Survey Report
for
Wolfden Resources Inc.
summarizing
2004 Coronation Gulf
Bathymetric Survey

Submitted:
December 2004

Prepared by:

CHALLENGER
GEOMATICS LTD.

Table of Contents

Introduction

This Survey Report has been prepared for Wolfden Resources Inc. in care of Gardner Lee Ltd. It is a summary of the services and products supplied by Challenger Geomatics Ltd. in surveying a portion of the Coronation Gulf. The report starts with a description of the mobilization of personnel and equipment, describes methodology, then processing, discusses problems encountered, summarizes products and concludes with recommendations for future work.

1.0 Mobilization

Upon notification of contract award, equipment preparation began. A Hydrotrac echosounder with a 24khz transducer had to be ordered and shipped, to provide a back up to the Innerspace 440 echosounder. Equipment had to be checked and field tested prior to shipment.

Equipment was then packed and shipped via First Air to Yellowknife, prior to the crew arriving.

The crew of Isabelle Bellavance and Paul Nicol departed Edmonton on July 28th, 2004, arriving the same day at Wolfden's ULU camp. The equipment arrived later the same day and was organized for shipment via helicopter to the coast, the next day.

On July 29th, the equipment was shipped to the coast by helicopter followed by the crew who began mobilizing the equipment onto the larger vessel. A base station was chosen near the staging area and set up prior to Sea trials which were completed on July 30th. It was at this time that it was discovered the Innerspace 440 echosounder would not work in water depths greater than 250 meters. The sounder was demobed and the Odom Hydrotrac with 24khz Transducer was mobilized.

2.0 Survey Methodology

This section can be cross referenced with Appendix A which is a summary of the field log

The following equipment was utilized during the Coronation Gulf project:

1. Leica GPS 1200 R.T.K system
2. Odom Hydrotrac survey precision echosounder with a 24 khz transducer
3. Dell laptop computer with a custom navigation software (CNAV)
4. Motorola hand-held radios and satellite phones for communications

A base station was chosen near the staging area at the Wentzell River on high ground, at the beginning of the project. An UTM zone 12 (NAD83) standalone coordinate was utilized and later adjusted after a tie was made to McElhanney's photo control – targets #6 and #5. The HT2 geoid model was applied to give orthometric elevations.

The boat system consisted of the laptop computer interfaced to a Leica 1200 GPS receiver and a Hydrotrac echosounder. The GPS receiver was configured to output a NMEA (National Marine Electronics Association) message in the GGA format. Raw data was automatically stored if Real Time Kinematic (RTK) was down (standalone) which did happen out in the gulf. RTK needs radio communication between the Rover (boat) and base station to operate and this failed when the distance from the base was too great or there was an obstruction like an island. By collecting raw data at the base station and rover a post mission Kinematic or differential solution could be achieved in processing.

The Odom Hydrotrac echosounder outputs a digital depth to the laptop computer in an ascii format, and produces a continual analogue trace of the bottom.

Challengers' CNAV software is used to collect the positional and depth information from the above devices. The laptop and CNAV software aided the helmsman in steering the boat along a survey line using a graphical display. This information was recorded at a 25m interval along the line in the Coronation Gulf and Gray's Bay areas. In the two port site areas, data was collected at a 10m interval while Line spacing of regional lines varied throughout the project area as follows:

Coronation Gulf	- 300m Line Spacing
Grays Bay	- 200m Line Spacing
Proposed Port Site 1 and 2	- 10-20m Line Spacing in shallow water
	- 50 – 100m Line Spacing in deep water
Proposed Port Site 3 and 4	- 100m Line Spacing
Shoal Examinations	- 25m Line Spacing

Crosslines (tag lines) were run perpendicular to regional lines at an interval of 15 or less times the regional line spacing.

The echosounder was bar checked at the beginning of each shift, weather permitting. This calibration process results in a propagation velocity for the water column (speed of sound) in the survey area. This was accomplished by lowering a bar beneath the transducer at a known depth (i.e. 10m) and adjusting the speed of sound on the echosounder to read that known depth.

A staff gauge was installed at the mouth of the Wentzell River, by Chris Anderson on the evening of August 2nd, 2004. Staff readings were taken when the boat departed and returned to the staging area. This information gives us the rise and fall of the tide during the field campaign.

Table 1 Tide staff gauge readings between August 2nd and 10th.

STAFF GAUGE INSTALLED AUG 02/04

date	local time	utc date	utc	reading	difference	water level(wrt cd)
2-Aug	2215	3-Aug	0415	3.10	0.07	0.475
3-Aug	530	3-Aug	1130	2.85	-0.18	0.225
3-Aug	1015	3-Aug	1615	2.84	-0.19	0.215
3-Aug	1930	4-Aug	0130	3.15	0.12	0.525
3-Aug	2020	4-Aug	0220	3.11	0.08	0.485
4-Aug	705	4-Aug	1305	2.70	-0.33	0.075
5-Aug	1120	5-Aug	1720	2.83	-0.20	0.205
5-Aug	1410	5-Aug	2010	2.92	-0.11	0.295
5-Aug	1715	5-Aug	2315	3.08	0.05	0.455
5-Aug	1915	6-Aug	0115	3.10	0.07	0.475
5-Aug	2100	6-Aug	0300	3.10	0.07	0.475
6-Aug	500	6-Aug	1100	2.80	-0.23	0.175
6-Aug	2130	7-Aug	0330	2.95	-0.08	0.325
7-Aug	700	7-Aug	1300	2.77	-0.26	0.145
7-Aug	850	7-Aug	1450	2.78	-0.25	0.155
7-Aug	1340	7-Aug	1940	2.85	-0.18	0.225
7-Aug	1900	8-Aug	0100	2.92	-0.11	0.295
7-Aug	2030	8-Aug	0230	2.90	-0.13	0.275
8-Aug	710	8-Aug	1310	2.77	-0.26	0.145
8-Aug	1930	9-Aug	0130	2.88	-0.15	0.255
8-Aug	2000	9-Aug	0200	2.87	-0.16	0.245
8-Aug	645	9-Aug	1245	2.88	-0.15	0.255
10-Aug	1230	10-Aug	1830	3.03	0.00	0.405

WATER LEVEL AT STAFF GAUGE WAS TIED IN ON AUG 10, 2004. STAFF READING WAS 3.03m .

3.0 Processing

3.1 Daily Field Processing

At the end of each shift data collected had to be backed off, organized, editted for zero depths (or erroneous), quality of position (RTK, differential and standalone had to be checked) and for the first couple of days the depths were input into excel so truncated soundings could be fixed (computer was truncating depths until new software was emailed to solve this problem – Aug 02). Depths were truncated when greater than 100m water depth but new coding corrected this.

3.2. Office Processing After Field Campaign

- Coordinates had to be shifted to known coordinates (McElhanney photo control) based on survey ties made to photo target #6 on Aug 10, 2004 and an additional tie to target #5 completed on Aug 11, 2004 from our base station used throughout the bathymetric program.
- Standalone GPS positions (Coronation Gulf area only) had to be processed to an RTK or differential position. It should be noted that standalone GPS was accurate to < 4.5 meters. (worst case)
- When GPS reverted to standalone positioning water elevation was held to previous RTK solution.

