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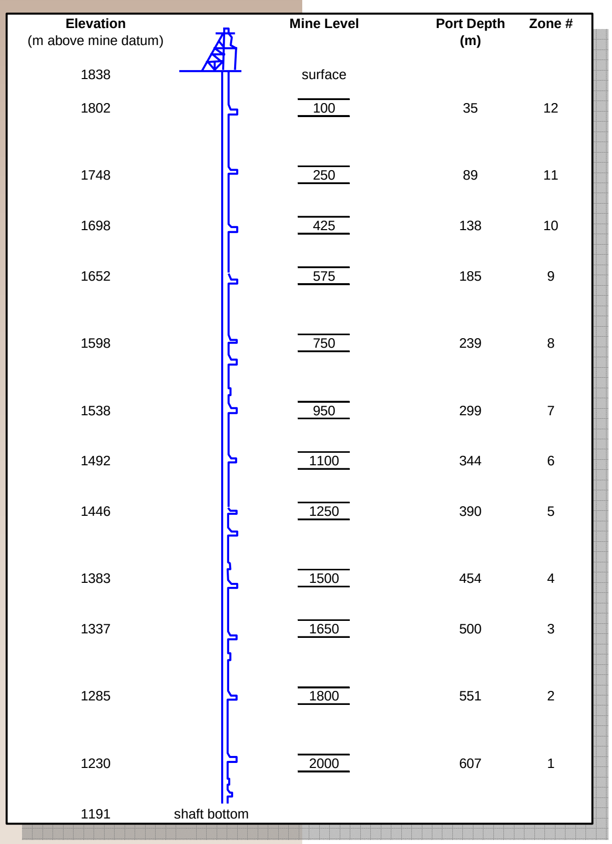
Giant Mine Arsenic Trioxide Management Project

Groundwater & C-Shaft Monitoring: 2005- 2006 Update Report



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Giant Mine Arsenic Trioxide Management Plan

Groundwater & C-Shaft Monitoring: 2005- 2006 Update Report

Indian and Northern Affairs Canada

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(Electronic files only in CD at the back of the report)

1 Introduction

This report reviews the results from groundwater and mine water (C-Shaft) monitoring at the Giant Mine from January 2005 to January 2007. The monitoring systems included in this report are the:

- fourteen deep “Westbay” Multiport (MP) monitoring wells;
- shallow standpipes monitoring the tailings ponds; shallow standpipes monitoring the Calcine Pond; and
- C-Shaft MP System.

Locations of all of these monitoring systems are illustrated on **Figure 1**.

Data from these monitoring locations are compared with previously collected data, interpretations presented regarding changes and possible causes, and comments provided regarding modifications of the existing conceptual model.

This report also provides an “as-built” report of the installation of the hybrid MP System in the C-Shaft, including preliminary monitoring data and operating issues/recommendations.

2 Monitoring

2.1 MP Monitoring System

Fourteen multiport (MP) multi-level monitoring systems have been installed at the Giant Mine site. A complete description of the installations, including geologic/structural target features is available in the installation reports (SRK, 2002 and 2004).

Monitoring zones within these wells were identified from core logging and positioned to monitor possible lithological and/or structural features believed to impart control on groundwater flow. Completion details are included in the installation reports (SRK, 2002 and 2005).

2.1.1 Data Collection to Date

Table 1 summarizes dates and types of data collected since installation of the MP monitoring systems. Pressure profile and water chemistry data collected during previous sampling events are included on the same charts to allow for direct comparison and trend assessment.

Table 1: Summary of MP Well Activities and Data Collection to Date (2002-2006)

Monitoring Well	Date	Comments	Pumping Port Status & Continuous Monitoring	MP Casing DTW (m)
S-1857	Jan-02	installed, pressure profile	all closed	
	Jan-02	Zone 1 and 3 sampled	all closed	
	Apr-02	pressure profile and K testing	Zone 3 open ("Level-logger" installed)	
	June/July, 2002	pressure profile	"Level-logger" removed, zone 3 closed, NOT tested	
	Oct-02	pressure profile	all closed??	
	Mar-03	Zones 1, 3, 5, 10 sampled	"Level-logger" installed - assume Zone 3 open?	
	May-03	"Level-logger" stuck at 90 m- no profile taken	unknown	
	Jun-03	"Level-logger" removed (blockage thawed), vented casing to Zone 1 to increase pressure differential between casing and Zone 3; pressure profile	All closed. Zone 3 Port closed (was open). No leaks detected.	77.51
	Jul-03	zones 3,5,10 sampled	all closed	
	Sep-03	pressure profile; zones 1, 3, 5, 10 sampled	all closed	139.25
	Mar-04	pressure profile	all closed	139.95
	Apr-04	pressure profile; zones 1, 3, 5, 10 sampled	all closed	
	Jun-04	pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile; zones 1, 3, 5, 10 sampled	all closed	
	Oct-05	pressure profile; zones 1, 3, 5, 10 sampled	all closed	139.53
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile; zones 3, 5, 10 sampled (could not sample zone 1 - seal dirty and shoe broke)	all closed	139.20
S-1858b	Aug-04	installed, pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile, zones 2 and 5 sampled	all closed	
	Oct-05	pressure profile, zones 2 and 5 sampled	all closed	146.45
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile, zones 2 and 5 sampled	all closed	146.90
S-1859	Aug-04	installed, pressure profile	all closed	
	Jan-05	NOT monitored (inaccessible)	all closed	
	Jun-05	pressure profile, zones 2 and 7 sampled	all closed	
	Oct-05	pressure profile, zones 2 and 7 sampled	all closed	40.78
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile, zones 2 and 7 sampled	all closed	41.11

Table 1: Summary of MP Well Activities and Data Collection to Date (2002-2006) (Cont.)

Monitoring Well	Date	Comments	Pumping Port Status & Continuous Monitoring	MP Casing DTW (m)
S-1860	Jan-02	installed, pressure profile	all closed	
	Jan-02	Zone 1 and 3 sampled	all closed	
	Apr-02	pressure profile and K testing	Zone 3 open ("Level-logger" installed)	
	June/July, 2002	pressure profile	"Level-logger" removed, zone 3 closed, tested OK	
	Oct-02	pressure profile	all closed	
	Mar-03	could not access - frozen	all closed	
	May-03	could not access - frozen	all closed	
	Jun-03	could not access - frozen	all closed	
	Jun-03	Blockage thawed. Leak test only.	All closed. MP casing bailed down. No leaks detected.	7.15
	Jul-03	pressure profile, zones 3,7,1 sampled	all closed	
	Sep-03	pressure profile, zones 3,7,1 sampled	all closed	49.53
	Mar-04	pressure profile	all closed	49.65
	Apr-04	pressure profile and sampled zones 3,7,10	all closed	
	Jun-04	pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile; zones 3 and 7 sampled	all closed	
	Oct-05	pressure profile; zones 3 and 7 sampled	all closed	49.11
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile; zones 3 and 7 sampled	all closed	49.38
S-1954	Aug-04	installed, pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile, zones 2 and 5 sampled, and duplicates at zone 2	all closed	
	Oct-05	pressure profile, zones 2 and 5 sampled	all closed	77.56
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile, zones 2 and 5 sampled	all closed	77.21
S-1955	Jan-02	installed, pressure profile	all closed	
	Apr-02	pressure profile (K testing unsuccessful)	all closed	
	June/July, 2002	pressure profile	all closed	
	Oct-02	pressure profile	all closed	
	Mar-03	Zones 2, 3, 6 sampled (no water in Z1)	all closed	
	May-03	pressure profile	all closed	
	Jun-03	pressure profile and samples collected at Z 2, 3 and 6	all closed	
	Sep-03	pressure profile, zones 2 and 6 sampled	all closed	142.54
	Mar-04	pressure profile	all closed	142.52
	Apr-04	pressure profile and sampled zones 1, 2, and 6	all closed	
	Jun-04	pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile, zones 2 and 6 sampled	all closed	
	Oct-05	pressure profile, zones 2 and 6 sampled	all closed	142.44
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile; zones 2 and 6 sampled	all closed	142.90

Table 1: Summary of MP Well Activities and Data Collection to Date (2002-2006) (Cont.)

Monitoring Well	Date	Comments	Pumping Port Status & Continuous Monitoring	MP Casing DTW (m)
S-1956	Aug-04	installed, pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile, zones 4 and 10 sampled	all closed	
	Oct-05	pressure profile, zones 4 and 10 sampled	all closed	156.49
	Jan-06	pressure profile, zones 4 and 10 sampled	all closed	
	Sep-06	pressure profile, zones 4 and 10 sampled	all closed	155.80
S-2224	Aug-04	installed, pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile, zones 3 and 9 sampled	all closed	
	Oct-05	pressure profile, zones 3 and 9 sampled	all closed	51.63
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile, zones 3 and 9 sampled	all closed	51.73
S-DIAND-001	Jan-02	installed, pressure profile	all closed	
	Jan-02	Zone 1 and 3 sampled	all closed	
	Apr-02	pressure profile and K testing	Zone 4 open ("Level-logger" installed)	
	June/July, 2002	pressure profile	"Level-logger" removed, zone 4 - unable to close	
	Oct-02	pressure profile	Zone 4 partially open	
	Mar-03	Zones 4, 8 sampled (dup from Z4)	Zone 4 partially open ("Level-logger" installed)	
	May-03	pressure profile, leak test	Leak test indicates Zone 4 partially open ("Level-logger" reinstalled)	
	Jun-03	pressure profile, 2 attempts at closure of Z 4	"Level-logger" removed	
	Jun-03	leak test at Zn 4, Zones 4, 8 sampled (dup from Z4)	leak test indicates Zone 4 closed, ("Level-logger" reinstalled as final check)	
	Jun-03	"Level-logger" pulled from well; pressure profile	all closed	
	Sep-03	pressure profile; zones 4,8,10 sampled	all closed	25.89
	Apr-04	pressure profile, sampled zones 4, 8, 10 (duplicate at zone 4)	all closed	
	Jun-04	pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile; zones 4,8,10 sampled	all closed	
	Oct-05	pressure profile; zones 4,8,10 sampled	all closed	29.86
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile; zones 4,8,10 sampled	all closed	29.10
S-DIAND-024	Aug-04	installed, pressure profile (twice in Aug)	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile and sampled zones 2, 5, and 10	all closed	
	Oct-05	pressure profile and sampled zones 2, 5, and 10	all closed	34.80
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile and sampled zones 2, 5, and 10	all closed	2.35

Table 1: Summary of MP Well Activities and Data Collection to Date (2002-2006) (Cont.)

Monitoring Well	Date	Comments	Pumping Port Status & Continuous Monitoring	MP Casing DTW (m)
S-DIAND-002	Jan-02	installed, pressure profile	all closed	
	Jan-02	Zone 1 and 3 sampled	all closed	44.54
	Apr-02	pressure profile	all closed	
	Apr-02	pressure profile and K testing	Zone 4 open ("Level-logger" installed)	
	June/July, 2002	pressure profile	"Level-logger" removed, zone 4 closed, NOT tested	
	Oct-02	pressure profile	all closed ?	27.59
	Mar-03	Zones 4 sampled (metals only) before MP casing disconnected at 6m - no access	all closed ???	4.91
	May-03	pressure profile; MP casing disconnected near surface (3 and 9 m??)	all closed ???; leak test indicates open casing	
	Jun-03	Top 3m section of MP casing pulled out. O-rings inspected and cleaned. Casing reattached. Coupling at 3m needs to be glued or annulus filled with cement to prevent casing parting again.	no leak test carried out	
	Jun-03	pressure profile, purged, and sampling (Zones 4, 5 and inside MP casing)	all closed (no leaks detected)	41.80
	Sep-03	pressure profile; zones 4,5,6,9 sampled	all closed	
	Mar-04	pressure profile	all closed	41.88
	Apr-04	pressure profile and sampled zones 4, 5, 6, and 9	all closed	
	Jun-04	pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile and sampled zones 4, 5, 6, and 9	all closed	
	Oct-05	pressure profile and sampled zones 4, 5, 6, and 9	all closed	43.07
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile and sampled zones 4, 5, 6, and 9	all closed	42.25
S-DIAND-021	Aug-04	installed, pressure profile	all closed	
	Jan-05	NOT monitored (frozen)	all closed	
	Jun-05	well blocked frozen at 40 m (nothing sampled)	all closed	
	Oct-05	well still blocked at 73.5 m (nothing sampled)	all closed	52.10
	Jan-06	well still blocked at 73.5 m (nothing sampled)	all closed	
	Sep-06	pressure profile to 73.5 m (blocked below), and sampled zone 11 (could not sample zone 10)	all closed	5.45
S-DIAND-022	Aug-04	installed, pressure profile	all closed	
	Jan-05	NOT monitored (inaccessible)	all closed	
	Jun-05	pressure profile and sampled zones 2, 4, 7, and 11	all closed	
	Oct-05	pressure profile and sampled zones 2, 4, 7, and 11	all closed	43.58
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile and sampled zones 2, 4, 7, and 11	all closed	38.23
S-DIAND-023	Aug-04	installed, pressure profile	all closed	
	Jan-05	pressure profile	all closed	
	Jun-05	pressure profile and sampled zones 2, 4, and 10	all closed	
	Oct-05	pressure profile and sampled zones 2, 4, and 10	all closed	42.83
	Jan-06	pressure profile	all closed	
	Sep-06	pressure profile and sampled zones 2, 4, and 10	all closed	41.07

2.1.2 2005 & 2006 Monitoring

Monitoring was carried out in January, June, and October of 2005, and again in January and September of 2006. The piezometric pressures were measured in all zones in each well during the monitoring rounds. The fluid samples were collected in June and October 2005, and in September 2006 from the zones listed in Table 2.

Table 2: Tasks Completed

Drillhole ID	MP Zones Sampled	Depth Water in MP Casing during sampling events (m)				
		Pressure Profiling		Water Sampling and Pressure Profiling		
		Jan 2005	Jan 2006	Jun 2005	Oct 2005	Sep 2006
S-1857	10, 5, 3, 1	139.68	139.35	139.58	139.53	139.40
S-1858b	2, 5	146.57	146.28	146.50	146.45	146.90
S-1859	2, 7	n/a	40.83	39.25	40.78	41.11
S-1860	7, 3	49.24	48.67	49.54	49.11	49.38
S-1954	2, 5	dry	dry	77.58	77.56	77.21
S-1955	2, 6	n/a	142.39	142.44	142.44	142.90
S-1956	4, 10	156.71	156.01	156.49	156.49	155.80
S-2224	3, 9	43.43	51.28	45.51	51.63	51.73
S-DIAND-001	10, 8, 4	27.42	29.87	26.91	29.86	29.10
S-DIAND-002	4, 5, 6, 9	43.08	24.32	42.32	43.07	42.25
S-DIAND-021	11	frozen at 40m	n/a	n/a	52.10	**5.45**
			note: blocked below 73.4 m			
S-DIAND-022	2, 4, 7, 11	n/a	n/a	42.68	43.58	38.23
S-DIAND-023	2, 4, 10	42.74	42.51	41.34	42.83	41.07
S-DIAND-024	2, 5, 10	34.75	11.01	34.43	34.80	**2.35**

Wells listed as “dry” do not have water inside the MP casing. Depth is bottom of casing.

Pressure pulse testing indicates when carried out, or that testing still required.

In January 2005 the MP well S-1859 was not profiled due lack of protective shack and exposure to wind/cold at that exposed location. The shack was later built and there were no problems with monitoring of this well during winter of 2006. The MP well S-DIAND-022 was not profiled due to difficult access from the highway and the requirement for a monitoring tent. As of September 2006, this well has not been sheltered but it is a short walking distance from the highway. At the time of January 2005 monitoring, five mostly complete shacks had been temporarily installed by Miramar staff and available for inspection by SRK. These shacks were found to require repositioning over the wellhead to enable proper access to the wellhead and shelter from weather. Protective locking caps with locks were installed on eight of the nine new wells.

All monitored wells were confirmed to be operating properly during 2005 and 2006 testing except for S-DIAND-021, which was blocked at a depth of approximately 39 m. The blockage was first discovered during the January 2005 profiling. The blockage is currently at approximately the same level as the inner casing water level measured (38.61 m downhole depth) in September 2004. Remedial actions were initiated to remove the ice from S-DIAND-021. Warm water was flushed in the MP casing over a period of multiple days, and ice was melted to a drillhole depth of 61 meters. Warm water no longer achieved efficient ice removal at this depth. The blockage was at 73.4 m depth down-hole during September 2006 monitoring.

This blockage was originally thought to be ice as the well was accessible along the total depth in September 2004 but found to be blocked in January 2005. However, attempts to melt the blockage below 73.4 m indicate that the blockage is not caused by ice, but is thought to be a foreign object (rock, etc.) that has been dropped into the well. As this well completion was not locked and unauthorised people were apparently accessing the site, it is now assumed that a rock or other objects has been dropped into the casing. Attempts have been made to remove the blockage, or push it to the bottom, but were unsuccessful to date (September 2006). Further work will be needed to regain access to the lower portion of the monitoring well.

To avoid possible freezing of the water in the MP wells, the casing water levels are maintained below expected frozen ground conditions during the winter months. Although no ice was observed in January 2006, S-DIAND-021 and -024 should be bailed down to below 25m.

2.1.3 Pressure Profiles

Pressure profiles were collected at each well and recorded on pre-formatted datasheets. Pressure profiles followed standard Westbay and SRK procedures, as documented in the equipment operation manuals.

2.1.4 Water Sampling

Water samples were collected from select zones in the monitoring systems using approved Giant Mine site methods, with additional modifications to conform to SRK's standard water sampling QA/QC procedures. Sample collection equipment was de-contaminated between monitoring zones by rinsing twice with deionised water. Field parameters were collected in standard lab-provided containers (including acid-washed when appropriate), and duplicates and field blanks included in the sample suite submitted for analysis. Copies of the field sample collection notes are included in Appendix A.

Zones sampled during the monitoring rounds in June and October 2005 and September 2006 are listed in **Table 3**.

Table 3: Zones samples for water chemistry (2005 to 2006)

Well	Sampling Dates	Zones sampled	Zones Purged
S-1857	Jun 2005 Oct 2005 Sep 2006	1, 3, 5, 10 1, 3, 5, 10 3, 5, 10	none none none
S-1858b	Jun 2005 Oct 2005 Sep 2006	2, 5 2, 5 2, 5	none none none
S-1859	Jun 2005 Oct 2005 Sep 2006	2, 7 2, 7 2 (dup), 7, (blk)	none none none
S-1860	Jun 2005 Oct 2005 Sep 2006	3, 7 3, 7 3, 7	none none none
S-1954	Jun 2005 Oct 2005 Sep 2006	2, 5 2, 5 2, 5	none none none
S-1955	Jun 2005 Oct 2005 Sep 2006	2, 6 2, 6 2, 6	none none none
S-1956	Jun 2005 Oct 2005 Sep 2006	4, 10 4, 10 4, 10	none none none
S-2224	Jun 2005 Oct 2005 Sep 2006	3, 9 3, 9 3, 9	none none none
S-DIAND-001	Jun 2005 Oct 2005 Sep 2006	4, 8, 10 4, 8, 10 4, 8, 10 (dup), (blk), (rins)	none none none
S-DIAND-002	Jun 2005 Oct 2005 Sep 2006	4, 5, 6, 9 4, 5, 6, 9 4, 5, 6, 9	none none none
S-DIAND-021	Jun 2005 Oct 2005 Sep 2006	Blocked at 40 m – no samples Blocked at 73 m – no samples 11 (could not sample 10)	none none none
S-DIAND-022	Jun 2005 Oct 2005 Sep 2006	2, 4, 7, 11 2, 4, 7, 11 2, 4, 7, 11	none none none
S-DIAND-023	Jun 2005 Oct 2005 Sep 2006	2, 4, 10 2, 4, 10 2 (dup), 4, 10, (blk), (rins)	none none none
S-DIAND-024	Jun 2005 Oct 2005 Sep 2006	2, 5, 10 2, 5, 10 2, 5, 10	none none none

(dup) = duplicate, (blk) = field blank, (rins) = equipment rinsate.

3 MP System Results and Interpretation

3.1 Pressure Profiles

All pressure profile data to date are displayed in **Figures 2** through **29.** Piezometric levels in each monitoring zone are plotted as the "equivalent depth to water" on the plots. This refers to the depth the water would be observed in an open standpipe if screened across the MP zone. The equivalent depth to water is calculated by adding the pressure head (height of water column calculated from the zone pressure measured) to the depth of the measurement port where the pressure was measured.

Any zone that has an equivalent depth to water greater than ground surface would have water flowing from the open standpipe and is classified as flowing artesian. The atmospheric line plotted with the data indicates a pressure head of zero (ie: a dry zone) at that depth. Any zone that plots above that line is unsaturated (under negative pressure, or suction, as in S-1955), and along, or below, that line is saturated.

Pressure measurements have been corrected for atmospheric effects and in all of the plots the vertical depth (corrected for drillhole dip and curvature) is illustrated. The general geology/lithology features and the corresponding MP casing design (i.e., packer locations) are shown to indicate where the zones are situated. The "error bars" illustrated are for presentation purposes and indicate the zone length monitored (section between hydraulic packers) and not calculated error.

On the depth profile graphs, the previous measurements 2002 to 2005 are shown in grey, and only the most recent pressure profile in September 2006 is emphasized. The seasonal fluctuations cause the scatter of data points and depth profiles. The groundwater level (as groundwater elevation above mine datum) was plotted as time series of all MP zones in each MP well as separate figure, showing observed trends from Jan 2002 to Sep 2006.

3.1.1 S-1857

Pressure data from September 2006 (**Figures 2** and **3**) show a normal downwards trend of increasing pressure with depth between zones 10 and 4, and there has been no significant change from previous measurements in 2004. In Zones 1 to 3 (at or below the Westbay Fault), the pressures have been consistent with previous measurements, although Zone 1 had the lowest pressure measured to date, possibly due to continued dewatering below the Westbay Fault.

The temporal changes in groundwater level can be described as seasonal, with water levels increasing during the freshet period April-July, then falling again until next annual cycle. In 2005-2006 the seasonal fluctuations in water level were small and similar to previous years. In Zone 3 closest to the Westbay Fault (on the eastern dewatered side of the fault), the water level was relatively high until June 2005, then it decreased to level observed before March 2004.

