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July 25, 2013

Mr. Stephen Lee
Director
Office of Conservation
Injection & Mining Division
617 North 3rd Street
Baton Rouge, LA 70802

Dear Mr. Lee:

Enclosed is a report (PB-0374) titled *Proximity of Class II and Class III Well Caverns to the Edge of the Napoleonville Salt Dome.* This report is intended to satisfy the requirements[1] of the Commissioner's Directive of January 30, 2013, that relates to the proximity of solution-mined caverns to the periphery of the Napoleonville salt dome. I have incorporated comments relative to the draft version of the salt dome mapping received from the Injection & Mining Division staff at our meeting in Baton Rouge on July 9, 2013.

Please let me know if you have any questions or if you would like any of this information in an electronic form (e.g., Microsoft Excel or AutoCAD). I have forwarded an electronic copy of the report and this transmittal letter to your Louisiana Department of Natural Resources email address.

Sincerely,

Joe L. Ratigan, Ph.D., P.E.
Consultant to PB ESS

JLR:krl

Enclosure

cc: Napoleonville Operators
Mr. Kevin Hill, Hill Geophysical
Mr. Roger Blair, PB Energy Storage Services, Inc.
Project Central File 1800-164 — Category K

[1] All requirements of the Directive are satisfied for all Napoleonville Operators, with the exception of Paragraph 3 requirements for Texas Brine relative to OXY Geismar Wells No. 1 and No. 3.

PROXIMITY OF CLASS II AND CLASS III WELL CAVERNS TO THE EDGE OF THE NAPOLEONVILLE SALT DOME

Topical Report PB-0374

prepared for

Bridgeline Holdings LP
CrossTex Energy Services
Dow Chemical
K/D/S Promix
Occidental Chemical
Pontchartrain Natural Gas System
Texas Brine Company

July 2013

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Topical Report PB-0374

by

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Bridgeline Holdings LP
CrossTex Energy Services
Dow Chemical
K/D/S Promix
Occidental Chemical
Pontchartrain Natural Gas System
Texas Brine Company

July 2013

FOREWORD

This report was developed by Ratigan Engineering & Consulting LLC and Hill Geophysical under subcontract to PB Energy Storage Services, Inc.

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1.0 INTRODUCTION AND OBJECTIVES

On January 30, 2013, the Louisiana Department of Natural Resources (LA DNR) Office of Conservation issued a Directive on Salt Cavern Locations in Relation to Periphery of Salt Stock. The Office of Conservation Directive states:

> *1. All operators-of-record of solution-mined caverns shall demonstrate the proximity of the outer walls of their respective salt caverns to the periphery of the salt stock by providing an updated top-of-salt/periphery-of-salt structure map ("Map") drawn on a scale no smaller than 1 inch to 500 feet, based on the most up-to-date subsurface data available to the operator from techniques which may include, but are not limited to, 2-D seismic, 3-D seismic, vertical seismic profiles, or well-bore data interpretation. The horizontal configuration of the salt cavern should be shown on the structure contour map and reflect the cavern's maximum lateral extent as determined by the most recent sonar caliper survey. With the Map, provide a narrative detailing the basis for determining the periphery of the salt stock depicted on the map.*

Each operator at the Napoleonville salt dome provided a response to the LA DNR Directive; however, the individual operator responses did not use a universally common database for the Napoleonville salt dome structure map. The inconsistency in the databases prompted the LA DNR to request a single submittal with a single salt dome map. The purpose of this report is to provide the single, dome-wide operator response to the LA DNR Directive.

The Napoleonville salt dome structure map was updated using the most recent and comprehensive data, including the following:

1. The salt dome structure interpretation from the 2013 Texas Brine-commissioned, three-dimensional (3D) seismic survey.
2. The salt dome structure interpretation from a 2007 Legend 3D seismic survey dataset that was provided to Dow Chemical by Legend Petroleum.
3. A Vertical Seismic Survey (VSP) dataset obtained when Georgia Gulf Well No. 6 was drilled in 2011.
4. Salt penetration data from the New Orleans Geologic Survey (NOGS) and records in the LA DNR.

Chapter 2.0 of this report provides a narrative of the salt dome structure mapping. A description of the proximity to the periphery of the salt dome for each of the solution-mined storage caverns in the Napoleonville Dome is provided in Chapter 3.0, and the report concludes with cited references and several appendices.

2.0 SALT DOME STRUCTURE MAP

A salt structure map of the Napoleonville salt dome was completed by integrating data from many different sources, including the following:

1. NOGS Napoleonville salt dome structure map [New Orleans Geologic Society, 1963] (located in Attachment A)
2. 2007 Legend 3D seismic data
3. 2013 Texas Brine 3D seismic data
4. Georgia Gulf Well No. 6 VSP
5. Salt penetration data from oil and/or gas wells and storage or mining caverns around the dome.

All of the data were loaded onto a **Kingdom** workstation and fully integrated to create the salt structure map. The data sources are described below.

NOGS Napoleonville Salt Dome Structure Map

The NOGS map was generated in 1963 and was used as the general salt structure map for the dome for many years. The salt penetration data on the NOGS map has been used in developing the 2013 update to the Napoleonville Dome map when the Louisiana Serial Number could be determined and the salt penetration data were consistent with the seismic survey data. Generally, well directional survey data were not included in developing the 1963 NOGS Napoleonville map.

2007 Legend 3D Seismic Data

A 3D seismic survey was collected in 2007 by Legend Petroleum. A portion of the 3D seismic survey data covering the dome was delivered to Dow as part of the Legend permit to acquire the data over their mineral holdings. The data were processed with industry-standard parameters. The data are imaged with 82.5-foot grid spacing, and the quality of data is good. When integrated with oil and/or gas well and cavern data, the salt/sediment interface is well imaged.

2013 Texas Brine 3D Seismic Data

A high-resolution, 3D seismic survey was collected on the western end of the dome by Texas Brine in response to the Bayou Corne sinkhole incident and used to map the western end of the dome. This 3D program was designed to view the salt/sediment interface to a depth of 7,000 feet. The data are imaged with 37.5-foot grid spacing, and the quality of the data is excellent. The salt/sediment interface is more clear than the Legend data.

Georgia Gulf Well No. 6 VSP

A VSP was run in the Georgia Gulf Well No. 6 in 2011. The VSP has a good salt-edge reflector, and it easily integrates into the overall structure map.

Oil and/or Gas Wells and Storage or Mining Caverns

Numerous salt penetrations occur in the mapped area. Cavern wellhead locations were (re)surveyed during 2012. Well locations for oil and gas wells were obtained from the LA DNR SONRIS website. Aerial photographs were used to confirm the locations of oil and gas wells. Directional surveys and well logs were researched on the LA DNR SONRIS website. Any oil and/or gas well that had a salt pick or was deep enough to have possibly penetrated salt was researched. Directional surveys were entered (only) for wells with salt penetrations to ensure that the location of the salt penetration was in the correct position. All well serial number locations and salt elevations and sources used to generate the 2013 structure map are provided in Table 2-1.

The 2013 updated Napoleonville salt dome structure map is illustrated in Appendix B and includes the Louisiana Serial Numbers for all salt penetration well data used in the update. Some approximate property boundaries are shown for reference. The 3D seismic data and well control show the salt dome extends to depths below 7,000 feet. However, the structure mapping terminates at 7,000 feet, because this is the depth beyond the interest of solution-mined caverns at the dome.

