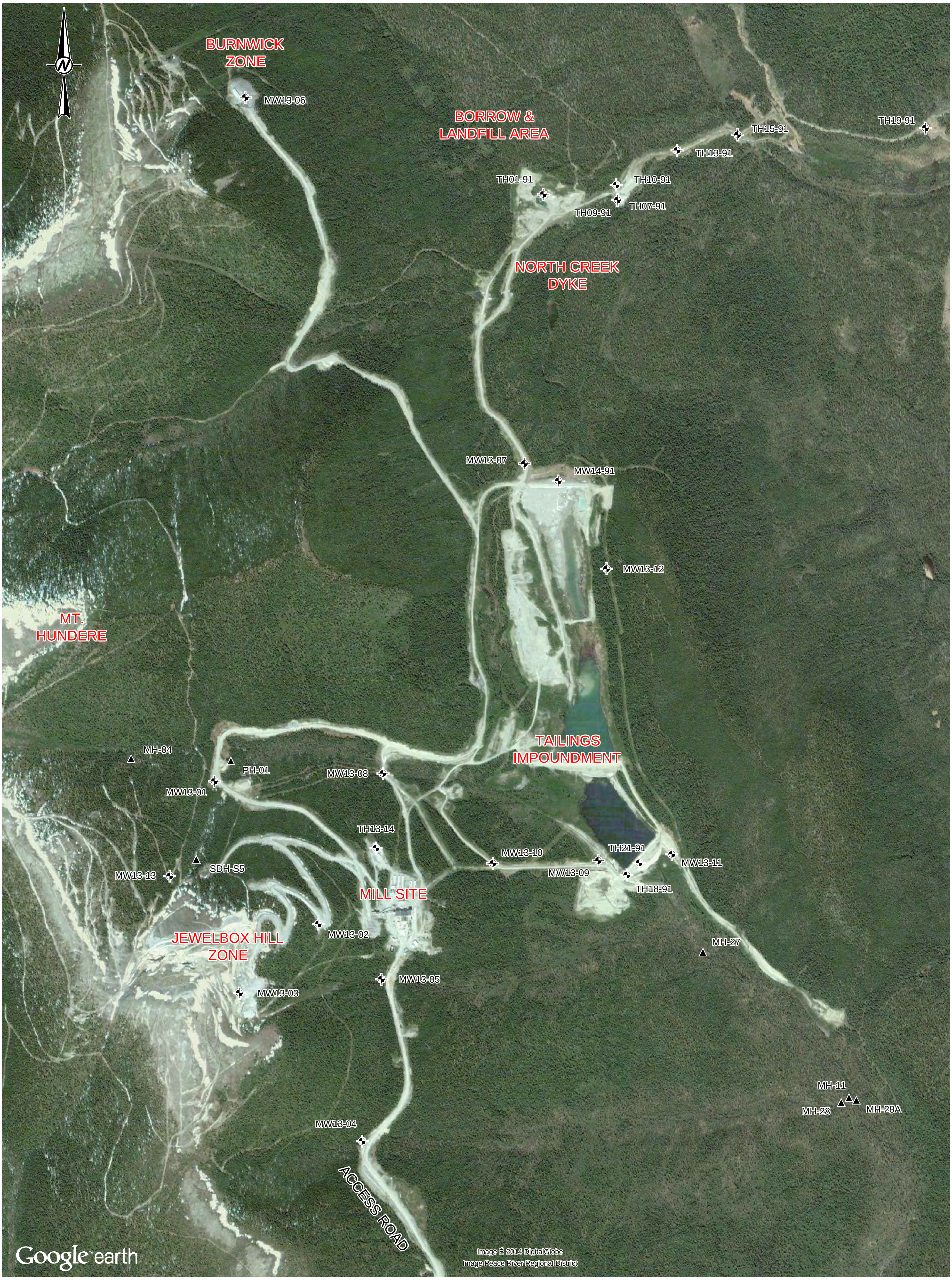
Golder Associates
Greater Vancouver Office, B.C.