In Zones 1 to 2, at or below Westbay Fault, the pressures appeared to decrease from September 2005 to September 2006.

3.1.2 S-1858b

Pressure data (**Figure 4** and **5**) show no significant change in 2005-2006 from measurements in previous years.

3.1.3 S-1859

Pressure data (**Figure 6** and **7**) show no significant change in 2005-2006 from measurements in previous years. Note that this well was not pressure profiled or sampled in January 2005 because of access problems in snow.

3.1.4 S-1860

Pressure data (**Figure 8** and **9**) show no significant change in 2005-2006 from measurements in previous years. Zones 2 and 3 (volcanic breccia and chlorite schist in zone 3 and non-brecciated volcanics in zone 2) still dominates the lower portion of the pressure profile, and the equivalent depth to water there is equal to the original open hole depth to water. At this time there is no explanation for the higher pressures in zones 2 and 3.

3.1.5 S-1954

Pressure data (**Figure 10**) show no significant change in 2005-2006 from measurements since December 2004, except for the deepest zone 1 (see **Figure 11**). Prior to June 2005, zone 1 was dry, most likely due to these zones being perched above the overall mine dewatering drawdown “cone” at this location, also supported by the very low water level in the open hole. In September 2005, zone 1 was no longer dry and had approximately 40 m of increase in water level since last measurement (Figure 11). Since September 2005 the water level in zone 1 has been decreasing slowly.

3.1.6 S-1955

No significant changes are observed (**Figures 12** and **13**). The upper part of the drillhole (Zones 6 and 7) remain the only zones that show piezometric levels significantly above the port elevations (see plotted port depth in Figure 12), and are still assumed to represent a perched water table. Zone 6 was temporarily dewatered during January 2006 measurement, but recovered to its usual water level by September 2006. Pressure variations appear to follow expected seasonal variations in infiltration during spring and summer, with water level declines over the winter.

All other zones continue to show minimal saturation above the ports. This is still assumed to be due to the ports being in the current dewatered drawdown “cone” of the mine and isolated from significant surface infiltration by low hydraulic conductivity of the overlying bedrock. However, the three deepest zones (1, 2, 3) have been increasing in saturation recently since September 2005 (Figure 13).

3.1.7 S-1956

Pressure data (**Figure 14**) show no significant change in 2005-2006 from measurements in previous years. However, the deepest zone 1 has been increasing in saturation since 2004 (Figure 15).

3.1.8 S-2224

Pressure data (**Figure 16**) show no significant change in 2005-2006 from measurements in previous years. The deepest zone 1 (connected to Fault Breccia at depth 148 m), and the adjacent zone 2, both continue to show the lowest groundwater levels and a continuing dewatering trend since 2004 (Figure 17).

3.1.9 S-DIAND-001

No significant changes in seasonal water level fluctuations are observed in S-DIAND-001 (**Figures 18** and **19**) with the exception of a lag in the upwards inflection of the shallow zones (4 through 10) as a result of the summer infiltration. The deepest three zones (1, 2, 3) in the volcanic (pillow flow) rock below the Townsite Fault have artesian pressures compared to the zones in schist rock above the fault. The deeper zones also respond most rapidly to summer infiltration. The water level in the open hole was high (depth to water 26 m) in September 2006 and there is potential for freezing of this well.

3.1.10 S-DIAND-002

No significant changes in seasonal water level fluctuations were observed in S-DIAND-002 (**Figure 20**). The deep and shallow zones have small seasonal variation in water levels (**Figure 21**), which is not always consistent. In 2003 the deeper zones had a decrease in water level in summer while the shallow zones showed increased water levels as result of infiltration. In 2005 and 2006, all zones showed similar trends with time except for anomalous data collected in the shallowest zones (7, 8, 9) in January 2006. This well shows one of the most uniform pressure profile with depth of all MP wells monitored.

3.1.11 S-DIAND-021

No significant changes in seasonal water level fluctuations were observed in zones 8 to 12 (**Figure 20** and **21**), based on very limited data set. In 2005-2006, well S-DIAND-021 could not be sampled in all zones because of ice or other blockages. During the January 2005 monitoring the well was frozen below 40 m. The ice was melted in October 2005 and sampling was attempted, but another blockage was found at 73.5 m and has been blocked since. This blockage is not thought to be a foreign object (rock, etc.) and not ice. Further efforts to clear the blockage will be carried out during the summer of 2007. The only pressure data in the 2005-2006 period was collected in September 2006 for zones 8 to 12 above the blockage.

3.1.12 S-DIAND-022

Pressure data (**Figure 24** and **25**) show no significant change in 2005-2006 from measurements in previous years. Note that this well was not pressure profiled or sampled in January 2005 because of access problems in snow.

3.1.13 S-DIAND-023

Pressure data (**Figure 26**) show no significant change in 2005-2006 from measurements in previous years. The seasonal groundwater level variation is very similar in all zones in this well (**Figure 27**).

3.1.14 S-DIAND-024

Pressure data (**Figure 28**) show no significant change in 2005-2006 from measurements in previous years. There is very small seasonal variation in groundwater levels in all zones (**Figure 29**) and this well shows one of the most uniform pressure profile with depth of all MP wells monitored. Anomalously low pressures were measured in zones 9, 8, 7, 6 and 2 during the January 2006 monitoring event, but the pressures were typical during the September 2006 monitoring round. It should be noted that the water level in the open hole was high (depth to water 2.3 m) in September 2006, and there is high potential for freezing of this well and it should be purged before winter.

3.1.15 Overall Interpretation

The 2005/6 pressure monitoring supports the earlier findings that the most significant source of variation in the data is due to seasonal fluctuations in water pressures, caused by changes in precipitation and infiltration.

The only significant observation is decrease in water level in Zone 3 of well S-1857 and return to typical water level previously observed in 2004 prior to anomalous increase event. In Zones 1 to 2, at or below Westbay Fault, the pressures appeared to decrease from September 2005 to September 2006. A decreasing trend in pressures was also observed in the deepest zone in wells S-2224, and also in well S-1954.

The deep zone in wells S-1955 and S-1956 has been increasing in saturation slightly, from previously dewatered conditions.

3.2 Water Sampling

Results of water analyses with comparison to CCME guidelines for aquatic life, and comparison to Baker Creek upstream of the mine workings, are presented in Appendix B.

3.2.1 QA/QC Results

In 2005-2006 sampling period, 11 duplicates, 14 field blanks and 5 equipment blanks were collected during the groundwater monitoring program (Appendix B). Duplicate samples generally indicated good reproducibility except for some of the metals. Arsenic concentrations in between duplicate samples differed by 0.5 to 29% (**See Appendix B**). This could be due to sample variability, or could reflect inaccuracies in the lab results. Field blanks and equipment rinsate samples were generally free from contamination, with most values at or near detection limits.

3.2.2 Water Chemistry Results

Groundwater monitoring results are provided in electronic form as CD-ROM attached to Appendix B. The appendix tables include comparisons to CCME guidelines for freshwater aquatic life and a surface water sample collected from Baker Creek upstream of the mine site (surveillance network program station SNP 43-11). A summary of arsenic concentrations is presented in **Table 4** and is graphed in **Figure 30**. It should be emphasized that the monitoring wells are located outside of the mine envelope within the assumed draw down cone of the mine and; therefore, do not reflect any influence from the underground mine workings. The samples were collected to establish current baseline conditions prior to any remediation measures, including any measures that could lead to movement of water from the mine towards these wells such as re-flooding the mine to the point where groundwater gradients are reversed (ie: flows away from mine workings).

Arsenic concentrations in most samples exceeded CCME criteria for aquatic life (0.005 mg/L) and were higher than the surface water sample from Baker Creek upstream of mine (0.02 mg/L). Most measured concentrations in groundwater monitoring wells were in range 0.01 to 0.1 mg/L, with elevated concentrations arsenic (> 1 mg/L) C-Shaft, S-DIAND-002, MW00-01 shallow piezometer, and S-DIAND-014A.

Short term trends based on two or three measurements over one year are difficult to detect because of natural sample variability. In six of the monitoring zones, there was a decreasing trend of arsenic in 2005-2006 time period in relatively shallow monitoring zones. In five zones the most recent samples had an increased arsenic level and may indicate an increasing trend in the deeper monitoring zones.

In the longer time period, 2002 to 2006, there are more measurements and sample variability has less effect on observed trends with time. There was a decreasing trend in three shallow monitoring zones (S-1955 zone 6, S-DIAND-001 zone 10, S-DIAND-002 zone 9), and an increasing trend in one shallow monitoring zone (S-1857 zone 10).

Table 4: Summary of Arsenic Concentrations in MP Wells

Well	Zone	Min (mg/L)	Max (mg/L)	Mean (mg/L)	# Samples	Trend	
						2005-2006	2002-2006
S-1857	1	0.0078	0.028	0.017	7	none	none
	3	0.0079	0.115	0.066	9	none	none
	5	0.121	0.169	0.16	7	none	none
	10	0.0533	0.394	0.22	7	none	increase
S-1858B	2	0.0122	0.0177	0.015	3	none	n/a
	5	0.0226	0.0522	0.041	3	decrease	n/a
S-1859	2	0.0065	0.0111	0.0083	3	none	n/a
	7	0.0004	0.0183	0.011	3	decrease	n/a
S-1860	1	0.039	0.045	0.042	2	none	none
	3	0.0282	0.065	0.042	6	none	none
	7	0.0173	0.056	0.042	8	decrease	none
S-1954	2	0.0139	0.0228	0.017	4	none	n/a
	5	0.26	0.303	0.28	3	none	n/a
S-1955	2	0.008	0.029	0.017	6	none	none
	3	0.01	0.0112	0.011	2	none	none
	6	0.132	0.428	0.32	7	decrease	decrease
S-1956	4	0.0102	0.0278	0.016	3	decrease	n/a
	10	0.0211	0.0318	0.025	3	none	n/a
S-2222	10	0.0002	0.0002		1	n/a	n/a
S-2224	3	0.0254	0.0472	0.037	3	increase	n/a
	9	0.0112	0.013	0.012	3	none	n/a
S-DIAND-001	4	0.005	0.0313	0.017	9	none	none
	8	0.004	0.0223	0.015	8	none	none
	10	0.0409	0.12	0.077	5	decrease	decrease
S-DIAND-002	4	1.26	2	1.7	8	none	none
	5	1.88	2.15	2.0	6	none	none
	6	1.04	2	1.4	5	none	none
	9	2.38	5	3.4	5	none	decrease
S-DIAND-022	2	0.0028	0.0095	0.0061	3	increase?	None
	4	0.0064	0.0091	0.0074	3	none	none
	7	0.0072	0.0082	0.0076	3	none	none
	11	0.0079	0.0124	0.01	3	none	none
S-DIAND-023	2	0.0032	0.0141	0.007	3	increase	n/a
	4	0.0038	0.0067	0.0048	3	none	n/a
	10	0.0027	0.0057	0.0045	3	none	n/a
S-DIAND-024	2	0.0034	0.00754	0.005	3	increase?	n/a
	5	0.0024	0.0054	0.0043	3	none	n/a
	10	0.0043	0.0249	0.011	3	increase?	n/a
S-DIAND-021	11	0.0034	0.0034		1	n/a	n/a

Notes 1) significant figures shown as reported by the lab (detection limit for arsenic varies from sample to sample)

2) n/a: insufficient data to make trend interpretation

It is possible that the elevated concentrations could be due to a regional effect, such as natural enrichment of arsenic in the soil and bedrock or enrichment due to atmospheric deposition of arsenic during operation of the roaster. It should be noted that groundwater gradients in the areas of all the wells, including S-DIAND-002, are towards the mine workings; therefore water will be flowing downwards towards the mine in the areas.

3.3 Shallow Standpipe Monitoring Wells

The results of Sept 2006 arsenic monitoring in the shallow standpipe wells are listed in **Table 5**. Arsenic concentrations were relatively low (< 0.05 mg/L), within the typical range observed in other monitoring wells at the Giant site (see **Figure 30**). One exception was MW001-01 where arsenic level was much higher at 14 mg/L. It should be noted that MW001-01 is located within the Northwest Pond in tailings material and so represents tailings pore water, and not local groundwater concentration. The previous measurement in August 2000 was 4 mg/L.

Table 5: Arsenic in Groundwater in Shallow Standpipe Monitoring Wells

Well	Arsenic (mg/L)
MW00-01	14.4
MW00-02	0.0351
MW00-03A	0.0383
MW00-03B	0.0115
MW00-04B	0.0359
MW01-1A	0.0427
MW01-2A	0.0452
MW01-2B	0.024
MW01-2C	0.0362

Notes: 1) Significant figures shown as reported by the lab.

3.4 Calcine Pond Monitoring

Groundwater sampling in the area of the former calcine storage pond at the Giant Mine was completed in August 2004, August 2005, and August 2006 by staff of the INAC Giant Mine Remediation Project. The monitoring wells were installed at seven locations during a drilling investigation completed in October 2003 (INAC 2004). A pair of wells had been installed at each location, with screens (0.75 m long) at varying depths below surface. These sampling wells were intended for the monitoring of groundwater within the calcine.

Since their installation, many of the wells have not produced sufficient water for sampling. Four of the wells produced sufficient water and were sampled in August 2004, and six wells produced water for sampling in August 2005. The 2004 samples were reported to have been “muddy” and required an extended time to settle before they could be filtered. The samples from both campaigns were analyzed at the Taiga Environmental Laboratory in Yellowknife. The results for dissolved Arsenic and Cyanide are shown in **Table 6**, and trends in time are graphed in **Figure 31**.

The concentration of arsenic in groundwater at the Calcine Pond ranged from less than 0.005 to 16 mg/L. The high levels of arsenic were present at different dates in S-DIAND-014A and S-DIAND-019A, but there was large temporal variability in results. At this time, there are no consistent temporal trends.

Cyanide concentrations in most samples exceeded CCME criteria for aquatic life (0.005 mg/L) for free cyanide. The levels of total cyanide in the 2005 samples varied from 0.005 to 5.1 mg/L, and weak-acid dissociable (WAD) cyanide varied from 0.006 to 0.11 mg/L. The most recent groundwater samples at S-DIAND-013A, S-DIAND-013B, and S-DIAND-019A analysed for total cyanide (August 2006) had much lower levels of total cyanide than the samples in the previous year (August 2005).

The samples also generally contained high levels of dissolved iron, which varied from 12 to 114 mg/L in most wells. The high levels of iron in solution suggest that, in most of the wells, almost all of the cyanide would have been present as iron cyanides (ferrous or ferric). Iron cyanides are non-toxic, and can only present an environmental concern upon dissociation to free cyanide or WAD cyanide forms. This could occur if the iron cyanides were to be released from their current environment, but the process of dissociation would be relatively slow and would not be expected to expose biota to toxic levels of free or WAD cyanide.

Table 6: Summary of Arsenic and Cyanide Concentrations in Calcine Pond Monitoring Wells

Well	Date	Arsenic	Cyanide-Total	Cyanide-WAD
		(mg/L)		
S-DIAND-013A	4-Aug-04	0.062		
	29-Aug-05	0.05	3.4	0.11
	17-Aug-06	0.55	0.0538	0.0145
S-DIAND-013B	4-Aug-04	0.453		
	29-Aug-05	0.004	0.03	0.01
	17-Aug-06	0.076	0.0738	0.0154
S-DIAND-014A	4-Aug-04	13.2		
	29-Aug-05	0.02	0.005	0.006
	17-Aug-06	15.7	0.0243	0.009
S-DIAND-014B	21-Aug-06	0.0286	0.0112	0.005
S-DIAND-018A	29-Aug-05	0.024	3.5	0.092
	22-Aug-06	0.705	0.0216	0.0102
S-DIAND-018B	29-Aug-05	5.13	4.9	0.002
	22-Aug-06	0.00361	0.023	0.005
S-DIAND-019A	4-Aug-04	0.007		
	29-Aug-05	12.5	5.1	0.094
	21-Aug-06	0.025	0.0321	0.005
S-DIAND-019B	21-Aug-06	0.00884	0.0266	0.005

Notes: 1) Significant figures shown as reported by the lab.

4 C-Shaft Monitoring System

4.1 Installation

4.1.1 System Objectives

The C-Shaft monitoring system was installed to monitor water level rise in the mine and discrete water chemistry at all of the mine levels within the C-Shaft during re-flooding. Sampling and water pressure measurements are carried out through the same type of MP System ports as installed in the deep groundwater monitoring wells.

Because the C-Shaft is open along the entire vertical profile, measurement of water pressure at each level would result in the same calculated shaft water level if the water was of constant density. However, as the water is expected to vary in temperature and chemistry, the pressure readings will provide information regarding changes in fluid density within the vertical profile. This density change can be related to the discrete fluid samples and temperatures collected from each level.

4.1.2 Installation Details

The MP System is a closed pipe, so can be installed in deep wells where the water level is within 100m of surface as the system's buoyancy counteracts the tensile load on the pipe couplings. However, installation of the PVC pipe in the unflooded shaft would have exceeded the tensile strength of the pipe couplings if suspended the full 600m. To work around this, it was decided to install the pipe from the bottom of the shaft up and attached to the wooden bracing in the shaft man-way using plastic clamps and stainless steel screws. This allowed the resulting compression load to be transferred to the clamping system. Once the shaft starts to flood, the system would become buoyant and could be balanced to reduce loading on the mounting straps.

To reduce system costs, and to preserve the remaining stock of MP pipe for other installations, the majority of the system was constructed using a hybrid PVC pipe manufactured by Rice Engineering of Edmonton to specifications given by SRK. This decision was made as the cost of the hybrid pipe was approximately 20% of the cost of the MP pipe.

Use of the hybrid pipe was contingent on the understanding that the pipe would be anchored to the wooden cribbing, and so would not be subjected to high compression or tension loading, as can be handled by the stronger joints in the MP System pipe. The hybrid pipes were equipped with a machined end to connect to the MP couplings where measurement ports were installed, and with flush joint threaded joints equipped with o-rings for joining the hybrid pipes.

At the same time the system was being installed, the decision was made to remove the pumps from the 2000 Level, prior to the 2005 freshet, and allow the bottom of the mine to start flooding. In order to get the lower part of the system installed before 2000 Level flooded, approximately 43 m (140ft) of MP pipe was used from the 2000 Level to just below the 1800 Level. This ensured that the bottom of the monitoring system if the mine flooded prior to the hybrid pipe being available. All pipe above this position comprises the hybrid pipe.

The monitoring ports were located at each of the mine levels intersecting the C-Shaft, as shown in **Table 7** and the mine levels are plotted on **Figure 32**. Magnetic couplings were installed 0.5m above each monitoring port to help locate the port when monitoring.

Table 7: C-Shaft MP Details

Mine Level	Measurement Port Depth (m)	Zone #	Magnetic Collar Depth Relative to MPort (m)
Surface	0.0		na
100	35.2	12	- 0.5
250	89.1	11	- 0.5
425	138.3	10	- 0.5
575	184.7	9	- 0.5
750	238.7	8	- 0.5
950	298.5	7	- 0.5
1100	344.4	6	- 0.5
1250	390.4	5	- 0.5
1500	454.4	4	- 0.5
1650	500.0	3	- 0.5
1800	551.0	2	- 0.5
2000	607.2	1	- 0.5

4.2 Monitoring Results

The mine water levels have been monitored since May 2005 and are graphed in **Figure 33**. As expected, there was a rapid re-flooding of the mine during freshet and summer of 2005 (May 2005 to October 2005) when the water level rose from 2000 Level to above the 1500 Level (a rise of 150 meters in water level). There was a slower rate of increase in water level from October 2005 to May 2006 over the winter, then a relatively brief but rapid increase again during the 2006 freshet to above the 1250 Level, followed by slow increase. Currently the mine water level is just above the 1100 Level.

The average daily rate of increase is shown in Figure 33. It should be noted that as the volume stage curve of the mine is not known to any reasonable degree of accuracy, it is not possible to relate water level increase to inflow rate. Mine water samples were collected from C-Shaft sampling ports at Level 1500 to 2000 in January 2006, September 2006, and January 2007. Due to mechanical problems with the electric winch, only the 2000 Level was sampled in June 2005 (as discussed blow). Results of monitoring of dissolved arsenic and chloride are presented in **Table 9**. The mean arsenic concentration ranged from 5.7 to 8.7 mg/L. In January 2007, the highest arsenic concentration was in zone 5 near water table surface (shallowest zone in the shaft). Chloride concentration increased with depth, with mean value ranging from 529 to 908 mg/L.

Trends over time in arsenic and chloride in C-Shaft were graphed in **Figure 34**. In 2005-2007, there was a decreasing trend of arsenic concentration in monitoring levels 2000 to 1500 (no trend at 1250 Level). Similarly to arsenic, chloride also had a decreasing trend at most sampling levels in time period 2005-2007.

Table 8: Summary of C-Shaft Activities and Data Collection to Date

Date	Comments	Pumping Port Status & Continuous Monitoring	Mine Water (mbgs)
May-05	C-Shaft Monitoring System Installed		611.90
Jun-05	Pressure monitoring at 2000 Level only; water sampling at 2000 Level only		582.36
Nov-05	Pressure monitoring at 2000 Level only		444.96
Jan-06	Pressure profile, and sampling (1500 to 2000 Level – unsure of 2000 level seal quality).	Probe parked at 1500 Level for weekly monitoring until July 2006	438.97
Jul-06	Pressure monitoring at 1250 Level only	Probe moved to 1250 Level for weekly monitoring until	370.20
Sep-06	Pressure profile and sampling zones 1 to 5 (level 2000 to 1500).	Changed probe to 2000 psi range probe because of increasing water pressure at 2000 level	357.50
Jan-07	Pressure profile and sampling zones 1 to 5 (level 2000 to 1500).	Probe parked at 1100 Level for weekly monitoring.	342.93

Note: mine water levels are referenced to ground surface at the C-Shaft.

