Appendix F-1
Alpine Geophysical Survey Report

Final Report

Expert Lakebed Studies
For the
Lake Erie Wind Power Project

Offshore Cleveland, Ohio

Prepared for:

Cuyahoga County Department of Development
Cleveland, Ohio

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1.0 EXECUTIVE SUMMARY

Between September 23rd and September 29th, 2010, Alpine Ocean Seismic Survey, Inc. (Alpine) performed a geophysical investigation of the Lake Erie lakebed related to the five turbine Lake Erie Wind Power Project. The survey area is approximately 14,500 foot by 1,000 foot area and is located eight miles offshore of Cleveland, Ohio.

Background

In 2006, the Board of County Commissioners established the Cuyahoga Regional Energy Development Task Force, now known as the Great Lakes Energy Development Task Force, in order to investigate and implement alternative and renewable energy projects. In 2009, juwi GMBH and its Ohio-based subsidiary JW Great Lakes Wind LLC, a consultant engaged by Cuyahoga County, submitted a Feasibility Study for an offshore wind energy demonstration project. The project was limited to five turbines to be located approximately eight miles offshore of Cleveland.

Previous Work

In 1974, Dames and Moore submitted a report entitled *Lake Bottom Geotechnical and Geophysical Studies, Reports No. 5-1 and 5-2*, which was part of the First Phase Airport Feasibility Study for the Lake Erie Regional Transportation Authority. The report presented the methods and findings of a survey conducted in an area 12 miles by 20 miles, which included the current wind farm site. The survey was performed using Uniboom subbottom profiling and an echo sounder. In addition, five geotechnical borings and twenty five Vibracores were taken throughout the site. The bathymetric data collected during this survey, corrected to elevation (IGLD), shows the lakebed to be relatively smooth and gently dipping to the north in the area of the proposed wind farm. The closest boring to this area was the geotechnical boring BH-3, located approximately 2.3 miles to the west. (See Figure 1 for the 1974 survey grid, with the currently proposed wind farm area and boring BH-3 highlighted in red.)

The 1974 survey shows a layer of soft silt and clay, ranging in thickness from five to twenty feet, near the area of the proposed wind farm (Figure 2). The depth below lakebed to the top of shale in this area was reported to range from seventy to ninety feet (Figure 3).

The Dames and Moore reports describes the sediments present below the soft silt-clay as consisting of two types of significantly denser material: 1) brown or gray-brown stiff to very stiff, silty to slightly gravelly clay and 2) gray to gray-brown massive to varved clay.

Unconfined compression and triaxial tests were run on samples taken from the five geotechnical borings to determine consolidation.

Survey Objectives and Methods

The survey objectives were as follows and were designed to confirm and augment currently available data:

- Acquire bathymetry at the proposed site and generate contours. Image the lakebed using Side Scan Sonar and describe targets and other surface features.
- Interpret site magnetic data and describe anomalies that stand out against the background magnetic field.
- Use boomer to obtain seismic records down to, when possible, 100 feet below the lakebed, to document the stratigraphy and the thickness of sediments above the shale layer present in the area.

The instrumentation utilized for the survey included an Innerspace 456 Dual Frequency Echo Sounder, Klein 3000 Side Scan Sonar, Geometrics G-882 Cesium Vapor Magnetometer, and GeoAcoustics Uniboom Subbottom Profiler.

Survey Results

Lake bottom elevations at the site range from approximately 513 to 510 feet (International Great Lakes Datum - IGLD). Corresponding water depths are 56 to 59 feet relative to the Lake Erie Chart Datum of 569.2 feet (IGLD).

The only targets detected by the Side Scan survey were relatively small and interpreted as being primarily natural in origin. There were only a few scattered magnetic targets and none of these were associated with the Side Scan targets.

An interpretation of geophysical data was made using a previous study (Dames and Moore, 1974) as a guide to describe the sediment and geologic units found at the site. The total thickness of sediment ranged between 78 and 95 feet, with 10 to 16 feet of likely soft silt and clays underlain by stiffer clay. The stiffer clay layer shows slight

variations in thickness in the northwest to southeast direction. A layer corresponding to a shale unit previously identified in the Dames and Moore report, was seen to underlay the stiffer clay throughout the site. Borings will be required to confirm the exact nature of the sediments and underlying rock.

Schedule

Due to weather conditions at the site, the geophysical survey was conducted in two parts. A reconnaissance survey, on September 23, 2010, consisted of bathymetric and seismic profiling, as well as Side Scan Sonar and magnetometer surveying. Lines were planned at 492 feet (150 meters) spacing in a NW-SE direction, with additional cross lines run at each of the proposed turbine locations.

The second part of the survey, which did not include seismic profiling, was conducted on September 29, 2010. Ninety eight (98) foot (30 meter) line spacing, in compliance with State Historic Preservation Office (SHPO) standards, was used to collect data as part of an archaeological and ecological assessment of the proposed turbine sites.

(See Appendices 3 and 4 for Field Logs and Daily Reports)

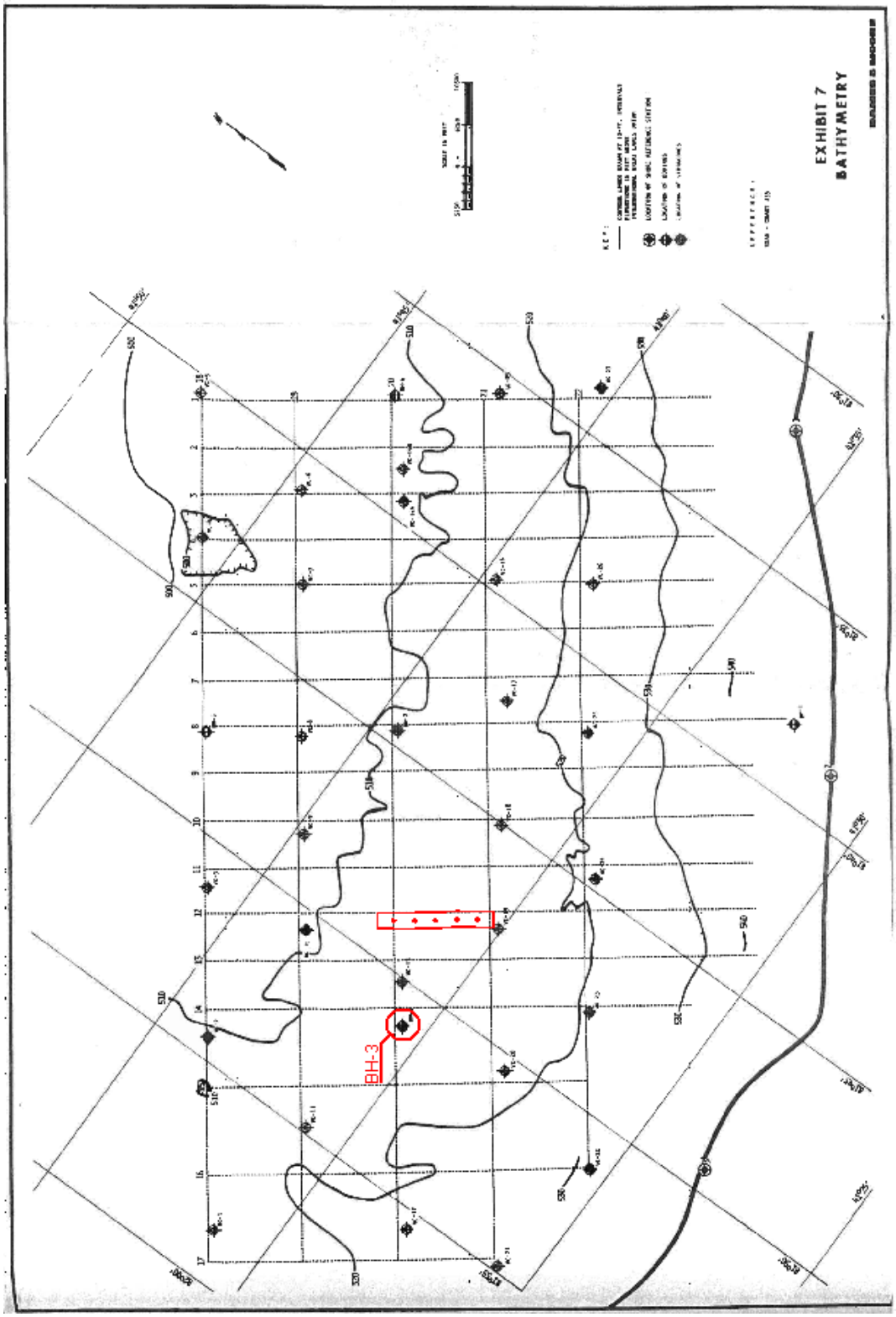


Figure 1 - Bathymetry and Boring Locations (Dames & Moore, 1974)

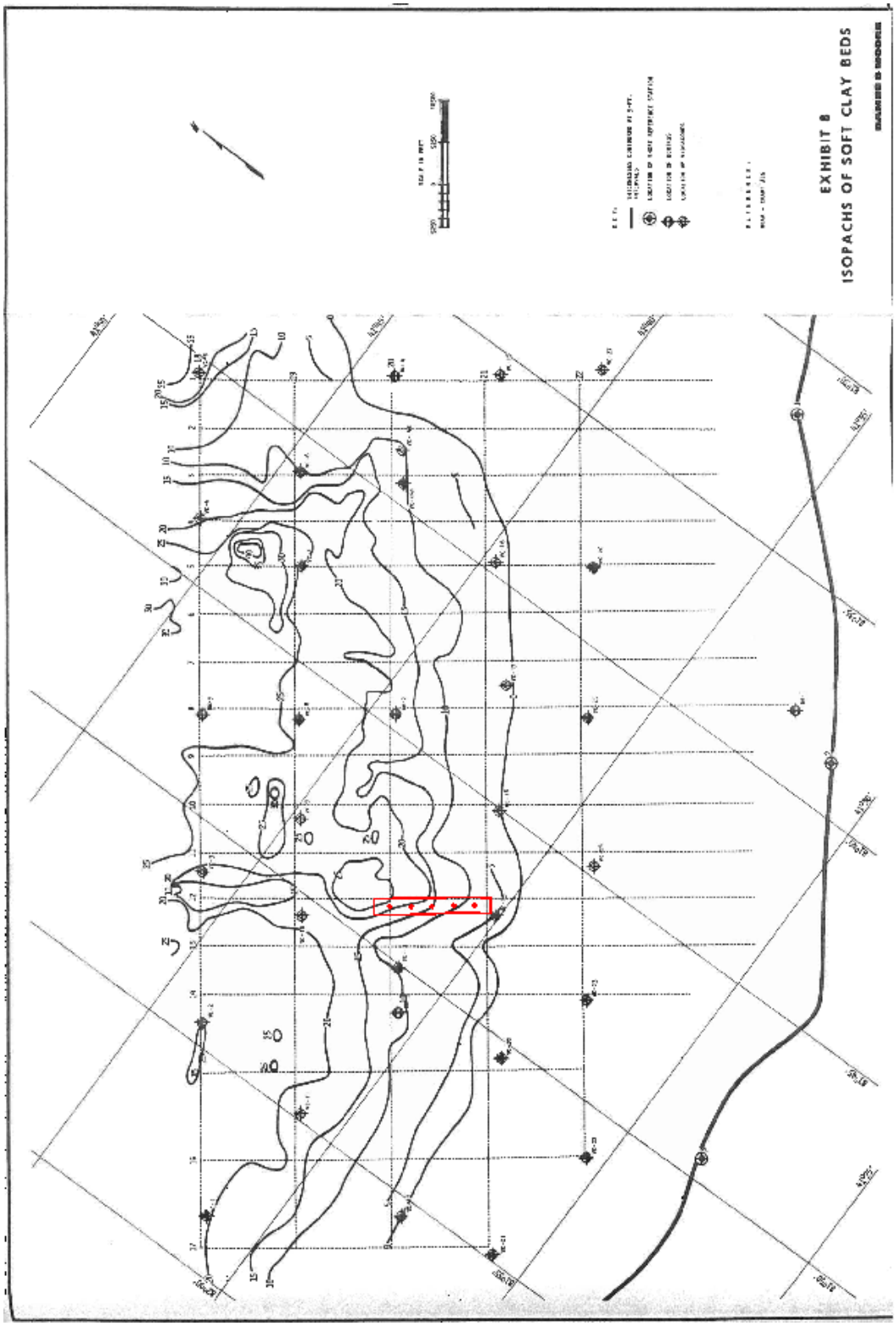


Figure 2 - Soft Silt-Clay Isopach (Dames & Moore, 1974)

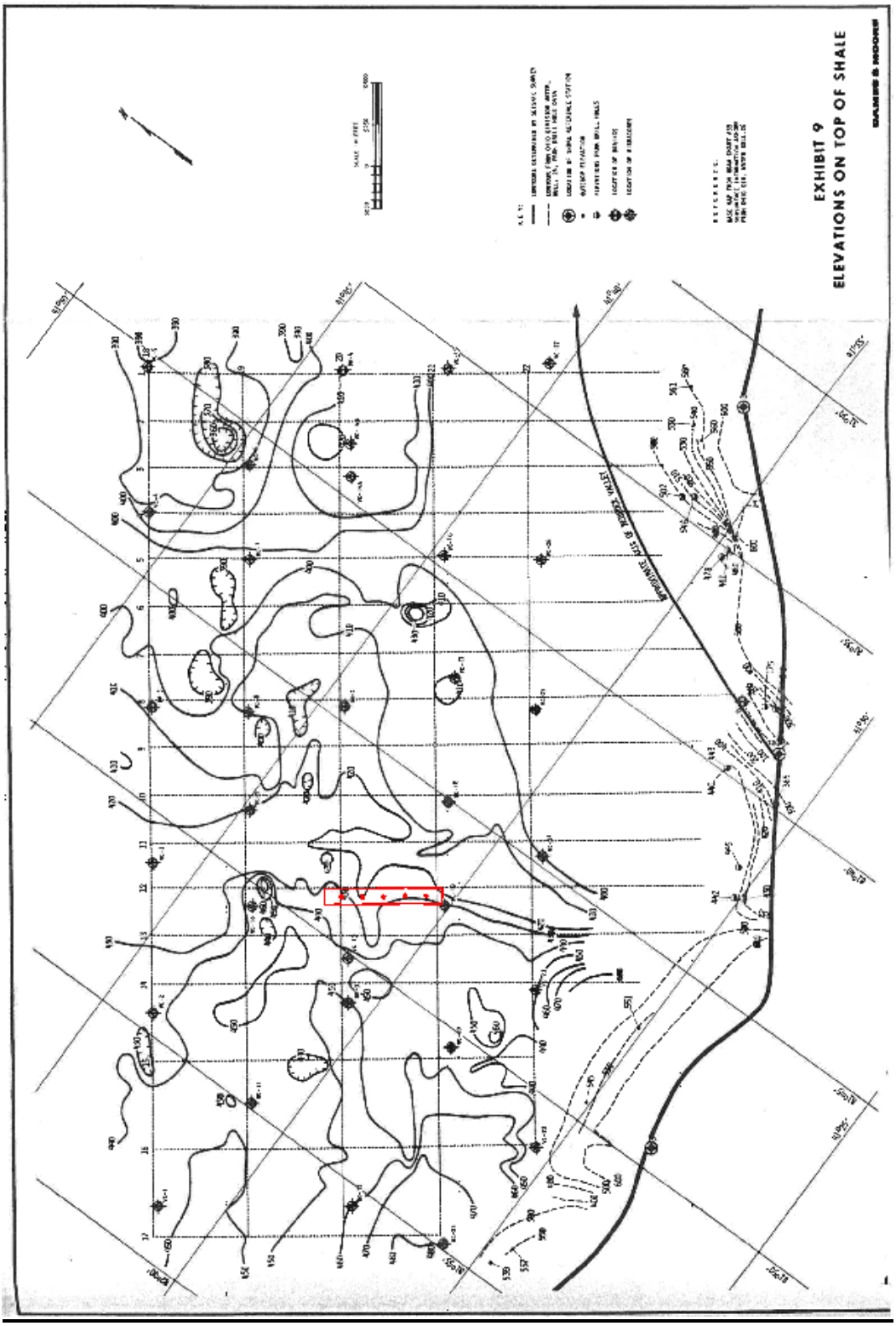


Figure 3 - Top of Shale Elevations (Dames & Moore, 1974)

2.0 GEOPHYSICAL SURVEY

2.1 Survey Layout

The original plan was to carry out a geophysical survey in a corridor 1,969 feet (600 meters) wide and approximately 14,500 feet (4420 meters) long located eight miles offshore of Cleveland, Ohio. This width was chosen to take into account a possible shift in the position of the centerline due to geological or other obstacles encountered during the survey. After a reconnaissance survey along the centerline and two lines 492 feet (150 meters) on either side showed no significant obstacles, it was decided to reduce the width of the corridor to 984 feet (300 meters). Within this corridor, five lines to either side of center were spaced 98 feet (30 meters) apart to comply with SHPO standards.

Additionally, survey lines intersecting the proposed wind turbine locations were drawn perpendicular to the main survey lines. This provided enhanced data resolution at those locations.

Figure 4 shows the survey line plan, with the 984 feet (300 meter) survey grid in red and the 1,969 feet (600 meter) grid in blue and green.

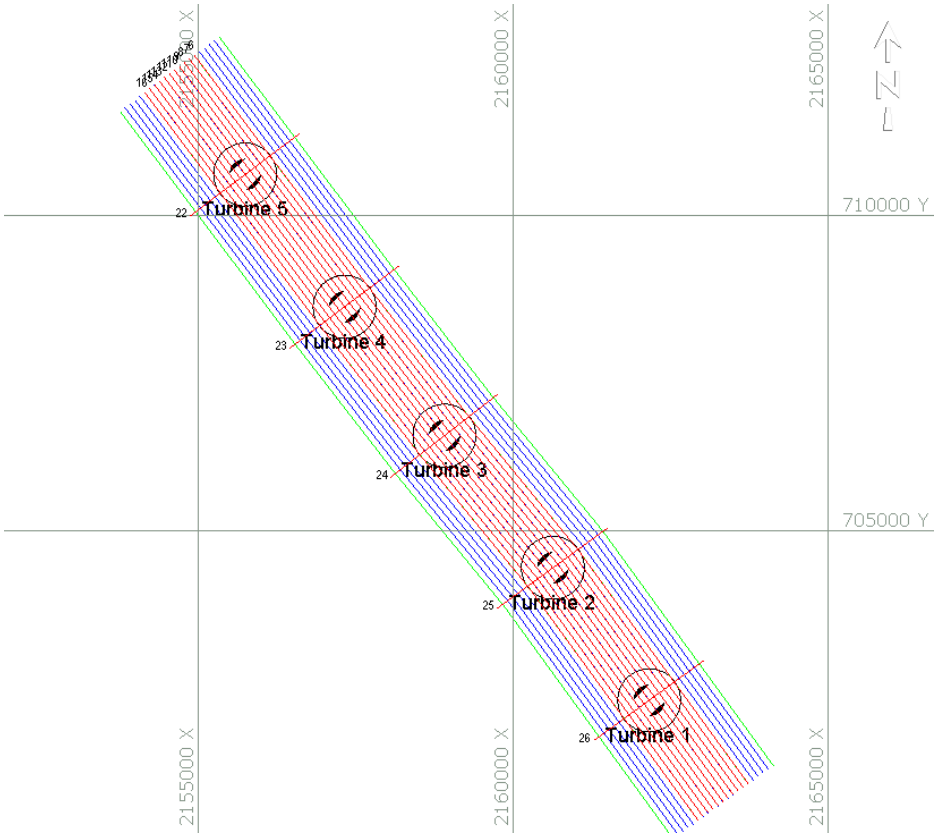


Figure 4 - Survey Line Plan

2.2 Equipment and Methods

2.2.1 Vessel

The M/V Sancho, a 55 foot steel workboat, was used for the survey (Figure 5). The single screw, diesel engine driven vessel featured a stern A-frame and a deck level cabin with space for the navigation, magnetometer, and echo sounder acquisition hardware. Additional lab space and storage space in the bow was used to house the Side Scan Sonar and seismic electronics.

The Innerspace Echo Sounder transducer was positioned along the middle, port side, of the ship, while the magnetometer and boomer were towed off the back corners of the ship. The Side Scan Sonar was towed using a digital counter block positioned over the center of the stern. All equipment offsets (Table 1) were measured against a Vessel Reference Point (VRP). (Figure 6)

Figure 5 - M/V Sancho

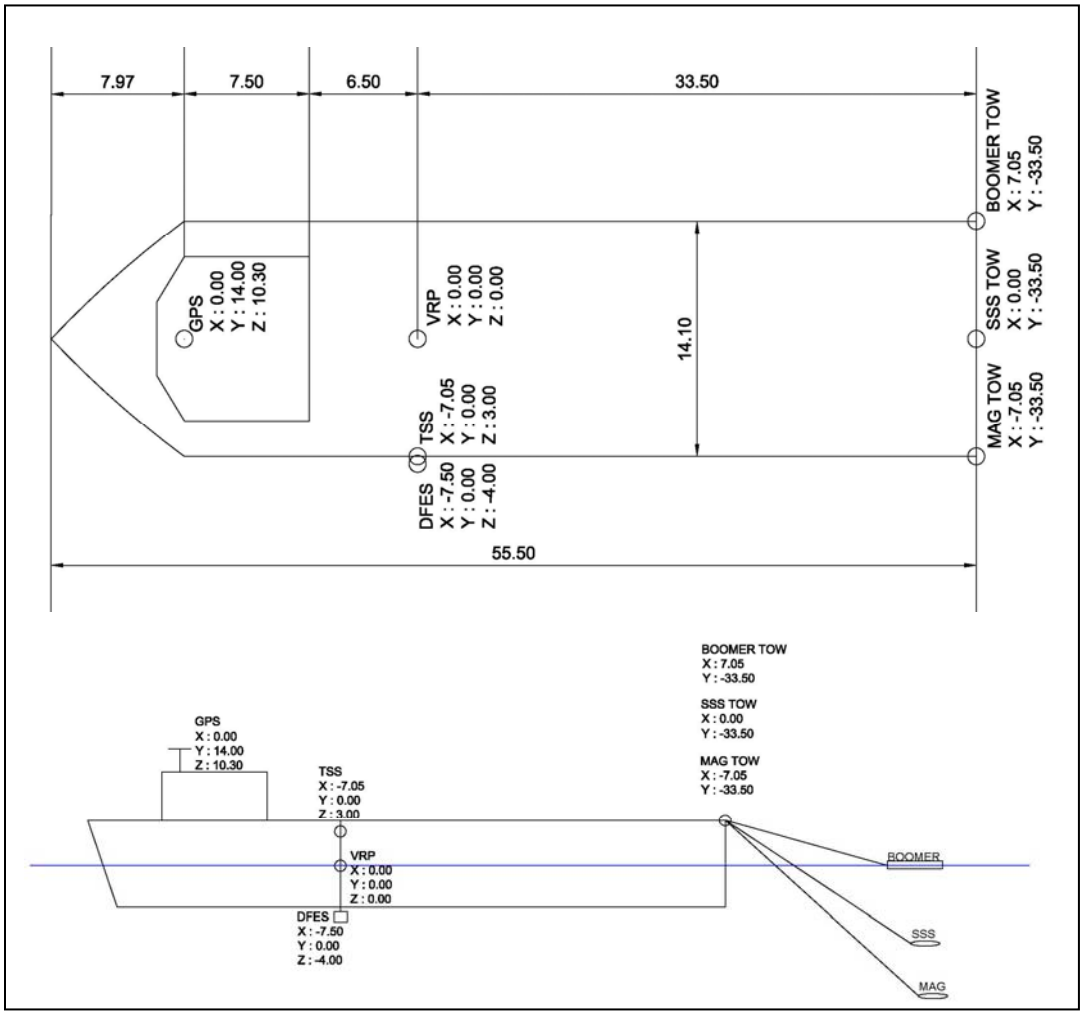


Figure 6 - Offset diagram of M/V Sancho in feet, not to scale.

