2009 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut.

Report Prepared for:
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Executive Summary

This document presents a review of the 2009 water quality monitoring results for the Nanisivik Mine located on the Borden Peninsula of northern Baffin Island in Nunavut Territory. Results for the Final Discharge Point (Station 159-4) are compared to the authorized criteria stated in the active Water Licence, while parameters at the remaining sampling Stations are compared to their Station specific 95th percentile action levels (calculated from historical data) as indicated in the *Contingency Plan for Water Quality Exceedances, Former Nanisivik Mine Site*, submitted to Breakwater Resources Ltd. in September, 2009.

During the 2009 monitoring season, all water samples collected from Station 159-4 (the "Final Discharge Point") met the authorized criteria set out in the 2009 Water Licence. Concentrations of the majority of key parameters measured at Stations within the Twin Lakes Creek watershed, the Chris Creek watershed, and the Landfill watershed remained below their respective 95th percentile action levels, and in no instance did concentrations of a key parameter exceed its specific 95th percentile action level on two consecutive occasions. As such, there are no follow-up investigations required at this time. Monitoring will resume during periods of flow (likely beginning in early June) throughout 2010.

The statements made in this Executive Summary are subject to the same limitations included in Section 4.0 (Closing), and are to be read in conjunction with the remainder of this report.

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1.0 Introduction

1.1 GENERAL INTRODUCTION

Stantec Consulting Ltd. (Stantec) is pleased to present Breakwater Resources Ltd. with a review of the 2009 water quality monitoring data for Nanisivik Mine on the Borden Peninsula of northern Baffin Island in the Nunavut Territory. The monitoring program is being conducted as required under Nunavut Water Licence NWB1AR-NAN0914 and is intended to assess, in part, the overall performance of reclamation and closure activities.

1.2 SITE DESCRIPTION

The Nanisivik Mine, herein referred to as the "Mine", is located in Nunavut on the Borden Peninsula, part of northern Baffin Island (Figure A-1, Appendix A). Specifically, the Mine is located on the southern shore of Strathcona Sound, approximately 33 kilometres by road from the nearest settlement, the hamlet of Arctic Bay. The Mine is located 750 kilometres north of the Arctic Circle at an approximate latitude of 73 degrees north. In 1998, CanZinco Ltd., a wholly owned subsidiary of Breakwater Resources Ltd., took possession of the Mine, and operated it until 2002.

The Mine facilities, which are presently decommissioned, consisted of an underground mine and a 2,200 tonne per day concentrator that used conventional crushing, rod and ball mill grinding, differential lead and zinc flotation, and concentrate drying. Between 1976 and 2002, the underground facility extracted and shipped zinc and lead concentrates. Ore concentrates were shipped from a concentrate storage shed located adjacent to Strathcona Sound, where a deepwater wharf allowed ocean-going vessels to moor. Concentrates were transferred to ships using a ship-loader. Process tailings were transported to and deposited at the West Twin Disposal Area (WTDA), where resulting effluent is discharged into Twin Lakes Creek. The Mine was in full operation from its opening in 1976 until closure in September, 2002.

Reclamation activities began at Nanisivik in 2002. On July 30, 2006, Environment Canada approved Nanisivik as having achieved "closed mine status" under the *Metal Mining Effluent Regulations* and therefore mine effluent and environmental effects monitoring requirements under those regulations are no longer required. Water quality monitoring continues, however, under Water Licence NWB1AR-NAN0914, issued by the Nunavut Water Board. On October 1, 2008, reclamation of the site was completed and a post-closure monitoring period began.

1.3 SAMPLING LOCATIONS

The main sampling locations used historically for water quality monitoring near the Mine are generally described in Table 1. Sampling locations are shown in Figure A-2 (Appendix A).

Table 1 Major Historical Surface Water Quality Sampling Locations

Group	Station	Distance Downstream of Headwaters (m)	Description
Twin Lakes Watershed	NML-23	0	Outflow of East Twin Lake
	159-4B	700	Upstream of Final Tailings Discharge at 159-4
	159-4	750	Outflow from West Twin Disposal Area
	159-4A	800	Downstream of Final Tailings Discharge at 159-4
	159-9	1750	Twin Lakes Creek stream crossing
	200-7	2400	Twin Lakes Creek upstream of waste rock piles
	159-11	3300	Twin Lakes Creek downstream of waste rock piles
	200-3	3400	Twin Lakes Creek downstream of natural sulphide outcrop
	159-10	3500	Twin Lakes Creek upstream of west townsite tributary
	159-6	7250	Outlet of Twin Lakes Creek into Strathcona Sound
Chris Creek Watershed	159-15	100	Chris Creek upstream of Area 14
	159-16	1000	Chris Creek downstream of Area 14
	159-14	2600	Chris Creek downstream of K-Baseline
	159-13	3100	Chris Creek downstream of East Adit
	159-17	4200	Chris Creek outlet into Strathcona Sound
East Adit Treatment Facility	159-12	-	Discharge from East Adit Retention Pond
Oceanview Pit	159-18	-	Runoff from Oceanview Open Pit area
	159-19	-	Discharge from Oceanview Sump
Landfill Watershed	NML-29	75	Downstream of Landfill – east drainage system
	NML-30	75	Downstream of Landfill - west drainage system

Sampling locations as detailed by Gartner Lee Ltd., 2004

1.4 PREVIOUS WATER QUALITY MONITORING PROGRAMS

1.4.1 Water Licences

Since 1976, Nanisivik Mine has operated under four different Water Licences. The Water Licences were issued by the Northwest Territories Water Board and the Nunavut Water Board and are listed with their issuance dates as follows:

- Water Licence N5L3-0159 – Northwest Territories Water Board (July, 1976; renewed in 1978, 1983, 1988 and 1991);
- Water Licence NWB1NAN9702 – Nunavut Water Board (July, 1997; the original term of five years was extended until closure in September, 2002);

- Water Licence NWB1NAN0208 – Nunavut Water Board (October, 2002 to May, 2008); and

- Water Licence NWB1AR-NAN0914 – Nunavut Water Board (April, 2009 to present, expiring March 31, 2014).

An application for renewal of the Water Licence for the Mine was received by the Nunavut Water Board on February 21, 2008. During the course of the application review process, the Water Licence expired on May 1, 2008. A public hearing was held on February 23, 2009 in Arctic Bay. The Chairman closed the record of proceedings on March 13, 2009, and a new Water Licence was issued, effective April 1, 2009 (Nunavut Water Board, 2009).

The current Water Licence contains requirements for maximum authorized concentrations of various water quality parameters at final discharge points (Table 1). As defined in the Water Licence, a final discharge point in respect of an effluent is "an identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent". Currently the only final discharge point for effluent at the Mine is Station 159-4, where effluent from the WTDA is released. Table 2 summarizes the effluent quality requirements for the final discharge point as listed in the Water Licence.

Table 2 Effluent Quality Requirements for Final Discharge Point

Substance	Maximum Authorized Monthly Mean Concentration	Maximum Authorized Concentration in a Composite Sample	Maximum Authorized Concentration in a Grab Sample
Total Arsenic (mg/L)	0.25	0.375	0.50
Total Copper (mg/L)	0.10	0.15	0.20
Total Lead (mg/L)	0.10	0.15	0.20
Total Nickel (mg/L)	0.50	0.75	1.00
Total Zinc (mg/L)	0.25	0.375	0.50
Total Suspended Solids (mg/L)	15.00	22.50	30.00
Radium 226 (Bq/L)	0.37	0.74	1.11
Total Cadmium (mg/L)	0.005	0.008	0.01
pH	6.0 – 9.5		

Note: Effluent quality requirements for Station 159-4 as defined in Part F, Item 1 of the Water Licence, NWB 1AR-NAN0914.

As per the recommendations set forth in the Contingency Plan for Water Quality Exceedances (prepared by Stantec Consulting Ltd., September, 2009), data for the remaining Stations are compared to Station-specific 95th percentile values (calculated from historical data) for each key parameter (see Table 3). When the 95th percentile value is exceeded for any key parameter at the same monitoring Station on two consecutive occasions, an investigation will be triggered to determine the cause of the exceedance. Action levels have not been identified for supporting parameters because they are of less concern from a toxicological perspective (*e.g.*, major ion concentrations such as calcium and chloride), or because there is insufficient data to develop an estimate of the 95th percentile value. For pH, values at all Stations have been compared to the acceptable range listed in the Water Licence limits for Station 159.4 (*i.e.,* 6.0 to 9.5). All data

collected in 2009 are summarized in tabular format in Appendix B. Temporal trends for selected parameters (*i.e.,* total cadmium, total lead, total zinc, total sulfate, TSS and pH) are displayed graphically in Appendix C for Stations 159-4 (Twin Lakes Disposal Area), 159-6 (outlet of Twin Lakes Creek to Strathcona Sound), 159-10 (Twin Lakes Creek, upstream of the west town site tributary), NML-23 (Outflow from East Twin Lake), 159-14 (Chris Creek, downstream of K-Baseline), 159-15 (Chris Creek, upstream from Area 14), 159-17 (Chris Creek outlet into Strathcona Sound) and NML-30 (Downstream of Landfill).

Table 3 Station-Specific Action Levels for Water Quality Parameters

Parameter	Station 159-6	Station 159-10	Station NML-23	Station 159-15	Station 159-14	Station 159-17	Station NML-29	Station NML-30
Total Cadmium (mg/L)	0.018	0.037	0.0058	0.00085	0.0005	0.0012	0.000245	0.000245
Total Lead (mg/L)	0.063	0.14	0.046	0.00725	0.0022	0.028	0.0055	0.0055
Total Zinc (mg/L)	6.3	13	0.014	0.17	0.13	0.38	0.015	0.015
Total Sulphate (mg/L)	509	651	25	269	408	499	240	240
Total Suspended Solids (mg/L)	63	15	11	4	33	53	22	22
pH	6.0 – 9.5							

Notes:
Action levels based on 95th percentile calculated from Station specific historical data. For further information, see the *Contingency Plan for Water Quality Exceedances, Former Nanisivik Mine Site*, Stantec Consulting Ltd., 2009.

