APPENDIX B

MAGNETOMETER SURVEY

7.0 MAGNETOMETER SURVEY

7.1 Introduction

The barrier island complex in the area between Pass Chaland and Grand Bayou Pass is known to have a number of pipelines and related oil field structures. Mapping of these pipelines prior to conducting any dredging or additional construction was required and is part of the survey conducted by the SJB team.

7.2 Schedule

The Alpine equipment and personnel were mobilized to New Orleans on July 14, 2003. The Alpine geophysicist drove the equipment to Empire, Louisiana on July 15, and spent the afternoon of that day with the Coastal Engineering team mobilizing the equipment on the survey vessel. Survey operations commenced on July 16 and were completed that evening, at which time the equipment was demobilized from the survey vessel.

7.3 Methods

In order to map the locations of the various pipelines in the area, Alpine Ocean Seismic Survey, Inc. (Alpine) conducted a magnetic anomaly survey using a Marine Magnetics SeaSpy Marine magnetometer, interfaced to two computers. One computer was used to monitor the magnetic field along the survey lines, and the second was used to continuously store the magnetic data. The magnetometer sensor was set to take a reading at one-second intervals along the survey lines.

The survey vessel and navigation control were supplied by Coastal Engineering Consultants, Inc. and were operated by their personnel. A DGPS navigation system was interfaced to Hypack software in the computer. Pre-plots of the proposed survey lines were pre-recorded and used to guide the survey vessel. The magnetometer sensor was floated on the water surface and towed at a fixed distance of 35 feet behind the survey vessel. The vessel was operated at a speed of between 3 and 5 knots.

During the field survey, an Alpine geophysicist monitored the magnetometer data continuously, and noted the location of the major anomalies.

7.4 Magnetic Field Strength Assessment

In order to conduct an assessment of the magnetic variation that might be expected from a known steel object, the magnetometer sensor was placed on the ground in an open field. Once the background level was stable, a section of one inch ID steel pipe ten feet long was carried past the sensor. The pipe was oriented parallel to the ground but across the axis of the sensor and carried at about 8 feet above the sensor. At that distance, the pipe created an anomaly of approximately 400 gammas. The same pipe, at a distance of 20 feet, gave an anomaly of about 60 gammas. A ¾ inch ID steel pipe, also ten feet long, at the 7-foot distance, gave an anomaly of between 250 and 300 gammas. A section of

water pump suction hose with a steel basket on the end, carried past the sensor at a distance of about 10 feet, gave an anomaly of about 90 gammas.

The width or shape of each anomaly was a function of the speed that the object was walked past the tow fish, and the orientation of the object relative to the alignment of the tow fish. When the pipe was carried horizontally, but aligned perpendicularly to the tow fish, the anomaly was observed to be a steep di-pole. When the pipe was parallel to the orientation of the tow fish, the anomaly was more of a monopole. The suction pump basket gave a monopole shaped anomaly.

An automobile moving toward and then away from the tow fish at a distance of between 45 and 50 feet gave a broad monopole shaped anomaly with a total field variation of approximately 50 gammas from background.

7.5 Data Interpretation

The magnetic data were reviewed using the Hypack single beam editor software that allows the viewing of the magnetic field variation along each separate survey line. The location of each anomaly, the magnetic field variation and the width of the anomaly can be selected and recorded using this software. The data are presented in Table 1 and shown on the attached plans. Given that the purpose of the project was to determine the location of oil field pipelines, anomalies of less than about 70 gammas were not plotted. However, other than the targets plotted, the surveyed area was magnetically very quiet, indicating a general lack of debris or other magnetically sensitive material.

7.6 Data Presentation

The attached plans show the navigation lines and anomalies in the survey area. The pipelines are indicated by a linear set of targets detected on adjacent survey lines. Where an individual target of lower amplitude is not part of a linear set of targets, the source of the individual target is interpreted as being debris.

Five survey lines were run in Bay Joe Wise in a north south orientation, with the south end being as close to the back of the barrier island as possible. The NOAA map for the area shows a linear channel parallel and close to the back of the barrier island. Two pipes were found to be present in the area of this channel, with the southern one having a more distinct magnetic signature.