Table 9: Arsenic and Chloride in C-Shaft (Jun 2005 – Jan 2007)

Arsenic (mg/L)						
Level	**Zone**	**Min**	**Max**	**Mean**	**Samples**	**Trend (2005-2007)**
2000	1	2.05	17	8.7	4	decrease
1800	2	2	11.8	5.8	3	decrease
1650	3	2.01	11.5	5.7	3	decrease
1500	4	2.04	14.2	6.6	3	decrease
1250	5	4.2	7.99	6.1	2	none
Chloride (mg/L)						
Level	**Zone**	**Min**	**Max**	**Mean**	**Samples**	**Trend (2005-2007)**
2000	1	760	1130	908	3	decrease
1800	2	755	1060	864	3	decrease
1650	3	756	1070	863	3	decrease
1500	4	705	997	819	3	decrease
1250	5	529	529	529	1	n/a

4.3 Operating Problems

4.3.1 Casing Leakage

A leak in the C-Shaft casing was detected during monitoring in September, 2005. This assessment was based on the observation that interior and exterior water levels were the same for the well, whereas normal operating procedures in the water tight casing system would have the interior water level significantly below that of the exterior to prevent leakage into the sampling zone. At the time the leakage was discovered, the water level was approximately 140m above the bottom of the well (2000 Level) above the top of the MP pipe.

Although it has not been verified, it is presumed that the leak is through a joint(s) in the hybrid pipe due to a missing or damaged o-ring, and not due to a break in the pipe as, to date, it has not interfered with the sampling probe travelling up and down the casing. However, this must be kept in mind when operating the tool in the well in the future, so any significant bumps, etc should be reported by field staff in the monitoring notes.

4.3.2 Electric Winch and MAGI (surface control box)

The electric winch experienced a number of electrical problems, mainly to do with blown fuses and surge protectors and slipping of the chain drive. The winch was returned to Westbay Instruments for servicing under the warranty, and has since been operating properly.

The MAGI (surface control box) was also found to be having problems and has been replaced by Westbay Instruments under the warranty. The replacement unit has functioned properly to date.

4.3.3 Pressure Probe

As the water levels continued to rise in C-Shaft, the pressures at 2000 Level increased above 250 psi. During the September 2006 monitoring and sampling, the pressure probe sensor could not read pressures above 285 psi (the probe sensor was rated at 250 psi). A temporary probe with pressure sensor rated to 2000 psi was rented to finish the monitoring. Subsequently the INAC pressure probe has been upgraded by Westbay Instruments with a 2000 psi transducer for operating at the higher zone pressures in the C-Shaft. The transducer accuracy is rated at 0.01% full scale, so the error in all MP well zones will only be 0.2 psi (~0.3m) and so is not considered significant for the current monitoring requirements on site.

5 Conclusions and Recommendations

5.1 Conclusions

- No significant changes in piezometric levels or chemistry were observed in the MP wells;
- No significant changes in piezometric levels or chemistry were observed in the shallow standpipes;
- No significant changes in piezometric levels or chemistry were observed in the calcine pond wells;
- Water levels in the C-Shaft are indicating seasonal influence on mine flooding as expected;
- Mine water chemistry indicates:
  - dissolved arsenic concentrations are less than expected and appear to indicate that there is less release of stored arsenic in the flooded levels than had been anticipated
  - the upper zone (#5: 1500 ft Level) currently has the highest arsenic concentration, and may represent influence of not captured "high test" water from the arsenic chambers mixing into the upper water column; and
  - calcine concentration levels are increasing at depth, which indicates either deeper groundwater inflow higher at depth, or stratification in the shaft due to density variation.

5.2 Recommended Monitoring Plan

MP Wells

- Pressure profiling should continue on a bi-annual basis, with specific attention paid to anomalous zones identified in this report;
- Sampling to be carried out annually;
- All well interior water levels to be maintained at least 25 m below ground surface. At this time, S-DIAND-021 and -24 should be bailed down; and
- Efforts should be made to remove blockage in S-DIAND-021.

Shallow Standpipes

- Water levels and sampling to be carried out annually.

C-Shaft

- C-shaft sampled quarterly; and
- C-shaft water levels monitored weekly.

This report, **1CI001.013 – Giant Mine Arsenic Trioxide Management Plan, Groundwater & C-Shaft Monitoring: 2005- 2006 Update Report, Indian and Northern Affairs, Canada,** was prepared by SRK Consulting (Canada) Inc.

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6 References

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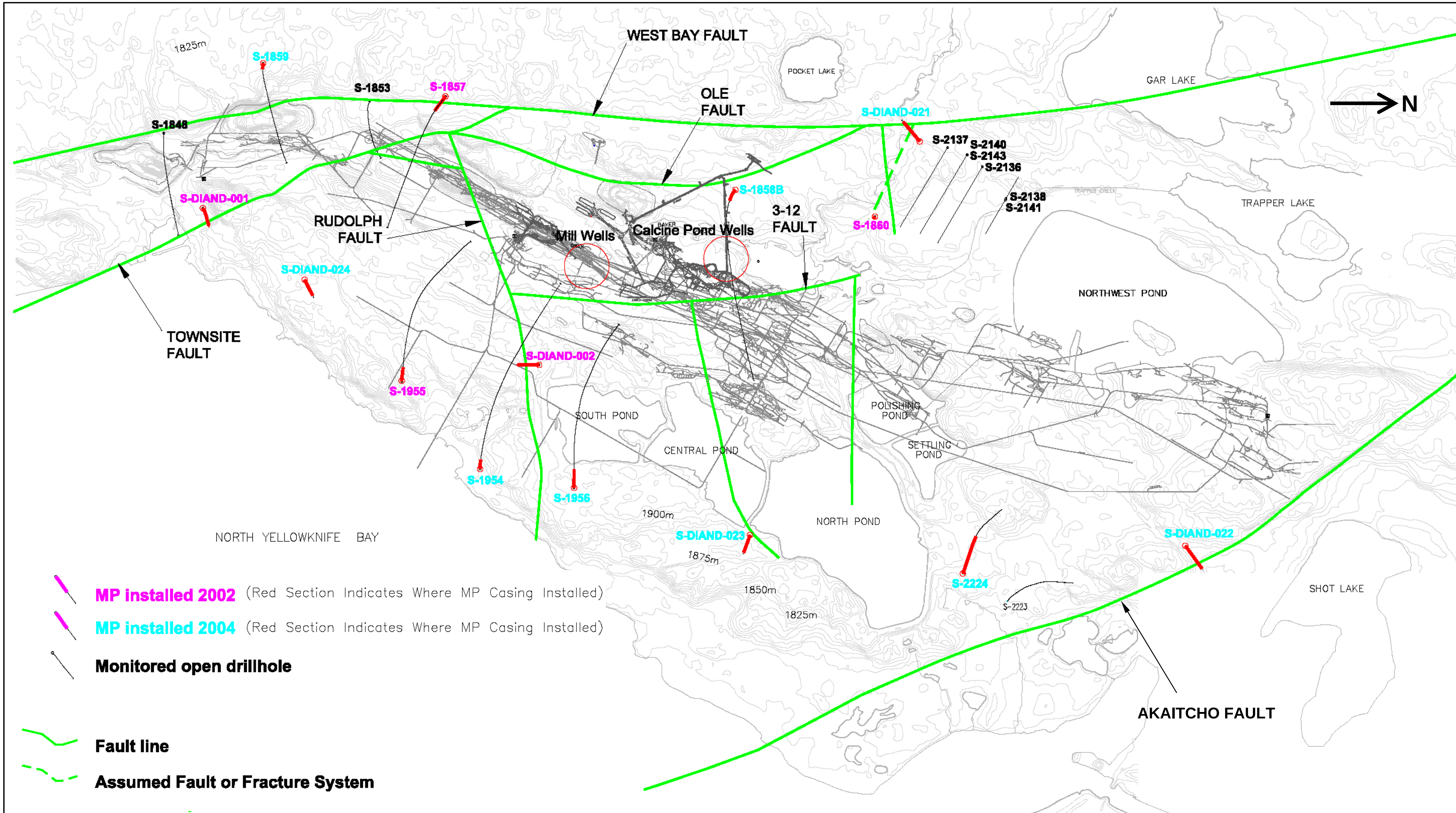
Figures



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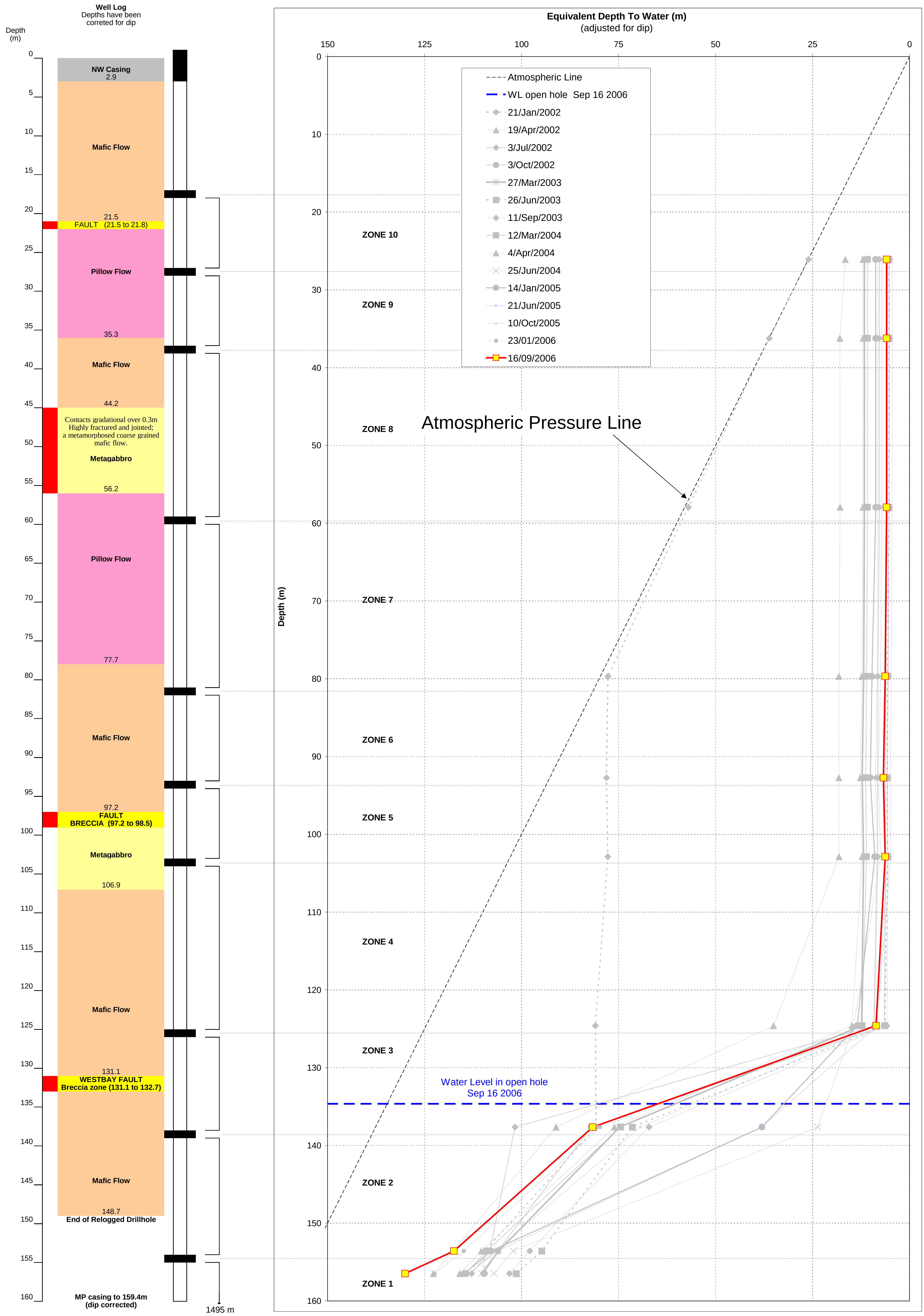
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

Groundwater Monitoring System Location Map

PROJECT:	DATE:	APPROVED:	FIGURE:
1CI001.13.C2.01	March 2007	MR	1



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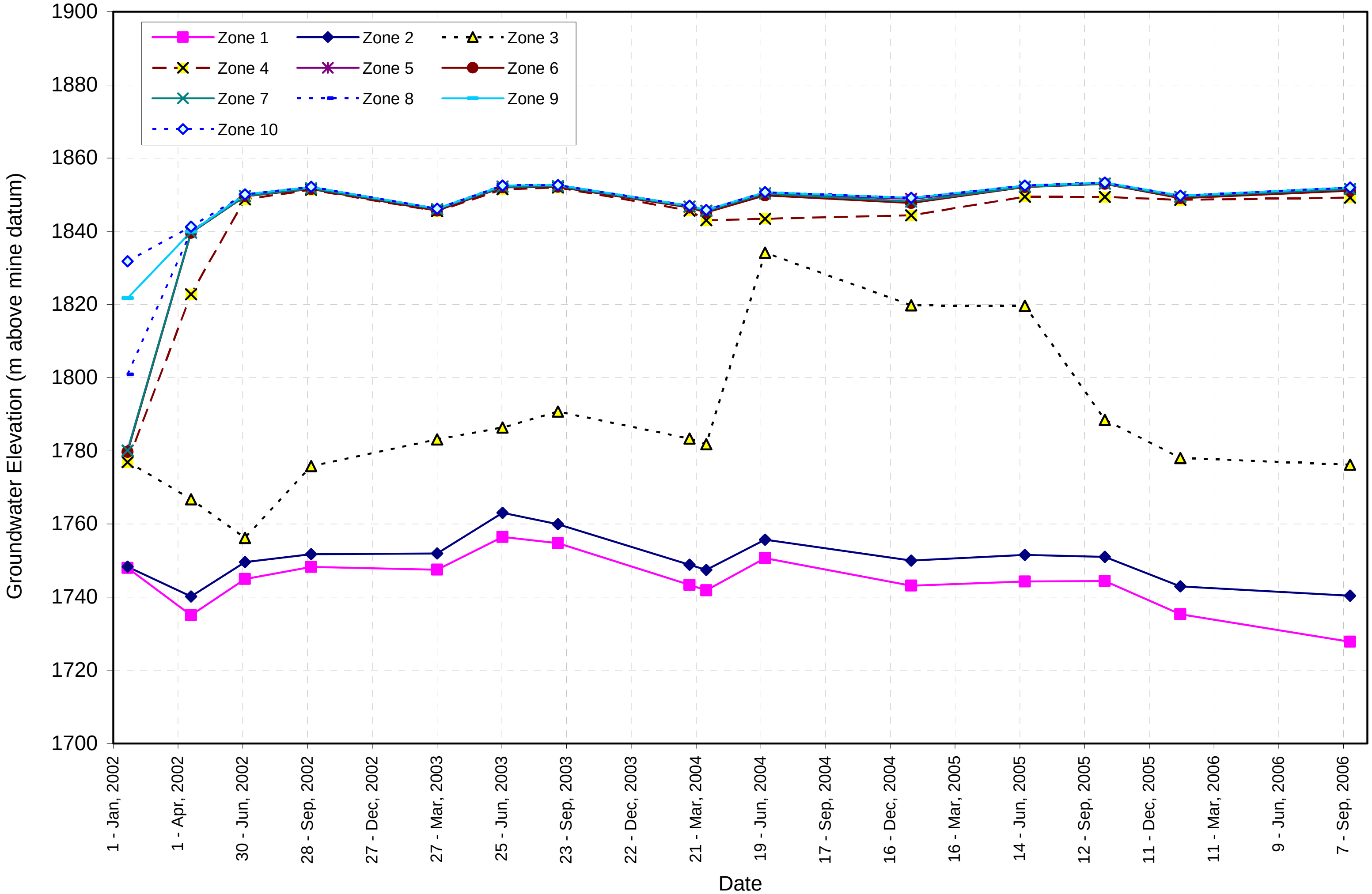
Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-1857 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	2



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2005-2006 Update Report, Giant Mine, NWT

S-1857
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
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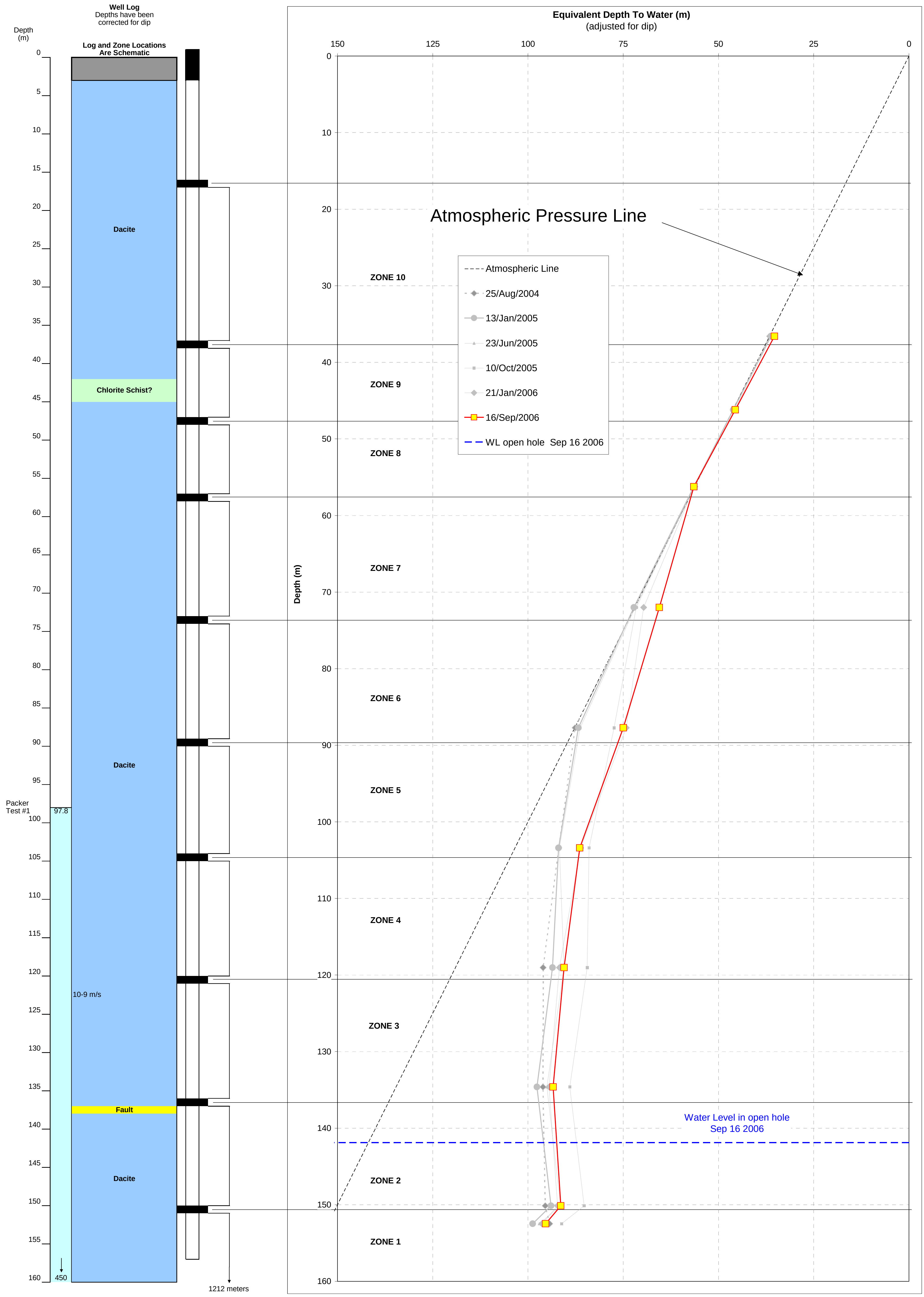

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Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-1858b Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
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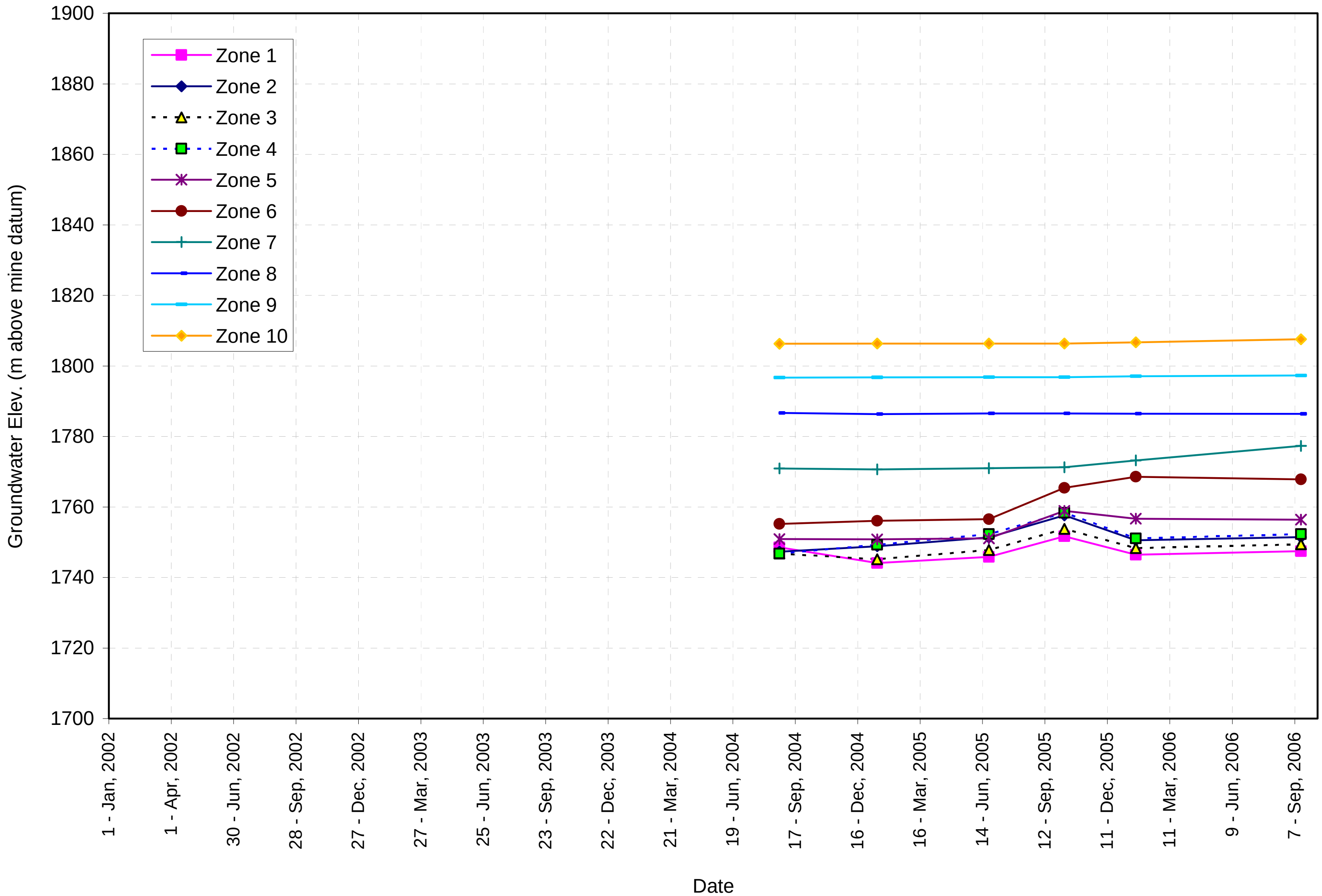