1.4.2 Recommended Water Quality Monitoring for Post-Closure Period, Nanisivik Mine

On May 30, 2008, Jacques Whitford submitted a letter report to Breakwater Resources Ltd. containing a review of the February 2004 Monitoring Plan and a review of the water quality collected from 1996 to 2007. Based on the review of data, a revised Water Quality Monitoring Schedule was developed for a Post-Closure Period (2008 to 2012). The amended monitoring schedule subsequently issued in the 2009 Water Licence (NWB 1AR-NAN0914) listed sampling locations, parameters to be sampled and sampling frequency as presented in Table 4.

Table 4 Recommended Water Quality Monitoring Schedule for Post Closure Period

Water Quality Monitoring Stations 2009-2014				
Monitoring Information				
Station Number	**Station Description**	**Purpose**	**Parameters to be Measured**	**Monitoring Frequency**
Twin Lakes Creek Watershed				
NML-23	Outflow from East Twin Lake	Upstream Control Station	Group 1	Bi-weekly
159-4	Outflow from West Twin Disposal Area	Final Discharge Point	Group 1 Group 4	Bi-weekly Twice Annually
159-10	Twin Lakes Creek upstream of West Townsite tributary	General Monitoring	Group 1	Bi-weekly
159-6	Outlet of Twin Lakes Creek into Strathcona Sound	General Monitoring	Group 1 Group 3 Group 4	Bi-weekly Bi-weekly Twice Annually
Chris Creek				
159-15	Chris Creek upstream of Area 14	Upstream Control Station	Group 1	Monthly
159-14	Chris Creek downstream of K-Baseline	K-Baseline Monitoring	Group 1	Monthly
159-17	Chris Creek Outlet into Strathcona Sound	General monitoring	Group 1 Group 4	Monthly Twice Annually
Landfill				
NML-29	Downstream of Landfill - East Drainage System	Landfill Monitoring	Group 1 Group 2 Group 3	Monthly
NML-30	Downstream of Landfill – West Drainage	Landfill Monitoring	Group 1 Group 2 Group 3	Monthly

Notes:
Monitoring Frequency applies during periods of flow. Water Quality Parameters and Monitoring Frequency as per Schedule I, Tables 1 and 2 of the Water Licence.
Group 1 includes: Metals analysis (total cadmium, total lead, total zinc); major cations (calcium, magnesium, sodium, potassium, ammonia, and the derived parameter hardness); major anions (chloride, sulphate, bicarbonate, carbonate, nitrate+nitrite, and the derived parameter for alkalinity); TSS; and field parameters (specific conductivity, temperature and pH).
Group 2 includes: Total petroleum hydrocarbons (TPH).
Group 3 includes: Oil and grease (Note: as TPH analysis is more sensitive, and as it provides quantitative results pertaining to hydrocarbons, it is proposed that analysis for oil and grease be replaced by TPH analysis in future sampling events).
Group 4 includes: Trace metal scan.

The recommended sampling locations for 2009-2014 presented here have been strategically identified as either background sampling locations, or are located in the immediate area of, or downgradient of former mine activities. Further it is expected that these locations along with the suggested frequencies and parameters, will provide the required information to ensure the reclamation objectives are being met.

2.0 Review of 2009 Water Quality Data

Water samples were collected in 2009 from the Twin Lakes Watershed, Chris Creek Watershed and Landfill Watershed. Due to miscommunication, the actual sampling frequency and parameters analyzed varied somewhat from those recommended in the 2009 Water Licence (see Table 3, section 1.4.2 of this report). A summary of the 2009 water quality monitoring results, along with the sampling frequency is presented in tabular format in Appendix B for the various watersheds noted above.

Only the data for Station 159-4 are compared to the effluent quality requirements for final discharge points (from the Water Licence), as only Station 159-4 is a final discharge point. Concentrations of various parameters measured at all other Stations are compared to their Station specific action levels, presented in Table 3.

Water quality data are not compared to the CCME water quality guidelines for the protection of aquatic life. There are two main reasons why the CCME water quality guidelines are not considered to be relevant to the data collected at Nanisivik.

First, the Mine is located in an area where there are highly mineralized outcrops related to the mineral resources that originally attracted mining activity. The Environmental Effects Monitoring (EEM) Study Design report, prepared for CanZinco Ltd. by Jacques Whitford Environment Limited (dated January 27, 2004) provides a summary of the local geological conditions, and their effects on stream water quality. The mineralized outcrops extend from Oceanview in the east, where there was open pit mining of surface deposits, through the Chris Creek drainage to the East Adit area, where mining extended underground to the West Adit and main portal areas in the Twin Lakes Creek drainage, and by natural extension to the west side of the Twin Lakes Creek drainage towards the landfill and STOL airstrip. Twin Lakes Creek cuts through a large mineral outcrop between Stations 159-11 (upstream) and 200-3 (downstream). Additional satellite mineral deposits are located throughout the area, and some of these, such as Area 14 in the headwaters of Chris Creek, were also mined. The CCME guidelines acknowledge that natural background conditions for trace elements in various regions of Canada may exceed the guideline values, and that this should not be construed negatively. Background data collected before mining activities began in 1975 show that concentrations of iron, cadmium, lead and zinc in Chris Creek, Twin Lakes Creek, and in the vicinity of the East Adit were sporadically elevated throughout the area. Spikes in trace metal concentrations are still observed today in response to weather events (*i.e.,* periods of rain can cause spikes in metal concentrations as weathered salts are mobilized from mineral outcrops) or in response to natural erosional processes.

Second, the watercourses in the region, including Twin Lakes Creek, East Twin Lake, Chris Creek, and watercourses in proximity to the East Adit, Oceanview, and the Landfill, are all naturally fishless, with a very sparse benthic invertebrate community, even in areas that have not been disturbed by mining. The barren characteristics of the aquatic ecosystems are discussed in the EEM Study Design report (Jacques Whitford Environment Limited 2004). The fishless condition of the streams is attributable to multiple factors including the naturally-

occurring mineralized zones, the presence of waterfalls that are impassable to fish, and the general climatic conditions that cause the creeks to completely freeze during the winter months.

Therefore, the principal consideration when evaluating the water quality monitoring results, which will be a test of whether reclamation and closure activities have been successful, will be whether the conditions that are recorded demonstrate that trace element concentrations are stable or declining, at concentrations that are consistent with pre-mining levels. Such trends are expected to become apparent over a period of years (*i.e.,* between 2009 and 2014).

2.1 STATION 159-4

The water quality data for Station 159-4 are presented in Table 5 for the parameters specified in the Water Licence. Raw data are provided in Table B1, Appendix B, while temporal trend graphs are in Appendix C (Figure C1). The maximum authorized grab, composite, and monthly mean concentrations were not exceeded in any sample collected at the WTDA final discharge point (*i.e.,* Station 159-4) in 2009.

Table 5 Monthly Mean Concentration at Station 159-4 in 2009 (mg/L).

Substance	Authorized Water Licence Limit	159-4		
		June	July	August
Total Arsenic	0.25	0.0005	0.0005	0.0005
Total Cadmium	0.005	0.00005	0.0002	0.0019
Total Copper	0.10	0.0005	0.001	0.00125
Total Lead	0.10	0.001	0.003	0.0025
Total Nickel	0.50	0.0025	0.0025	0.0025
Total Radium 226 (Bq/L)	0.37	0.005	0.005	0.0125
Total Suspended Solids	15.00	5.00	1	1
Total Zinc	0.25	0.03	0.075	0.1
pH	6.0 – 9.5	6.7	NM	7.8

Notes:
NM = Not Measured
Laboratory detection limits were elevated during the August 5, 2009 sampling event due to a laboratory error.

2.2 TWIN LAKES WATERSHED (EXCLUDING STATION 159-4)

The upper reach of the Twin Lakes Watershed includes East Twin Lake (represented by Station NML-23) which was minimally disturbed by mining activities. Station 159-10 is located downstream of a major natural mineral outcrop that undergoes active erosion from the Twin Lakes Creek. The natural mineral outcrop is a feature of great importance to the chemistry of Twin Lakes Creek, as it can release acidity and heavy metals (particularly cadmium, lead and zinc) to the water as a result of weathering and erosion. Station 159-6 is located in Twin Lakes Creek, immediately upstream of its outlet into Strathcona Sound. Station 159-6 is also periodically influenced by metals released by the natural mineral outcrop. However, the baseline studies carried out before mining activities began indicate that pockets of

mineralization can be found throughout the region, and that background concentrations of cadmium, lead and zinc in water were frequently found to be elevated (BC Research 1975). Baseline concentrations of cadmium (0.004 mg/L), lead (0.0016 mg/L) and zinc (15 mg/L) were measured near Station 159-6, at the mouth of Twin Lakes Creek in 1975 (BC Research 1975), however, these concentrations are inherently variable depending upon weather conditions.

Raw data from the 2009 monitoring season are presented in Tables B2-1 to B2-3, Appendix B, while temporal trend figures for selected parameters are provided in Appendix C (Figures C2 to C4). A summary of the water quality observed in Twin Lakes Creek during 2009 follows.

- Cadmium concentrations in all samples were consistently below their respective site specific action levels. The maximum measured concentration of total cadmium was 0.0064 mg/L, recorded at Station 159-10 on August 31, 2009; the action level for cadmium at this station is 0.037 mg/L.

- Lead concentrations were consistently below their respective action levels. The maximum measured concentration of total lead was 0.003 mg/L, recorded at Station 159-6 on July 16, 2009; the action level for lead at this station is 0.063 mg/L.

- Zinc concentrations were consistently below their respective action levels. The maximum measured concentration of total zinc was 3.0 mg/L, recorded at Station 159-10 on August 31, 2009; the action level for zinc at this station is 13 mg/L.

- The sulphate concentration recorded on August 14, 2009 at Station 159-6 was 511 mg/L, slightly higher than the proposed action level of 509 mg/L. The subsequent concentration recorded on August 31, 2009 was 351 mg/L, lower than the action level. The sulphate concentration measured on August 31, 2009 at Station NML-23 was 38 mg/L, exceeding the action level of 25 mg/L. As August 31, 2009 was last sampling event of 2009, sampling results from June of 2010 will be examined to determine whether this exceedance is of significance. Sulphate concentrations measured at Station 159-10 were below their site-specific action level of 651 mg/L.

- TSS measurements were consistently below their respective action levels. The maximum measured concentration of TSS was 10 mg/L, recorded at Station 159-6 on July 22, 2009; the action level for TSS at this station is 63 mg/L.