Table 1 - Vessel Offsets

	Equipment	X (feet)	Y (feet)	Z (feet) *from water line*
1	Primary GPS (GPS)	0.00	14.00	10.30
2	TSS Motion Sensor (TSS)	-7.05	0.00	3.00
3	Innerspace 445 (DFES)	-7.50	0.00	-4.00
4	Side Scan Sonar Tow (SSS TOW)	0.00	-33.50	N/A
5	Magnetometer Tow (MAG TOW)	-7.05	-33.50	N/A
6	Boomer Tow (BOOMER TOW)	7.05	-33.5	N/A

2.2.2 Navigation Control

A Hemisphere Vector DGPS System was used for navigation during the survey. The Hemisphere System does not require any specialized calibration procedures with the exception of ensuring that the antenna is installed in-line with the vessel in order to generate a correct heading. Differential corrections were received from the Detroit, MI Coast Guard Station and then applied in real time to the GPS navigation, increasing horizontal accuracy. The positioning data were output to a computer with Hypack 2010 navigation software. The software used measured equipment offsets to send corrected navigation data to all systems requiring geo-referencing and converted the raw latitude/longitude provided by the Hemisphere System into NAD83 Ohio State Plane North (US survey feet).

2.2.3 Bathymetric Survey

Water depth data were collected using an Innerspace 456 Dual Frequency Echo Sounder. The use of a dual frequency system (versus a single frequency system) allows for the identification of very soft muddy bottoms since its low frequency channel can penetrate the bottom while its high frequency channel reflects off the lakebed surface.

Heave data were acquired with a TSS-DMS05 Motion Reference Sensor which was placed less than 0.5 feet horizontally from the dual frequency echo sounder. The heave data were applied during processing to dampen the effect of wave motion on the echo sounder readings.

Sound velocity profiles of the water column were taken daily using an Applied Microsystems SV plus V2 System to determine the speed of sound needed to correct echo sounder depth readings. The profiles showed an average speed of sound of 4,881 feet/second on September 23rd, and 4,868 feet/second on September 29th. These values are close to the average speed of sound in fresh water, which is 4,800 feet/second at approximately 40° F.

Bathymetric data were corrected to IGLD 85 using the NOAA tide station #9063063, Cleveland, OH. Additionally, a Coastal Leasing MacroTide Gauge, was deployed at the site to measure offshore lake levels during the two survey days. Data from the Coastal Leasing Tide Gauge revealed a difference of nearly 0.5 feet from the 23rd to the 29th, which was more pronounced than the difference seen in the NOAA data. The difference was noted in the raw bathymetry data, and corrected lake levels from the NOAA tide station were adjusted to account for this. The difference between the data sets was likely the result of differing wind intensity and direction at the location of Alpine's tide gauge relative to the NOAA tide station.

2.2.4 Magnetic Survey

A Geometrics G-882 cesium vapor magnetometer was used to collect magnetic data. The sensor was towed with 230 feet of cable off the back of the boat, using its supplied data/tow cable and an additional safety line. The depth of the magnetometer was recorded and monitored in real time by a pressure sensor installed on the towfish. The altitude of the magnetometer did not exceed the Bureau of Ocean Energy Management, Regulation and Enforcement's standard of 20 ft (6 meters).

Depth calibration values (scale and bias) provided by the manufacturer were utilized to correctly convert the pressure sensor data into depth values. These calibration values were input in the MagLog software, which logs the magnetometer data while drawing navigation from Hypack. The depth reading from the magnetometer was compared to the Innerspace Echo Sounder to ensure accuracy.

2.2.5 Seismic Survey

A GeoAcoustics GeoPulse Boomer System was used to collect geophysical data for the project. A GeoAcoustics Model 5420 Power Supply provided power to a Model 5813 Transmitter Plate mounted on a sled and towed behind the survey boat. The unit was operated at 1/4 second repetition rate at a power setting of 105 joules. Returning

acoustic signals were received by a 20 element streamer with a built in pre-amp towed behind the boat. These signals were then transmitted to a GeoPulse Model 5210A Filter/Pre-Amp, and recorded by a CODA DA2000 Seismic Acquisition System. Filters were set to 700 Hz low cut and 2500 Hz high cut. The layback of the streamer was measured and recorded directly into the CODA DA2000 System so that the resultant navigation data were correctly geo-referenced. Data were later processed by the CODA System to obtain the depth of reflectors below the lakebed. These data were optimized using various post-acquisition filters.

2.2.6 Side Scan Sonar Survey

A Klein Model 3000 Side Scan Sonar System was used to collect the Side Scan data. During the survey, data were digitally acquired using Klein Sonar Pro software. The software displayed the data in real time, enabling the operator to note any significant targets. The side scan was interfaced to the navigation system, and all data were continuously geo-referenced. The towfish was deployed off the stern and kept at an altitude near 10 percent of its range. Cable out was tracked via a 3PS Inc. Digital Counter Block, and layback was calculated by the Side Scan Sonar acquisition computer using Klein Sonar Pro software. The system was operated at a range of 492 feet (150 meters) during the initial reconnaissance survey conducted on September 23rd, allowing for approximately 100 percent overlap between adjacent lines. During the detailed survey on September 29th, the system was operated at a range of (164 feet) 50 meters per channel. Since the lines were spaced 98 feet (30 meters) apart, this provided more than 100 percent overlap on data from adjacent lines.

2.3 Personnel

Contract Manager	Robert Mecarini
Geotechnical Manager	Chuck Dill
Geophysical Manager	Leo Gherardi
Marine Scientist/Equipment Operator	Dan Ciarletta
Marine Scientist/Equipment Operator	Phil Morton

3.0 GEOPHYSICAL DATA PRESENTATION AND DISCUSSION

3.1 Bathymetric Data

Bathymetric data revealed a smooth bottom, gently deepening towards the north, with a change in elevation of slightly more than three feet over 2.75 miles. Bottom elevations at the south end of the survey area are approximately 513 feet (IGLD), while elevations at the north end are approximately 510 feet (IGLD). A map of this data is available as Chart 1 in Appendix 6. Corresponding water depths at the time of survey were close to 58 feet in the south and approximately 61 feet in the north. The U.S. Army Corps of Engineers and NOAA list the Chart Datum for Lake Erie at 569.2 feet (IGLD), which would produce corrected depths of 56 feet in the south and 59 feet in the north. The water level of Lake Erie at the time of survey was approximately 571 feet IGLD, which accounts for the difference in corrected and uncorrected depths.

3.2 Lakebed Features

3.2.1 Side Scan Sonar Features

The Side Scan Sonar showed a generally uniform and smooth lake bottom (Figure 7). No evidence of ripples or other sedimentary features were observed along the survey route. However, some areas of the bottom revealed enhanced reflectivity, which may represent locally disturbed areas. Possible isolated boulders were also noted. These locations were assigned a target number, and corresponding imagery and information can be found in Appendix 1- Side Scan Sonar Targets.

For comparison purposes, Alpine conducted a brief Side Scan Sonar test near the Crib structure, located south of the survey site. The test showed the lakebed at this location presents significant bottom features, including ripples. (Figure 8)

A few linear targets less than 100 feet long were found in the survey area, representing apparent bottom scars. No significant patterns or groupings of targets were found, and none of the Side Scan targets revealed an association with magnetic targets.

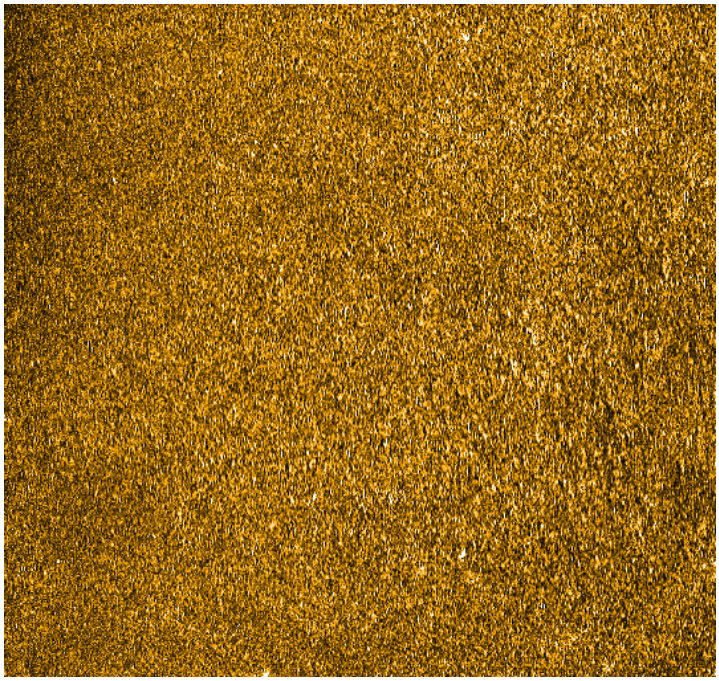


Figure 7 - Side Scan image of typical bottom in survey area, width approx. 140 ft

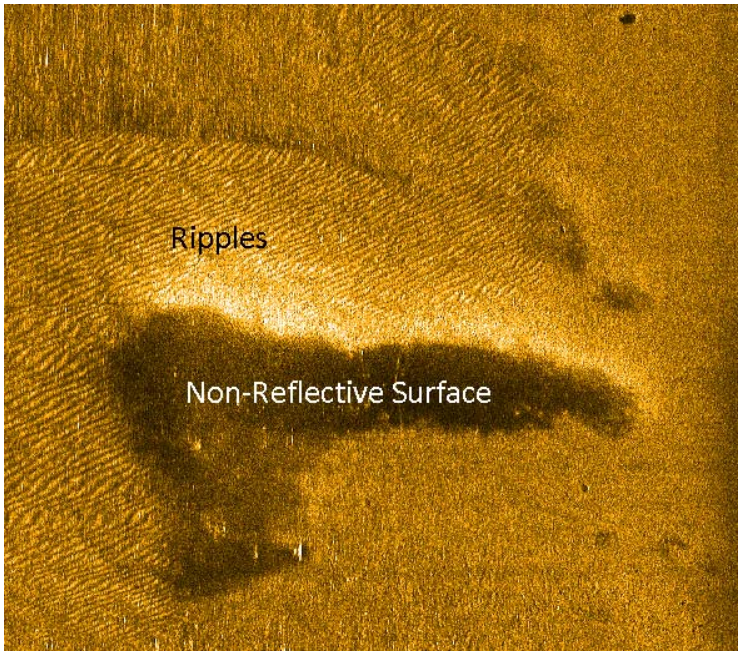


Figure 8 - Side Scan image of bottom near Crib structure, width approx. 165 ft

3.2.2 Magnetometer Targets

After adjusting for the background magnetic field, only sixteen magnetic anomalies (see Appendix 2- Magnetometer Targets) of any significance were noted. Of these sixteen anomalies, only seven had a total amplitude of greater than 40 Gamma (Figure 9, example), with the most magnetically intense having an amplitude of 227.2 Gamma. The more intense anomalies also showed the least width, having pole-to-pole distances of less than 0.01 feet. This indicates that the objects are likely very small or thin. Most other anomalies did not exceed a width of 10 feet. The short anomaly lengths present in the area signify that the magnetic targets were probably within close range of the magnetometer as it passed by. This is confirmed by the lack of magnetic influence seen in survey lines run adjacent to lines previously found to feature magnetic anomalies.

It is possible that some of the more intense anomalies are manmade, such as small metallic objects discarded from a ship. The less intense objects are most likely a function of geology, perhaps representing small pockets of glacial till or other magnetic rocks/sediment near the surface. In both cases, the Side Scan Sonar imagery did not show any objects that would correlate with the anomalies. The lack of correlation islikely due to the magnetic objects being masked by overlying sediment.

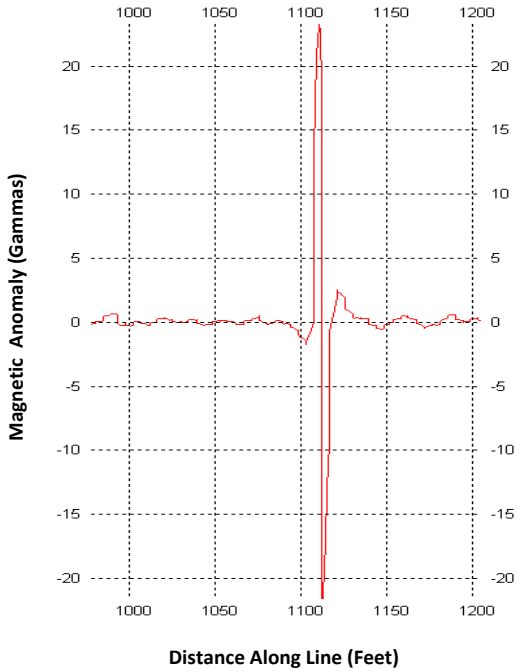


Figure 9 - Magnetometer Target #12, with a total amplitude of over 40 Gamma

3.3 Seismic Data

Dames and Moore, in their 1974 report, used a speed of sound of 5700 feet per second to determine the thickness of sediment in their seismic records. To be consistent with their interpretation, Alpine used the same speed.

The current seismic survey presented reflectors that could differentiate two potential sedimentary units. Following Dames and Moore's interpretation, the upper unit is likely soft silt 10 to 16 feet in thickness. The lower unit is probably dense clay and silt of glacial origin underlain by a shale unit.

3.3.1 Soft Silty Sediments

The soft silts in the upper unit contain a number of closely spaced and relatively horizontal reflectors, typical of sediments deposited in a quiet environment. The contact between the bottom of this unit and the top of the underlying glacial sediments is somewhat irregular, but generally slopes down to the north and east through the survey area. The thickness of this soft sediment unit was mapped and contoured at two foot intervals. This map is shown as Chart 4 in Appendix 6. The data compare well with the analysis from 1974.

3.3.2 Glacial Sediments

The nature of the sediment between the soft silt and the underlying shale varies over the site. As shown on Chart 7 in Appendix 6, in the northern portion of the surveyed block, from Turbine 5 to Turbine 3, a distinct reflector, or a pair of closely spaced flat-lying reflectors, is present in the middle of the glacial sediment section. The upper part of the glacial sediment contains several faint internal reflectors, while the bottom portion contains few, if any, reflectors. The reflectors in the upper portion are likely attributable to occasional sand lenses.

The reflectors marking the division between the upper and lower parts of the glacial sediment were found to become indistinct between Turbine 3 and Turbine 2. South of Turbine 3, there are few, if any, horizontal reflectors within the glacial unit, indicating more uniform sediment.

3.3.3 Shale

The seismic reflectors representing the shale surface are broken and indistinct. The elevation of this irregular shale surface was mapped and contoured, and the results are presented on Chart 6 in Appendix 6. The data compare well with the elevation contours determined by Dames and Moore.

3.4 Data Review for Evidence of Aquatic Species

Side scan sonar and single beam echo sounder systems are capable of detecting schools of fish, due to the relatively high frequency of the acoustic pulse used. Depending on the density of fish in the school, a school of fish may block out both the side scan and echo sounder data, creating a shadow on the data. The size of the school can be estimated from the scale lines shown on the data. The signals from a lower frequency subbottom profiler system, such as the Uniboom as used on the Lake Erie project, may pass through the fish and therefore fish, if present, would not be detected on the data.

The Lake Erie survey was conducted in two parts due to weather constraints. The first part of the survey was conducted during daylight hours. During this part of the project, the side scan system was operated at a range of 150 meters (495 feet) per channel and the tow fish was deployed at a depth of approximately 15 feet below water surface or 45 feet above the lake bed. Four survey lines were completed at this time, with each line being approximately 2.5 miles long.

The second part of the survey was run at night approximately one week after the first part. During the night time operations, the system was operated at a range of 50 meters (164 feet) per channel, and the tow fish was between 18 and 25 feet off the lake bottom. Seven lines were run during the second part of the project. No distinct evidence of schools of fish were observed on any of the data collected during the night time geophysical surveys conducted at the proposed offshore wind farm site in Lake Erie.

However, a few targets possibly representing small schools of fish were observed during the daylight operations. An example of one of these potential small schools is shown below.

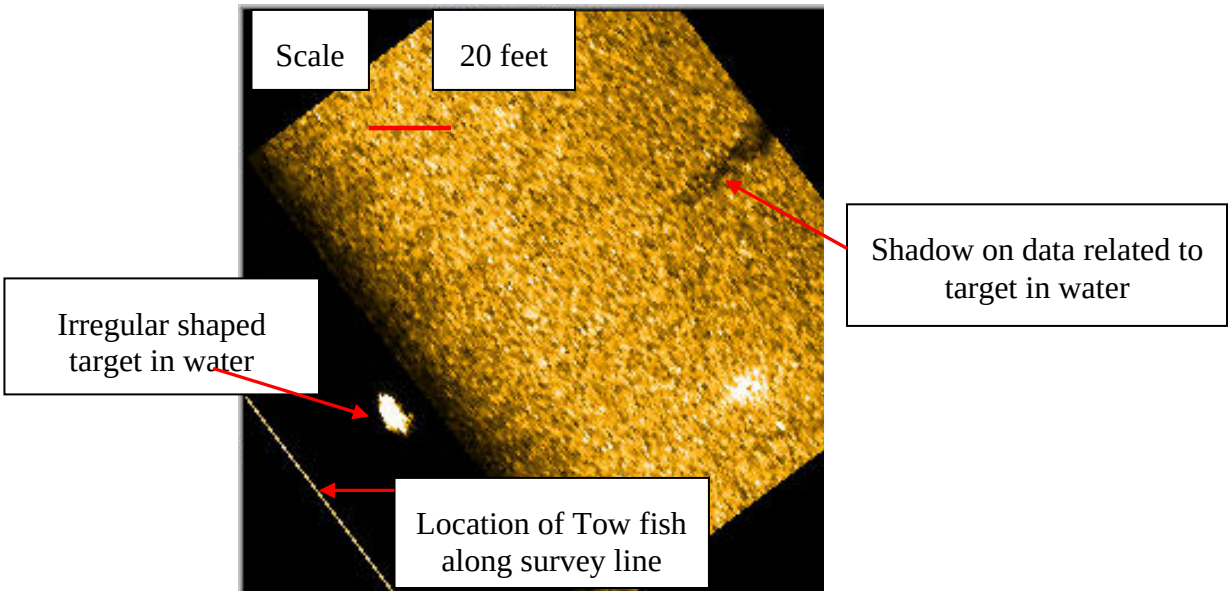


Figure 10 – Side Scan Sonar Data Example of Possible School of Fish

The white area within the water column, which is the black background portion on the lower left of the figure, is interpreted as a possible school of fish. The elongated black area to the right on the adjacent yellow colored data is interpreted as the being the shadow created by the school. This target was the largest of eleven similar targets observed during the collection of four survey lines, with the smaller groups consisting of white targets observed in the water column with no shadow on the data. On average we estimate that we observed about one such target each mile. The estimated size of the target is less than five meters across.

It is not possible to determine how many fish may have been present within any of the apparent targets detected on the data.

Note that, since the tow fish was deployed relatively close to the lake bottom during the lines run at night, any fish present between the tow and the lake surface would likely not be detected by the side scan system, as the side scan system is designed to detect targets to the side and below, but not above the tow fish.

CONCLUSIONS

The purpose of this project was to determine the bathymetry and stratigraphy of the site, as well as the possible presence of natural or man-made features on, or below, the lakebed which might adversely impact the installation or stability of wind turbines at their proposed locations. No significant man-made features were identified on the lakebed

by the Side Scan Sonar, and no magnetometer targets were found that would pose a hazard to engineering near the turbines.

Bathymetry data show the area around the proposed turbines to be nearly flat, with a very gentle deepening towards the north of approximately one foot per mile. Bottom elevations range from approximately 513 to 510 feet (IGLD). Corresponding water depths over the survey area are about 56 to 59 feet after correction to the Lake Erie Chart Datum.

Seismic data showed reflectors that probably delineate multiple geologic units. Based on the study by Dames and Moore, it is likely that soft silts and clays, approximately 10 to 16 feet thick, are present on the lakebed over the entire work site. These soft sediments are underlain by a thick sequence of stiffer silts and clays of glacial origin which, in turn, overly what is believed to be an irregular shale surface 78 to 95 feet below the lakebed.

An engineering analysis of the data collected during the present survey, taking into consideration information from the Dames and Moore report, will be required to determine the most suitable foundation design for wind turbines at the site. Additional borings at the proposed turbine locations should be taken prior to final project design.

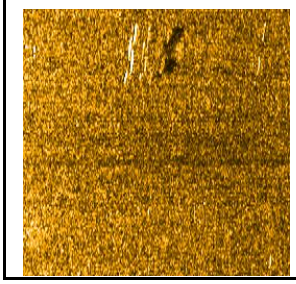
REFERENCES

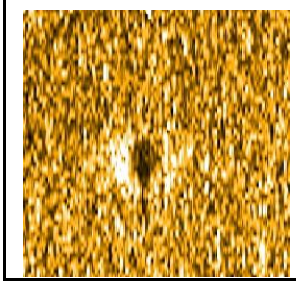
Dames & Moore, 1974. *Lake Bottom Geotechnical and Geophysical Studies, Reports No. 5-1 & 5-2.* First Phase Airport Feasibility Study for the Lake Erie Regional Transportation Authority. Prepared under contract to Howard Needles Tammen & Bergendoff.

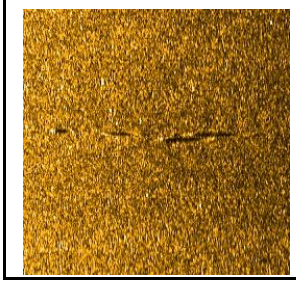
Driedger-Marschall et al, 2009. *Final Feasibility Report.* Great Lakes Wind Energy Center Feasibility Study. Prepared by JW Great Lakes Wind LLC, subsidiary of juwi GmbH.