Once the soundings were plotted they were visually inspected on the computer, it was during this time that a discrepancy was noted. On August 5th the night shift visited Port site 1 area for the first time, rough sea conditions prevented the crew from performing a bar check (calibration) so the previous velocity was used (1405m/s). The crew returned to Port 1 area on the evening of August 6th, continued to survey the area, rough seas persisted until the morning of August 7th when the sea conditions subsided. The crew performed a calibration at Port 1; the speed of sound was determined to be 1467m/s. This actual speed of sound had to be used to compute new depths in edited data.

A similar problem was encountered where a bar check was completed out in the middle of Gray's Bay, surveying began and the sea conditions got worse, the vessel proceeded to calmer waters (Ports 3 and 4 and Port 2 Areas), another bar check was not performed until the following day. (1405m/s to 1466m/s was accounted for in editing)

3.3 Elevations and Reduction of Soundings to Chart Datum

3.3.1 Sounding Reductions

On August 11, 2004 the base station was tied into CHS BM– 16 (1979) at Baychimo Harbour 111 Km away. (see Appendix B) The BM is 1.932m above chart datum. Geodetic elevation showed it to be 2.946m a difference of +1.014m between Geodetic and chart datum. RTK positions offshore provide elevations of the water level surface in real-time, instantaneously. Geodetic water surface elevations were reduced to chart datum (- 1.014m) so that the water surface is now with respect to (W.R.T) chart datum allowing the soundings to be reduced as follows:

i.e. Depth = 100m
Water Elev = 0.3m (W.R.T chart datum)
Reduced depth = 99.7m ; and

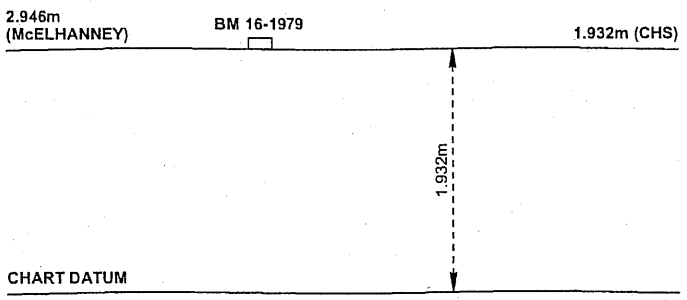
i.e. Depth = 100m
Water Elev. = -0.1 (W.R.T chart datum)
Reduced depth = 100.1m

3.3.2 Relationship of Geodetic Elevation to Chart Datum

Geodetic coordinates were supplied from McElhanney (see Appendix C) via Brent of Gartner Lee, and Challenger used these coordinates as a basis for assigning coordinates to their base station and for field data collection. Upon completion of the bathymetric survey Challenger did a Static GPS observation to relate McElhanney's Geodetic Coordinates to the Canadian Hydrographic (CHS) BM16 at BayChimo. The CHS publishes an elevation of 1.932m above Chart Datum for this BM16 and Challengers survey established a geodetic elevation of BM16 to be 2.946m relative to McElhanney's geodetic control.

See the following figure.

RELATIONSHIP BETWEEN
GIVEN CONTROL (McELHANNEY) AND CHART DATUM (CHS)



BM 16–1979 SHOULD HAVE AN ELEVATION OF 1.932 metres.

BASED ON McELHANNEY CONTROL BM 16–1979 IS ASSIGNED 2.946 metres.

TO MATCH CHART DATUM ALL McELHANNEY AND McELHANNEY
BASED ELEVATIONS MUST BE REDUCED BY –1.014 metres.

Figure 1

4.0 Problems Encountered

1. Innerspace Echosounder would not work in depths greater than 250m the spare Hydrotrac Echosounder was utilized with 24khz transducer.

2. Digital depths were truncated at the start of project (depths > 100M) until new coding was received via email. Problem data was dealt with by editing it in excel.

3. Real-Time Kinematic GPS was down from August 01-04, 2004, 3 radio modem cables failed. Replacements were received on August 04 and implemented on August 5th. Data during this time was recorded at the base station and rover receivers to be later processed to an RTK or differential solution – centimeter to sub meter accuracy. Note again standalone GPS proved to be good to 4.5m or less (worst case), in addition RTK GPS was achieved up to 45kilometers offshore using a 25 Watt radio.

4. Power problems on August 05, 2004 due to unknown cause. The power supply cable was fried, and the invertor was inspected at camp by an electrician and found to be okay and the battery on board boat tested okay. The Electrician at camp built a 20V power supply for the computer and a standard cable was expedited from Edmonton the next day. Great Slave helicopters loaned us a cable in the meantime. Paul used his laptop computer on the night shift after these power problems, but his computer did not have the drivers to interface to the echosounder so he had to manually fix the echosounder.

5. A noisy echotrace which did not digitize at high speeds. We had to input depths into the file later from echotrace. The problem was solved at end of shift by lowering transducer (change draft). In hind sight we should have done this first, saving processing time.

6. The survey ties to McElhanney and CHS control was done at the end of the project and because of this additional computations were required.

Summary

The only time the crew had to shutdown due to technical problems was during the day shift when the power problems occurred. All other times were due to weather.

5.0 Chart Production

Upon completion of processing, the data was prepared for drafting:

- data was thinned for contouring and the plotting of soundings depending on the various scales of drawings and the line spacing required.

Note: All data resides in the drawing on a separate layer.

Five plots were produced:

Plot#1	Location plan	Scale	1:75,000
Plot#2	Approach to Gray's Bay	Scale	1:60,000
Plot#3	Gray's Bay	Scale	1:30,000
Plot#4	Port 1	Scale	1:5,000
Plot#5	Port 2	Scale	1:5,000

A rectified photo mosaic, provided by Gartner Lee, was inserted into the drawings and shown as background.

6.0 Recommendations

1. If a 24 hour operation is necessary again in the future the following are recommended:

- Additional personnel should be used, for organizing and processing data, possibly with an AutoCad system to plot data quickly. In addition the staff could rotate among themselves so everybody stays fresh. One of the problems the crew had was spending too much time processing / organizing data with the spare computer. Because 2 computers were required on the boat (operations and spare) there was a lot of time spent transferring and backing up data after each shift.

- An accommodation on the coast is another recommendation if running operations 24 hours. This would cut down on travel time, make it easier for troubleshooting and make assessment of the weather conditions easier.

2. A velocity profiler is recommended for this type of work, rather than a bar check. It is easier to lower / retrieve a velocity profiler in unsuitable sea conditions, than it is to lower and hold a bar at 2m, 5m, 10m, 15m etc. plus it would give a more accurate mean speed of sound in deeper water.