No pipelines were detected along the two east-west survey lines run in Bay Joe Wise. However, there were a few targets in the narrow channel at the east end of Bay Joe Wise, and one in the channel heading out to the Gulf. The targets numbers 37, 38 and 39 were likely the indication of debris. Target 40 may be a pipe. Due to the lack of sufficient water depth in the inlet, it was not possible to continue the survey line south any further than indicated. Therefore, it was not possible to reach the point where the signs on the east and west sides of the pass indicate an oil pipe crossing, which would be the continuation of the pipes running along the north side of the barrier island.

The major pipe present along the back of the barrier in Bay Joe Wise appear also to continue to the west to at least the area of Pass Chaland. A survey line run down the length of the channel from Bay Joe Wise to Pass Chaland crossed the pipe in several locations, as shown on Maps 1 and 2.

There is a prominent oil field structure north of the channel in the area of anomalies 24 and 25. These anomalies appear to represent pipes which head offshore from this structure, crossing the east-west pipes in the channel. One pipe crosses the offshore survey lines at anomalies 20 and 18, while the second pipe heads offshore to the southeast, and crosses the offshore lines at anomalies 41, 17 and 9.

To the west of Pass Chaland, there is another set of anomalies, numbers 21 and 19, which indicate one or two pipelines running offshore in southwest direction. The inshore end of this pipe or pipes appears to cross the beach to the west of the inlet. The NOAA chart for the area shows two very closely spaced pipelines at this location, but the magnetic data do not show two distinct anomalies at targets 21 and 19.

At Pass Chaland, there are signs on both sides of the inlet indicating the presence of a petroleum pipeline crossing. This pipeline appears to correspond to target 8. The other two lower gamma anomalies, numbers 34 and 35, located to the north in the inlet, correspond to a pair of anchored shrimp boats at those locations.

Track line 13, located at the eastern end of the offshore part of the survey, crossed two anomalies, shown as target 12 and 13 on Map 4. One or the other of these anomalies may correspond to a wreck that is plotted on the NOAA Chart for this area. These two anomalies were both several hundred gammas in strength, but were monopole type anomalies, rather than a dipole that would be the typical pipeline type anomaly.

7.7 Magnetic Signature Types

DP = Dipole; This type of magnetic anomaly looks like a sine wave, starting with either a positive or negative pulse relative to the flat background, and then swinging rapidly in the opposite polarity when the source of the anomaly is crossed. Generally a dipole anomaly indicates the presence of a linear target, such as a pipeline.

A monopole anomaly is a spike, either increasing in gammas from the background (M+) or decreasing from background (M-). Both of these types are caused by isolated magnetic sources, such as a crab trap, or other more significant sized debris. The amount of deviation from background and the width of the anomaly are functions of the magnetic strength of the source and the distance of the source from the magnetometer tow fish.

7.8 Magnetometer Survey Tolerance

The purpose of the survey was to conduct a reconnaissance survey along the proposed alignment shown in the plans. The locations of significant variations in the total magnetic field along the survey lines are able to indicate the alignment of a pipeline according to the proposed procedure. However, normal archaeological surveys conducted with a magnetometer consider the maximum distance off line that an object can be mapped to be no more than 50 feet. Therefore, Alpine can only be responsible for detecting non-linear objects that may be present less than 50 feet off of the linear survey lines accomplished this survey.