Table 2-1. Salt Penetration Data Used in 2013 Napoleonville Salt Dome Structure Map Update (Page 1 of 3)

Well Name	Number	Serial Number	Surface Coordinates		Salt Depth Subsea (ft)	Data Source
			Easting	Northing		
Clifton	2	10568	2064926.1	489062.44	–657	New Orleans Geologic Society [1963]
Dugas & Leblanc	1	14169	2061954.62	485602.47	–669	New Orleans Geologic Society [1963]
Aucoin et al	4	14339	2069773.24	486125.77	–685	New Orleans Geologic Society [1963]
Dugas & Leblanc	5	14403	2066203	492088.0	–711	New Orleans Geologic Society [1963]
A Simoneaux	1	23549	2074731	490718	–6,159	Subsurface Group Application for OXY Taft Wells No. 11 and 12
Dr Ha Leblanc Et Al	3	30566	2070817.27	487036.92	–730	New Orleans Geologic Society [1963]
Gus J Labarre Est	1	30948	2061347	488059.0	–700	Texas Brine Company
Gus J Labarre Est	3	31033	2060086.8	486326.8	–1,187	New Orleans Geologic Society [1963]
Trahan	1	32207	2072480.16	493585.9	–7,339	New Orleans Geologic Society [1963]
Trahan	2	32713	2072482.12	492603.69	5,212	New Orleans Geologic Society [1963]
Gus J Labarre	1	39252	2059549	485816.84	–6,170	New Orleans Geologic Society [1963]
Dr Henry Leblanc	2	39332	2070786	486055.0	–4,183	New Orleans Geologic Society [1963]
Kessler-Sternfels	1	40104	2069821	493980.7	–8,940	New Orleans Geologic Society [1963]
C J Savoie	1	41159	2059330	485197.8	–6,472	New Orleans Geologic Society [1963]
Armelise Pltg Co	1	43487	2075240.84	490754.69	–6,935	New Orleans Geologic Society [1963]
Armelise Pltg Co	2	43966	2075335	490209	–6,984	Subsurface Group Application for OXY Taft Wells No. 11 and 12
Landry	1	44247	2073118	491223.0	–2,692	New Orleans Geologic Society [1963]
Alex Simoneaux	2	44356	2074137.34	488389.42	–4,710	New Orleans Geologic Society [1963]
Armelise Planting Co Ltd	3	44922	2075524	490901.0	–7,254	New Orleans Geologic Society [1963]
Simoneaux	1	45209	2074386.91	490316.55	–5,415	New Orleans Geologic Society [1963]
Armelise Pltg Co	4	45542	2075175	491227	–7,208	Subsurface Group Application for OXY Taft Wells No. 11 and 12
Dugas-Leblanc	1	47022	2063541	484150.0	–1,760	Dow Chemical Company
State Unit 1	1	53821	2059138.4	485889	–6,565	New Orleans Geologic Society [1963]
Sam Keesler Jr et al	1	54759	2075204.87	491773.56	–7,121	New Orleans Geologic Society [1963]
La Barre	1	55963	2058885	485815.75	–6,865	New Orleans Geologic Society [1963]
E O Trahan et al	2	56809	2072794.4	494532.02	–10,147	New Orleans Geologic Society [1963]
Simoneaux	1	57797	2074381	492498	–7,047	Subsurface Group Application for OXY Taft Wells No. 11 and 12

Table 2-1. Salt Penetration Data Used in 2013 Napoleonville Salt Dome Structure Map Update (Page 2 of 3)

Well Name	Number	Serial Number	Surface Coordinates		Salt Depth Subsea (ft)	Data Source
			Easting	Northing		
E O Trahan Etal	3	58883	2073969	492825.0	–7,128	New Orleans Geologic Society [1963]
Paul Kessler	1	60124	2074857	492099	–7,085	Subsurface Group Application for OXY Taft Wells No. 11 and 12
Dow Clifton Brine	1	66425	2070343.97	489135.63	–660	Dow Chemical Company
Lydia T Supple	1	72165	2071751.3	494566.67	–9,997	New Orleans Geologic Society [1963]
Kessler-Sternfels	1	75723	2070803.57	494054.97	–8,533	New Orleans Geologic Society [1963]
C V Sua;S Klotz U2	1-D	77978	2072221	496676.05	–13,342	New Orleans Geologic Society [1963]
Dow Brine	4	79012	2069829.21	488009.00	–673	Dow Chemical Company
Dow Brine	5	80000	2069651.93	487130.64	–727	Dow Chemical Company
Occidental Brine	3	110339	2063598.82	487302.15	–660	Dow Chemical Company
Dow Brine	6	121780	2066348.15	487741.27	–699	Dow Chemical Company
Dow Storage	7	122209	2071134.42	488902.25	–697	Dow Chemical Company
Dow Storage	8	138107	2071109.21	488050.72	–687	Dow Chemical Company
Georgia Gulf	1	142314	2064813.51	489677.70	–686	Texas Brine Company
Georgia Gulf	2	142315	2065213.98	489682.19	–672	Texas Brine Company
Gustave J Labarre et al	3	142316	2065612.13	489686.35	–778	Texas Brine Company
Occidental Brine	4	144743	2063768.34	488741.19	–660	Dow Chemical Company
Occidental Brine	5	144744	2063806.36	487744.15	–686	Dow Chemical Company
Dow Storage	10	145382	2067937.13	487409.47	–699	Dow Chemical Company
Dow Storage	9	145921	2067917.95	488056.33	–735	Dow Chemical Company
Dow Brine	11	150981	2067320.72	488039.58	–695	Dow Chemical Company
OXY Geismar	1	151645	2061262.35	489091.91	–750	Texas Brine Company
OXY Geismar	2	151646	2061309.28	488429.04	–775	Texas Brine Company
Georgia Gulf	4	158778	2064414.02	489673.36	–730	Texas Brine Company
Dow Brine	12	162381	2067331.19	487391.51	–675	Dow Chemical Company
Dow Brine	13	165323	2067904.70	488605.58	–695	Dow Chemical Company
Dow Brine	14	170950	2067305.24	488590.64	–724	Dow Chemical Company
Dow Brine	15	172740	2067887.32	489156.63	–667	Dow Chemical Company

Table 2-1. Salt Penetration Data Used in 2013 Napoleonville Salt Dome Structure Map Update (Page 3 of 3)

Well Name	Number	Serial Number	Surface Coordinates		Salt Depth Subsea (ft)	Data Source
			Easting	Northing		
OXY Geismar	3	180708	2060653.60	488404.10	–700	Texas Brine Company
Dow Storage	16	181612	2067287.52	489139.71	–700	Dow Chemical Company
Dow Storage	17	187182	2067874.88	489626.46	–693	Dow Chemical Company
K/D/S-Promix, L.L.C.	5	971357	2070262.24	490331.52	–727	Dow Chemical Company
Natural Gas Storage	1	971444	2068653.94	489792.35	–690	Subsurface Group Application for OXY Taft Wells No. 11 and 12
Dow Storage	3	971487	2070147.79	487162.90	–672	Dow Chemical Company
Promix	2	971488	2070282.62	489829.47	–680	Dow Chemical Company
Dow Brine	5A	971490	2071500.00	489050.00	–855	Dow Chemical Company
UCAR Storage	1	971540	2068835.49	486710.29	–627	Dow Chemical Company
UCAR Storage	2	971541	2068821.42	486310.76	–660	Dow Chemical Company
Crosstex Storage	1	971564	2062574.72	489203.99	–691	Subsurface Group Application for OXY Taft Wells No. 11 and 12
Dow Brine	18	971667	2064941.22	487542.34	–670	Dow Chemical Company
Dow Storage	3A	971766	2070113.76	487194.47	–700	Dow Chemical Company
Dow Brine	19	971816	2065019.21	488799.09	–645	Dow Chemical Company
Dow Brine	20	971860	2067125.19	489989.09	–719	Dow Chemical Company
Dow Brine	21	971970	2066772.41	491086.55	–767	Dow Chemical Company
OXY Taft	10	971992	2061391.24	487271.13	–690	Texas Brine Company
Dow Storage	22	972001	2068033.42	490257.07	–727	Dow Chemical Company
Dow Storage	9A	972247	2067876.81	488099.54	–750	Dow Chemical Company
OXY Taft	9	972654	2061352.60	487850.47	–700	Texas Brine Company
Georgia Gulf	5	973089	2064050	489754	–712	Texas Brine Company
Dow Storage	8A	973102	2071092.00	488003.00	–682	Dow Chemical Company
Gulf South Pipeline Co	1	973123	2070842.70	491049.96	–855	Dow Chemical Company
Georgia Gulf	6	973515	2064567	489996	–712	Texas Brine Company

3.0 SOLUTION-MINED CAVERN PROXIMITY TO DOME PERIPHERY

Table 3-1 provides a listing of all Class II and Class III solution-mined cavern wells at the Napoleonville salt dome. The listing includes active as well as plugged and abandoned wells. The most recent cavern sonar surveys are listed along with the proximity of each cavern with respect to the periphery of the salt dome as mapped in Appendix B. The surface coordinates for each well are listed in the table. With the exception of Promix Well 2A, Dow Well 5A, and Georgia Gulf Wells No. 5 and No. 6[1], the surface locations are from a 2012 horizontal position survey conducted by Fenstermaker & Associates on behalf of the Napoleonville operators. The Fenstermaker survey data are provided in Appendix C.