3. Ties to control should be done at the start of a new project rather then at the end to minimize processing.

Appendix A

Field Log Summary

Field Log Summary

July 28th, 2004

- Travel to Yellowknife
- Charter to ULU Camp
- Equipment arrives at 1800hrs
- Unpack and organize
- Batteries on charge
- Camp orientation

July 29th, 2004

- Travel to coast
- Equipment shuttled by helicopter
- Meet Allen and crew
- Begin mobilizing boat
- Test and check equipment

July 30th, 2004

- Travel to site
- Set up base station – RTK mode
- Boat Ant 1.67m
- Draft 0.48m
- Travel out to east of Hepburn Island
- Innerspace not tracking deeper than 270m
- Back to shore – De-mob innerspace
- Mob Hydrotrac with 24 khz Xducer
- ANT HGT 1.61m
- Draft 0.46m
- Back out to islands
- Digitizer not showing 100's digit (truncated)

July 31st, 2004

0000 - Fix 1000
- EOL #6 head for base to change out batteries

0800 - SOL #7 Fix 3100

0904 - EOL #7 Fix 3550

1021 - SOL 9 Fix 4093

1240 - EOL 10 Fix 5042

1243 - SOL 11 5048
- Extend existing line north
- SOL 12 Fix 5580
- SOL 13 Fix 5653
- SOL 14 Fix 5750

- SOL 15 Fix 5830
- SOL 16 Fix 5918
- SOL 17 Fix 6000
- SOL 18 Fix 6080
- SOL 19 Fix 6160
- SOL 20 Fix
- SOL 21 Fix 6330
- SOL 22

1655 - EOL 22 7119

Travel to base

2000 Depart back to area – 2nd crew back to camp

Switching to 24hr operation

- Infill @ Hepburn area

2200 Fix 7912

2255 Fix 8255

2320 Fix 8510

2330 - Stop at Island point record position for photo guys Fix 100-119 on LEICA

- Continue Lines

August 1st, 2004

0000 - Fix 8810 Coronation Gulf Corridor area
GPS (RTK – DGPS – Standalone – RTK)

0040 - 20 Km North RTK in and out

0056 - Encounter ice, turn onto next line

0110 - Fix 9520 200m W.D.

0145 - Fix 9864 200m W.D.

0200 9985 100m W.D.

0310 - Encounter ice turn STBD.

- SOL 6 Fix 12330

0317 - SOL 4 Fix 10856

0420 - SOL 5 Fix 11580

0425 - Possible shoal

0530 - Encounter ice turn STBD.

- SOL 6 Fix 12330

0635 Fix 13158 Run tie (check line)

Fix 13975 Run recon line at Port 3 and 4 area

- Back to base

- Crew change

1000 - Change out Batts

1245 - SOL 7 Fix 14500
- Fix 15300 Digitizer does not read +300m W.D. correctly
- Fix 16065 – 16087 – Delete

1707 - EOL 8 Fix 16715
1917 - EOL Fix 17242
- Back to base for crew change
- Cable problems no RTK, change out cables

2030 - Head out.
- Bar check
- Collect GPS points on broken island
Fix 100 – 105 on LEICA

2130 - Head north to Coronation Gulf Area.
- SOL 10 Fix 17352

2252 Fix 17455
2330 - SOL 11 - Avoid ice

August 2nd, 2004

0000 Fix 18950
0035 - SOL 13 Fix 19595
0105 - SOL 14 Fix 20000 (infill)
- SOL 15 Fix 20530

0310 - SOL 19 Fix 21810
0350 - SOL 20 22330
0425 - SOL 21 Fix 22840
0610 - In Grays Bay Fix 24190
- Last fix 24809
- Back off data
- GPS is Standalone – no RTK
- Problems with cables – PP Kinematic Mode – Log every 5 Seconds
- Crew change
- Boat Ant Hgt is 1.61

0825 - SOL 31 Fix 25000 East Hepburn
0900 Fix 25439
Fix 25970 – 26918 Sounder not working properly
- Delete Fix 26427 – 26440
- Too windy / waves

1035 - Head back to shore
1125 - Check base station – standby for weather
1515 - Set out for Gray's Bay
1545 - Bad sea conditions back to shore

- Crew change

2000 - At coastal camp process and organize data
- Install staff gauge – Chris Anderson

- Received update to CNAV (to read 100 Digit on soundings)

August 3rd, 2004

0800 - Crew Change
- Rover Hgt 1.61m

1020 - Head out to Grays Bay tried bar check – Too windy

1040 - GPS Problems
- Delete fixes 26500-26637
- Sounder problems too much wave action
- Delete fixes 26700-26799

1236 Fix 26800

1415 - Bar check – Grays Bay

1820 Fix 29550

1925 - EOL 30390 Head back to shore

- Crew Change

2040 - Head out to Gulf run C/L between Islands
Fix 30400 SOL
- Abandon line head back to camp

2120 - Resume survey
Fix 31319 No digitization – noisy
- Will have to extract depth manually from trace latter
- Noise cleaned no Fix 31630
- Encounter ice run X lines (check)

2355 Fix 32230

August 4th, 2004

0000 - Run check lines

0145 - Fix 33556 back to regional lines
- End line due to ice

0330 - XLING 13.5Km north of start
- Fix 35000

0530 - SOL 34 Fix 36420

0705 - EOL Fix 36996 Head for base
- Adjust transducer and Ant to clear up noise
- Crew Change
- HI = 1.7m

- Draft = 0.49m

0930 - Waiting on weather to improve

1125 - Attempt Grays Bay – too rough
- Back to shore organize data

- No night shift on boat
- Process data due to sea conditions

August 5th, 2004

0630 - New GPS equipment arrive test at camp – good
- Processing data

1015 - At site
- Rover HI 1.70m
- Draft 0.49m
- Set up equipment
- Process data – Waiting on weather

1430 - Head out – Bar check

1645 - Problems with laptop power cable
- Head back to shore – both cables damaged

- Crew Change

- Bring out 3rd laptop
- Does not have the drivers to run Ethernet card for sounding
- Manually fix
- Survey port 1 area
- Seas are rough – back to camp

August 6th, 2004

- Do not send day shift – Process
- Back out at 2000 hours – MOB equipment

2145 - Survey Grays Bay

August 7th, 2004

0000 - Continue Grays Bay Survey and additional data in Port 1

0500 - Bar Check

0645 - Last Fix 50872 Head to base

- Crew Change

0850 - Head out to Grays Bay

0915 - Fix 51000
- Too rough back to shore
- Data editing

1340 - Back out to Grays Bay
1425 - SOL 60 200m N Offset C/C
1510 - SOL 61 400m N Offset C/C
1725 - EOL 61 Fix 53500
1755 - SOL 63 Fix 53700
1850 - EOL 63 54550
1900 - Head back to shore Fix 54630

- Crew Change

2045 - Run 1400m S of C/L Grays Bay
- Survey port 3&4 area

2345 Begin Survey of port 2 area

August 8th, 2004

0010 - Continue survey port 2
0330 - Head for Coronation Gulf to complete
- Infill Fix 62633

0700 - EOL Fix 63606
- Head for shore

- Crew Change

0850 - Survey Grays Bay
1600 - Sounder problems delete Fix 65600-65620
1930 - EOL's Fix 68770

- Note wrong fix # will edit by renumbering by adding 30000
- i.e. 60000 to 90000

- Crew Change

- Bar check

2025 - Grays Bay infill
- Port 1 infill
- Potential Barge landing 7519356N, 498389E
- Continue infill port 1
- Shoal exam Fix 72200
- Complete Shoal Fix 72750
- Run infill lines 100m spacing

- Port 2 lines (50m spacing)

August 9th, 2004

0000 - Continue infill Port 2
- Fix 73300
- Run infill 200m line spacing ports 2 – 3 area Fix 76520

0638 - End survey Fix 77212
- Shutdown and Demob
- Alan's boat is returning to Coppermine
- Weather and sea's are rough
- Travel to camp via helicopter
- Processing / Organize data

August 10th, 2004

0700 - Prep to MOB small boat

1000 - Travel to site
- Mobilize small boat – second crew (Isabelle), surveying photo targets, tide guage, shoreline etc.