Charts of Magnetic Targets
Table 1

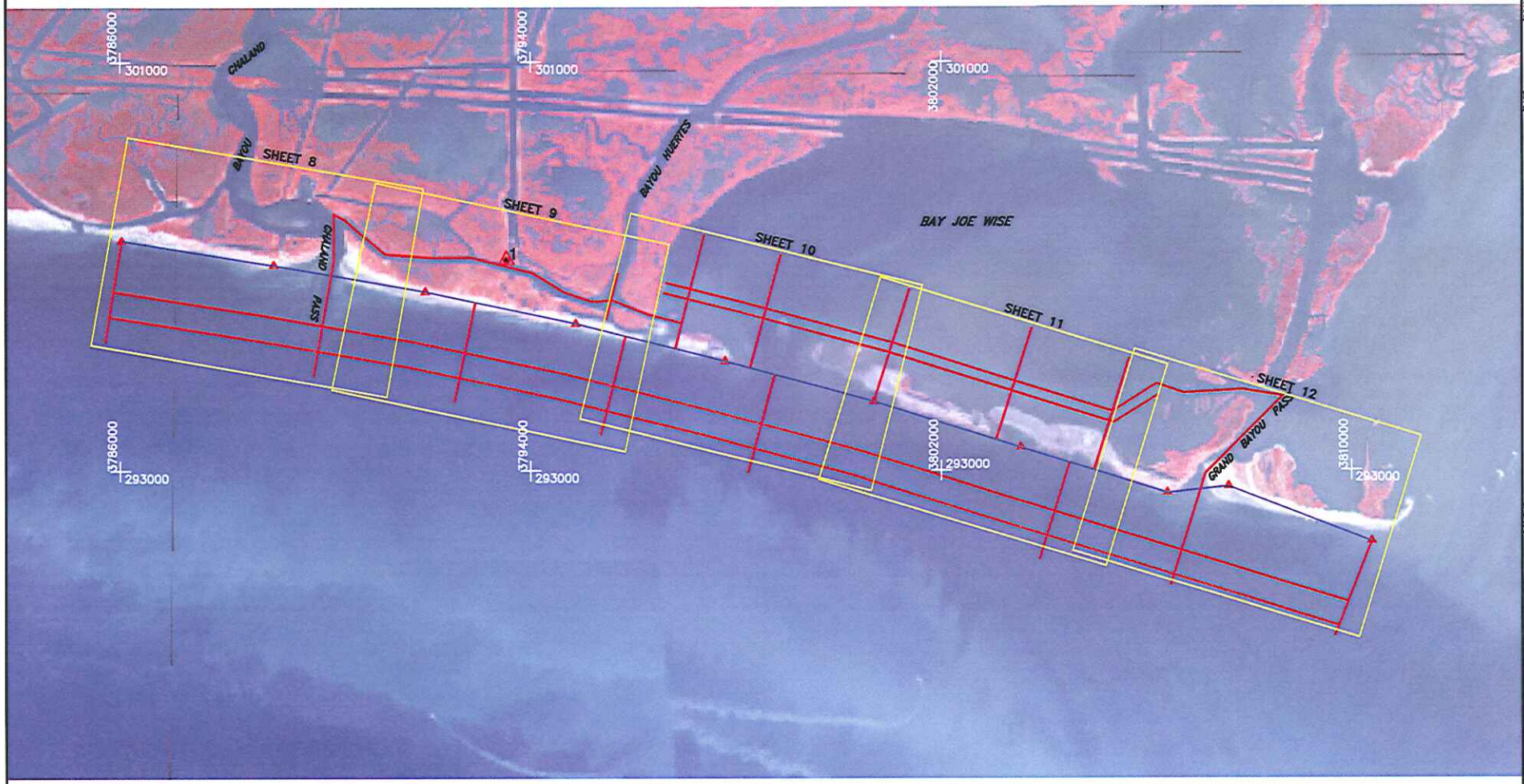
Magnetometer Targets, Pass Chaland to Grand Bayou Pass Survey							
		Start		End			
Target No.	Line no.	X	Y	X	Y	Gamma	Type
1	1	3796899	295685	3796912	295725	460	dp
2	1	3796925	295790	3796935	295866	170	-mp
3	2	3798365	295322	3798372	295354	880	dp
4	2	3798388	295424	3798399	295462	360	-mp
5	3	3800893	294541	3800833	294654	1100	dp
6	4	3803140	293804	3803151	293864	5000	dp
7	4	3803163	293905	3803175	293972	620	+mp
8	7	3790138	297020	3790128	296935	290	+mp
9	9	3795518	294362	3795454	294107	340	-mp
10	11	3804196	292203	3804188	292182	70	-mp
11	12	3806645	291328	3806691	291481	100	dp
12	13	3810231	291185	3810194	291087	900	-mp
13	13	3810115	290872	3810068	290802	770	+mp
14	14	3795481	296173	3795505	296263	570	mp
15	15	3809474	290018	3809407	290036	170	+mp
16	15	3808034	290474	3807984	290489	90	+mp
17	15	3795504	294170	3795343	294215	680	-mp
18	15	3793615	294602	3793470	294639	1812	+mp
19	15	3788486	295596	3788380	295607	1920	+mp
20	16	3793703	295099	3793530	295143	830	dp
21	16	3788893	295963	3788589	296050	1170	dp
22	17	3796023	296101	3796158	296118	1445	dp
23	17	3796213	296078	3796350	296026	2807	dp
24	17	3793438	296946	3793544	296916	1570	dp
25	17	3793544	296916	3793630	296898	2090	dp
26	17	3794366	296555	3794423	296518	1740	dp
27	17	3794576	296462	3794654	296432	1980	dp
28	17	3790565	297664	3790580	297650	300	+mp
29	17	3790637	297599	3790687	297548	410	dp
30	17	3791116	297233	3791214	297188	700	dp
31	17	3791947	297127	3792073	297128	600	dp
32	17	3792250	297133	3792361	297134	1550	dp
33	17	3793241	297028	3793356	296984	470	dp
34	17	3790278	297442	3790283	297315	175	-mp
35	17	3790265	297242	3790244	297141	100	+mp
36	19	3806773	294493	3806834	294506	150	-mp
37	19	3807912	294561	3807969	294551	80	+mp
38	19	3807975	294543	3808023	294523	150	+mp
39	19	3808199	294499	3808298	294418	360	dp
40	19	3807341	293226	3807446	293282	330	dp
41	3	3795100	294776	3795277	294735	588	dp

