Lead

Lead concentrations in surface fresh waters are hardness dependent. CCME guidelines for the protection of aquatic life range between 1 μg/L for soft waters (<60 mg/L $CaCO_3$) and 7 μg/L for very hard water (>180 mg/L $CaCO_3$). The majority of lakes sampled displayed hardness levels below 60 mg/L $CaCO_3$ (Figure 2.9-2). Corresponding lead concentrations were below 1 μg/L, indicating they did not exceed CCME guidelines (Figure 2.9-9).

Lead concentrations measured in the Yellowknife River were generally below CCME guidelines for the protection of aquatic life for soft waters (i.e., <60 mg/L $CaCO_3$), with the exception of the sampling events in 1998 and 1999 (Figure 2.9-10).

Inorganic Mercury

Lakes tested for mercury were selected based on their past mining history. All but one of the lakes sampled had mercury values below the CCME guideline for the protection of aquatic life (0.026 μg/L) (Figure 2.9-9). The lake with elevated mercury levels was located in the southernmost portion of the Yellowknife River drainage basin, was very shallow, and also displayed high total coliform and fecal coliform counts (Puznicki 1996).

Mercury levels measured at the Yellowknife River station were always below CCME guidelines (Figure 2.9-10).

Nickel

Nickel concentrations in surface fresh waters are hardness dependent, with toxicity increasing in aquatic environments as hardness decreases (Puznicki 1996). Measured nickel concentrations were well below the CCME guideline of 25 μg/L for soft waters (e.g., <60 mg/L $CaCO_3$) (Figure 2.9-11).

Nickel concentrations measured in the Yellowknife River were also well below CCME guidelines (Figure 2.9-10).

Selenium

Selenium concentrations were only tested by Puznicki (1996) and were always below the analytical detection limit set by the laboratory. As such, the results were not reported further.

Selenium concentrations measured in the Yellowknife River were always below the CCME guideline for the protection of aquatic life (1 μg/L) from 2002 onward (Figure 2.9-10).

Zinc

Natural zinc concentrations in surface fresh waters of western Canada have been known to range between 1-290 μg/L (Puznicki 1996). Zinc concentrations measured in lakes located between Great Slave Lake and the Beaufort Sea were at the lower end of this range (Figure 2.9-11). Most of the lakes tested were also below the CCME guideline of 30 μg/L for the protection of aquatic life.

Zinc concentrations measured in the Yellowknife River were always below CCME guidelines (Figure 2.9-10).

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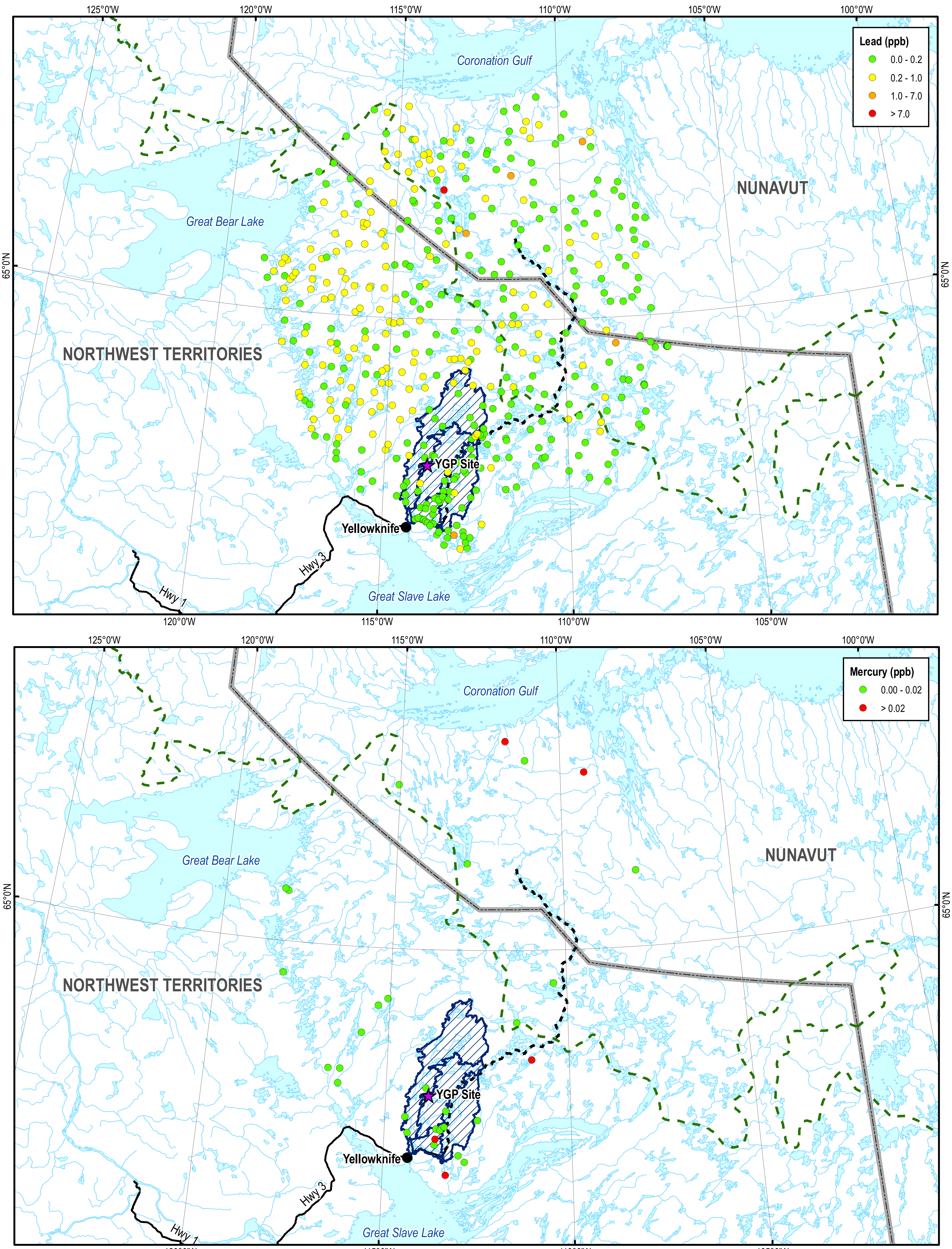

LEGEND

- Yellowknife Gold Project Site
- Yellowknife
- Treeline
- Yellowknife River Basin Watersheds
- NWT - Nunavut Border
- Winter Road
- Road
- River
- Waterbody

N
W E
S

NOTES
1. Water quality data from Department of Indian and Northern Affairs (Puznicki, 1996) and Ruhland et al. (2003).
2. Base data source: Atlas of Canada.

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YELLOWKNIFE GOLD PROJECT

Water Quality in the Slave Province
Lead and Inorganic Mercury

PROJECTION		DATUM
NWT Lambert		NAD83

Scale: 1:5,000,000

100 50 0 100

Kilometres

Tyhee NWT Corp

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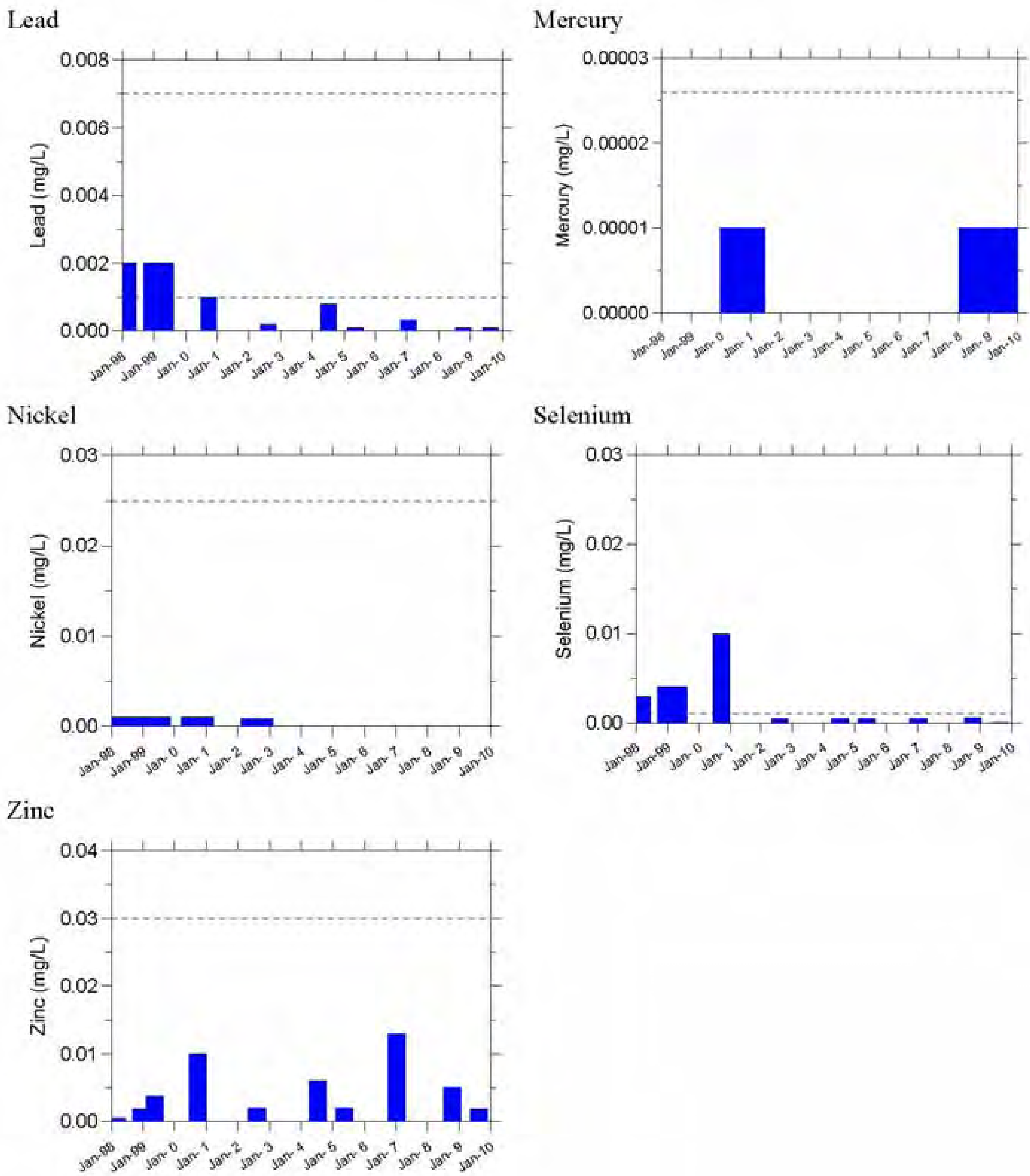
FILE NO.			
V23201097-DAR-049.mxd			
PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	March 14, 2011		

Figure 2.9-9



NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Pb and Ni guidelines are hardness dependent.
3. Results below detection limit report detection limit value.
4. Detection limits include (in mg/L): Pb = 0.0001; Hg = 0.00001; Ni = 0.0001; Se = 0.0005; Zn = 0.005.

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YELLOWKNIFE GOLD PROJECT

Total Metals
Yellowknife River at Yellowknife

PROJECT NO.	DWN	CKD	REV
V23201097	KW	TP	0

OFFICE	DATE
EBA-VANC	April 14, 2011

Figure 2.9-10

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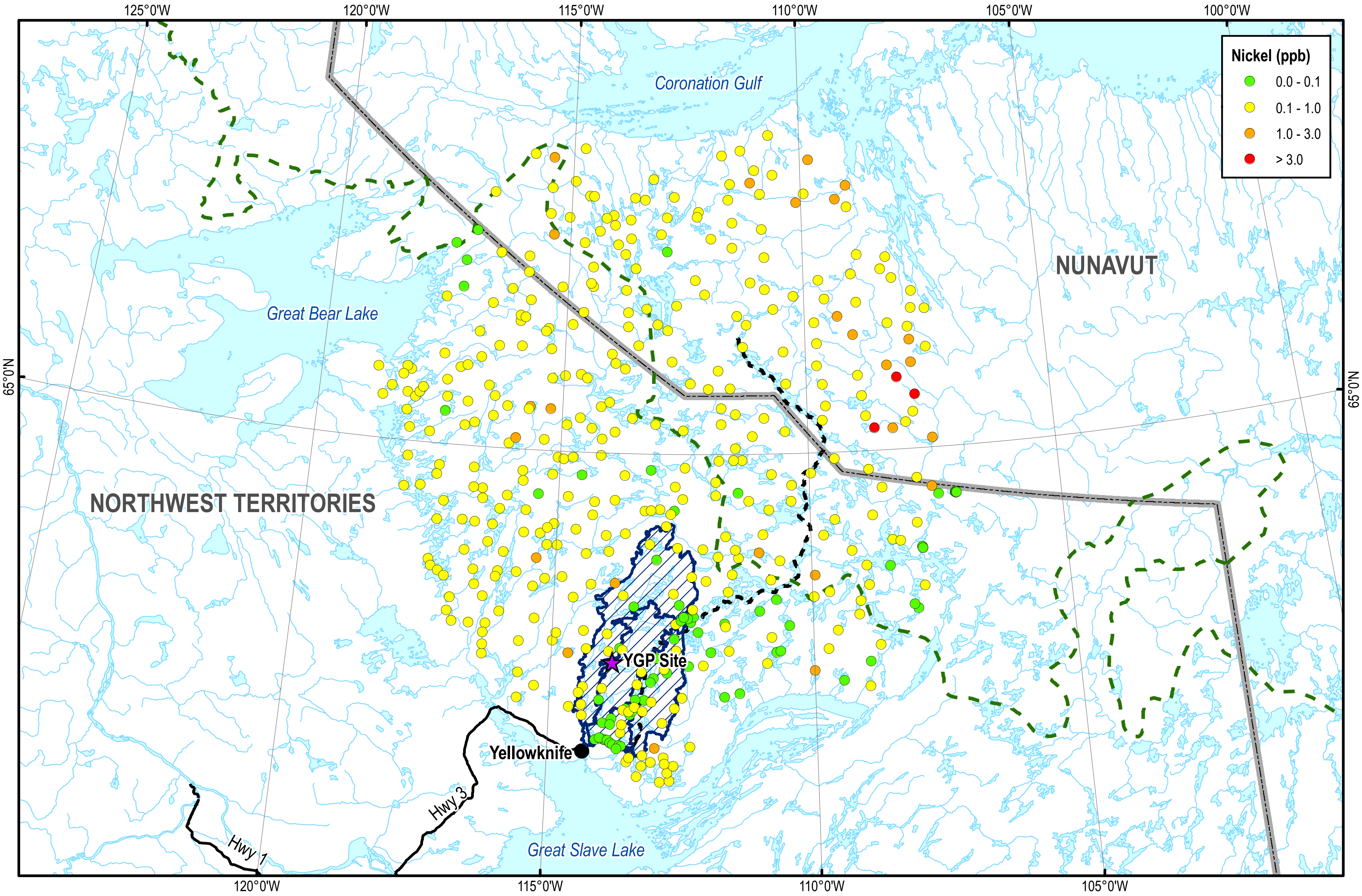

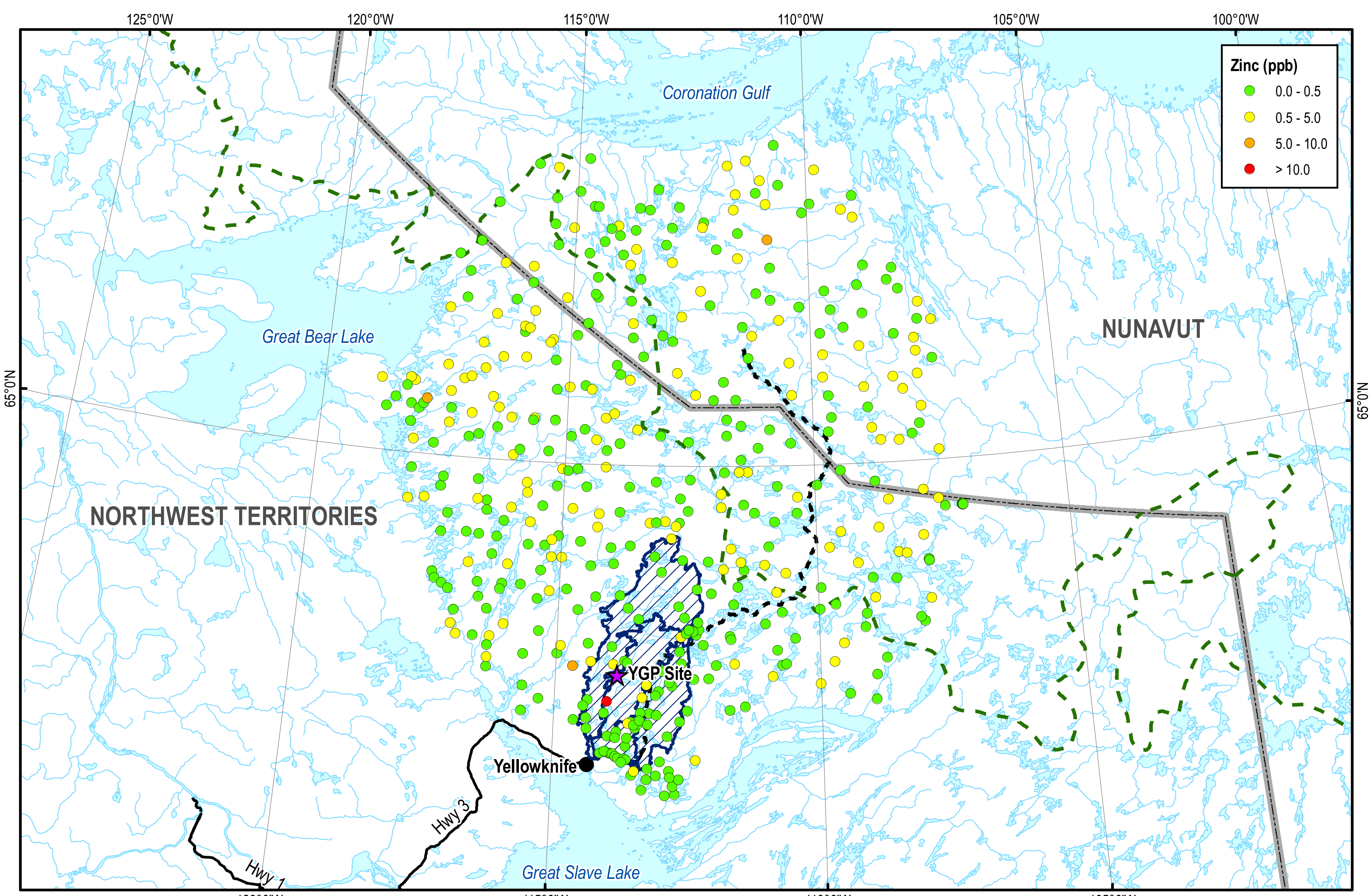

LEGEND

- Yellowknife Gold Project Site
- Yellowknife
- Treeline
- Yellowknife River Basin Watersheds
- NWT - Nunavut Border
- Winter Road
- Road
- River
- Waterbody

N E S W

NOTES
1. Water quality data from Department of Indian and Northern Affairs (Puznicki, 1996) and Ruhland et al. (2003).
2. Base data source: Atlas of Canada.

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YELLOWKNIFE GOLD PROJECT

Water Quality in the Slave Province
Nickel and Zinc

PROJECTION	DATUM
NWT Lambert	NAD83

Scale: 1:5,000,000

100 50 0 100
Kilometres

Tyhee NWT Corp

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FILE NO.
V23201097-DAR-050.mxd

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	March 14, 2011

Figure 2.9-11

2.9.6 Local Water Quality

Water quality data characterizing the local study area have been compiled from baseline studies conducted in 2004-2005 and on-going SNP monitoring for the Tyhee NWT Corp Water License. Six lakes were included in baseline studies, while four are included in the SNP monitoring.

Remediation activities at the Discovery Mine were also carried out during this timeframe and included the excavation and capping of the existing tailings and managing the water in a borrow pit by pumping the excess to Round Lake (INAC 2004, 2008b). The initial capping took place between 1998 and 2000, while the remaining tailings were excavated and disposed of in 2005. Water management at the borrow pit is ongoing, with periodic pumping to Round Lake occurring as required.

2.9.6.1 Physical Parameters 2004-2005

pH

The pH of lakes measured throughout the YGP area in 2004 and 2005 fell within the CCME guidelines for the protection of aquatic life (6.5-9) (Figure 2.9-12). pH levels were generally higher in 2004 than 2005.