Appendix D provides the map that illustrates the maximum extent of the solution-mined storage caverns and the salt dome structure. The location of the cavern illustrated is based on the wellhead surface location and gyroscopic survey data (when available).

Based on the data presented in the map in Attachment D, the cavern walls of the three Texas Brine OXY Geismar wells are less than 500 feet from the edge of the dome. The Office of Conservation Directive states:

2. All operators-of-record of solution-mined salt caverns whose salt cavern walls are within 500 feet of the periphery of the salt stock at their closest approach to the salt stock, as depicted on the Map, shall in addition to providing Conservation with the Map and narrative, provide vertical cross-sections of the salt caverns showing their outline and position within the salt stock and position in relation to the periphery of the salt stock for the entire vertical length of the cavern. Cross-sections of the salt caverns should be oriented to indicate the closest approach of the salt cavern wall to the periphery of the salt stock. The outline of the salt cavern should be based on the most recent sonar caliper survey. Operators shall provide data, collection methods and rationale supporting the representation of the periphery of the salt stock to the Office of Conservation.

Figures 3-1 through 3-3 illustrate the three caverns and the proximity to the edge of the salt dome. The proximity of the Texas Brine OXY Geismar Well No. 2 cavern to the Texas Brine OXY Geismar Well No. 3 cavern is provided in Figure 3-4. This information is provided because, technically, the eastern wall of Well No. 3 can now be considered the edge of the salt dome. The Office of Conservation Directive states:

> *3. All operators-of-record of solution-mined salt caverns unable to demonstrate through the provisions of paragraph 2 of this directive a minimum separation of 300 feet between the periphery of the salt stock and the closest approach of any cavern for which they operate must provide to the Office of Conservation:*

[1] Coordinates for Promix Well 2A, Dow Well 5A, and Georgia Gulf Wells No. 5 and No. 6 were obtained from the LA DNR SONRIS website.

Table 3-1. Class II and Class III Solution-Mined Storage Caverns and Wells at the Napoleonville Salt Dome—Proximity to the Salt Dome Periphery (Page 1 of 3)

Operator	Well		Serial Number	Wellhead		Sonar Date	Cavern Proximity to Edge of Dome		
	Name	Number		Northing	Easting		Azimuth	Distance	Depth
Bridgeline Holdings LP	Bridgeline	1	972568	488,389.19	2,062,534.11	5-Mar-01	N31°14'02"W°°	1,451	(2,205)
CrossTex Energy Services	CrossTex	1	971564	489,203.99	2,062,574.72	9-Jul-10	N26°59'32"W	827	(3,236)
	CrossTex	2	971565	488,700.69	2,061,966.62	25-Feb-13	N25°55'18"W	1,026	(2,994)
Dow Chemical	Dow Grace Brine	1	66425	489,135.63	2,070,343.97	19-Aug-12	S46°43'44"E	1,746	(3,074)
	Dow Grace Brine	1A	973100	489,154.00	2,070,304.00	19-Aug-12	S46°43'44"E	1,746	(3,074)
	Dow Grace Brine	1B	973101	489,106.00	2,070,310.00	19-Aug-12	S46°43'44"E	1,746	(3,074)
	Dow Clifton Brine	1	66424	488,941.08	2,066,330.00	19-Nov-03	N32°16'11"W	2,265	(2,720)
	Promix Brine	2	971488	489,829.47	2,070,282.62	19-Nov-09	N17D2'5"E	2,346	(2,886)
	Dow Storage	3	971487	487,162.90	2,070,147.79	8-Sep-11	S38°26'16"E	701	(2,740)
	Dow Storage	3A	971766	487,194.47	2,070,113.76	8-Sep-11	S38°26'16"E	701	(2,740)
	Dow Brine	4	79012	488,009.00	2,069,829.21	17-Aug-12	S37D21'13"E	1,379	(1,847)
	Dow Brine	4A	973094	487,972.00	2,069,866.00	17-Aug-12	S37D21'13"E	1,379	(1,847)
	Dow Brine	5	80000	487,130.64	2,069,651.93	26-Nov-04	S42°20'13"E	986	(2,102)
	Promix	5A[a]	971490	489,050.00	2,071,500.00				
	Dow Clifton Brine	6	121780	487,741.27	2,066,348.15	15-Jun-04	S12°17'00"E	2,721	(3,025)
	Dow Storage	7	122209	488,902.25	2,071,134.42	3-Oct-08	S49°29'08"E	1,363	(1,885)
	Dow Storage	8	138107	488,050.72	2,071,109.21	10-Oct-12	S44°20'54"E	865	(2,980)
	Dow Storage	8A	973102	488,003.00	2,071,092.00	10-Oct-12	S44°20'54"E	865	(2,980)
	Dow Storage	9	145921	488,056.33	2,067,917.95	26-Jun-08	S35°54'32"E	2,810	(3,378)
	Dow Storage	9A	972247	488,099.54	2,067,876.81	9-Aug-08	S35°54'32"E	2,810	(3,378)
	Dow Storage	10	145382	487,409.47	2,067,937.13	12-Jul-08	S22°45'07"E	2,048	(2,434)
	Dow Brine	11	150981	488,039.58	2,067,320.72	26-Jun-03	S21°06'34"E	2,918	(2,103)
	Dow Brine	12	162381	487,391.51	2,067,331.19	30-Jun-04	S12°07'29"E	2,226	(2,048)
	Dow Brine	13	165323	488,605.58	2,067,904.70	19-Mar-05	S47°01'57"E	2,984	(2,060)
	Dow Brine	14	170950	488,590.64	2,067,305.24	5-Jan-05	S27°20'15"E	3,208	(2,192)
	Dow Brine	15	172740	489,156.63	2,067,887.32	27-Dec-11	N13°41'21"W	3,235	2,166

Table 3-1. Class II and Class III Solution-Mined Storage Caverns and Wells at the Napoleonville Salt Dome—Proximity to the Salt Dome Periphery (Page 2 of 3)

Operator	Well		Serial Number	Wellhead		Sonar Date	Cavern Proximity to Edge of Dome		
	Name	Number		Northing	Easting		Azimuth	Distance	Depth
Dow Chemical (continued)	Dow Storage	16	181612	489,139.71	2,067,287.52	25-Jun-08	N21°24'02"W	3,130	(3,150)
	Dow Storage	17	187182	489,626.46	2,067,874.88	15-Aug-12	N09°01'13"W	2,743	(2,210)
	Dow Brine	18	971667	487,542.34	2,064,941.22	28-Sep-10	S10°42'36"E	2,351	(2,813)
	Dow Brine	19	971816	488,799.09	2,065,019.21	8-Mar-11	N24°02'59"W	1,676	(3,314)
	Dow Brine	20	971860	489,989.09	2,067,125.19	16-Aug-12	N19°50'10"W	2,078	(3,255)
	Dow Brine	21	971970	491,086.55	2,066,772.41	4-May-12	N17°10'32"W	910	(2,196)
	Dow Storage	22	972001	490,257.07	2,068,033.42	23-Aug-12	N10°43'44"W	2,093	(3,382)
	Union Carbide Storage	1	971540	486,710.29	2,068,835.49	29-Jan-13	S35°59'08"E	1,379	(2,591)
	Union Carbide Storage	2	971541	486,310.76	2,068,821.42	28-Feb-00	S13°05'13"E	1,069	(2,780)
	Gulf South Pipeline Co.	1	973123	491,049.96	2,070,842.70	28-Jan-11	N14°26'44"E	910	(2,565)
K/D/S Promix	KDS Promix Storage	1	971354	489,817.30	2,069,783.05	25-Aug-01	N03°25'16"E	2,280	(1,955)
	KDS Promix Storage	2A	971489	489,829.83	2,070,282.29	23-Mar-72	S82D8'28"E	671[b]	(1,700)
	KDS Promix Storage	3	971355	489,841.24	2,070,780.93	15-Mar-06	S34°04'01"E	2,547	(3,640)
	KDS Promix Storage	4	971356	490,342.42	2,070,759.71	26-Feb-11	N17°37'19"E	1,759	(2,493)
	KDS Promix Storage	5	971357	490,331.52	2,070,262.24	16-Apr-12	N13°32'46"E	1,856	(2,558)
	KDS Promix Storage	6	971358	490,319.14	2,069,762.65	8-Jan-11	N09°42'24"E	1,850	(2,017)
Occidental Chemical	Occidental Brine	1	109979	489,168.62	2,063,527.26	1-Feb-13[c]	N32°47'02"W	762	(2,974)
	Occidental Brine	2	110338	488,235.25	2,063,563.21	17-Apr-03	N28°21'54"W	1,908	(2,965)
	Occidental Brine	3	110339	487,302.15	2,063,598.82	6-Nov-96	S09°28'14"W	2,520	(2,970)
	Occidental Brine	4	144743	488,741.19	2,063,768.34	30-Jan-13	N23°06'11"W	1,619	(5,710)
	Occidental Brine	5	144744	487,744.15	2,063,806.36	15-Jun-10	S05°41'31"W	3,103	(5,948)
	Occidental Brine	9	972654	487,850.47	2,061,352.60	25-Aug-12	N49°53'32"W	932	(5,850)
	Occidental Brine	10	971992	487,271.13	2,061,391.24	31-Oct-12	N77°39'49"W	1,224	(5,810)
	Occidental Brine	11[d]		486,589.26	2,061,547.10		S54°02'26"W	1,857	(5,000)
	Occidental Brine	12[d]		486,839.16	2,060,817.53		N89°31'29"W	1,011	(5,000)