LEGEND

- CONTROL MONUMENT LOCATION AND SURVEY BASELINE
- 1 PRIMARY CONTROL MONUMENT
- MAGNETOMETER PROFILE
- 3787000 / 298000 GRID TICK AND STATE PLANE COORDINATES, NORTH AMERICAN DATUM, 1983, LOUISIANA SOUTH ZONE

N

0' 1500' 3000' 6000'



PASS CHALAND TO GRAND BAYOU PASS BARRIER SHORELINE RESTORATION (BA-35)

ALPINE OCEAN SEISMIC SURVEY
70 Oak Street, Norwood NJ 07648
September, 2003

NO.	DATE	BY	REVISION DESCRIPTION

SCALE: AS NOTED
DATE: OCT 2, 2003
DRAWN: G.P.D.
CHECKED: M.T.P.
SEC. TWP. RNG.
ACAD NO. 02132PL7
JOB NO. 02.132
EST. NO.

CLIENT: LOUISIANA DEPARTMENT OF NATURAL RESOURCES

TITLE: PASS CHALAND - GRAND BAYOU PASS
MAGNETOMETER SURVEY PLAN

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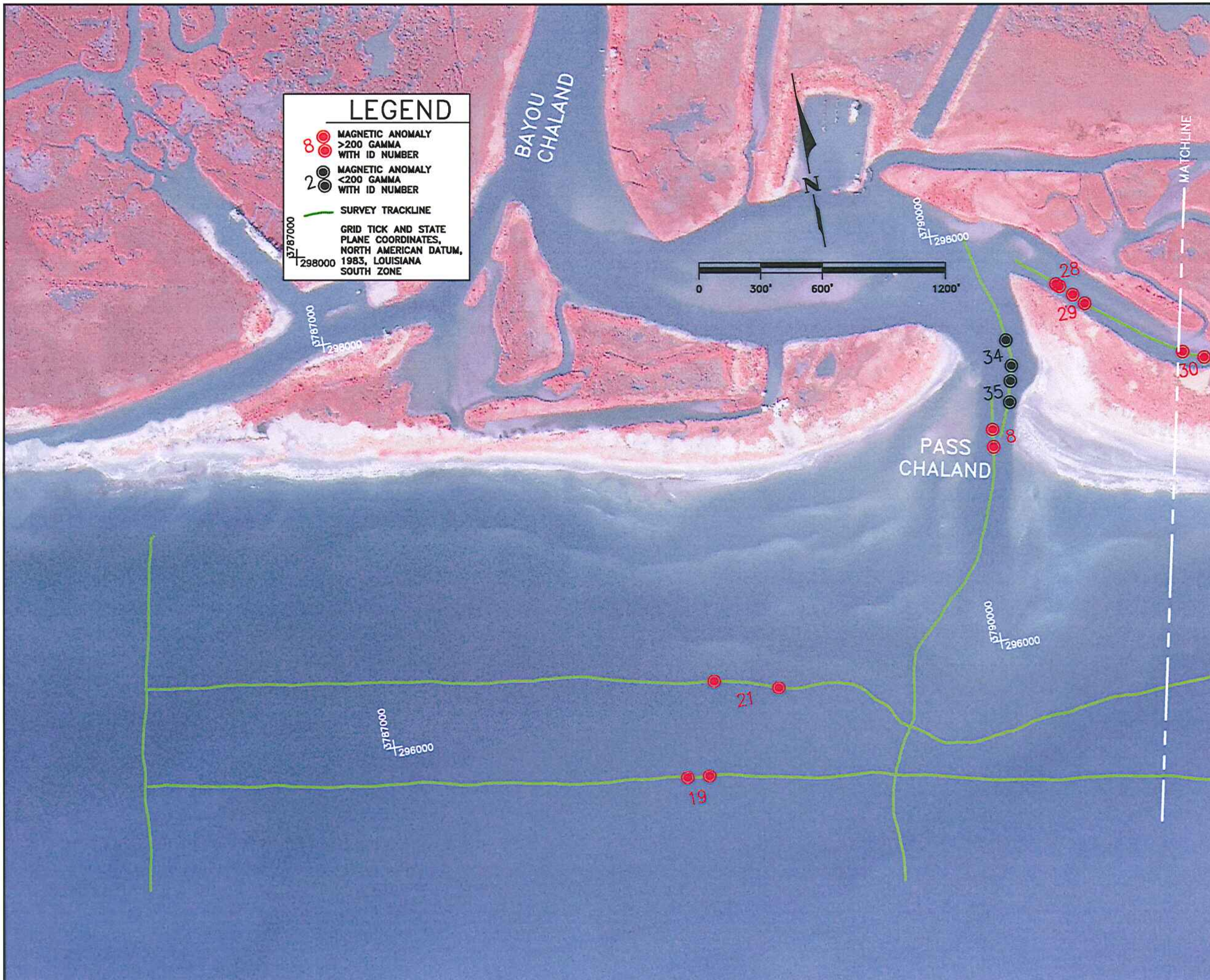
SHEET 7 OF
FILE NO.: 02132-PL-7