- All pH values fell within the recommended range of 6.0 to 9.5 with the exception of a sample collected at Station 159-10 (pH 5.8 on June 15, 2009) and a sample collected at NML-23 (pH 5.99 on June 8, 2009). The low pH at Station NML-23 was measured in a sample collected very early in the season, and may be more reflective of snowmelt water than being truly representative of East Twin Lake. The very low conductivity (0 mS) associated with this sample would support this interpretation.

2.3 CHRIS CREEK WATERSHED

Chris Creek extends approximately 5 km from its headwaters to its mouth at Strathcona Sound. There are mineralized outcrops throughout the watershed, including Area 14, K Baseline, and parts of Oceanview, the East Open Pit, and the East Adit. BC Research measured high concentrations of cadmium (0.028 mg/L), lead (0.02 mg/L) and zinc (15 mg/L) in Chris Creek prior to mining activities taking place. Trace metal concentrations within the Chris Creek Watershed in 2009 were generally within the range of natural background levels recorded prior to the Mine development.

Raw data from the 2009 monitoring season are presented in Tables B3-1 to B3-3, Appendix B, while temporal trend figures for selected parameters are provided in Appendix C (Figures C5 to C7). The surface water samples collected from the Chris Creek watershed during the 2009 monitoring program were erroneously not submitted for the analysis of total sulphate. A summary of the water quality observed in the Chris Creek watershed during 2009 follows.

- Cadmium concentrations were consistently below their respective action levels. The maximum concentration of total cadmium was 0.0007 mg/L, measured at Station 159-17 on July 17, 2009; the action level for cadmium at this station is 0.0012 mg/L.

- The total lead concentration measured at Station 159-14 on July 17, 2009 (0.003 mg/L) exceeded the Station specific action level of 0.0022 mg/L. However, concentrations of total lead in subsequent samples collected at Station 159-14 were below the laboratory detection limit of 0.001 mg/L. As such, no further investigation is required at this time. Lead concentrations in all other samples collected from the Chris Creek watershed in 2009 were below their respective action levels. The maximum concentration of total lead was 0.18 mg/L, measured at Station 159-17 on July 17, 2009; the action level for lead at this station is 0.028 mg/L.

- Zinc concentrations were consistently below their respective action levels. The maximum concentration of total zinc was 0.27 mg/L, recorded at Station 159-17 on August 17, 2009; the action level for zinc at this station is 0.38 mg/L.

- TSS measurements were consistently below their respective action levels. The maximum measured concentration of TSS was 38 mg/L, recorded at Station 159-17 on July 17, 2009; the action level for TSS at this station is 53 mg/L.

- The pH levels recorded at Stations 159-14 and 159-15 fell within the recommended range of 6.0 to 9.5. No pH measurements were recorded at Station 159-17.

2.4 LANDFILL WATERSHED

The landfill is located west of Nanisivik, with primary drainage systems that flow intermittently to the east and west, monitored at Stations NML-29 and NML-30, respectively. The landfill has been decommissioned with thermal cover, and will become entombed in permafrost. Water quality monitoring at the landfill includes hydrocarbons, in addition to metals. There do not

appear to be any historical water quality data relevant to the landfill area. However, water quality data collected by BC Research (1975) for areas outside the Mine property showed cadmium concentrations to 0.0002 mg/L, lead concentrations to 0.002 mg/L, and zinc concentrations to 0.09 mg/L.

Raw data from the 2009 monitoring season are presented in Table B4, Appendix B, while temporal trend graphs of selected parameters are provided in Appendix C (Figure C8). The surface water samples collected from the Landfill watershed during the 2009 monitoring program were erroneously not submitted for the analysis of sulphate concentrations. Results for 2009 are summarized below.

- Concentrations of benzene, toluene, ethylbenzene and xylenes (BTEX), and petroleum hydrocarbon fractions, were below laboratory detection limits.
- Cadmium concentrations were below the laboratory detection limit of 0.0001 mg/L.
- Lead concentrations were below the laboratory detection limit of 0.001 mg/L.
- Zinc concentrations were below the laboratory detection limit of 0.01 mg/L.
- TSS concentrations were below the laboratory detection limit of 2 mg/L.
- The measured pH levels fell within the acceptable range of 6.0 to 9.5.

2.5 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC) DISCUSSION

QA/QC sampling consisted of the collection and analysis of several samples for quality assurance. This program permits the evaluation of the representativeness of the samples. Blind field duplicate samples collected at the Mine and sent for analysis of key parameters included Station 159-4 on June 9, 2009 and Station 159-6 on July 22, 2010. Relative Percent Difference (RPD) of each duplicate parameter measured is provided in Table 6.

Table 6 Results of QA/QC samples and associated Relative Percent Differences (RPDs)

Date	June 9, 2009			July 22, 2009		
Parameter	Station 159-4	Station 159-4 (FD)	RPD (%)	Station 159-6	Station 159-6 (FD)	RPD (%)
TSS	1	9	160	10	10	0
Radium 226	0.005	0.005	0	NM	NM	N/A
Aluminum	0.02	0.02	0	NM	NM	N/A
Arsenic	0.0005	0.0005	0	NM	NM	N/A
Cadmium	0.00005	0.00005	0	0.0003	0.0003	0
Copper	0.0005	0.0005	0	NM	NM	N/A
Iron	0.03	0.03	0	NM	NM	N/A
Lead	0.001	0.001	0	0.0005	0.0005	0

Table 6 Results of QA/QC samples and associated Relative Percent Differences (RPDs)

Date	June 9, 2009			July 22, 2009		
Parameter	Station 159-4	Station 159-4 (FD)	RPD (%)	Station 159-6	Station 159-6 (FD)	RPD (%)
Mercury	0.00005	0.00005	0	NM	NM	N/A
Molybdenum	0.006	0.006	0	NM	NM	N/A
Nickel	0.0025	0.0025	0	NM	NM	N/A
Zinc	0.03	0.03	0	0.23	0.24	4.3
Alkalinity	36	36	0	NM	NM	N/A
Ammonia	0.06	0.07	15.4	0.01	0.01	0
Nitrite	0.05	0.05	0	NM	NM	N/A
Hardness	248	251	1.2	NM	NM	N/A
Calcium	50	51	2	NM	NM	N/A
Magnesium	30	30	0	NM	NM	N/A

Notes:
1. Concentrations of all parameters are reported in mg/L, with the exception of Radium 226, which is reported in Bq/L.
2. Where concentrations were below the laboratory detection limit, ½ the detection limit was used in the calculation of RPD.
3. NM = Not Measured, N/A = Not Applicable

In general, the duplicate results agree closely with their corresponding samples and confirm the representativeness of sampling procedures. The relative percent difference (RPD) from the mean for individual parameters ranged between 0% and 160% for field duplicates. Most results (22 of 23) fell within a ±20% range. There are no firm guidelines for the degree of correlation expected between duplicates due to the potential for natural heterogeneity within the sample, as well as potential contaminant distribution. However, the values noted above are considered to indicate an acceptable duplicate correlation. All individual parameters in the duplicates were classified the same (either above or below the respective action levels). The overall laboratory and field data quality are considered acceptable.

A detailed QA/QC plan outlining up to date sampling methods, field sampling personnel requirements, field documentation and record keeping requirements and guidelines for the labeling, packaging and shipping of samples has been submitted to the Nunavut Water Board (QA/QC Plan for Surface Water Monitoring Samples, Former Nanisivik Mine Site, Nunavut, Stantec Consulting Ltd., 2009).

3.0 Discussion

The effectiveness and adequacy of mine reclamation will be demonstrated through monitoring key parameters at key sampling Stations over the next few years. Concentrations of indicator substances from disturbed areas should be stable or declining, and should be consistent with conditions that existed prior to mining activities (subject to the constraints that high baseline levels of heavy metals impose on the site). As site reclamation activities were largely completed in 2008, 2009 represents the first monitoring season free of substantial anthropogenic disturbance of the surrounding landscape. It is expected that water quality will continue to stabilize in the coming years.

Temporal trends for key water quality parameters (cadmium, lead, zinc, sulphate, TSS and pH) at selected sampling Stations are shown in Figures C1 to C8 in Appendix C. Signs of disturbance in the area of the WTDA between 2001 and 2004 were evident in historical water quality data for Station 159-4 (Figure C1) as irregular spikes in metal concentrations, although in most cases, the Water Licence limits on metal concentrations were met. Concentrations of the key indicator substances have substantially stabilized since 2005, a trend that remained evident in 2009 and that is expected to continue into the future.

At Station 159-6 (Figure C2), Twin Lakes Creek near Strathcona Sound, concentrations of lead and cadmium have been generally stable over the past few years, while concentrations of zinc have tended to be more variable. However, for the past two years, concentrations of all three metals were consistently low, remaining well below the 95th percentile action level. It should be noted however, that concentrations of key parameters are expected to be periodically elevated as a result of the effects of weathering and erosion on the major mineral deposit that is intersected by the creek. As such, it is not surprising to have seen an isolated exceedance of the 95th percentile action level for total sulphate at Station 159-6, nor is it a surprise to see pH levels occasionally fall slightly outside the preferred range.

Stations 159-15 and 159-17 represent the headwaters and mouth of Chris Creek (Figures C5 and C7, respectively), while Station 159-14 (Figure C6) represents the area located just downstream of K-Baseline. It is too early to try to evaluate trends in the post closure period for these sites; however, results for 2009 were generally good. Concentrations all measured parameters remained within their respective 95th percentile action levels, with the exception of a single exceedance of total lead at Station 159-14.

Station NML-30 (Figure C8) downgradient of the landfill, shows generally stable pH levels and low concentrations of trace metals, with all measured hydrocarbon and metal concentrations being below their respective laboratory detection limits. Again, it is too early to try to evaluate trends. Flowing water was not present to be sampled at Station NML-29 during 2009.

The year 2009 represents the first sampling season of the post closure monitoring. Trace metal concentrations at the WTDA discharge location remain low, meeting the Water Licence conditions. Elsewhere, trace metal concentrations are generally consistent with conditions that existed naturally, before Mine development.

4.0 Closing

This report has been prepared for the sole benefit of Breakwater Resources Ltd. The report may not be used by any other person or entity, other than for its intended purposes, without the consent of Breakwater Resources Ltd and Stantec Consulting Ltd.