Table 3-1. Class II and Class III Solution-Mined Storage Caverns and Wells at the Napoleonville Salt Dome—Proximity to the Salt Dome Periphery (Page 3 of 3)

Operator	Well		Serial Number	Wellhead		Sonar Date	Cavern Proximity to Edge of Dome		
	Name	Number		Northing	Easting		Azimuth	Distance	Depth
Pontchartrain Natural Gas Sys	Natural Gas Storage	1	971444	489,792.35	2,068,653.94	18-Nov-07	N08°33'07"E	2,700	(3,700)
Texas Brine Company	Gustave J LeBarre et al	1	142314	489,677.70	2,064,813.51	1-Mar-11	N26°18'58"W	1,288	(2,100)
	Gustave J LeBarre et al	2	142315	489,682.19	2,065,213.98	11-Aug-10	N32°25'38"W	1,516	(3,500)
	Gustave J LeBarre et al	3	142316	489,686.35	2,065,612.13	2-Mar-11	N35°39'56"W	1,683	(2,450)
	Gustave J LeBarre et al	4	158778	489,673.36	2,064,414.02	2-Sep-10	N25°35'15"W	1,098	(2,047)
	Gustave J LeBarre et al	5	973089	489,754.00	2,064,050.00	3-Apr-12	N22°43'08"W	965	(6,225)
	Gustave J LeBarre et al	6	973515	489,996.00	2,064,567.00	5-Apr-13	N27°53'58"W	1,024	(7,000)
	OXY Geismar	1	151645	489,091.91	2,061,262.35	3-Jan-13	S34°02'34"E	147	(2,535)
	OXY Geismar	2	151646	488,429.04	2,061,309.28	12-Apr-13	N42°50'04"W	371	(5,000)
	OXY Geismar	3	180708	488,404.10	2,060,653.60	10-Jun-07	N47°40'58"W	—	(5,000)

(a) Well 5A was never solution mined.
(b) Distance from casing shoe to edge of dome.
(c) An early sonar survey (1987) for Well No. 1 is also used in the assessment provided in this report. The earlier sonar illustrated some cavern space no longer accessible to the sonar survey tool.
(d) Proposed wells with pending permits.

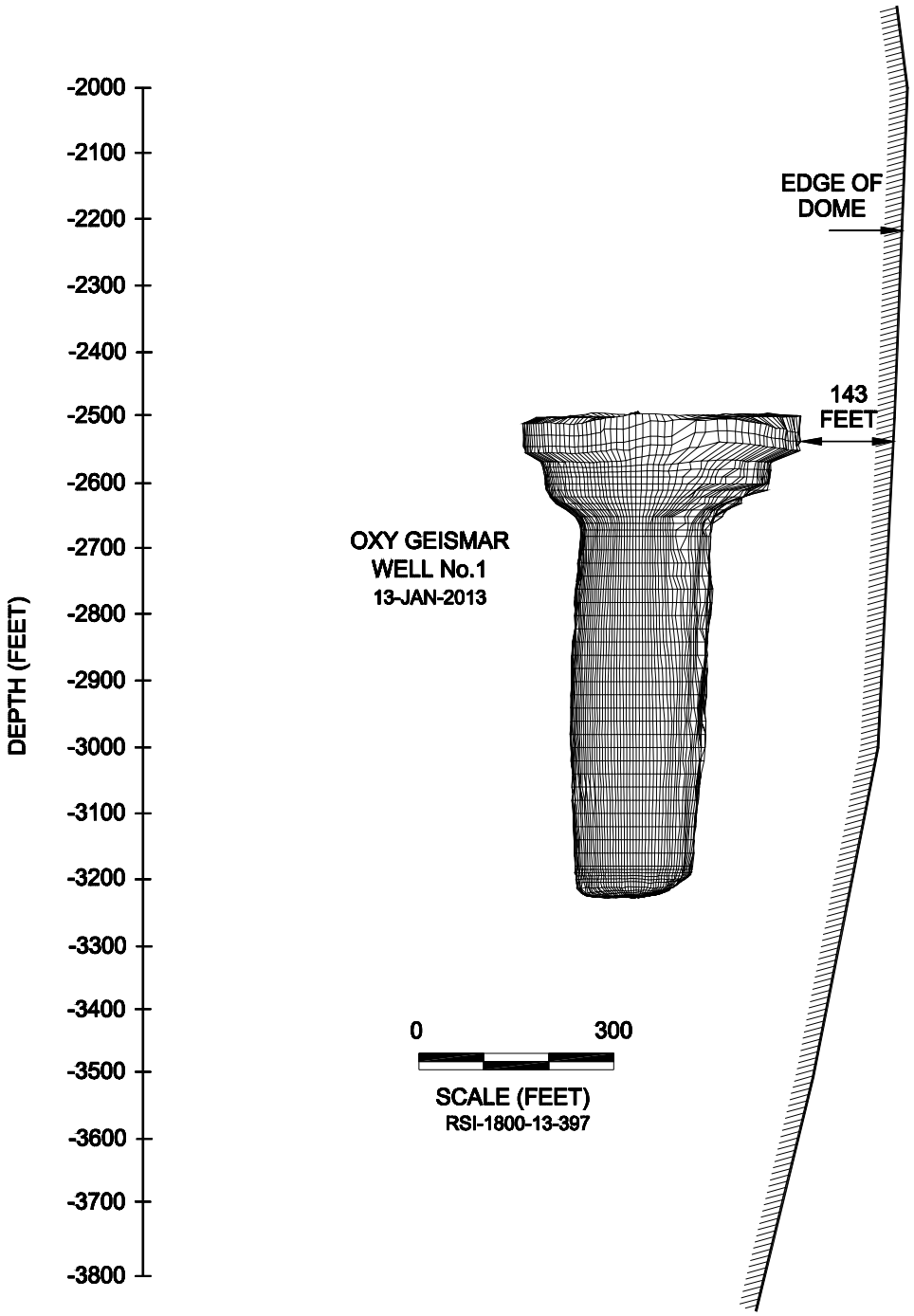


Figure 3-1. Proximity of the Cavern Associated With the Texas Brine OXY Geismar Well No. 1 to the Periphery of the Napoleonville Salt Dome Periphery.