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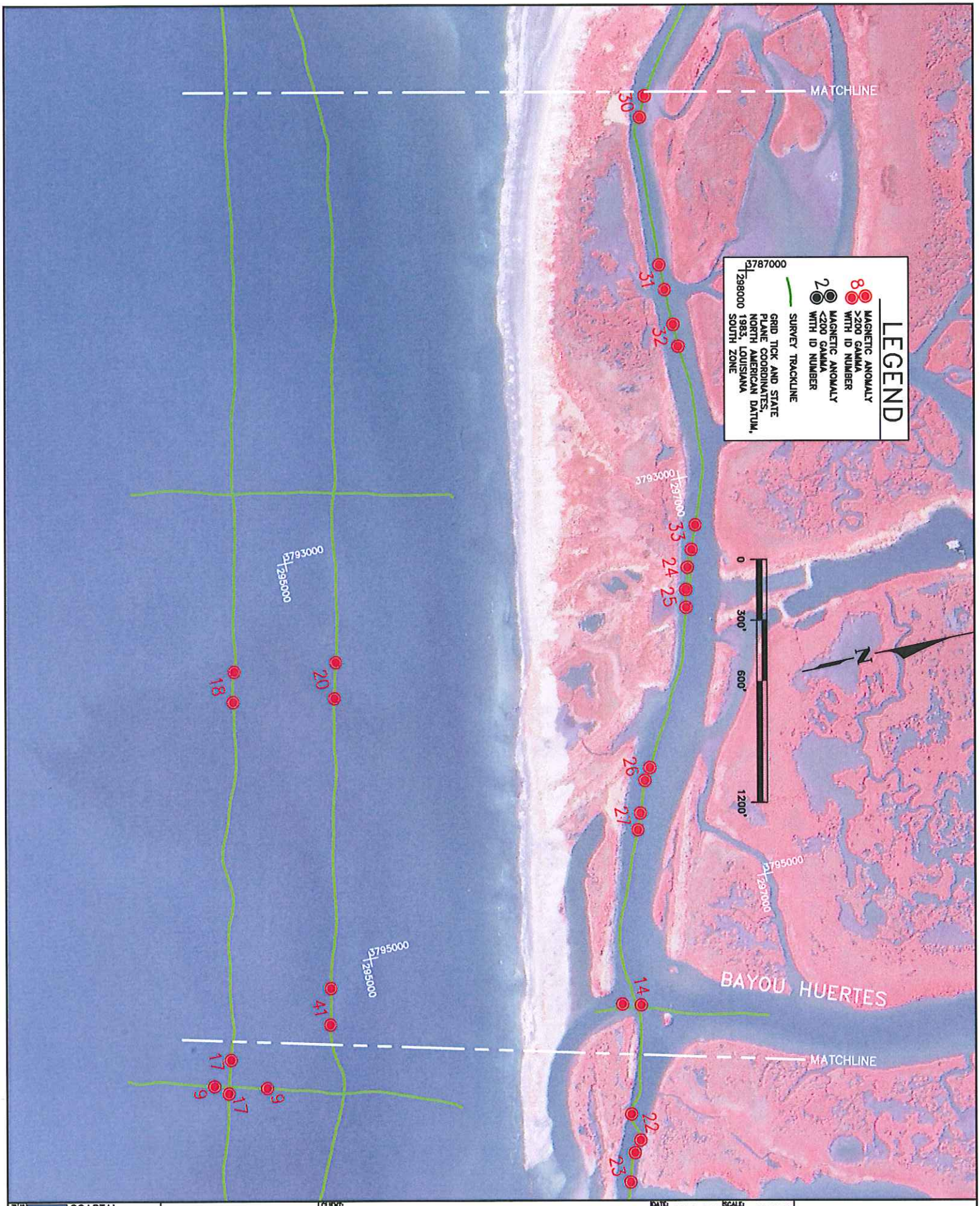