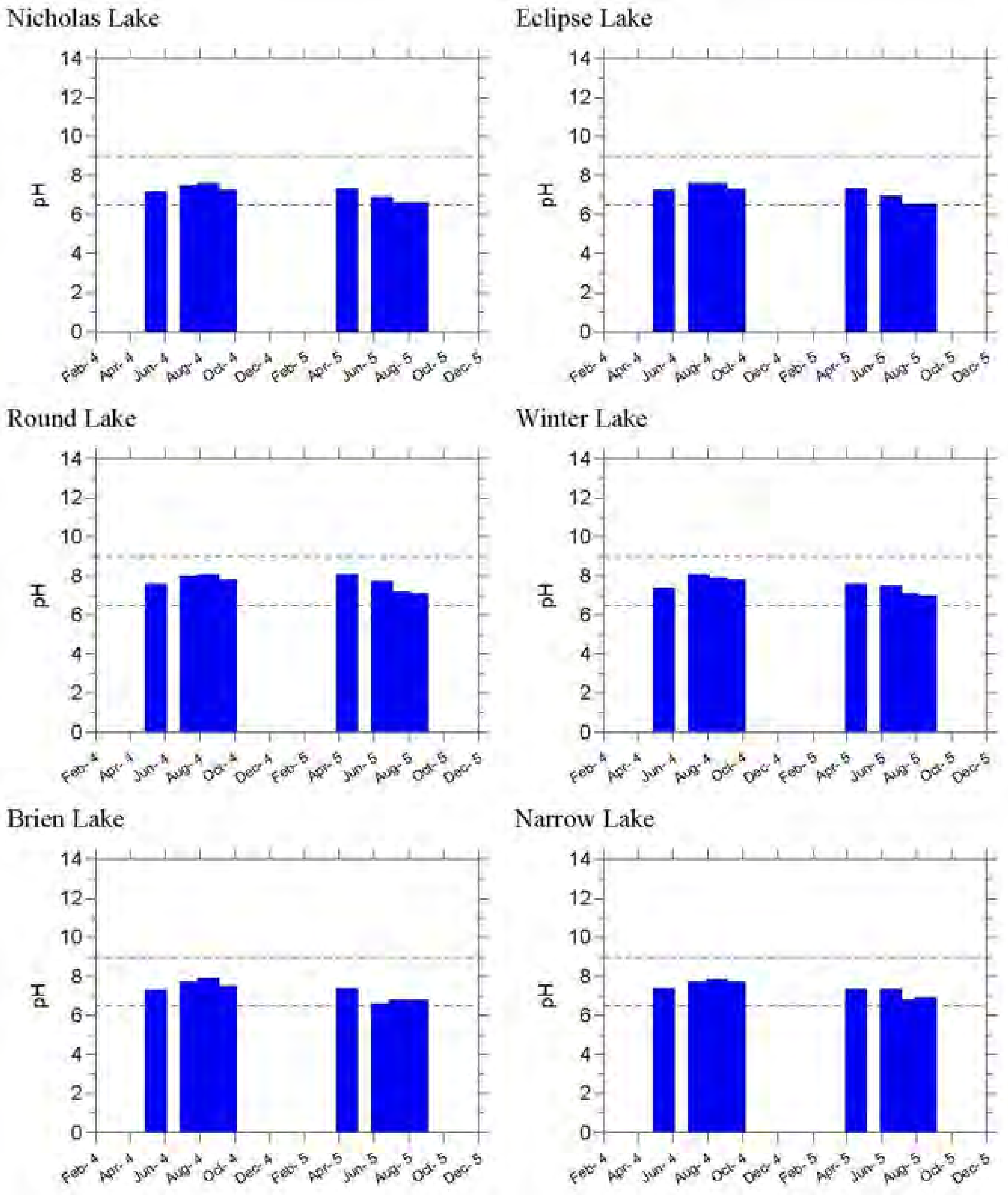
Hardness (as $CaCO_3$)

Lakes of the YGP area ranged in water hardness (Figure 2.9-13). Nicholas and Eclipse lakes in the northern portion of the YGP area had very soft water in both 2004 and 2005, with hardness values below 30 mg/L $CaCO_3$. Brien Lake had generally soft water (hardness values ranging between 31-60 mg/L $CaCO_3$), while Narrow Lake had moderately-hard water (hardness values ranging between 61-120 mg/L $CaCO_3$). Round Lake reported very hard water in both 2004 and 2005 (hardness values above 180 mg/L $CaCO_3$), with the exception of July 2005 when hardness levels dropped noticeably. Water hardness in Winter Lake fluctuated between moderately hard and hard, particularly in 2005. The hardness levels in Round and Winter lakes could be associated with the remediation works being undertaken at the time.

2.9.6.2 Nutrients 2004-2005

Nutrients include parameters such as ammonia, nitrate and phosphorous. The results of the 2004 and 2005 baseline water quality sampling programs determined that all parameters measured were found to be within the expected range for lakes in this region in winter conditions (see Appendix C).

Phosphorous concentrations generally ranged from about 0.004 mg/L in Eclipse Lake to 0.014 mg/L in Winter Lake, but varied over a considerable range among lakes and over time. The trophic state of a lake is often identified on the basis of phosphorous concentrations, where levels of 0-0.012, 0.012-0.024, and 0.014-0.096 mg/L reflect ranges for oligotrophic, mesotrophic, and eutrophic lakes (Carlson, 1977). Using these ranges, lakes in the YGP study area are generally oligotrophic, although Round and Winter lakes can be considered to be mesotrophic.



NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.

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YELLOWKNIFE GOLD PROJECT

pH
2004-2005

PROJECT NO.	DWN	CKD	REV	
V23201097	SL	TP	0	Figure 2.9-12
OFFICE	DATE			
EBA-VANC	February 9, 2011			

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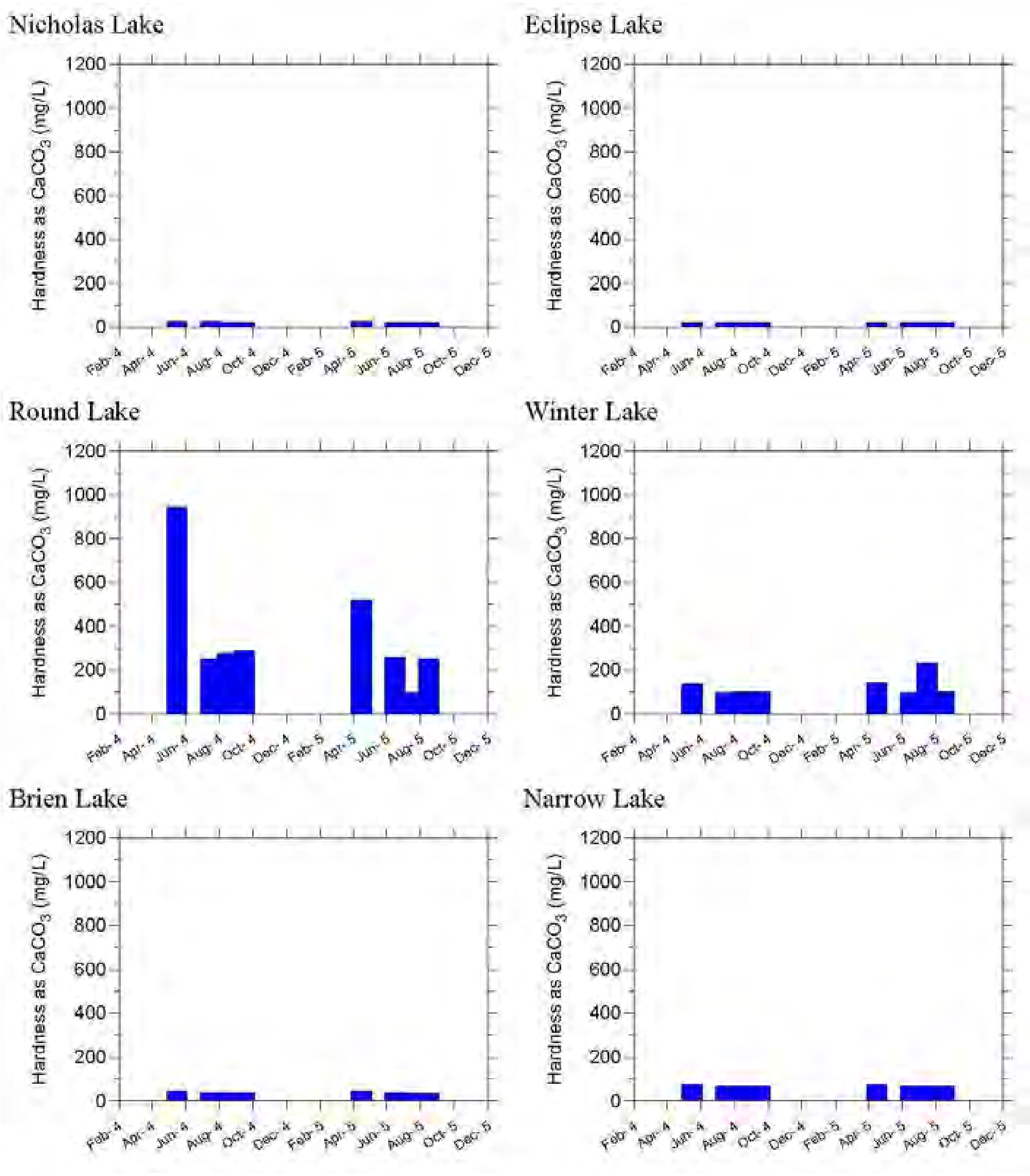

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NOTES
1.

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Hardness (as $CaCO_3$) 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-13

Ammonia

Ammonia concentrations ranged from below the laboratory detection limit of 0.005 mg/L to 3.950 mg/L in Round Lake during May (under ice conditions) (Figure 2.9-14). MOE (2001) recommend water quality criteria for ammonia in BC waters as a maximum concentration of 2.5 mg/L (as N) and a 30 day average concentration of 1.0 mg/L (as N). These numbers are developed from tables that show the toxicity of ammonia increase with temperature and increase with pH. Figure 2.9-14 shows that the under ice ammonia level recorded in Round Lake in late winter/early spring (April/May) exceeded the maximum concentration water quality objective in 2004 and the 30 day average concentration in 2005. All other average levels measured were below the water quality objectives, although, Winter Lake also showed a tendency toward higher winter/spring levels.

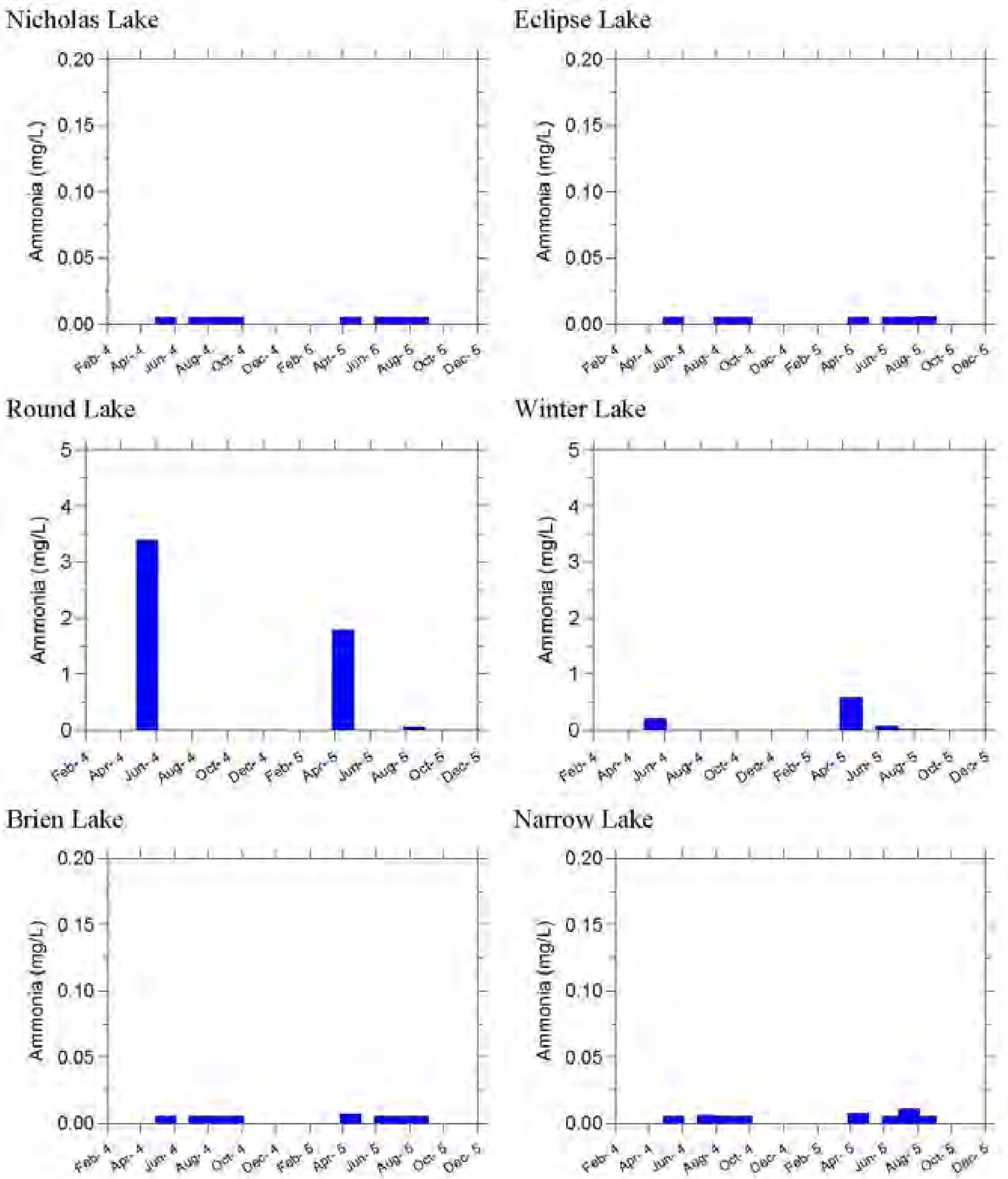
The elevated levels recorded in these shallow lakes were likely due to the ammonification of large quantities of coproprel (a mixture of humus material, fine plant fragments, algae remains, quartz and mica grains, diatom frustules, and exoskeleton fragments) at or near the bottom of these lakes (Cole 1983). Ammonification is the production of ammonia from organic nitrogenous compounds, through decomposition of dead material and the metabolism of living organisms. Round Lake and Winter Lake are shallow waterbodies with extensive amounts of organic substrate.

2.9.6.3 Total Metals 2004-2005

Total metal concentrations reported from the 2004 and 2005 baseline water quality sampling programs were generally below the CCME Canadian Water Quality Guidelines Criteria for the Protection of Freshwater Aquatic Life and on occasion, below the ultra-low detection limits used by ETL. However, at some sampling stations, exceedances of CCME guidelines were noted for aluminum, arsenic, copper, mercury, and nickel. Additional detail is provided below.

Aluminum

All but one aluminum value recorded in the water collected from all YGP lakes sampled during 2004 and 2005 fell within the range of the CCME criterion for the protection of freshwater aquatic life (FAL) (0.005 mg/L at a pH< 6.5 and 0.1 at pH > 6.5). The average total aluminum concentration for all lakes during all sampling sessions was 0.0183 (mg/L), while the average dissolved aluminum concentration was 0.0141 (mg/L). The one exceedance recorded was in Round Lake in June 2005. This exceedance was likely related to INAC's practice of pumping out the clay borrow pit (a source of material used by INAC in the reclamation efforts related to the historic Discovery Mine) as Round Lake was the receiving water body for this discharge. Aluminum concentrations are shown in Figure 2.9-15.



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YELLOWKNIFE GOLD PROJECT

Ammonia
2004-2005

PROJECT NO.	DWN	CKD	REV	
V23201097	SL	TP	0	**Figure 2.9-14**
OFFICE	DATE			
EBA-VANC	February 9, 2011			

NOTES
1. Different y-axis limits for Round Lake and Winter Lake.

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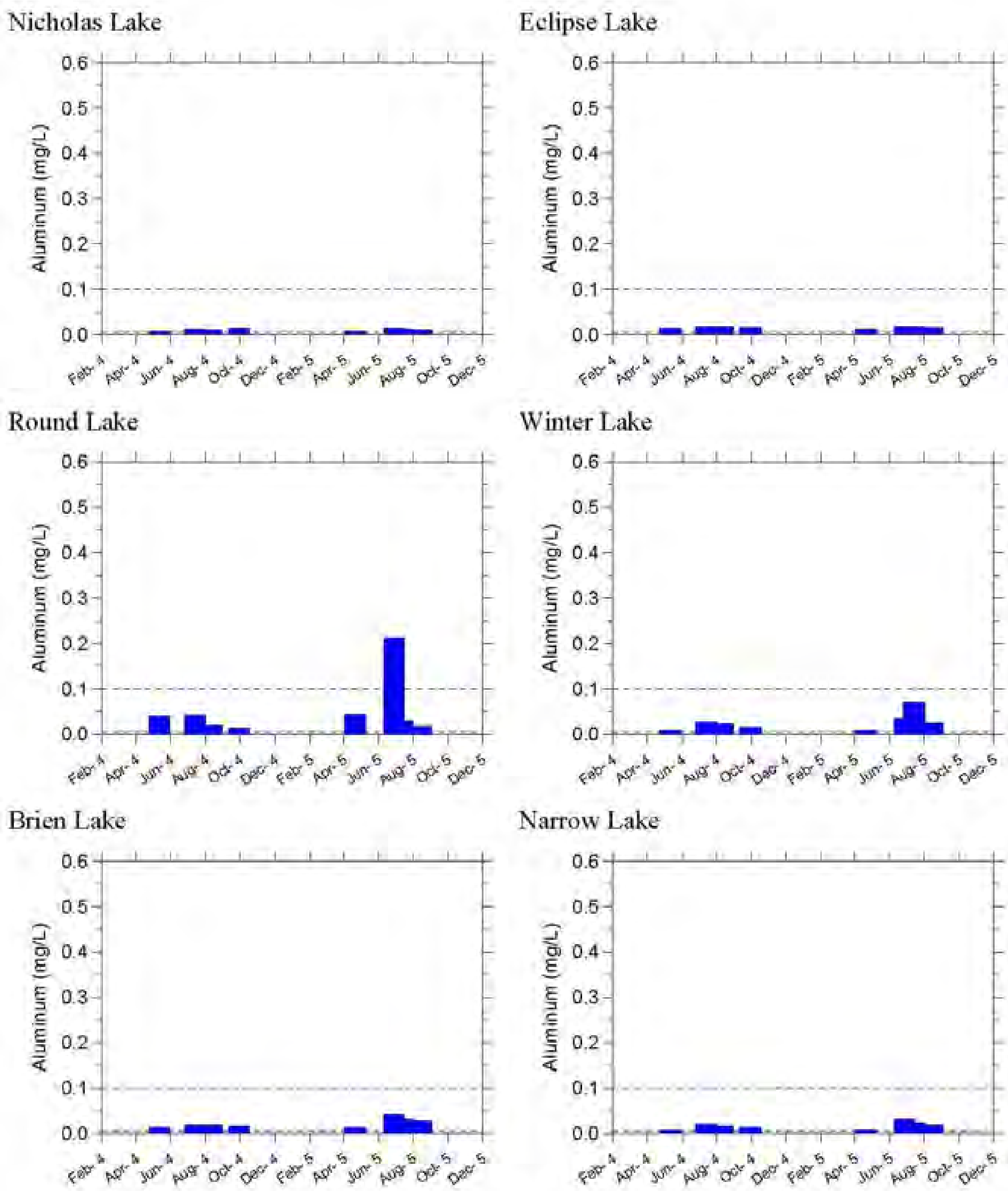

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Al guidelines are pH dependent.
3. Results below detection limit report detection limit value (0.0003 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Aluminum 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-15

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Aluminum is the most abundant metallic element in the earth's crust with a strong affinity for oxygen. Under normal conditions of chemical weathering, the degree of acidity or alkalinity of the weathering solution determines the amount of total and dissolved aluminum in the water. Results from the Department of Indian and Northern Affairs (DIAND) show aluminum values are naturally high throughout the Slave Geological Province (Puznicki 1996; Pienitz et al. 1997; Ruhland et al. 2003). Any elevated aluminum concentrations recorded in the YGP lakes sampled, were likely due to a combination of geology, remediation efforts at the historic Discovery Mine, and to a lesser extent (in some lakes) turbidity and shallow lake depth (Puznicki 1996).

Arsenic

Arsenic concentrations in sampled YGP lakes, with the exception of Round Lake, were below the CCME criterion of 0.005 mg/L for the protection of fish and aquatic life (Figure 2.9-16). Round Lake water samples were consistently above the CCME criteria and Winter Lake exceeded the criteria in the July 2005 sampling.

Round, Winter, and Narrow lakes drain in series from the historic Discovery Mine tailings, with Narrow Lake being farthest downstream. The recorded arsenic levels for these three lakes show a trend in arsenic concentrations with Round Lake having the highest and Narrow Lake the lowest. These arsenic concentrations may be linked to drainage from the remediated tailings deposited by the historic Discovery mine.