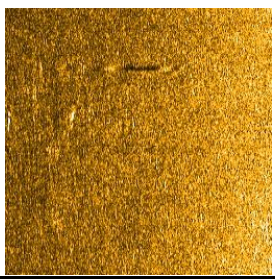
APPENDIX 1

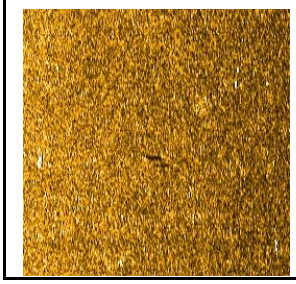
SIDE SCAN SONAR TARGETS

Contact Image	Contact Info			User Entered Info	
	Contact	1			
	Projected Coordinates	Easting	Northing	Depth	60 US Feet
		2157351.452	708057.042	Target Length	29 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	4 US Feet
	Line Name	Line 20		Classification 1	Target
	Description	Irregular reflector target and possible low relief object(s)			

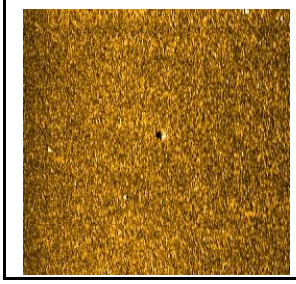
Contact Image	Contact Info			User Entered Info	
	Contact	2			
	Projected Coordinates	Easting	Northing	Depth	61 US Feet
		2155236.533	711661.856	Target Length	3 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1.5 US Feet
	Line Name	Line 11		Classification 1	Target
	Description	Boulder-like object			

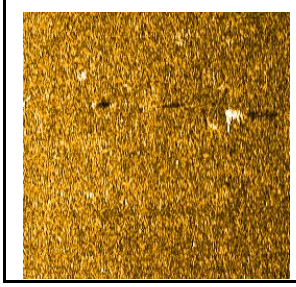
Contact Image	Contact Info			User Entered Info	
	Contact	3			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2163100.828	701041.324	Target Length	43 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Drag scar			

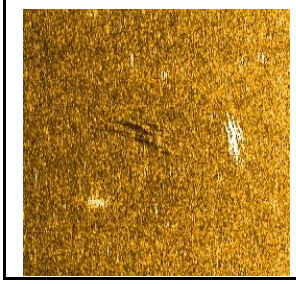
Contact Image	Contact Info			User Entered Info	
	Contact	4			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162562.815	701433.521	Target Length	9.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Drag scar			

Contact Image	Contact Info			User Entered Info	
	Contact	5			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162548.572	701783.222	Target Length	4 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Isolated scar or low relief object			

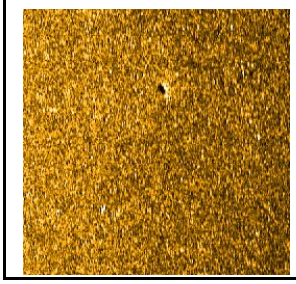
Contact Image	Contact Info			User Entered Info	
	Contact	6			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162547.209	701782.603	Target Length	4 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Isolated scar or low relief object			

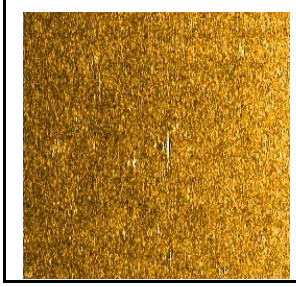
Contact Image	Contact Info			User Entered Info	
	Contact	7			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162401.044	701927.779	Target Length	2.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Boulder-like object			

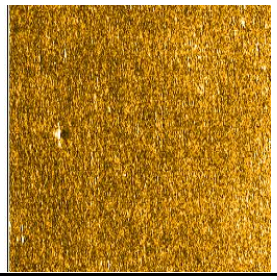
Contact Image	Contact Info			User Entered Info	
	Contact	8			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162400.055	701993.362	Target Length	6.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	4 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Unidentified Reflector and boulder			

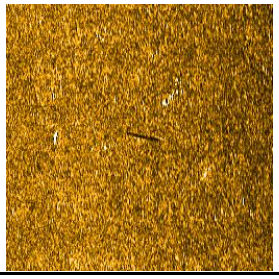
Contact Image	Contact Info			User Entered Info	
	Contact	9			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162106.113	702033.487	Target Length	12.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	4 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Unidentified Reflectors and possible irregular scars			

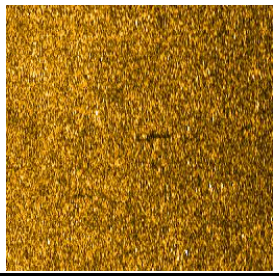
Contact Image	Contact Info			User Entered Info	
	Contact	10			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162106.113	702033.487	Target Length	14 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Possible linear scar			

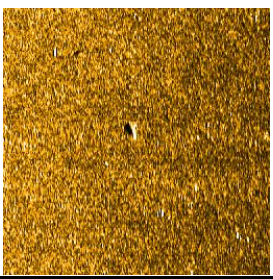
Contact Image	Contact Info			User Entered Info	
	Contact	11			
	Projected Coordinates	Easting	Northing	Depth	58.5 US Feet
		2162025.068	702469.492	Target Length	2.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Boulder-like object			

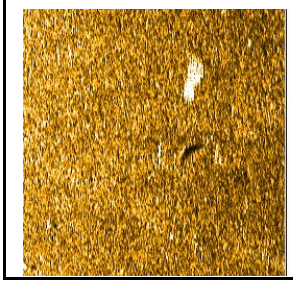
Contact Image	Contact Info			User Entered Info	
	Contact	12			
	Projected Coordinates	Easting	Northing	Depth	58.5 US Feet
		2161829.529	702407.175	Target Length	6 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Linear reflector			

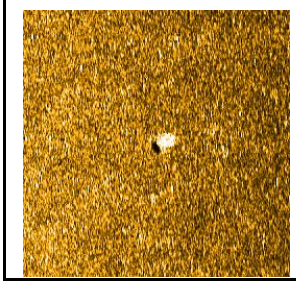
Contact Image	Contact Info			User Entered Info	
	Contact	13			
	Projected Coordinates	Easting	Northing	Depth	58.5 US Feet
		2161331.781	703013.5	Target Length	5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Irregular small reflector or low relief object			

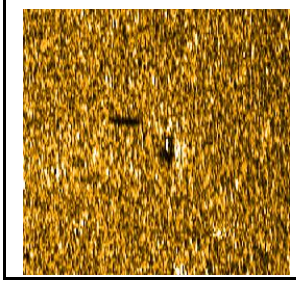
Contact Image	Contact Info			User Entered Info	
	Contact	14			
	Projected Coordinates	Easting	Northing	Depth	58.5 US Feet
		2161441.055	703256.7	Target Length	8 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Linear scar			

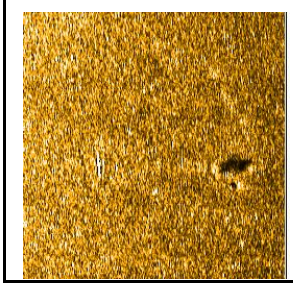
Contact Image	Contact Info			User Entered Info	
	Contact	15			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2160994.733	703877.427	Target Length	5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 5 & 8		Classification 1	Target
	Description	Unknown low relief object			

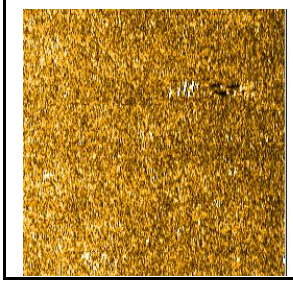
Contact Image	Contact Info			User Entered Info	
	Contact	16			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2160477.79	704609.334	Target Length	4 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Boulder-like object			

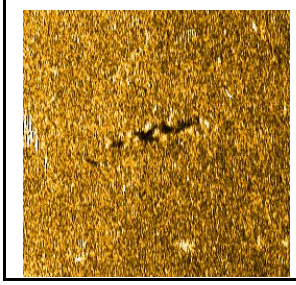
Contact Image	Contact Info			User Entered Info	
	Contact	17			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2160281.31	704892.587	Target Length	10 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	4 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Half-moon scar and reflector			

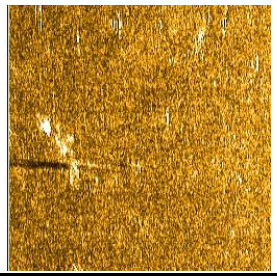
Contact Image	Contact Info			User Entered Info	
	Contact	18			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2159600.229	705690.607	Target Length	4 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3.5 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Boulder-like object			

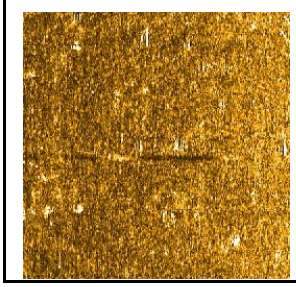
Contact Image	Contact Info			User Entered Info	
	Contact	19			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2159521.204	705767.711	Target Length	3 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Unidentified low relief object(s) and possible scar			

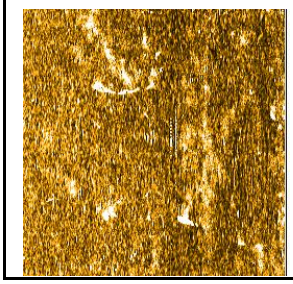
Contact Image	Contact Info			User Entered Info	
	Contact	20			
	Projected Coordinates	Easting	Northing	Depth	60.5 US Feet
		2157096.573	708931.999	Target Length	7 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	7 US Feet
	Line Name	Line 3 & 5		Classification 1	Target
	Description	Irregular boulder target			

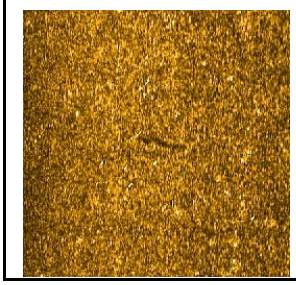
Contact Image	Contact Info			User Entered Info	
	Contact	21			
	Projected Coordinates	Easting	Northing	Depth	60.5 US Feet
		2156997.029	709070.289	Target Length	7 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Unidentified target and reflector			

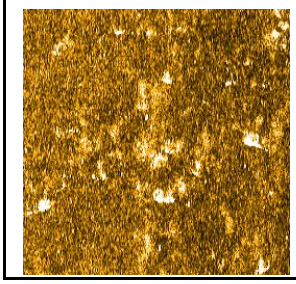
Contact Image	Contact Info			User Entered Info	
	Contact	22			
	Projected Coordinates	Easting	Northing	Depth	60.5 US Feet
		2156631.231	709507.102	Target Length	27 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3 US Feet
	Line Name	Line 5		Classification 1	Target
	Description	Unidentified low relief object(s), or possibly scar			

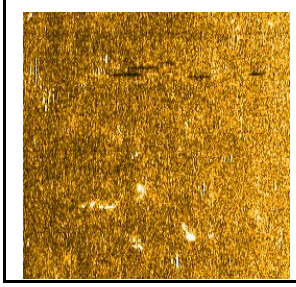
Contact Image	Contact Info			User Entered Info	
	Contact	23			
	Projected Coordinates	Easting	Northing	Depth	61 US Feet
		2155613.709	710406.438	Target Length	28 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Linear scar			

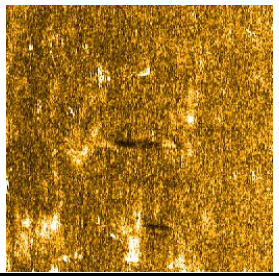
Contact Image	Contact Info			User Entered Info	
	Contact	24			
	Projected Coordinates	Easting	Northing	Depth	61 US Feet
		2155072.91	712071.126	Target Length	46 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 12		Classification 1	Target
	Description	Linear scar			

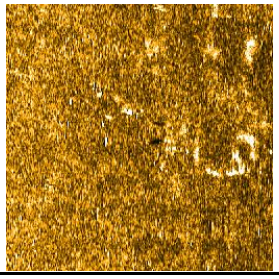
Contact Image	Contact Info		User Entered Info	
	Contact	25		
	Projected Coordinates	Easting / Northing	Depth	61 US Feet
		2155432.461 / 711201.825	Target Length	- US Feet
	Map Projection	NAD83 Ohio N. State Plane	Target width	- US Feet
	Line Name	Line 10	Classification 1	Target
	Description	Numerous unidentified reflectors		

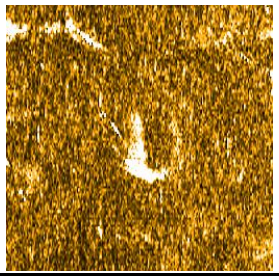
Contact Image	Contact Info		User Entered Info	
	Contact	26		
	Projected Coordinates	Easting / Northing	Depth	61 US Feet
		2156020.933 / 710493.447	Target Length	12.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane	Target width	1 US Feet
	Line Name	Line 10	Classification 1	Target
	Description	Irregular scar		

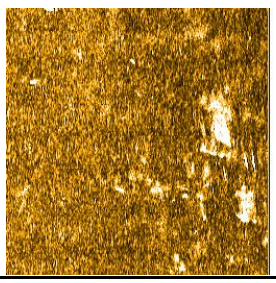
Contact Image	Contact Info		User Entered Info	
	Contact	27		
	Projected Coordinates	Easting / Northing	Depth	61 US Feet
		2156080.513 / 710335.404	Target Length	4 US Feet
	Map Projection	NAD83 Ohio N. State Plane	Target width	3 US Feet
	Line Name	Line 10	Classification 1	Target
	Description	Unidentified Reflectors		

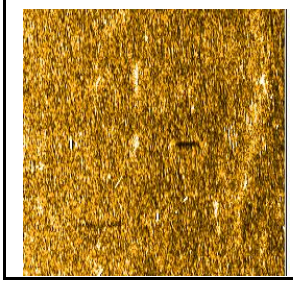
Contact Image	Contact Info		User Entered Info	
	Contact	28		
	Projected Coordinates	Easting / Northing	Depth	60 US Feet
		2157550.706 / 708738.822	Target Length	12.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane	Target width	4 US Feet
	Line Name	Line 12 and 29	Classification 1	Target
	Description	Irregular linear scarring		

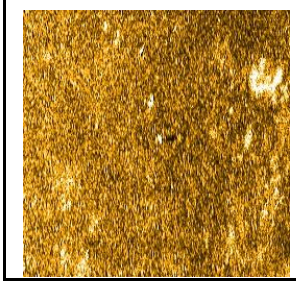
Contact Image	Contact Info			User Entered Info	
	Contact	29			
	Projected Coordinates	Easting	Northing	Depth	60 US Feet
		2158235.117	707903.722	Target Length	16 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 12		Classification 1	Target
	Description	Scarring			

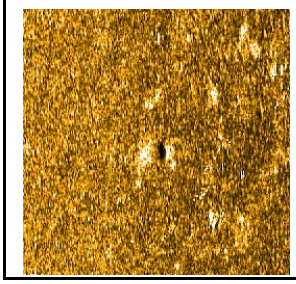
Contact Image	Contact Info			User Entered Info	
	Contact	30			
	Projected Coordinates	Easting	Northing	Depth	59.5 US Feet
		2158755.328	706859.02	Target Length	13 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	10 US Feet
	Line Name	Line 10		Classification 1	Target
	Description	Irregular reflector			

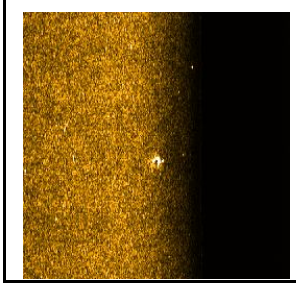
Contact Image	Contact Info			User Entered Info	
	Contact	31			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2160902.335	704593.928	Target Length	8 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	7 US Feet
	Line Name	Line 31		Classification 1	Target
	Description	Irregular reflector targets			

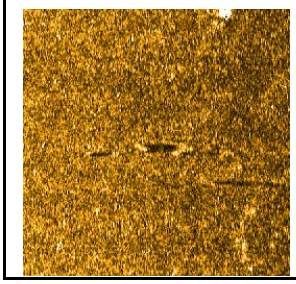
Contact Image	Contact Info			User Entered Info	
	Contact	32			
	Projected Coordinates	Easting	Northing	Depth	58.5 US Feet
		2161640.088	703111.954	Target Length	10 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	4 US Feet
	Line Name	Line 10		Classification 1	Target
	Description	Irregular reflector targets			

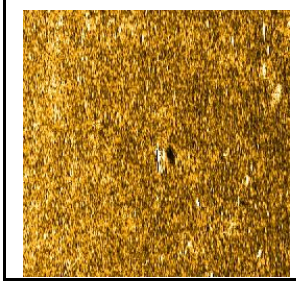
Contact Image	Contact Info			User Entered Info	
	Contact	33			
	Projected Coordinates	Easting	Northing	Depth	58.5 US Feet
		2161283.929	703406.052	Target Length	4.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 9		Classification 1	Target
	Description	Boulder-like objects			

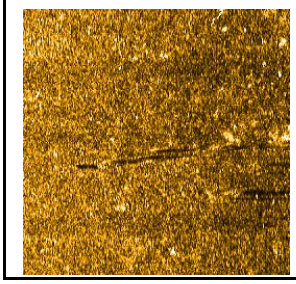
Contact Image	Contact Info			User Entered Info	
	Contact	34			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2160411.76	704543.819	Target Length	9 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	8 US Feet
	Line Name	Line 9		Classification 1	Target
	Description	Irregular reflector targets			

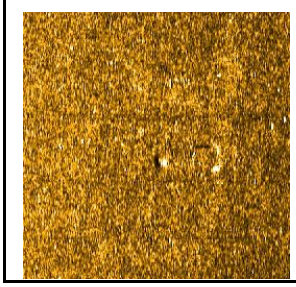
Contact Image	Contact Info			User Entered Info	
	Contact	35			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2160021.644	705040.509	Target Length	4 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 9		Classification 1	Target
	Description	Boulder-like object			

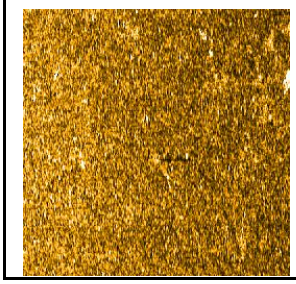
Contact Image	Contact Info			User Entered Info	
	Contact	36			
	Projected Coordinates	Easting	Northing	Depth	59.5 US Feet
		2158157.234	707093.542	Target Length	3 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Irregular reflector target at edge of side scan range			

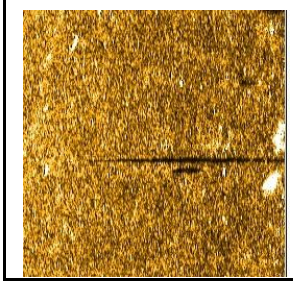
Contact Image	Contact Info			User Entered Info	
	Contact	37			
	Projected Coordinates	Easting	Northing	Depth	60 US Feet
		2157879.951	707685.3	Target Length	47 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1.5 US Feet
	Line Name	Line 9		Classification 1	Target
	Description	Inconsistent scarring			

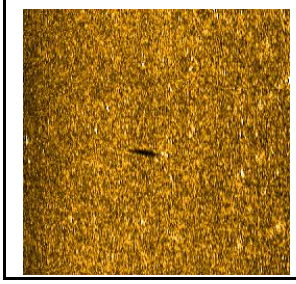
Contact Image	Contact Info			User Entered Info	
	Contact	38			
	Projected Coordinates	Easting	Northing	Depth	60 US Feet
		2157337.864	708391.569	Target Length	3.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 9		Classification 1	Target
	Description	Boulder-like object or possible debris			

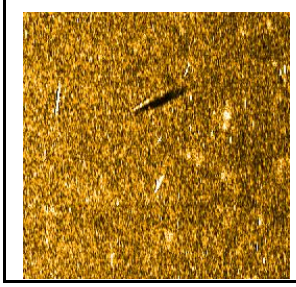
Contact Image	Contact Info			User Entered Info	
	Contact	39			
	Projected Coordinates	Easting	Northing	Depth	61 US Feet
		2155700.45	710561.986	Target Length	52 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 9 and 28		Classification 1	Target
	Description	Irregular linear scarring			

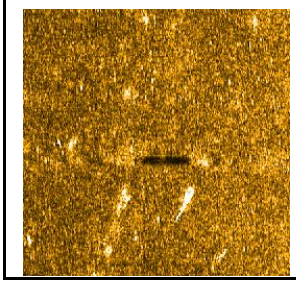
Contact Image	Contact Info			User Entered Info	
	Contact	40			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2161213.124	703931.42	Target Length	56 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 10 and 11		Classification 1	Target
	Description	Possible boulder-like objects			

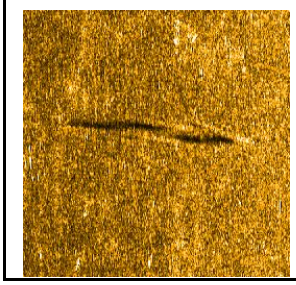
Contact Image	Contact Info			User Entered Info	
	Contact	41			
	Projected Coordinates	Easting	Northing	Depth	58.5 US Feet
		2161827.822	702449.066	Target Length	7 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	1 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Lone boulder-like object			

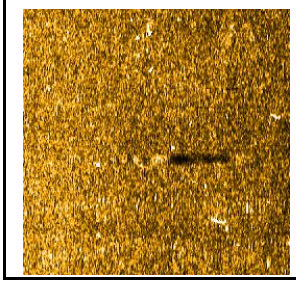
Contact Image	Contact Info			User Entered Info	
	Contact	42			
	Projected Coordinates	Easting	Northing	Depth	59 US Feet
		2159578.55	705437.788	Target Length	49 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Linear scarring and reflectors			

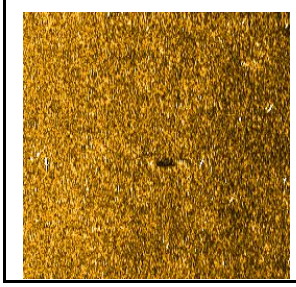
Contact Image	Contact Info			User Entered Info	
	Contact	43			
	Projected Coordinates	Easting	Northing	Depth	59.5 US Feet
		2158636.61	706483.964	Target Length	7 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 19		Classification 1	Target
	Description	Possible scar			

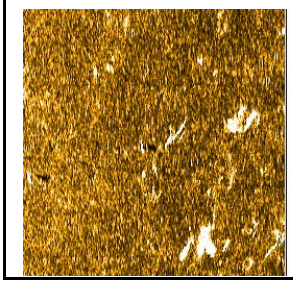
Contact Image	Contact Info			User Entered Info	
	Contact	44			
	Projected Coordinates	Easting	Northing	Depth	60 US Feet
		2157459.773	708077.334	Target Length	7 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3 US Feet
	Line Name	Line 19 and 3		Classification 1	Target
	Description	Irregular scarring			

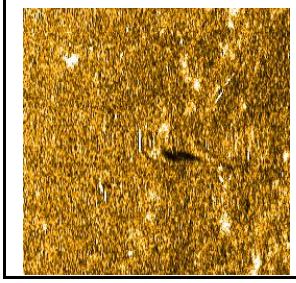
Contact Image	Contact Info			User Entered Info	
	Contact	45			
	Projected Coordinates	Easting	Northing	Depth	60.5 US Feet
		2155861.131	709775.55	Target Length	12.5 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 21		Classification 1	Target
	Description	Unknown objects and reflectors , possible scar			

Contact Image	Contact Info			User Entered Info	
	Contact	46			
	Projected Coordinates	Easting	Northing	Depth	61 US Feet
		2155153.194	710722.281	Target Length	41 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 21		Classification 1	Target
	Description	Irregular linear scarring			

Contact Image	Contact Info			User Entered Info	
	Contact	47			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162430.192	702436.343	Target Length	15 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 12 and 32		Classification 1	Target
	Description	Unknown low relief object or drag scar			

Contact Image	Contact Info			User Entered Info	
	Contact	48			
	Projected Coordinates	Easting	Northing	Depth	58 US Feet
		2162974.17	700638.246	Target Length	2 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	2 US Feet
	Line Name	Line 20		Classification 1	Target
	Description	Lone boulder-like object			

Contact Image	Contact Info			User Entered Info	
	Contact	49			
	Projected Coordinates	Easting	Northing	Depth	60 US Feet
		2157097.556	708404.243	Target Length	7 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	5 US Feet
	Line Name	Line 20 and 29		Classification 1	Target
	Description	Inconsistent reflectors with light scar			

Contact Image	Contact Info			User Entered Info	
	Contact	50			
	Projected Coordinates	Easting	Northing	Depth	61 US Feet
		2155637	710342.244	Target Length	9 US Feet
	Map Projection	NAD83 Ohio N. State Plane		Target width	3 US Feet
	Line Name	Line 20		Classification 1	Target
	Description	Inconsistent reflectors with unknown low relief object			

APPENDIX 2

MAGNETOMETER TARGETS

Expert Lakebed Studies for
The Lake Erie Wind Power Project
Offshore Cleveland, Ohio

Target	Line	Easting (ft)	Northing (ft)	AMP1 (Γ)	AMP2 (Γ)	Amp 1 - Amp 2 (Γ)	Width (ft)	Character
1	16	2162089.38	701564.16	6.38	-5.17	11.55	5.50	Dipole
2	16	2160604.88	703596.00	6.05	-12.30	18.35	4.96	Dipole
3	16	2160222.63	704133.25	5.25	-14.58	19.83	5.36	Complex Dipole
4	16	2154100.38	712015.28	40.31	-22.27	62.58	4.90	Complex Dipole
5	23	2156519.50	707925.88	88.50	-138.70	227.20	0.01	Dipole
6	23	2157893.50	708957.63	114.33	-58.31	172.64	0.01	Dipole
7	25	2160044.00	703970.06	25.75	-17.27	43.02	0.01	Dipole
8	6	2163602.00	701168.31	7.61	-42.19	49.80	3.72	Complex Dipole
9	6	2163523.25	701265.09	10.42	-6.67	17.09	0.86	Complex Dipole
10	6	2162317.88	702926.69	5.73	-2.62	8.35	4.26	Dipole
11	6	2160518.00	705319.06	8.16	-5.66	13.82	5.66	Dipole
12	12	2162767.88	701293.06	23.29	-25.45	48.74	1.36	Dipole
13	9	2155015.00	711955.81	39.91	-19.52	59.43	0.01	Dipole
14	9	2158420.00	707457.63	20.37	-5.70	26.07	4.70	Complex Dipole
15	14	2159331.13	705523.41	5.37	-3.51	8.88	14.10	Complex Dipole
16	15	2162342.00	701391.81	66.62	-29.04	95.66	6.20	Complex Dipole

APPENDIX 3

FIELD LOGS

ALPINE OCEAN SEISMIC SURVEY, INC.
70 Oak Street Norwood, New Jersey 07648
Tel: (201) 768-8000 Fax: (201) 768-5750

NAVIGATION LOG

JOB NO._____1634_____ **LOCATION** _____**Cleveland, Ohio**_____

CLIENT_____Cuyahoga County_____ **DATES**_____**9/23/2010**_____

INSTRUMENTATION_Boomer, Klein SSS, Geometrics Mag, Hypack, Innerspace 456_____

DATE	TIME	EVENTS
9/23	0730	At dock; Whiskey Island Marina
	0750	Underway to site; clear day light SE wind
	0855	At site; deploy pressure/tide gauge
		Bar check echo sounder
		Deploy gear
	1010	Pull in magnetometer and add 2 more weights
	1030	Deploy – now ok
		Seeing rock on Boomer at +/- 90
	1101	Start of line #6 150m E of center line
		Mag lay back 140 feet; depth 46/58
		Boomer – 65
		Speed 3.4 knots- line run to NW;
		first fix #1 @100’ interval
	1135	Lost Hypack @ fix120
	1208	Restart line near Tower 3
	1230	Start of line at fix 205
		Check data and then return to center line
	1242	Start center line line 6 fix 206
	1322	End of line 6 = center line last fix 363
		Check data