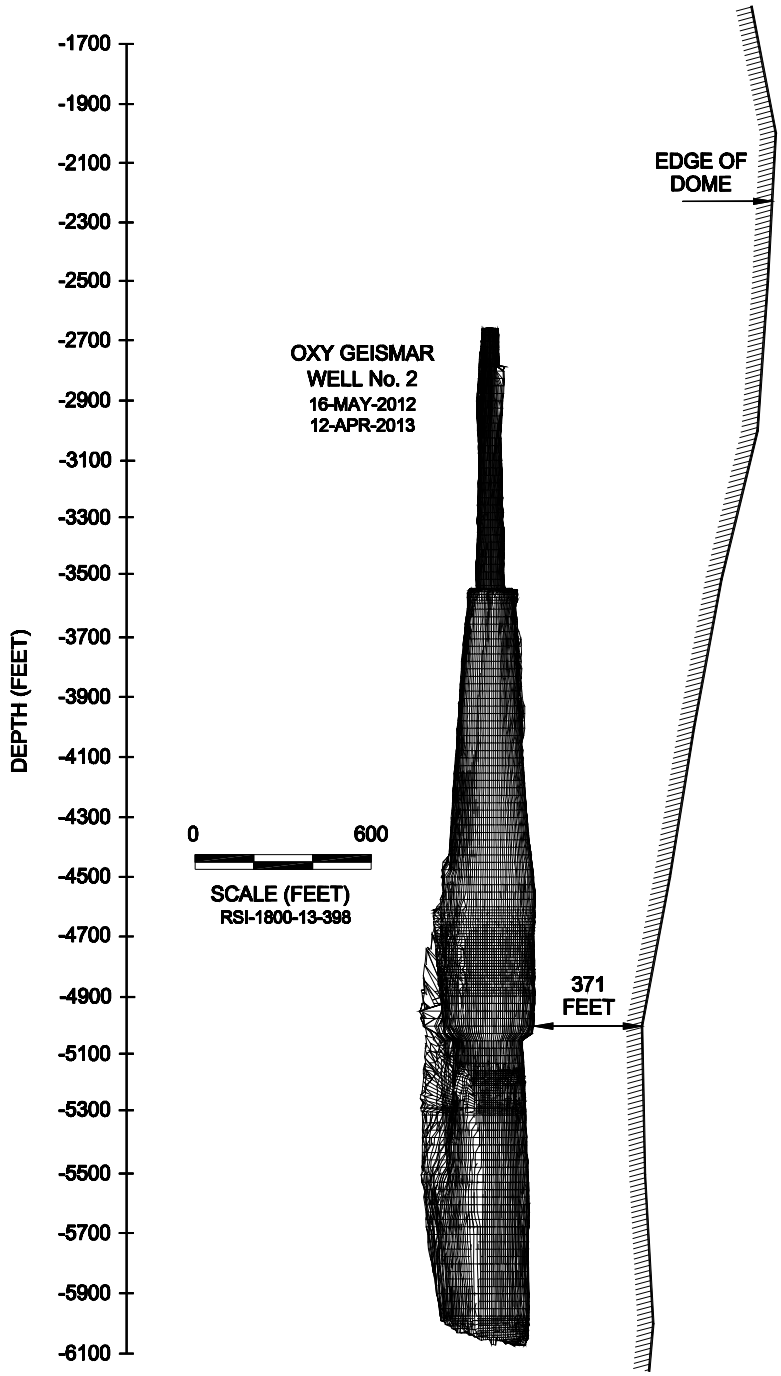


Figure 3-2. Proximity of the Cavern Associated With the Texas Brine OXY Geismar Well No. 2 to the Periphery of the Napoleonville Salt Dome Periphery.

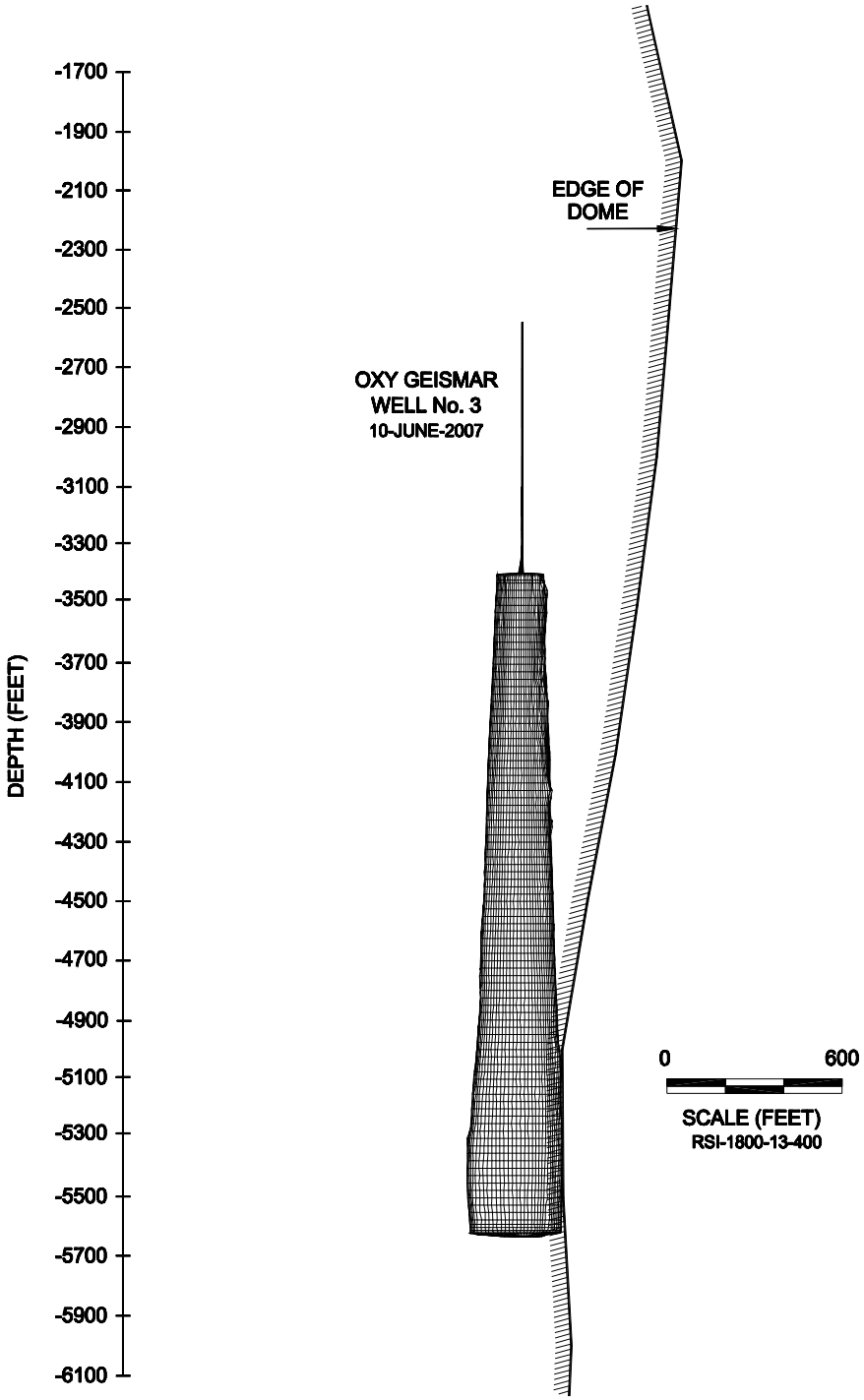


Figure 3-3. Proximity of the Cavern Associated With the Texas Brine OXY Geismar Well No. 3 to the Periphery of the Napoleonville Salt Dome Periphery.