1130 - Head out – Bar check
- Collect data on way to Port 2 area
- Infill at Port 2 area
- Stop at Port 2 site – Chris out doing recon

1420 - Brent in as helmsman – continue survey Port 2 area

1830 - Head for Kennarctic River to demob boat

1900 - Demob and secure boat

2000 - Travel to camp
- Download / Back off / Check data
- Preps for tomorrow

August 11th, 2004

0630 - Isabelle backing off data
- Then travel to Yellowknife with C. Anderson

0900 - Paul travel to coast
- Start up base station
- Set receiver at photo target #5
- Travel to High Lake for fuel with equipment left at coast
- Travel to Baychimo Bay across Bathurst Inlet
- Found benchmark with help from locals
- Run levels between BM's
- Set up GPS over BM – 16 and observe for 90 minutes
- Travel to coast – demob Base station
- Move base to photo target #13

1630 - Begin static GPS survey to three additional targets

2100 - Complete demob of all equipment from coast to ULU camp
- Process data

August 12th, 2004

- Pack up all equipment and prep for shipment
- Process data

August 13th, 2004

- Travel to High Lake
- Travel to Yellowknife
- Travel to Edmonton

Appendix B

Copies of Email
Correspondence
With the CHS

Paul Nicol

From: "Christy Thompson" <cthompson@chalgeo.com>
To: <pnicol@chalgeo.com>
Sent: Friday, August 27, 2004 3:11 PM
Subject: FW: Bench mark Information

-----Original Message-----
From: HerronT@DFO-MPO.GC.CA [mailto:HerronT@DFO-MPO.GC.CA]
Sent: Friday, July 30, 2004 10:05 AM
To: cthompson@chalgeo.com
Cc: SolvasonR@DFO-MPO.GC.CA
Subject: FW: Bench mark Information

Christy,

Here is the information requested for Bay Chimo, it is the closest to Gray's Bay. If additional information is required concerning vertical control or tides please contact Ron Solvason directly, contact information below. If we can be of further assistance please contact Al Koudys or myself.

Ron,
Contact information for Christy Thompson at Challenger Geomatics Ltd.
Telephone (780)424-5511 or (780)945-2585
Email: cthompson@chalgeo.com

Regards,

Terese

-----Original Message-----
From: Solvason, Ron
Sent: Friday, July 30, 2004 9:37 AM
To: Herron, Terese
Subject: RE: Bench mark Information

Terese
I have just updated the information in the Benchmark database for station 6250 Baychimo. The elevations given in the database for all of the benchmarks are heights above Chart Datum (CD). Chart Datum was originally established at Baychimo in 1979 and was defined as 2.323 metres below Benchmark 14-1979 (Unique Number 79T9506). In 1998 a survey was conducted in the vicinity of Baychimo and a temporary water level gauge was established. The temporary gauge was set up to record water level heights above the previously established Chart Datum by levelling from benchmark 14-1979 with a height of 2.323 metres. At this time elevations above Chart Datum were carried to benchmarks 15-1979 and 16-1979. I have updated the data base with the elevations defined in 1998. They are:
15-1979 3.044 metres
16-1979 1.932 metres

From a quick review of the data collected at Baychimo in 1998, it appears that the area is quite susceptible to "wind setup" and therefore if surveys are to be conducted in the area a temporary tide gauge or RTK GPS will be required to account for the water level variability. The tidal range in this area is relatively small (0.5 metres) but the wind setup can cause differences from the predicted tidal height of nearly + or - 1 metre.

All of the benchmark heights shown in the database for 6240 Cambridge Bay and 6290 Kugluktuk are referenced

to Chart Datum (CD).

There is very little information available in this area, the only other sites that have data are at Gjoa Haven. To be able to make use of RTK GPS, they will have to extend control from Baychimo to the survey area and establish a reference station near the survey area. x

If you have a contact name and phone number I can try and contact them if necessary.

Ron Solvason CLS

Fisheries and Oceans Canada | Pêches et Océans Canada
Central and Arctic Region | Région du Centre et de l'Arctique
Canadian Hydrographic Service | Service hydrographique du Canada
Tides Currents and Water Levels Section | Section des marées, des courants et des niveaux de l'eau
867 Lakeshore Road | 867 chemin Lakeshore
P.O. Box 5050 | CP 5050
Burlington, Ontario
L7R 4A6

Tel. 905-336-4844
Toll Free/Sans frais 1-877-CHS-LINK
Facsimile / télécopieur 905-336-8916

-----Original Message-----
From: Herron, Terese
Sent: Thursday, July 29, 2004 2:23 PM
To: Solvason, Ron
Subject: FW: Bench mark Information

Hi Ron,

Al Koudys and I had a conversation with two individuals from Challenger Geomatics Ltd. They have been awarded a contract by Wolfden Resources to survey a corridor from Gray's Bay north to join the corridor across the north of Coronation Gulf and Dease Strait. They are planning on using RTK. I'm not sure if they are installing a tide gauge. They are mobilizing from Kugluktuk if I understood correctly. The mining company Wolfden is looking after logistical support. They have the bench mark information from the website, they wanted to confirm the reference datum for all bench marks was chart datum. The info on the website is 1979 and I believe CHS was in the area of Bay Chimo and Kugluktuk in the 1990's perhaps there is more recent information available. They have a copy of the current tide tables.
The contract states they are to survey to CHS standards and they are looking for information from us to assist them in achieving those standards. Would you be able to provide them with appropriate vertical control information?

Thanks,

Terese

-----Original Message-----
From: Robinson, Carol
Sent: Friday, July 23, 2004 10:36 AM
To: Herron, Terese
Subject: RE: Bench mark Information

Terese,

http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Nat/benchmark/login_e.asp

Link to View Data

Station 6240 (Cambridge Bay)
Station 6290 (Kugluktuk)

-----Original Message-----
From: Herron, Terese
Sent: July 21, 2004 15:28
To: Robinson, Carol
Cc: Solvason, Ron
Subject: Bench mark Information

Hi Carol,

A company doing some survey work in Gray's Bay Coronation Gulf has requested some vertical control information for Coppermine/Kugluktuk and Cambridge Bay. Do we have any benchmark and datum information we could supply them.

Thanks,

Terese
Terese Herron
(905)336-4832 | facsimile / télécopieur (905)336-8916
herront@dfo-mpo.gc.ca
Hydrographer Data Acquisition | Hydrographe
Canadian Hydrographic Service | Service hydrographique du Canada
Central and Arctic Region | Région Centrale et de l'Arctique
Fisheries and Oceans Canada | Pêches et Océans Canada
867 Lakeshore Road | 867 chemin Lakeshore
Burlington, Ontario L7R 4A6
Government of Canada | Gouvernment du Canada

Benchmarks for Baychimo (#6250)

Unique Number	Station Number	Station Name	Benchmark Number
79T9506	6250	Baychimo	14-1979
Latitude	N/A	**Setting**	NA
Longitude	N/A	**Type**	Not Known
Established	1979	**Agency**	Not Known
Benchmark Condition	Not Known	**Last Inspected**	9999
Holding Benchmark	**Datum Name**	**Elevation (metres)**	
NO	CD	2.323	

Description

On the low rocky peninsula that divides the northwest shore of Baychimo Harbour into two bays, 10 meters northwest of the head of a notch about 10 meters wide that indents the peninsula, 12.3 metres southwest of BM 15, 27.2 metres northwest of BM 16.

Unique Number	Station Number	Station Name	Benchmark Number
79T9505	6250	Baychimo	15-1979
Latitude	N/A	**Setting**	NA
Longitude	N/A	**Type**	Permanent Agency Marker
Established	1979	**Agency**	CHS
Benchmark Condition	Not Known	**Last Inspected**	9999

Description

On the same peninsula, 12.3 meters northeast of BM 14-1979, set into a higher and more massive outcrop of glaciated rock, a bronze tablet marked: Hydrographic Service Canada BM 15-1979.