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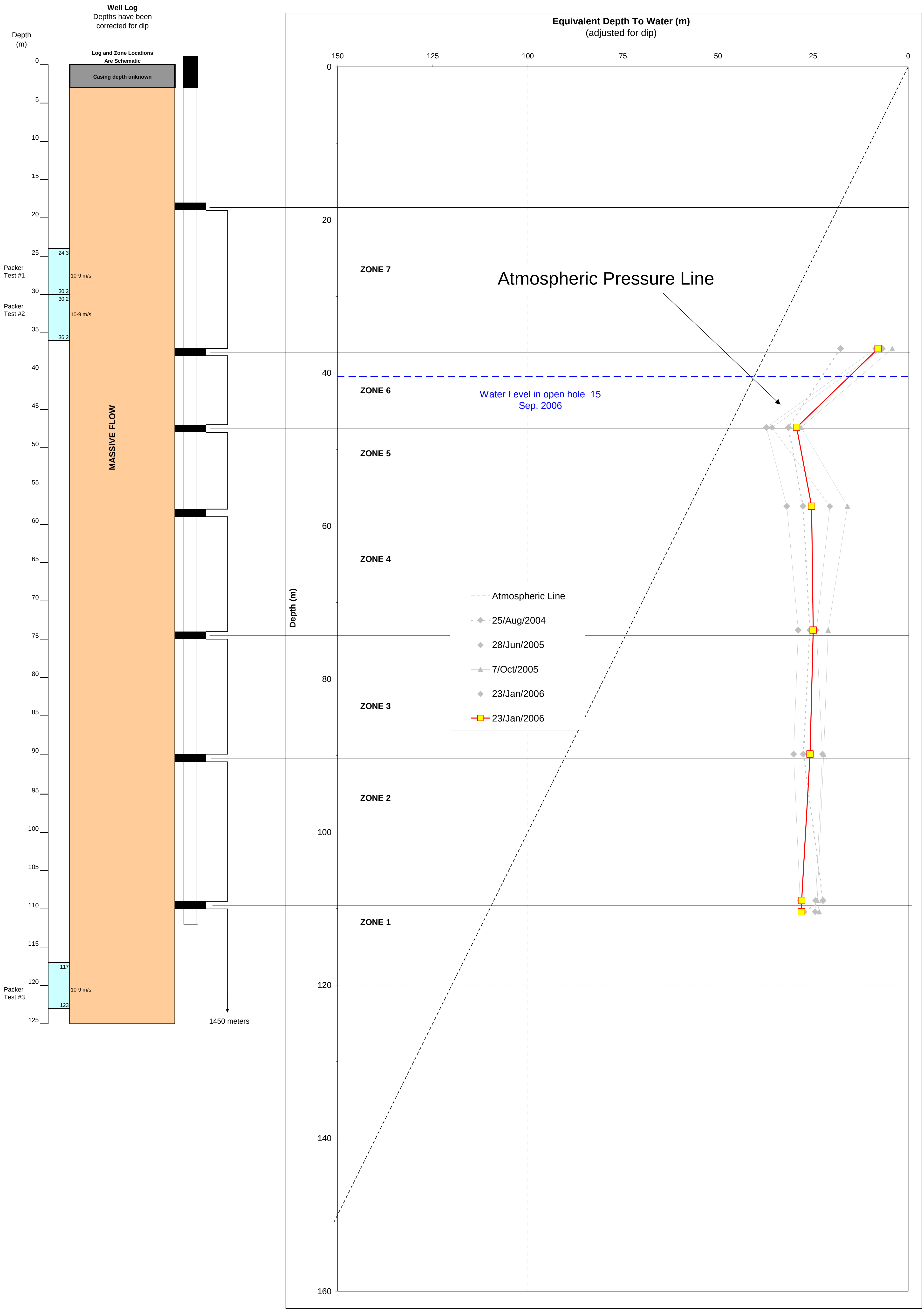
INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	**S-1858B** **Groundwater Level vs Time**

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	**5**



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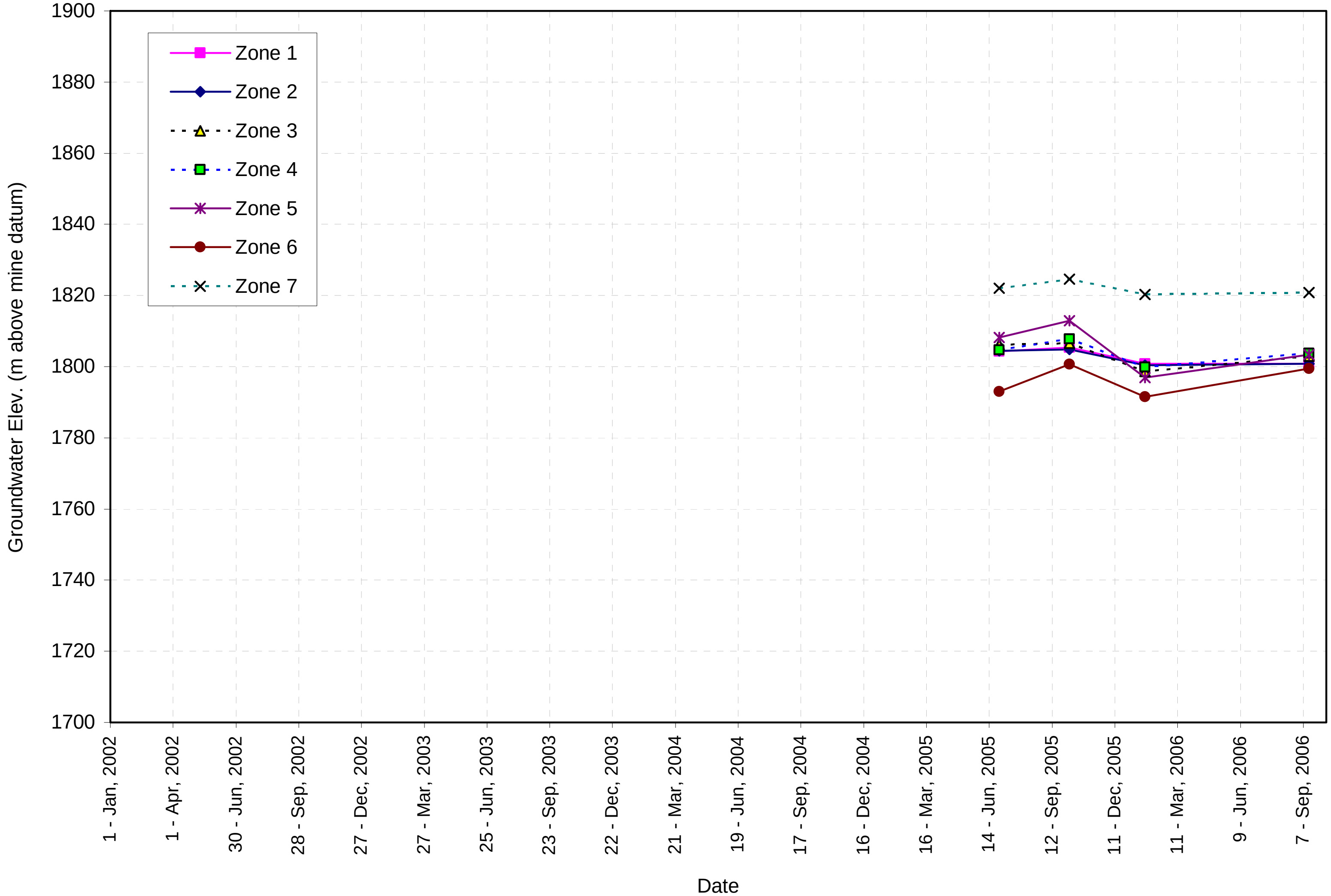
Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-1859 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	6



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INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	**S-1859** **Groundwater Level vs Time**

PROJECT:	DATE:	APPROVED:	FIGURE::
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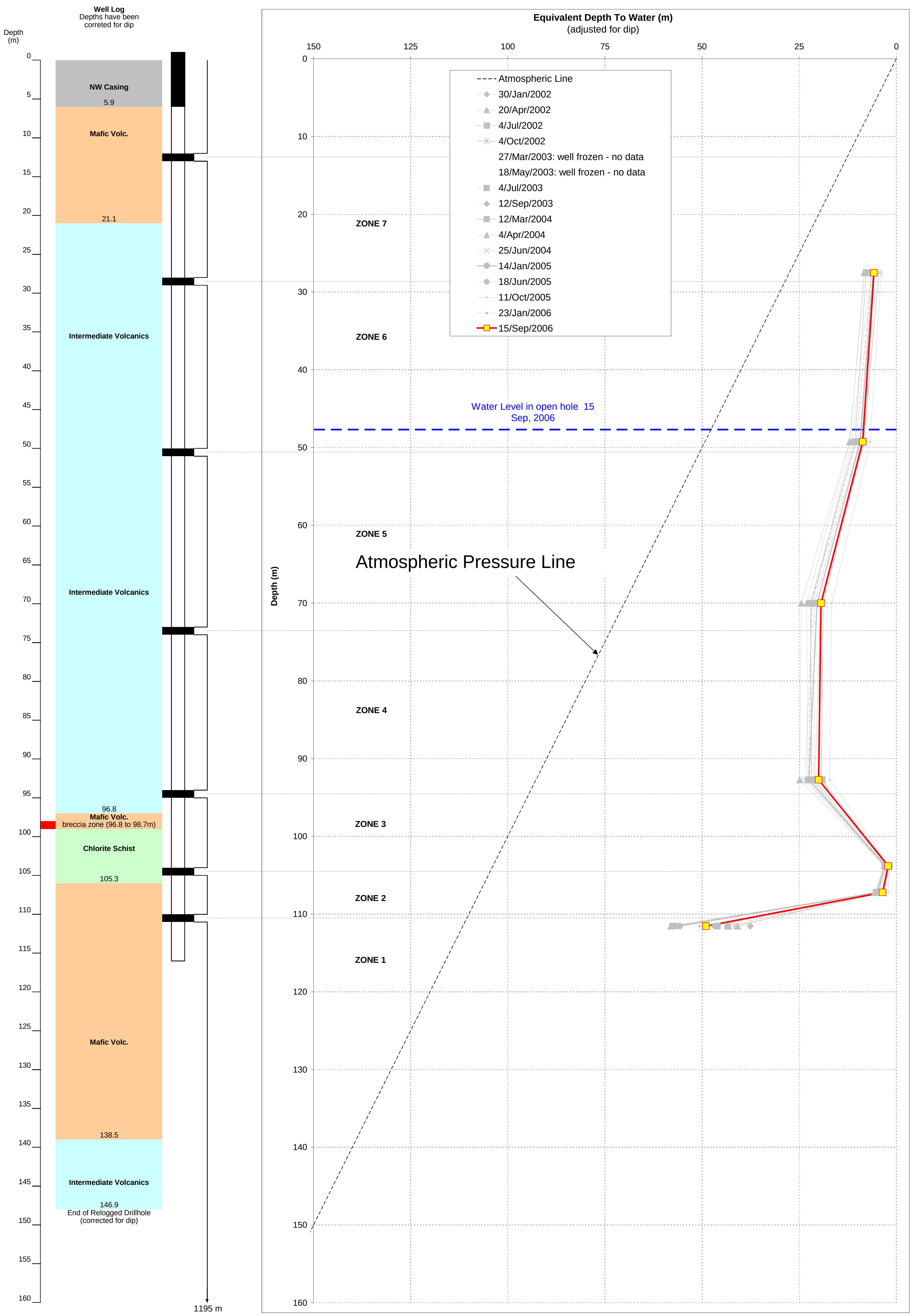

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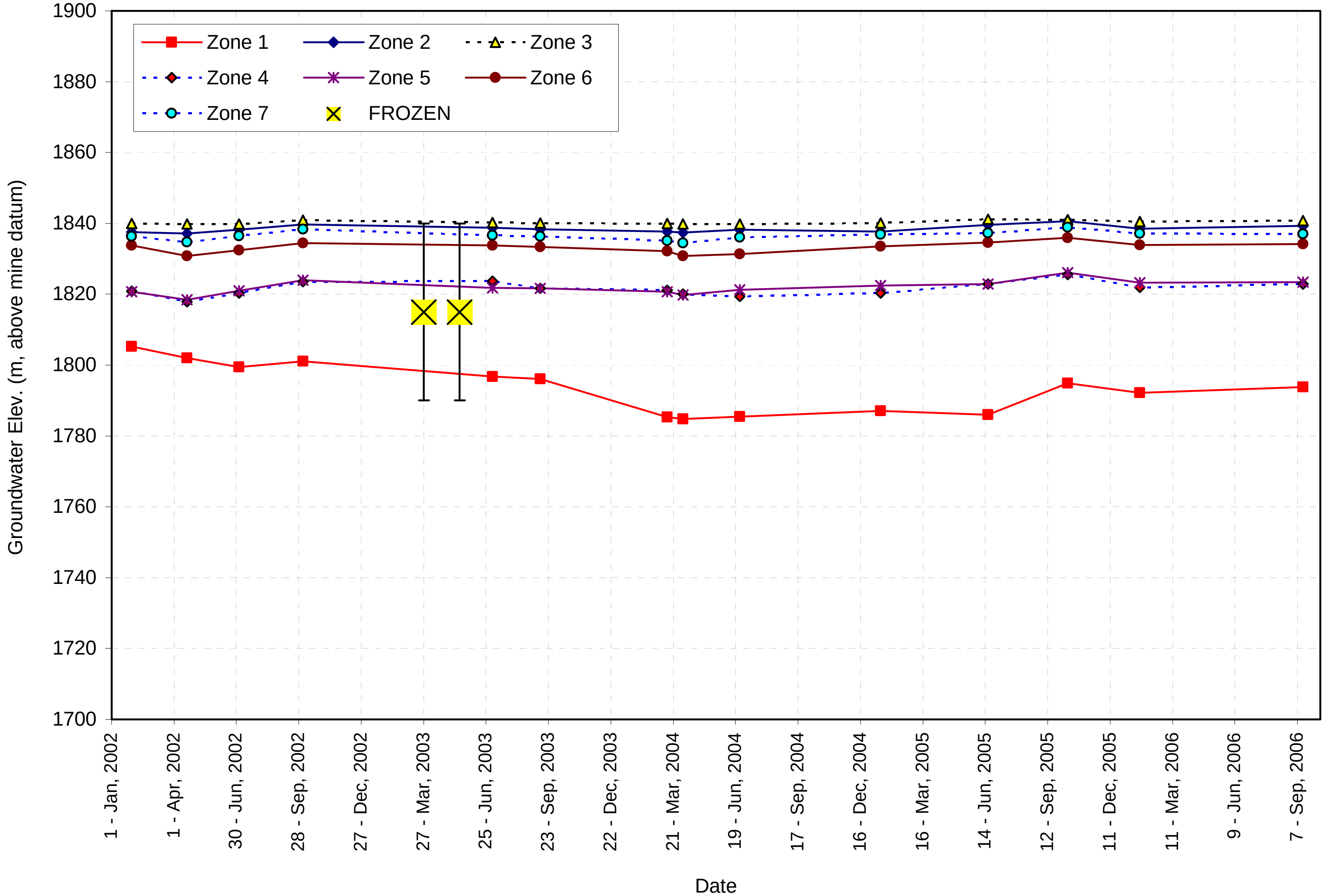
GIANT MINE REMEDIATION PROJECT TEAM

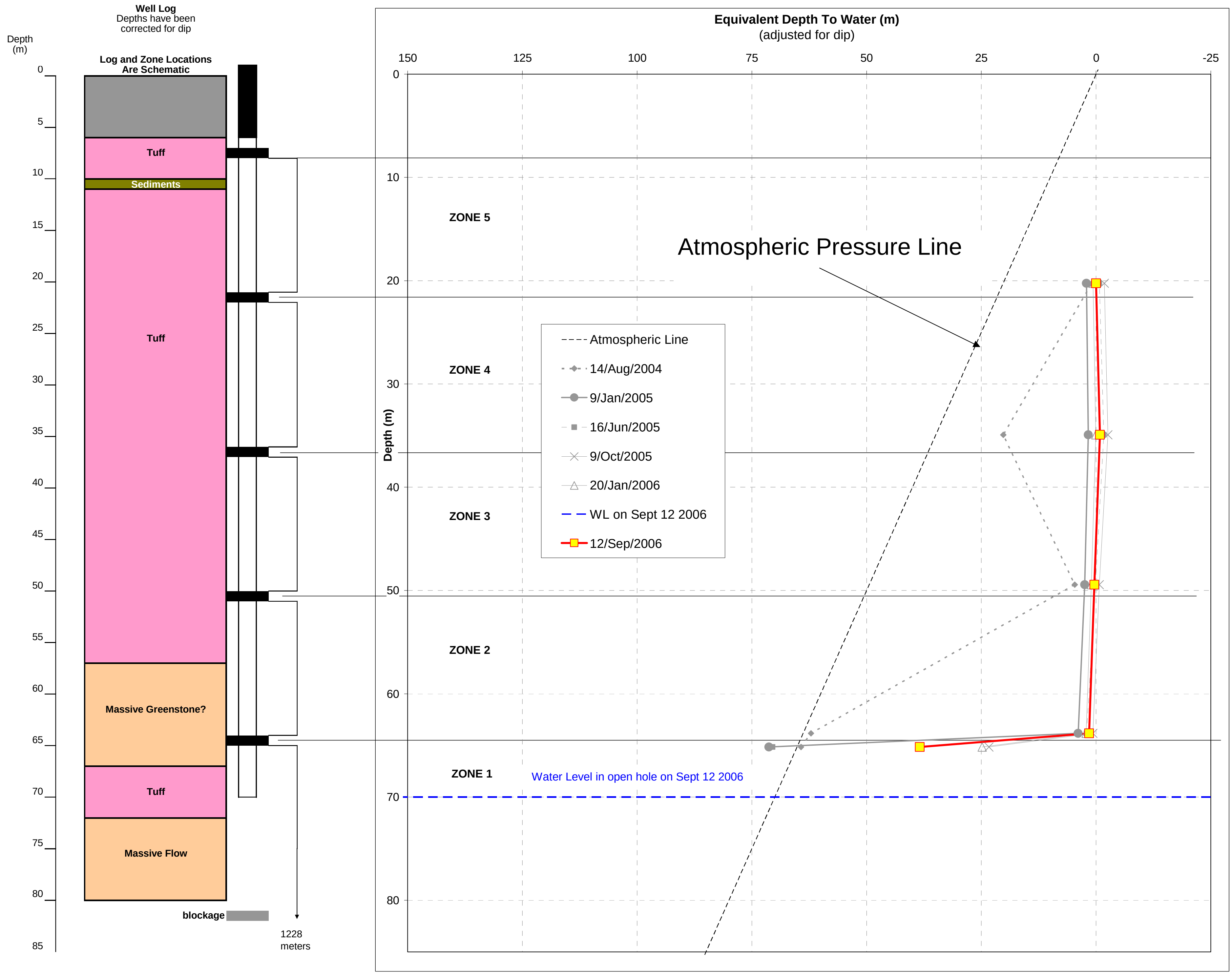
Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-1860 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	8

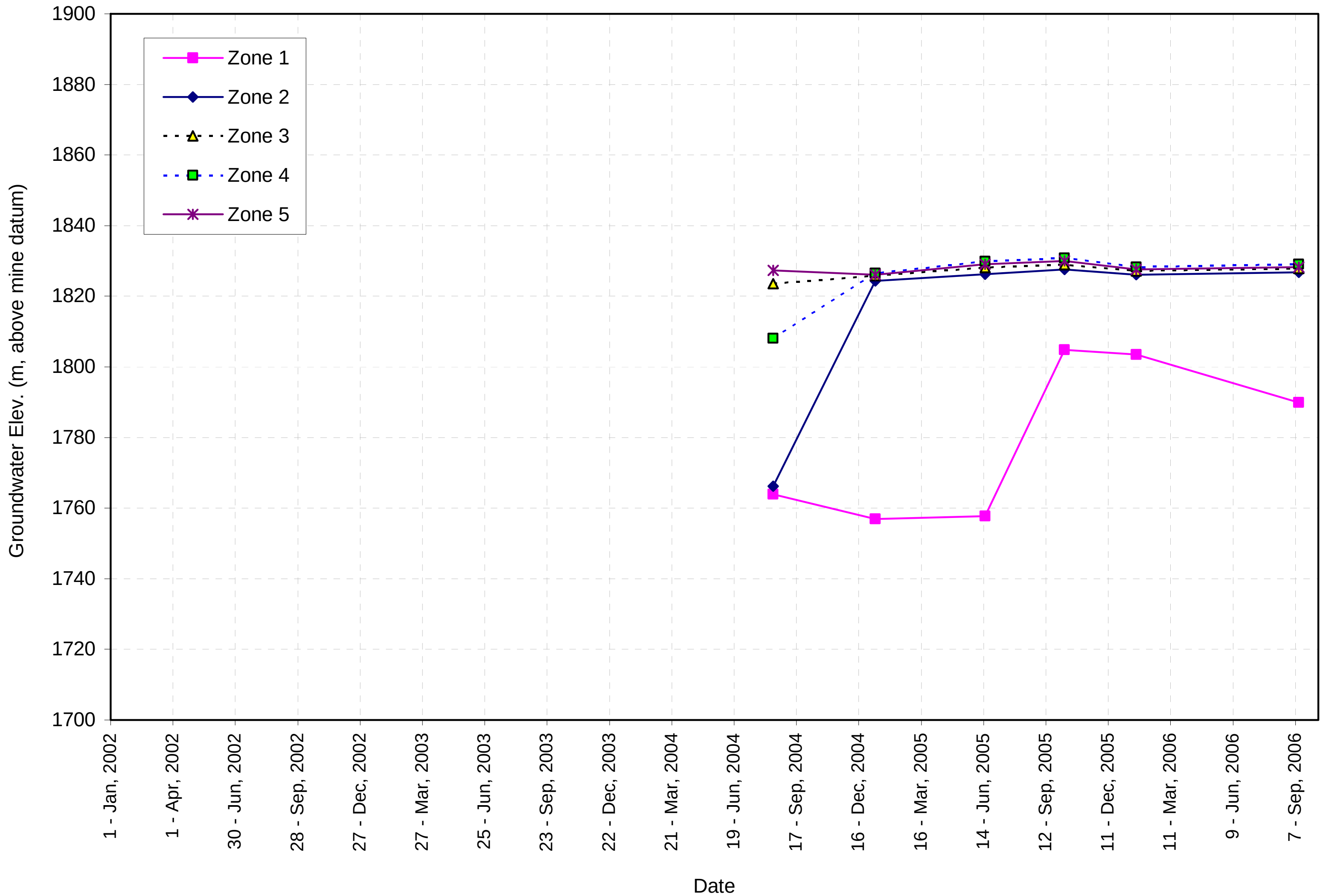


SRK Consulting Engineers and Scientists	Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT			
INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	**S-1860** **Groundwater Level vs Time**			
	PROJECT: 1CI001.13.C2.01	DATE: March 2007	APPROVED: MR	FIGURE:: 9