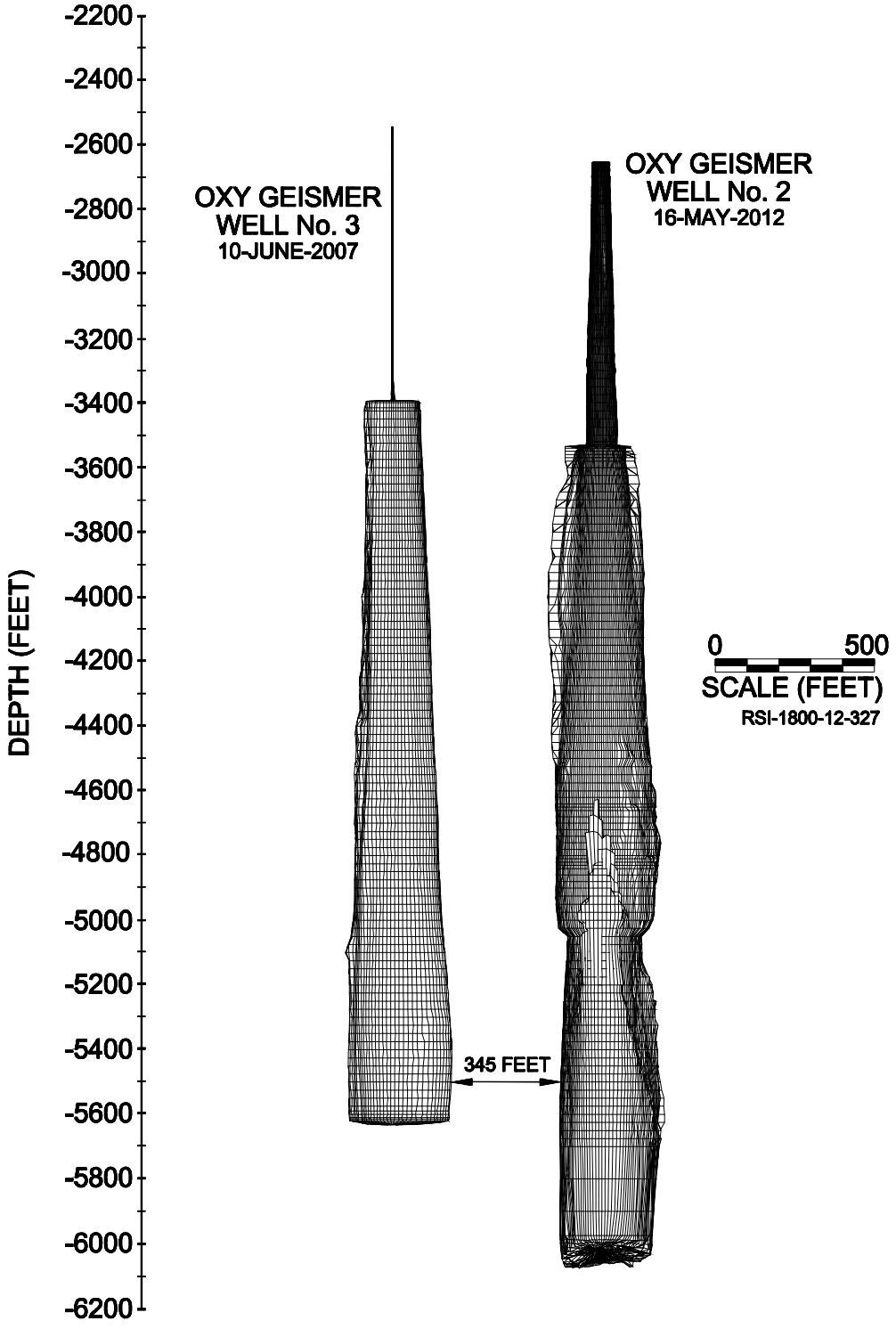


Figure 3-4. Proximity of the Cavern Associated With the Texas Brine OXY Geismar Well No. 2 to the Cavern Associated With the Texas Brine OXY Geismar Well No. 3.

a.i. confirmation of the current structural stability of the cavern, through methods which may include, but are not limited to: sonar caliper surveys, vertical seismic profiles, mechanical integrity tests, and/or subsidence surveys for the affected facility; a combination of these methods shall be provided if appropriate; OR

ii. a plan to confirm current structural stability of the cavern through testing/monitoring methods including, but not limited to: sonar caliper surveys, vertical seismic profiles, mechanical integrity tests, and/or subsidence surveys of the applicable facility, a combination of methods shall be proposed where appropriate.

b. In addition to the provisions of 3a above, provide a plan for ongoing monitoring of structural stability of the cavern through methods which may include, but are not limited to: sonar caliper surveys, vertical seismic profiles, micro-seismic monitoring, and/or continuous cavern pressure data monitoring, a combination of methods shall be proposed where appropriate.

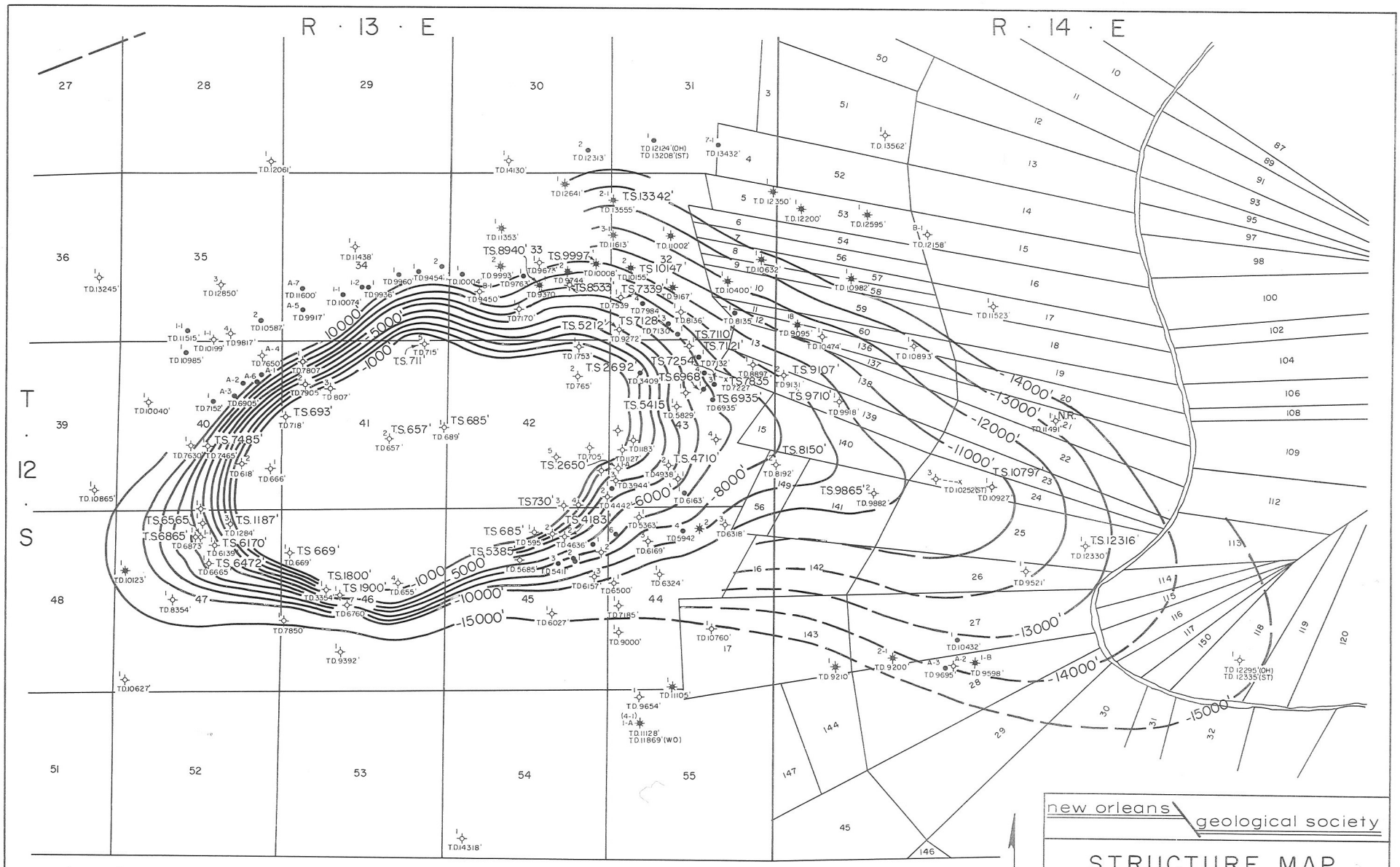
The caverns associated with Texas Brine OXY Geismar Wells No. 1 and No. 3 are less than 300 feet from the periphery of the salt dome. The Texas Brine response to the Directive above relative to OXY Geismar Wells No. 1 and No. 3 is not addressed in this report.

4.0 REFERENCES

New Orleans Geological Society, 1963. *Salt Domes of South Louisiana, Volume I*, Revision 1, J. P. Raymond (ed.), New Orleans Geological Society, New Orleans, LA.