ALPINE OCEAN SEISMIC SURVEY, INC.
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Tel: (201) 768-8000 Fax: (201) 768-5750

NAVIGATION LOG

JOB NO._____1634_____ **LOCATION** _____**Cleveland, Ohio**_____

CLIENT_____Cuyahoga County_____ **DATES**_____**9/23/2010**_____

INSTRUMENTATION_Boomer, Klein SSS, Geometrics Mag, Hypack, Innerspace 456_____

DATE	TIME	EVENTS
9/23	1345	Start of line 16 – 150 m west of C/L
		Fix 364; heading NNW
	1430	End of line fix 522
	1509	Start of cross line 22 = tower 5 east to west
		Fix # 523; cable out – mag – 230’ at Start of line
		Layback 186 ft
	1519	End of line; last fix 555
	1530	Start of line 23 – cross line tower 4
		Fix 556 heading East
	1542	End of line fix 588; SE to next line
	1552	Start of line 24 heading west
		Fix 589
	1603	End of line 24 – tower 3
		Last fix 622
	1614	Start of line 25; tower 2
		First fix 623
	1625	End of line 25; last fix 656 Tower 2
	1636	Start of line 26; tower 1
		First fix 657

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NAVIGATION LOG

JOB NO._____1634_____ **LOCATION** _____**Cleveland, Ohio**_____

CLIENT_____Cuyahoga County_____ **DATES**_____**9/23/2010**_____

INSTRUMENTATION_Boomer, Klein SSS, Geometrics Mag, Hypack, Innerspace 456_____

DATE	TIME	EVENTS
9/23	1646	End of line at fix 691
		Go to SE end of line 6 to rerun first part
		from this morning
	1700	Start line 6_3 (redo of inshore portion) first fix 692
	1755	Infill done; last fix 795
	1822	Start line 10 to SSE – run all gear
		First fix 796
	1912	End of line 10; last fix 956
	1915	Recover all geophysical gear
	1930	Recover tide gauge; head toward dock
	2100	Docked at Whiskey Island Marina

ALPINE OCEAN SEISMIC SURVEY, INC.
70 Oak Street Norwood, New Jersey 07648
Tel: (201) 768-8000 Fax: (201) 768-5750

NAVIGATION LOG

JOB NO._____1634_____ **LOCATION** _____**Cleveland, Ohio**_____

CLIENT_____Cuyahoga County_____ **DATES**_____**9/24/2010**_____

INSTRUMENTATION_Boomer, Klein SSS, Geometrics Mag, Hypack, Innerspace 456_____

DATE	TIME	EVENTS
9/24	0700	Wind SSW 15-25; standby for weather
		NOAA Forecasts
		Friday afternoon - WSW 24kts; 3 ft small craft
		Friday night - W 26kts; 8 ft small craft
		Saturday - W 22kts; 5-6 ft small craft
		Saturday night - NW 16kts; 6 ft small craft
		Sunday - NE 11kts; 3-4 ft
		Sunday night - ENE 11kts; 2 ft
		Monday - ENE 11kts; 2 ft

ALPINE OCEAN SEISMIC SURVEY, INC.
70 Oak Street Norwood, New Jersey 07648
Tel: (201) 768-8000 Fax: (201) 768-5750

NAVIGATION LOG

JOB NO._____1634_____ **LOCATION** _____**Cleveland, Ohio**_____

CLIENT_____Cuyahoga County_____ **DATES**_____**9/29/2010**_____

INSTRUMENTATION_Boomer, Klein SSS, Geometrics Mag, Hypack, Innerspace 456_____

DATE	TIME	EVENTS
9/29	1500	At boat – ready to set up gear again
	1535	Underway – seas and wind calm
	1710	At site; deploy tide gauge and echo sounder,
		SSS and Mag
		Start line 12 – Mag,Echo and SSS
	1721	First fix 957
	1810	End of line 12
	1823	Start of line 9 to South
	1918	End of line 9; last fix 1269
	1919	Start of line 13 to North
	2017	End of line 13
	2020	Start of line 8 to SSE
	2107	End of line 8; fix 1582
	2110	Start of line 14; fix 1583 to NNW
	2203	End of line 14; fix 1738
	2207	Start of line 7; fix 1739
		@1018 – SSS to layback 25 m
	2256	End of line 7; fix 1897
	2259	Start of line 15; fix 1898

ALPINE OCEAN SEISMIC SURVEY, INC.
70 Oak Street Norwood, New Jersey 07648
Tel: (201) 768-8000 Fax: (201) 768-5750

NAVIGATION LOG

JOB NO._____1634_____ **LOCATION** _____**Cleveland, Ohio**_____

CLIENT_____Cuyahoga County_____ **DATES**_____**9/29/2010-9/30/2010**_____

INSTRUMENTATION_Boomer, Klein SSS, Geometrics Mag, Hypack, Innerspace 456_____

DATE	TIME	EVENTS
9/29	2351	End of line 15; last fix 2053
		Recover SSS & Mag
		Stopped Tide Gauge
9/30	0046	Completed lines & download
		Underway to dock
	0150	Docked at Whiskey Island Marina

APPENDIX 4

DAILY REPORTS

ALPINE OCEAN SEISMIC SURVEY, INC
70 Oak Street, Norwood, New Jersey 07648
Tel: 201-768-800 Fax: 201-768-5750

DAILY REPORT LOG #1

Project #:	1634
Company:	Cuyahoga County of Ohio - Cuyahoga Department of Development
Location:	Lake Erie - Cleveland, Ohio
Date:	22-Sep-10
Vessel Name:	M/V Sancho
Equipment Used:	Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
	Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
	Tide Gauge, CSI DGPS Antenna
Crew:	Dill, Gherardi, Ciarletta, Morton
Subcontractors:	Underwater Marine Contractors, Inc.
Weather:	10kts South, seas one foot
Weather Forecast:	

A: OPERATIONAL SUMMARY	**(Yes/No)**
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	0	0	40

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Boat to move to lake side marina in AM; crew meet boat at 07:15 ready to sail to site

Start Uniboom seismic, Side Scan, magy and echo survey along main tower route

E. ESTIMATED COMPLETION DATES

September 24, 2010

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
7:30	At boat, commence mobilization
17:30	All gear tested and operational

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

Mobilization Day, All equipment installed and working properly

I. Client's Comments:

Signed:

Chuck Dill	9/23/2010	Gregory Zucca	9/22/2010
Party Chief	Date	Client	Date

Alpine Ocean Seismic Survey

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #2

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 23-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Gherardi, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: Winds light and variable; seas calm

Weather Forecast: 20-30 kts South-west, seas two-four feet

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	14	14	26

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Standby for weather on Friday

E. ESTIMATED COMPLETION DATES

9/26/2010 for geophysical survey; Sept 29 for geotechnical boring

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
7:30	Meet boat at Whiskey Island marina
7:50	Underway to work site; weather and seas calm
8:55	At site;deploy tide gage: deploy SVP for bathy calibration; deploy all geophysical
	gear and commence testing
10:00	Boomer, echo and Side Scan OK. Add two additional weights to maggy to
	achieve required tow depth of sensor; retest at survey speed- good
11:01	Start survey line #6, 150 m east of centerline
11:35	Problem with navigation program requires break in line to reset computer
12:08	Resume survey of line #6
12:30	End line #6;
12:42	Start survey line CenterLine (Line 11)
13:27	End survey of Centerline
13:45	Start line #16, 150 m west of Centerline
14:30	End line # 16
15:09	Start crosslines, #22, Tower 5
16:46	End of all cross lines, towers 1-5
17:00	Start re-run of first survey line (#6) to ensure data coverage
17:55	Complete infill of first survey line
18:22	Run survey line #10, offset from Centerline by 30 m to east
19:12	End survey lines; recover geophysical gear
19:30	Recover tide gage; underway to dock
21:00	Docked at Whiskey Island Marina

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

Side Scan and Magnetometer surveys found only one or two small objects on sea floor. Subbottom survey confirmed previous survey reported range of depths to bedrock and thickness of soft sediments. Seismic reflections from near rock surface characterized by several irregular layers, vs one distinct reflector.

I. Client's Comments:

Signed:

Chuck Dill	9/23/2010	Gregory Zucca	
Party Chief	Date	Client	Date

Alpine Ocean Seismic Survey

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #1

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 24-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Gherardi, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: Wind WSW-20-25 kts

Weather Forecast: 20-30 kts West, seas 5-6 feet

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	0	14	26

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Standby for weather on Friday

E. ESTIMATED COMPLETION DATES

9/26/2010 for geophysical survey; Sept 29 for geotechnical boring

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
8:00	Confirm standby for weather
17:00	Standby for weather

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

I. Client's Comments:

Signed:

Chuck Dill	9/24/2010	Gregory Zucca	
Party Chief	Date	Client	Date
Alpine Ocean Seismic Survey			

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #1

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 25-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Gherardi, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: Wind NW-20-25 kts

Weather Forecast: 15-20 kts West, seas 3-4 feet

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	0	14	26

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Standby for weather through the weekend: Saturday AM, demob personnel, leave equipment and vessel in sta
in standby at reduced rate, due to extended bad weather forecast.

E. ESTIMATED COMPLETION DATES

9/29/2010 for geophysical survey; geotechnical boring schedule to be determined

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
7:00	Saturday AM, crew departs by air flight to NJ
17:00	Standby for weather

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

I. Client's Comments:

Signed:

Chuck Dill	9/25/2010	Gregory Zucca	
Party Chief	Date	Client	Date
Alpine Ocean Seismic Survey			

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #1

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 26-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Gherardi, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: Wind NW-NE 20-25 kts

Weather Forecast: 15-20 kts West, seas 3-4 feet

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	0	14	26

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Standby for weather through the weekend at reduced rate.

E. ESTIMATED COMPLETION DATES

9/29/2010 for geophysical survey; geotechnical boring schedule to be determined

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
7:00	
17:00	Standby for weather

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

I. Client's Comments:

Signed:

Chuck Dill	9/26/2010	Gregory Zucca	
Party Chief	Date	Client	Date

Alpine Ocean Seismic Survey

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #1

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 27-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Gherardi, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: Wind NE 11-15 kts, Seas 3-4 feet

Weather Forecast: NE-N winds 15-20 kts, seas 4-6 feet, subsiding overnight

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	0	14	26

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Standby for weather

E. ESTIMATED COMPLETION DATES

9/29/2010 for geophysical survey; geotechnical boring schedule to be determined

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
7:00	
17:00	Standby for weather

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

I. Client's Comments:

Signed:

Chuck Dill	9/27/2010	Gregory Zucca	
Party Chief	Date	Client	Date

Alpine Ocean Seismic Survey

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #1

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 28-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Gherardi, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: Wind NW 11-15 kts, Seas 3-4 feet

Weather Forecast: Wind West to South, decreasing

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	0	14	26

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Standby for weather

Will fly crew of three to Cleveland to resume geophysical survey

E. ESTIMATED COMPLETION DATES

9/30/2010 for geophysical survey; geotechnical boring schedule to be determined

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
7:00	
17:00	Standby for weather

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

I. Client's Comments:

Signed:

Chuck Dill	9/28/2010	Gregory Zucca	
Party Chief	Date	Client	Date

Alpine Ocean Seismic Survey

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #1

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 29-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: south 5-10 knots, seas calm

Weather Forecast: Wind to increase from NW noon on Thursday and continue windy through wee

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	21	38	0

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Complete geophysical survey and demob survey vessel

Then drive home

E. ESTIMATED COMPLETION DATES

9/30/2010 for geophysical survey; geotechnical boring schedule to be determined

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
12:20	Flight departs NY for Cleveland
15:00	Crew at boat; reset gear
16:00	Underway to work site
17:20	Set tide gage;deploy side scan, echo and magnetometer
midnight	completed 6 of 7 survey lines
	will continue survey and finish during night

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

I. Client's Comments:

Signed:

Chuck Dill	9/29/2010	Gregory Zucca	
Party Chief	Date	Client	Date

Alpine Ocean Seismic Survey

	ALPINE OCEAN SEISMIC SURVEY, INC 70 Oak Street, Norwood, New Jersey 07648 Tel: 201-768-800 Fax: 201-768-5750	DAILY REPORT LOG #1

Project #: 1634

Company: Cuyahoga County of Ohio - Cuyahoga Department of Development

Location: Lake Erie - Cleveland, Ohio

Date: 30-Sep-10

Vessel Name: M/V Sancho

Equipment Used: Hypack Nav, Uniboom, Coda DA2000, Klein 3000 Side Scan Sonar
Sonar Pro, Geometrics Magnetometer, Innerspace 456 echo sounder
Tide Gauge, CSI DGPS Antenna

Crew: Dill, Ciarletta, Morton

Subcontractors: Underwater Marine Contractors, Inc.

Weather: south 5-10 knots, seas calm

Weather Forecast: Wind to increase from NW noon on Thursday and continue windy through wee

A: OPERATIONAL SUMMARY	(Yes/No)
Survey/Sampling gear working properly (If no, describe in comments below)	Yes
Was downtime incurred? (If yes, describe in comments and note length of time below)	No
Length of Downtime:	N/A
Any route realignment, incidents, accidents or pertinent observations (If yes, describe in comments below)	No

B. DAILY GEOPHYSICAL SURVEY OPERATIONS SUMMARY

Planned Line Miles	Total Line Miles Surveyed/24 Hrs.	Total Line Miles Surveyed	Total Line Miles Remaining
40	21	38	0

C. DAILY SEDIMENT SURVEY OPERATIONS SUMMARY

Planned # of ft to Drill in Sediment	# of ft Drilled in Sediment Last 24 hrs	Total # of ft Drilled in Sediment	# of ft Remaining to Drill in Sediment
50	0	0	50
Planned # of ft to Drill in Rock	# of ft Drilled in Rock Last 24 hrs	Total # of ft Drilled in Rock	# of ft Remaining to Drill in Rock
10	0	0	10
Planned Shelby Tube Tests	# of Shelby Tube Tests Last 24 hrs	Total # of Shelby Tube Tests	Shelby Tube Tests Remaining
2	0	0	2

D. PLANNED ACTIVITY FOR THE NEXT 24 HOURS

Complete geophysical survey and demob survey vessel

Then drive home on Friday,October 1, 2010

E. ESTIMATED COMPLETION DATES

9/30/2010 for geophysical survey; geotechnical boring schedule to be determined

F. DAILY CHRONOLOGY OF EVENTS

(Activites in the last 24 hours and observations of note)

Time	Activity
midnight	continuing survey started yesterday
0:30	complete last of 7 survey lines with magy, side scan and echo
0:45	Recover geophysical gear; steam south to recover tide gage
1:00	Recover tide gage;conduct SVP
2:00	At dock; secure for night
9:30	meet boat at dock to commence demob of equipment
13:00	Demob of boat complete. All equipment packed in trucks for drive back on Friday

* All times in local Eastern Daylight Time.

G. Health and Safety Incidents

None

H. Alpine Comments:

I. Client's Comments:

Signed:

Chuck Dill	9/30/2010	Gregory Zucca	
Party Chief	Date	Client	Date

Alpine Ocean Seismic Survey

APPENDIX 5

EQUIPMENT SPECIFICATIONS SHEETS

www.coastal-usa.com

Coastal's MacroTide

Description: Coastal's MacroTide and MacroTide+ record pressure levels in aquatic environments for tidal measurements using either an ICS Strain Gauge Pressure Sensor or a high-precision Paroscientific Digiquartz Sensor.

Capacity: 200K standard
Optional (Compact Flash Cards): 8MB, 16MB, etc.

Housing: **Diameter** – 5.5 in.
Length – 14 in. (including handle)
Weight – 15 lbs. in air
Material – Stainless steel and UHMW plastic housing
MacroTide+ length is 15.5 in., weight is 17 lbs. in air

Power: User replaceable standard alkaline D cells

Interface: *Wizard* IBM PC compatible software
ASCII data files in engineering units
User controlled sampling parameters and sensor functions

Clock: Solid state real time, accuracy one minute per year

Standard: **Pressure, Standard** – ICS Strain Gauge
Temperature, Internal – YSI Thermister

Optional: Standard, MacroTide+ **Pressure, High Precision** – Paroscientific Digiquartz

Optional: **Temperature, External –** YSI Thermister
Additional External Pressure – ICS Strain Gauge

Coastal MacroTide
Exterior(above), Interior(below)

Function	Sensor (*optional)	Range	Accuracy	Resolution	Units
Pressure, Standard	IC Sensors Strain Gauge, piezoresistive	30, 50, 100, 250	0.1%	12 bit	psia
Temperature	Internal YSI Thermister	-5° to 35°	0.1°	.02 typ	°C
Pressure, High Precision	*Paroscientific Digiquartz	900<	0.015%	16 bit	psia

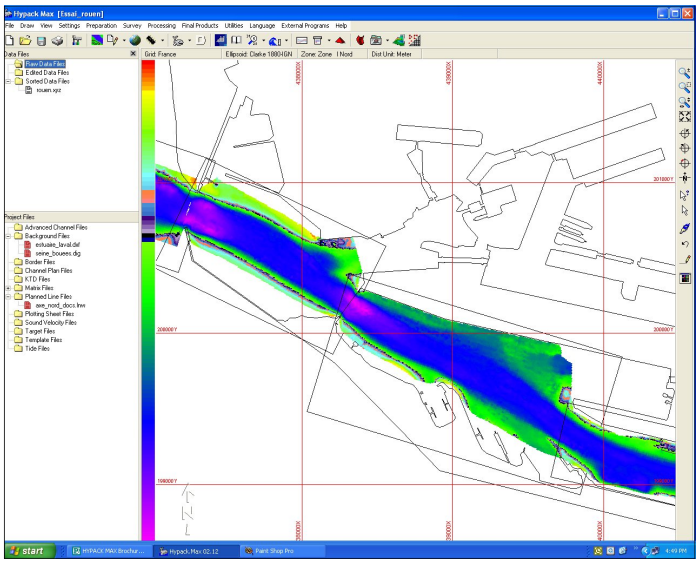
Coastal Leasing, Inc. 179 Sidney Street Cambridge MA 02139-4238
p 617.497.1122 f 617.497.1188 coastal@coastal-usa.com

HYPACK®

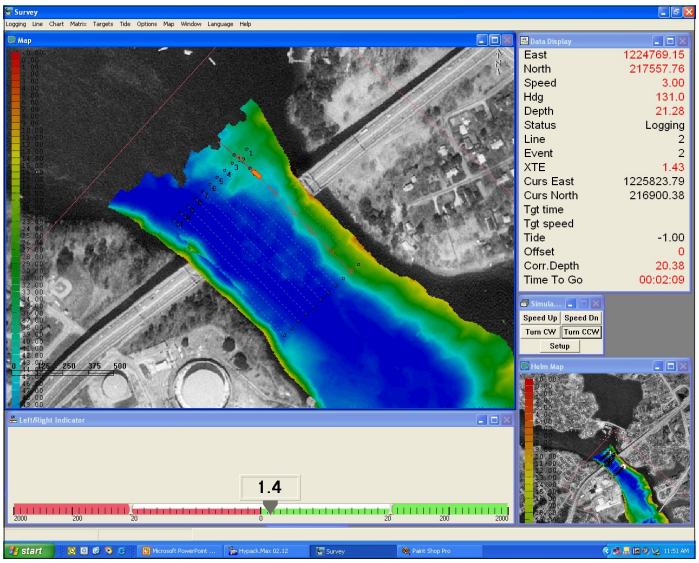
HYDROGRAPHIC SURVEY SOFTWARE

HYPACK®

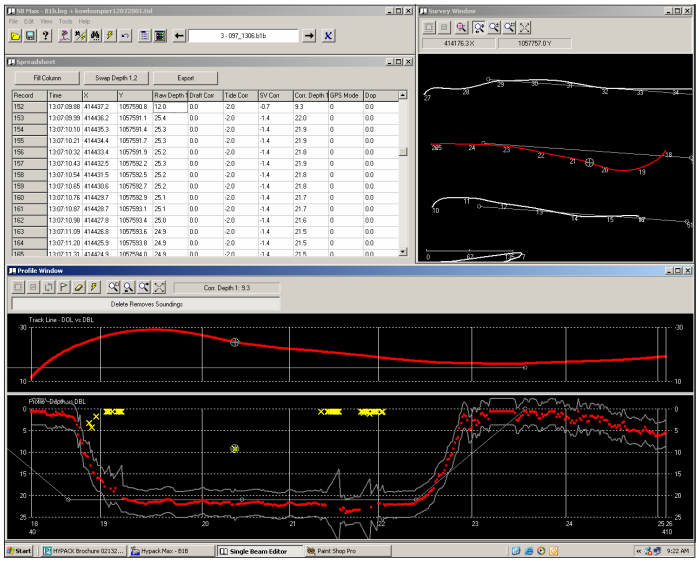
HYPACK® is one of the most widely used hydrographic surveying packages in the world, with over 3,000 users. It provides the surveyor with all of the tools needed to design their survey, collect data, process it, reduce it, and generate final products. Whether you are collecting hydrographic survey data or environmental data, or positioning your vessel in an engineering project, HYPACK® provides the tools needed to complete your job. With users spanning the range from small vessel surveys with just a GPS and single beam echosounder to large survey ships with networked sensors and systems, HYPACK® gives you the power needed to accomplish your task in a system your surveyors can master.



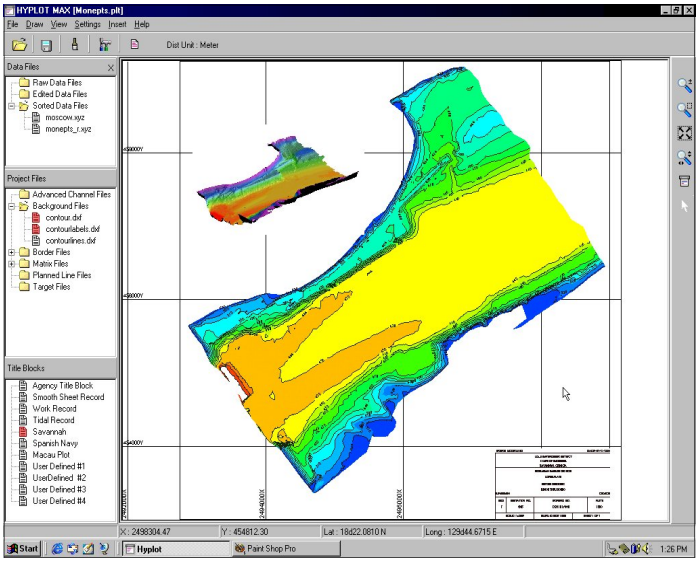
SURVEY DESIGN: HYPACK® allows you to create a 'Project' that contains all of your survey information for each job. You can easily define your geodetic basis, selecting from existing national grids or defining your own projection or local grid. HYPACK® also allows you to import background files in a variety of formats, including S-57, OrthoTif, ARCS, DXF, DGN, BSB and VPF. These files can be displayed while you create your planned lines, survey, edit and plot your results.



SURVEY: HYPACK® contains interface drivers to over 200 devices includings positioning systems, echosounders, heave-pitch-roll sensors, gyros and other types of equipment. SURVEY supports a single vessel or multiple vessels, along with towfish and ROVs. Data is logged with incredible precision (<1mSec). Survey data and windows can be broadcast over a network to any other computer or saved to a file using our Shared Memory Output routines.



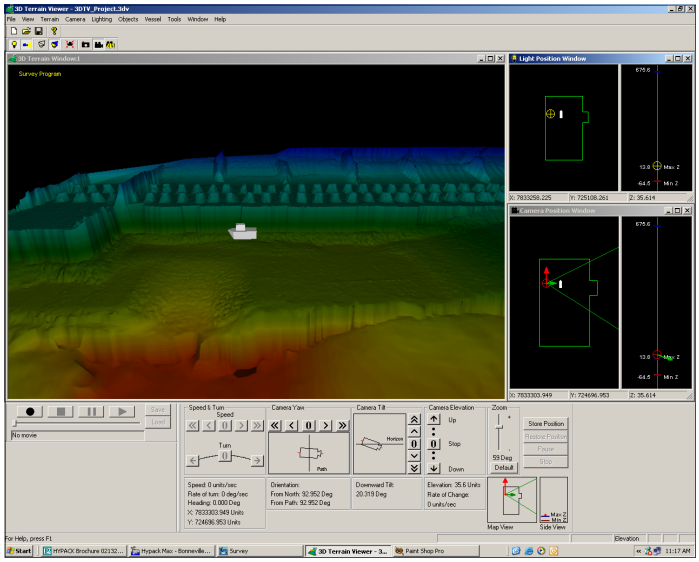
EDITING: The SINGLE BEAM EDITOR program is used to quickly review your survey data and to automatically and/or manually remove outliers. Sounding data is simultaneously displayed in plan, spreadsheet, and profile views with the channel design info drawn in the backgrounds. Routines developed by **HYPACK®** from collaboration with the U.S. Army Corps of Engineers to integrate water level corrections based on RTK GPS elevation info are a standard part of package.