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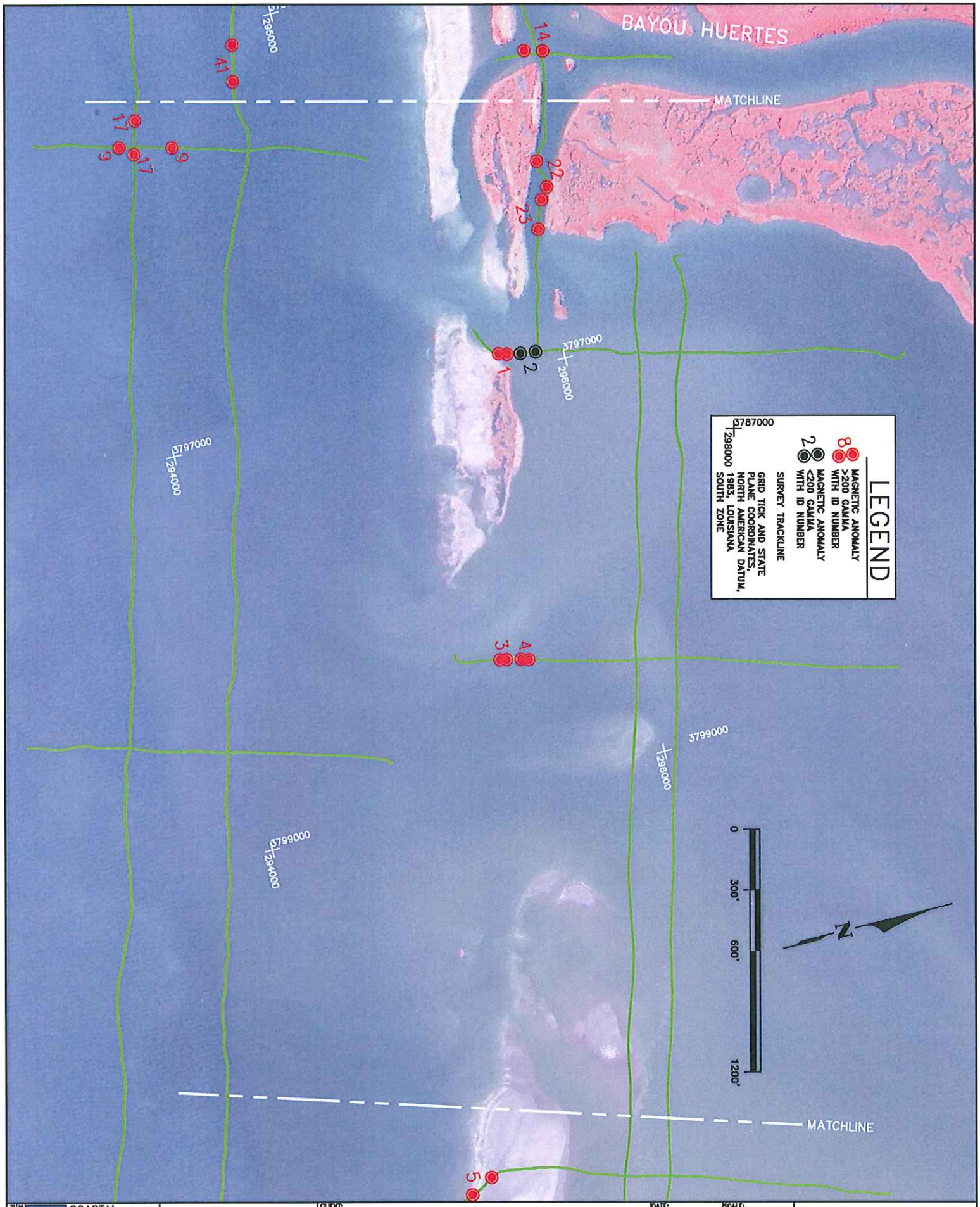