APPENDIX A

NEW ORLEANS GEOLOGIC SURVEY SALT DOME STRUCTURE MAP OF NAPOLEONVILLE SALT DOME



Legend

- ..... oil well.
- ..... gas well.
- ..... dry hole.
- ..... produced and abandoned
- T.S. ..... top of salt.

new orleans geological society

STRUCTURE MAP
TOP OF SALT

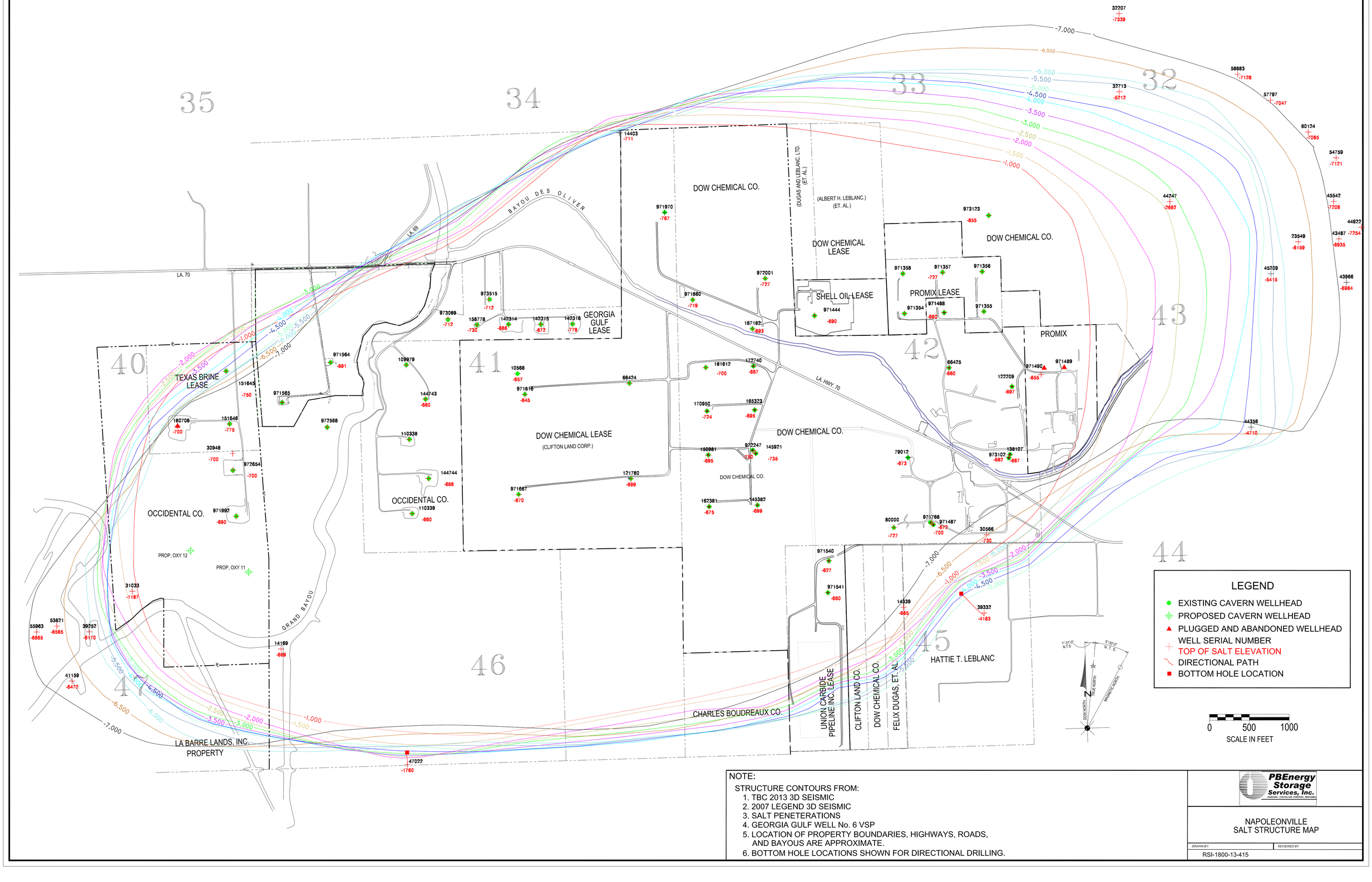
NAPOLEONVILLE FIELD
ASSUMPTION PARISH, LOUISIANA

SCALE 0 1/2 1 MILE

AS OF June 1, 1963

APPENDIX B

STRUCTURE MAP OF NAPOLEONVILLE SALT DOME—2013 UPDATE



LEGEND

- EXISTING CAVERN WELLHEAD
- PROPOSED CAVERN WELLHEAD
- PLUGGED AND ABANDONED WELLHEAD
- WELL SERIAL NUMBER
- TOP OF SALT ELEVATION
- DIRECTIONAL PATH
- BOTTOM HOLE LOCATION

NOTE:

STRUCTURE CONTOURS FROM:

1. TBC 2013 3D SEISMIC
2. 2007 LEGEND 3D SEISMIC
3. SALT PENETERATIONS
4. GEORGIA GULF WELL No. 6 VSP
5. LOCATION OF PROPERTY BOUNDARIES, HIGHWAYS, ROADS, AND BAYOUS ARE APPROXIMATE.
6. BOTTOM HOLE LOCATIONS SHOWN FOR DIRECTIONAL DRILLING.

PBEnergy Storage Services, Inc.

NAPOLEONVILLE SALT STRUCTURE MAP

DRAWN BY:	REVIEWED BY:

RSI-1800-13-415

APPENDIX C

2012 HORIZONTAL POSITION SURVEY
FENSTERMAKER & ASSOCIATES

Table C-1. 2012 Horizontal Position Survey—Fenstermaker & Associates (Page 1 of 2)