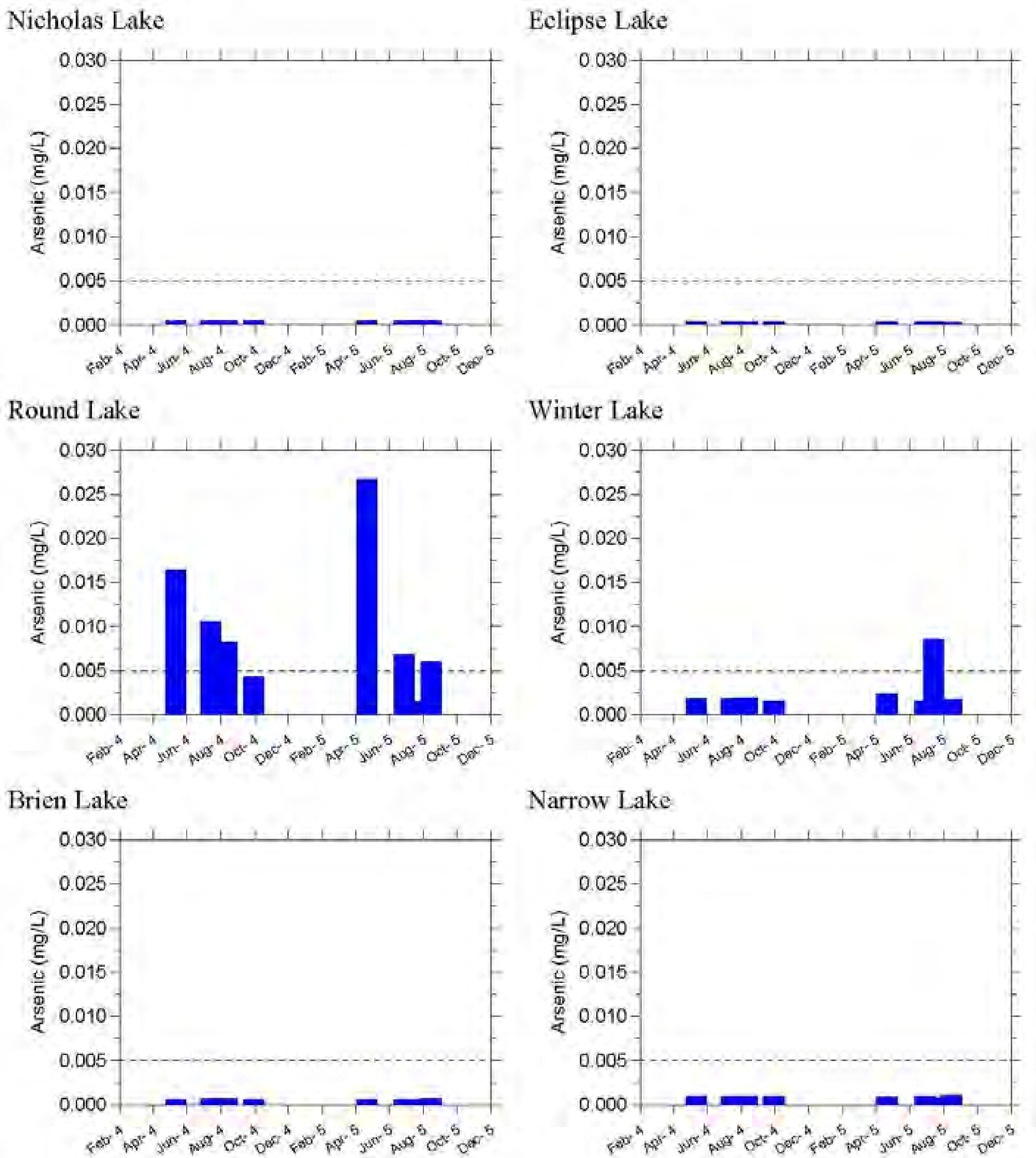
Cadmium

Cadmium concentrations in YGP lakes sampled were largely below the ultra-low laboratory detection limit (0.00005 mg/L), which is greater than the CCME criterion of 0.000017 mg/L (Figure 2.9-17). These cadmium concentrations are consistent with the levels measured in numerous lakes located between Great Slave Lake and the Beaufort Sea (Puznicki 1996) and are likely representative of natural background conditions.

Copper

Copper concentrations in all six YGP lakes sampled exceeded the lower CCME criterion of 0.002 mg/L at some point during the sampling events of 2004 and 2005 (Figure 2.9-18). Copper concentrations in Nicholas Lake in particular were routinely above CCME guidelines. These elevated values could be attributed to naturally high background levels of copper present in the geological formations of this region.

The same general trend in average total copper concentrations was noted in Round, Winter and Narrow lakes as noted for total arsenic with Round Lake being highest and Narrow Lake being lowest. This trend in total copper concentrations may be linked to drainage from the remediated tailings deposited by the historic Discovery mine.



NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.00003 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Arsenic 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-16

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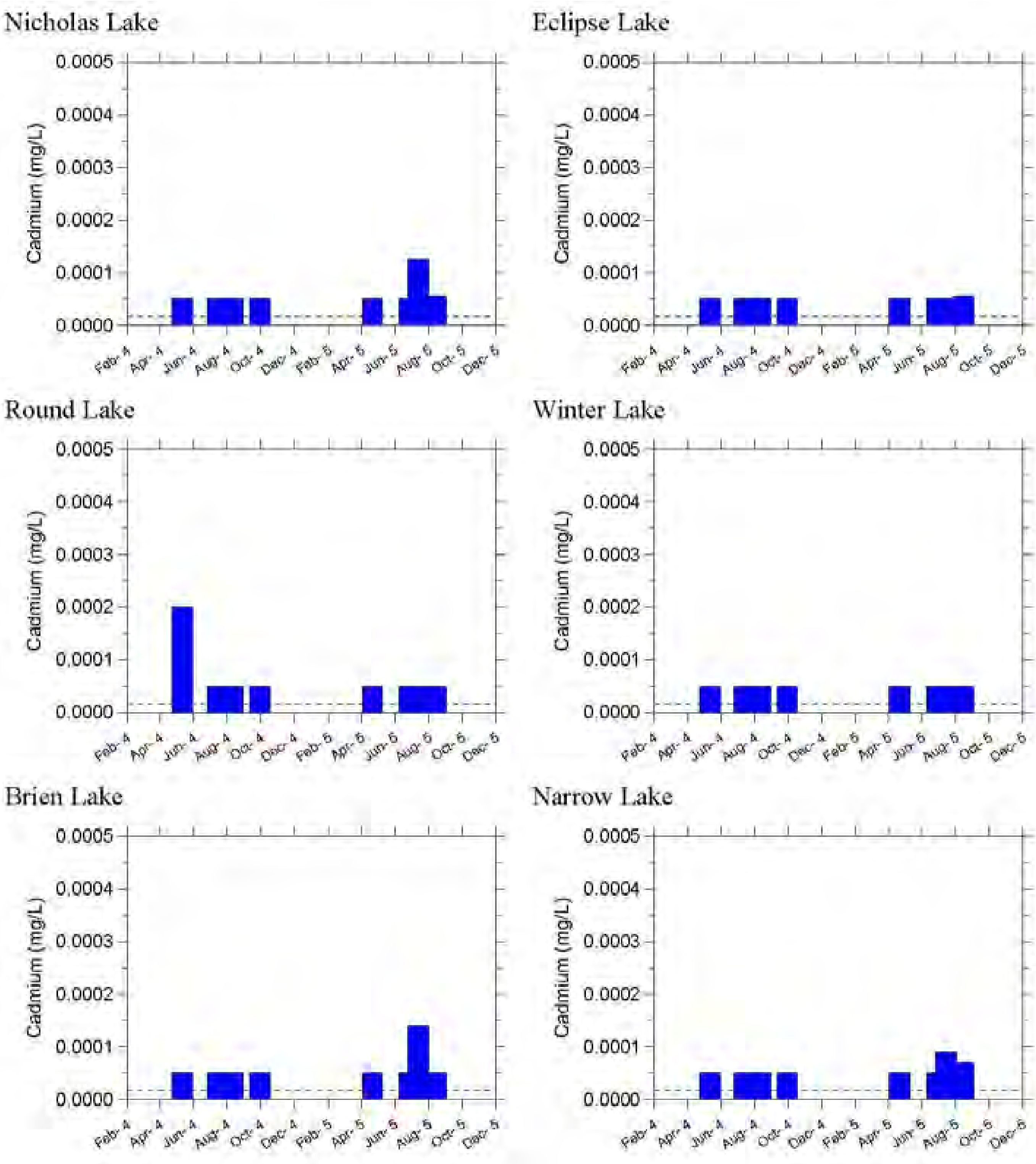

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YELLOWKNIFE GOLD PROJECT

Total Cadmium 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-17

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.00005 mg/L).

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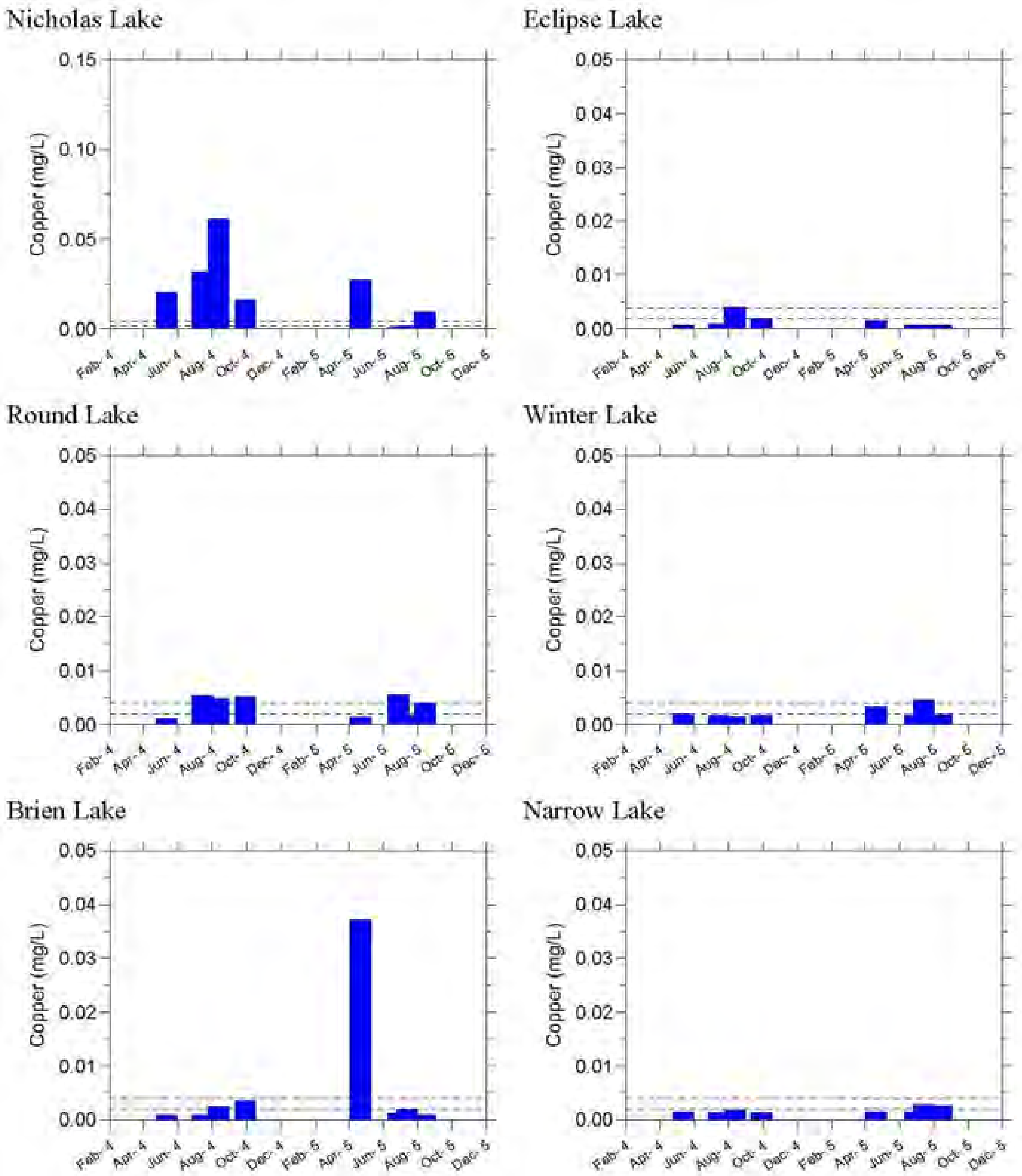

NOTES
1. Different y-axis limit for Nicholas Lake.
2. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
3. Cu guidelines are hardness dependent.
4. Results below detection limit report detection limit value (0.0006 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Copper 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-18

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Cyanide

With the exception of a single sampling event at Round Lake in 2004, cyanide concentrations in all lakes tested were below the analytical detection limit of 0.002 mg/L and the CCME guideline for the protection of aquatic life (0.005 mg/L) (Figure 2.9-19). The spike in cyanide concentrations observed in Round Lake may be linked to drainage from the remediated tailings deposited by the historic Discovery mine.

Iron

Iron concentrations in YGP lakes sampled were well below the CCME criterion of 0.3 mg/L (Figure 2.9-20), and were similar to those reported for other lakes in the region (Puznicki 1996; Pienitz et al. 1997; Ruhland et al 2003).

Lead

YGP lakes sampled for lead were all below CCME guidelines (Figure 2.9-21). Recorded lead levels were also similar to other lakes in the region (Puznicki 1996).

Inorganic Mercury

Inorganic mercury concentrations in YGP lakes were frequently below the ultra-low laboratory detection limit of 0.00002 mg/L, which is comparable to the CCME criteria of 0.000026 mg/L.

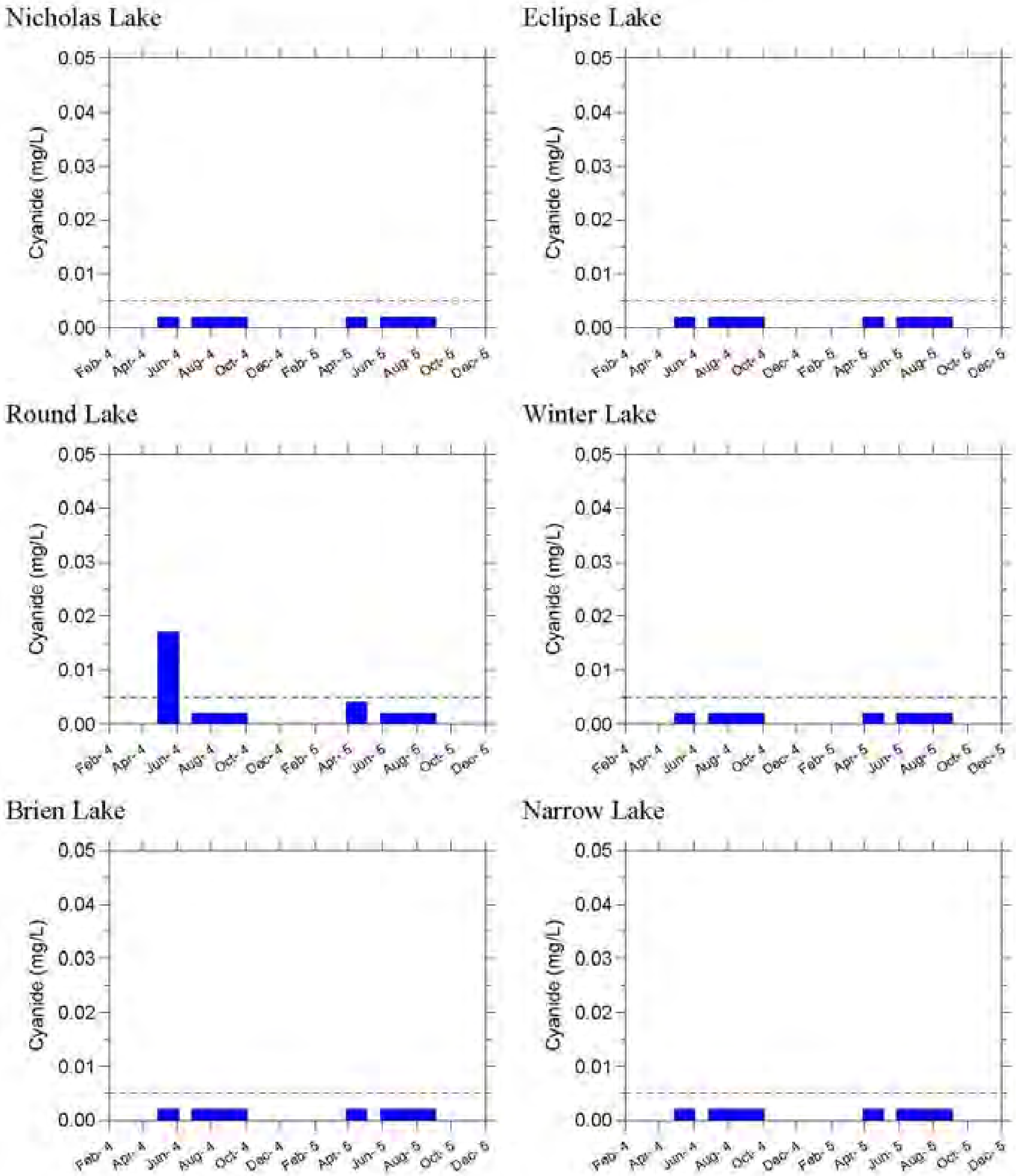
Samples exceeding the CCME guidelines for inorganic mercury were observed in 2004 at Nicholas Lake and in 2005 at Round and Brien Lakes (Figure 2.9-22). Elevated mercury concentrations in lakes not previously disturbed by anthropogenic activities (e.g., Brien and Nicholas lakes) could be attributed to naturally high levels of mercury in mineralized rock or the result of atmospheric deposition (Grigal 2002). Mercury levels in Round and Narrow lakes may also be linked to drainage from the remediated tailings deposited by the historic Discovery mine. Total mercury levels in Winter Lake were not found to exceed CCME guideline levels. However, as indicated in Section 2.10.6.6, total mercury levels resulting from SNP sampling in Winter Lake were consistently above the 0.000026 mg/L guideline level. No explanation for this difference is immediately available, although differences in sampling timing and location may, in part, be responsible.

Nickel

Nickel concentrations in YGP lakes sampled were well below the CCME criteria of 0.025mg/L, with the exception of Round Lake (Figure 2.9-23). Nickel concentrations exceeded CCME guidelines in Round Lake in September 2004 and August 2005. These elevated levels may be linked to drainage from the remediated tailings deposited by the historic Discovery mine.

Selenium

Lakes sampled for selenium were all below the CCME guideline of 0.001 mg/L (Figure 2.9-24). Round, Winter, and Narrow lakes, which drain in series, all displayed higher selenium levels compared to the other lakes sampled, particularly in 2005. These elevated levels may be linked to drainage from the remediated tailings deposited by the historic Discovery mine.



NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.002 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Cyanide 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-19

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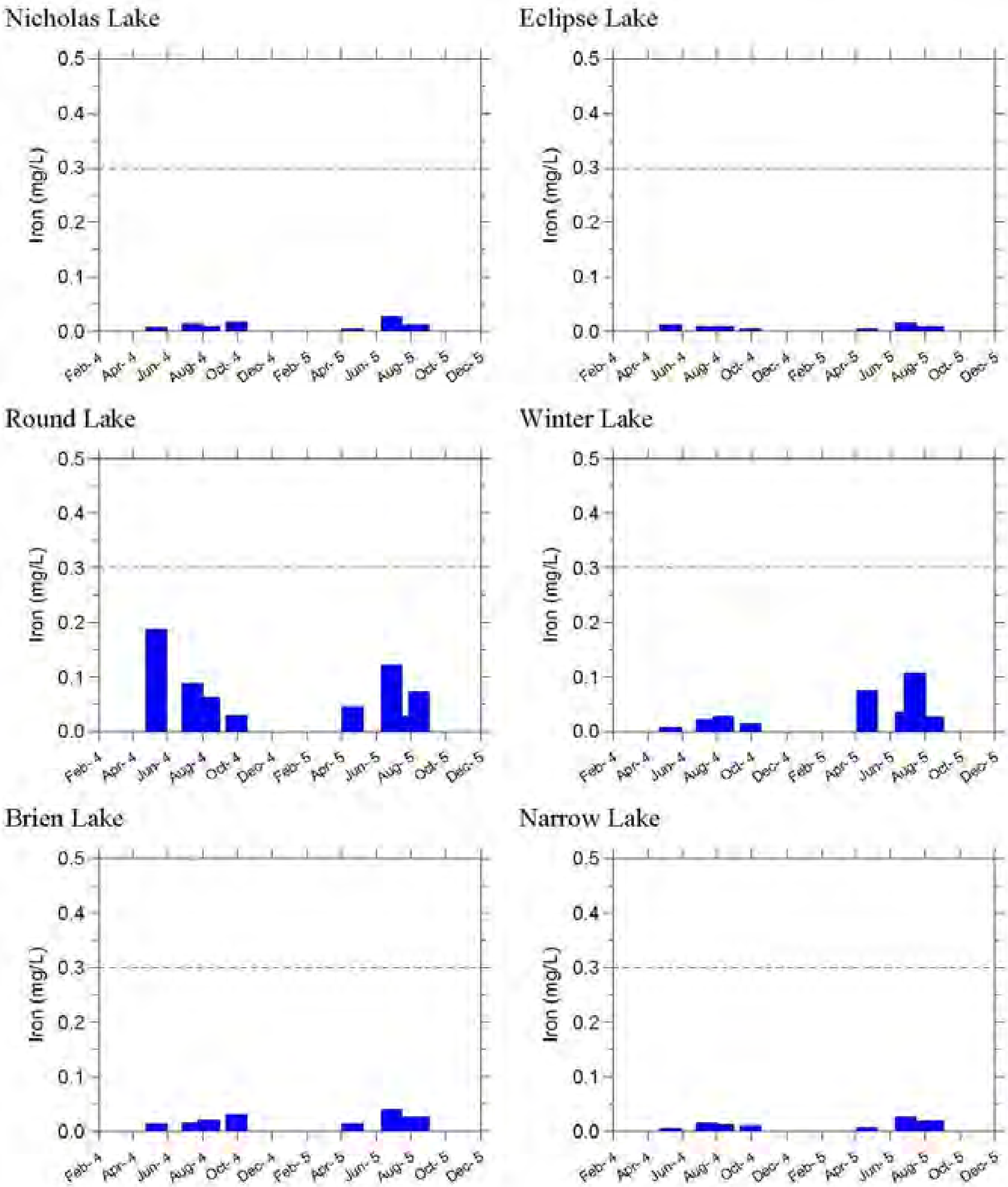

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.005 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Iron 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-20