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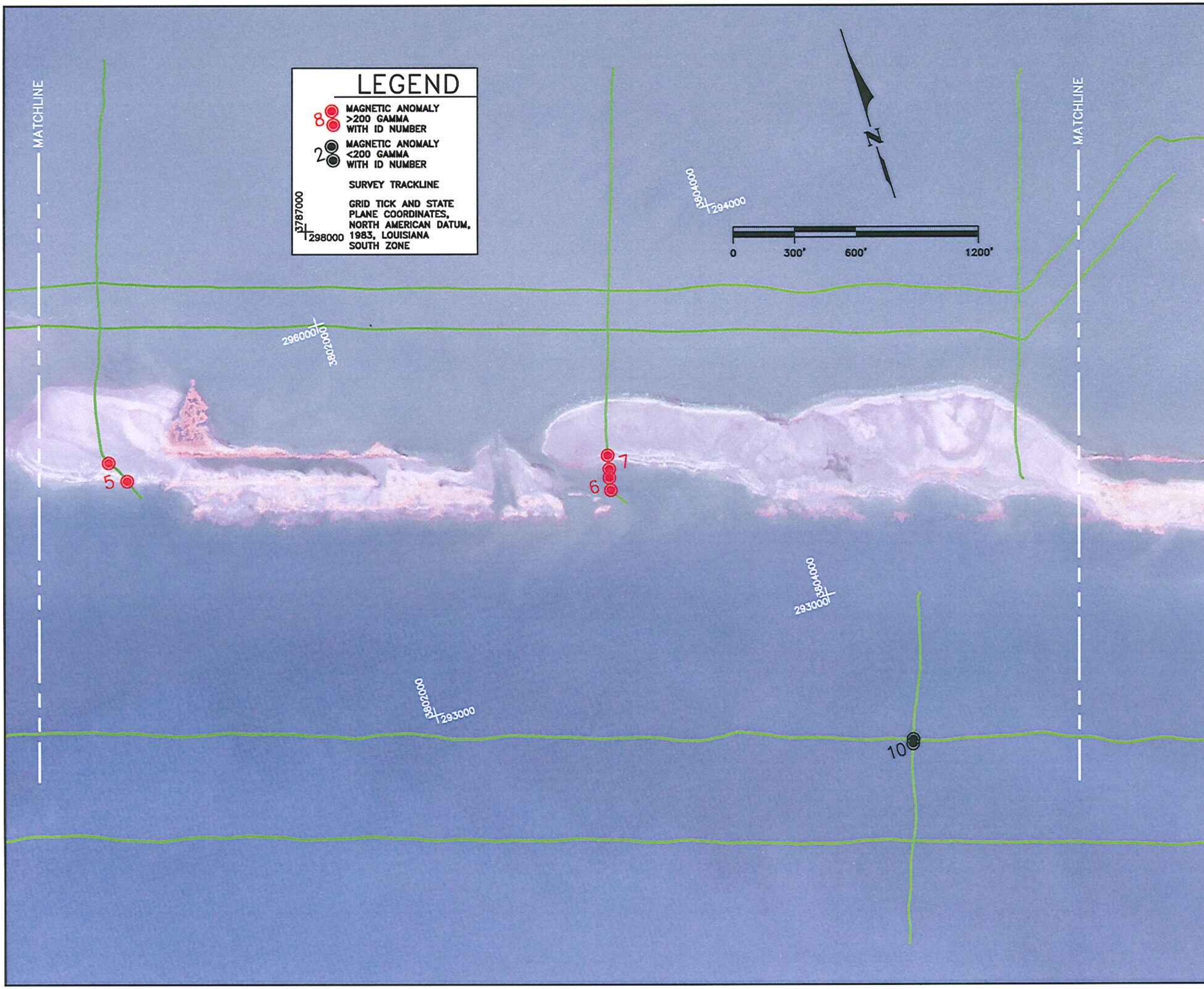