The information and conclusions contained in this report are based upon work undertaken in accordance with generally accepted engineering and scientific practices current at the time the work was performed. The information provided in this report was compiled from existing documents, design information provided by Breakwater Resources Ltd., data provided by regulatory agencies and others. Information obtained from secondary sources has been assumed to be correct; Stantec Consulting Ltd. accepts no responsibility for damages or liability that may arise from use of this data.

If any conditions become apparent that deviate from our understanding of conditions as presented in this report, Stantec Consulting Ltd. requests that we be notified immediately, and permitted to reassess the conclusions provided herein.

This report was prepared by Cy Pedersen, M.Sc., and was reviewed by Malcolm Stephenson, Ph.D. If you have any questions or comments on the contents of this report, please contact the undersigned.

We trust that the above information fulfills your needs at this time. Should you require additional information, please do not hesitate to contact us.

Sincerely,

STANTEC CONSULTING LTD.

Original Signed By

Cy Pedersen, M.Sc.
Environmental Scientist

Original Signed By

Malcolm Stephenson, Ph.D.
Project Manager, Principal

jl \\jwfscl01\fredericton$\data\projects\1039xxx\1039597\3-reporting information\annual report 2009\final nanisivik 2009 monitoring_stantec.doc

5.0 References

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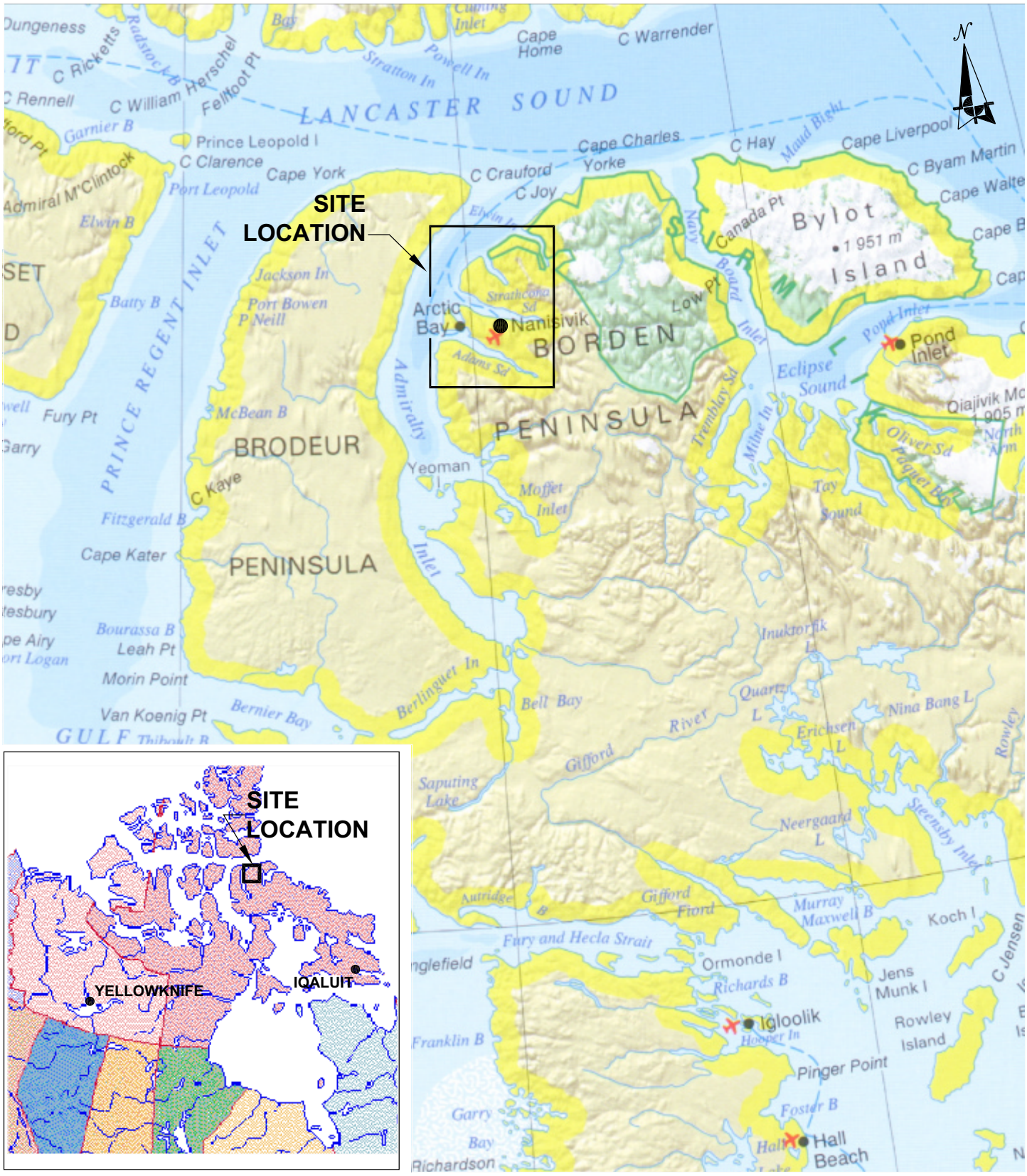
APPENDIX A

Figures

2009 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut



0 15 30 60 90 120 150 Km

SOURCE OF FIGURE:
REFERENCE MAP BY NATURAL RESOURCES CANADA
"YUKON TERRITORIES, NORTHWEST TERRITORIES AND NUNAVUT"
DATE: 2000
(LAMBERT CONFORMAL CONIC PROJECTION)

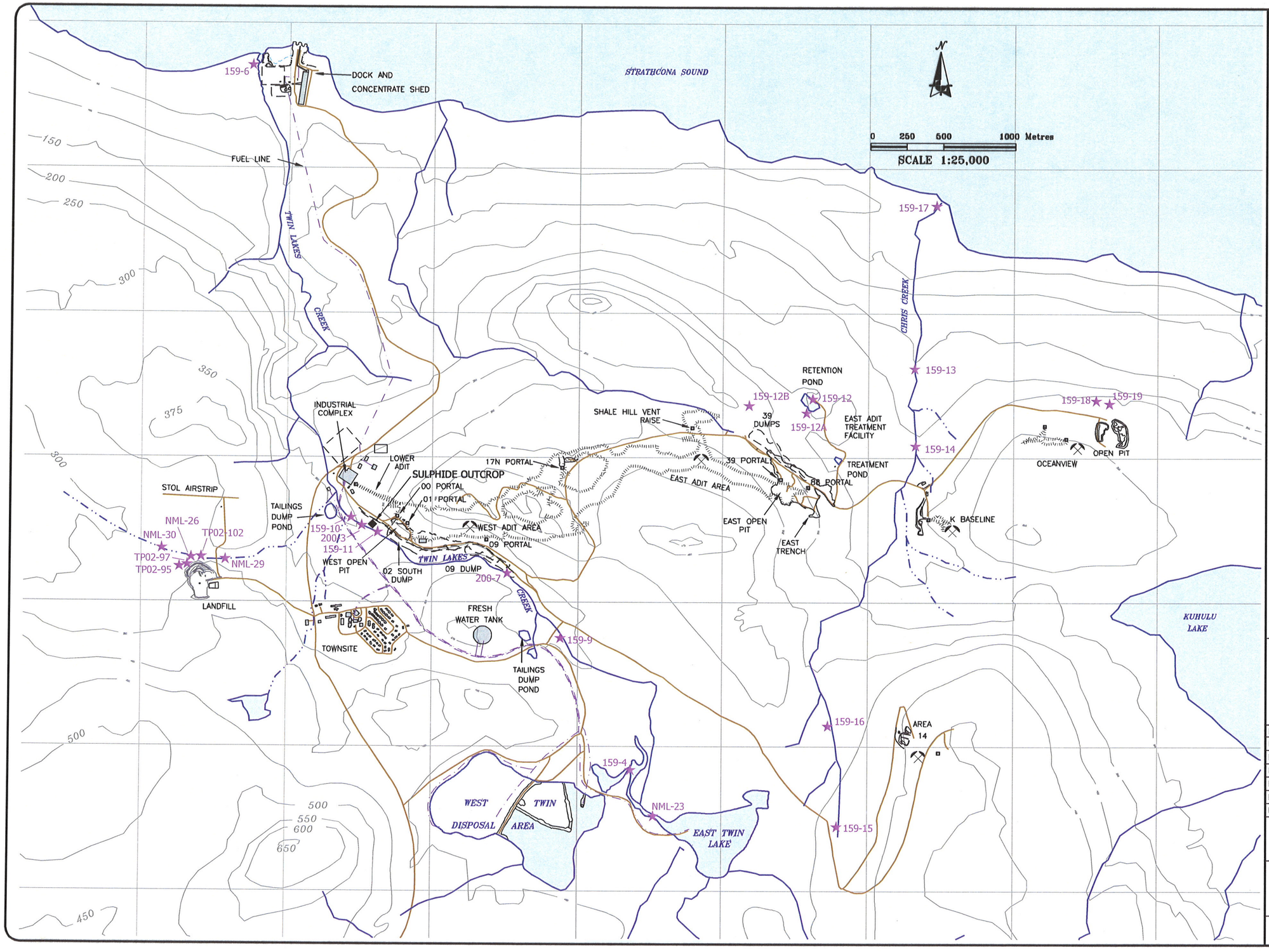
DRAWING INFORMATION:	
REVIEWED BY:	EJD
DRAWN BY:	CPW
DATE ISSUED:	FEBRUARY, 2004
PROJECT NUMBER:	23-635
FILE NAME:	23635-5F-01.DWG
REVISION:	0

Project: 2004 CLOSURE and RECLAMATION PLAN
Location: NANISIVIK MINE, NUNAVUT
Client: CanZinco Ltd.

SITE LOCATION

Stantec

Figure No. A-1



LEGEND:

- ROAD
- GROUND CONTOUR (50 m INTERVAL)
- SHORELINE, DRAINAGE, STREAMS
- INTERMITTENT DRAINAGE
- HIGH TIDE LINE – SURVEYED
- TOP OF BANK
- PIPELINE
- EXTENT OF UNDERGROUND WORKINGS
- MINING AREA
- ADIT, RAISE
- ★ NML-16 WATER SAMPLING LOCATION

SOURCE OF DRAWING:

ORIGINAL FIGURES PROVIDED BY NANISIVIK MINE

DRAWING INFORMATION:	
REVIEWED BY:	AL
DRAWN BY:	CCL/CPW
DATE ISSUED:	FEBRUARY, 2004
PROJECT NUMBER:	23-635
FILE NAME:	23635-7F-02.DWG
REVISION:	0

RECLAMATION and CLOSURE MONITORING PLAN
Location: NANISIVIK MINE, NUNAVUT
Client: CanZinco Ltd.