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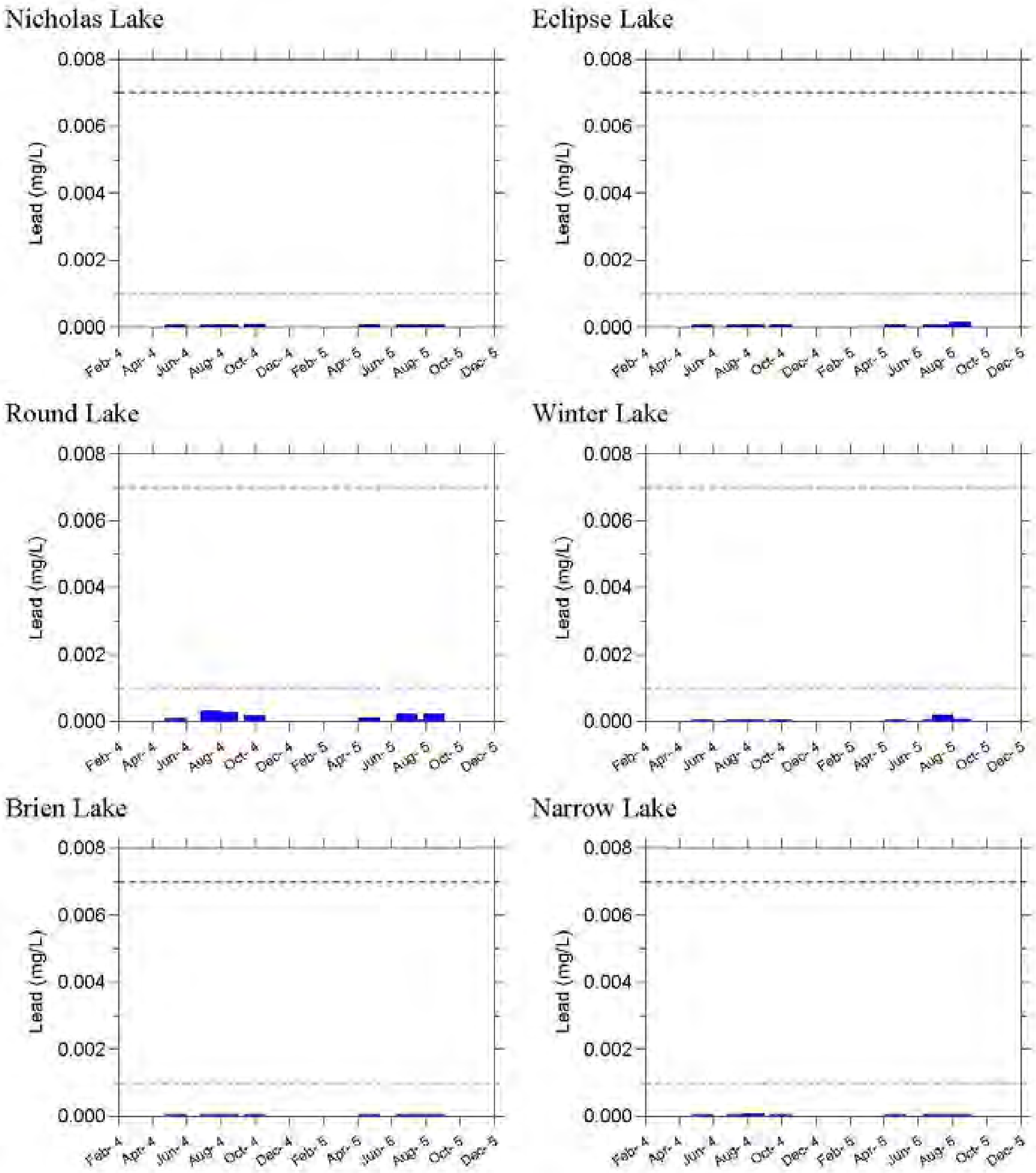

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Pb guidelines are hardness dependent.
3. Results below detection limit report detection limit value (0.00005 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Lead 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-21

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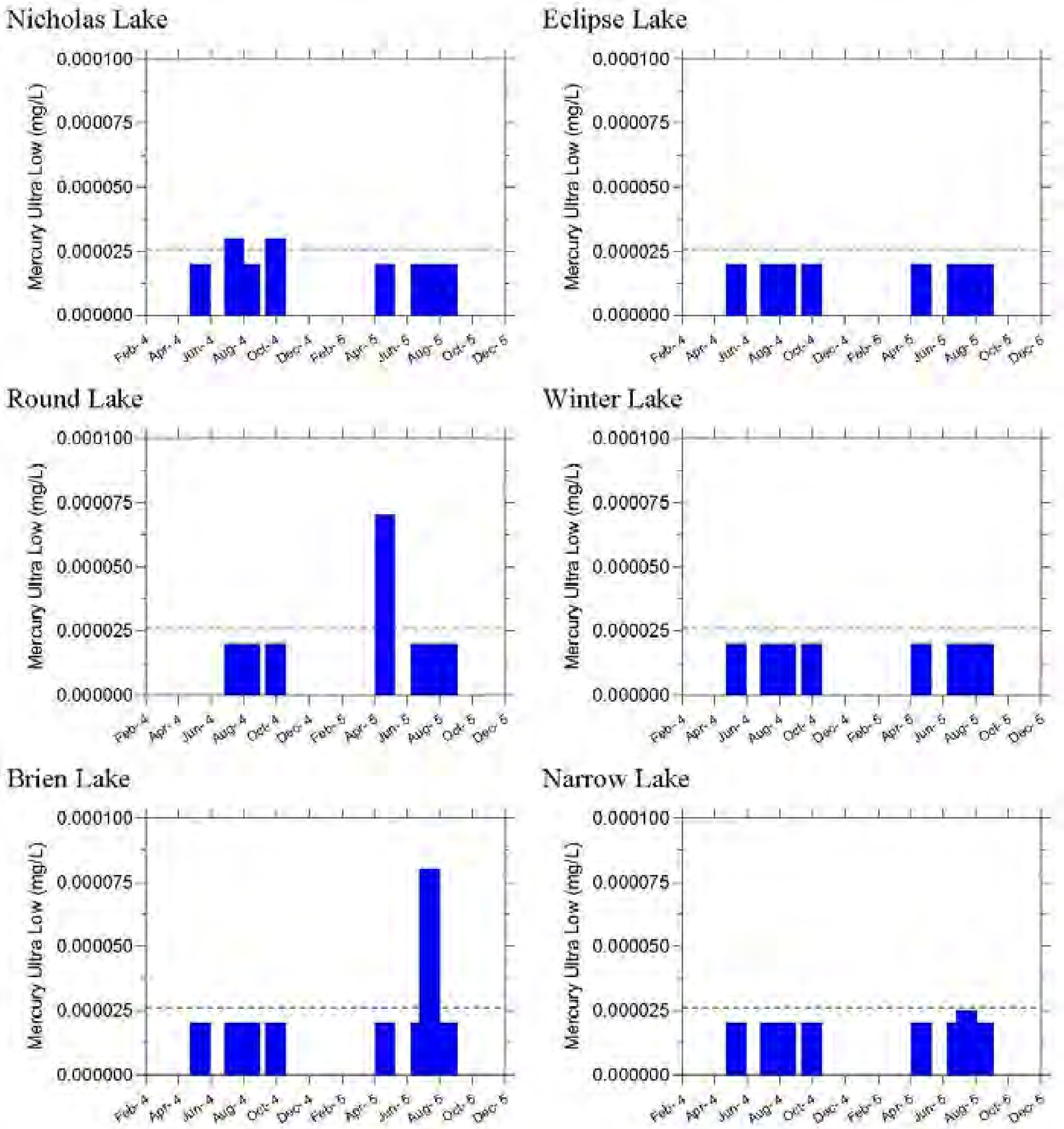

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.00002 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Ultra Low Mercury 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-22

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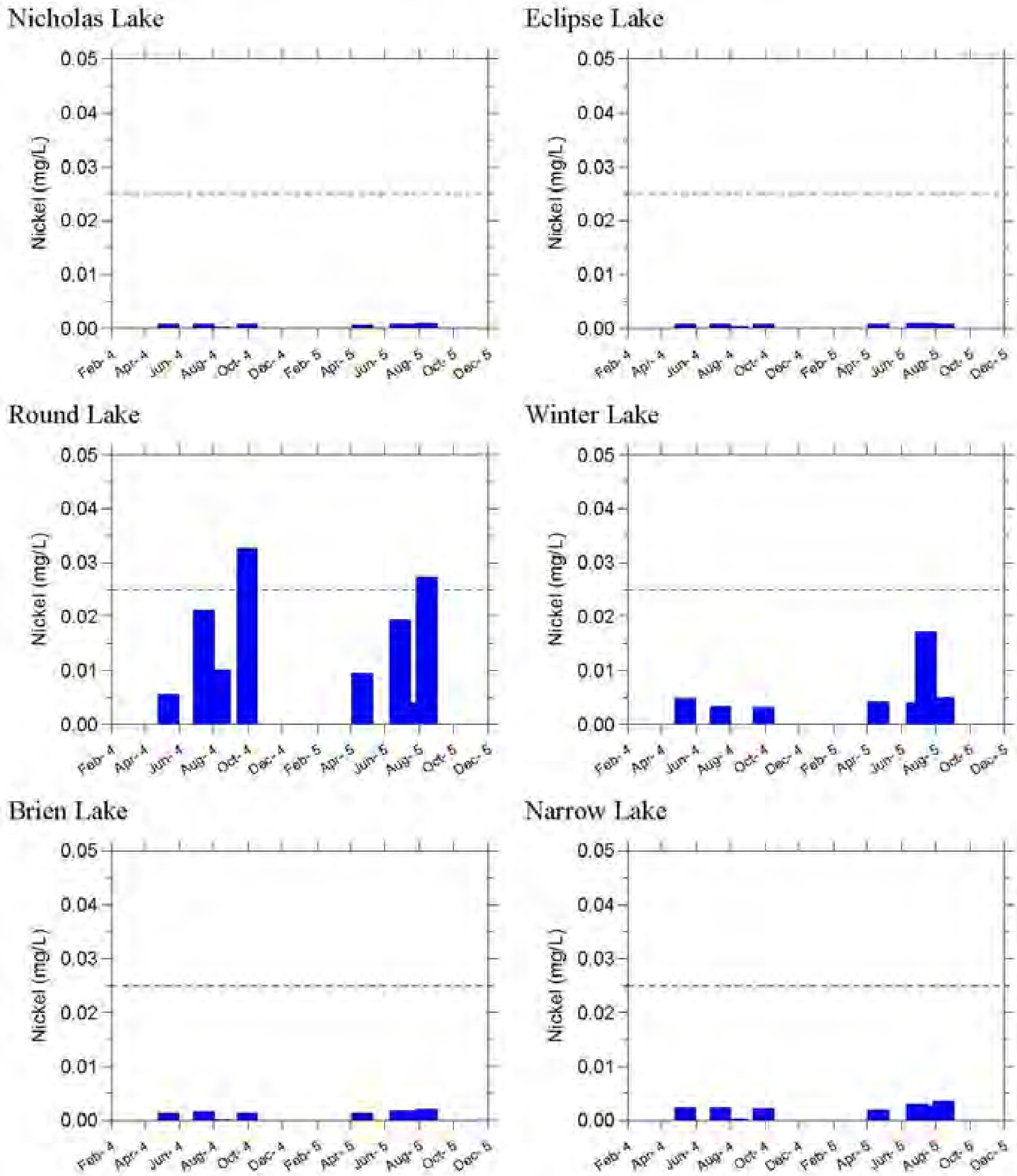

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Ni guidelines are hardness dependent (upper CCME limit of 0.15 mg/L not shown).
3. Results below detection limit report detection limit value (0.00006 mg/L).

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YELLOWKNIFE GOLD PROJECT

Total Nickel 2004-2005

PROJECT NO.	DWN	CKD	REV	
V23201097	SL	TP	0	Figure 2.9-23
OFFICE	DATE			
EBA-VANC	February 9, 2011			

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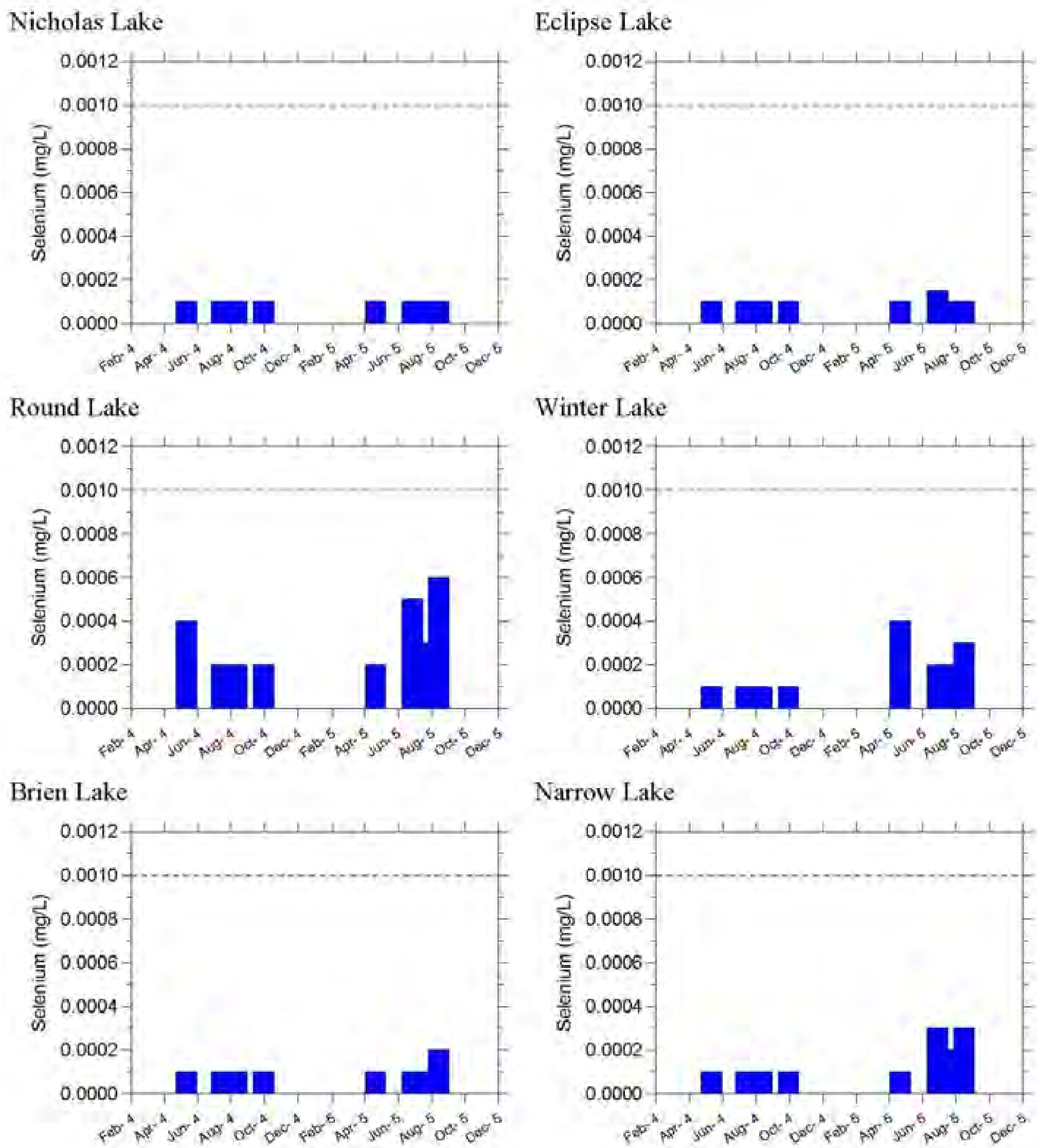

CLIENT

Tyhee NWT Corp

YELLOWKNIFE GOLD PROJECT

Total Selenium
2004-2005

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.0001 mg/L).

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PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-24

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Zinc

Zinc concentrations were all below the CCME guideline of 0.03 mg/L (Figure 2.9-25). Concentrations were slightly elevated in Round Lake, however, this may be linked to drainage from the remediated tailings deposited by the historic Discovery mine.

2.9.6.4 Physical Parameters – SNP Monitoring

Surveillance Network Program (SNP) monitoring has been conducted on a regular basis in accordance with Tyhee NWT Corp's water license. The data resulting from the SNP provide additional background information, which will be vital for assessment of post-construction monitoring information. The following are the main results of this on-going program, which is described in Section 2.9 of this DAR.

pH

The pH of lakes measured as part of the SNP monitoring has been within the CCME guidelines for the protection of aquatic life (Figure 2.9-26).

Hardness (as $CaCO_3$)

Water hardness determined from the SNP monitoring has ranged from very soft (<30 mg/L $CaCO_3$ for Lake A) to very hard (>180 mg/L $CaCO_3$ for Round Lake) (Figure 2.9-27). Water in Round Lake was very hard with large fluctuations. Winter Lake, which is a receiving site for Round Lake, has had variable water hardness levels, likely due in part to the high hardness levels in Round Lake. Water hardness levels in Round and Winter lakes may also have been influenced by drainage from the remediated tailings deposited by the historic Discovery mine.

2.9.6.5 Nutrients – SNP Monitoring

Ammonia

With the exception of reference Lake A, ammonia concentrations in SNP lakes have been somewhat higher than the levels measured in lakes throughout the region (Figure 2.9-28; Figure 2.9-4). Higher levels of ammonia, particularly in Round and Winter Lakes, could be due in part to their shallow depths and organic substrates.

2.9.6.6 Total Metals – SNP Monitoring

The following provides a summary of total metals concentrations determined from the SNP sampling program in Giauque, Round, Winter, and A lakes. The comparison of these results with analyses derived from the 2004-2005 YGP water quality sampling program reveals differences in certain parameters (e.g. lead, mercury), which may have resulted from variability in sampling locations and timing.

Aluminum

Aluminum concentrations have been largely below the upper CCME guideline (for pH ≥6.5) in all lakes during the monitoring period (Figure 2.9-29). Aluminum levels have periodically exceeded the upper CCME guideline level in Giauque, Round, and Winter lakes, which in part could be linked to drainage from the remediated tailings deposited by the historic discovery mine. In particular, the high level recorded in Round Lake in mid-2008 could be in response to the earlier (March 2008) construction by INAC of an outflow structure linking a borrow pit to Round Lake in order to prevent turbid water from flowing into Giauque Lake. The intention was to use Round Lake as a polishing pond for water collecting in the borrow pit instead of discharging the water directly into Giauque Lake (INAC 2004).

Arsenic

Arsenic concentrations in all SNP lakes, with the exception of Round Lake and a single sampling event in April 2005 in Winter Lake, have been below the CCME guideline of 0.005 mg/L for the protection of aquatic life (Figure 2.9-30). High arsenic levels in Round Lake are likely due to the presence of historic tailings and the remediation efforts implemented to stabilize them.

Cadmium

Cadmium concentrations have been elevated in all SNP lakes (Figure 2.9-31), however, with a few exceptions, all were within the ranges observed in lakes throughout the region (Puznicki 1996). Exceptions included spikes in cadmium observed in Giauque Lake in July 2010, Round Lake in February 2003, and Winter Lake in March and May, 2010.

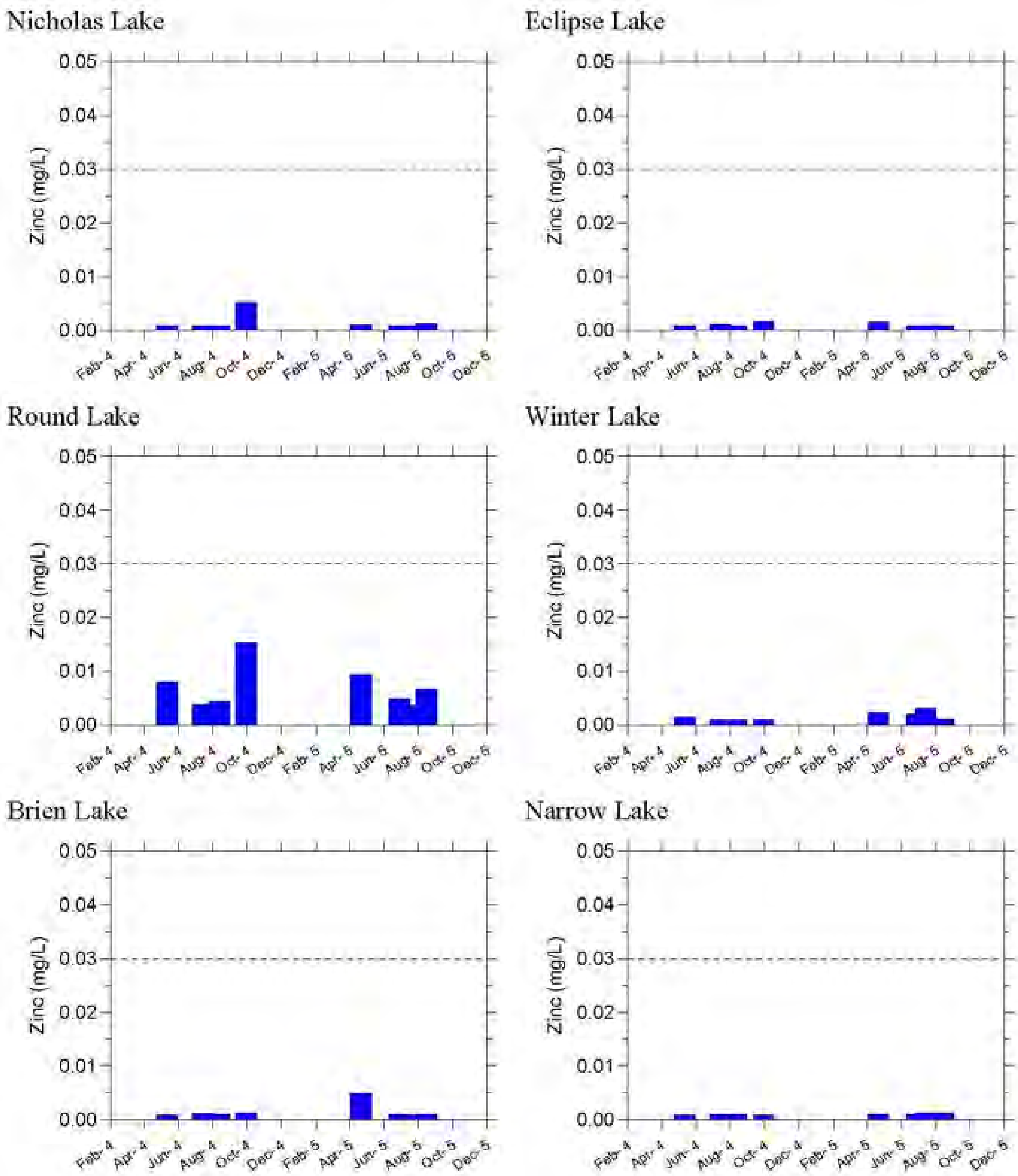
Copper

With the exception of reference Lake A, which never exceeded the CCME guidelines for copper, all other SNP lakes reported copper concentrations in excess of the lower CCME guideline at some point during the sampling period (Figure 2.9-32). A noticeable spike in copper was observed in January 2008 in Giauque Lake.