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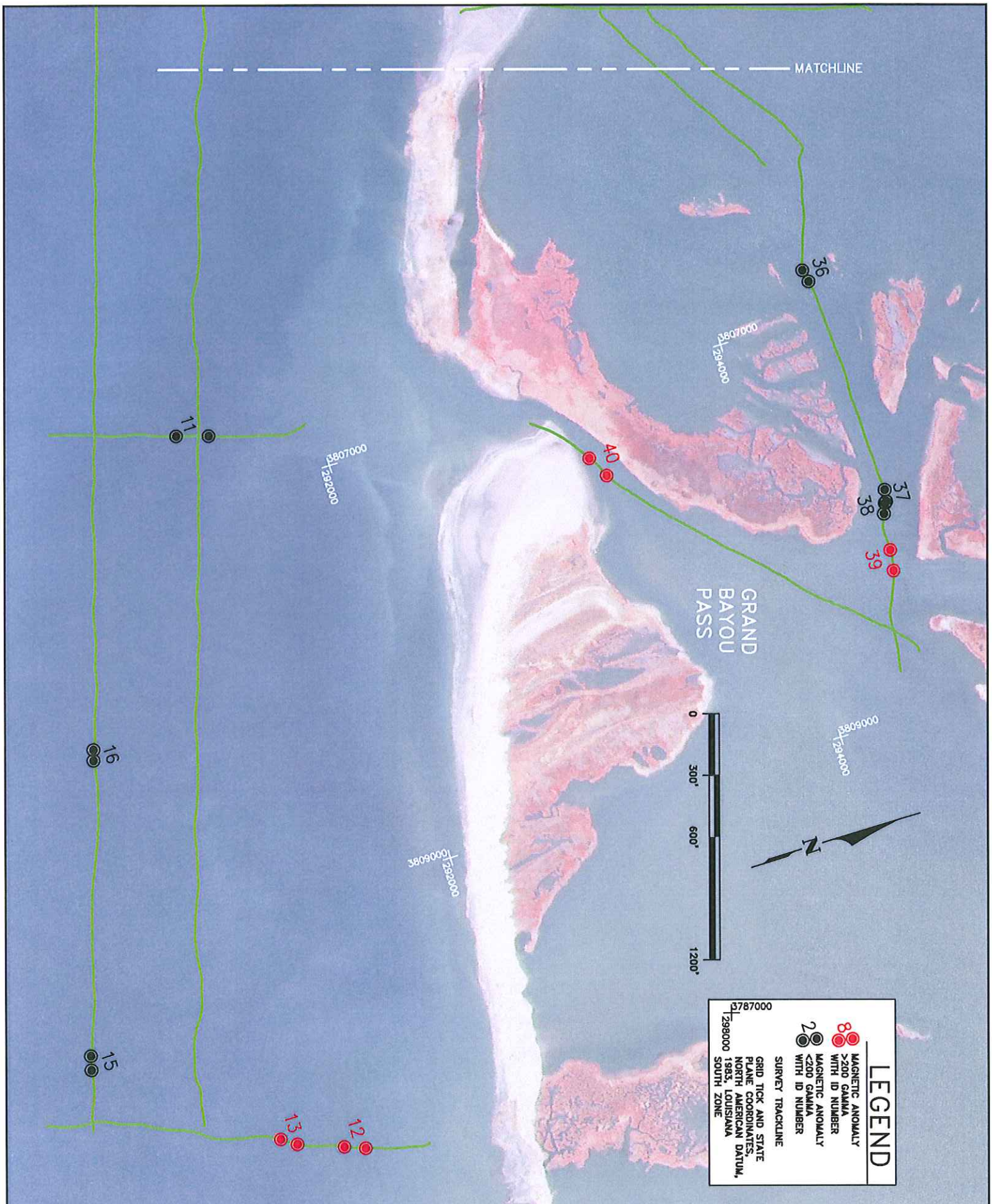

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