WATER SAMPLING LOCATIONS - MINE AREA

Stantec

Figure No. A-2

APPENDIX B

2009 Water Quality Summary Tables

2009 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

Table B1: Final Discharge Point (Station 159-4)

Parameter	Maximum Allowable Concentration	Sample Date							
		09-Jun-09	09-Jun-09 FD	15-Jun-09	08-Jul-09	22-Jul-09	05-Aug-09	17-Aug-09	31-Aug-09
Specific Conductivity (mS)	**N/A**	0.5	-	0.57	-	-	1.43	-	-
Temperature (Celsius)	**N/A**	5.7	-	5.5	-	-	9.8	-	-
pH	**6 - 9.5**	6.68	-	6.63	-	-	7.57	-	7.97
Radium (Bq/L)	**1.11**	< 0.01	< 0.01	-	< 0.01	< 0.01	0.02	< 0.01	-
TSS	**30**	< 2	9	-	< 2	< 2	< 2	< 2	< 2
Sulphate	**N/A**	-	-	-	-	-	-	-	796
Cadmium	**0.01**	<0.0001	<0.0001	-	0.0002	0.0002	<0.01	0.0003	0.0004
Lead	**0.2**	0.001	0.001	-	0.004	0.002	<0.01	0.002	<0.001
Nickel	**1**	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005
Zinc	**0.5**	0.03	0.03	-	0.05	0.1	0.12	0.09	0.09
Arsenic	**0.5**	<0.001	<0.001	-	<0.001	<0.001	-	<0.001	<0.001
Copper	**0.2**	<0.001	<0.001	-	0.001	0.001	-	0.002	<0.001
Calcium	**N/A**	50	51	-	85	184	201	177	215
Magnesium	**N/A**	30	30	-	44	106	114	102	126
Sodium	**N/A**	-	-	-	-	-	-	-	12
Potassium	**N/A**	-	-	-	-	-	-	-	12
Ammonia	**N/A**	0.06	0.07	-	0.09	0.21	0.2	0.17	0.15
Hardness	**N/A**	248	251	-	393	896	971	862	1060
Chloride	**N/A**	-	-	-	-	-	-	-	28
Bicarbonate	**N/A**	-	-	-	-	-	-	-	79
Carbonate	**N/A**	-	-	-	-	-	-	-	-
Nitrate	**N/A**	-	-	-	-	0.73	-	0.9	-
Nitrite	**N/A**	<0.10	<0.10	-	<0.10	-	<0.10	-	-
Derived Alkalinity	**N/A**	36	36	-	41	74	77	77	79

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-FD = Field Duplicate

-**Bold** = Value exceeds Maximum Authorized Concentration in a Grab Sample, as listed within the 2009 Water Licence requirements

Table B2-1: Twin Lakes Creek Water Quality Data (Station 159-6)

Parameter	2009 Action Levels (Station 159-6)	Sample Date								
		16-Jun-09	8-Jul-09	16-Jul-09	22-Jul-09	22-Jul-09 FD	5-Aug-09	14-Aug-09	17-Aug-09	31-Aug-09
Specific Conductivity (mS)	**N/A**	-	-	-	0.17	-	0.51	-	-	9.23
Temperature (Celsius)	**N/A**	-	-	-	12.1	-	5.5	-	-	6.7
pH	**6-9.5**	-	-	-	6.66	-	6.91	-	-	7.19
Radium (Bq/L)	**N/A**	-	-	-	-	-	-	-	-	-
TSS	**63**	-	<2	7	10	10	<2	<2	<2	<2
Sulphate	**509**	-	-	-	-	-	-	**511**	-	351
Cadmium	**0.018**	0.0005	0.0003	0.0006	0.0003	0.0003	<0.01	0.0014	0.0014	0.0027
Lead	**0.063**	<0.001	<0.001	0.003	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001
Nickel	**N/A**	-	-	<0.005	-	-	-	<0.005	-	<0.005
Zinc	**6.3**	0.14	0.11	0.14	0.23	0.24	0.82	0.97	0.68	1.3
Arsenic	**N/A**	-	-	<0.001	-	-	-	<0.001	-	<0.001
Copper	**N/A**	-	-	0.002	-	-	-	<0.001	-	0.001
Calcium	**N/A**	-	-	-	-	-	-	121	-	86
Magnesium	**N/A**	-	-	-	-	-	-	79	-	59
Potassium	**N/A**	-	-	-	-	-	-	3	-	3
Sodium	**N/A**	-	-	-	-	-	-	7	-	4
Ammonia	**N/A**	-	0.03	0.03	<0.02	<0.02	<0.02	<0.02	0.02	0.03
Hardness	**N/A**	-	-	-	-	-	-	627	-	458
Chloride	**N/A**	-	-	-	-	-	-	15	-	10
Bicarbonate	**N/A**	-	-	-	-	-	-	63	-	59
Nitrate + Nitrite	**N/A**	-	-	-	-	-	-	1.11	-	0.96
Derived Alkalinity	**N/A**	-	-	-	-	-	-	63	-	59

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-FD = Field Duplicate

-**Bold** = Value exceeds specified 2009 action levels

Table B2-2: Twin Lakes Creek Water Quality Data (Station 159-10)

Parameter	2009 Action Levels (Station 159-10)	Sample Date						
		15-Jun-09	8-Jul-09	15-Jul-09	22-Jul-09	5-Aug-09	17-Aug-09	31-Aug-09
Specific Conductivity (mS)	N/A	0.09	-	-	0.12	0.42	-	7.87
Temperature (Celsius)	N/A	3.7	-	-	12.2	9.8	-	5.9
pH	6-9.5	**5.8**	-	-	6.38	6.65	-	7.8
Radium (Bq/L)	N/A	-	-	-	-	-	-	-
TSS	15	-	<2	<2	3	<2	<2	2
Sulphate	651	-	-	-	-	-	-	311
Cadmium	0.37	-	0.0003	0.0006	0.0007	<0.01	0.0022	0.0064
Lead	0.14	-	<0.001	0.002	0.002	<0.01	<0.001	<0.001
Nickel	N/A	-	-	-	-	-	-	-
Zinc	13	-	0.11	0.18	0.33	1.18	0.89	3
Arsenic	N/A	-	-	-	-	-	-	-
Copper	N/A	-	-	-	-	-	-	-
Calcium	N/A	-	-	-	-	-	-	71
Magnesium	N/A	-	-	-	-	-	-	52
Potassium	N/A	-	-	-	-	-	-	3
Sodium	N/A	-	-	-	-	-	-	3
Ammonia	N/A	-	-	-	-	-	-	0.04
Hardness	N/A	-	-	-	-	-	-	391
Chloride	N/A	-	-	-	-	-	-	9
Bicarbonate	N/A	-	-	-	-	-	-	45
Nitrate + Nitrite	N/A	-	-	-	-	-	-	0.95
Derived Alkalinity	N/A	-	-	-	-	-	-	45

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-FD = Field Duplicate

-**Bold** = Value exceeds specified 2009 action levels

Table B2-3: Twin Lakes Creek Water Quality Data (Station NML-23)

Parameter	2009 Action Levels (Station NML-23)	Sample Date						
		8-Jun-09	8-Jul-09	15-Jul-09	24-Jul-09	5-Aug-09	17-Aug-09	31-Aug-09
Specific Conductivity (mS)	N/A	0	-	-	0.77	0.04	-	1.79
Temperature (Celsius)	N/A	3.7	-	-	13.3	6	-	5.6
pH	6-9.5	**5.99**	-	-	7.47	7.85	-	8.11
Radium (Bq/L)	N/A	-	-	-	-	-	-	-
TSS	11	-	<2	<2		<2	3	<2
Sulphate	25	-	-	-	-	-	-	**38**
Cadmium	0.58	-	0.0008	0.0001	<0.0001	<0.01	<0.0001	<0.0001
Lead	0.046	-	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001
Nickel	N/A	-	-	-	-	-	-	-
Zinc	0.14	-	0.01	<0.01	<0.01	<0.05	<0.01	<0.01
Arsenic	N/A	-	-	-	-	-	-	-
Copper	N/A	-	-	-	-	-	-	-
Calcium	N/A	-	-	-	-	-	-	14
Magnesium	N/A	-	-	-	-	-	-	8
Potassium	N/A	-	-	-	-	-	-	<1
Sodium	N/A	-	-	-	-	-	-	<2
Ammonia	N/A	-	-	-	-	-	-	<0.02
Hardness	N/A	-	-	-	-	-	-	68
Chloride	N/A	-	-	-	-	-	-	2
Bicarbonate	N/A	-	-	-	-	-	-	26
Nitrate + Nitrite	N/A	-	-	-	-	-	-	0.23
Derived Alkalinity	N/A	-	-	-	-	-	-	26

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-FD = Field Duplicate

-**Bold** = Value exceeds specified 2009 action levels

Table B3-1: Chris Creek Water Quality Data (Station 159-15)

Parameter	2009 Action Levels (Station 159-15)	Sample Date	
		23-Jul-09	17-Aug-09
Specific Conductivity (mS)	N/A	0.28	-
Temperature (Celsius)	N/A	13.7	-
pH	6 - 9.5	7.35	-
Radium (Bq/L)	N/A	-	-
TSS	4	-	< 2
Sulphate	269	-	-
Cadmium	0.00085	<0.0001	<0.0001
Lead	0.00725	<0.001	<0.001
Nickel	N/A	-	-
Zinc	0.17	<0.01	0.01
Arsenic	N/A	-	-
Copper	N/A	-	-

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-**Bold** = Value exceeds specified 2009 action levels

Table B3-2: Chris Creek Water Quality Data (Station 159-14)

Parameter	2009 Action Levels (Station 159-14)	Sample Date		
		17-Jul-09	23-Jul-09	17-Aug-09
Specific Conductivity (mS)	N/A	-	0.71	-
Temperature (Celsius)	N/A	-	15.3	-
pH	6 - 9.5	-	7.56	-
Radium (Bq/L)	N/A	-	-	-
TSS	33	16	-	< 2
Sulphate	408	-	-	-
Cadmium	0.0005	0.0001	<0.0001	<0.0001
Lead	0.0022	**0.003**	<0.001	<0.001
Nickel	N/A	-	-	-
Zinc	0.13	0.06	0.05	0.07
Arsenic	N/A	-	-	-
Copper	N/A	-	-	-