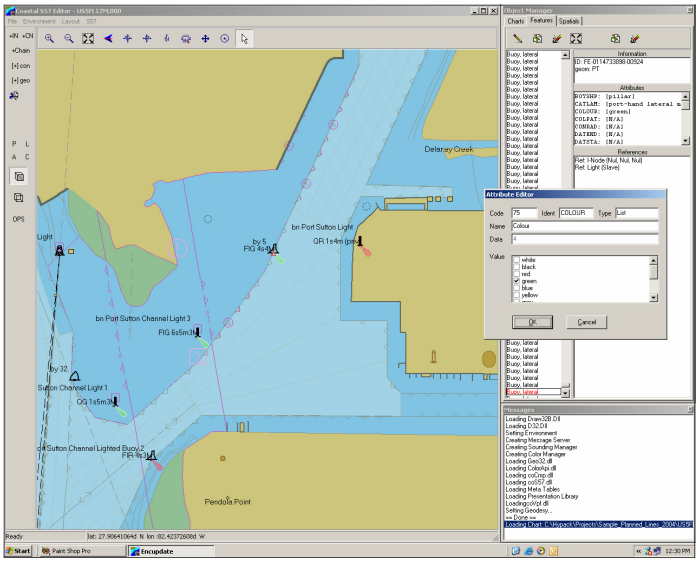
FINAL PRODUCTS: The ability to create the final products you need separates **HYPACK®** from the rest. The plotting program generates professional smooth sheets with soundings, grids, graphics and contours in a WYSIWYG display. The VOLUMES program is the de facto standard of the U.S. Army Corps of Engineers for the computation of quantities in dredging projects. TIN MODEL creates surface models that can be used for contouring, volume computations and surface visualization.

HYPACK®

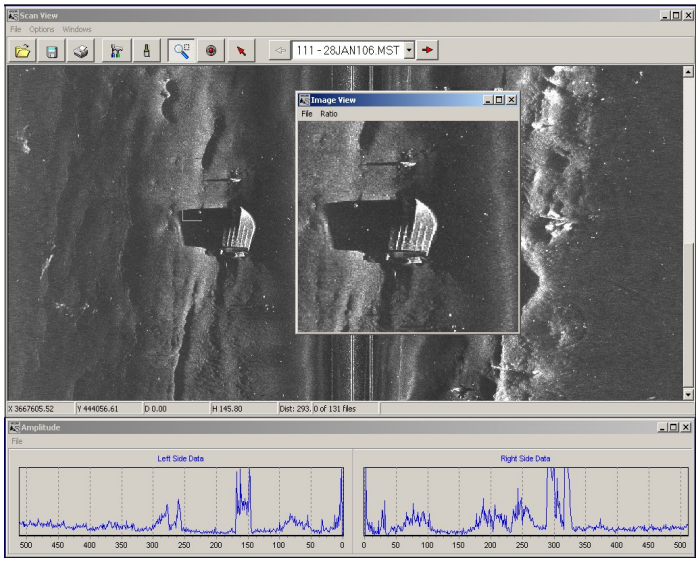
Support: An important factor in the purchase of any hydrographic survey system is the support provided to the end-user. **HYPACK®** prides itself on taking good care of our users. A trained, professional staff is on-call to answer your questions, develop custom device drivers or modify programs to meet your needs. **HYPACK®** training seminars are held annually in many countries to provide you with the latest information. We continue to update our training materials every year to make it easier for you to get the most out of our products. Our latest training material contains PowerPoint presentations with embedded AVI demonstrations on over 100 topics. Our bi-monthly newsletter, 'Sounding Better' is published on our web site (www.hypack.com) and contains technical articles on how to get the most out of your package.



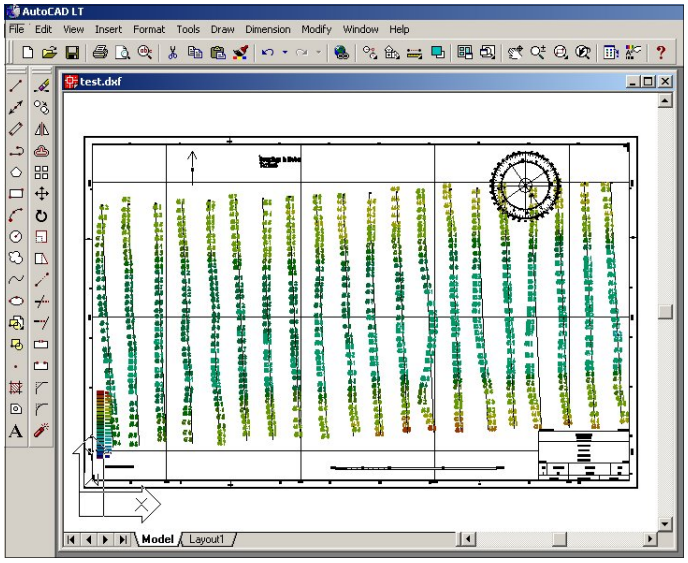
DATA VISUALIZATION: The TIN MODEL and 3D TERRAIN VIEWER (3DTV) programs of **HYPACK®** provide fantastic tools to view and present your data. 3DTV allows you to fly a 'camera' across your edited XYZ surface and display the results or save them to a AVI file for distribution to your clients. 3DTV also allows you to position the camera relative to the actual vessel position, showing the vessel in real time against the bottom surface.



ENCEdit is a new **HYPACK®** module that allows you to create, modify and verify ENC data in S-57 format. ENCEdit provides you with tools to re-attribute, create, move or delete existing features. You can also create new features by manually entering coordinates, by importing data from DXF/DGN, or by transferring targets in real time from SURVEY directly into ENCEdit.



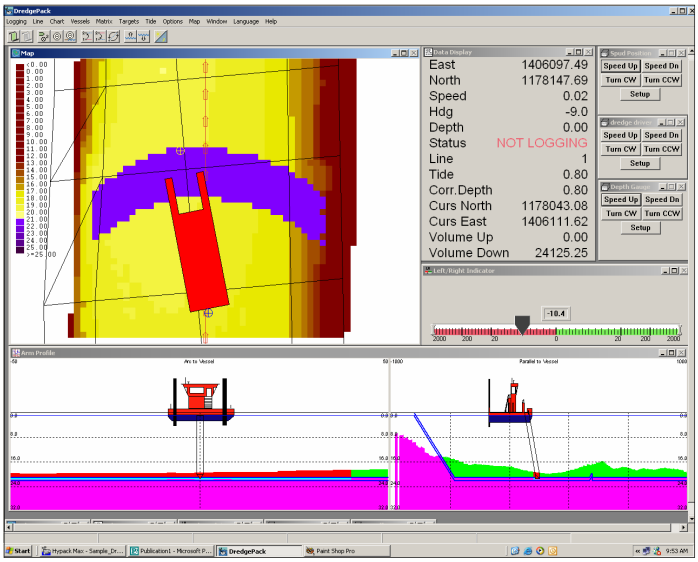
Side Scan Sonar (SSS) Support: **HYPACK®** provides support of SSS systems in its basic package. All analog and several digital side scan systems can be utilized with the SIDE SCAN SURVEY program. Users can display the real time data and perform targeting in real time or post-processing. A program that generates side scan mosaics in GeoTIF format allows you to plot your results in **HYPACK®** or export them to your GIS.



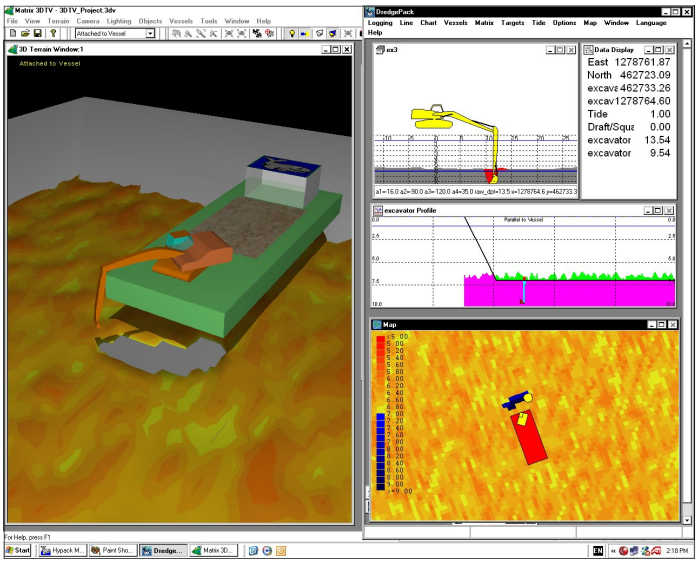
Export to CAD: Many of our users are interested in exporting their survey data into their CAD/GIS package. **HYPACK®** has several tools to import/export via DXF/DGN. The EXPORT TO CAD program takes all of the our files and converts them to DXF and DGN. The plotting sheets and sectional plots can also be exported directly to DXF. Users can create planned lines in their CAD/GIS program and import them into **HYPACK®**.

DREDGEPACK®

DREDGEPACK® is a specially modified version of **HYPACK®** used for providing precise digging information on dredges. It allows you to see exactly where you are digging, how deeply you are digging and how deeply you need to dig. With the ADVANCED CHANNEL DESIGN program, you can create complex dredging plans. Real time cross sections are provided to show you the design profile, the depth of the cutting tool and the material that has to be removed.

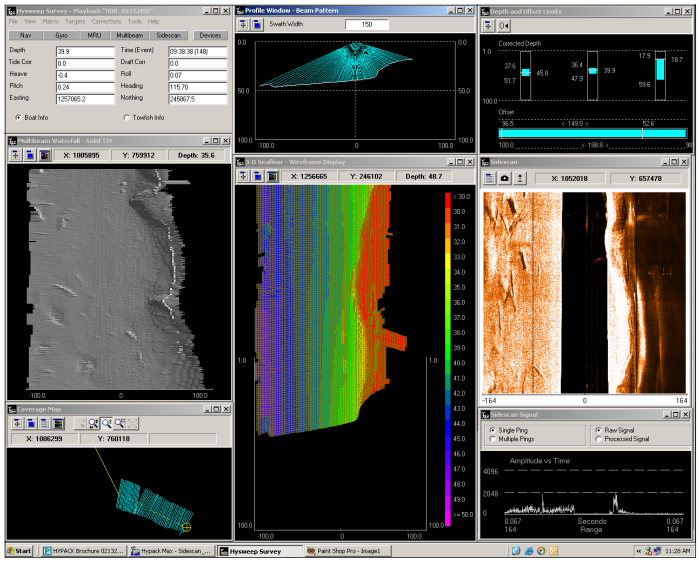


DREDGEPACK® runs on cutter suction, hopper, excavator and bucket-style dredges. It can store a history of the dredge's position, draft, digging tool depth and digging status in order to meet reporting requirements. DREDGEPACK® has been designed to run with a minimum of user intervention. Make sure you are maximizing your dredge's efficiency with DREDGEPACK®

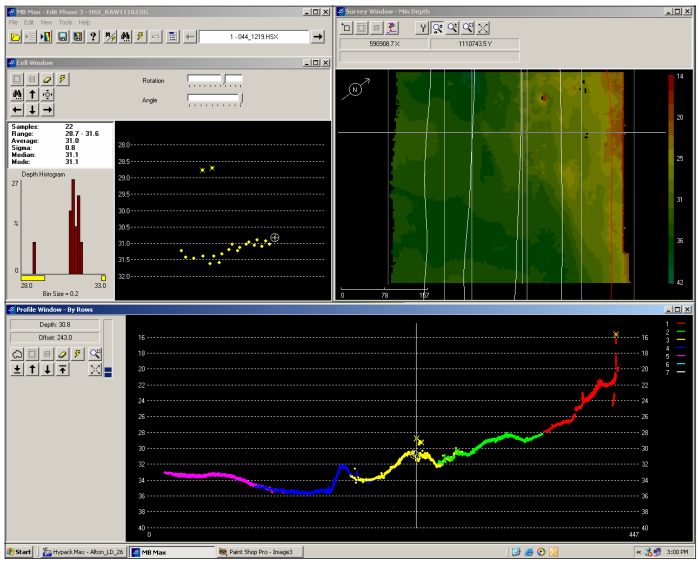


HYSWEEP®

HYSWEEP® is an optional module that integrates the collection and processing of multibeam and multiple transducer sonar systems into **HYPACK®.** Time and again, surveyors switch to HYSWEEP® due to the powerful tools and the ease-of-use of the package. Survey data collected in **HYSWEEP®** is fully integrated with the final products of **HYPACK®**. More surveyors use **HYSWEEP®** for multibeam data collection and processing than any other multibeam software package.



HYSWEEP® SURVEY: The data collection program of **HYSWEEP®** runs simultaneously with the SURVEY program of **HYPACK®**. It provides real time display, QC functions and data logging for most commercially available multibeam systems, including those from Atlas, Odom, Reson, Sea Beam and Simrad. A coverage map lets you examine the bottom coverage in real time, ensuring that you have 100% or 200% coverage before leaving the area.



MULTIBEAM EDITING: Multibeam data editing, sonar alignment calibration and system performance testing are all provided in the powerful MULTIBEAM EDITOR of **HYSWEEP®**. The program performs automatic or manual filtering, using geometric and statistical methods. It also contains the Performance Test that measures the overall performance of your system versus beam angle as required by USACE. **HYSWEEP®** can also use water level corrections created from RTK GPS elevations.

HYPACK, Inc.

56 Bradley St.
Middletown, CT 06457
Phone: 860-635-1500
Web: www.hypack.com
Sales: sales@hypack.com

V100 Series GPS Compass

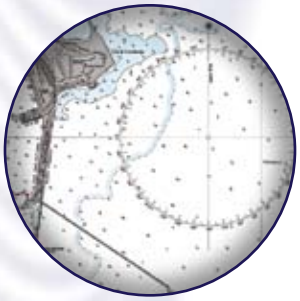
Professional Heading and Positioning Smart Antenna

V100™

Experience superior navigation from the accurate heading and positioning performance available with the V100™ Series GPS Compass. The rugged enclosure combines Hemisphere GPS' Crescent®Vector board and two multipath-resistant antennas for portability and simple installation. The half-meter length smart antenna mounts easily to a flat surface or pole. The stability and maintenance-free design of the V100 replaces traditional gyrocompasses at a fraction of the cost.

Powered by Crescent

The latest Hemisphere GPS products are powered by Crescent Receiver Technology, the future of precision GPS.



Key V100 Series Advantages

- Affordable solution delivers 2D GPS heading accuracy better than 0.3 degree rms
- Differential positioning accuracy of less than 60 cm, 95% of the time
- Smart antenna design ensures simple installation and portability
- Integrated gyro and tilt sensor deliver fast start-up times and provide heading updates during temporary loss of GPS
- Fast heading and positioning output rates up to 20 Hz
- Differential options including SBAS (WAAS, EGNOS, etc.) and optional beacon differential
- COAST™ technology maintains accurate solutions for 40 minutes or more after loss of differential signal

V100 Series GPS Compass

GPS Sensor Specifications

Receiver Type:	L1, C/A code, with carrier phase smoothing
Channels:	Two 12-channel, parallel tracking (Two 10-channel when tracking SBAS)
Update Rate:	Standard 20 Hz (position and heading)
Horizontal Accuracy:	< 0.6 m 95% confidence (DGPS)* < 2.5 m 95% confidence (autonomous, no SA)**
Heading Accuracy:	< 0.3° rms
Pitch / Roll Accuracy:	< 1° rms
Rate of Turn:	90°/s max
Start up Time:	< 60s typical
Heading Fix:	< 20s
Satellite Reacquisition:	< 1s

Beacon Sensor Specifications (V110 version)

Channels:	2-channel, parallel tracking
Frequency Range:	283.5 to 325 kHz
Operating Modes:	Automatic (signal strength or range) and manual
Compliance:	IEC 61108-4 beacon standard

Communications

Serial ports:	2 full duplex RS-232 and 2 half-duplex RS-422
Baud Rates:	4800 - 57600
Correction I/O Protocol:	RTCM SC-104, L-Dif (Hemisphere GPS proprietary)
Data I/O Protocol:	NMEA 0183, Crescent binary, L-Dif (Hemisphere GPS proprietary)
Heading Warning I/O:	Open relay system indicates invalid heading

Certifications

BSH/4612/4411140/09

0735/09

Environmental

Operating Temperature:	-32°C to +74°C (-25°F to +165°F)
Storage Temperature:	-40°C to +85°C (-40°F to +185°F)
Humidity:	100% non-condensing
EMC:	FCC Part 15, Subpart B, Class B CISPR22, CE

Power

Input Voltage:	9 to 36 VDC
Power Consumption:	< 5 W
Current Consumption:	< 360 mA @ 12 VDC
Isolation:	Power supply isolated from serial ports
Reverse Polarity Protection:	Yes

Mechanical

Dimensions (not including mounts):	60 cm L x 16 cm W x 18 cm H (23.6" L x 6.3" W x 7.1" H)
Weight:	1.5 kg (3.3 lb)
Power/Data Connector:	18-pin, Environmentally sealed

Aiding Devices

Gyro:	Single axis gyro provides reliable <1° heading for periods up to 3 minutes when loss of GPS lock has occurred
Tilt Sensor:	Assists in fast start up of RTK solution

* Depends on multipath environment, number of satellites in view, satellite geometry, baseline length (for local services), and ionospheric activity

** Depends on multipath environment, number of satellites in view, and satellite geometry

Authorized Distributor:

HEMISPHERE GPS
4110 - 9th Street S.E.
Calgary, AB T2G 3C4
Canada

Phone: 403.259.3311
Fax: 403.259.8866
precision@hemispheregps.com
www.hemispheregps.com

TSS DMS-05 Surface Motion Sensor

The TSS DMS-05 is a Surface Motion Sensor designed specifically for the emerging needs of multibeam users allowing highly productive surveys aboard small boats, in rough sea conditions undertaking tight turns and rapid speed changes. The sensor can interface to an optional GPS unit or external GPS/DGPS or a speed log if already available. The auxiliary input also accepts Heading gyro compass data. Systems are available for deck mount or in 1000m underwater housings for ROV, AUV or Towed vehicle applications.

Key Features

- High dynamic accuracy and immunity to vessel turns and speed changes.
- Easy and convenient to install.
- No Data timing errors
- Real time digital and analogue updates.
- Compact unit.

Technical Specifications

Title	Value
Heave	Accuracy: 5 cm or 5% whichever is greater, Range: ±99m Resolution: 1cm, Bandwidth: 0.05 to 10Hz
Roll & Pitch	Accuracy: 0.05% dynamic Range: ±50° Resolution: Digital 0.01° (RS232 or RS422), Analogue 0.024° (12 bit - 10V ~+10V), Bandwidth: 0 to 10Hz
Update Rate	Digital: up to 200Hz, Analogue: up to 500Hz
Operating Temperature	0° to +40°C
Power Requirement	18 to 36V DC (10W)
Velocity Input Packet Format	NMEA 0183 VTG TSIP (Trimble Standard Interface Protocol)
Heading Input Packet Format	NMEA 0183, HDT:SGB1000S: SGB ASCII; Robertson: Plath Navigat X

Dimensions

Title	(mm)	(inch)	(kg)	(lbs)
	257 x 127 x 171mm	10.1" x 5" x 6.7"	2 kg	4.4 lbs

New

Coda GeoSurvey DA series

FEATURES

- Compatible with all leading sidescan sonars & sub-bottom profilers
- Up to 4 analogue input channels
- Digital/network interface
- Dual independent triggering
- 1U, 19” rack-mountable
- Dual monitors
- Dual printer interface
- Real-time heave input
- Magnetometer input

The all-new Coda GeoSurvey™ DAseries™ acquisition system is available for all sidescan sonars and sub-bottom profilers including the latest digital sonars and popular analogue systems. Building on more than 12 years of experience as a leader and innovator in the field of geophysical acquisition, Coda GeoSurvey is the system of choice for many of the world’s leading survey companies and research institutes.

The Coda DAseries is a purpose-built, turn-key hardware solution specifically designed for the most demanding of offshore survey requirements and is delivered pre-installed, ready to run. With options including two-channel and four-channel analogue acquisition, two independent triggers, digital network interfaces, Windows or Linux operating systems, rugged, compact rack-mountable hardware, the DAseries is a highly flexible solution for all geophysical data acquisition requirements. With Coda’s extensive range of real-time and post-processing software tools such as Pipeline Inspection, Mosaicing and GeoKit interpretation tools, Coda GeoSurvey fulfils the most demanding marine geophysical and engineering survey specifications.

For digital-only sonar systems and sub-bottom profilers from L3-Klein, EdgeTech and Teledyne Benthos and for all post-processing applications, Coda GeoSurvey can be installed on any standard PC running Windows XP.

BENEFITS

- Compact size & weight
- Guaranteed hardware compatibility
- Minimal field setup with factory configured and tested hardware
- 24/7 technical support for hardware *and* software

CodaOctopus

www.codaoctopus.com
sales@codaoctopus.com
Worldwide +44 131 553 1380; USA & Canada +1 888 340 2627
24hr support: support@codaoctopus.com

Coda
LeadingGeoSurveySolutions

Coda GeoSurvey™ DAseries
Technical Specifications

System	Triggers	Channels	Serial Ports	Interfaces	Additional Information
DA500	1	2	2	SSS or SBP	19” rack-mountable
DA1000	1	4	2	SSS and SBP separately	19” rack-mountable
DA2000	2	4	2	SSS and SBP simultaneously	19” rack-mountable, dual printing, supports dual monitors, multiple sensor positions

INPUTS & OUTPUTS	
Analogue inputs	Adjustable input-range analogue inputs compatible with all analogue sidescan sonar outputs and sub-bottom profilers including direct hydrophone connection. Improved low voltage performance
Trigger inputs	Standard TTL input. Up to 2 independent/asynchronous triggers
Trigger outputs	Standard TTL output
Navigation & fix data	Multiple serial ports for NMEA compatible navigation data and other proprietary format navigation, fix and annotation strings
Printer interfaces	Up to two independent parallel printer interfaces compatible with printers from Octopus, EPC, Alden/GeoAcoustics Ultra and Isys
Network	2 Ethernet interfaces (1 x 1Gb, 1 x 10/100Mb) for data transfer and interface to digital sonars
Other interfaces	USB x 4; IEEE 1394 (peripheral interface)
DATA RECORDING	
Recording devices	Internal hard disk, external hard disk (via USB 2.0 or IEEE 1394), DVD RAM and remote network devices. Automatic continuous recording switch-over. Raw or processed data recording and copying. Post acquisition data back-up to DVD-R and CD-R disks
Recording formats	CODA, SEGY, XTF, QMIPS
DISPLAY MODES	
Sonar	Vertical and horizontal scrolling waterfall, A-scan/oscilloscope, dual or single channel
Sub-bottom	User-defined seismic zoom windows, left/right, up/down, scroll directions
Dual format	Simultaneous display of multiple channels and data types in multiple windows, on single or dual monitors (DA1000 & DA2000)
Navigation	On screen real-time nav. updates, track plot, corrected nav, navigation smoothing, speed correction etc.
PROCESSING	
Sidescan	Real-time sonar gain correction and colour palette display enhancement facilities, cross-track smoothing, speed correction. Extensive real-time and post-processing modules including Pipeline Inspection, Mosaicing and GeoKit interpretation tools. *See Coda GeoSurvey Productivity Suite for more information*
Sub-bottom	Extensive real-time signal processing and gain correction for sub-bottom profiler together with display enhancement facilities. User-defined depth and time based filters and gain controls. Stacking, auto seabed tracking, speed correction. Extensive post processing modules for reprocessing and interpretation. Supports heave sensor input for real-time heave correction *See Coda GeoSurvey Productivity Suite for more information*
PHYSICAL	
Description	19” rack-mountable system – 1U, slim-line ruggedized industrial PC
Dimensions	17” wide x 1.75” high x 14” deep (19” wide x 1.75” x 14” deep with rack mounting)
Shipping case	Custom Peli-case
Power	100-240 Volts AC
Processor	Pentium M 1.8GHz or better
Memory	512Mb as standard
Hard Disk	300 gigabyte
Display	Compatible with single or dual screens (optional)

NEW GeoSurvey DAseries 20070131

www.codaoctopus.com
Sales: *worldwide* tel +44 131 553 1380; sales@codaoctopus.com ***USA & Canada*** tel +1 888 340 2627; salesamericase@codaoctopus.com
24hr support: *worldwide* tel +44 131 553 7003; ***USA & Canada*** tel +1 888 340 CODA; support@codaoctopus.com

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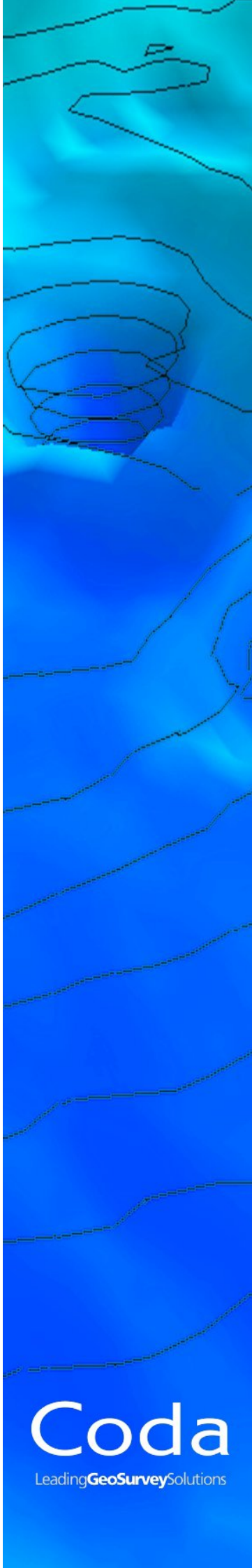


GeoPulse 5420S

Solid State Power Supply

Introduction

The GeoPulse 5420S is a compact solid state power supply specifically designed for use with Boomer systems.