SRK Consulting Engineers and Scientists	Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT
INDIAN AND NORTHERN AFFAIRS CANADA GIANT MINE REMEDIATION PROJECT TEAM	**S-1954 Pressure**

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	**10**



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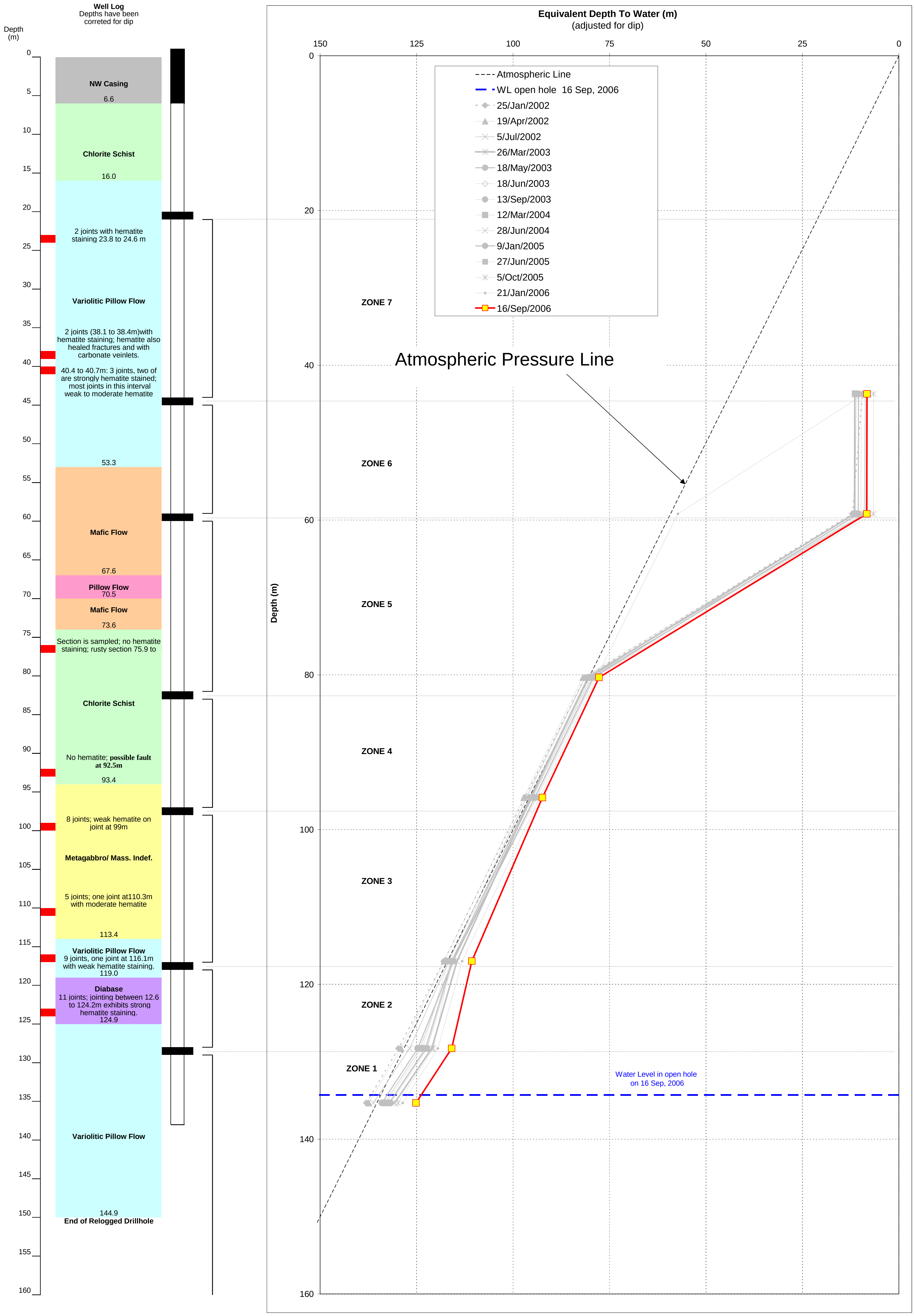
INDIAN AND NORTHERN AFFAIRS CANADA

GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

S-1954
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	**11**



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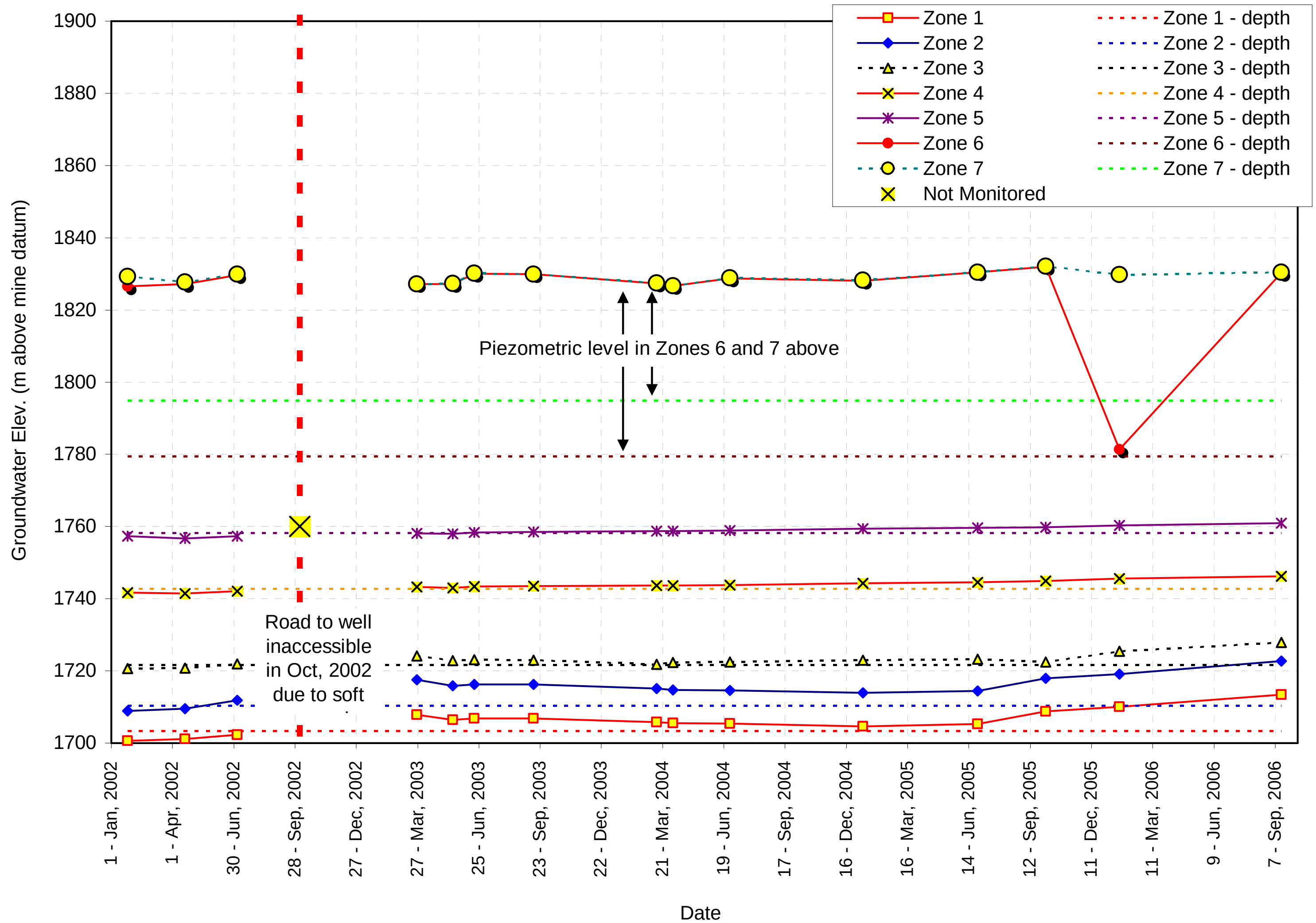
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-1955 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	12



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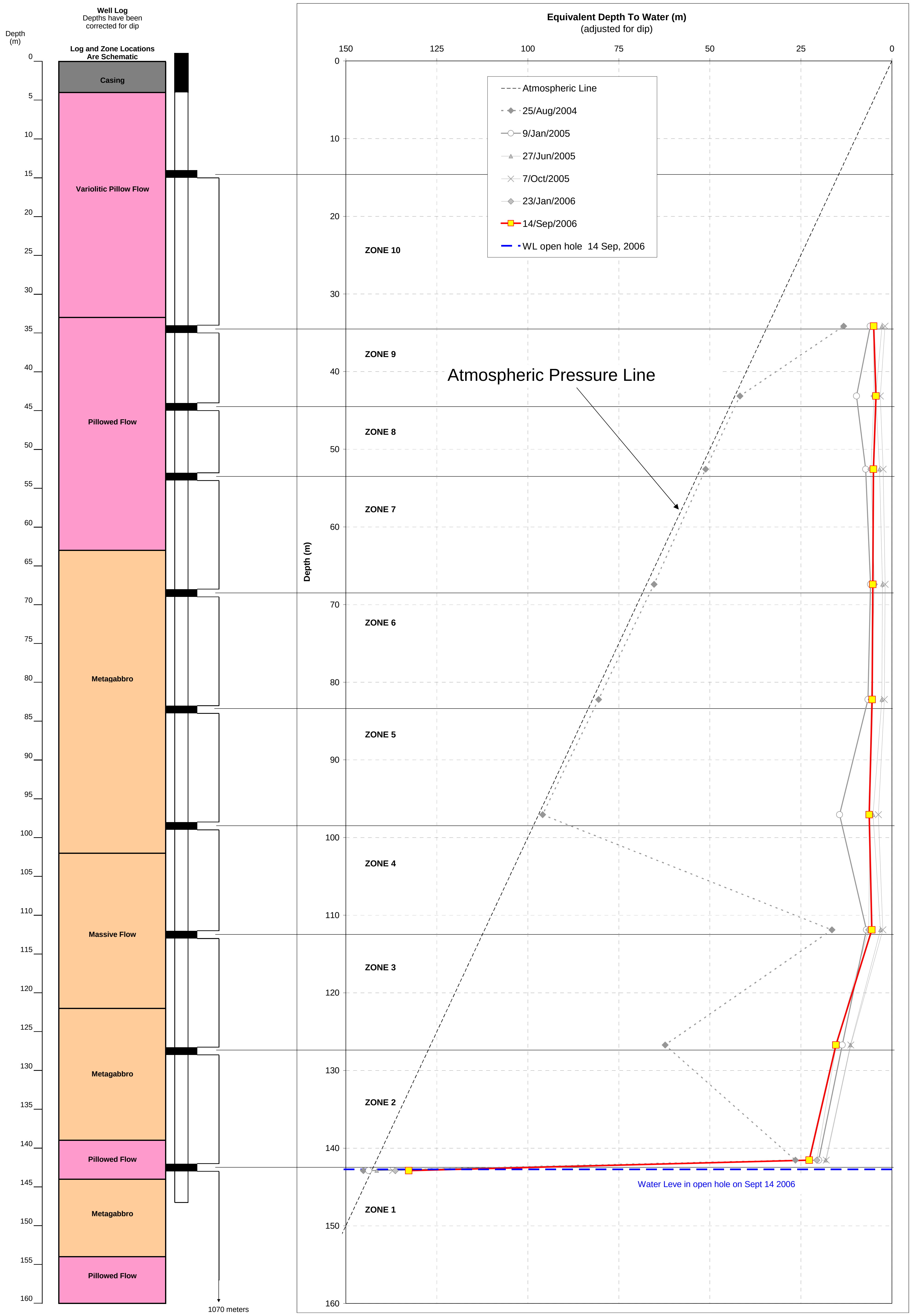
INDIAN AND NORTHERN AFFAIRS CANADA

GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

S-1955
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	13



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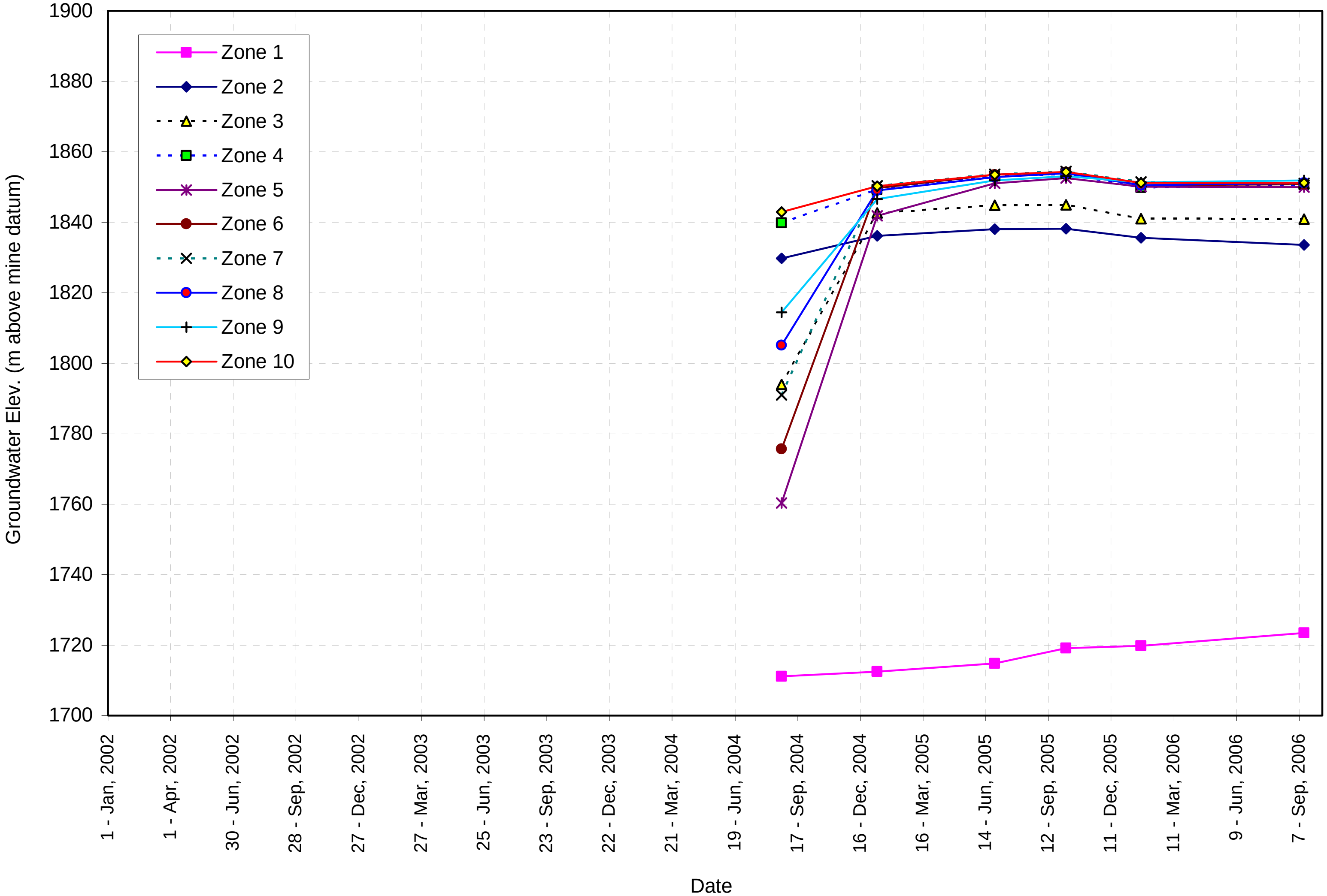
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-1956 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	14



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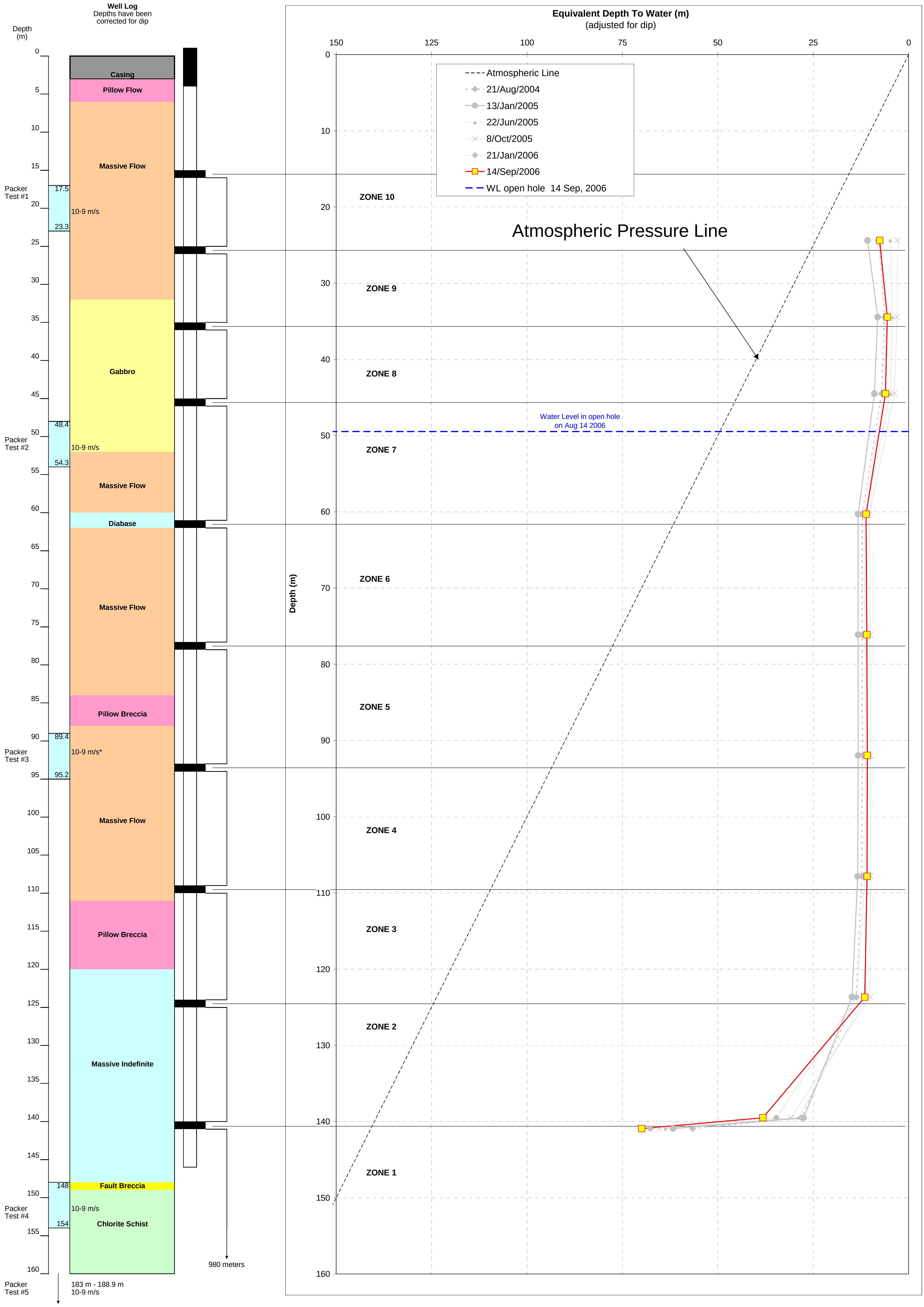
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