Cyanide

Total cyanide levels measured as part of the SNP sampling program have been largely below the CCME guideline of 0.005 mg/L (Figure 2.9-33). However, periodic exceedances were observed in three of the SNP lakes, Giauque, Round, and A lakes, but not in Winter Lake. The sources of cyanide in all but A Lake can be attributed to the presence of historic tailings from the Discovery Mine and the remediation efforts implemented to stabilize them. However, periodic elevated levels of cyanide in A Lake are more difficult to explain since there is no information that this lake, identified as a reference lake for the SNP studies, has been historically affected by any mining development.

As indicated in Section 2.9.6.3, water quality sampling identified a cyanide spike in the spring of 2004 in Round Lake, but no other exceedances of the CCME guideline for cyanide in any of the other lakes sampled. The temporal and spatial variability in background cyanide concentrations will be important factors in the assessment of post-construction levels of this contaminant. Cyanide is a main constituent in the leach process, but will be detoxified as described in Section 4.11.7. However, residual cyanide is expected to be discharged to the TCA and will be carefully monitored due to its potential toxicity.



NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.0008 mg/L).

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CLIENT

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

YELLOWKNIFE GOLD PROJECT

Total Zinc 2004-2005

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-25

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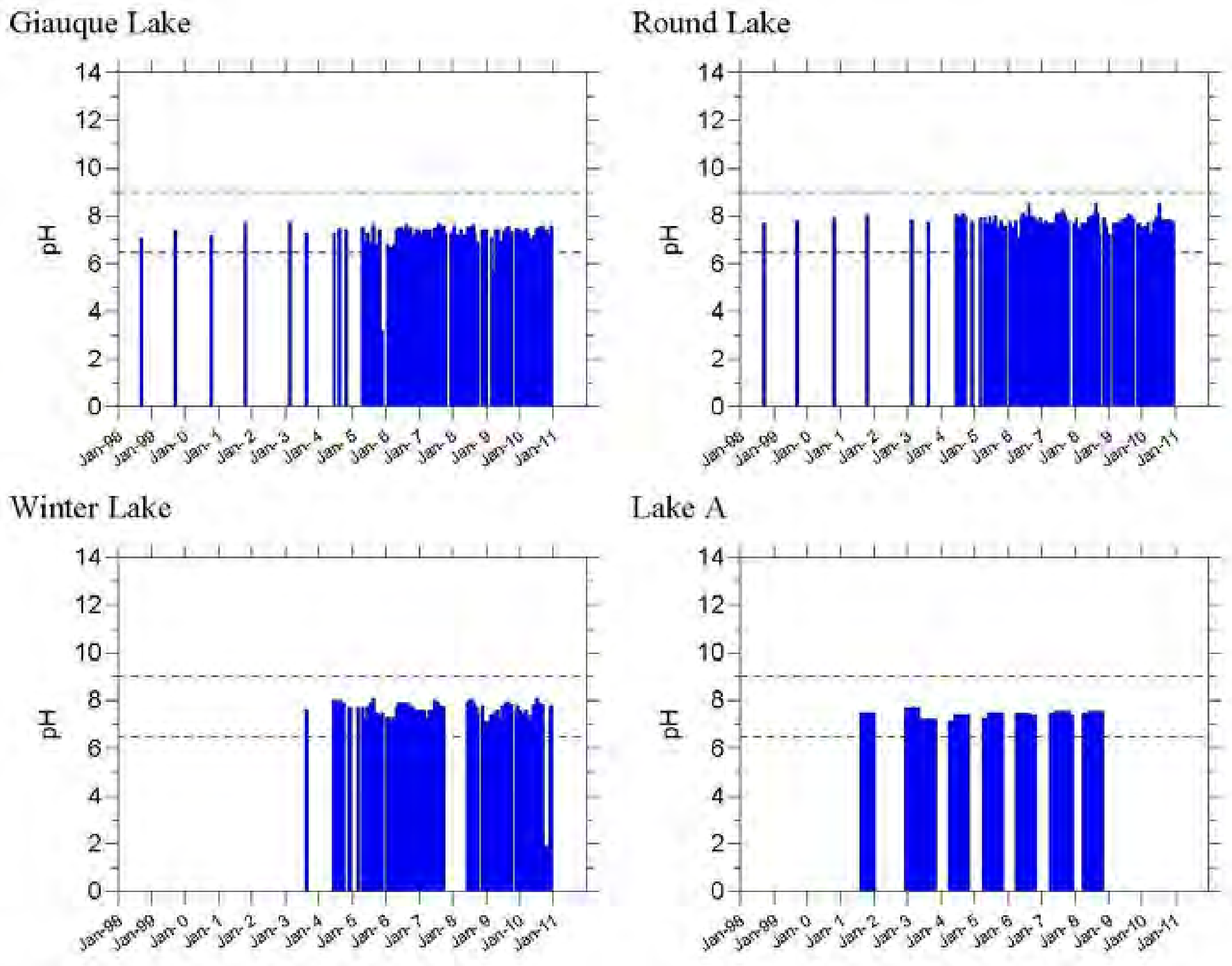

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NOTES

1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.

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eba

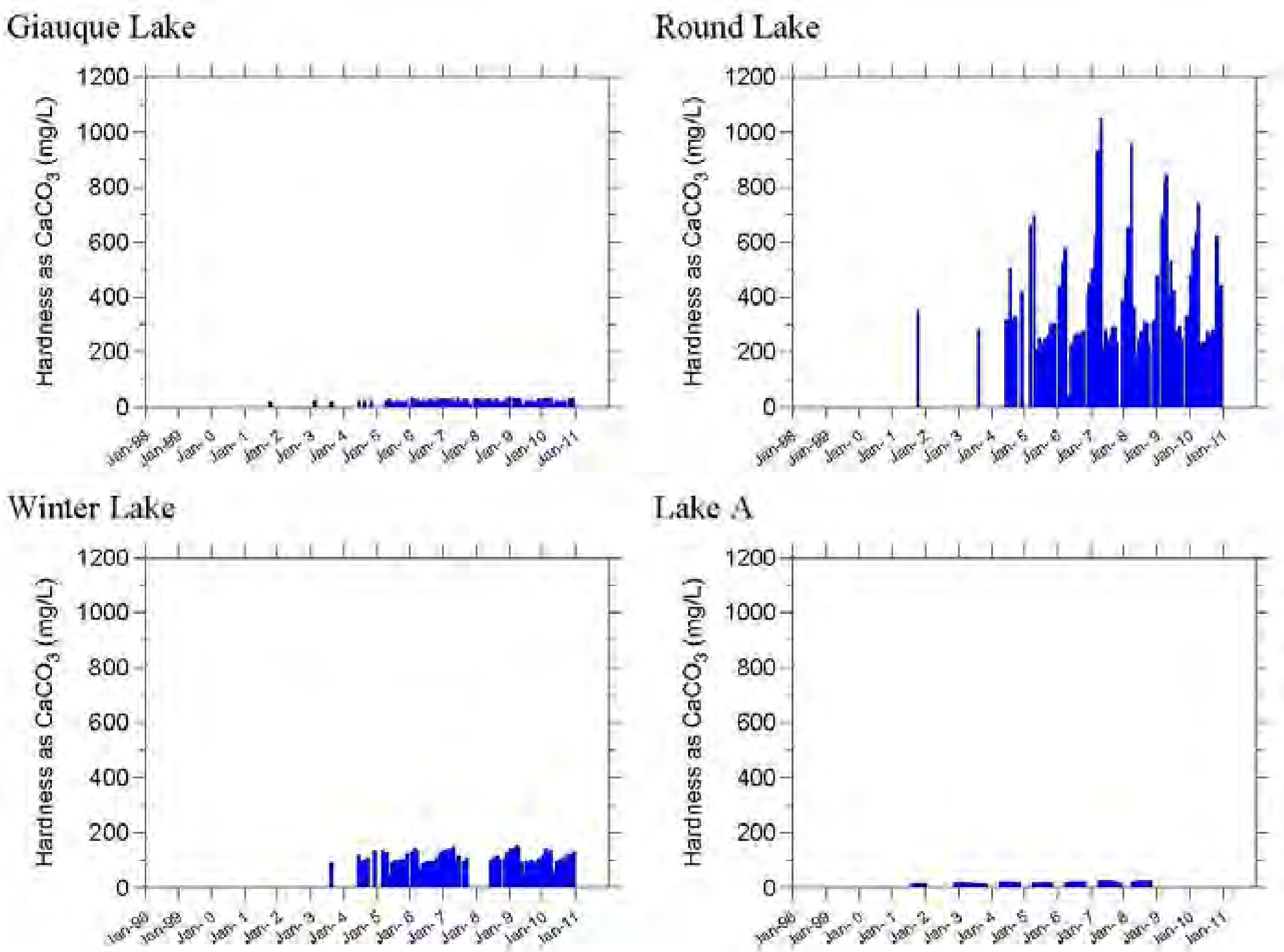
YELLOWKNIFE GOLD PROJECT

pH
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-26



CLIENT

Tyhee NWT Corp

NOTES
1.

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YELLOWKNIFE GOLD PROJECT

Hardness (as $CaCO_3$)
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-27

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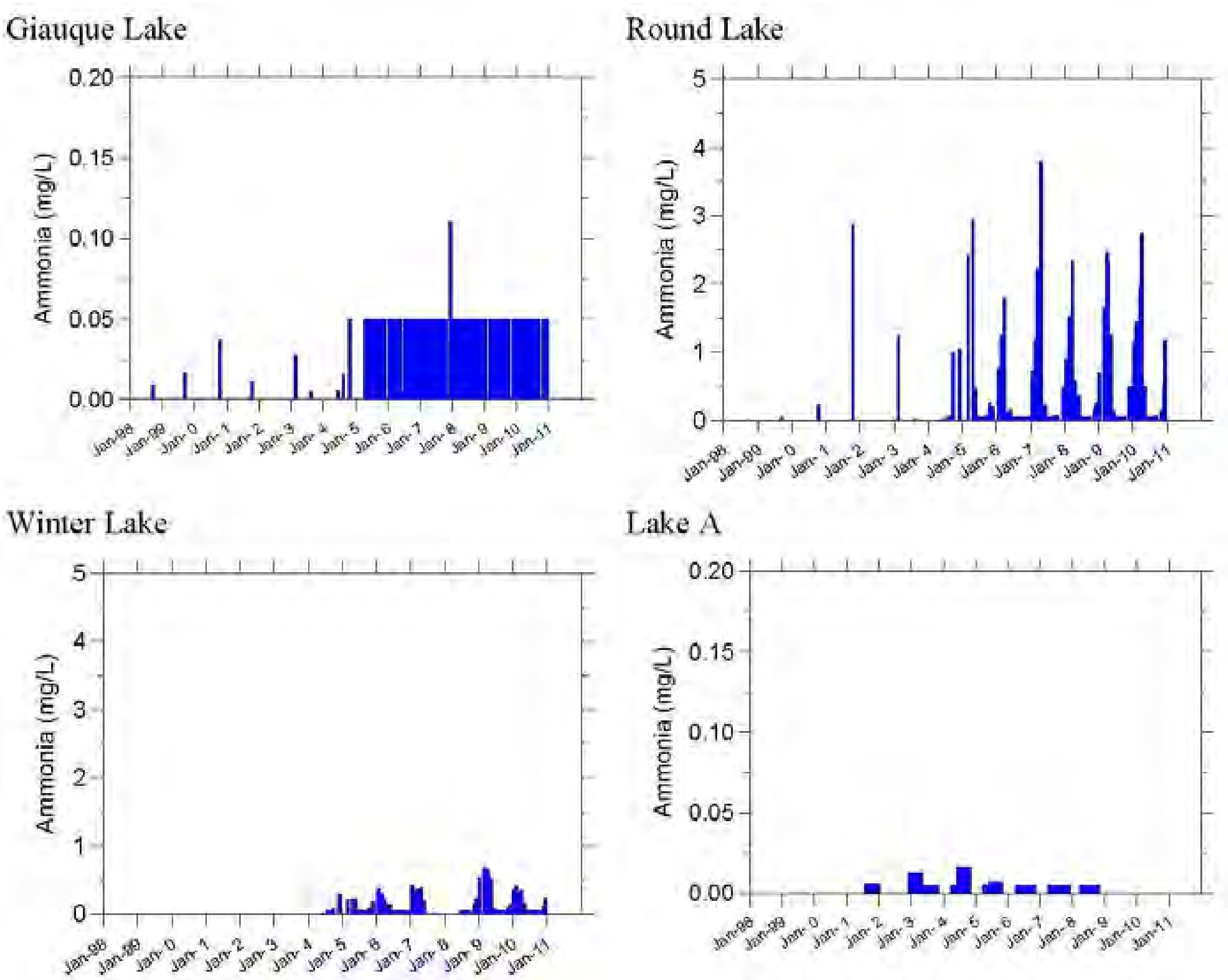

CLIENT

Tyhee NWT Corp

YELLOWKNIFE GOLD PROJECT

Ammonia
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-28

EBA Engineering Consultants Ltd.

NOTES
1. Different y-axis limits for Round Lake and Winter Lake.

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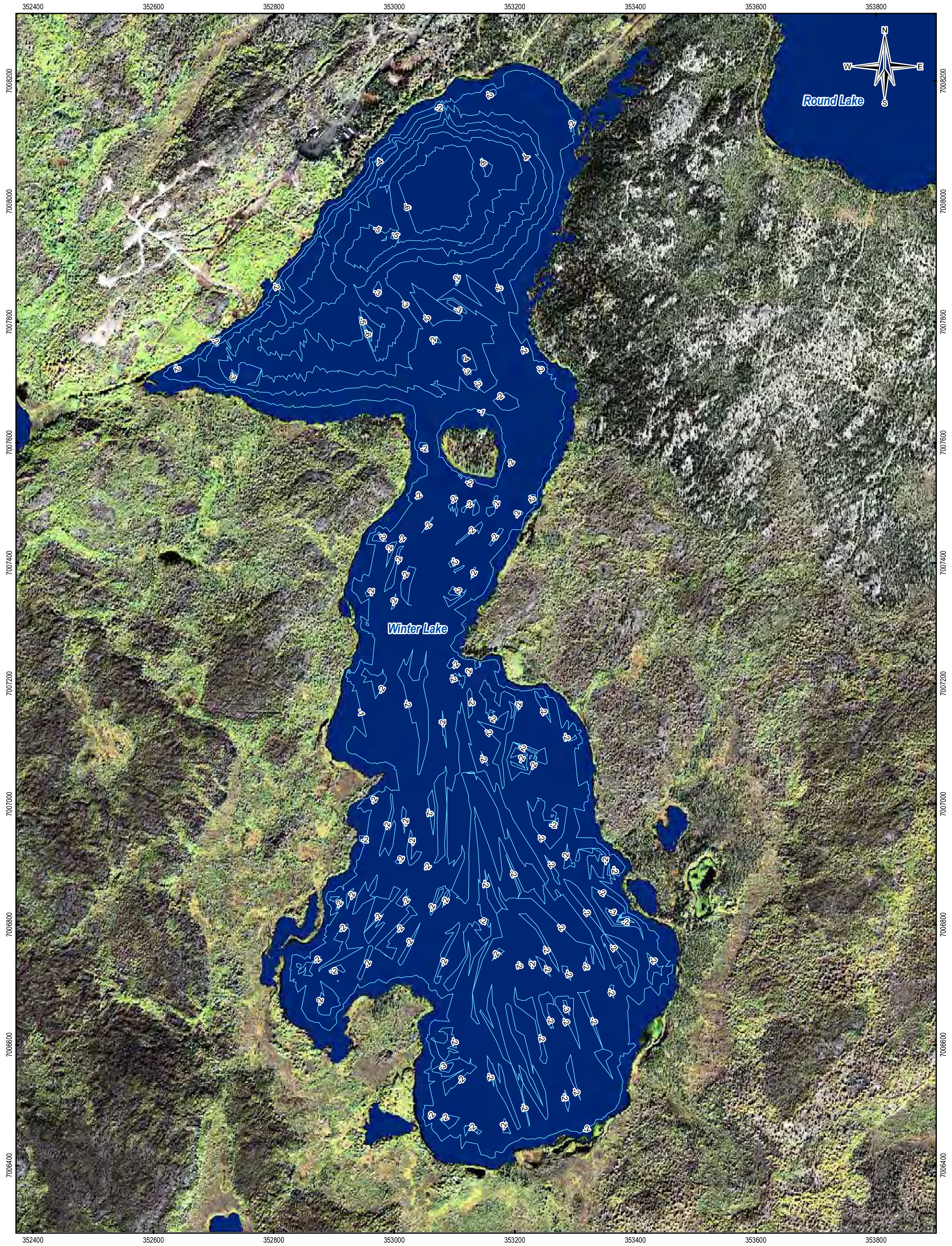

LEGEND

Bathymetry (1m interval)

NOTES
1. Bathymetry Features: data was collected using a Trimble Pathfinder Pro XRS TS-C1 GPS data logger and Trimble Pro XRS receiver and a MarineTek SEAMAX depth sounder. The data were formatted using ARC/INFO to produce maps.
2. Imagery Source: IKONOS (July 27 and August 2, 2004); Landsat TM (August 11, 2001).
3. Water Features: Extracted from IKONOS imagery.

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YELLOWKNIFE GOLD PROJECT

Winter Lake Bathymetry

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:6,000

50 25 0 50 100 150

Metres

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

FILE NO.
V23201097-DAR-016.mxd

PROJECT NO.	DWN	CKD	REV
V23201097	SL	DM	0

OFFICE	DATE
EBA-VANC	March 29, 2011

Figure 2.11-4

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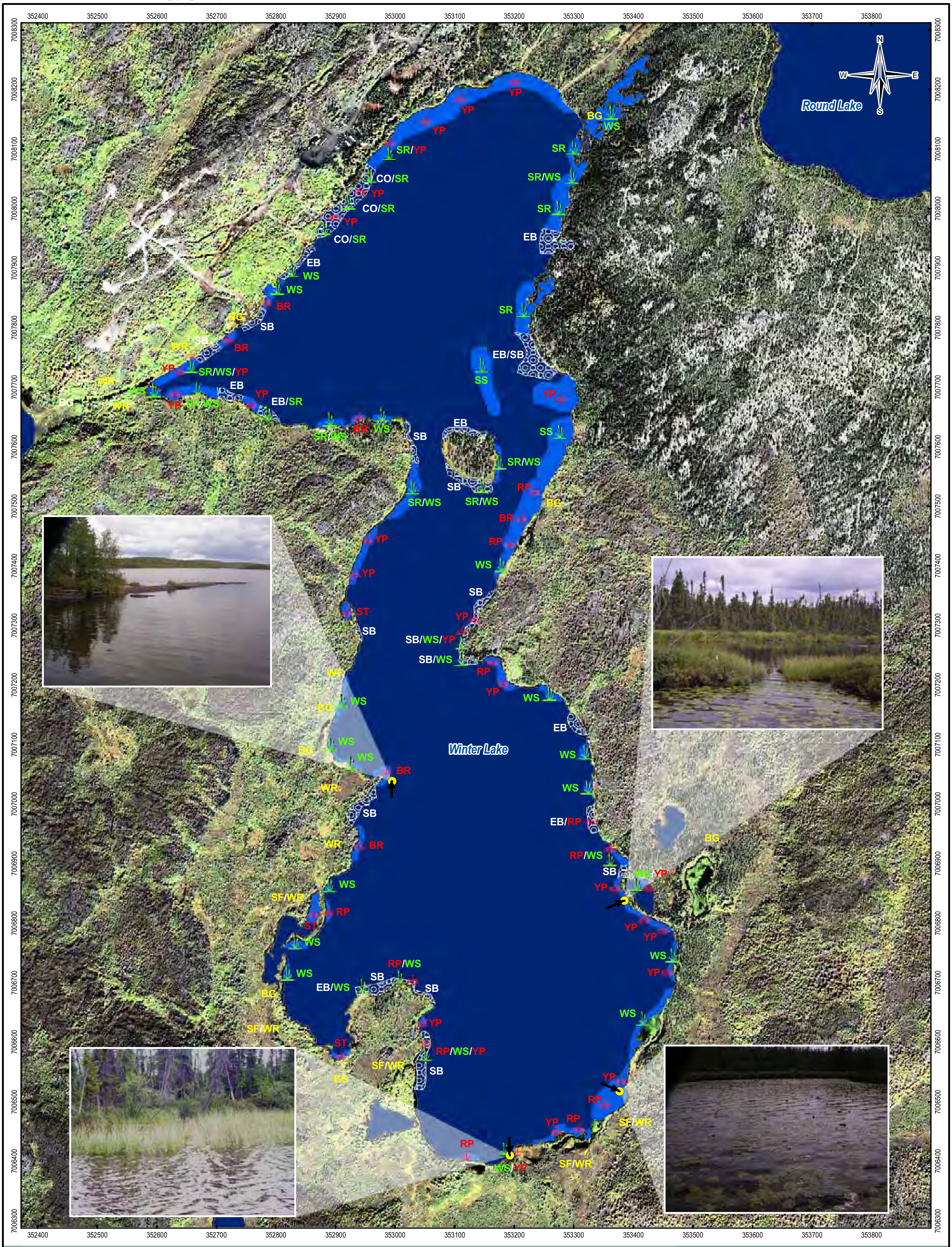

LEGEND

- Photo
- Rock Feature
- Emergent Vegetation
- Submergent Vegetation
- Picture Angle

Emergent Vegetation		Habitat Type	
BG	Bog Wetland	BG	Bog Wetland
SF	Sedge Fen	SF	Sedge Fen
SR	Scouring Rush	WR	Willow (Salix) Riparian
SS	Soft Stemmed		
WS	Water Sedge		
Submergent Vegetation		**Feature**	
BR	Burreed	CO	Cobbles
RP	Richardson's Pondweed	EB	Emergent Boulders
ST	Submerged Trees	SB	Shallow Boulders
YP	Yellow Water Lily		

NOTES

1. Imagery Source: IKONOS (July 27 and August 2, 2004); Landsat TM (August 11, 2001).
2. Water Features: Extracted from IKONOS imagery.
3. Habitat Features: from Spring/Summer 2005.