Solid State High Voltage Switching

The GeoPulse 5420S employs a solid state high voltage switching device which offers significant advances over the older technology, spark gaps and ignitrons. Solid state switching offers higher efficiency, very high reliability and excellent repeatability. Other advantages include:

- No wear out mechanism, unlike spark gaps.
- A greatly increased life span as compared to ignitrons & spark gaps.
- Less RF is produced when the unit fires, easing EMC compliance.
- No air freight restrictions, unlike mercury filled ignitrons.

Designed for Safety

The GeoPulse 5420S offers a number of considerably improved safety features, these include:-

- All controls are situated on the front panel, therefore there is no requirement to open the unit to change energy settings.
- A fully rated HV connector allows safe, rapid and reliable connection to the transducer.
- The specially developed low cross sectional area high flexibility screened cable provides low RF emissions and improves on-deck safety with minimum energy loss.
- Safety interlocks prevent operation of the 5420S when the lid is removed and when the cable is disconnected from the front panel.

- Residual energy from the capacitors is dumped to a resistor bank when the unit is opened.
- An over-current safety trip is provided to protect the unit from damage in certain fault conditions.

System Operation

The GeoPulse 5420S is controlled entirely from the front panel, which makes the unit very easy to operate. The energy output of the unit is regulated irrespective of the key rate and does not drop at higher key rates within the power envelope of the system. The following controls and indicators are provided:

- Energy settings are adjusted using a front panel switch. Energy settings are 105J, 175J, 280J 350J and 455J. It should be noted that the maximum permissible energy setting when using the GeoPulse 5813B Boomer Plate is 280 Joules at 2 pulses per second.
- A Capacitor Status indicator shows which capacitors have been selected.
- A Charge Rate indicator shows the voltage ramping up to its full value, thereby giving a direct measure of the HV available across the capacitors.
- Temperature and Voltage warning indicators are provided to alert the operator to potential problems.

Specification

- Dimensions: 60 cm (W) x 41 cm (D) x 39 cm (H)
- Weight: 83kg

Power

- Input Voltage: 115 - 230Vac 50/60 Hz
- Output Voltage: 3750 Vdc nominal
- Output Energy: Switch selectable 105J, 175J, 280J, 350J & 455J

Energy Storage

- Capacitance: C1 15µF C2 25µF C3 25µF
- Charging Power: 910W Max.

Environmental

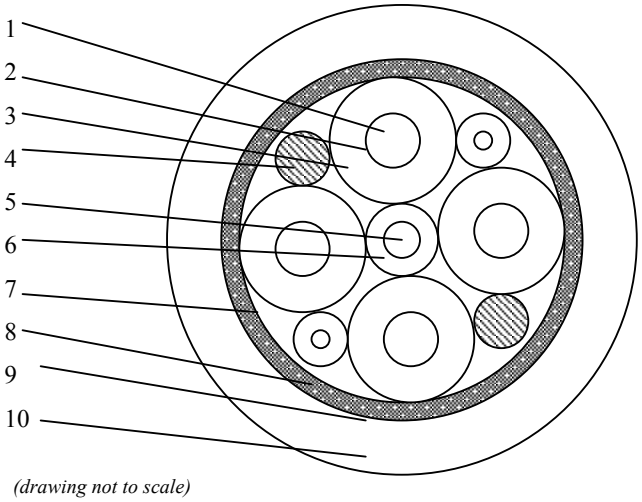
- Operational: 0 to 50°C
- Storage: -15°C to 65°C

Connections

- Power In: 25A 3 pin panel mounted
- Power Out: HV panel mounted connector with safety interlock
- Key Input: CMOS/TTL & optical fibre on front panel

Power Cable

- Nominal OD: 25 mm
- Estimated weight in air: 1080 kg/km
- Min. static bend radius: 180 mm
- Min. dynamic bend radius: 280 mm
- Electrical characteristics at 20°C: 10.00 mm^2 conductor resistance = 1.95 Ω/km of cable
  1.50 mm^2 conductor resistance = 13.7 Ω/km of cable
- Insulation resistance core/ core: Min 1500 MΩ at 5000 VDC



(drawing not to scale)

1. Tinned copper conductor
2. Semi conductive foil
3. Insulation of MPR 105
4. Filler
5. Tinned copper conductor
6. Insulation of MPR 105
7. Polyesterfoil
8. Double braid of tinned copperwire
9. Nonwoven polyesterfoil
10. Jacket of HFS 100, yellow

Specification subject to change without notice.
(9-5420S-6900/A 01/2001)

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Fax: +65 6546 3690
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www.geoacoustics.com

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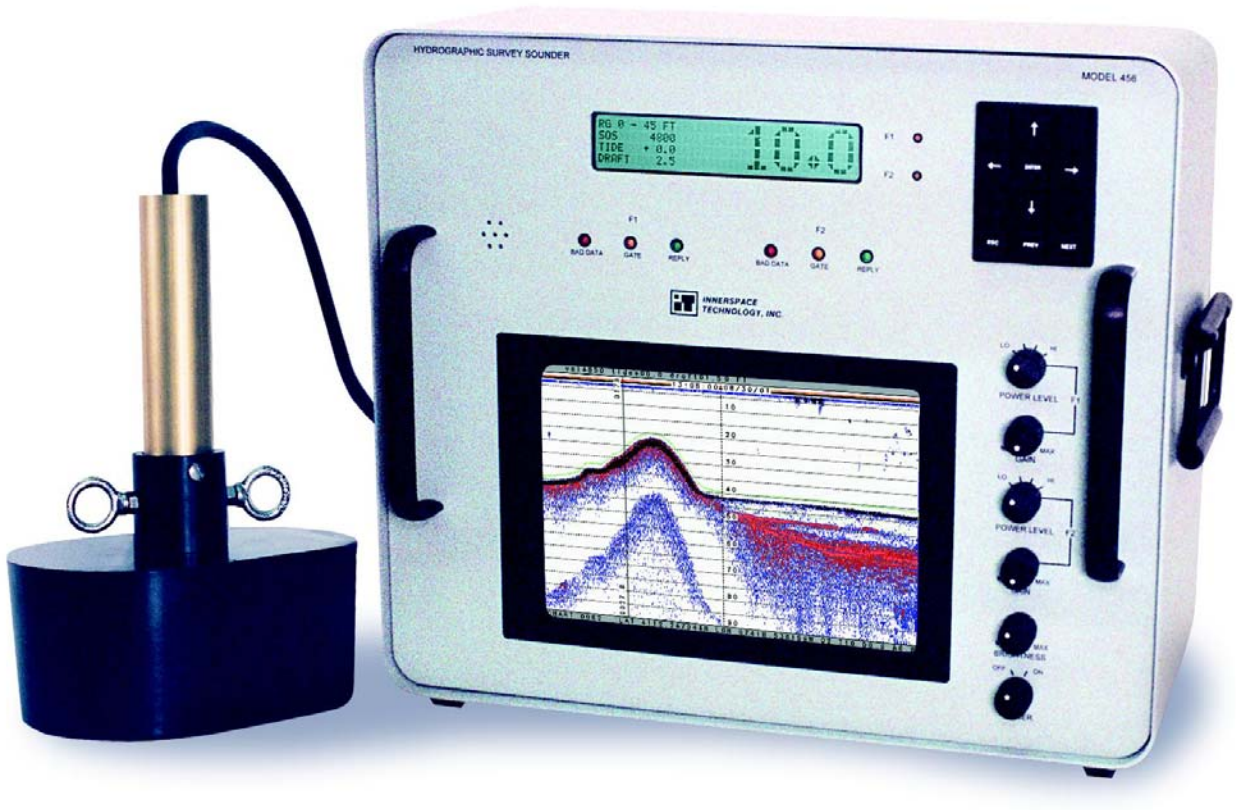
INNERSPACE

HYDROGRAPHIC SURVEY SOUNDER
MODEL 456 Dual Frequency



DESCRIPTION

The Innerspace Technology Model 456 Dual Frequency Hydrographic Survey Sounder provides survey quality electronic chart and digital depth information. Dual analog depth soundings are displayed on a high resolution, daylight readable, color graphic LCD, in six colors. The digital depths are displayed on a separate, large character, alphanumeric LCD which also displays operator menu selections for set up. Designed with the operator in mind, the easy-to-use menu is controlled via up / down, left / right arrows; no numerical entries are required and, when power is turned off, all entries are saved for next power on. Once the set up parameters are entered, the 456 operates automatically – tracking up and down slopes – with a minimum of operator intervention. The 456's analog chart display provides a continuous, dual frequency, high resolution bottom profile with alphanumerical annotation of pertinent information including: Speed-of-Sound, Tide, Draft, Time and Fix Number. The chart display screens can be internally stored, either continuous or on command, on a 72 or 112 MB Flash Ram for later viewing or hard copy printout via standard computer equipment. Digital depths are output to a computer via one of four bi-directional RS232 ports available. Optionally, the 456 can be furnished with built in DGPS or RTK. The small, lightweight unit contains the latest electronic technology and is ideal for use on small boats for waterways maintenance hydrographic surveys and for any survey with varying bottom densities and sub-bottom conditions.

INNERSPACE TECHNOLOGY, INC.

728 GARDEN STREET, CALSTADT, NJ 07072 (201) 933-1600 FAX (201) 933-7340
E-mail: info@innerspacetechnology.com Website: www.innerspacetechnology.com

SPECIFICATIONS

GRAPHIC DISPLAY
- 640 x 480 Pixel Color TFT LCD
- Dual Backlight 350 nits with Brightness Control
- 10.4 inch Diagonal Size

ALPHANUMERIC DISPLAY
- 4 lines x 40 characters with large numerics 1 in. High with Backlight

OPERATION
- Menu driven set up of operating parameters

PARAMETER SELECTION
- Speed-of-Sound, Tide, Draft, Gate Width, Scale, Backlight, Com Ports and many more

DEPTH RANGES
- 0-45, 40-85, 80-125, 120-165, 160-205 Feet 0-22.5, 20-42.5, 40-62.5, 60-82.5, 80-102.5, Meters
- Resolution: .1 unit Feet and Meters, .01 unit CM
- Multipliers: 1, 2
- Auto Ranging

ANNOTATION
- LCD graphic display numerically displays Speed-of-Sound, Tide, Draft, Date, Time, Depth, Fix Number, External Annotation and GPS or Heave Data

TRANSMITTER
- High and low frequency front panel Power Level switches with four levels 10 to 500 watts

RECEIVER
- High and low frequency front panel manual gain controls with 12 db range
- Time Varied Automatic Gain adjustment under microprocessor control 20 or 30 Log
- Adjustable Blanking

DIGITIZER
- Range Gated (selectable widths)
- Initial Depth Entry
- 4 Modes of Operation
- Upper Gate Mark on Graphic Display
- Depth/GPS Multiplexer

UTILITIES
- Depth Simulator (for testing)
- Chart Speed (four)
- Continuous Screen Capture to Memory
- Factory Defaults

INPUT / OUTPUTS
- RS232 Ports A, B, C, D
- Parallel Port
- Keyboard Port
- VGA Port
- Floppy Port
- Optional GPS Antenna
- Optional Remote Readout Model 605

TRANSDUCER
- Dual Frequency Molded Urethane
- Low Sidelobes, Internal Transformers
- Lightweight, Portable Housing

FREQUENCIES (standard)
- 200kHz 6° / 50kHz 15°
- 200kHz 6° / 33kHz 23°
- 200kHz 6° / 24kHz 33°

POWER
- 12VDC, 5 Amp
- 120-240VAC 2 Amps 50/60Hz

ENCLOSURE
- Drawn Aluminum Case
- Aluminum panel painted to resist corrosion.
- Heavy duty transit case included

OVERALL SIZE
- 17 in. Wide x 14.5 in. High x 9.5 in. Deep
- 43.2 cm Wide x 36.8 High x 24.1 Deep

WEIGHT
- 30 lbs. less GPS
- 13.6 kg less GPS

OPTIONS:
- Heave Sensor
- 12 Channel GPS Receiver (Sub-Meter or Centimeter Accuracy)
- Remote VGA Display & Cable
- Model 605 Remote Alphanumeric Display (Large Numeric LCD)
- Additional Memory 112 MB
- Floppy disk drive (1.44 MB) in travel case
- Zip drive and adapter cable
- Mini Keyboard (89 key) and adapter cable
- VGA cable
- Parallel cable
- Special transducers
- Over-The-Side Transducer Mount
- GPS Antenna Adapter and Pole
- Transducer Pipes and Adapter
- Speed-Of-Sound Probe
- Speed-Of-Sound Graphics software

INNERSPACE TECHNOLOGY, INC.

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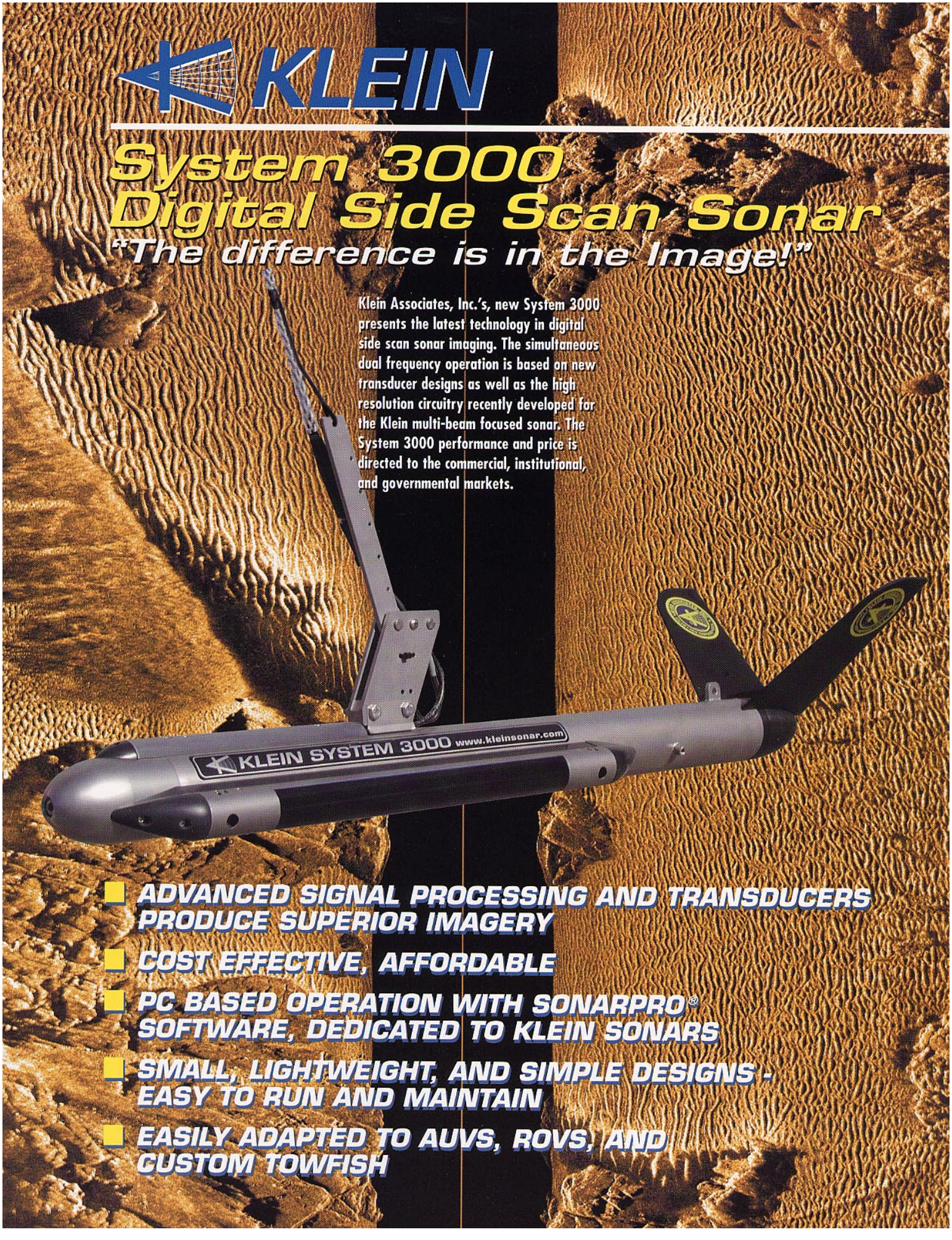
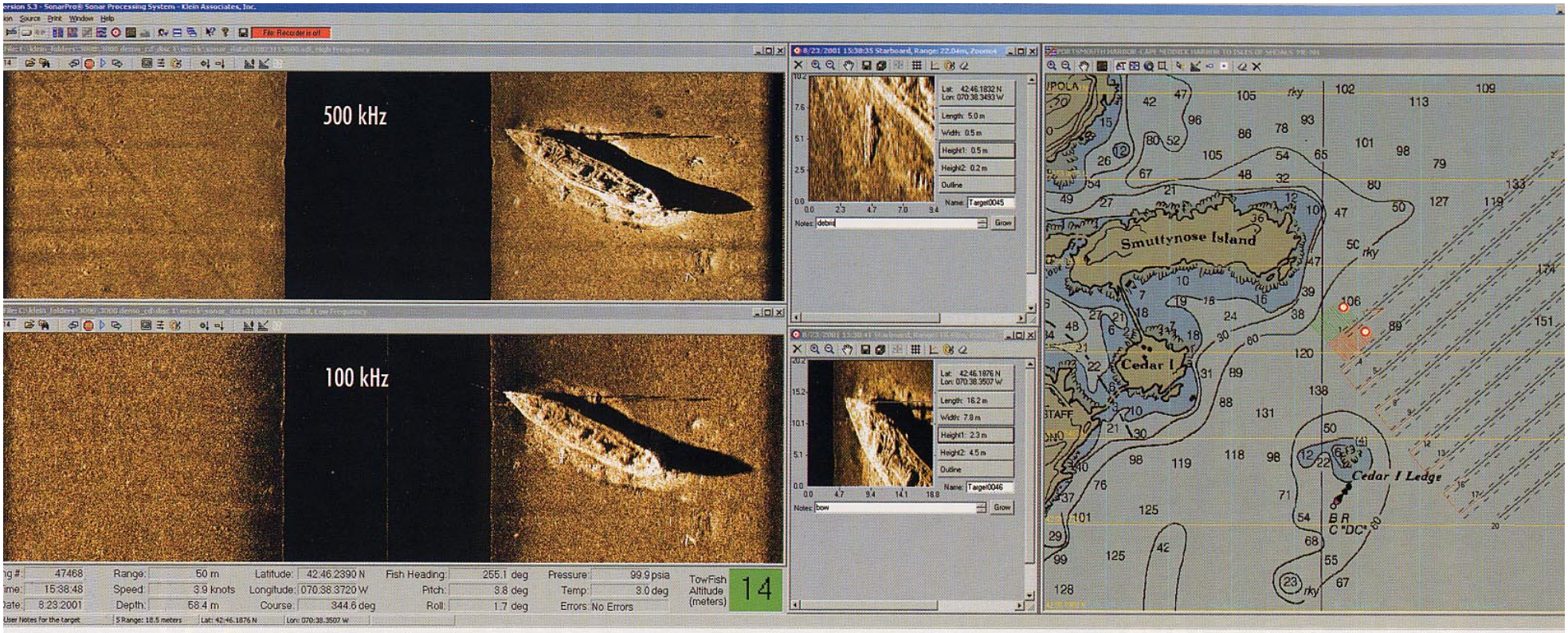

KLEIN
System 3000
Digital Side Scan Sonar
"The difference is in the Image!"
Klein Associates, Inc.'s, new System 3000 presents the latest technology in digital side scan sonar imaging. The simultaneous dual frequency operation is based on new transducer designs as well as the high resolution circuitry recently developed for the Klein multi-beam focused sonar. The System 3000 performance and price is directed to the commercial, institutional, and governmental markets.
KLEIN SYSTEM 3000 www.kleinsonar.com
ADVANCED SIGNAL PROCESSING AND TRANSDUCERS PRODUCE SUPERIOR IMAGERY
COST EFFECTIVE, AFFORDABLE
PC BASED OPERATION WITH SONARPRO® SOFTWARE, DEDICATED TO KLEIN SONARS
SMALL, LIGHTWEIGHT, AND SIMPLE DESIGNS - EASY TO RUN AND MAINTAIN
EASILY ADAPTED TO AUVS, ROVS, AND CUSTOM TOWFISH



SPECIFICATIONS

Towfish

Frequencies	100 kHz (125 kHz +/- 1% act.), 500 kHz (445 kHz, +/- 1% act.)
Transmission Pulse	Tone Burst, operator selectable from 25 to 400 µsecs. **Independent pulses for each frequency**
Beams	Horizontal - 1 deg. @ 100 kHz, 0.2 deg. @ 500 kHz Vertical - 40 deg.
Beam Tilt	5, 10,15, 20, 25 degrees down, adjustable
Maximum Range	600 meters @ 100 kHz; 150 meters @ 500 kHz
Depth Rating	1,500 meters standard, options to 3km & 6km depths
Construction	Stainless Steel
Size	122 cm long, 8.9 cm diameter
Weight	29 kg in air
Standard Sensors	Roll, pitch, heading
Options	Magnetometer Interface, pressure, Acoustic Positioning Responder, and Responder Interface Kits

Transceiver Processor Unit (TPU)

Operating System	vxWorks® with custom application
Basic Hardware	19-inch rack or table mount, VME bus structure
Outputs	100 Base-Tx, Ethernet LAN
Navigation Input	NMEA 0183
Power	120 watts @ 120/240 VAC, 50/60 Hz

Klein Sonar Workstation

Basic Operating System	Windows NT® & 2000® or equiv.
Sonar Software	SonarPro®
Data Storage	Internal hard drive, optional devices available
Hardware	Industrial PC with technically advanced components

Tow Cables

Klein offers a selection of coaxial, Kevlar® reinforced, lightweight cables, double armored steel cables, and interfaces to fiber optic cables. All cables come fully terminated at the towfish end.

KLEIN

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Phone: (603) 893-6131
Fax: (603) 893-8807
E-mail: mail@kleinsonar.com
web site: www.kleinsonar.com

SonarPro® Software

Custom developed software by users and for users of Klein side scan sonar systems operating on Windows NT® & 2000®. Field proven for many years on Klein's Multi-Beam Focused Sonar Series 5000 Systems and adapted to the System 3000 single-beam system. SonarPro® is a modular package combining ease of use with advanced sonar features.

Basic Modules	Main Program, Data Display, Information, Target Management, Navigation, Data Recording & Playing, and Sensor Display.
Multiple Display Windows	Permits multiple windows to view different features as well as targets in real time or in playback modes. Multi-Windows for sonar channels, navigation, sensors, status monitors, targets, etc.
Survey Design	Quick & easy survey set up with ability to change parameters, set tolerances, monitor actual coverage, and store settings.
Target Management	Independent windows permitting mensuration, logging, comparisons, filing, classification, positioning, time & survey target layers, and feature enhancements. Locates target in navigation window.
Sensor Window	Displays all sensors in several formats (includes some alarms) and responder set up to suit many frequencies and ping rates.
Networking	Permits multiple, real time processing workstations via a LAN including "master and slave" configurations.
"Wizards"	To help operator set up various manual and default parameters.