PROJECT No.		12-1021-0006	PHASE No.	
DESIGN	AB	17 Sep. 2012	SCALE AS SHOWN	REV. 0
GIS	MM	15 May. 2013		
CHECK	AB	1 Feb. 2013	FIGURE: 1	
REVIEW	GJH	1 Feb. 2013		

REFERENCE

BASE DATA OBTAINED FROM THE GEOGRATIS (NTS MAP SHEET 105A).
DATUM: NAD83 PROJECTION: UTM ZONE 09

\\golder.gds\gal\Burnaby\CAD-GIS\Bur-Graphics\Projects\2012\1021\12-1021-0006\7000\CAD_Phase 7000\1210210006-7000-01.dwg | Layout: 1210210006-7000-01 | Modified: RYJames 03/24/2014 6:08 PM | Plotted: RYJames 04/03/2014



LEGEND

- SDH MW WELL LOCATION
- ▲ HYDROCARBONS WATER QUALITY MONITORING SITES 2013

REFERENCE

All units are in metres unless otherwise noted.
Base imagery obtained from Google Earth Pro under licence.
Google Earth Imagery date June 12th, 2006.
Google Earth Image is to be used for surrounding detail reference only.
Datum: NAD 83 Projection: UTM Zone 9

0 300 600 900
SCALE METRES

PROJECT

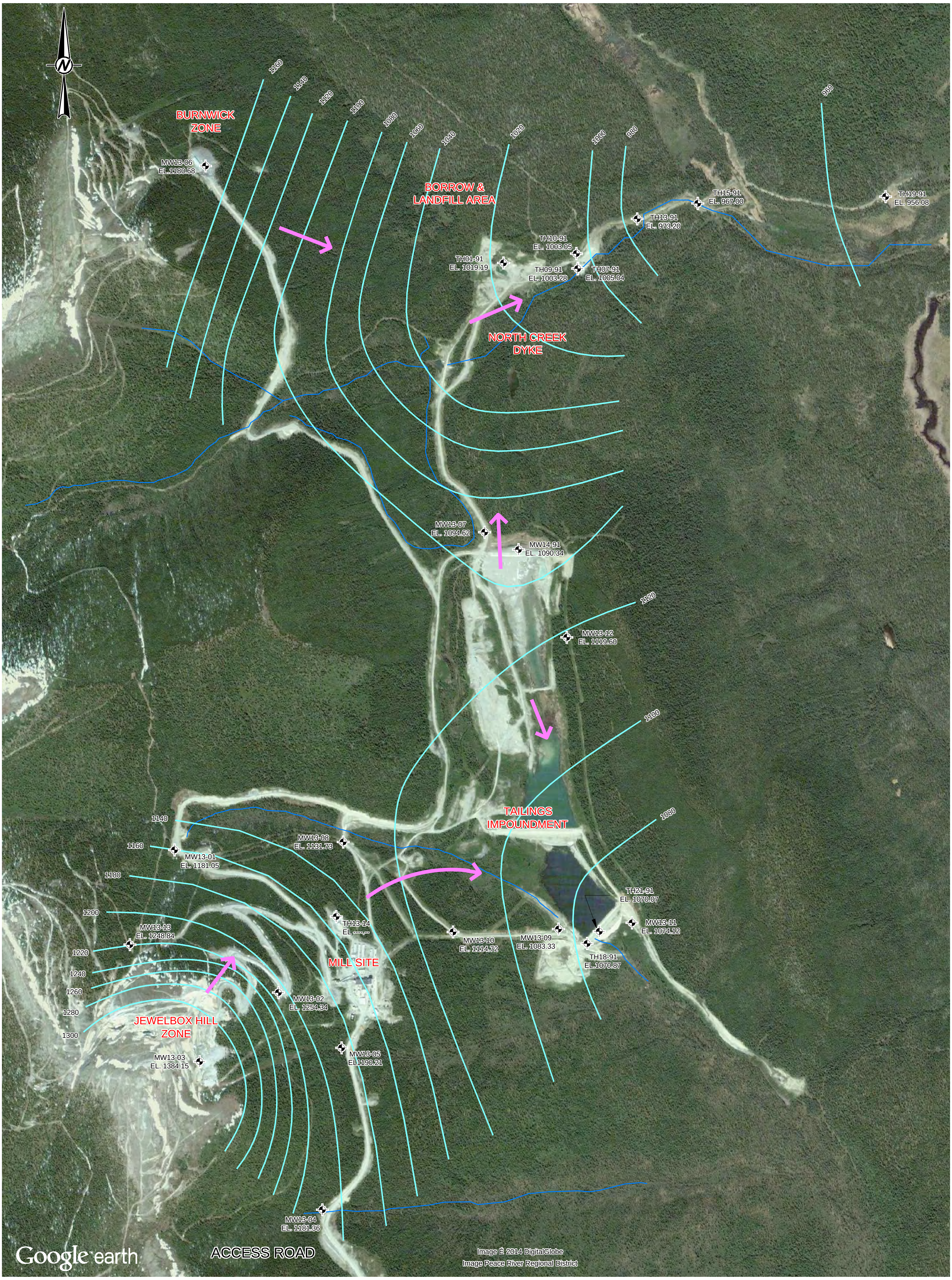
TECK METALS
SA DENA HES HYDROGEOLOGICAL ASSESSMENT
SA DENA HES MINE, YUKON TERRITORY