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YELLOWKNIFE GOLD PROJECT

Winter Lake Habitat Features

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:6,014

50 25 0 50 100 150

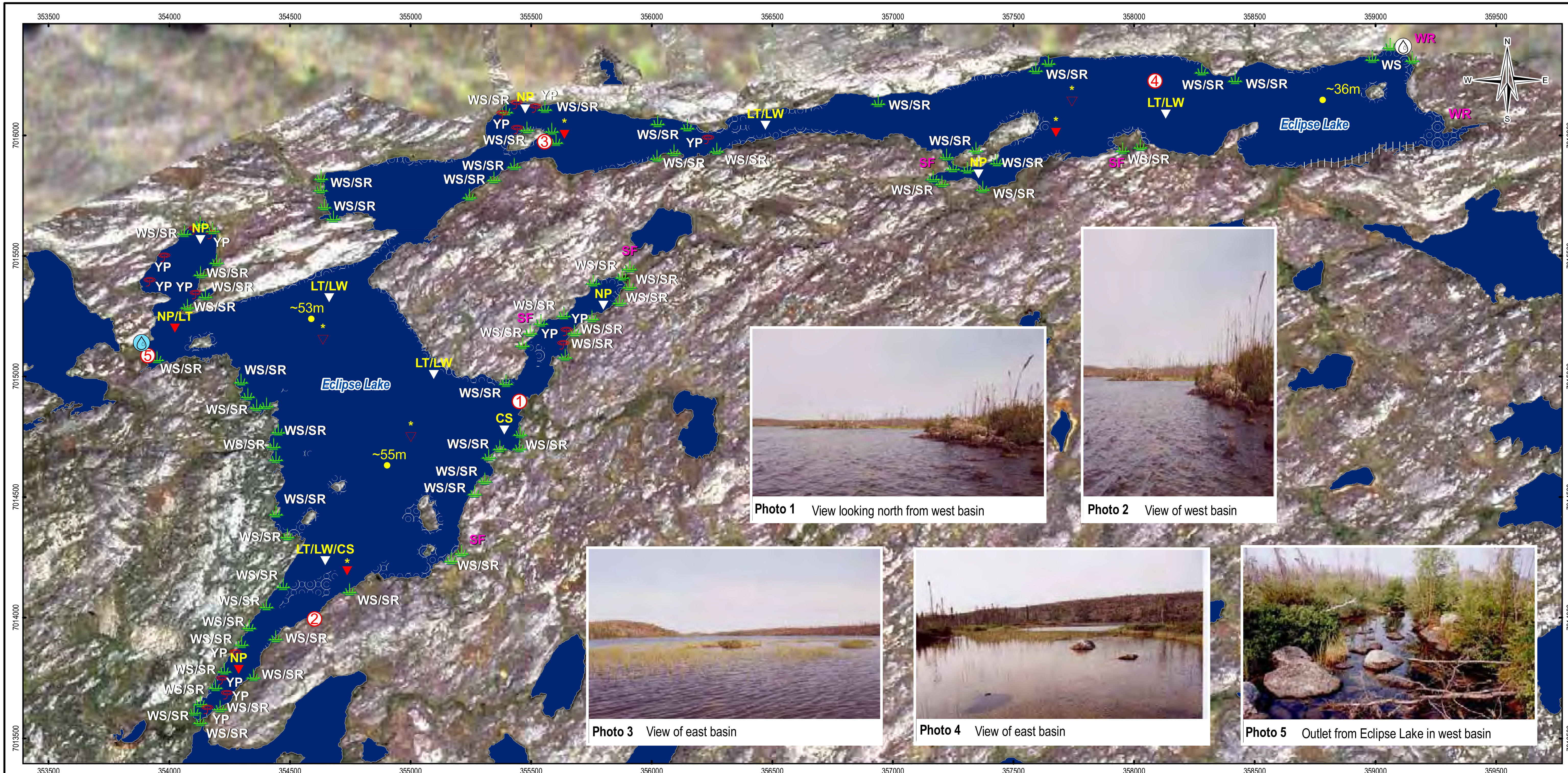
Metres

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

FILE NO.			
V23201097-DAR-017.mxd			
PROJECT NO.	**DWN**	**CKD**	**REV**
V23201097	SL	DM	0
OFFICE	**DATE**		
EBA-VANC	February 15, 2011		

Figure 2.11-5



LEGEND

- Depth Measurement
- Photo Number and Orientation

Habitat Type/Vegetation Community

BG	Bog Wetland
CS	Cotton Grass/Sphagnum
SF	Sedge Fen
WR	Willow (*Salix*) Riparian

Habitat Feature

- Cliff
- Shallow Boulders
- Beaver Dam
- Principal Inlet
- Principal Outlet

Fish Species/Use

CS	Cisco
LT	Lake Trout
LW	Lake Whitefish
NP	Northern Pike
*	Most Fish Species
	Fish Rearing / Foraging
	Fish Spawning
	Fish Winter Holding

Emergent Vegetation

SR	Scouring rush
WS	Water sedge

Submergent Vegetation

YP	Yellow water lily

NOTES
Base data source: IKONOS (July 27 and August 2, 2004); Landsat TM (August 11, 2001).

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YELLOWKNIFE GOLD PROJECT

Eclipse Lake Habitat Features

PROJECTION	DATUM
UTM Zone 12	NAD83

Scale: 1:16,000
100 50 0 100 200 300 400 500
Metres

Tyhee NWT Corp
EBA Engineering Consultants Ltd.

FILE NO.
V23201097-DAR-018.mxd

PROJECT NO.	DWN	CKD	REV
V23201097	SL	DM	0

OFFICE	DATE
EBA-VANC	February 15, 2011

Figure 2.11-6

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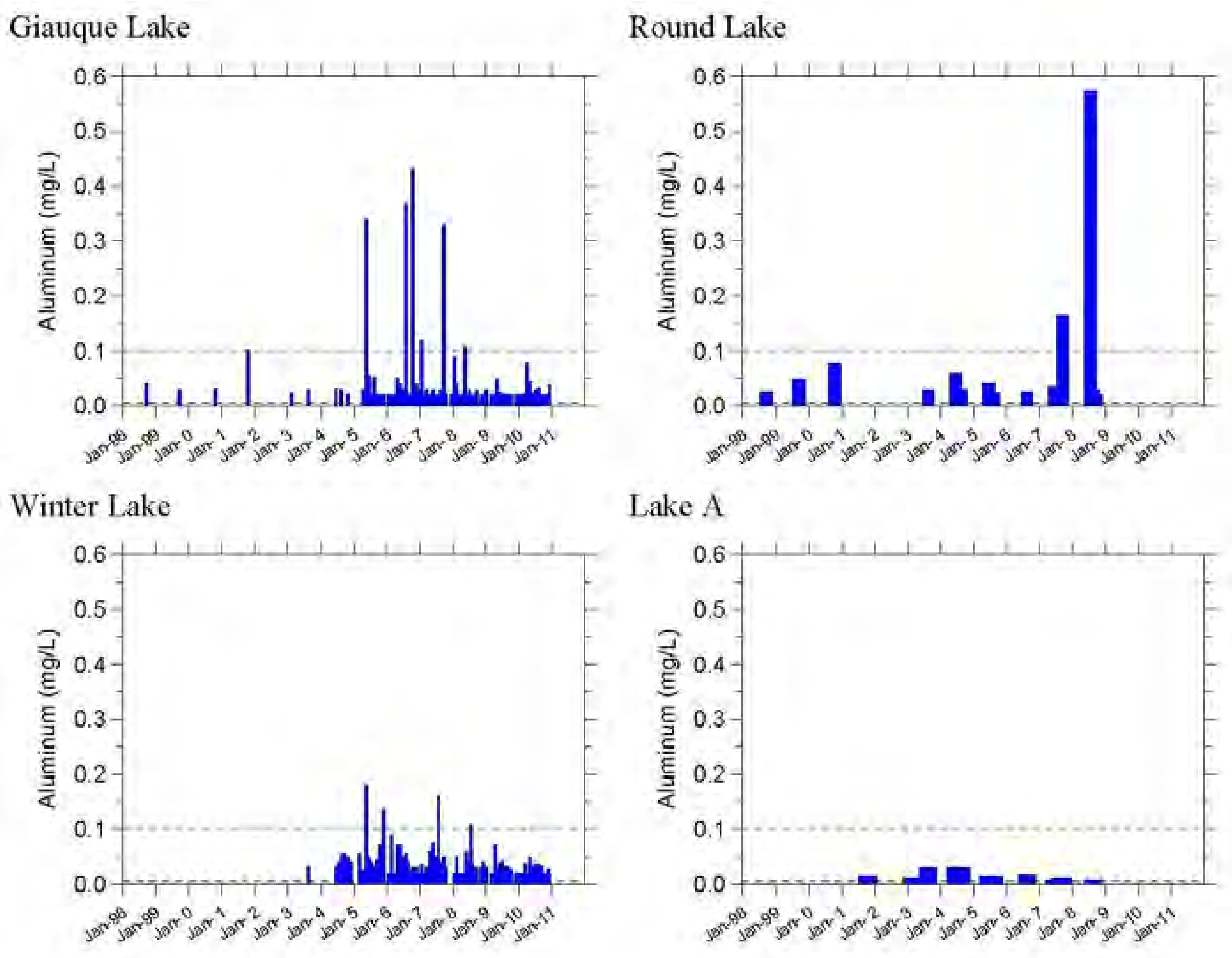

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Al guidelines are pH dependent.
3. Results below detection limit report detection limit value (0.03 mg/L).

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CLIENT

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

eba

YELLOWKNIFE GOLD PROJECT

Total Aluminum
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-29

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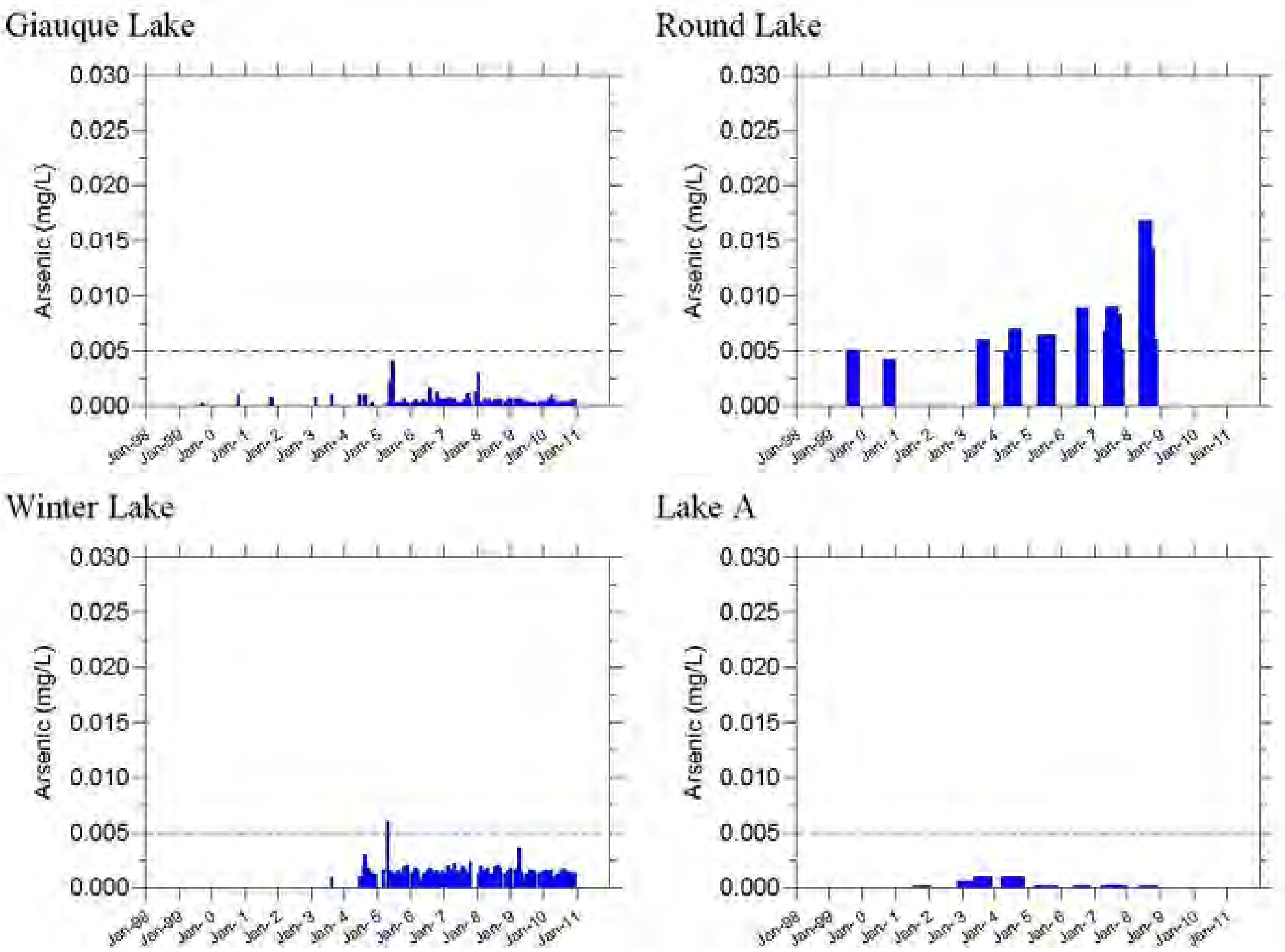

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NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.0002 mg/L).

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CLIENT

Tyhee NWT Corp

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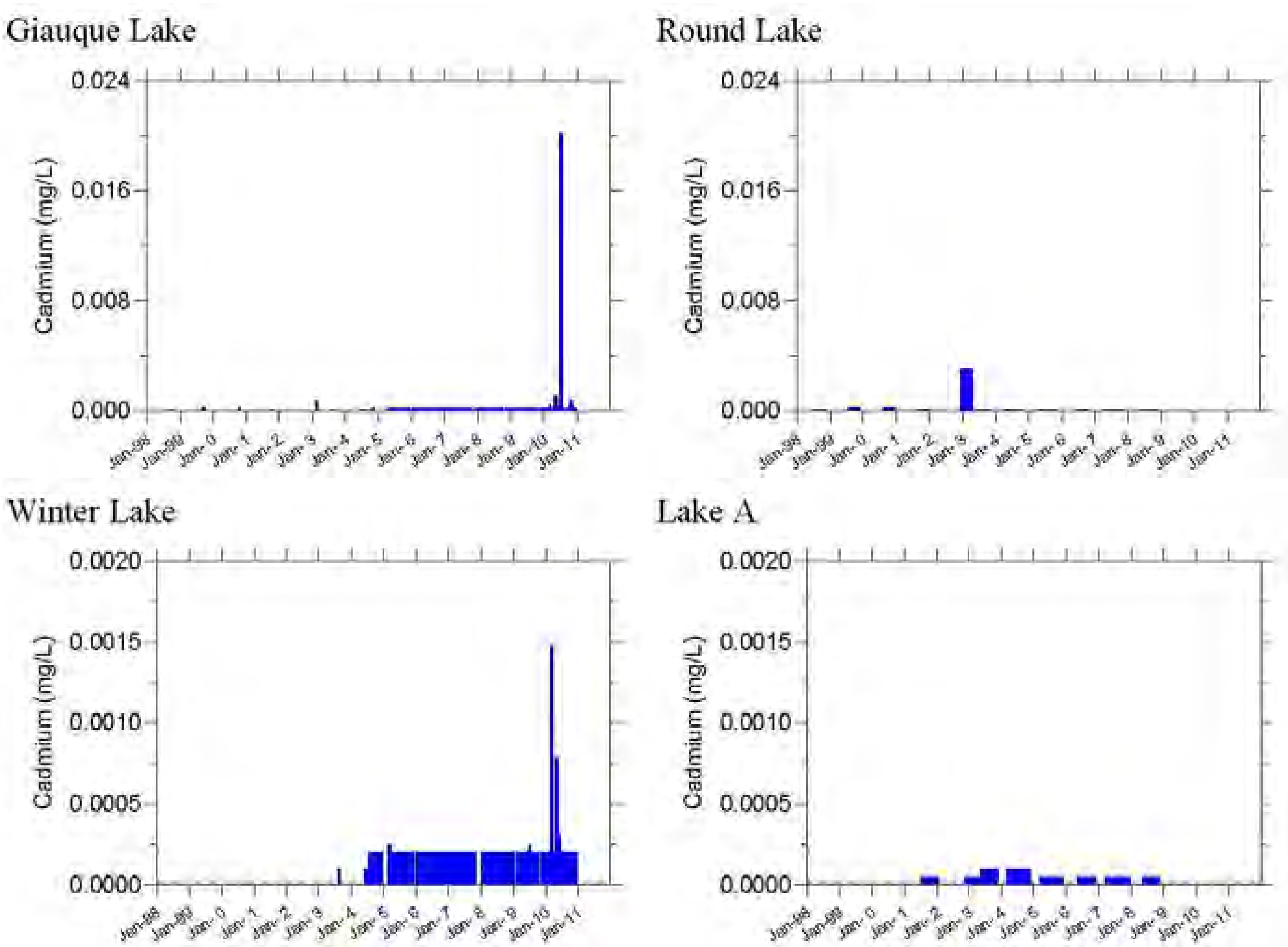
YELLOWKNIFE GOLD PROJECT

Total Arsenic
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-30



NOTES
1. Different y-axis limits for Giauque Lake and Round Lake.
2. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
3. Results below detection limit report detection limit value (0.00005 mg/L).

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Tyhee NWT Corp

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YELLOWKNIFE GOLD PROJECT

Total Cadmium
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-31

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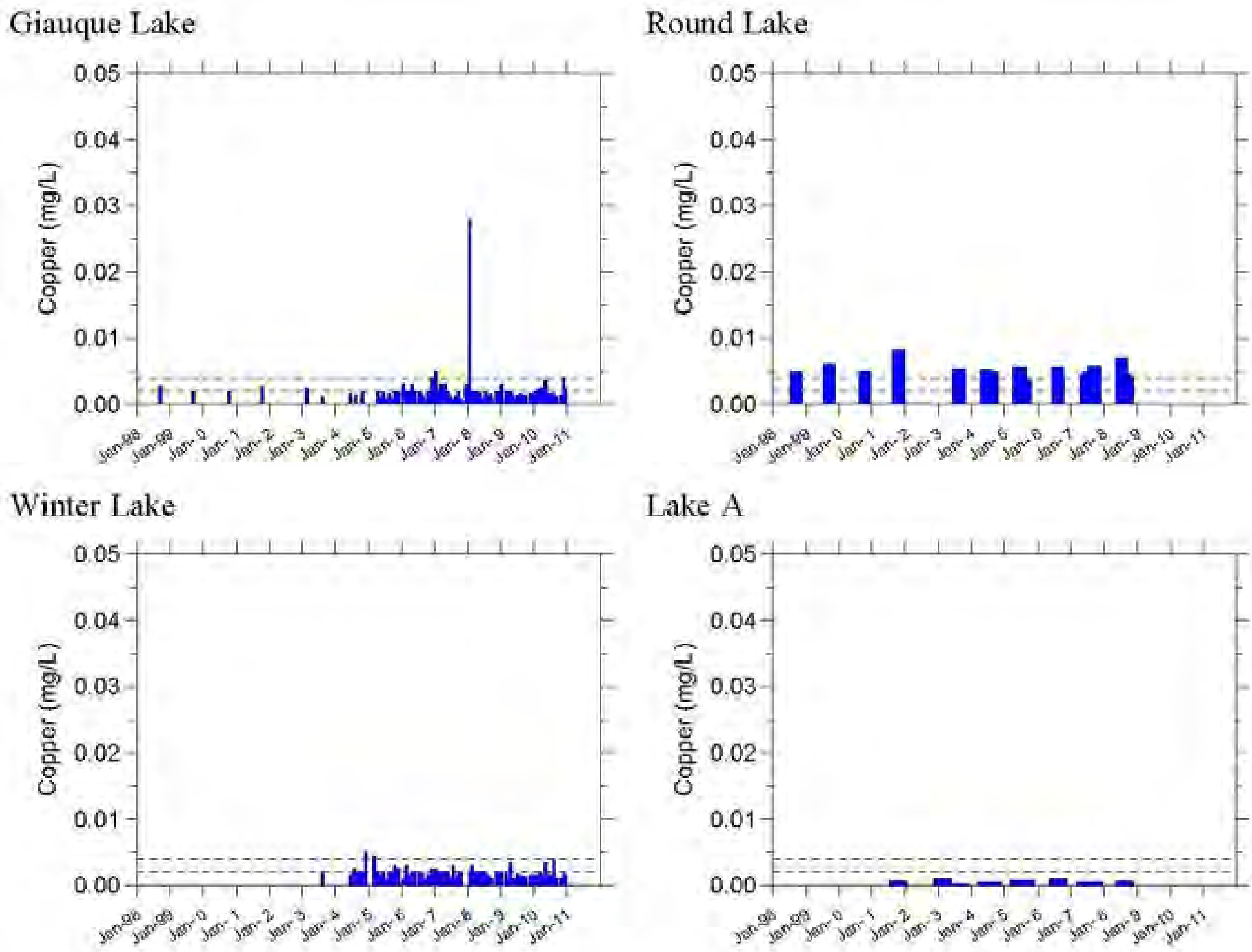

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Cu guidelines are hardness dependent.
3. Results below detection limit report detection limit value (0.0003 mg/L).