SV Plus^{v2}

Setting the Standard for Sound Velocity Profiling

Updated in 2004, the SV Plus^{v2} was released in 1996 as the first-ever time of flight sound velocimeter. By directly measuring the time-of-flight of an acoustic ping, the SV Plus^{v2} improves sound velocity accuracies by a factor of five over CTD based calculations such as Chen & Millero or Del Grosso.

Applied Microsystems has manufactured more than 3000 time-of-flight sound velocity sensors, making the SV Plus^{v2} a proven field partner. Used by surveyors worldwide and recommended by leading multi-beam manufacturers, the SV Plus^{v2} is the industry standard for reliable sound velocity measurement.

Key Features:

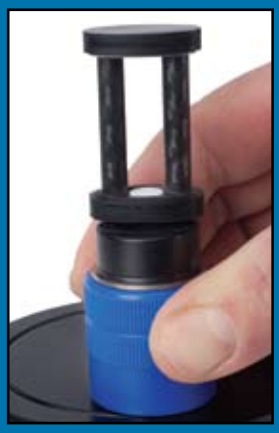
- *Sound Velocity:* Time-of-Flight, +/-0.03 m/s (precision)
- *Temperature:* Precision Aged Thermistor, +/-0.05°C (precision), +/-0.005°C (optional)
- *Pressure:* Temperature Compensated Strain Gauge, +/-0.03%FS (precision), +/-0.01%FS (optional)
- *Sampling:* user selectable sampling to 25 Hz
- *Power:* dual power (internal battery and external supply)
- *Memory:* gigabyte non-volatile memory (expandable)
- *Additional Channels:* up to 10 analog or 5 digital channels
- *SV•Xchange™:* optional SV•Xchange™, the industry's only field-swappable sound velocity sensor
- *USB:* optional USB port for high-speed data download

SV•Xchange™

Exchangeable SV Sensor Option

SV•Xchange™ is the industry's only field-swappable sound velocity sensor. Any SV•Xchange™ sensor can be connected to any Xchange enabled instrument - when you want, where you want - without compromising calibration accuracy.

Key benefits include increased instrument field time, lower cost of ownership, greater convenience and increased flexibility. The SV•Xchange™ is available as an option on the SV Plus^{v2}.



Electrical:

- Gigabyte non-volatile memory (expandable)
- Up to 25 scans per second
- Real time clock
- 8 to 26 VDC (external)
- Auto detect RS232 or RS485
- Optional additional channels (10 analog or 5 digital)
- Auto shut-down in low battery conditions

Sampling Modes:

- Continuous; defined increments of time or pressure; on request

Power Options:

- 9 D cell Alkaline batteries
- 3, 6, or 9 D cell Lithium batteries
- 9 D cell Ni-Cad rechargeable batteries

Mechanical:

- Housing & End Cap: Hard anodized 6061-T6 Aluminium to 5000 m or 7075-T6 Aluminium to 6000 m
- Size: 100 mm / 4.0" (diameter) x 881 mm / 34.9" (end-to-end, logger version)
- Connectors: Subconn Micro 8 wet pluggable, Female
- Environmental: Storage, -40°C to 60°C; Usage, -20°C to 45°C

Accessories:

- Instrument suspension bar
- Instrument protection frame
- Field spares kit

Ordering Code:

- PDC-A1500

**specifications subject to change without notice*

		Range	Precision	Accuracy	Response	Resolution
Standard	Sound Velocity (Invar)	1400 to 1550 m/s	+/-0.03 m/s	+/-0.05 m/s	145 microseconds	0.015 m/s
	Temperature	-2 to 32°C	+/-0.003°C	+/-0.05°C	1 second	0.001°C
	Pressure (Strain Gauge)	Various to 6000 m	+/-0.03%FS	+/-0.05%FS	10 milliseconds	0.005%FS
Optional Upgrades	SV•Xchange™	1375 to 1625 m/s	+/-0.006 m/s	+/-0.025 m/s	47 microseconds	0.001 m/s
	Temperature	Various to 45°C	+/-0.003°C	+/-0.005°C	350 milliseconds	0.001°C
	Pressure (Quartz Crystal)	Various to 7000 m		+/-0.01%FS	Varies	0.000001%FS
Calculated Parameters	Salinity	0 to 40 psu		+/-0.035 psu		

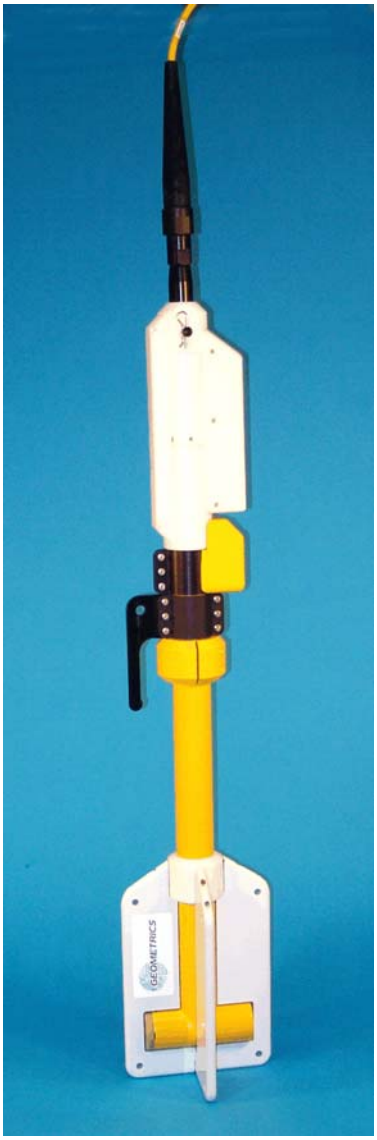
APPLIED MICROSYSTEMS

2071 Malaview Avenue, Sidney BC Canada • TEL: +1-250-656-0771
info@appliedmicrosystems.com • www.appliedmicrosystems.com

Version 1.08

G-882SX MARINE MAGNETOMETER

- ***CESIUM VAPOR PERFORMANCE – Tow the Cesium magnetometer "Anywhere – Any Direction" worldwide***
- ***NEW STREAMLINED DESIGN FOR TOW SAFETY – Low probability of fouling in lines or rocks***
- ***NEW QUICK CONVERSION FROM NOSE TOW TO CG TOW – Simply remove an aluminum locking pin, move tow point and reinsert. New built in easy carry handle!***
- ***NEW INTERNAL CM-221 COUNTER MODULE – Provides Flash Memory for storage of default parameters set by user***
- ***NEW ECHOSOUNDER / ALTIMETER OPTION***
- ***NEW DEPTH RATING – 4,000 psi !***
- ***NO EXPORT LICENSE REQUIRED – 0.01 nT with speeds up to 40 Hz with the internal CM-221 Mini-Counter***
- ***EASY PORTABILITY & HANDLING – no winch required, single man operation, only 44 lbs with 200 ft cable (without weights)***
- ***COMBINE TWO SYSTEMS FOR INCREASED COVERAGE – Internal CM-221 Mini-Counter provides multi-sensor data concatenation allowing side by side coverage which maximizes detection of small targets and reduces noise***



G-882SX with Weight Collar Depth Option & Altimeter

Cesium Vapor performance is now available in a low cost, small size system for professional surveys in shallow or deep water. Good sensitivity and sample rates are maintained for all applications. The well proven Cesium sensor is combined with a unique and new CM-221 Larmor counter and ruggedly packaged for small or large boat operation. Use your computer and standard printer with our MagLogLite™ software to log, display and print GPS position and magnetic field data. The G-882SX is the lowest priced full range marine magnetometer system ever offered.

The G-882SX offers flexibility for operation from small boat, shallow water surveys as well as deep tow applications (4,000 psi rating, telemetry over steel coax available to 10Km). The G-882SX also directly interfaces to all major Side Scan manufacturers for tandem tow configurations. Being small and lightweight (44 lbs net, without weights) it is easily deployed and operated by one person. But add several streamlined weight collars and the system can quickly weigh more than 100 lbs. for deep tow applications. Power may be supplied from a 24 to 30 VDC battery power or the included 110/220 VAC power supply. The tow cable employs high strength Kevlar strain member with a standard length of 200 ft (61 m) and optional cable length up to 500m with no telemetry required.
A rugged fiber-wound fiberglass housing is designed for operation is all parts of the world allowing sensor rotation for work in equatorial regions. The shipboard end of the tow cable is attached to an included junction box or optional on-board cable for quick and simple hookup to power and output of data into any Windows 98, ME, NT, 2000 or XP computer equipped with RS-232 serial ports.

The G-882SX Cesium magnetometer provides non-export license operating sensitivity and sample rates for quick deployment anywhere in the world. MagLogLite™ Logging Software is offered with each magnetometer and allows recording and display of data and position with Automatic Anomaly Detection and automatic anomaly printing on Windows™ printer! Additional options include: MagMap2000 plotting and contouring software and post acquisition processing software MagPick™ (free from our website.)

The G 882SX system is particularly well suited for the detection and mapping of all sizes of ferrous objects. This includes anchors, chains, cables, pipelines, ballast stone and other scattered shipwreck debris, munitions of all sizes (UXO), aircraft, engines and any other object with magnetic expression. Objects as small as a 5 inch screwdriver are readily detected provided that the sensor is close to the seafloor and within practical detection range. (Refer to table at right).

The design of this high sensitivity G 882SX marine unit is directed toward the largest number of user needs. It is intended to meet all marine requirements such as shallow survey, deep tow through long cables, integration with Side Scan Sonar systems and monitoring of fish depth and altitude.

Typical Detection Range For Common Objects

Ship 1000 tons	0.5 to 1 nT at 800 ft (244 m)
Anchor 20 tons	0.8 to 1.25 nT at 400 ft (120 m)
Automobile	1 to 2 nT at 100 ft (30 m)
Light Aircraft	0.5 to 2 nT at 40 ft (12 m)
Pipeline (12 inch)	1 to 2 nT at 200 ft (60 m)
Pipeline (6 inch)	1 to 2 nT at 100 ft (30 m)
100 KG of iron	1 to 2 nT at 50 ft (15 m)
100 lbs of iron	0.5 to 1 nT at 30 ft (9 m)
10 lbs of iron	0.5 to 1 nT at 20 ft (6 m)
1 lb of iron	0.5 to 1 nT at 10 ft (3 m)
Screwdriver 5 inch	0.5 to 2 nT at 12 ft (4 m)
1000 lb bomb	1 to 5 nT at 100 ft (30 m)
500 lb bomb	0.5 to 5 nT at 50 ft (16 m)
Grenade	0.5 to 2 nT at 10 ft (3 m)
20 mm shell	0.5 to 2 nT at 5 ft (1.8 m)

MODEL G 882SX CESIUM MARINE MAGNETOMETER SYSTEM SPECIFICATIONS

OPERATING PRINCIPLE:	Self-oscillating split-beam Cesium Vapor (non-radioactive)
OPERATING RANGE:	20,000 to 100,000 nT
OPERATING ZONES:	The earth's field vector should be at an angle greater than 6° from the sensor's equator and greater than 6° away from the sensor's long axis. Automatic hemisphere switching. Now towable "Anywhere – Any Direction"
CM-221 COUNTER SENSITIVITY:	0.01nT with speeds up to 40 samples per second
HEADING ERROR:	±1 nT (over entire 360° spin)
ABSOLUTE ACCURACY:	<2 nT throughout range
OUTPUT:	RS-232 at 1,200 to 19,200 Baud
MECHANICAL:	
Sensor Fish:	Body 2.75 in. (7 cm) dia., 4.5 ft (1.37 m) long with fin assembly (11 in. cross width), 40 lbs. (18 kg) Includes Sensor and Electronics and 1 main weight. Additional collar weights are 14lbs (6.4kg) each, total of 5 capable
Tow Cable:	Kevlar Reinforced multiconductor tow cable. Breaking strength 3,600 lbs, 0.48 in OD, 200 ft maximum. Weighs 17 lbs (7.7 kg) with terminations.
OPERATING TEMPERATURE:	-30°F to +122°F (-35°C to +50°C)
STORAGE TEMPERATURE:	-48°F to +158°F (-45°C to +70°C)
ALTITUDE:	Up to 30,000 ft (9,000 m)
WATER TIGHT:	O-Ring sealed for up to 4,000 psi (9000 ft or 2750 m) depth operation
POWER:	24 to 32 VDC, 0.75 amp at turn-on and 0.5 amp thereafter
ACCESSORIES:	
Standard:	View201 Utility Software operation manual and ship kit
Optional:	Telemetry to 10Km coax, gradiometer (longitudinal or transverse), reusable shipping case
MagLog Lite™ Software:	Logs, displays and prints Mag and GPS data at 10 Hz sample rate. Automatic anomaly detection and single sheet Windows printer support

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE ***12/06***

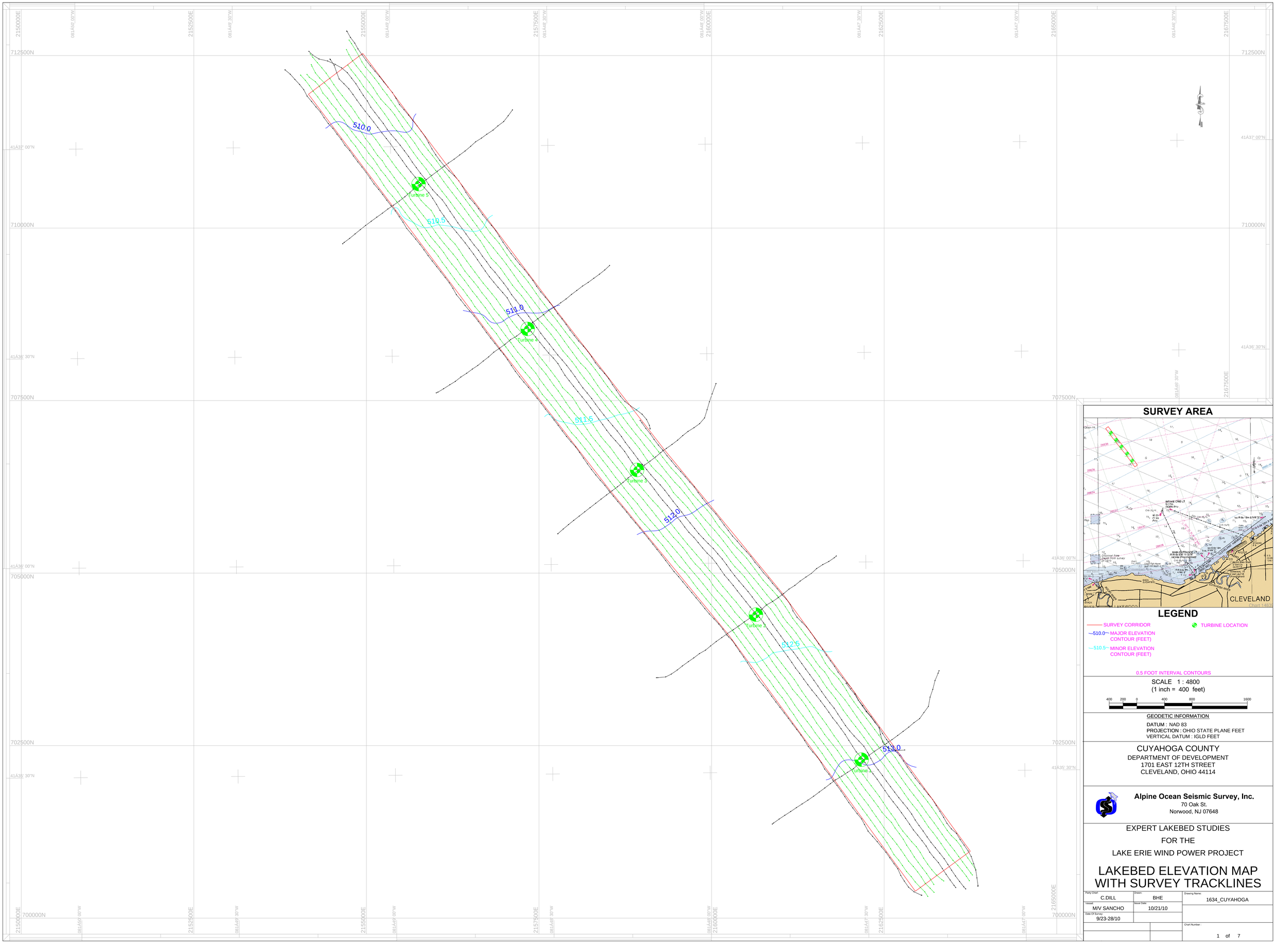
GEOMETRICS, INC. 2190 Fortune Drive, San Jose, California 95131
408-954-0522 Fax 408-954-0902 Internet: sales@mail.geometrics.com

GEOMETRICS Europe **20 Eden Way, Pages Industrial Park, Leighton Buzzard, LU7 4TZ, UK**
Tel: 44-1525-383438 Fax 44-1525-382200 Eml: chris@georentals.co.uk

GEOMETRICS China Laurel Industrial Co. Inc. - Beijing Office, Room 2509-2511, Full Link Plaza
#18 Chaoyangmenwai Dajie, Chaoyang District, Beijing, China 100020
10-6588-1126 (1127..1130), 10-6588-1132 Fax 010-6588-1162

APPENDIX 6

CHARTS



SURVEY AREA

LEGEND

- SURVEY CORRIDOR
- TURBINE LOCATION
- 510.0 MAJOR ELEVATION CONTOUR (FEET)
- 510.5 MINOR ELEVATION CONTOUR (FEET)

0.5 FOOT INTERVAL CONTOURS

SCALE 1 : 4800
(1 inch = 400 feet)

400 200 0 400 800 1600

GEODETIC INFORMATION

DATUM : NAD 83
PROJECTION : OHIO STATE PLANE FEET
VERTICAL DATUM : IGLD FEET

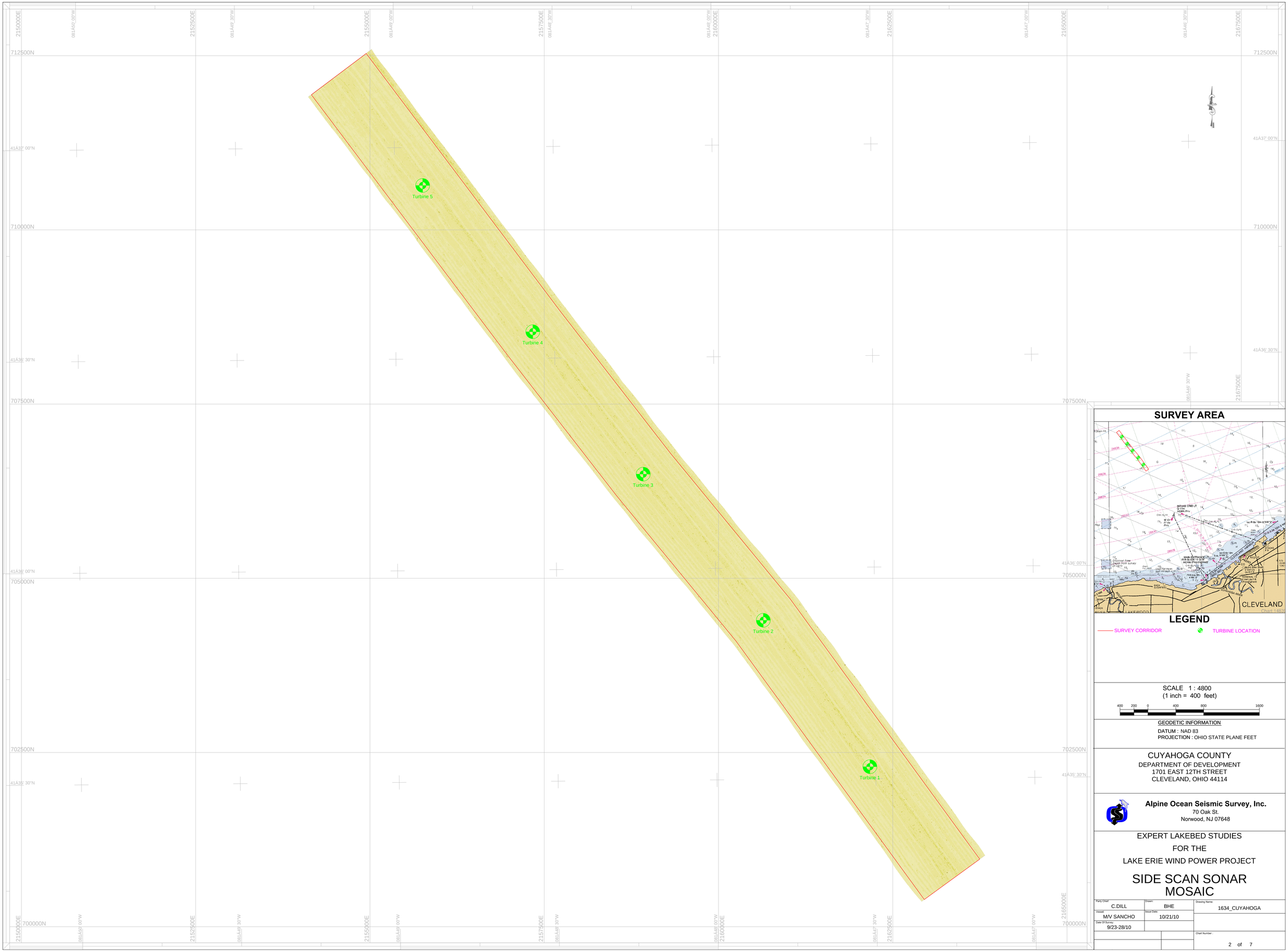
CUYAHOGA COUNTY
DEPARTMENT OF DEVELOPMENT
1701 EAST 12TH STREET
CLEVELAND, OHIO 44114

Alpine Ocean Seismic Survey, Inc.
70 Oak St.
Norwood, NJ 07648

EXPERT LAKEBED STUDIES
FOR THE
LAKE ERIE WIND POWER PROJECT

LAKEBED ELEVATION MAP WITH SURVEY TRACKLINES

Party Chief:	Drawn:	Drawing Name:
C.DILL	BHE	1634_CUYAHOGA
Vessel:	Issue Date:	
M/V SANCHO	10/21/10	
Date Of Survey:		
9/23-28/10		
		Chart Number :
		1 of 7



SURVEY AREA

LEGEND

SURVEY CORRIDOR

TURBINE LOCATION

SCALE 1 : 4800
(1 inch = 400 feet)