S-1956
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	**15**



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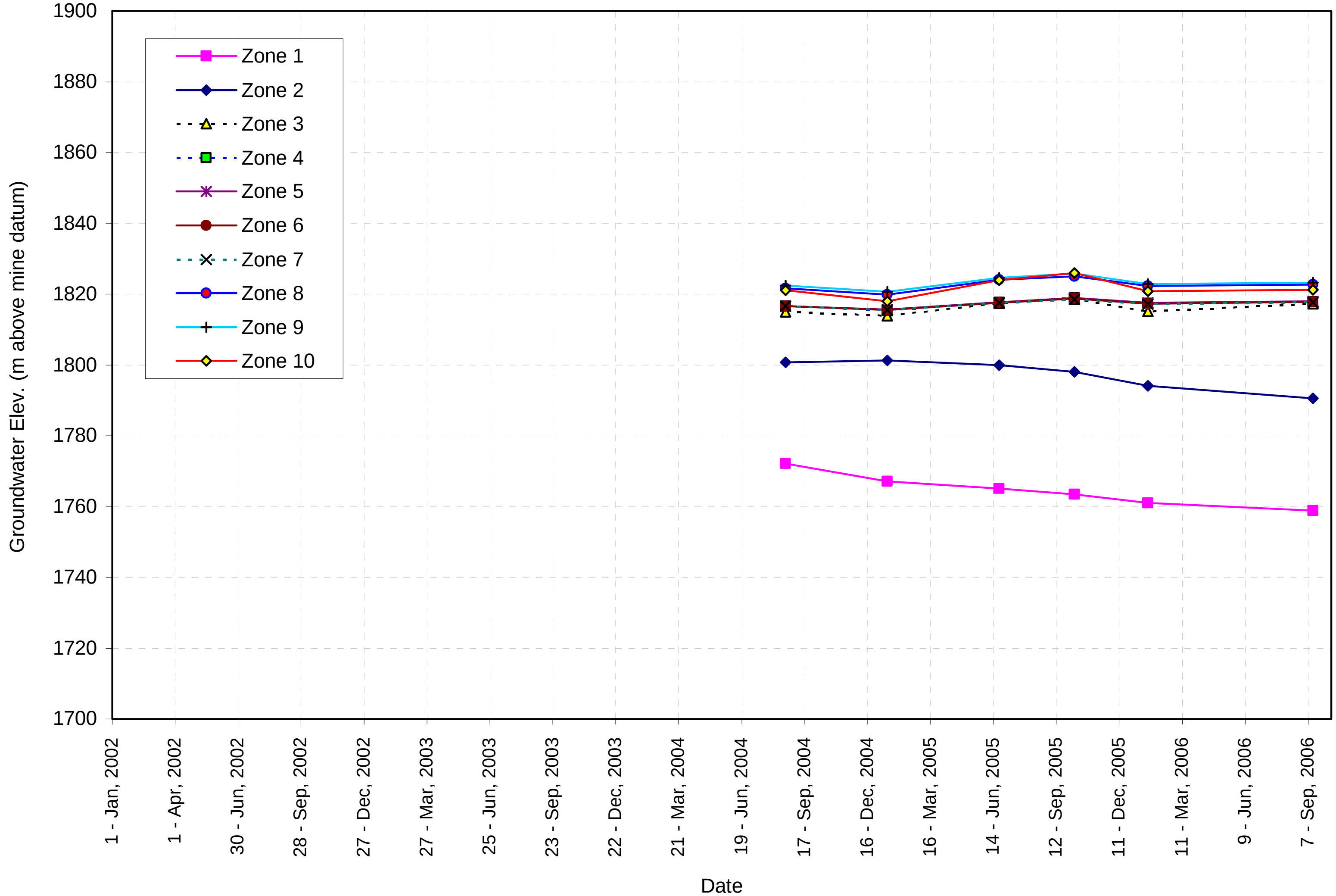
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-2224 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	16



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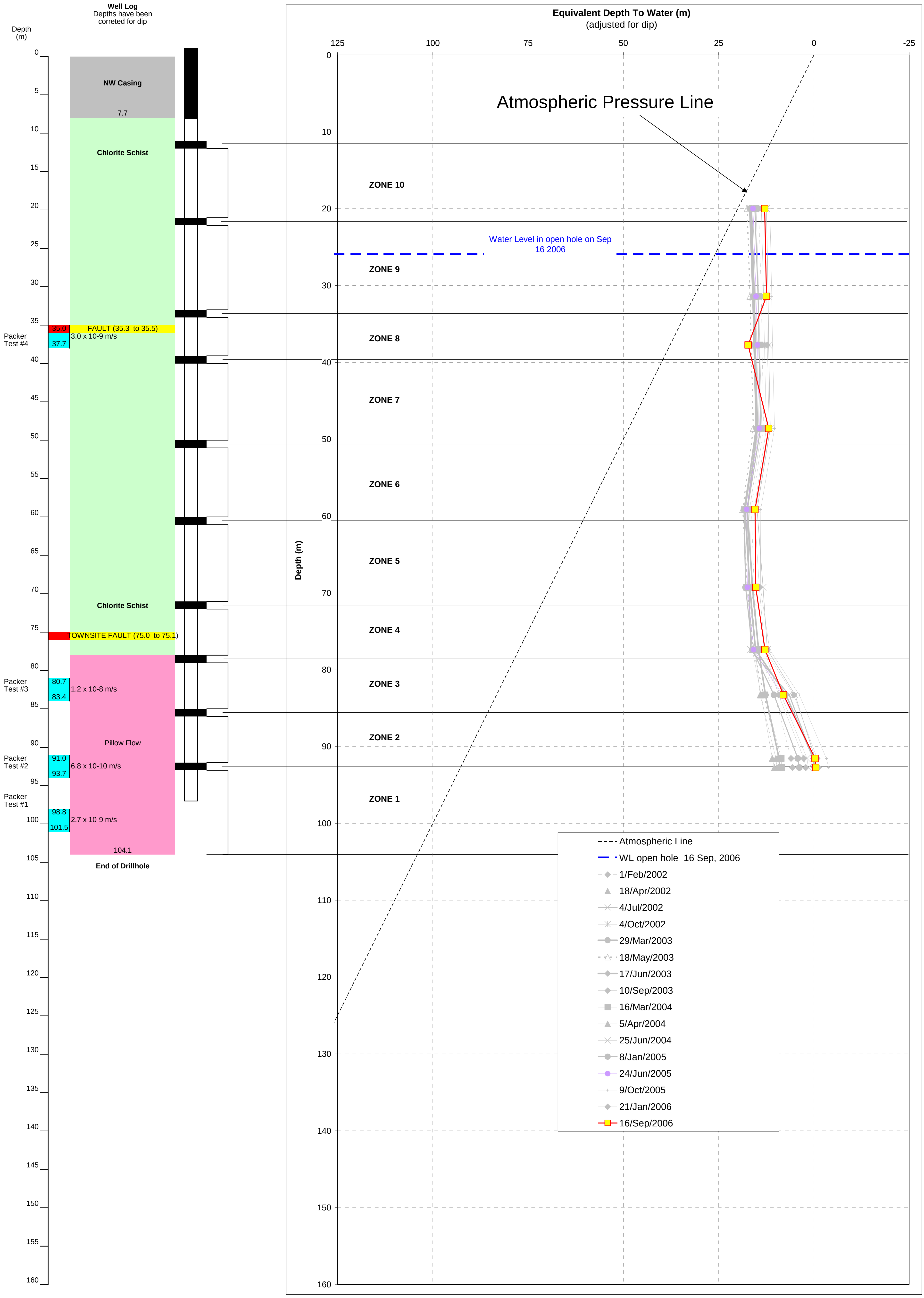
INDIAN AND NORTHERN AFFAIRS CANADA

GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

S-2224
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	17



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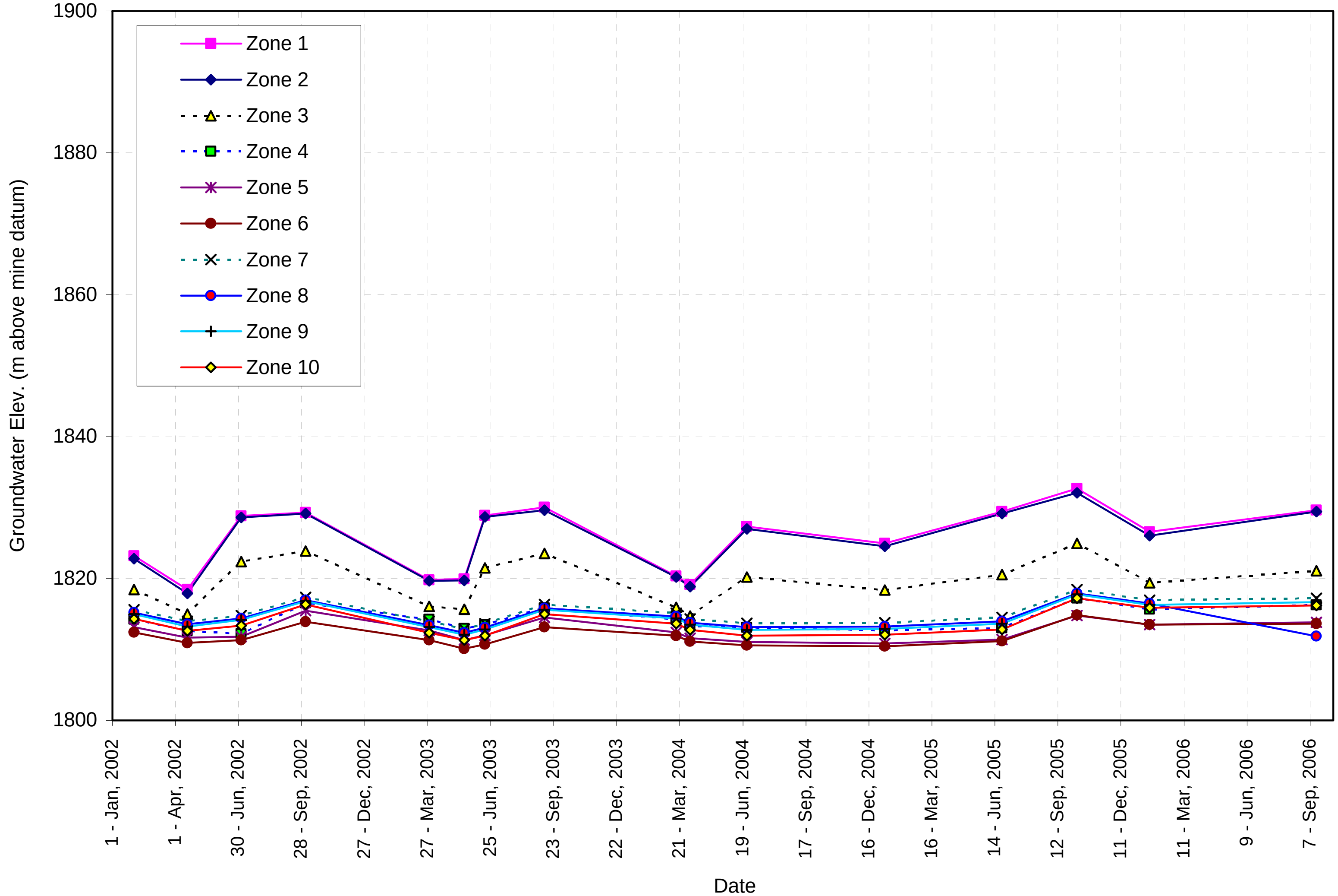
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

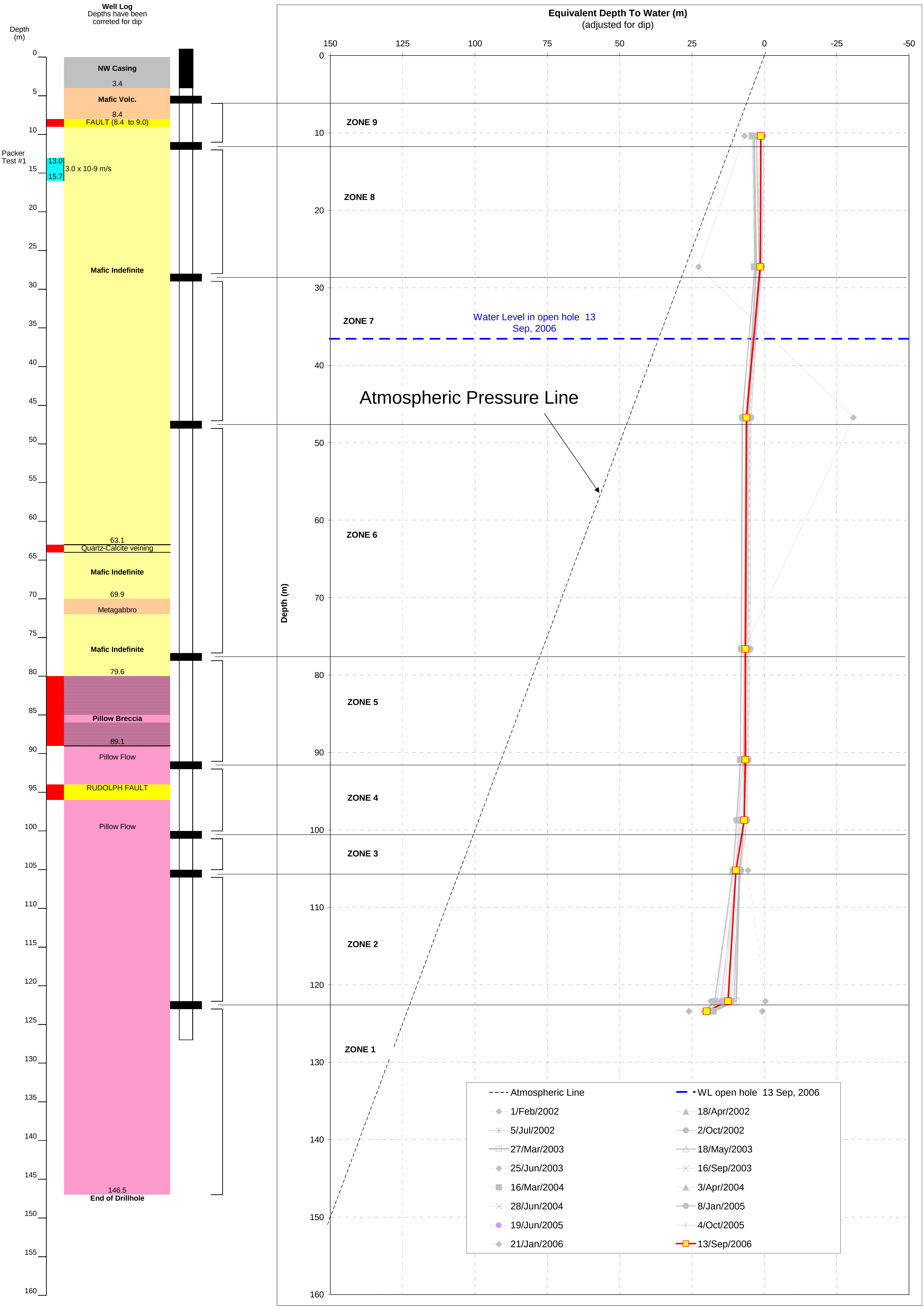
S-DIAND-001 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	18



SRK Consulting Engineers and Scientists	Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT
INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	**S-DIAND-001** **Groundwater Level vs Time**

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	**19**



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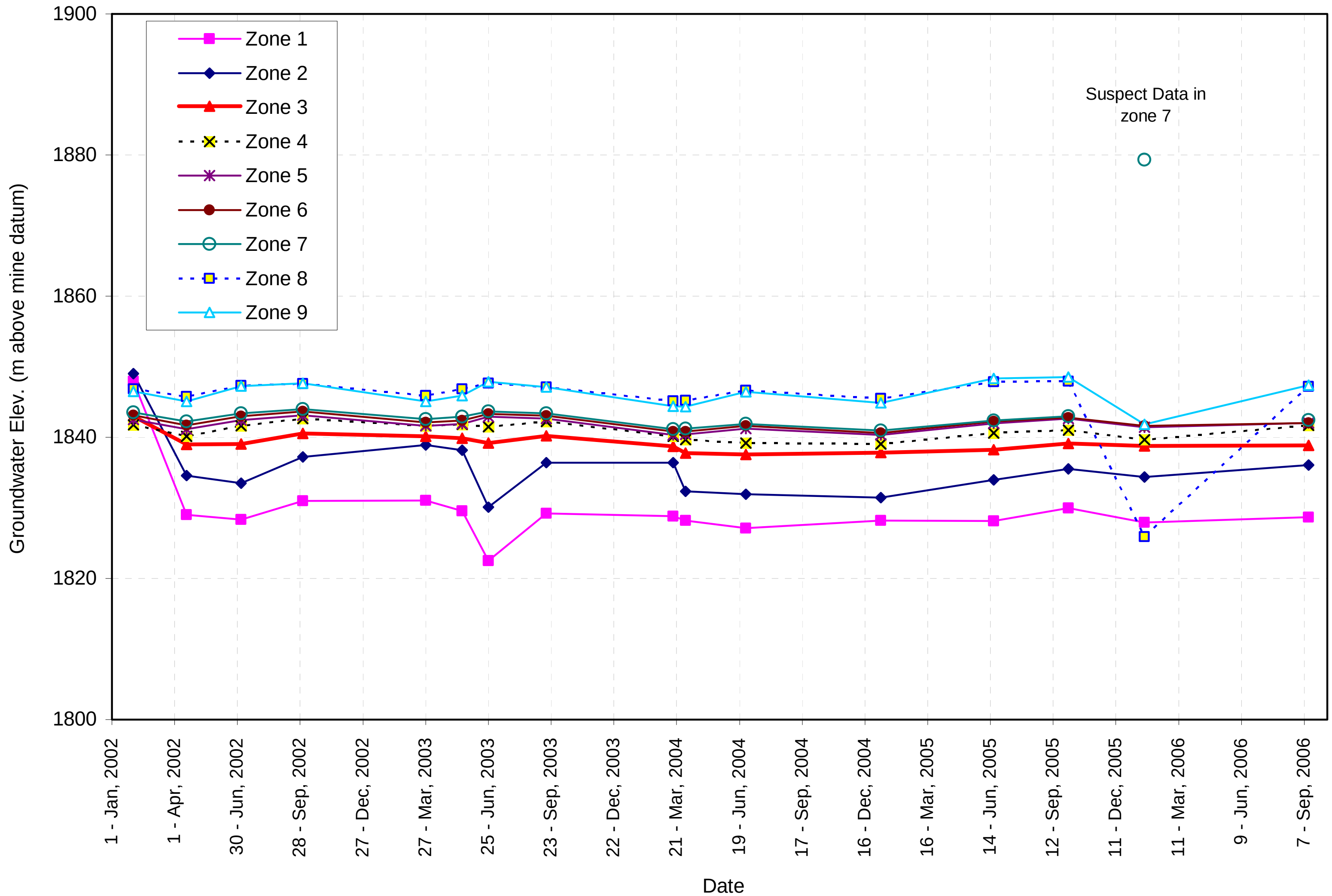
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-DIAND-002 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	20



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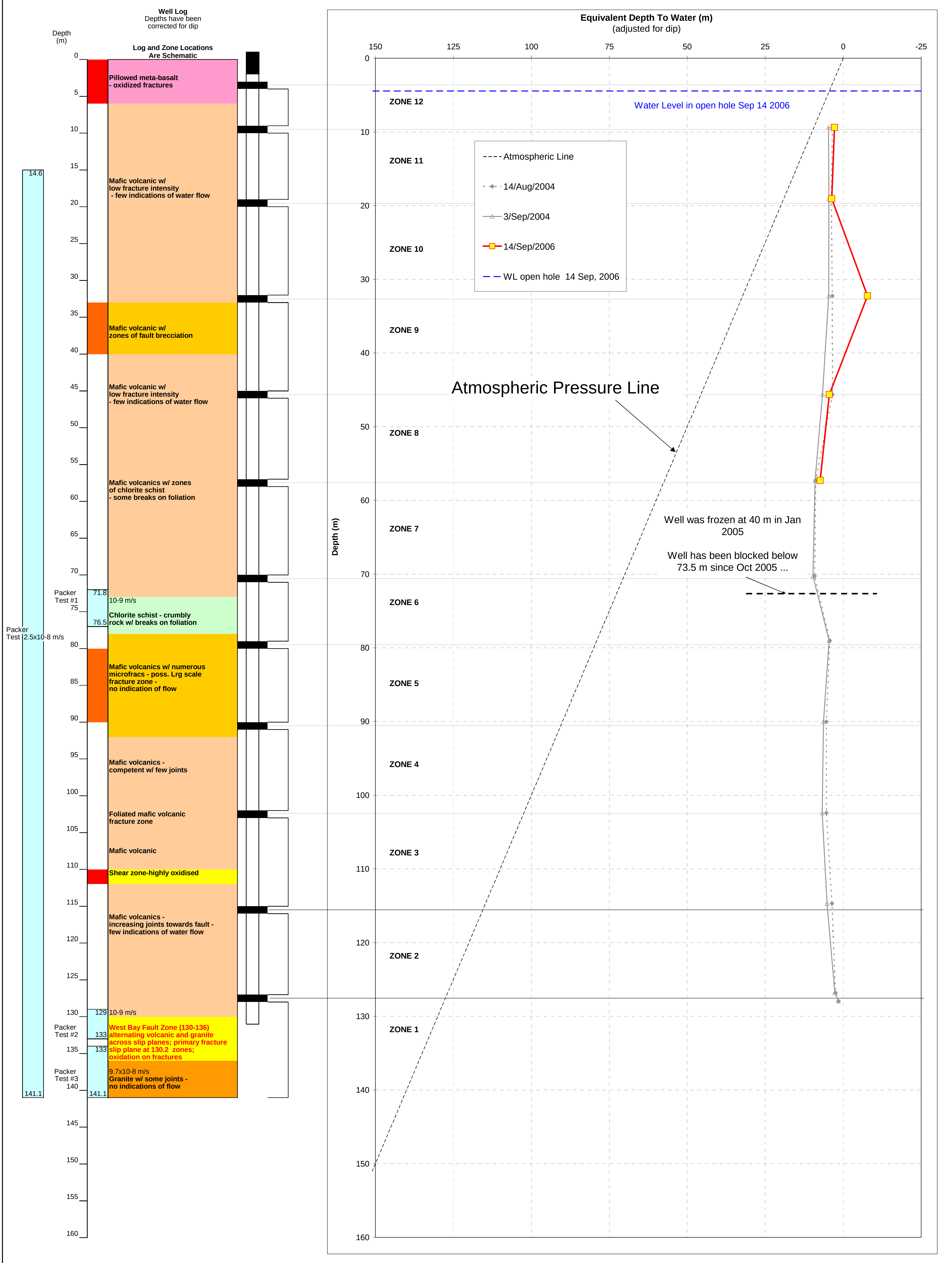
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