Assumed elevation 10.000 metres.

Elevation 3.044 metres (ref C&A FS 1200235).

Unique Number	Station Number	Station Name	Benchmark Number

79T9504	6250	Baychimo	16-1979
Latitude	N/A	**Setting**	NA
Longitude	N/A	**Type**	Permanent Agency Marker
Established	1979	**Agency**	CHS
Benchmark Condition	Not Known	**Last Inspected**	9999

Description

On the same peninsula 14 meters east of the head of the notch that indents it 27.2 meters southeast of BM 14-1979 set into low glaciated bedrock a bronze tablet marked: Hydrographic Service Canada BM 16-1979.

Assumed elevation 8.887 metres.

Elevation 1.932 metres (ref C&A FS 1200235).

Appendix C

McElhanney Consulting Services Ltd.
Photo Targeting and Control
Coordinates

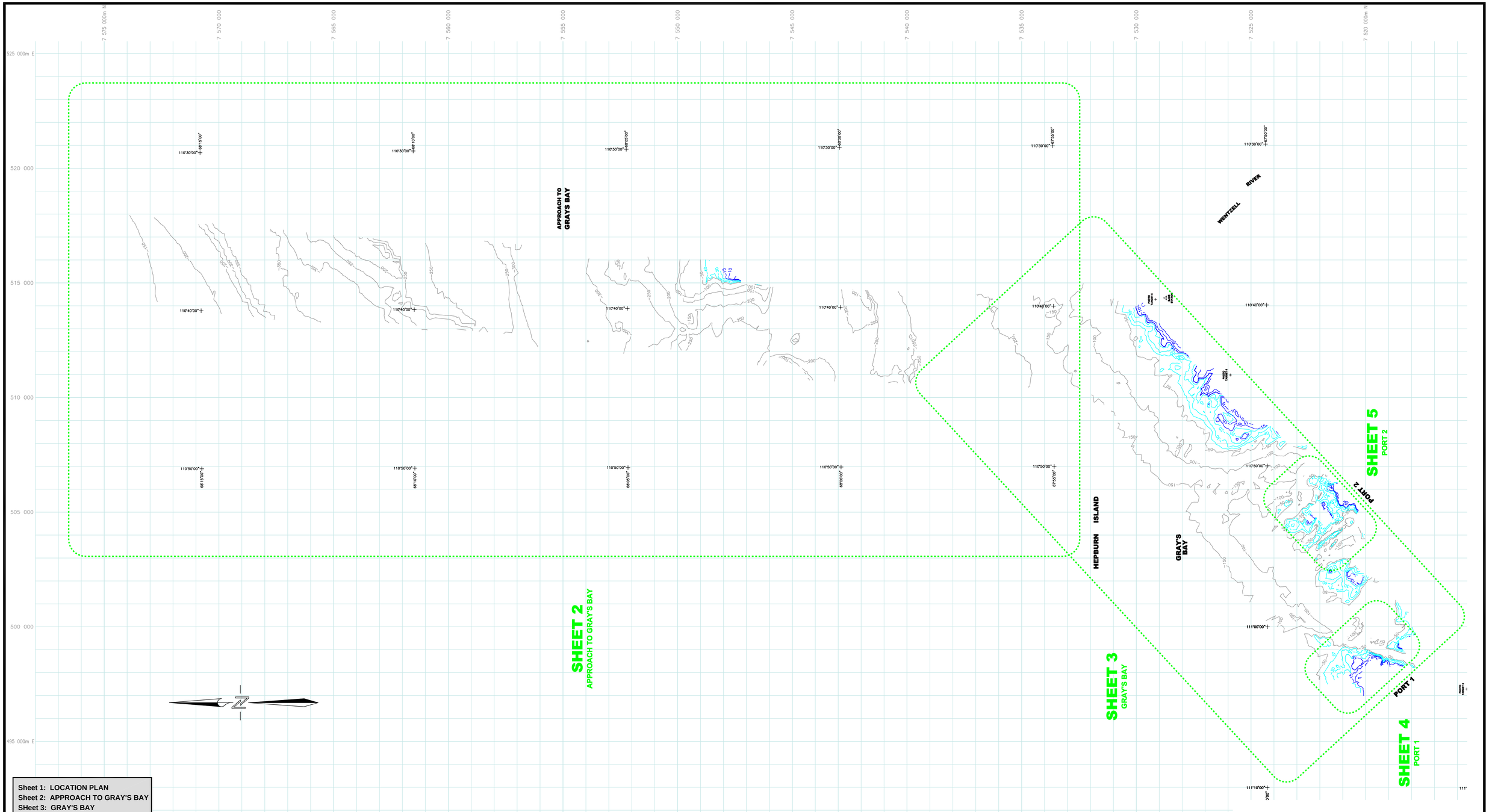
McElhanney Consulting Services Ltd.
Wolfden Resources Inc. - Ulu Mine, Nunavut
Photo Targeting and Control

Reference System - NAD83CSRS - UTM Zone 12 - NT2 Geoid Model					
STATION NUMBER	UTM NORTH	UTM EAST	ORTHO ELEV	TARGET ELEV	DESCRIPTION
Targeted Stations					
1	7522832.167	489362.378	23.841		LARGE TARGET
2	7519118.091	497683.171	10.256		SMALL TARGET
3	7515593.749	497283.007	11.001		SMALL TARGET
4	7520908.440	508132.040	19.280		SMALL TARGET
5	7525904.389	510983.207	3.345		SMALL TARGET
6	7529156.620	514282.627	5.495		SMALL TARGET
7	7530616.607	517115.630	3.489		LARGE TARGET
8	7535723.782	523060.590	16.287		LARGE TARGET
9	7528393.068	501578.880	148.845		LARGE TARGET 71A63 MON
10	7538184.652	508566.507	37.350		LARGE TARGET
11	7510939.172	493419.031	181.726		LARGE TARGET
12	7511841.956	516717.707	111.155		LARGE TARGET
13	7493721.317	499936.858	275.067		LARGE TARGET
14	7498885.655	515795.034	233.560		LARGE TARGET
15	7476558.575	504538.716	309.111		SMALL TARGET
16	7476433.071	507742.179	297.836		SMALL TARGET
17	7467114.661	503597.917	372.545		SMALL TARGET
18	7470372.089	506819.838	300.079		SMALL TARGET
19	7447634.225	497992.630	373.662		LARGE TARGET
20 OS 11	7451948.703	511386.003	278.204	278.094	LARGE TARGET
21 OS 15	7422759.460	499156.755	476.153	476.003	SMALL TARGET
22	7423220.974	502467.534	414.817		SMALL TARGET
23	7418756.598	498384.698	496.769		LARGE TARGET
24	7418667.111	504931.389	414.636		LARGE TARGET

4401	7421056.930	501227.634	473.211		EXISTING MINE CONTROL
4460	7421016.728	501300.759	467.221		EXISTING MINE CONTROL
71A16	**7433401.394**	**503864.169**	**458.700**		**COORDINATE ORIGIN**

NOTE

Coordinates and Elevations are based on Geodetic Survey Division Mean Marker Name 71A16
UTM Zone 12 North = 7433401.394 East = 503864.169 Elev. = 458.7m
NTS Map NO 076M02



Sheet 1: LOCATION PLAN
Sheet 2: APPROACH TO GRAY'S BAY
SHeet 3: GRAY'S BAY
Sheet 4: PORT 1
Sheet 5: PORT 2

LEGEND & NOTES:

The survey represented by this plan was performed between JULY 31 and AUGUST 11, 2004.