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-**Bold** = Value exceeds specified 2009 action levels

Table B3-3: Chris Creek Water Quality Data (Station 159-17)

Parameter	2009 Action Levels (Station 159-17)	Sample Date		
		17-Jul-09	23-Jul-09	17-Aug-09
Specific Conductivity (mS)	N/A	-	-	-
Temperature (Celsius)	N/A	-	-	-
pH	6 - 9.5	-	-	-
Radium (Bq/L)	N/A	-	-	-
TSS	53	38	-	-
Sulphate	499	-	-	-
Cadmium	0.0012	0.0007	0.0001	0.0002
Lead	0.028	0.018	<0.001	<0.001
Nickel	N/A	<0.005	<0.005	-
Zinc	0.38	0.22	0.16	0.27
Arsenic	N/A	<0.001	<0.001	-
Copper	N/A	0.002	<0.001	-

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-**Bold** = Value exceeds specified 2009 action levels

Table B4: Landfill Water Quality Data (Station NML-30)

Parameter	2009 Action Levels (Station NML-30)	Sample Date					
		7-Jun-09	7-Jul-09	24-Jul-09	5-Aug-09	17-Aug-09	19-Aug-09
Specific Conductivity (mS)	**N/A**	0.28	-	0.46	0.5	-	-
Temperature (Celsius)	**N/A**	6.4	-	12.5	5.5	-	-
pH	**6 - 9.5**	7.39	-	7.57	7.58	-	-
Radium (Bq/L)	**N/A**	-	-	-	-	-	-
TSS	**22**	-	<2	-	<2	-	<2
Sulphate	**240**	-	-	-	-	-	
Cadmium	**0.000245**	-	<0.0001	<0.0001	<0.01	<0.0001	-
Lead	**0.0055**	-	<0.001	<0.001	<0.01	<0.001	-
Nickel	**N/A**	-	-	-	-	-	-
Zinc	**0.015**	-	<0.01	<0.01	<0.05	<0.01	-
Arsenic	**N/A**	-	-	-	-	-	-
Copper	**N/A**	-	-	-	-	-	-
Calcium	**N/A**	-	-	-	-	-	-
Magnesium	**N/A**	-	-	-	-	-	-
Sodium	**N/A**	-	-	-	-	-	-
Potassium	**N/A**	-	-	-	-	-	-
Ammonia	**N/A**	-	-	-	-	-	-
Hardness	**N/A**	-	-	-	-	-	-
Chloride	**N/A**	-	-	-	-	-	-
Bicarbonate	**N/A**	-	-	-	-	-	-
F1	**N/A**	-	<0.2	<0.2	-	-	<0.2
F2	**N/A**	-	<0.2	<0.2	-	-	<0.2
F3	**N/A**	-	<0.2	<0.2	-	-	<0.2
F4	**N/A**	-	<0.2	<0.2	-	-	<0.2
F1-BTEX	**N/A**	-	<0.2	<0.2	-	-	<0.2
Benzene	**N/A**	-	<0.5	<0.5	-	-	<0.5
Toluene	**N/A**	-	<0.5	<0.5	-	-	<0.5
Ethyl Benzene	**N/A**	-	<0.5	<0.5	-	-	<0.5
m/p - xylene	**N/A**	-	<1.0	<1.0	-	-	<1.0
o-xylene	**N/A**	-	<0.5	<0.5	-	-	<0.5

Notes:

-Concentrations are reported as total mg/L unless otherwise specified

-**Bold** = Value exceeds specified 2009 action levels

APPENDIX C

Temporal Trend Figures

2009 Annual Water Quality Monitoring Report, Nanisivik Mine, Nunavut

Figure C1: Temporal trends at Station 159-4

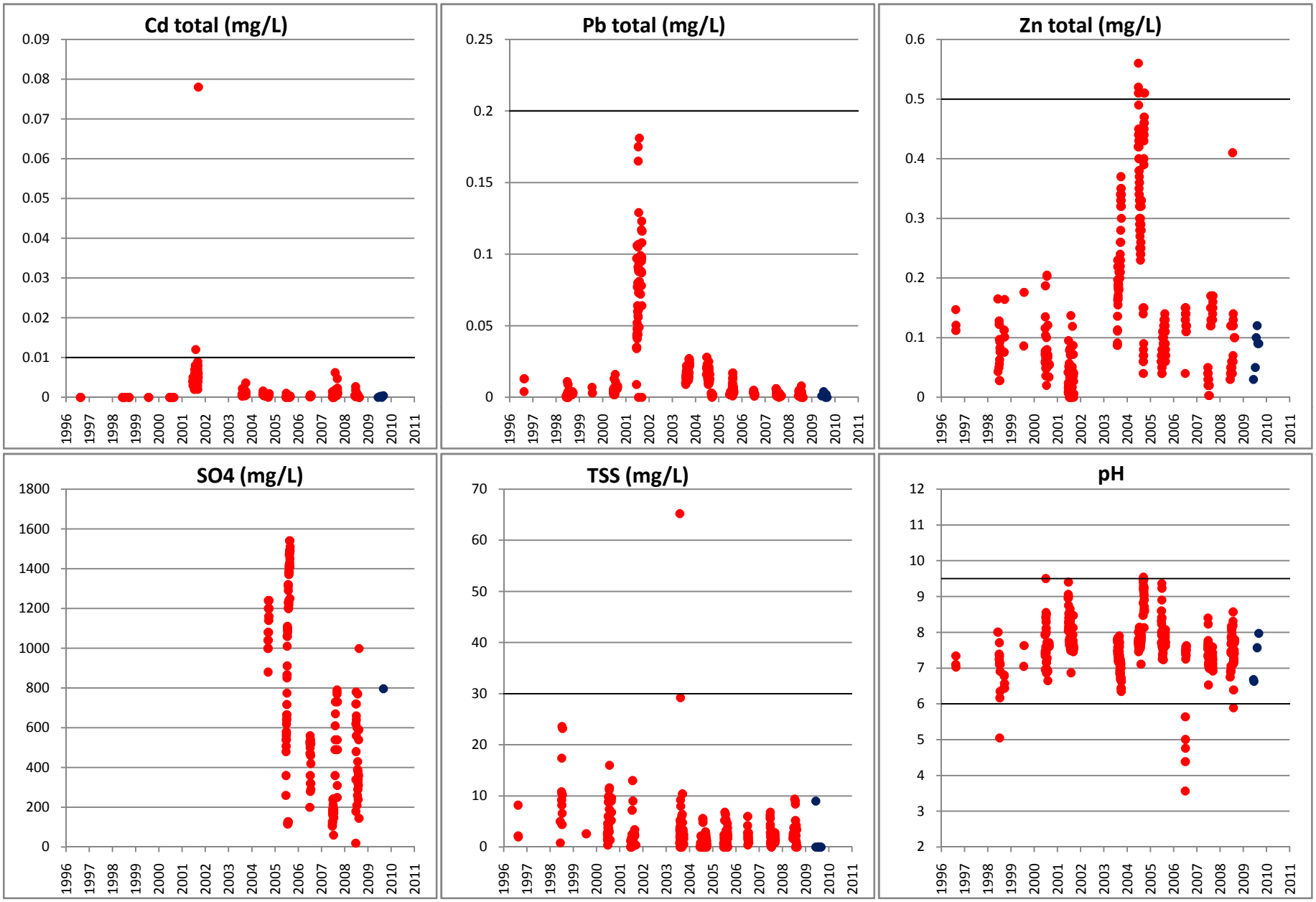


Figure C2: Temporal trends at Station 159-6

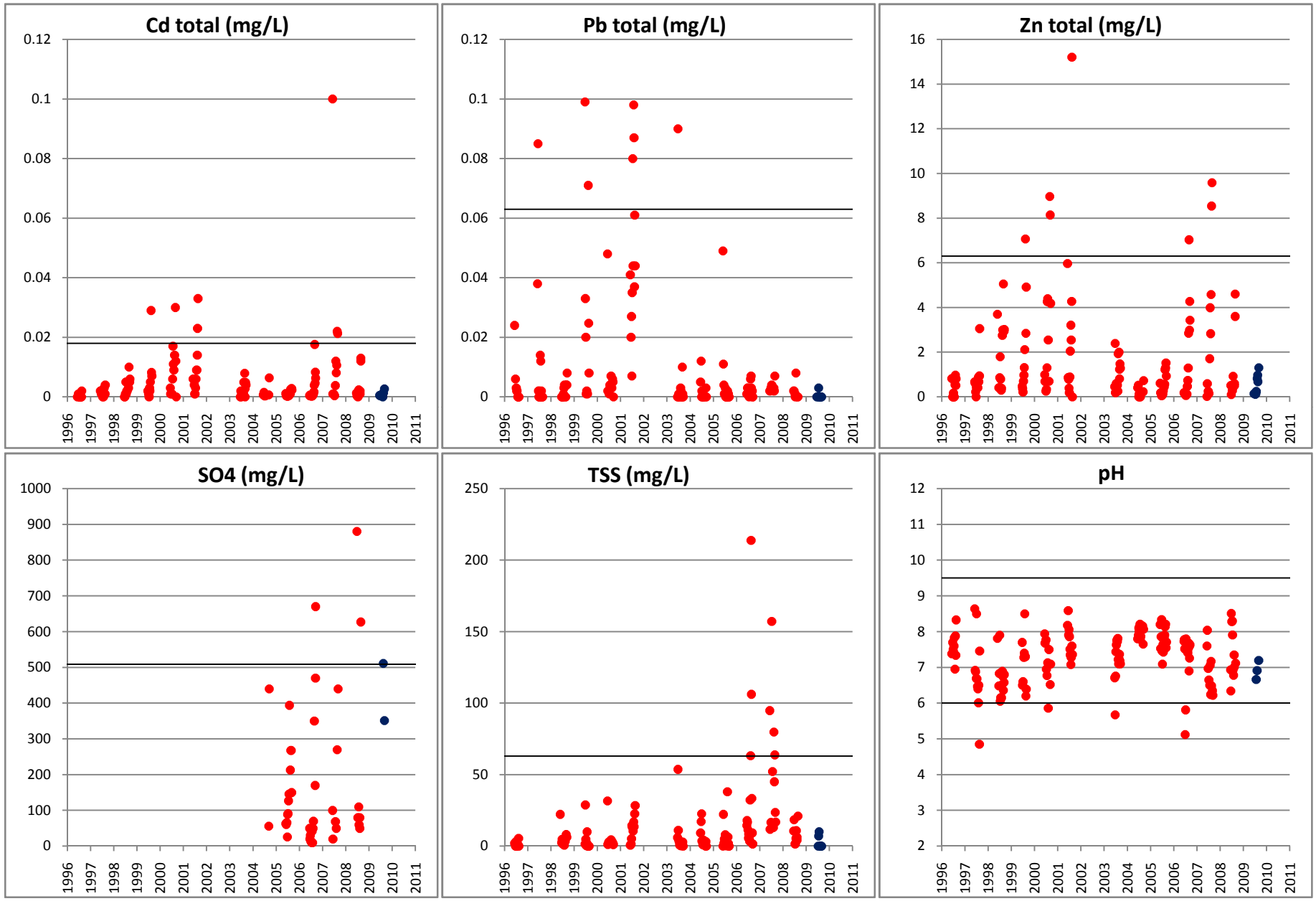


Figure C3: Temporal trends at Station 159-10