S-DIAND-002
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	21



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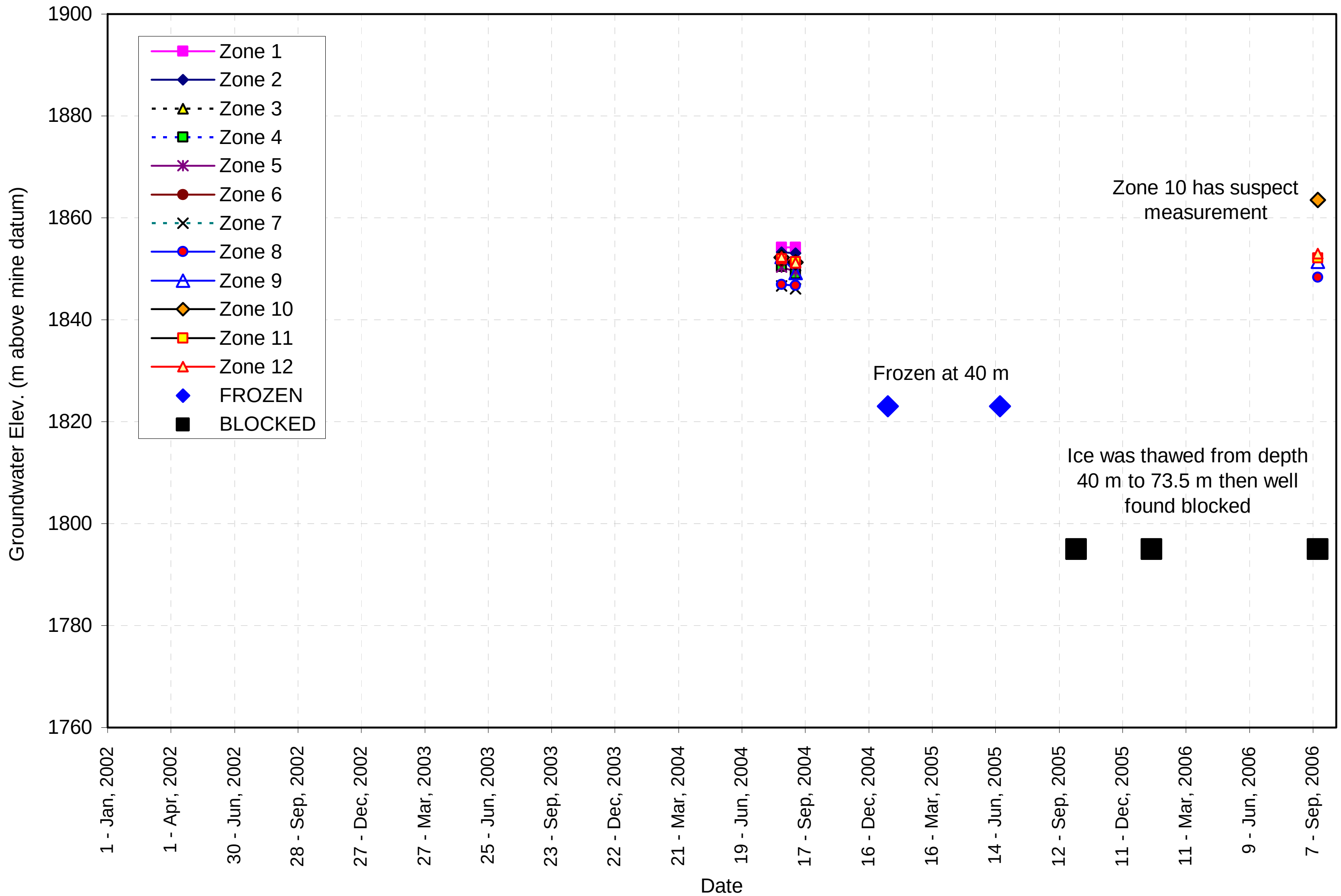
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

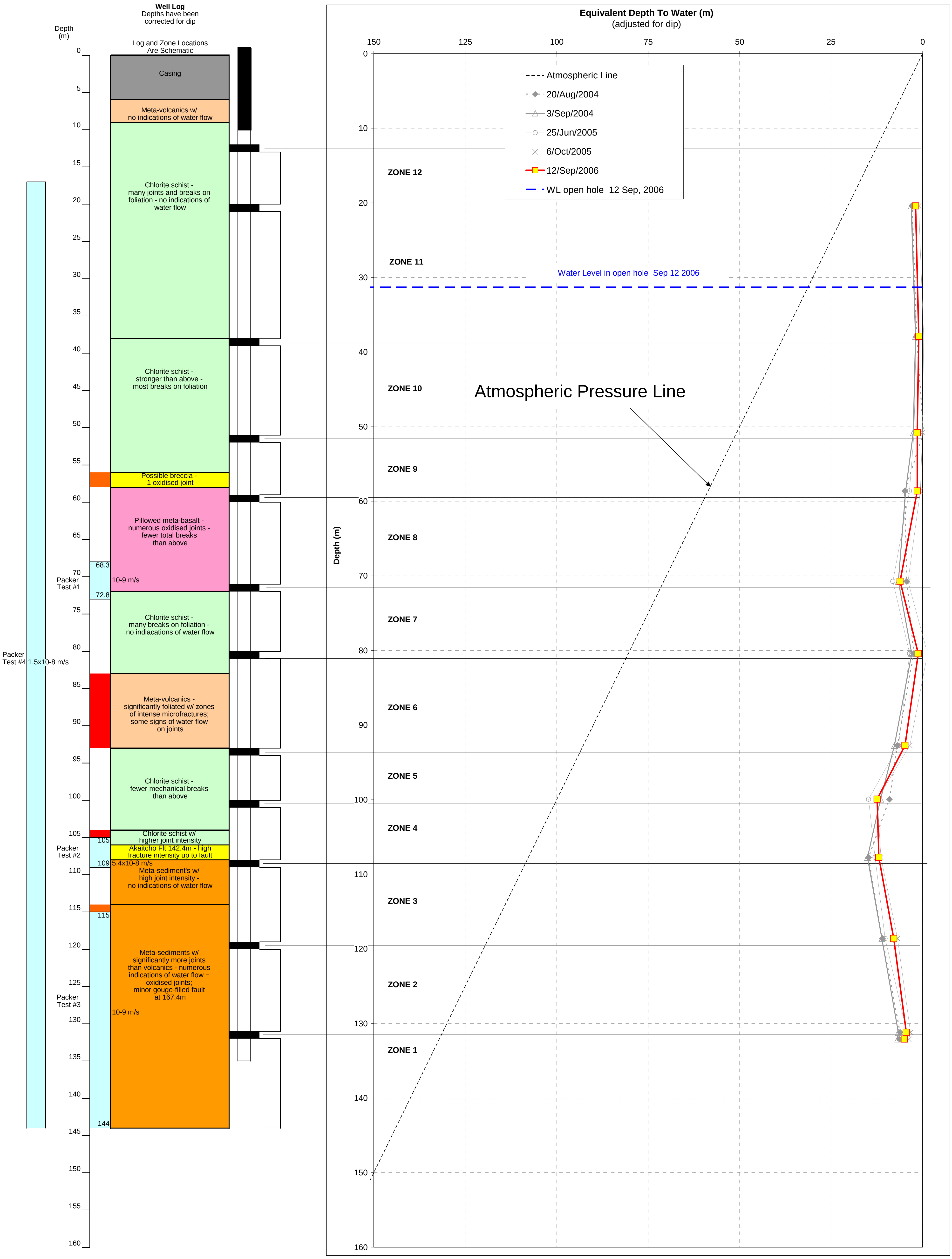
S-DIAND-021 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	22



SRK Consulting Engineers and Scientists	Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT
INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	**S-DIAND-021** **Groundwater Level vs Time**

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	**23**



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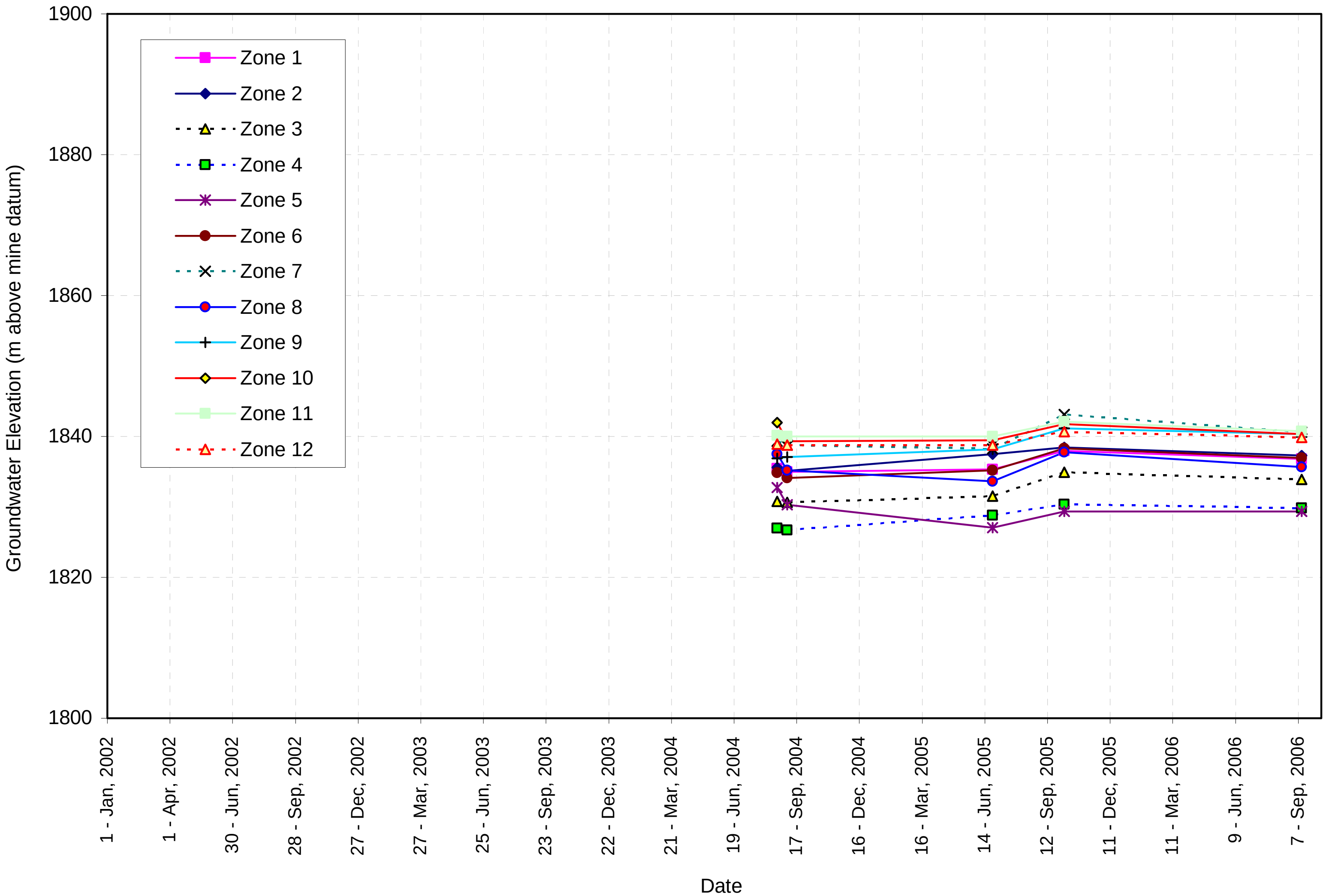
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

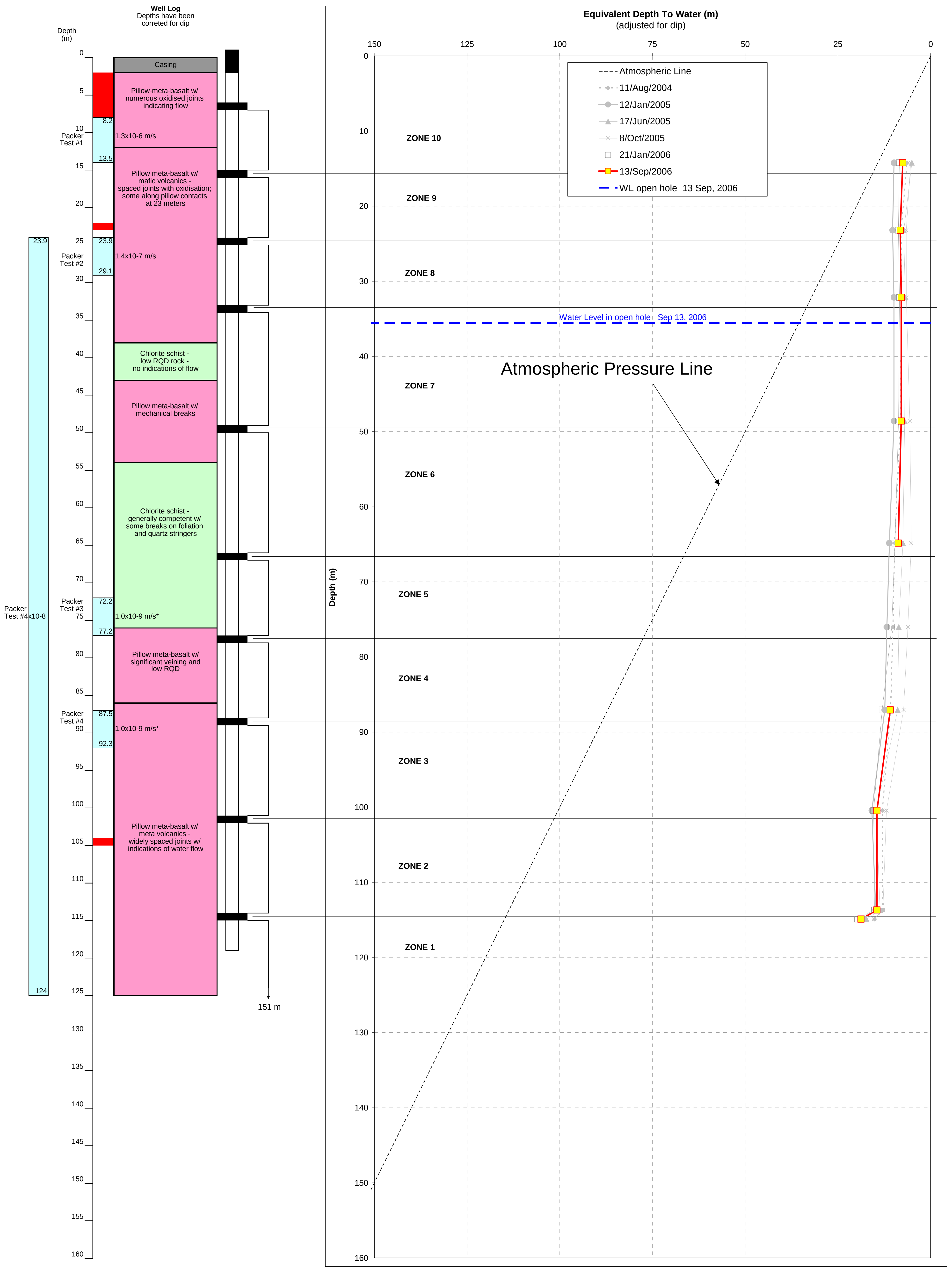
S-DIAND-022 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	24



SRK Consulting Engineers and Scientists	Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT
INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	**S-DIAND-022** **Groundwater Level vs Time**

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	**25**



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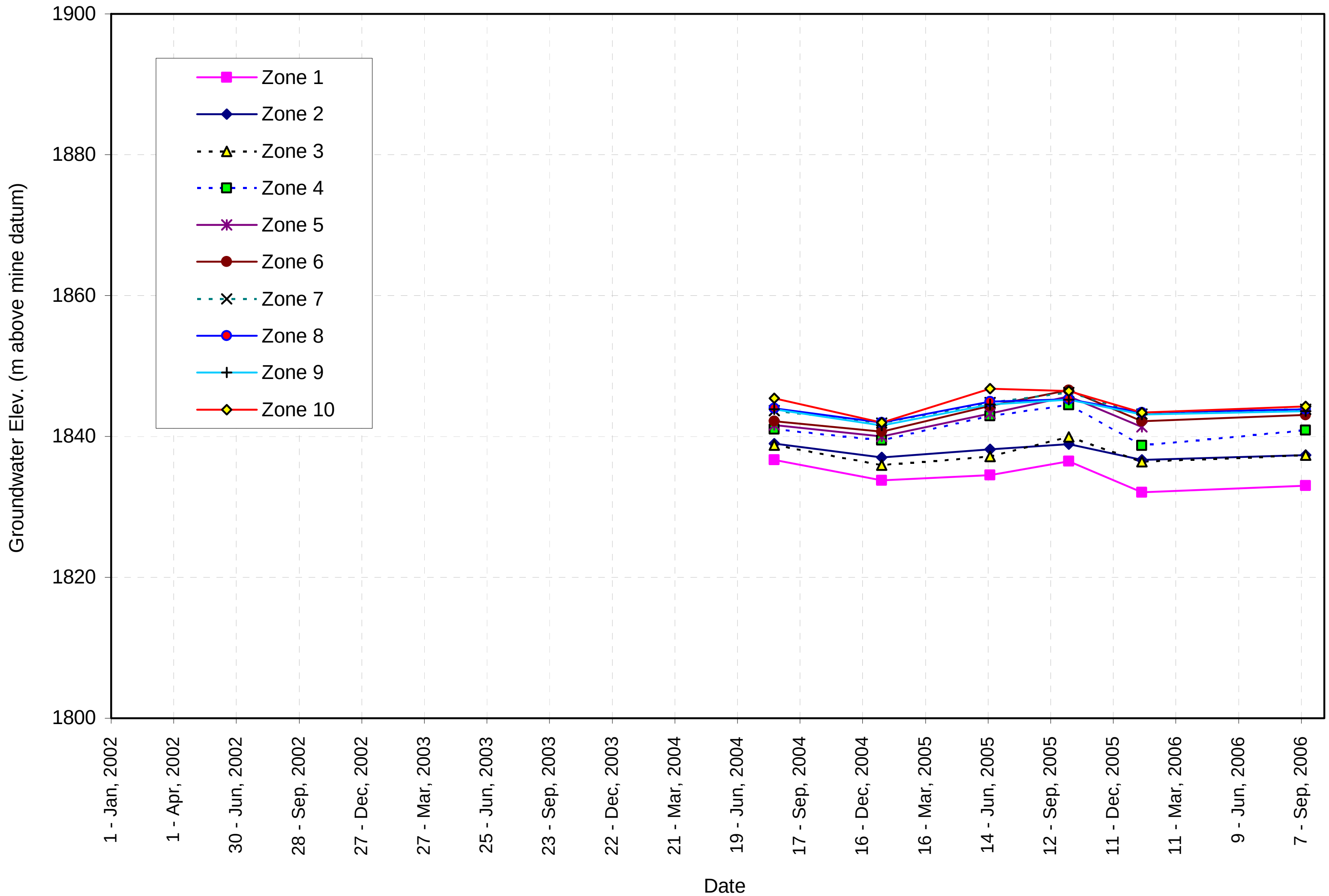
Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-DIAND-023 Pressure

INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	26



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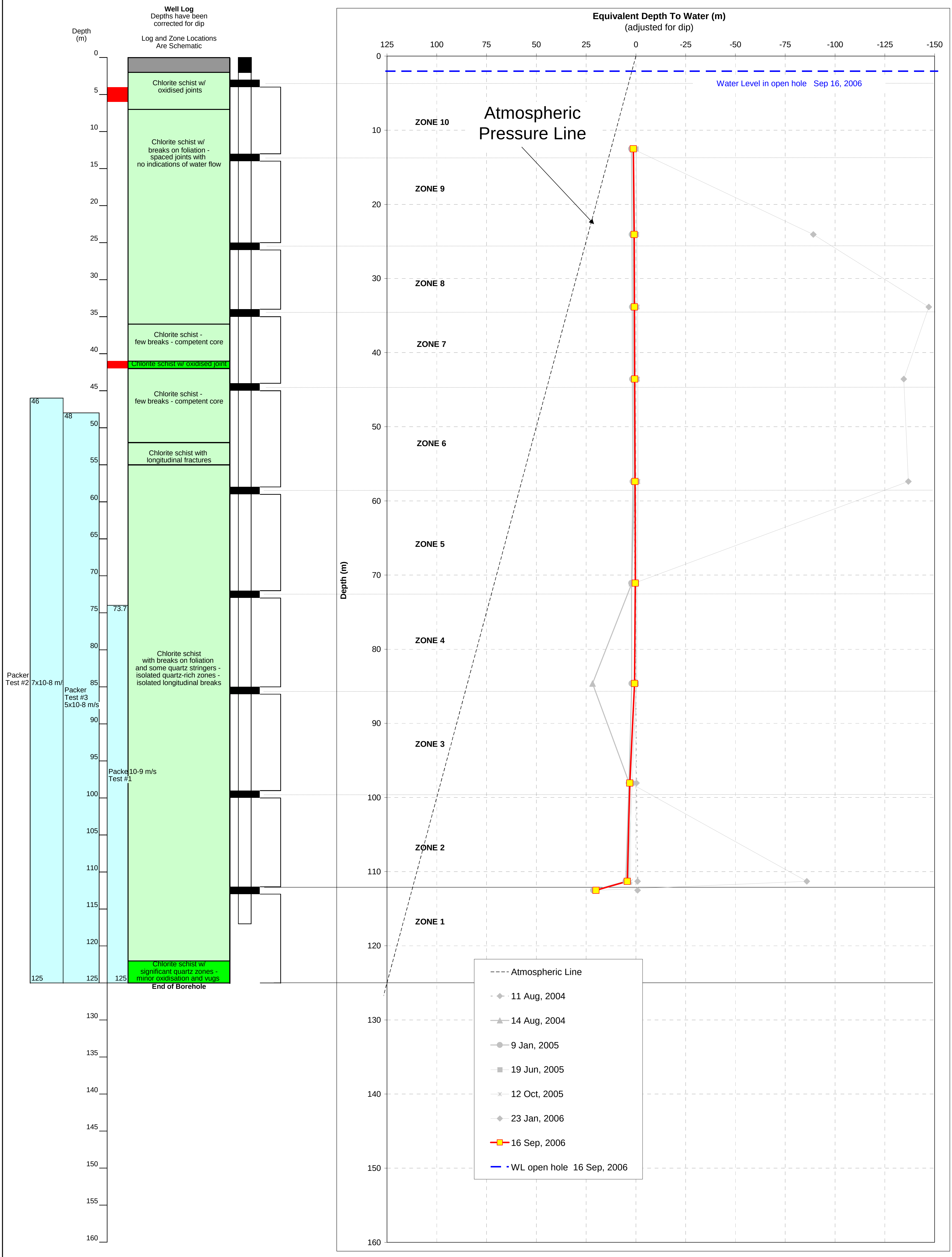
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