The following hydrographic equipment was used in performing the survey.
–LEICA 1200 GPS System in real–time kinematic (RTK) and differential GPS Modes (<10cm–1m)
–Odom Hydrotac Echosounder with 24khz transducers.

Depths are in metres and decimals thereof.

Depths are reduced to Chart Datum

Photo Mosaic provided by Gartner Lee

TABLE OF COORDINATES

Name	Northing	Easting	Elevation	Description
BASE STATION	7 528 725.374	514 345.344	16.236	12" SPIKE
PHOTO TARGET 5	7 525 904.389	510 983.207	2.331	SPIKE
PHOTO TARGET 3	7 515 593.749	497 283.007	9.987	SPIKE
PHOTO TARGET 6	7 529 156.607	514 282.627	4.481	SPIKE

COORDINATES ARE UTM ZONE 12 (NAD 83). REFERENCED TO GEODETIC SURVEY DIVISION NRCAN MARKER 71A16. ELEVATIONS OF CONTROL ARE HEIGHT ABOVE CHART DATUM REFERENCED TO CHS BM 16-1979 ELEV. = 1.932m ABOVE CHART DATUM. (BAYCHIMO HARBOUR)

METRES 1500 0 1500 3000 4500 6000 METRES 7500

SCALE - 1 : 75 000

REV.	DESCRIPTION	BY	DATE

CHALLENGER GEOMATICS LTD. EDMONTON (780) 424-5511 CALGARY (403) 253-8101 REGINA (306) 545-5008

DWG. No. 04-S-30214

DATE	NOV.26/04
DESIGNED	
DRAWN	LS/SM
CHECKED	CT/PN
APPROVED	
APPROVED	

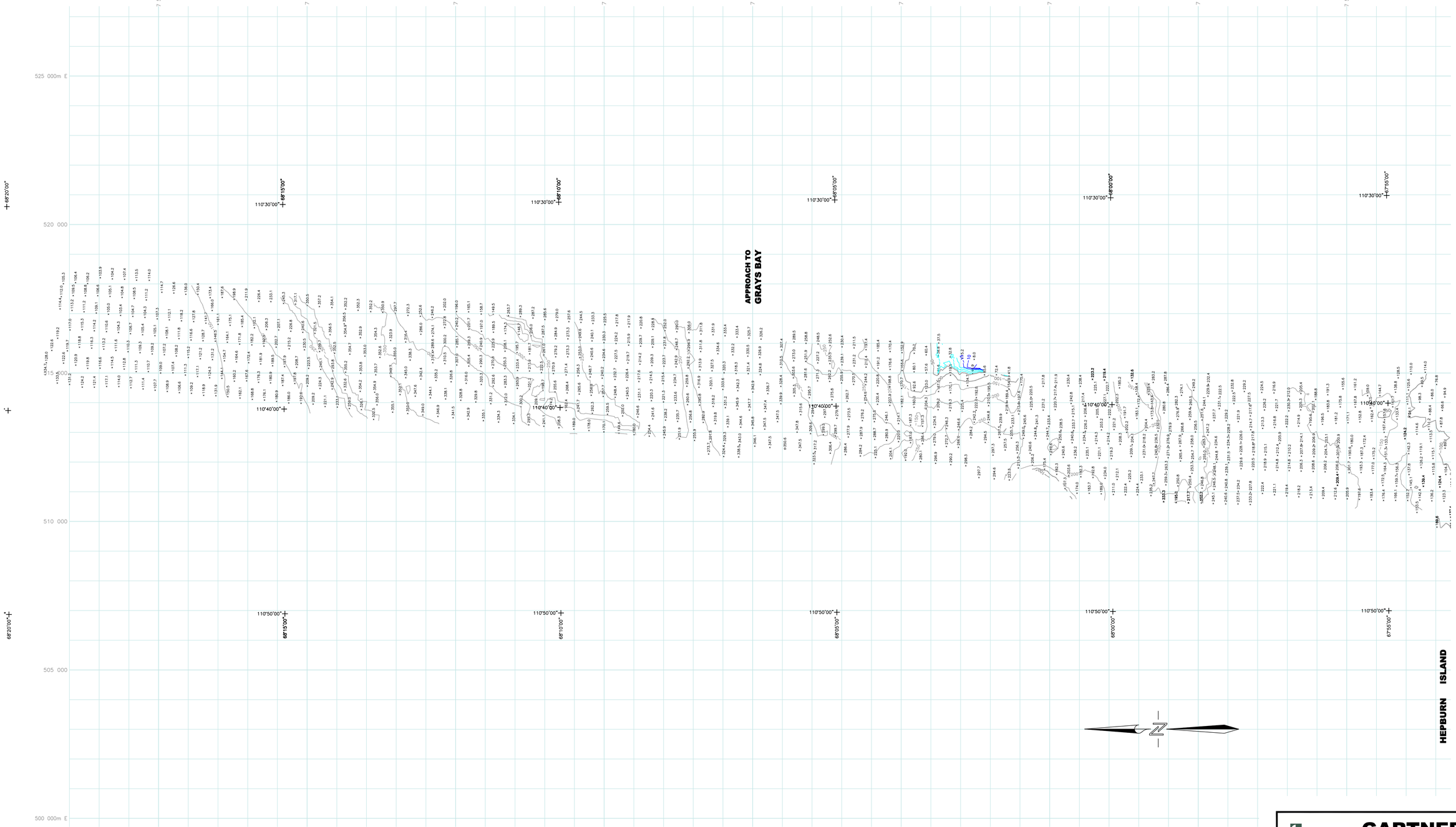
Gartner Lee **GARTNER LEE**

CORONATION GULF BATHYMETRY

LOCATION PLAN

Datum: North American Datum 1983 (NAD83)
Projection: Universal Transverse Mercator (UTM) Zone 12

SCALE	DRAWING NO.	REV.
1 : 75 000		0



LEGEND & NOTES:

The survey represented by this plan was performed between JULY 31 and AUGUST 11, 2004.

The following hydrographic equipment was used in performing the survey.
–LEICA 1200 GPS System in real–time kinematic (RTK) and differential GPS Modes (<10cm–1m)
–Odom Hydrotac Echosounder with 24khz transducers.

Depths are in metres and decimals thereof.