400 200 0 400 800 1600

GEODETIC INFORMATION
DATUM : NAD 83
PROJECTION : OHIO STATE PLANE FEET

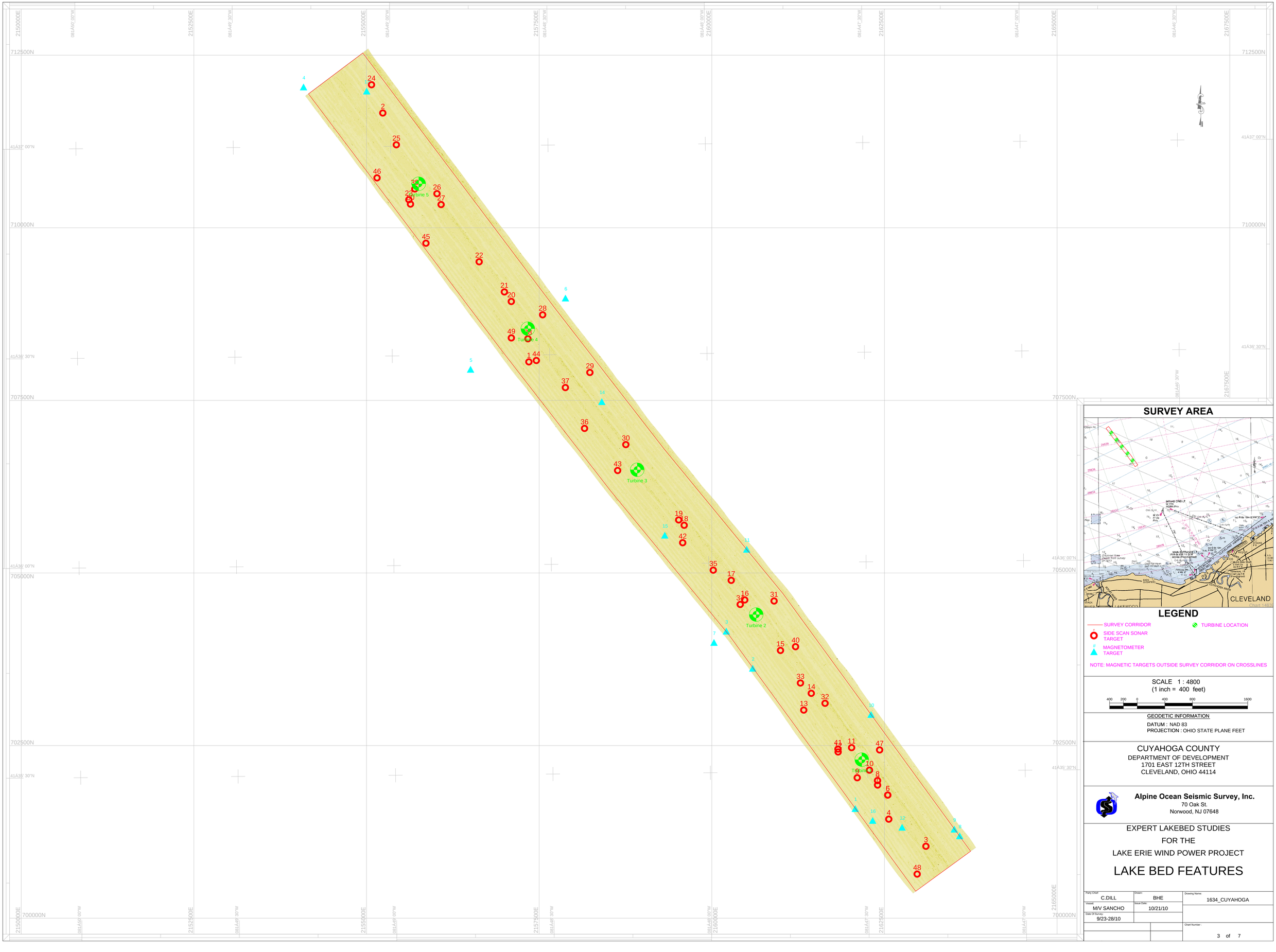
CUYAHOGA COUNTY
DEPARTMENT OF DEVELOPMENT
1701 EAST 12TH STREET
CLEVELAND, OHIO 44114

Alpine Ocean Seismic Survey, Inc.
70 Oak St.
Norwood, NJ 07648

EXPERT LAKEBED STUDIES
FOR THE
LAKE ERIE WIND POWER PROJECT

SIDE SCAN SONAR MOSAIC

Party Chief: C.DILL	Drawn: BHE	Drawing Name: 1634_CUYAHOGA
Vessel: M/V SANCHO	Issue Date: 10/21/10	
Date Of Survey: 9/23-28/10		
		Chart Number :



SURVEY AREA

LEGEND

- SURVEY CORRIDOR
- TURBINE LOCATION
- SIDE SCAN SONAR TARGET
- MAGNETOMETER TARGET

NOTE: MAGNETIC TARGETS OUTSIDE SURVEY CORRIDOR ON CROSSLINES

SCALE 1 : 4800
(1 inch = 400 feet)

400 200 0 400 800 1600

GEODETIC INFORMATION
DATUM : NAD 83
PROJECTION : OHIO STATE PLANE FEET

CUYAHOGA COUNTY
DEPARTMENT OF DEVELOPMENT
1701 EAST 12TH STREET
CLEVELAND, OHIO 44114

Alpine Ocean Seismic Survey, Inc.
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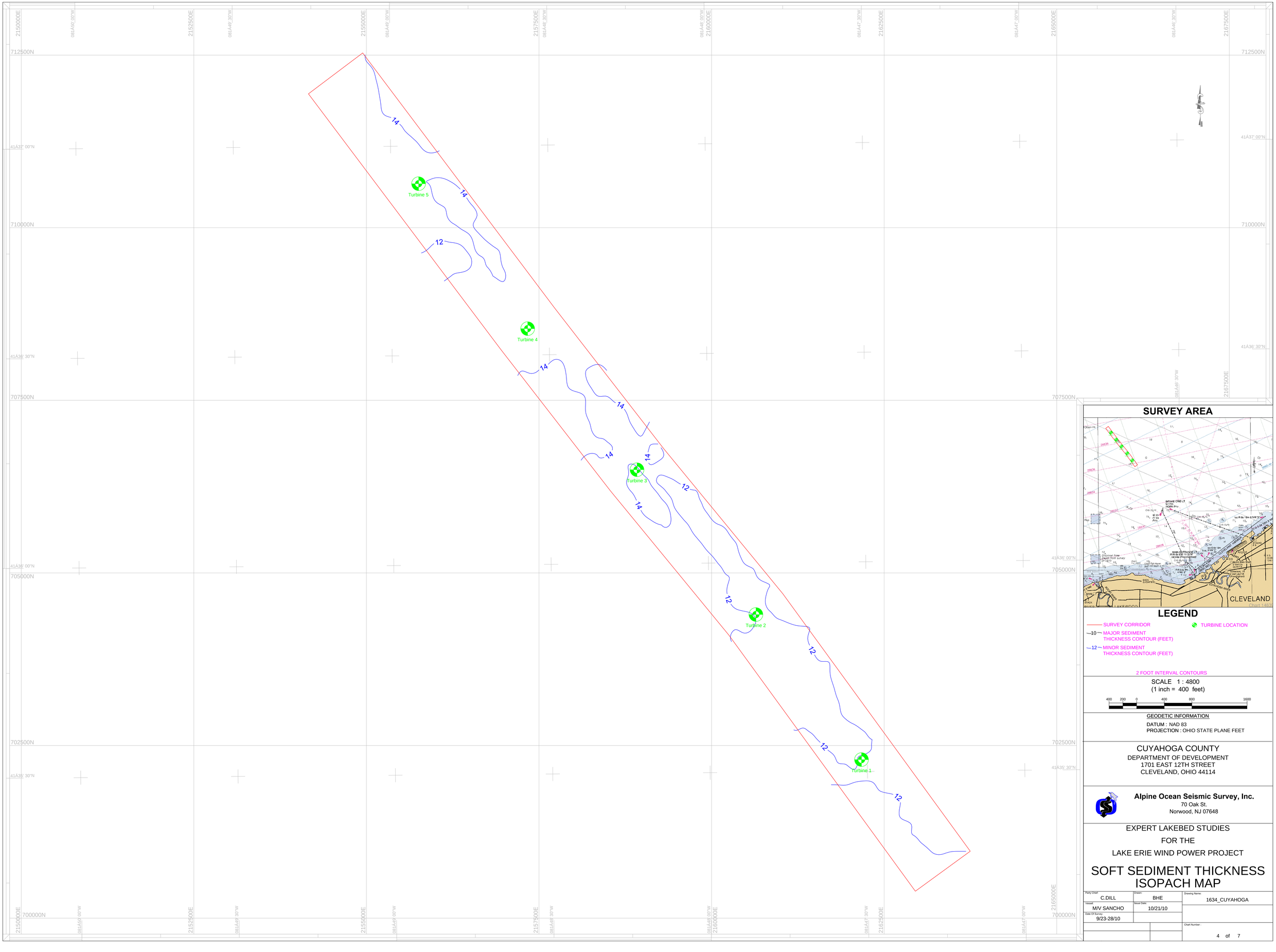
Norwood, NJ 07648

EXPERT LAKEBED STUDIES
FOR THE
LAKE ERIE WIND POWER PROJECT

LAKE BED FEATURES

Party Chief: C.DILL	Drawn: BHE	Drawing Name: 1634_CUYAHOGA
Vessel: M/V SANCHO	Issue Date: 10/21/10	
Date Of Survey: 9/23-28/10		
		Chart Number: 3 of 7



SURVEY AREA

LEGEND

- SURVEY CORRIDOR
- TURBINE LOCATION
- 10 MAJOR SEDIMENT THICKNESS CONTOUR (FEET)
- 12 MINOR SEDIMENT THICKNESS CONTOUR (FEET)

2 FOOT INTERVAL CONTOURS

SCALE 1 : 4800
(1 inch = 400 feet)

400 200 0 400 800 1600

GEODETIC INFORMATION

DATUM : NAD 83
PROJECTION : OHIO STATE PLANE FEET

CUYAHOGA COUNTY
DEPARTMENT OF DEVELOPMENT
1701 EAST 12TH STREET
CLEVELAND, OHIO 44114

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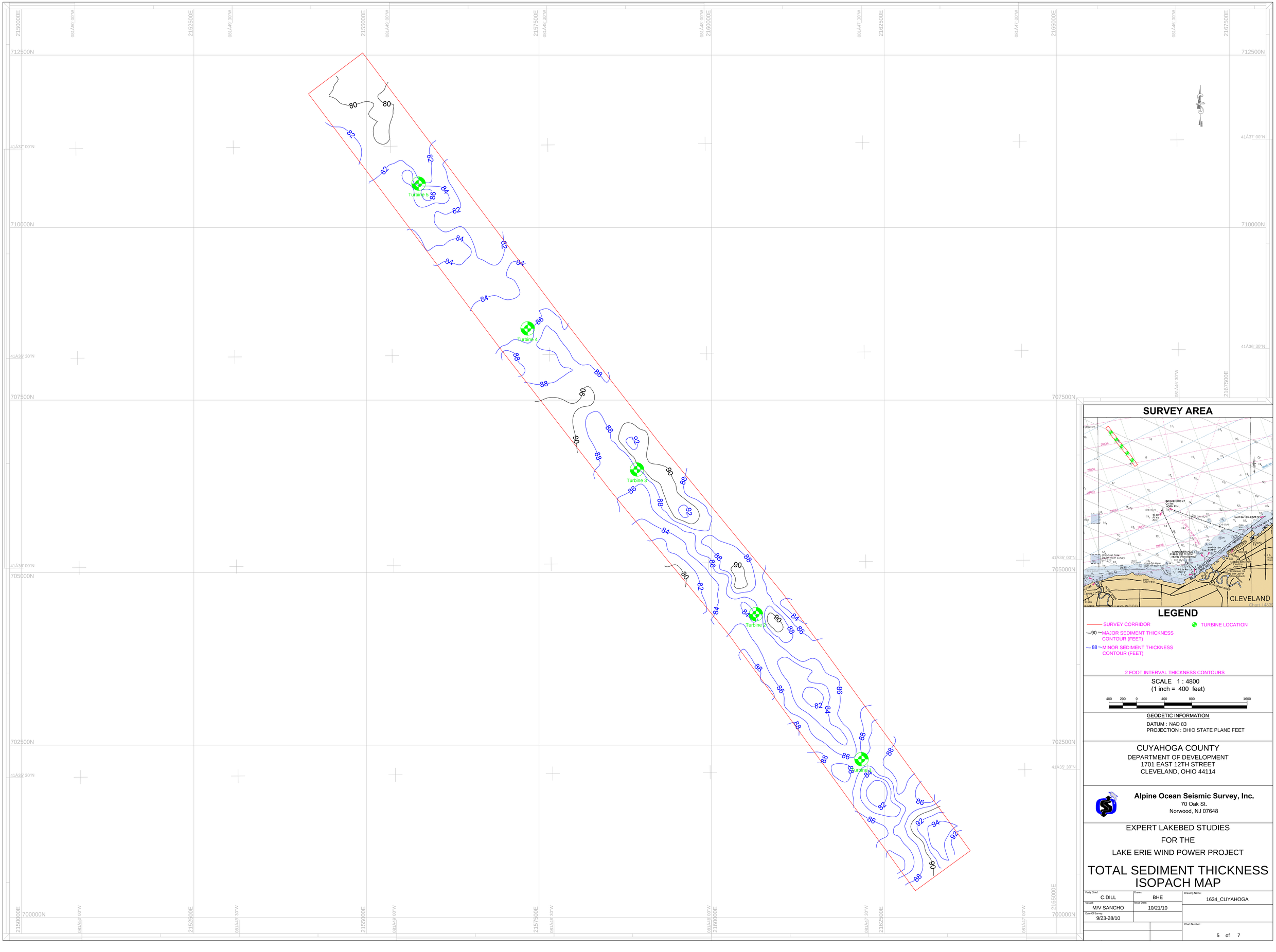
Norwood, NJ 07648

EXPERT LAKEBED STUDIES
FOR THE
LAKE ERIE WIND POWER PROJECT

SOFT SEDIMENT THICKNESS ISOPACH MAP

Party Chief: C.DILL	Drawn: BHE	Drawing Name: 1634_CUYAHOGA
Vessel: M/V SANCHO	Issue Date: 10/21/10	
Date Of Survey: 9/23-28/10		
		Chart Number: 4 of 7



SURVEY AREA

LEGEND

- SURVEY CORRIDOR
- TURBINE LOCATION
- 90 — MAJOR SEDIMENT THICKNESS CONTOUR (FEET)
- 88 — MINOR SEDIMENT THICKNESS CONTOUR (FEET)

2 FOOT INTERVAL THICKNESS CONTOURS

SCALE 1 : 4800
(1 inch = 400 feet)

400 200 0 400 800 1600

GEODETIC INFORMATION

DATUM : NAD 83
PROJECTION : OHIO STATE PLANE FEET

CUYAHOGA COUNTY
DEPARTMENT OF DEVELOPMENT
1701 EAST 12TH STREET
CLEVELAND, OHIO 44114

Alpine Ocean Seismic Survey, Inc.
70 Oak St.
Norwood, NJ 07648

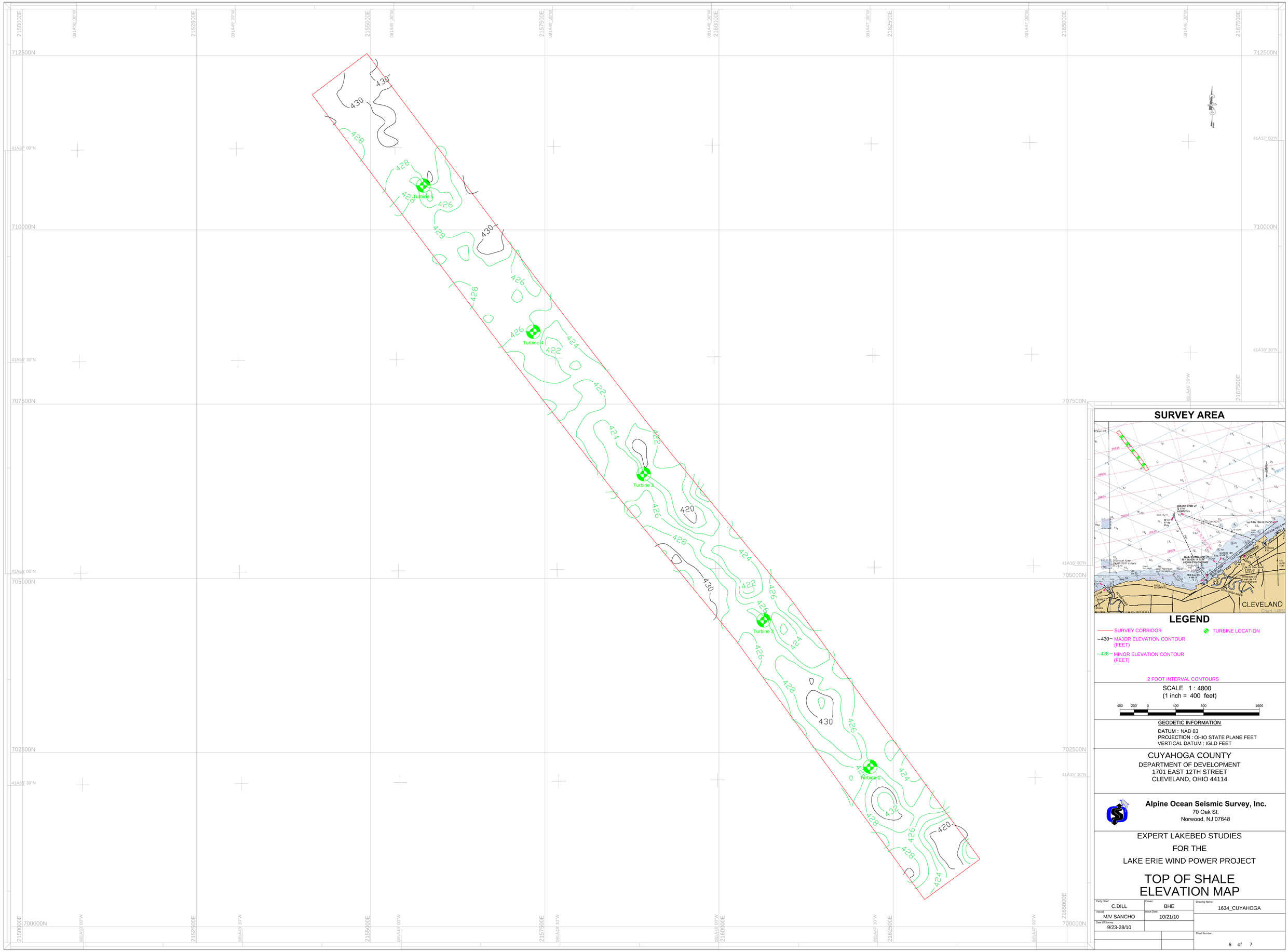
EXPERT LAKEBED STUDIES

FOR THE

LAKE ERIE WIND POWER PROJECT

TOTAL SEDIMENT THICKNESS ISOPACH MAP

Party Chief:	Drawn:	Drawing Name:
C.DILL	BHE	1634_CUYAHOGA
Vessel:	Issue Date:	
M/V SANCHO	10/21/10	
Date Of Survey:		
9/23-28/10		
		Chart Number:
		5 of 7



SURVEY AREA

LEGEND

- SURVEY CORRIDOR
- TURBINE LOCATION
- 430 MAJOR ELEVATION CONTOUR (FEET)
- 428 MINOR ELEVATION CONTOUR (FEET)

2 FOOT INTERVAL CONTOURS

SCALE 1 : 4800
(1 inch = 400 feet)

400 200 0 400 800 1600

GEODETIC INFORMATION

DATUM : NAD 83
PROJECTION : OHIO STATE PLANE FEET
VERTICAL DATUM : IGLD FEET

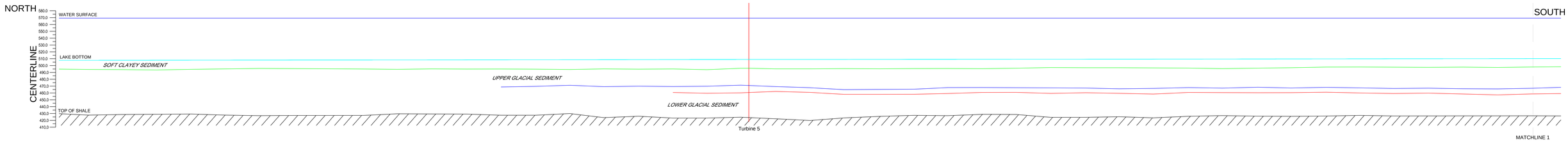
CUYAHOGA COUNTY
DEPARTMENT OF DEVELOPMENT
1701 EAST 12TH STREET
CLEVELAND, OHIO 44114

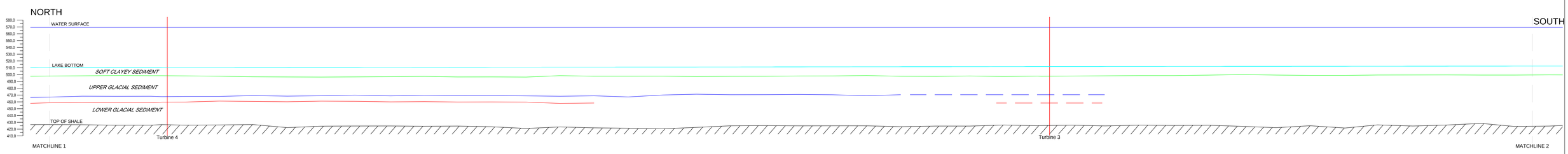
Alpine Ocean Seismic Survey, Inc.
70 Oak St.
Norwood, NJ 07648

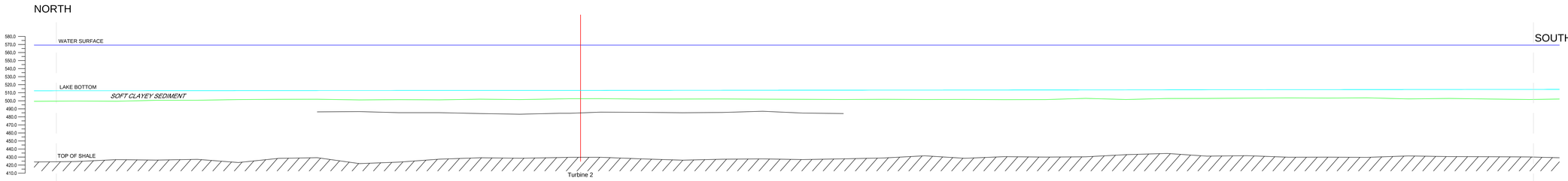
EXPERT LAKEBED STUDIES
FOR THE
LAKE ERIE WIND POWER PROJECT

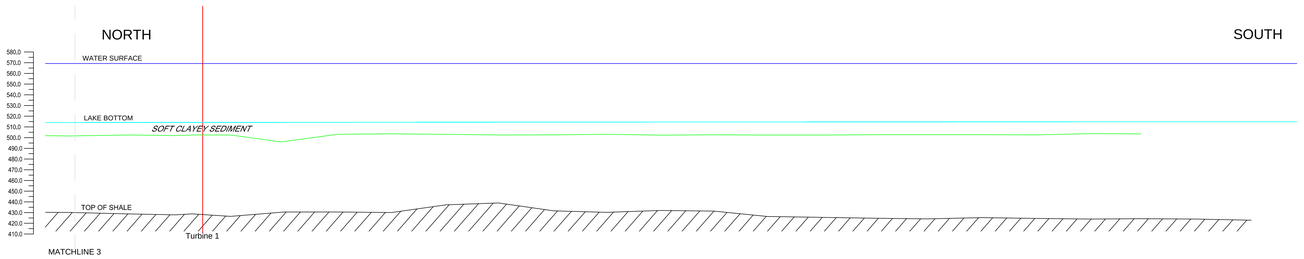
TOP OF SHALE ELEVATION MAP

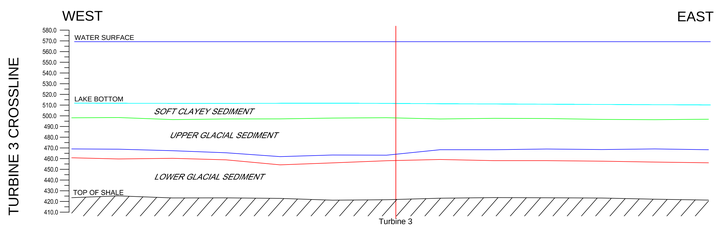
Party Chief: C.DILL	Drawn: BHE	Drawing Name: 1634_CUYAHOGA
Vessel: M/V SANCHO	Issue Date: 10/21/10	
Date Of Survey: 9/23-28/10		
		Chart Number : 6 of 7











SURVEY AREA

LEGEND

- WATER SURFACE
- LAKE BOTTOM
- TOP OF UPPER GLACIAL SEDIMENT
- TOP OF LOWER GLACIAL SEDIMENT (REFLECTOR 1)
- TOP OF LOWER GLACIAL SEDIMENT (REFLECTOR 2)
- TOP OF SHALE

VERTICAL SCALE 1 : 600
(1 inch = 50 feet)

50 25 0 50 100 200

HORIZONTAL SCALE 1 : 1200
(1 inch = 100 feet)

100 50 0 100 200 400

GEODETIC INFORMATION

DATUM : NAD 83
PROJECTION : OHIO STATE PLANE FEET
VERTICAL DATUM : IGLD FEET

CUYAHOGA COUNTY
DEPARTMENT OF DEVELOPMENT
1701 EAST 12TH STREET
CLEVELAND, OHIO 44114

Alpine Ocean Seismic Survey, Inc.
70 Oak St.
Norwood, NJ 07648

EXPERT LAKEBED STUDIES
FOR THE
LAKE ERIE WIND POWER PROJECT

GEOLOGICAL PROFILES OF CENTERLINE & TURBINE 3 CROSSLINE

Party Chief: C.DILL	Drawn: BHE	Drawing Name: 1634_CUYAHOGA
Vessel: M/V SANCHO	Issue Date: 10/21/10	
Date Of Survey: 9/23-28/10		
		Chart Number : 7 of 7