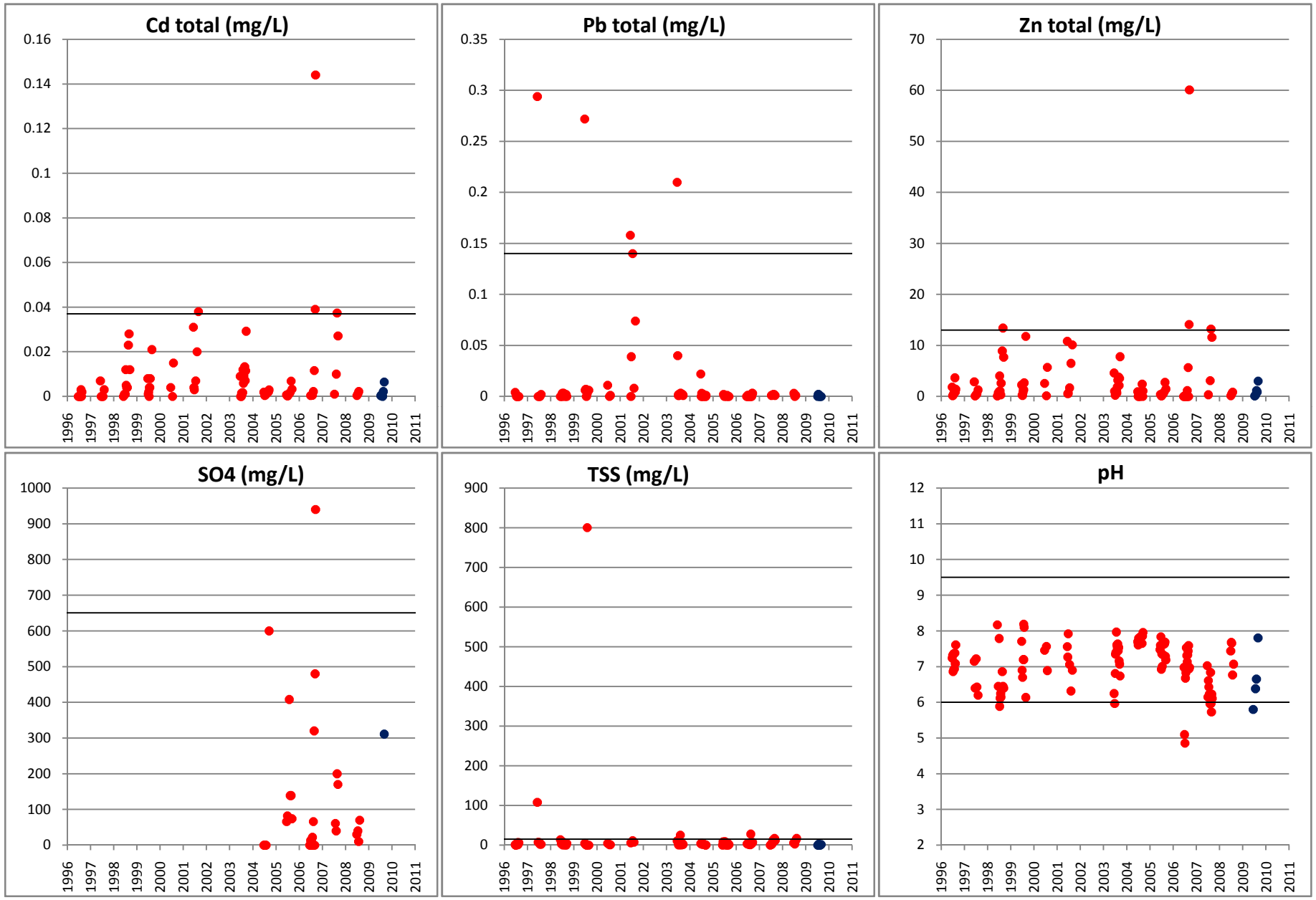


Figure C4: Temporal trends at Station NML-23

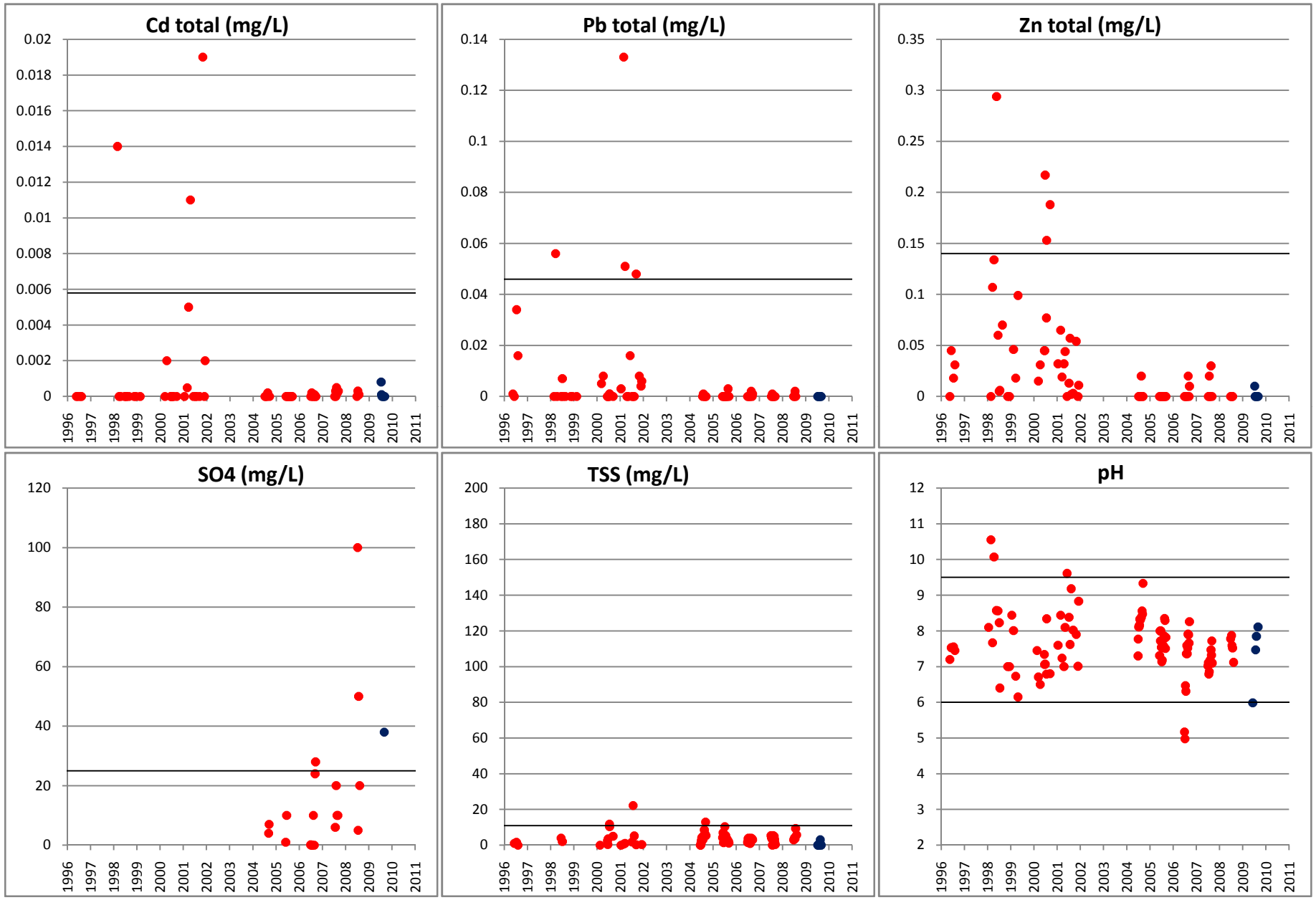


Figure C5: Temporal trends at Station 159-15

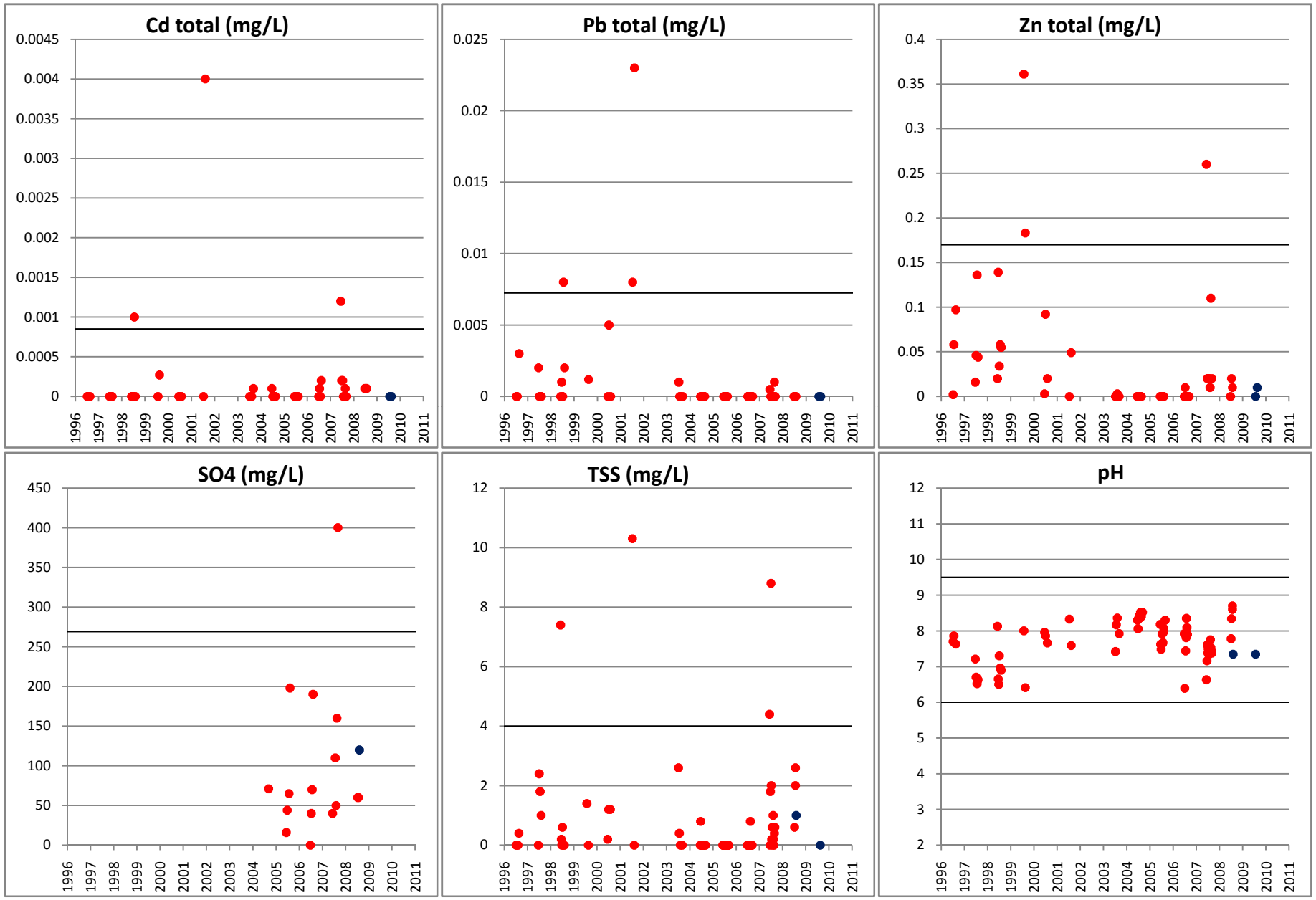


Figure C6: Temporal trends at Station 159-14

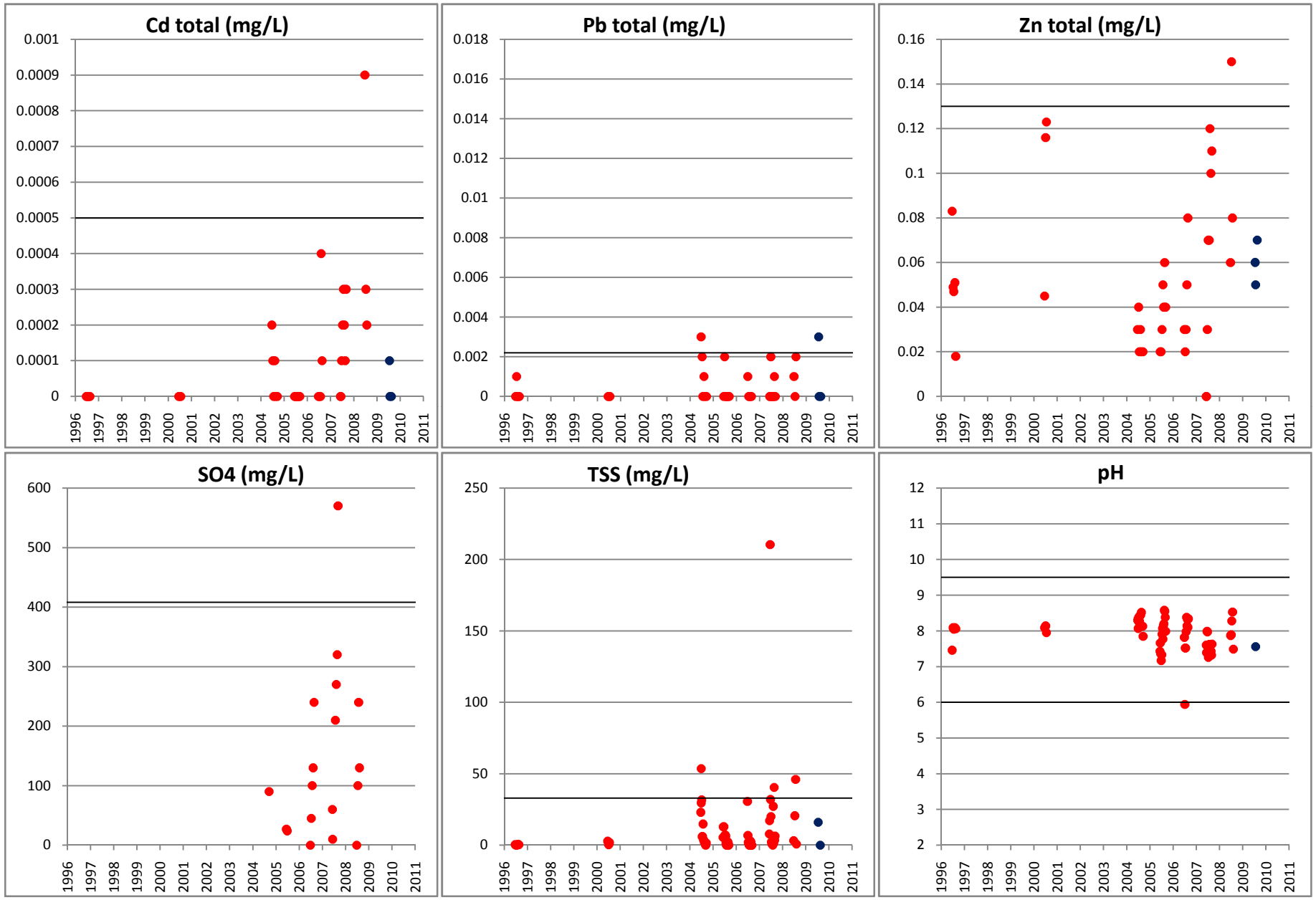


Figure C7: Temporal trends at Station 159-17

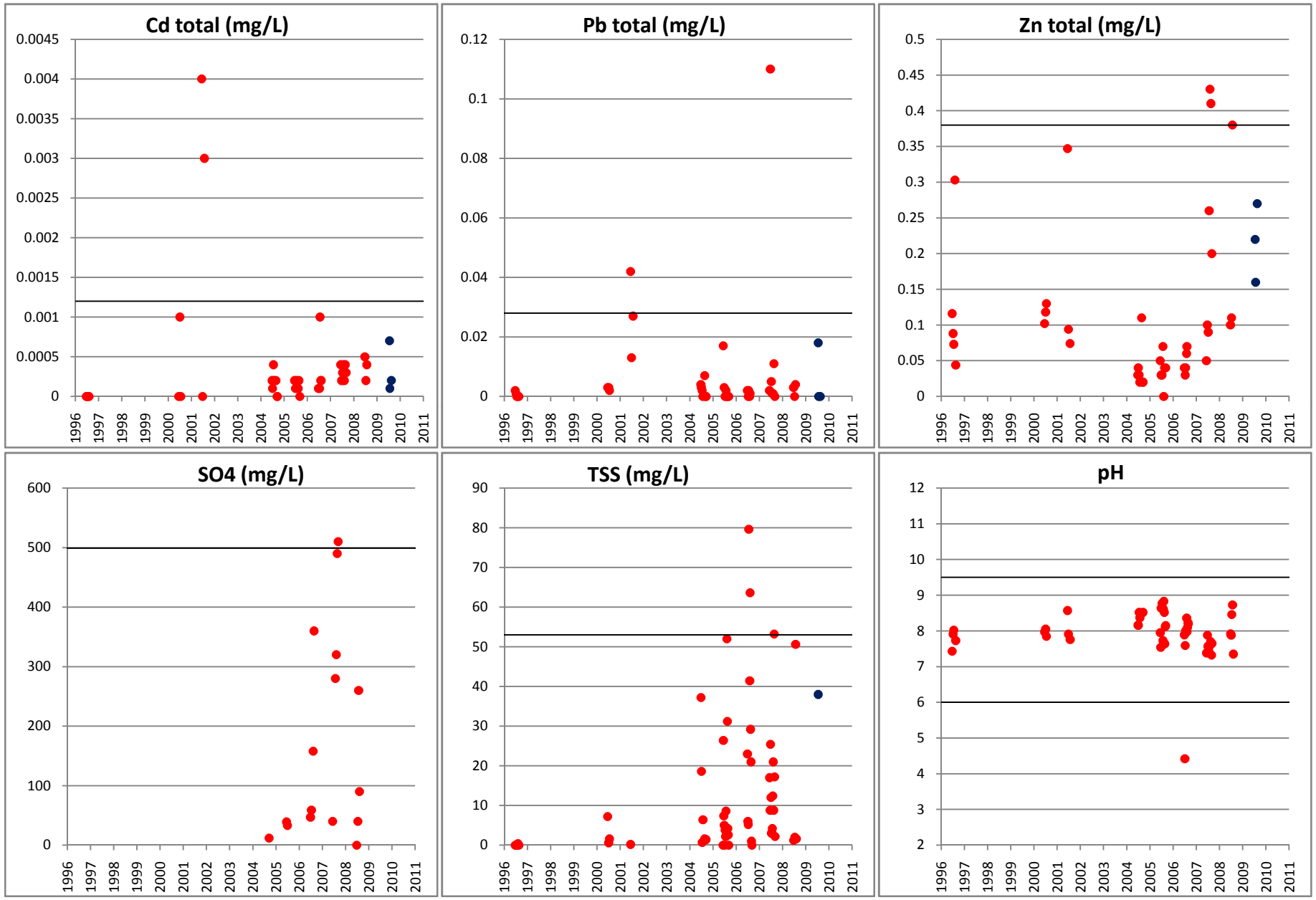


Figure C8: Temporal trends at Station NML-30