Depths are reduced to Chart Datum

Photo Mosaic provided by Gartner Lee

TABLE OF COORDINATES

Name	Northing	Easting	Elevation	Description
BASE STATION	7 528 725.374	514 345.344	16.236	12" SPIKE
PHOTO TARGET 5	7 525 904.389	510 983.207	2.331	SPIKE
PHOTO TARGET 3	7 515 593.749	497 283.007	9.987	SPIKE
PHOTO TARGET 6	7 529 156.607	514 282.627	4.481	SPIKE

COORDINATES ARE UTM ZONE 12 (NAD 83). REFERENCED TO GEODETIC SURVEY DIVISION NRCAN MARKER 71A16. ELEVATIONs OF CONTROL ARE HEIGHT ABOVE CHART DATUM REFERENCED TO CHS BM 16-1979 ELEV. = 1.932m ABOVE CHART DATUM. (BAYCHIMO HARBOUR)

METRES 600 0 600 1200 1800 2400 3000 6000 METRES

SCALE - 1 : 60 000

REV.	DESCRIPTION	BY	DATE

CHALLENGER GEOMATICS LTD. EDMONTON (780) 426-5511 CALGARY (403) 253-8101 REGINA (306) 545-5008

DWG. No. 04-S-30214

DATE	NOV.26/04
DESIGNED	
DRAWN	LS/SM
CHECKED	CT/PN
APPROVED	
APPROVED	

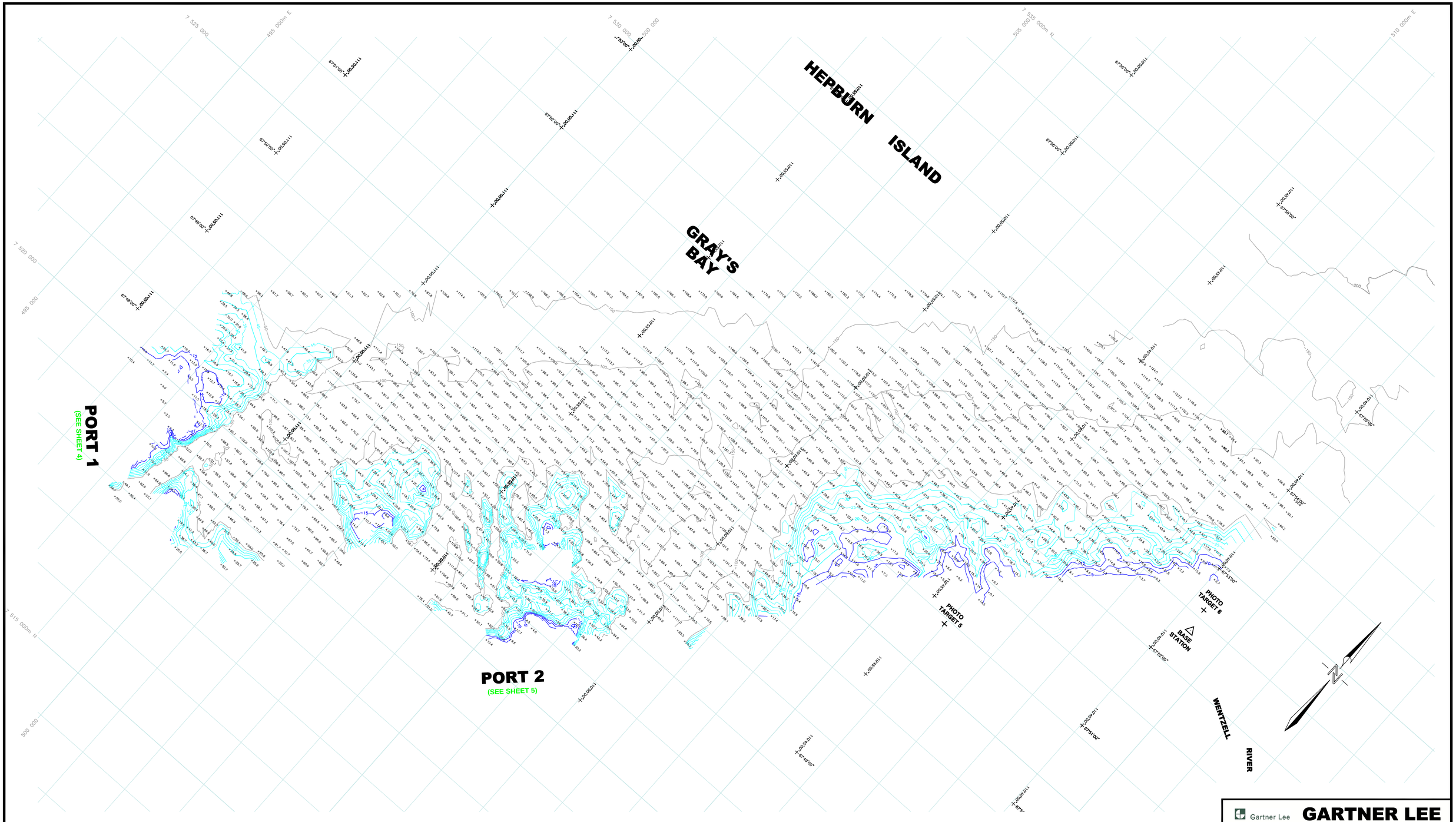
Gartner Lee **GARTNER LEE**

CORONATION GULF BATHYMETRY

APPROACH TO GRAY'S BAY

Datum: North American Datum 1983 (NAD83)
Projection: Universal Transverse Mercator (UTM) Zone 12

SCALE	DRAWING NO.	REV.
1 : 60 000		0



LEGEND & NOTES:

The survey represented by this plan was performed between JULY 31 and AUGUST 11, 2004.

The following hydrographic equipment was used in performing the survey.
–LEICA 1200 GPS System in real–time kinematic (RTK) and differential GPS Modes (<10cm–1m)
–Odom Hydrotac Echosounder with 24khz transducers.

Depths are in metres and decimals thereof.

Depths are reduced to Chart Datum

Photo Mosaic provided by Gartner Lee

TABLE OF COORDINATES

Name	Northing	Easting	Elevation	Description
BASE STATION	7 528 725.374	514 345.344	16.236	12" SPIKE
PHOTO TARGET 5	7 525 904.389	510 983.207	2.331	SPIKE
PHOTO TARGET 3	7 515 593.749	497 283.007	9.987	SPIKE
PHOTO TARGET 6	7 529 156.607	514 282.627	4.481	SPIKE

COORDINATES ARE UTM ZONE 12 (NAD 83), REFERENCED TO GEODETIC SURVEY DIVISION NRCAN MARKER 71A16. ELEVATIONs OF CONTROL ARE HEIGHT ABOVE CHART DATUM REFERENCED TO CHS BM 16-1979 ELEV. = 1.932m ABOVE CHART DATUM. (BAYCHIMO HARBOUR)