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Tyhee NWT Corp

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YELLOWKNIFE GOLD PROJECT

Total Copper
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0

OFFICE	DATE
EBA-VANC	February 9, 2011

Figure 2.9-32

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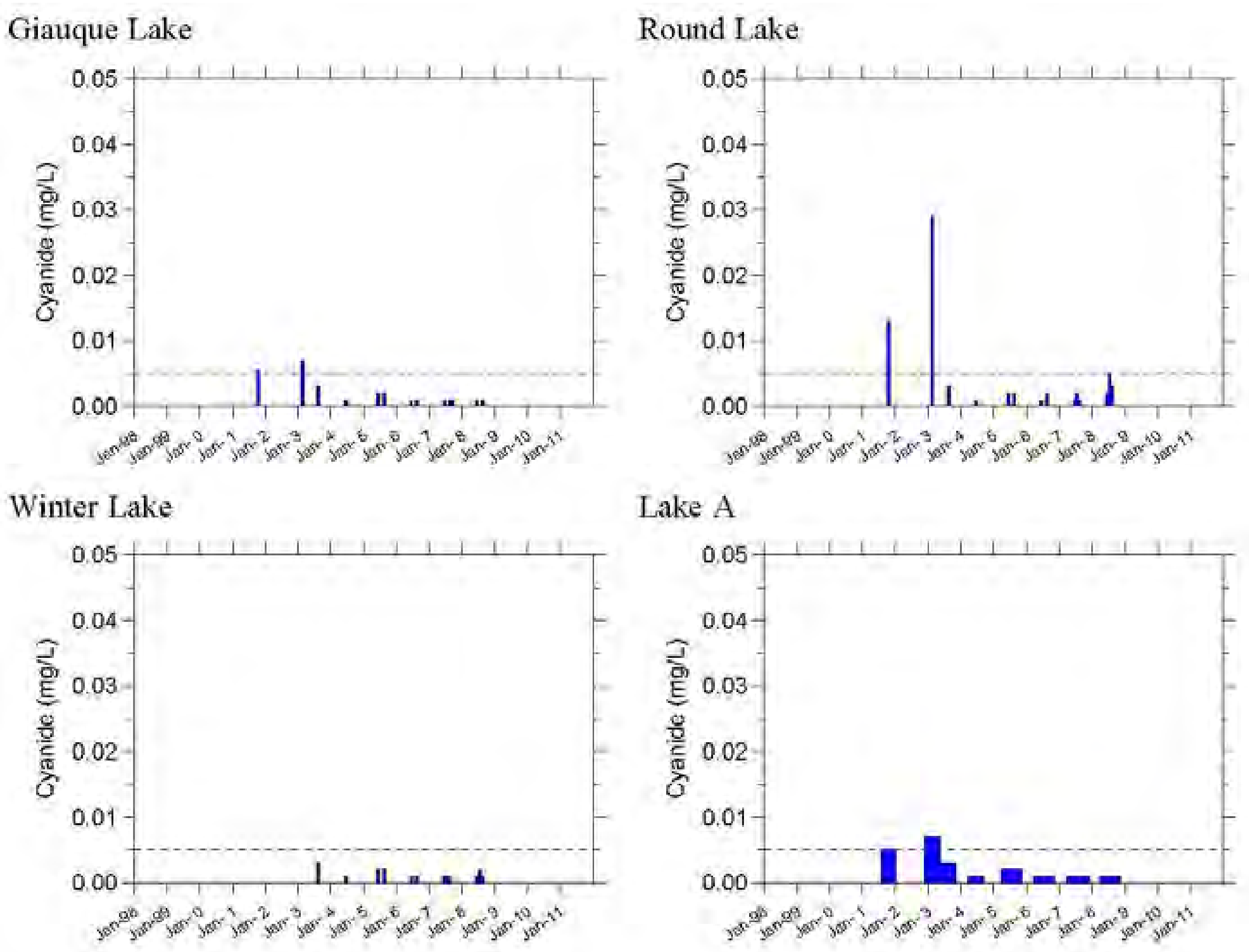

NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.002 mg/L).

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CLIENT

Tyhee NWT Corp

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YELLOWKNIFE GOLD PROJECT

Total Cyanide
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-33

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Iron

Iron concentrations have been below the CCME guideline of 0.3 mg/L in Winter Lake, reference Lake A, and Round Lake, with the exception of a single sampling event in July 2008 (Figure 2.9-34). Iron levels were slightly elevated in Giauque Lake in mid and late-2006, late 2007, and early 2008. All of the iron levels recorded in SNP lakes are similar to those observed in lakes throughout the region (Puznicki 1996; Pienitz et al. 1997; Ruhland et al 2003).

Lead

Lead concentrations in Winter Lake and reference Lake A have always been below CCME guidelines, irrespective of water hardness (Figure 2.9-35). Round Lake also did not exceed CCME guidelines due to its very hard water, which reduces the solubility of potentially toxic metal ions such as lead. Giauque Lake had elevated lead levels in 2006, 2007, 2008, and 2010.

Inorganic Mercury

CCME guidelines for inorganic mercury have been exceeded in all SNP sampled lakes at some point during the reporting period, including reference Lake A (Figure 2.9-36). Giauque and Winter lakes displayed consistently high mercury levels.

Inorganic mercury concentrations in YGP lakes were frequently below the ultra-low laboratory detection limit of 0.00002 mg/L, which is comparable to the CCME criteria of 0.000026 mg/L.

Elevated mercury concentrations in lakes not previously disturbed by anthropogenic activities (e.g., Brien and Nicholas lakes) could be attributed to naturally high levels of mercury in mineralized rock or the result of atmospheric deposition (Grigal 2002). It has also been suggested by Moore et al. (1978) that naturally elevated background levels of mercury occur in the environment of the study area. Mercury levels in Round and Narrow lakes may also be linked to drainage from the remediated tailings deposited by the historic Discovery mine.

Nickel

Nickel concentrations in SNP lakes have all been below CCME guidelines, with the exception of Round Lake (Figure 2.9-37). Round Lake displayed much higher concentrations of nickel compared to the other lakes sampled and exceeded CCME guidelines in 1998, 2000, 2007, and 2008. The early exceedances could be associated with drainage from the remediated tailings deposited by the historic discovery mine; the later exceedances could be in response to the pumping of the borrow pit.

Selenium

Selenium concentrations have been below CCME guidelines in all lakes, with the exception of Giauque Lake in 2007 and Winter Lake in 2007 and 2008 (Figure 2.9-38).

Zinc

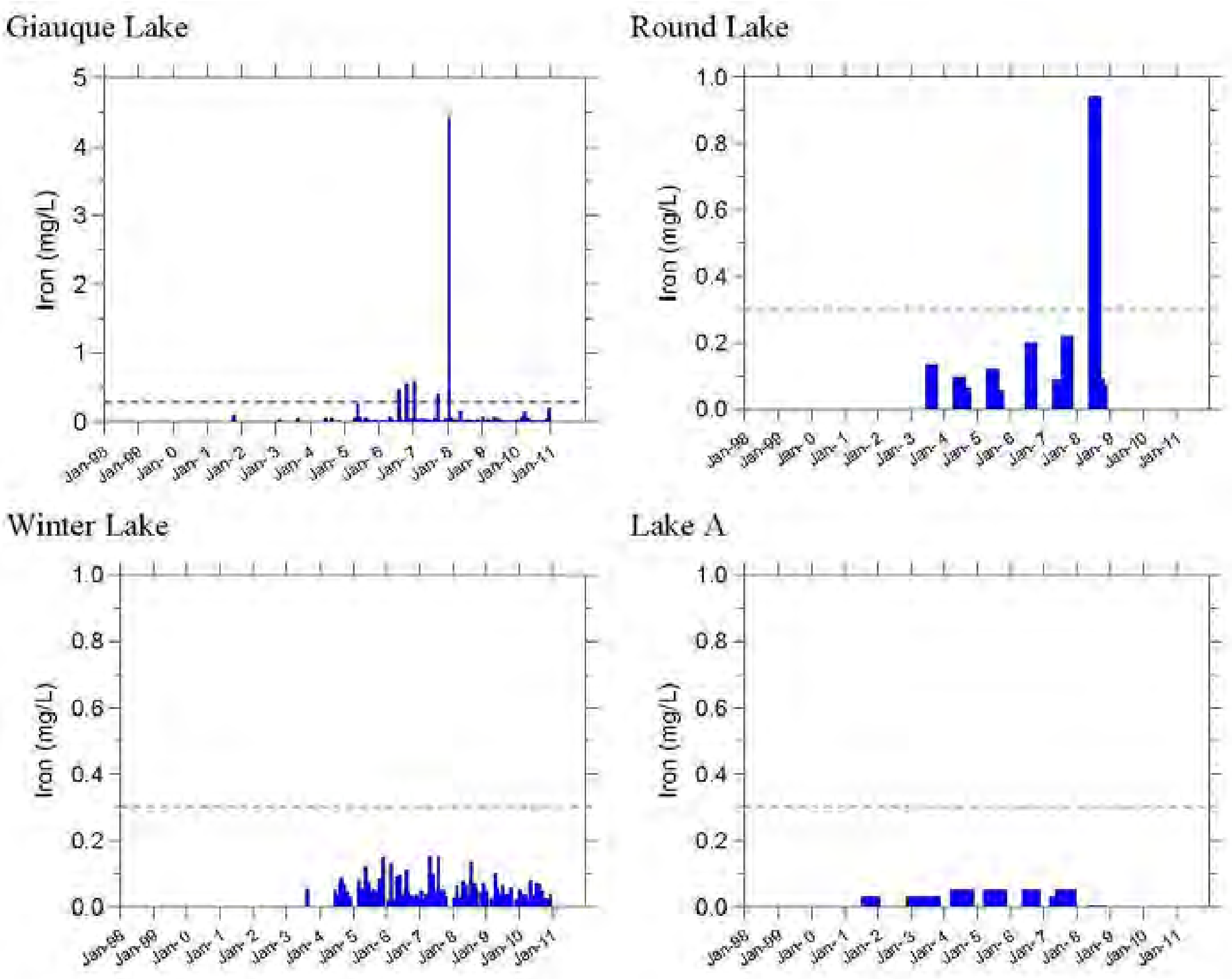
Round Lake and reference Lake A displayed zinc levels that have been largely below CCME guidelines, with the exception of August 2006 and February 2003, respectively (Figure 2.9-39). Zinc concentrations were more variable in Giauque and Winter lakes.

2.9.7 Temperature and Dissolved Oxygen

Seasonal changes and variations in temperature and/or dissolved oxygen (DO) observed at the stations during the 2004-05 baseline sampling programs were within the expected natural ranges for lakes in this region at this time of year. The observed trend of lower DO concentrations with increasing depth during May, July and August, reflected the more anaerobic conditions commonly found at the bottom of most lakes in the region. Water column temperature readings were typical and characteristic for these lakes for all seasons sampled. Full analysis of the dissolved oxygen profiles for each lake can be found in Appendix C.

2.9.7.1 Narrow Lake

Station A on Narrow Lake is located approximately 2.3 km southwest of Tyhee NWT Corp's camp, in the main channel of the lake. DO concentration and temperature measurements recorded at Station A are shown in Figure 2.9-40. The Narrow Lake results exhibited typical DO and temperature profiles. DO depression at the bottom was noted in May, July and August, 2004 and April, July and August 2005. A thermocline developed at the 3 m depth in July and migrated down to the 5 m depth by August. In 2005, the top of the thermocline developed at the 3 m depth in June and migrated down to the 7 m depth by August. Similarly, during the 2004 sampling program, a thermocline developed at the 3 m depth in July and migrated down to the 5 m depth by August. It should be noted that on all sampling dates the water column had sufficient oxygen to support a healthy fish population (>6.5 mg/l).



NOTES
1. Different y-axis limit for Giauque Lake.
2. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
3. Results below detection limit report detection limit value (0.05 mg/L).

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CLIENT

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

YELLOWKNIFE GOLD PROJECT

Total Iron
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV	
V23201097	SL	TP	0	Figure 2.9-34
OFFICE	DATE			
EBA-VANC	February 9, 2011			

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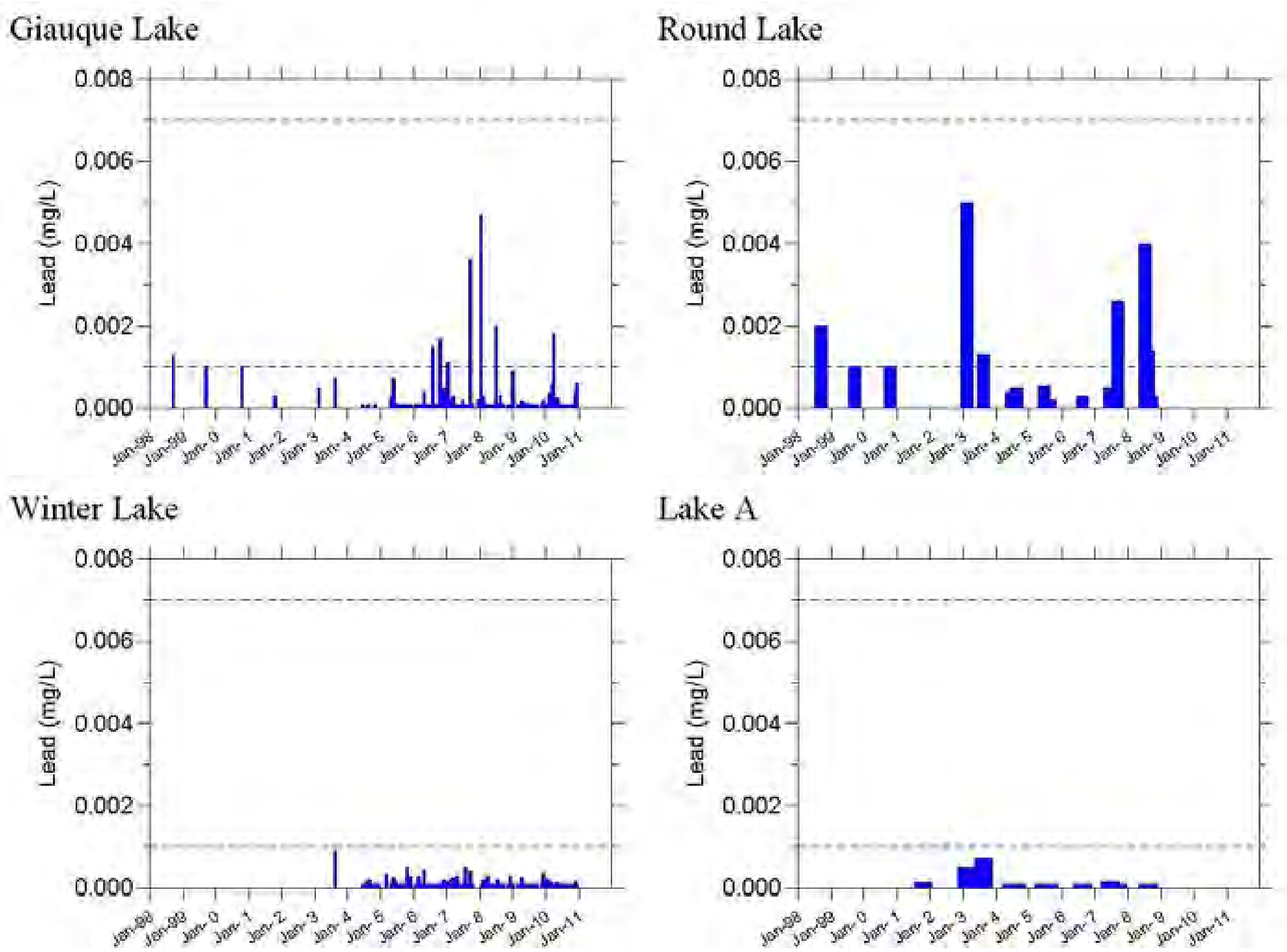

NOTES

1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Pb guidelines are hardness dependent.
3. Results below detection limit report detection limit value (0.0001 mg/L).

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Tyhee NWT Corp

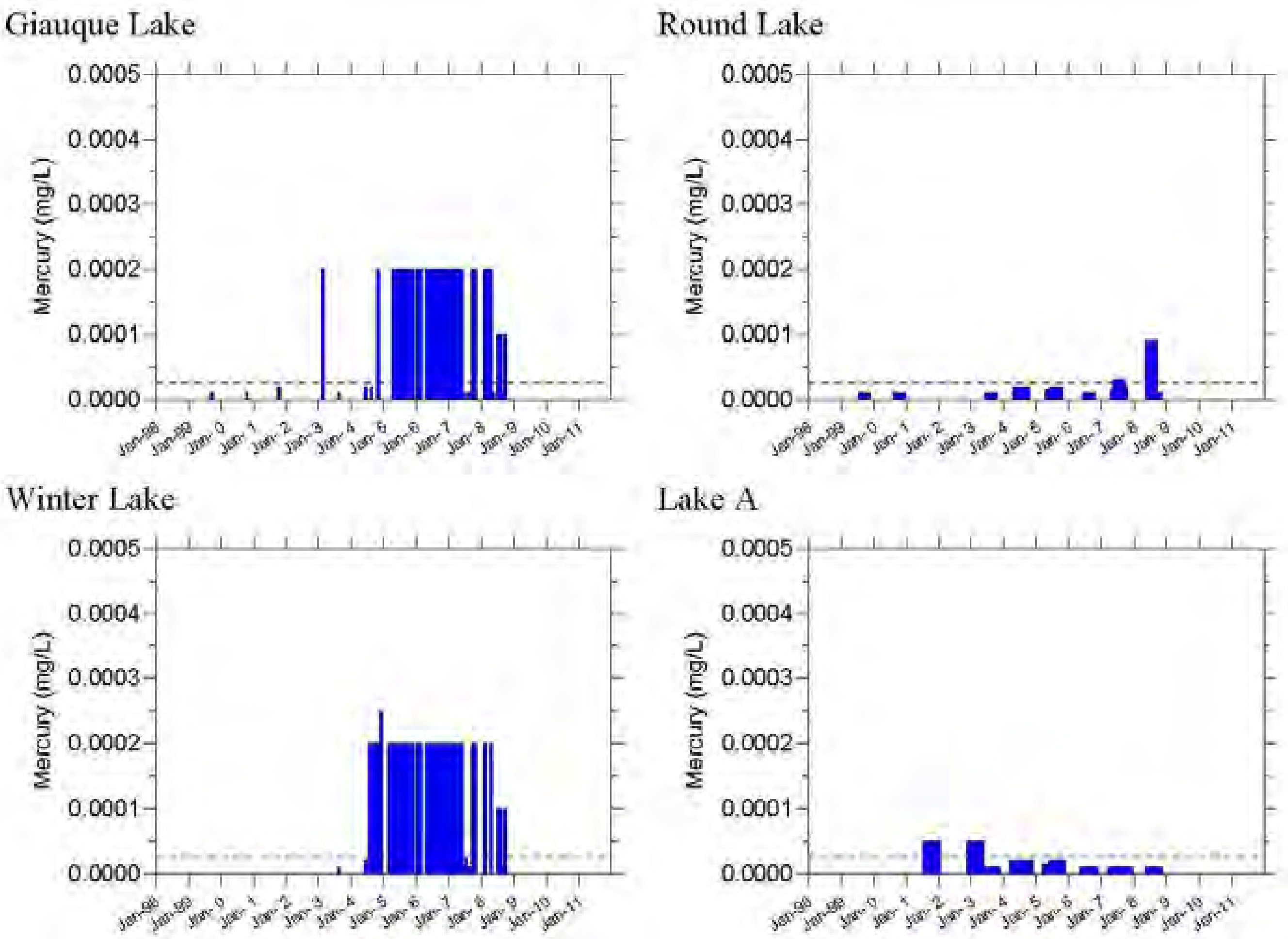
EBA Engineering Consultants Ltd.

YELLOWKNIFE GOLD PROJECT

Total Lead
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-35



NOTES

1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.00001 mg/L).