S-DIAND-023
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	**27**



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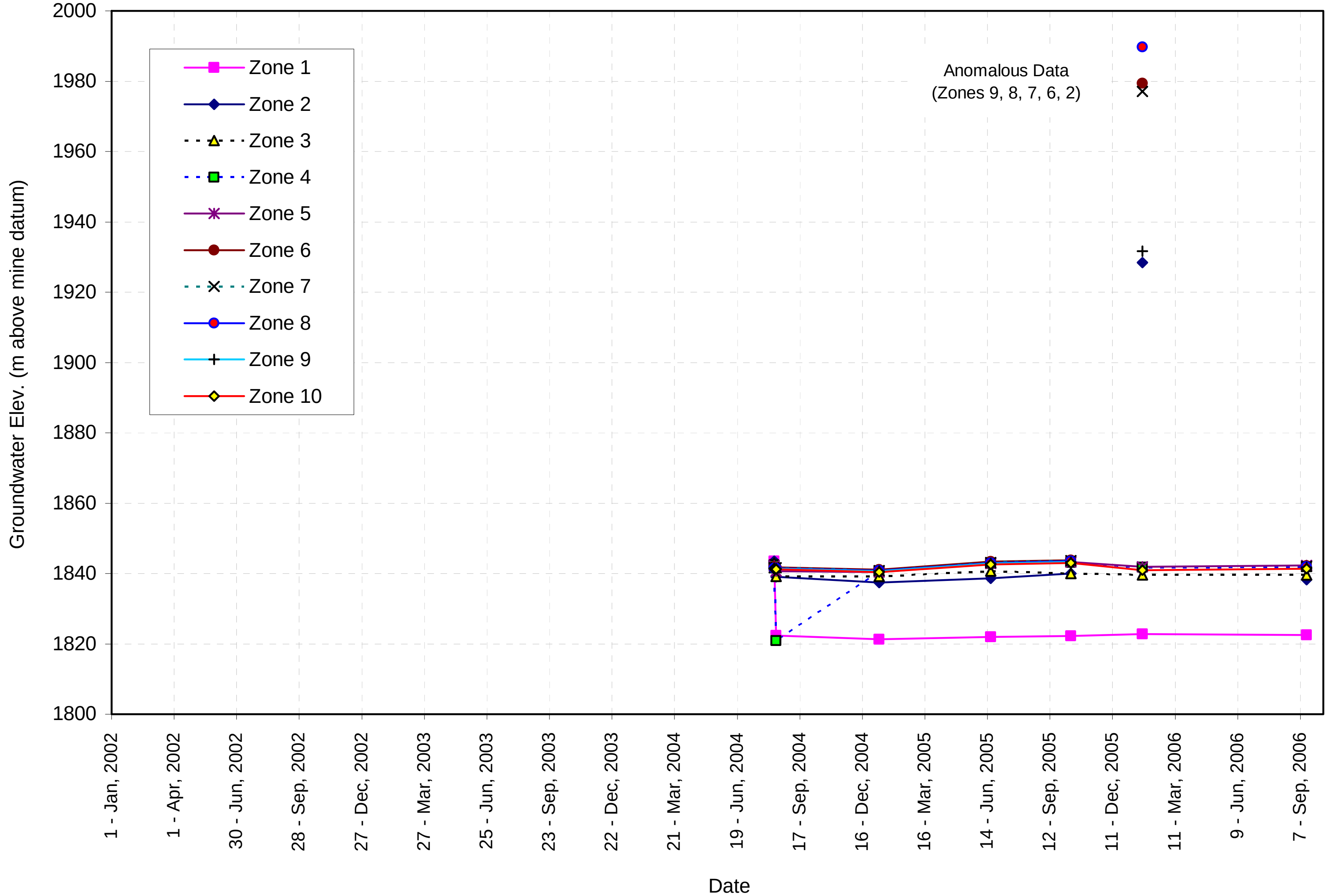
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

S-DIAND-024 Pressure

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.013.C2.01	March 2007	MR	28



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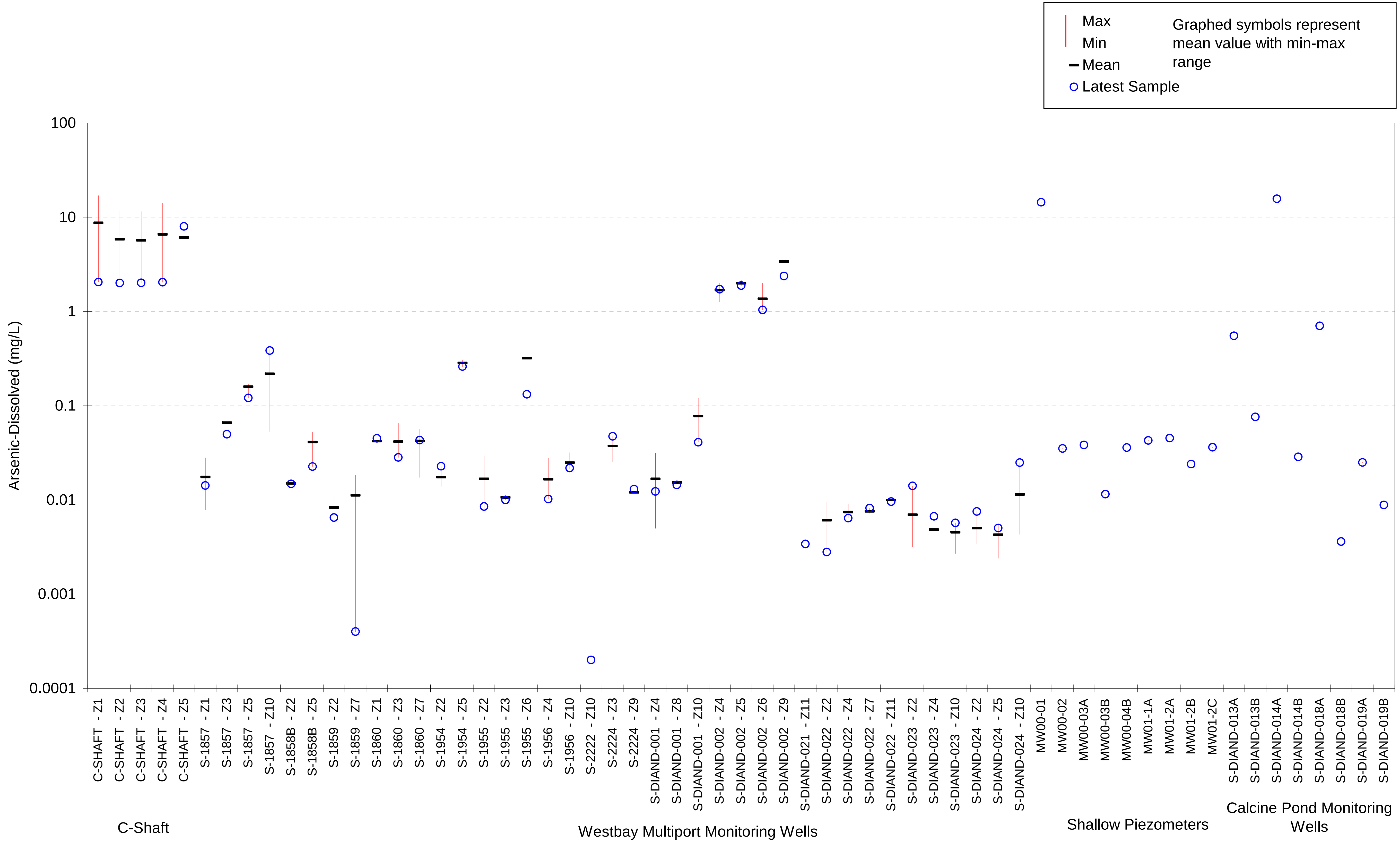
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

S-DIAND-024
Groundwater Level vs Time

PROJECT:	DATE:	APPROVED:	FIGURE::
1CI001.13.C2.01	March 2007	MR	29



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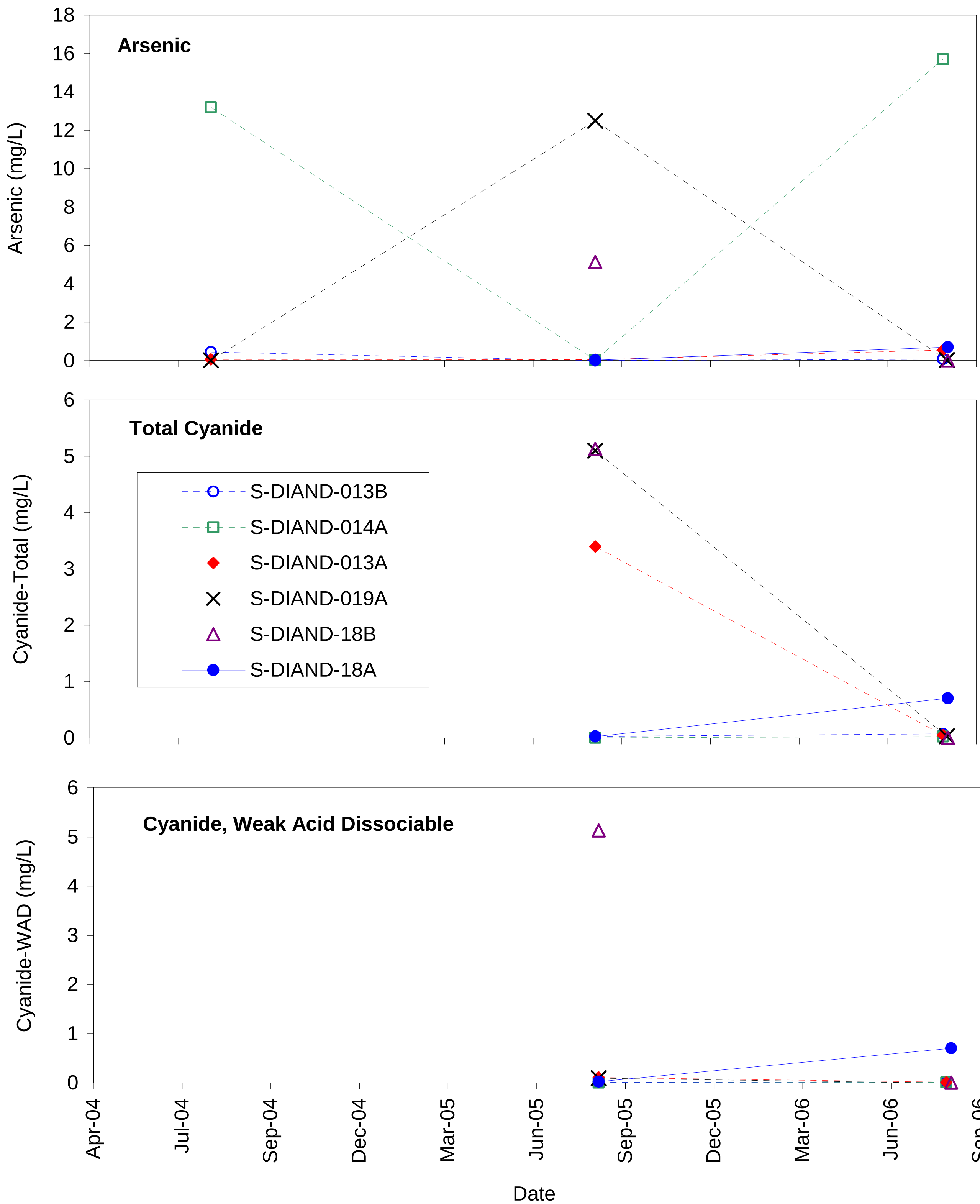
INDIAN AND NORTHERN AFFAIRS CANADA

GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

Arsenic in Groundwater in Monitoring Wells

PROJECT:	DATE:	APPROVED:	FIGURE:
1CI001.13.C2.01	March 2007	MR	30



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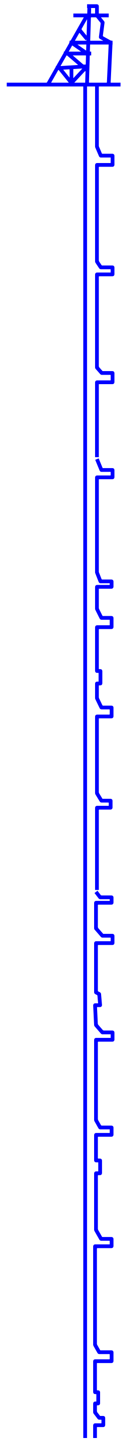
INDIAN AND NORTHERN AFFAIRS CANADA
GIANT MINE REMEDIATION PROJECT TEAM

Groundwater & C-Shaft Monitoring:
2005-2006 Update Report, Giant Mine, NWT

Calcine Pond Monitoring Wells
Arsenic and Cyanide vs Time

PROJECT:	DATE:	APPROVED:	FIGURE:
1CI001.013.C2.01	March 2007	MR	31

Elevation (m above mine datum)	Mine Level	Port Depth (m)	Zone #
1838	surface		
1802	100	35	12
1748	250	89	11
1698	425	138	10
1652	575	185	9
1598	750	239	8
1538	950	299	7
1492	1100	344	6
1446	1250	390	5
1383	1500	454	4
1337	1650	500	3
1285	1800	551	2
1230	2000	607	1
1191	shaft bottom		



FILE REF: FIG-32-Shaft_WL_v2.XLS

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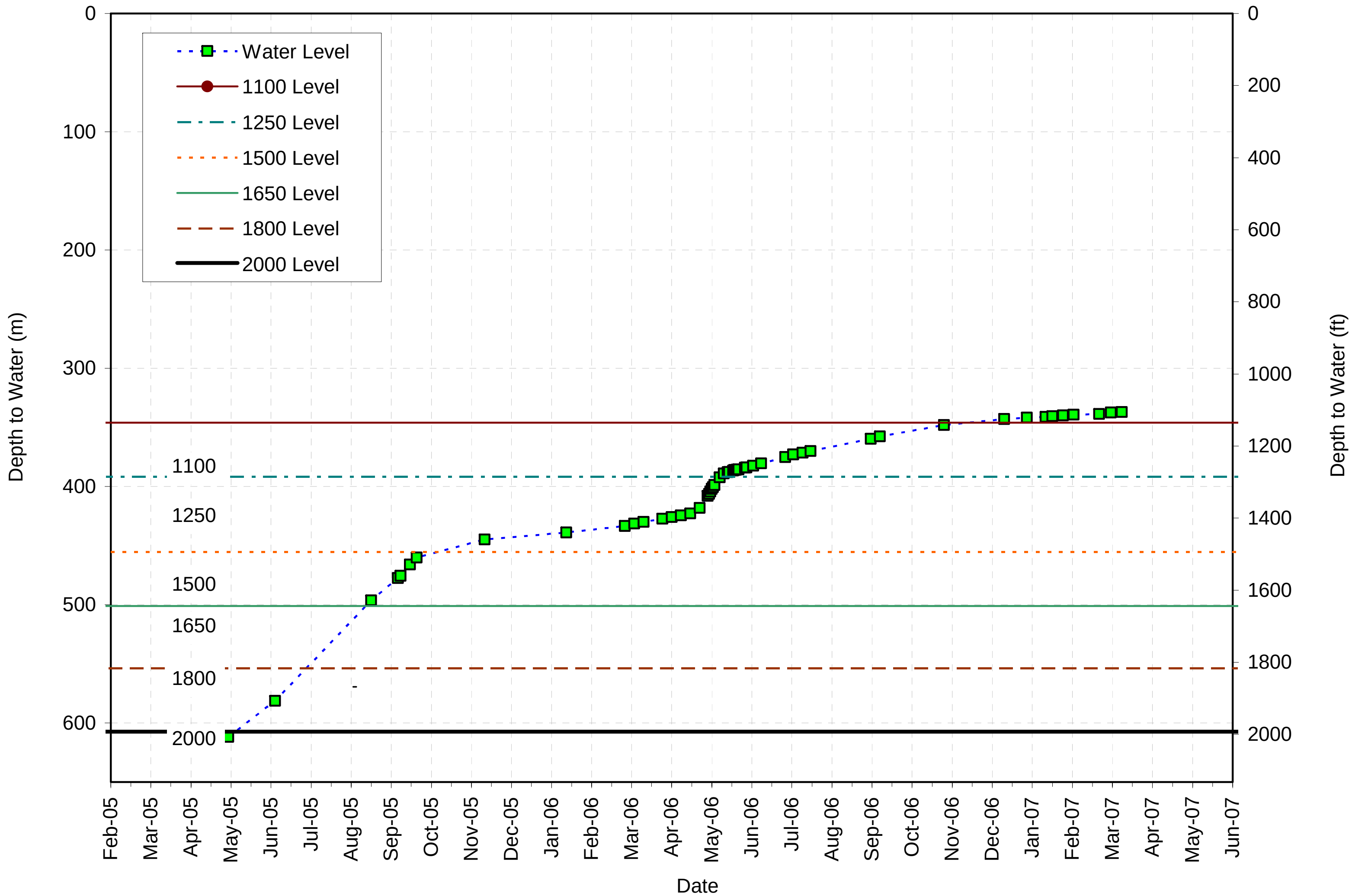
GIANT MINE REMEDIATION PROJECT TEAM

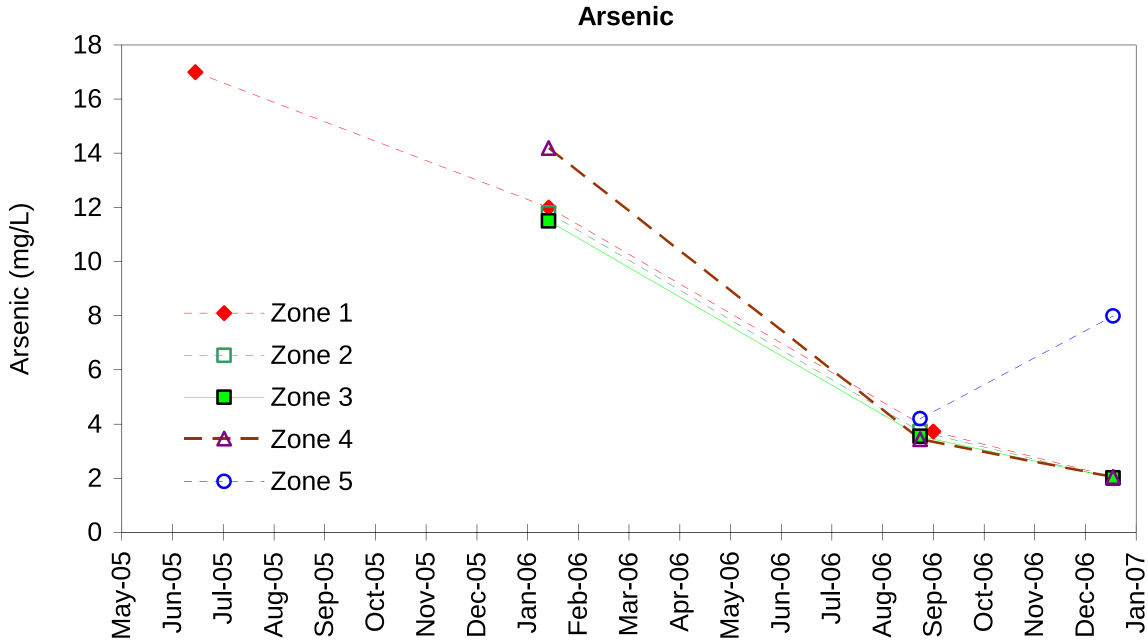
Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT

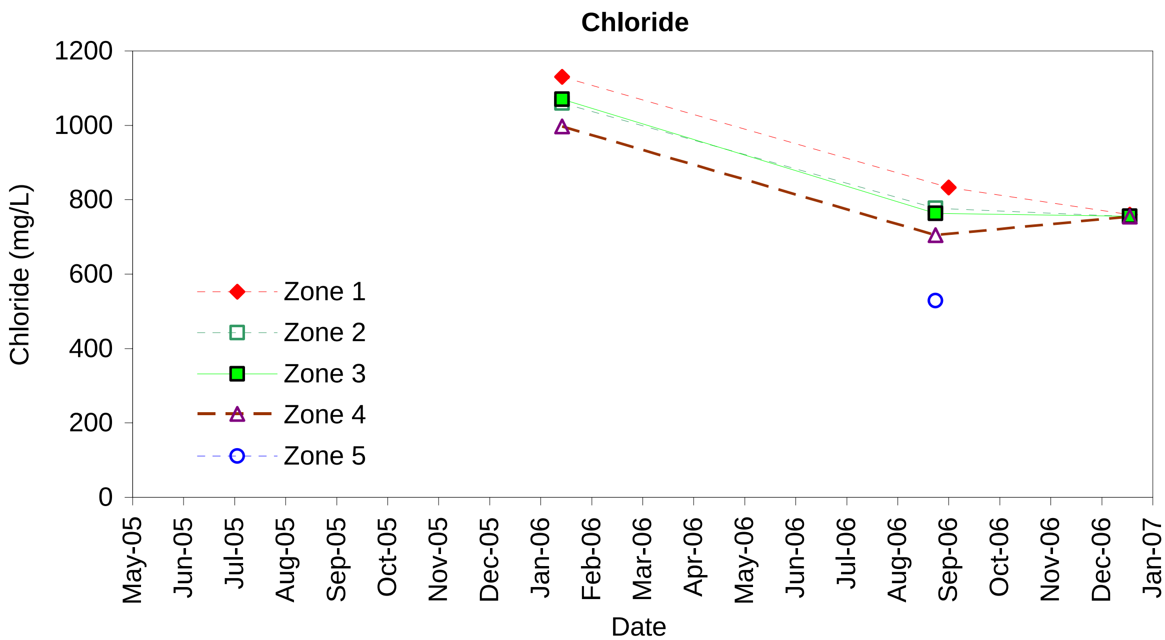
C-Shaft Levels

PROJECT	DATE	APPROVED	FIGURE
1CI001.013	March 2007	MR	**32**



SRK Consulting Engineers and Scientists	Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT			
	C-Shaft **Water Level vs Time**			
INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	PROJECT: 1CI001.13.C2.01	DATE: March 2007	APPROVED: MR	FIGURE:: **33**





SRK Consulting *Engineers and Scientists*	Groundwater & C-Shaft Monitoring: 2005-2006 Update Report, Giant Mine, NWT
INDIAN AND NORTHERN AFFAIRS CANADA **GIANT MINE REMEDIATION PROJECT TEAM**	**C-Shaft** **Arsenic and Chloride vs Time**

PROJECT:	DATE:	APPROVED:	FIGURE:
1CI001.013.C2.01	March 2007	MR	**34**