METRES 300 0 300 600 900 1200 1500 3000 METRES

SCALE - 1 : 30 000

REV.	DESCRIPTION	BY	DATE

CHALLENGER GEOMATICS LTD.
EDMONTON (780) 424-5511
CALGARY (403) 253-8101
REGINA (306) 545-5008

DWG. No. 04-S-30214

DATE	NOV.26/04
DESIGNED	
DRAWN	LS/SM
CHECKED	CT/PN
APPROVED	
APPROVED	

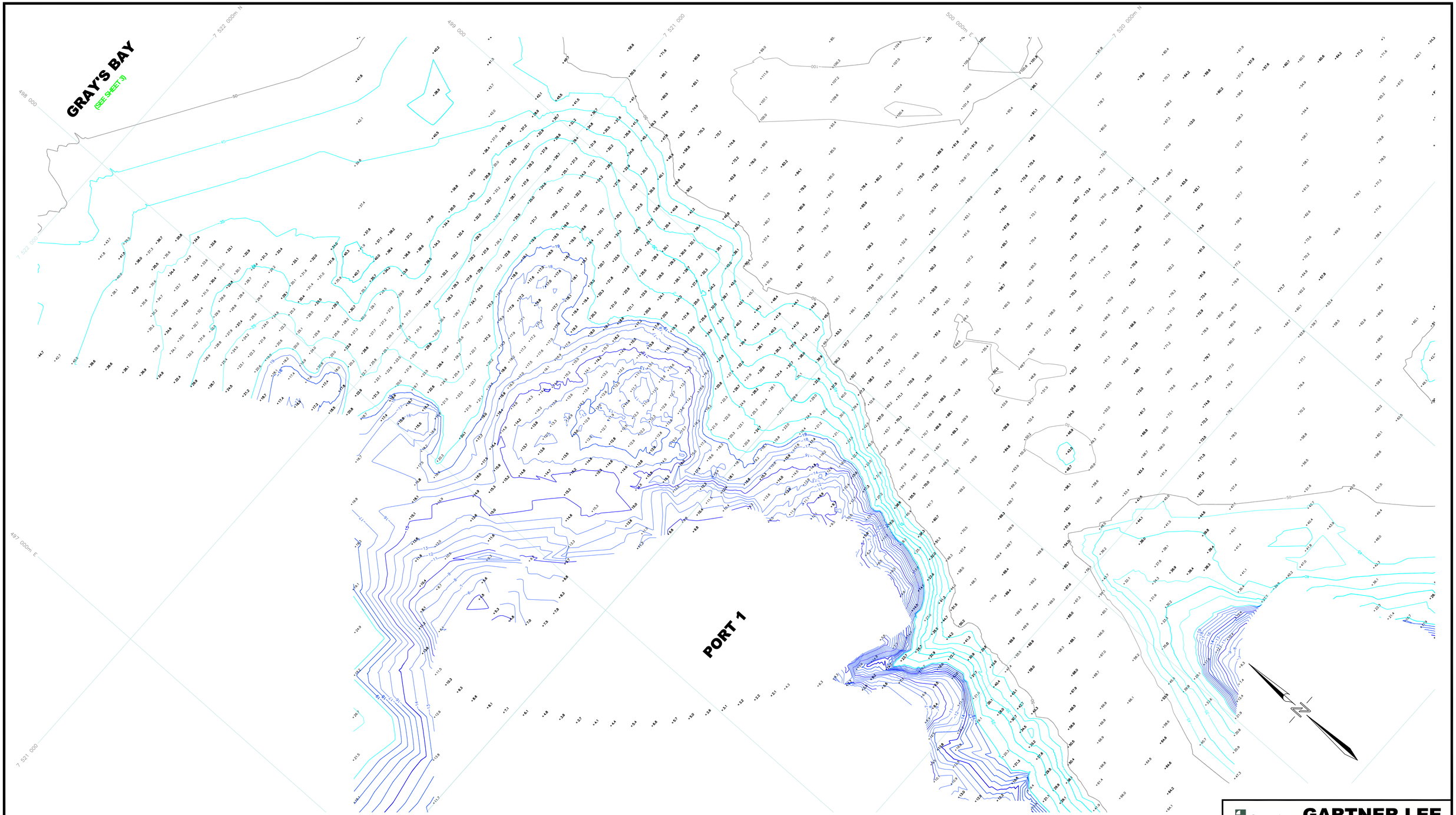
Gartner Lee **GARTNER LEE**

CORONATION GULF BATHYMETRY

GRAY'S BAY

Datum: North American Datum 1983 (NAD83)
Projection: Universal Transverse Mercator (UTM) Zone 12

SCALE	DRAWING NO.	REV.
1 : 30 000		0



LEGEND & NOTES:

The survey represented by this plan was performed between JULY 31 and AUGUST 11, 2004.

The following hydrographic equipment was used in performing the survey.
–LEICA 1200 GPS System in real–time kinematic (RTK) and differential GPS Modes (<10cm–1m)
–Odom Hydrotac Echosounder with 24khz transducers.

Depths are in metres and decimals thereof.

Depths are reduced to Chart Datum

Photo Mosaic provided by Gartner Lee

TABLE OF COORDINATES

Name	Northing	Easting	Elevation	Description
BASE STATION	7 528 725.374	514 345.344	16.236	12" SPIKE
PHOTO TARGET 5	7 525 904.389	510 983.207	2.331	SPIKE
PHOTO TARGET 3	7 515 593.749	497 283.007	9.987	SPIKE
PHOTO TARGET 6	7 529 156.607	514 282.627	4.481	SPIKE

COORDINATES ARE UTM ZONE 12 (NAD 83), REFERENCED TO GEODETIC SURVEY DIVISION NRCAN MARKER 71A16. ELEVATIONS OF CONTROL ARE HEIGHT ABOVE CHART DATUM REFERENCED TO CHS BM 16-1979 ELEV. = 1.932m ABOVE CHART DATUM. (BAYCHIMO HARBOUR)

METRES 100 50 0 100 200 300 400 500 METRES

SCALE - 1 : 5 000

REV.	DESCRIPTION	BY	DATE

CHALLENGER GEOMATICS LTD
EDMONTON (780) 424-5511
CALGARY (403) 253-0101
REGINA (306) 545-5008

DWG. No. 04-S-30214

DATE	NOV.26/04
DESIGNED	
DRAWN	LS/SM
CHECKED	CT/PN
APPROVED	
APPROVED	

Gartner Lee **GARTNER LEE**

CORONATION GULF BATHYMETRY

PORT 1

Datum: North American Datum 1983 (NAD83)
Projection: Universal Transverse Mercator (UTM) Zone 12

SCALE	DRAWING NO.	REV.
1 : 5 000		0

503 000m E

504 000

505 000m E

7 523 000m N

7 522 000

7 521 000

520 000m N

504 000

GRAY'S BAY

(SEE SHEET 3)

PORT 2

LEGEND & NOTES:

The survey represented by this plan was performed between JULY 31 and AUGUST 11, 2004.

The following hydrographic equipment was used in performing the survey.
–LEICA 1200 GPS System in real–time kinematic (RTK) and differential GPS Modes (<10cm–1m)
–Odom Hydrotac Echosounder with 24khz transducers.

Depths are in metres and decimals thereof.

Depths are reduced to Chart Datum

Photo Mosaic provided by Gartner Lee

TABLE OF COORDINATES

Name	Northing	Easting	Elevation	Description
BASE STATION	7 528 725.374	514 345.344	16.236	12" SPIKE
PHOTO TARGET 5	7 525 904.389	510 983.207	2.331	SPIKE
PHOTO TARGET 3	7 515 593.749	497 283.007	9.987	SPIKE
PHOTO TARGET 6	7 529 156.607	514 282.627	4.481	SPIKE

COORDINATES ARE UTM ZONE 12 (NAD 83). REFERENCED TO GEODETIC SURVEY DIVISION NRCAN MARKER 71A16. ELEVATIONs OF CONTROL ARE HEIGHT ABOVE CHART DATUM REFERENCED TO CHS BM 16-1979 ELEV. = 1.932m ABOVE CHART DATUM. (BAYCHIMO HARBOUR)

METRES 100 50 0 100 200 300 400 500 METRES

SCALE - 1 : 5 000

REV.	DESCRIPTION	BY	DATE

CHALLENGER GEOMATICS LTD. EDMONTON (780) 424-5511 CALGARY (403) 253-0101 REGINA (306) 545-5908

DWG. No. 04-S-30214

DATE	NOV.26/04
DESIGNED	
DRAWN	LS/SM
CHECKED	CT/PN
APPROVED	
APPROVED	

Gartner Lee **GARTNER LEE**

CORONATION GULF BATHYMETRY

PORT 2

Datum: North American Datum 1983 (NAD83)
Projection: Universal Transverse Mercator (UTM) Zone 12

SCALE	DRAWING NO.	REV.
1 : 5 000		0