ISSUED FOR USE

CLIENT

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

YELLOWKNIFE GOLD PROJECT

Total Mercury
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-36

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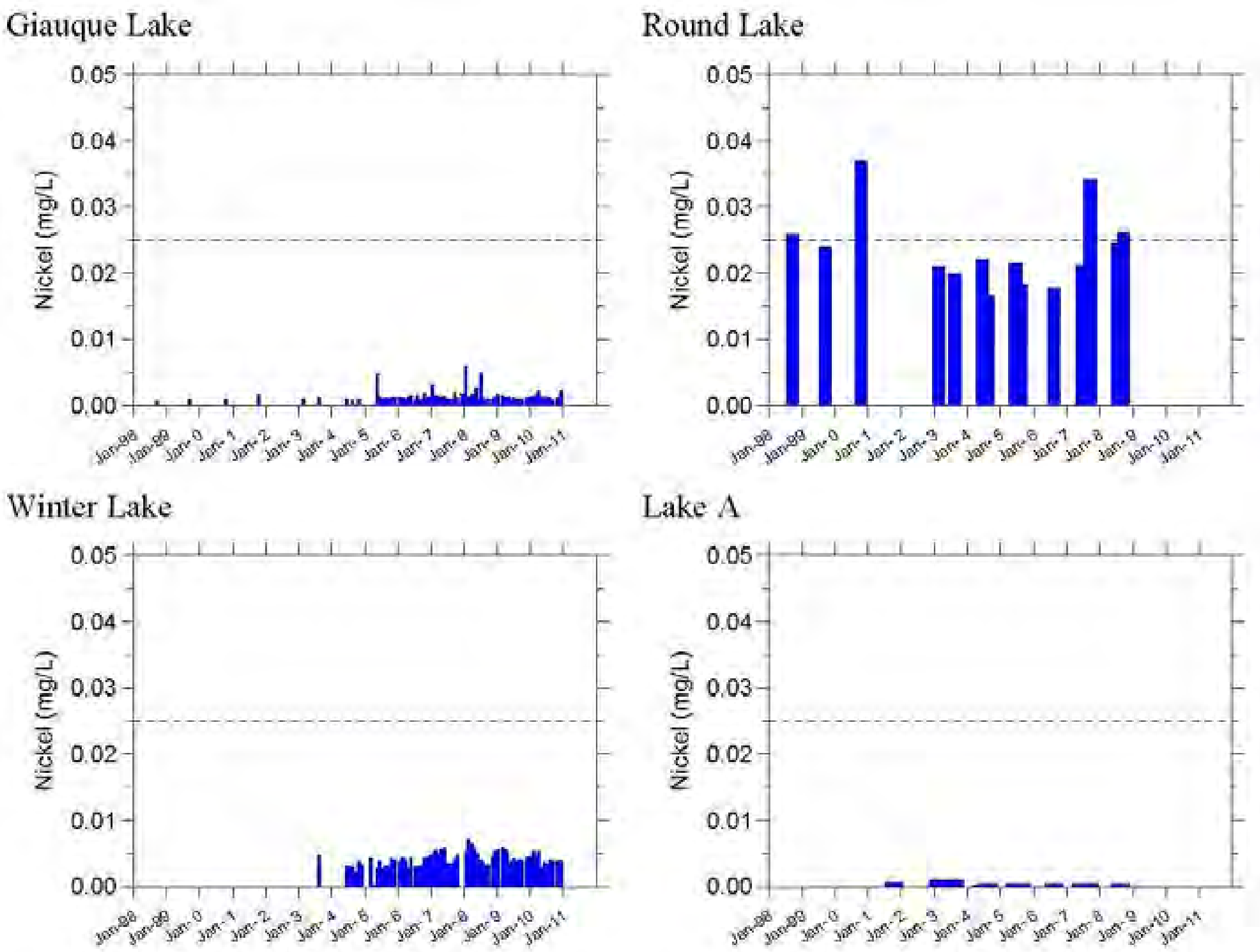

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NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Ni guidelines are hardness dependent (upper CCME limit of 0.15 mg/L not shown).
3. Results below detection limit report detection limit value (0.0001 mg/L).

ISSUED FOR USE

CLIENT

Tyhee NWT Corp

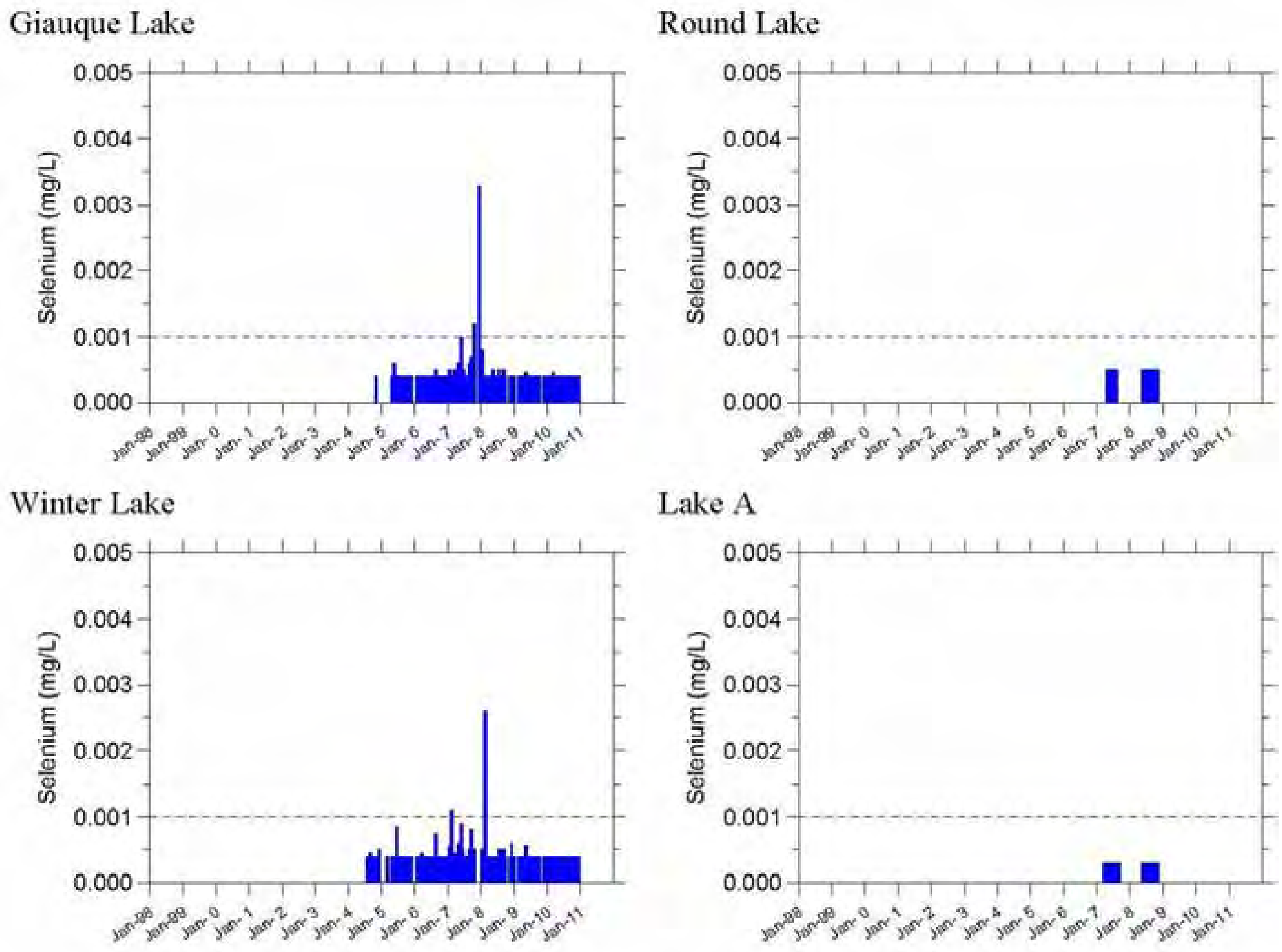
EBA Engineering Consultants Ltd. eba

YELLOWKNIFE GOLD PROJECT

Total Nickel
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-37



NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.0003 mg/L).

ISSUED FOR USE

CLIENT

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

YELLOWKNIFE GOLD PROJECT

Total Selenium
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-38

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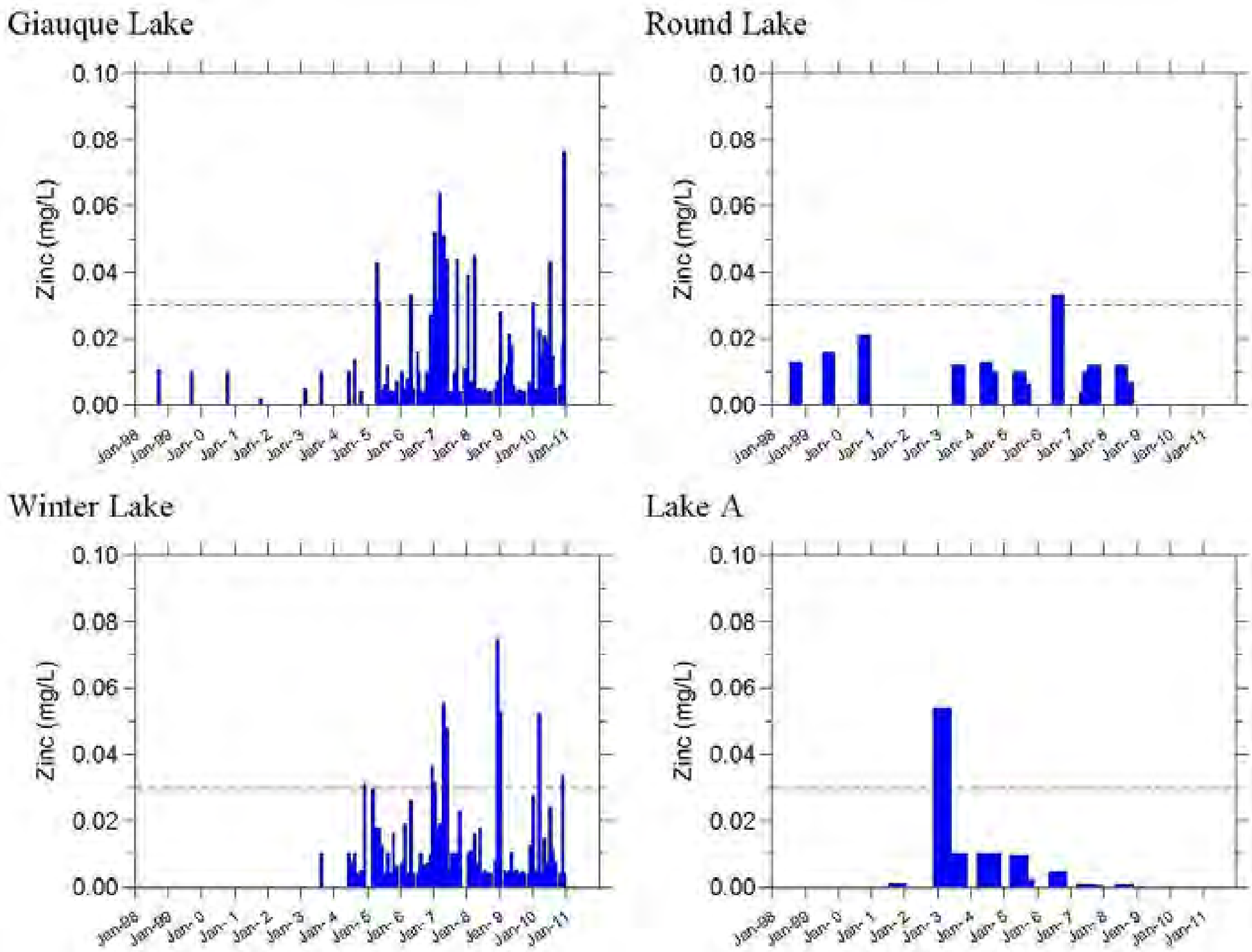

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NOTES
1. Dashed lines represent CCME Guidelines for the Protection of Aquatic Life.
2. Results below detection limit report detection limit value (0.0004 mg/L).

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CLIENT

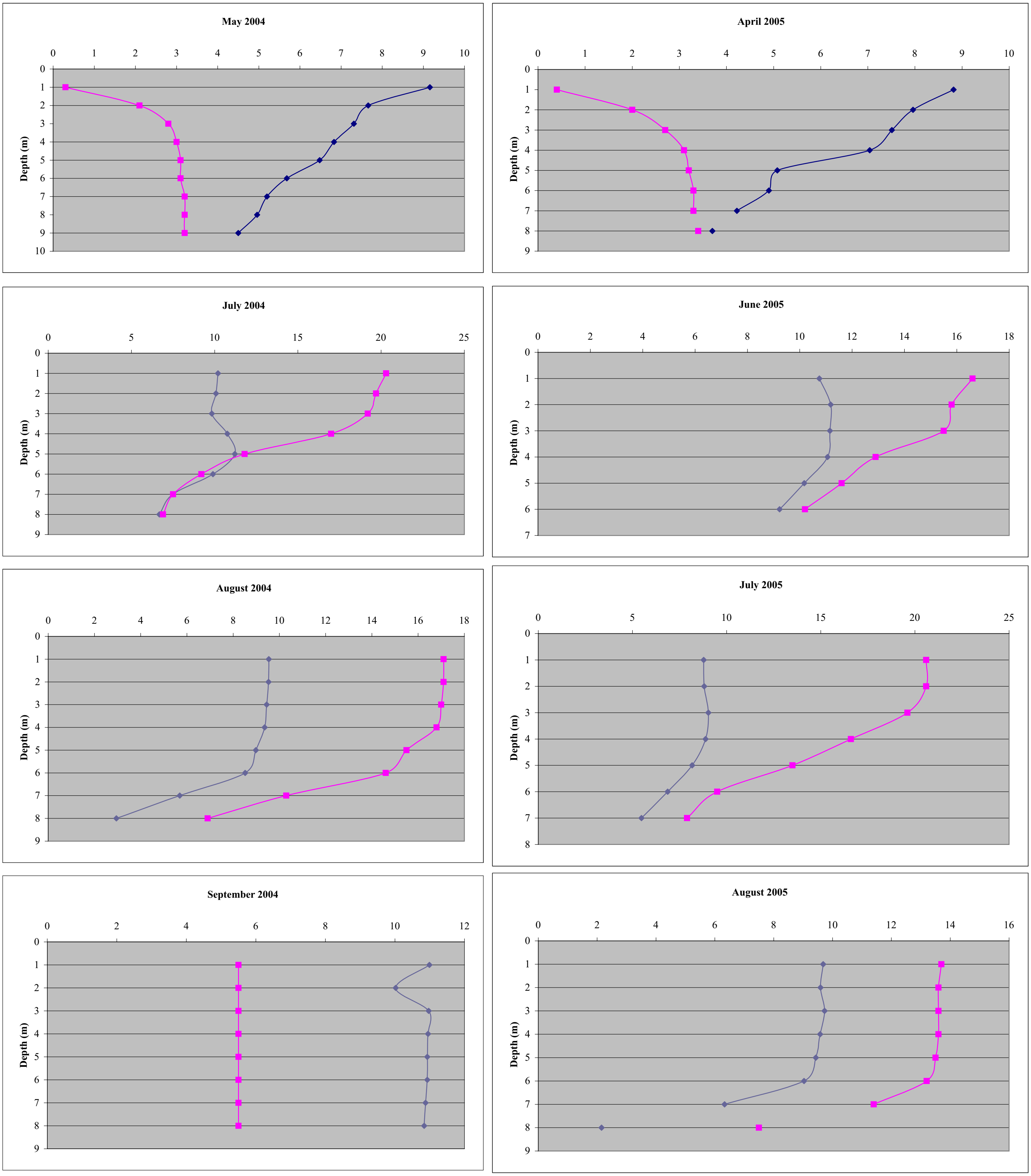
Tyhee NWT Corp

EBA Engineering Consultants Ltd.

YELLOWKNIFE GOLD PROJECT

Total Zinc
Surveillance Network Program (SNP) Sampling

PROJECT NO.	DWN	CKD	REV	
V23201097	SL	TP	0	**Figure 2.9-39**
OFFICE	DATE			
EBA-VANC	February 9, 2011			



LEGEND

DO (mg/L)
Temp (°C)

CLIENT

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

YELLOWKNIFE GOLD PROJECT

Dissolved Oxygen Profiles Narrow Lake

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-40

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2.9.7.2 Winter Lake

Station A on Winter Lake is located approximately 0.8 km southwest of Tyhee NWT Corp's camp, in the main body of the lake. The temperature and dissolved oxygen profiles for Winter Lake are found in Figure 2.9-41.

Winter Lake exhibited anoxic conditions (< 0.5 mg/L) under ice in both 2004 and 2005, and was more oxygenated during the open water seasons. Dissolved oxygen and temperature profiles for Winter Lake in 2005 varied from those observed in 2004 in that the top of the thermoclines were observed to occur at 4 m and 3 m in June and July, 2005. The differences observed are likely due to the fact that slightly deeper depths were tested in 2005 (max of 3.5 m versus 6 m). Also, unlike the 2004 sampling results, DO values reached critical (<6.5 mg/L) levels in June and July, 2005.

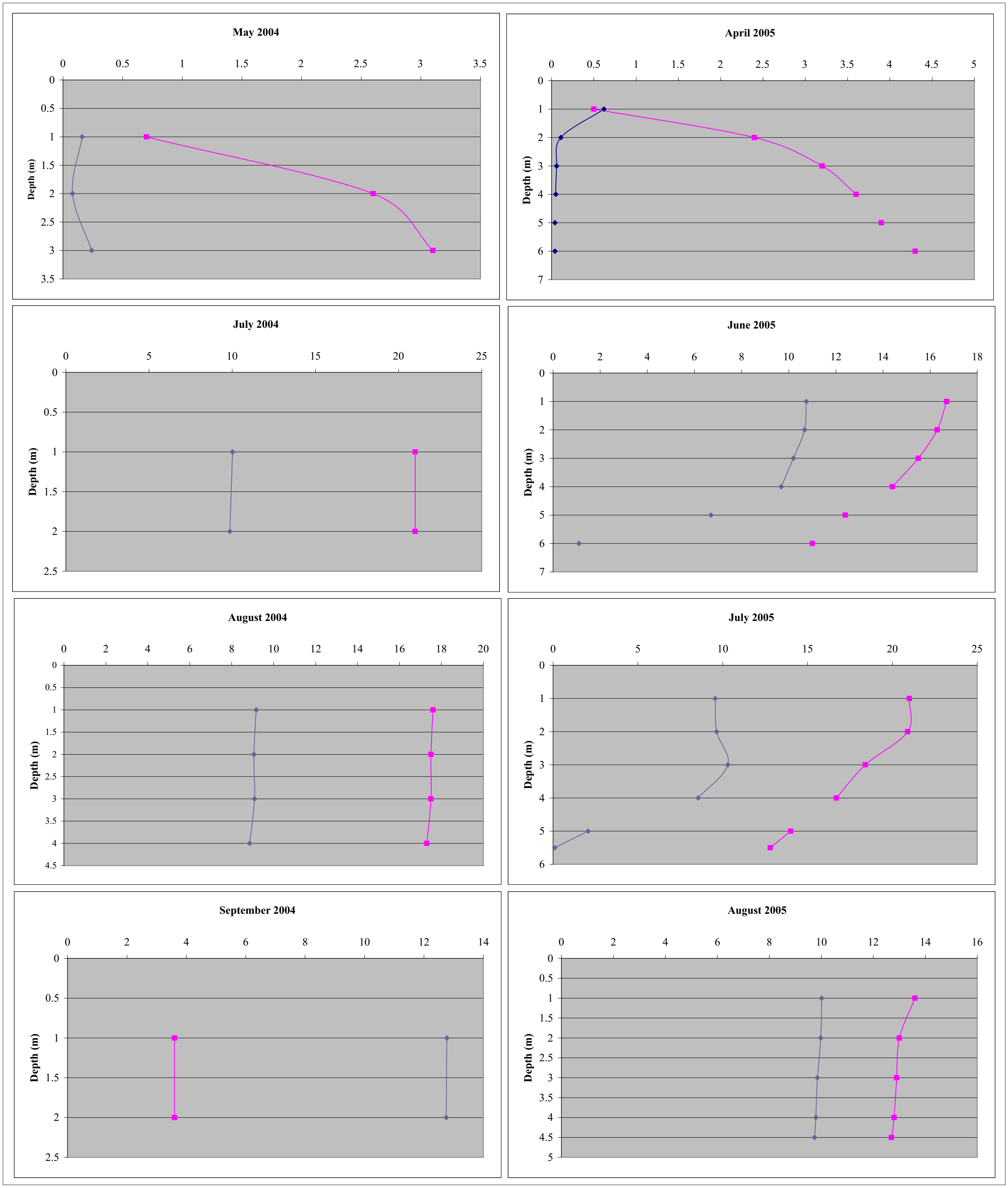
Additional sampling was conducted at four locations in Winter Lake on March 22, 2010, to determine ambient dissolved oxygen levels below the ice. Consistent with winter data previously obtained in 2004 and 2005, the results indicate that available DO levels at all locations sampled were well below the CCME minimum oxygen criteria (6.5 - 9.5 mg/L) for the protection of aquatic life, as shown in Table 2.9-1. The anoxic conditions measured under ice during all years of sampling would likely preclude, or severely limit overwintering by fish in this lake.

TABLE 2.9-1: WINTER LAKE DISSOLVED OXYGEN AND TEMPERATURE LEVELS, MARCH 22, 2010

Winter Lake Sampling Location	Ice Depth (m)	Water Depth (m)	Total Ice + Water Depth (m)	Dissolved Oxygen Meter Calibration Slope*	Sample Depth (m)	Dissolved Oxygen (mg/L)**	Water Temperature (ºC)
Winter Lake 1	0.62	6.4	7.02	0.76	1	2.62	1.2
					2	0.12	3.4
					3	0.06	3.8
					4	0.08	4.0
					5	0.10	4.4
					6	0.23	4.5
Winter Lake 2	0.63	2.0	2.63	0.85	1	0.83	1.4
					1.5	0.44	1.9
Winter Lake 3	0.64	2.8	3.44	0.79	1	1.17	1.2
					2	0.25	3.4
					2.5	0.24	3.6
Winter Lake 4	0.57	1.3	1.87	0.81	1	0.48	0.7

* A calibration slope ranging from 0.60 to 1.20 represents the instrument is in good working order and the dissolved oxygen levels can be relied upon.

** DO levels measured at the 1.0 m depths are not considered accurate due to the unavoidable introduction of oxygen to the surface water during the augering process.



LEGEND

- DO (mg/L)
- Temp (°C)

CLIENT

Tyhee NWT Corp

EBA Engineering Consultants Ltd.

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YELLOWKNIFE GOLD PROJECT

Dissolved Oxygen Profiles
Winter Lake

PROJECT NO.	DWN	CKD	REV
V23201097	SL	TP	0
OFFICE	DATE		
EBA-VANC	February 9, 2011		

Figure 2.9-41

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