TITLE

MONITORING WELL & TESTHOLE LOCATIONS

Golder Associates

PROJECT No.	12-1021-0006-7000	FILE No.	1210210006-7000-01
DESIGN	TR	2013-12-03	SCALE AS SHOWN
CADD	LYT	2013-12-03	FIGURE
CHECK	TR	2014-03-24	**FIGURE 2**
REVIEW	HG	2014-03-24	



LEGEND

ID00-00 EL.0000.00	SDH MW WELL LOCATION ID & ELEVATION (m)
0000	ELEVATION & CONTOUR LINE
	GROUND WATER FLOW DIRECTION
	WATERCOURSE

REFERENCE

All units are in metres unless otherwise noted.
Base imagery obtained from Google Earth Pro under licence.
Google Earth Imagery date June 12th, 2006.
Google Earth Image is to be used for surrounding detail reference only.
Datum: NAD 83 Projection: UTM Zone 9

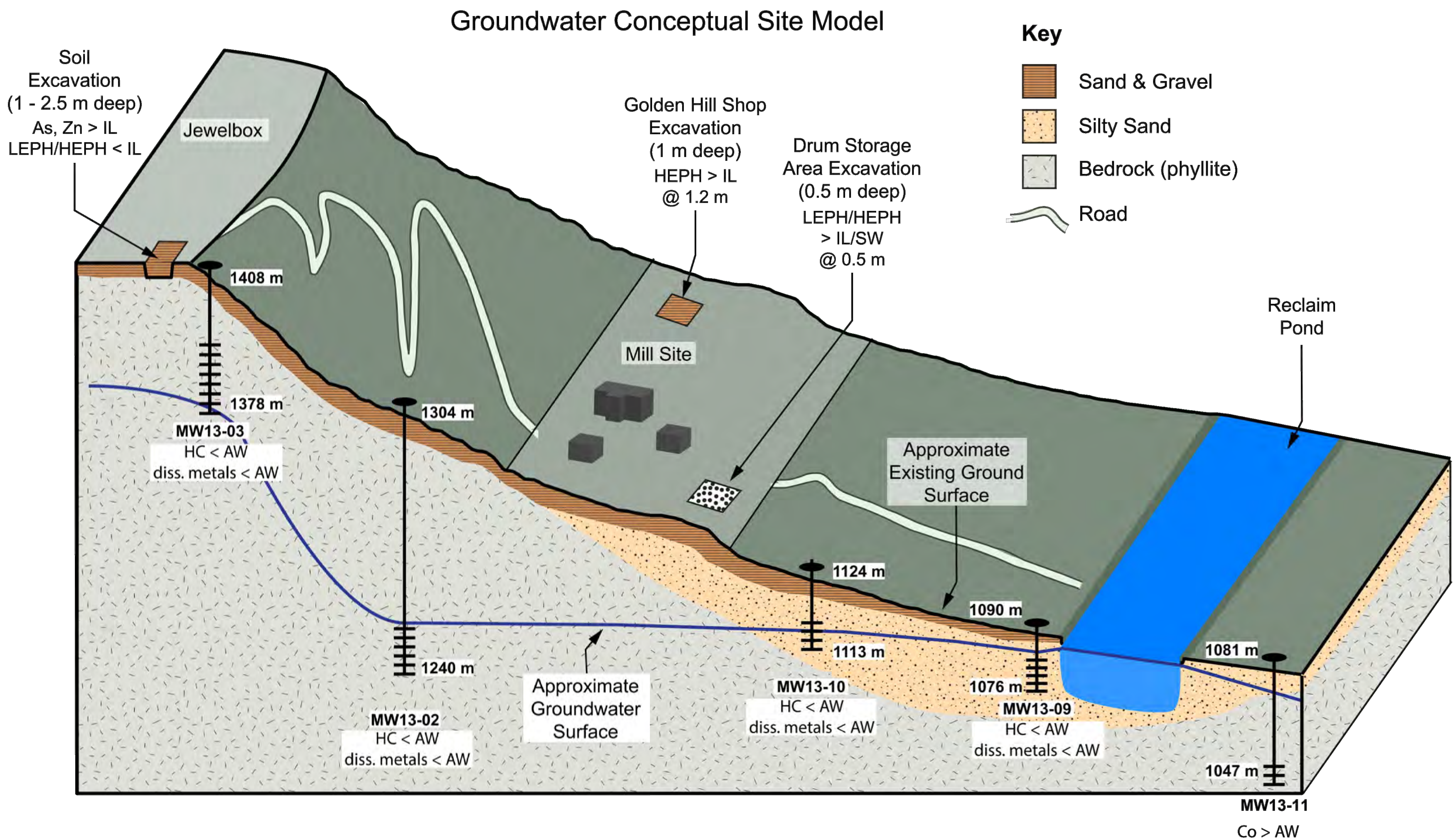
0 300 600 900
SCALE METRES

PROJECT
TECK METALS
SA DENA HES HYDROGEOLOGICAL ASSESSMENT
SA DENA HES MINE, YUKON TERRITORY

TITLE
GROUND WATER ELEVATIONS AND CONTOURS FROM SEPTEMBER 26, 2013

Golder Associates

PROJECT No.	12-1021-0006-7000		FILE No.	1210210006-7000-02
DESIGN	TR	2013-12-03	SCALE	AS SHOWN
CADD	LYT	2013-12-03	FIGURE	
CHECK	TR	2014-03-24		FIGURE 3
REVIEW	GH	2014-03-24		



PROJECT
TECK METALS
SA DENA HES HYDROGEOLOGICAL ASSESSMENT
SA DENA HES MINE, YUKON TERRITORY

TITLE
CONCEPTUAL MODEL

Golder Associates

PROJECT No.	12-1021-0006-7000	FILE No.	1210210006-7000-04
DESIGN	TR	2013-03-24	SCALE NOT TO SCALE
CADD	RTJ	2013-03-24	FIGURE
CHECK	TR	2013-03-24	**FIGURE 4**
REVIEW	GH	2013-03-24	