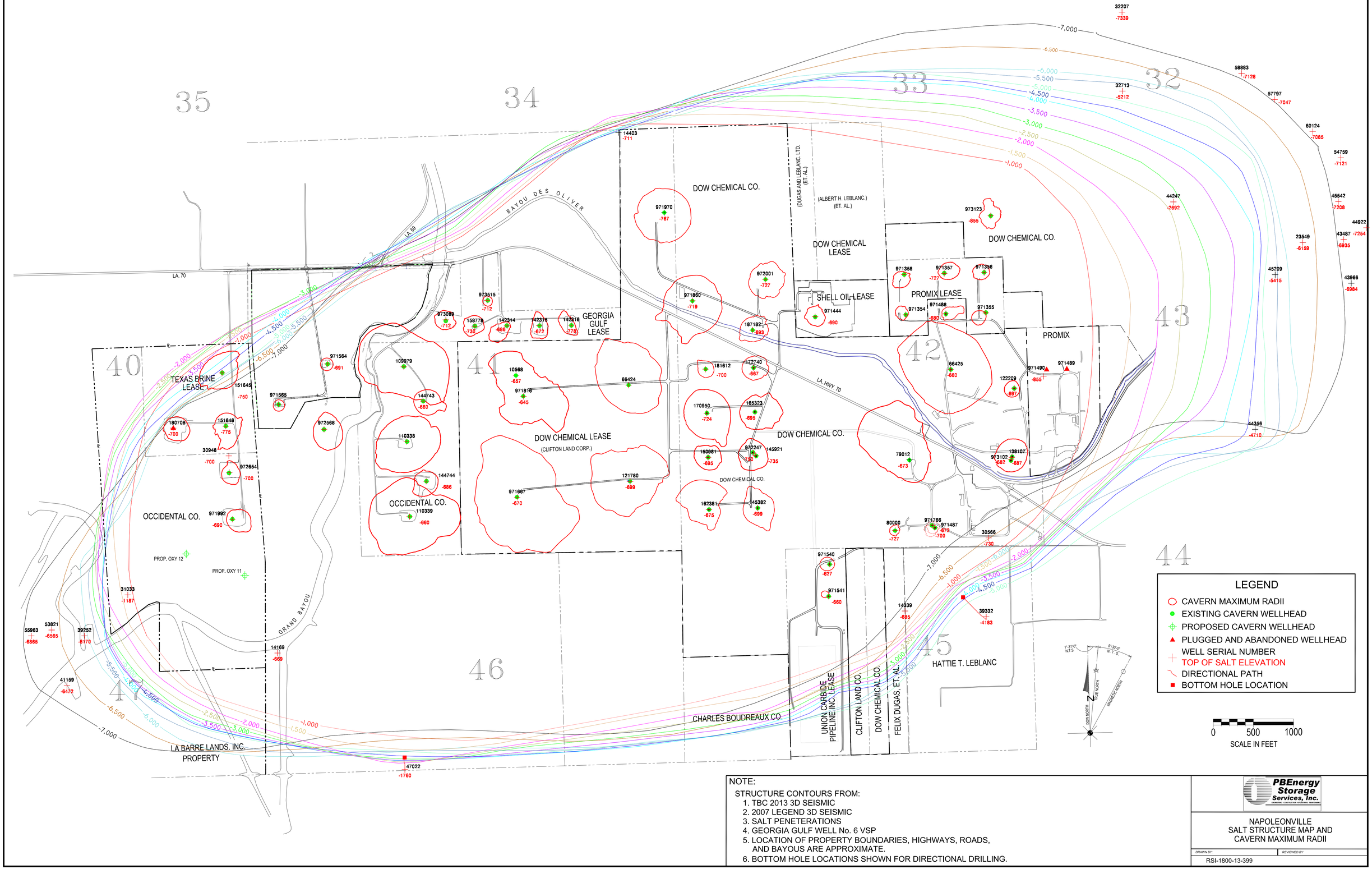
Organization	Well Name	Well Serial No.	NAD 83 (2011)		NAD 83 (2011)		NAD 27	
			Latitude	Longitude	Northing	Easting	Northing	Easting
Chevron Pipeline Company	Napoleonville Storage No. 1 (Enron Storage Well, Gas Well)	972568	30 00 35.12181 N	91 08 09.09872 W	549094.15	3343333.56	488389.19	2062534.11
Crosstex Processing Svcs, LLC	Crosstex Storage No. 1 (Enron Rawmake Well No. 1)	971564	30 00 43.18721 N	91 08 08.62092 W	549908.96	3343374.16	489203.99	2062574.72
	Crosstex Storage No. 2 (Enron Propane Well No. 2)	971565	30 00 38.21516 N	91 08 15.54758 W	549405.66	3342766.06	488700.69	2061966.62
Dow Hydrocarbons & Resources LLC	Dow Clifton Brine No. 1 (Clifton Well No. 1)	66424	30 00 40.51860 N	91 07 25.91119 W	549646.06	3347129.47	488941.08	2066330.00
	Dow Clifton Brine No. 6 (Clifton Well No. 6)	121780	30 00 28.65197 N	91 07 25.71349 W	548447.36	3347149.04	487742.40	2066349.57
	Dow Storage No. 3 (Grace Well No. 3)	971487	30 00 22.84460 N	91 06 42.52441 W	547867.86	3350947.29	487162.90	2070147.79
	Dow Storage No. 3A (Grace Well No. 3A)	971766	30 00 23.15781 N	91 06 42.91070 W	547899.43	3350913.27	487194.47	2070113.76
	Dow Brine No. 4 (Dow Well No. 4)	79012	30 00 31.22663 N	91 06 46.12944 W	548713.97	3350628.71	488009.00	2069829.21
	Dow Brine No. 5 (Grace Well No.5)	80000	30 00 22.53473 N	91 06 48.16503 W	547835.60	3350451.43	487130.64	2069651.93
	Dow Storage No. 7 (Dow Well No. 7)	122209	30 00 40.04420 N	91 06 31.26380 W	549607.24	3351933.91	488902.25	2071134.42
	Dow Storage No. 8 (Dow Well No. 8)	138107	30 00 31.61498 N	91 06 31.56946 W	548755.69	3351908.71	488050.72	2071109.21
	Dow Storage No. 9A	972247	30 00 32.15954 N	91 07 08.33476 W	548804.51	3348676.29	488099.54	2067876.81
	Dow Storage No. 9	145921	30 00 31.73102 N	91 07 07.86768 W	548761.30	3348717.44	488056.33	2067917.95
	Dow Storage No. 10	145382	30 00 25.32710 N	91 07 07.66328 W	548114.43	3348736.62	487409.47	2067937.13
	Dow Brine No. 11	150981	30 00 31.57623 N	91 07 14.66119 W	548744.55	3348120.20	488039.58	2067320.72
	Dow Brine No. 12	162381	30 00 25.16051 N	91 07 14.55571 W	548096.47	3348130.67	487391.51	2067331.19
	Dow Brine No. 13	165323	30 00 37.16850 N	91 07 08.00672 W	549310.55	3348704.18	488605.58	2067904.70
	Dow Brine No. 14	170950	30 00 37.03162 N	91 07 14.82567 W	549295.61	3348104.71	488590.64	2067305.24
	Dow Brine No. 15	172740	30 00 42.62389 N	91 07 08.19278 W	549861.61	3348686.79	489156.63	2067887.32
	Dow Storage No. 16	181612	30 00 42.46743 N	91 07 15.01567 W	549844.69	3348086.99	489139.71	2067287.52
	Dow Storage No. 17	187182	30 00 47.27523 N	91 07 08.32432 W	550331.45	3348674.35	489626.46	2067874.88
	Dow Brine No. 18	971667	30 00 26.69671 N	91 07 41.73634 W	548247.30	3345740.69	487542.34	2064941.22
	Dow Brine No. 19	971816	30 00 39.13641 N	91 07 40.82387 W	549504.06	3345818.67	488799.09	2065019.21
	Dow Brine No. 20 (Dow Well No. 20)	971860	30 00 50.87877 N	91 07 16.84431 W	550694.08	3347924.65	489989.09	2067125.19
	Dow Brine No. 21 (Dow Well No. 21)	971970	30 01 01.74948 N	91 07 20.83430 W	551791.56	3347571.86	491086.55	2066772.41
	Dow Storage No. 22 (Dow Well No. 22)	972001	30 00 53.51498 N	91 07 06.50761 W	550962.07	3348832.88	490257.07	2068033.42
	Dow Grace Brine No. 1 (Grace Well No. 1)	66425	30 00 42.36975 N	91 06 40.24971 W	549840.62	3351143.46	489135.63	2070343.97
	Gulf South Pipeline Co. No. 1 (Magnolia Well)	973123	30 01 01.28736 N	91 06 34.55875 W	551752.59	3351640.05	491047.58	2070840.57
	Ucar Storage No. 1	971540	30 00 18.38885 N	91 06 57.46022 W	547415.24	3349634.99	486710.29	2068835.49

Table C1. 2012 Horizontal Position Survey—Fenstermaker & Associates (Page 2 of 2)

Organization	Well Name	Well Serial No.	NAD 83 (2011)		NAD 83 (2011)		NAD 27	
			Latitude	Longitude	Northing	Easting	Northing	Easting
Dow Hydrocarbons & Resources LLC (continued)	Ucar Storage No. 2	971541	30 00 14.43406 N	91 06 57.62887 W	547015.71	3349620.92	486310.76	2068821.42
	Ucar SWD No. 1	971522	30 00 01.68469 N	91 06 56.03008 W	545728.07	3349763.94	485023.15	2068964.42
K/D/S-Promix, L.L.C.	KDS Promix Storage No. 1 (Promix Well No. 1)	971354	30 00 49.12858 N	91 06 46.61511 W	550522.29	3350582.53	489817.30	2069783.05
	Promix Brine No. 2 (Promix Well No. 2)	971488	30 00 49.24316 N	91 06 40.93606 W	550534.83	3351081.77	489829.83	2070282.29
	KDS Promix Storage No. 3 (Promix Well No. 3)	971355	30 00 49.34653 N	91 06 35.26383 W	550546.24	3351580.42	489841.24	2070780.93
	KDS Promix Storage No. 4 (Promix Well No. 4)	971356	30 00 54.30824 N	91 06 35.49415 W	551047.42	3351559.19	490342.42	2070759.71
	KDS Promix Storage No. 5 (Promix Well No. 5)	971357	30 00 54.20993 N	91 06 41.15313 W	551036.52	3351061.72	490331.52	2070262.24
	KDS Promix Storage No. 6 (Promix Well No. 6)	971358	30 00 54.09696 N	91 06 46.83625 W	551024.15	3350562.12	490319.14	2069762.65
Occidental Chemical Corporation	Occidental Brine No. 1 (Hooker No. 1)	109979	30 00 42.82069 N	91 07 57.78671 W	549873.59	3344326.71	489168.62	2063527.26
	Occidental Brine No. 2 (Hooker No. 2)	110338	30 00 33.58022 N	91 07 57.39639 W	548940.21	3344362.66	488235.25	2063563.21
	Occidental Brine No. 3 (Hooker No. 3)	110339	30 00 24.34244 N	91 07 57.00985 W	548007.10	3344398.28	487302.15	2063598.82
	Occidental Brine No. 4 (Hooker No. 4)	144743	30 00 38.58517 N	91 07 55.05311 W	549446.16	3344567.79	488741.19	2063768.34
	Occidental Brine No. 5 (Hooker No. 5)	144744	30 00 28.71438 N	91 07 54.64044 W	548449.10	3344605.82	487744.15	2063806.36
	Occidental Brine No. 9	972654	30 00 29.80875 N	91 08 22.54799 W	548555.42	3342152.05	487850.47	2061352.60
	Occidental Brine No. 10	971992	30 00 24.07299 N	91 08 22.11960 W	547976.07	3342190.69	487271.13	2061391.24
Pontchartrain Natural Gas Sys	Natural Gas Storage No. 1 (Shell Well No. 1)	971444	30 00 48.90288 N	91 06 59.45911 W	550497.34	3349453.42	489792.35	2068653.94
Texas Brine Company LLC	Gustave J. Labarre et al No. 1 (Georgia Gulf No. 1 Well)	142314	30 00 47.83777 N	91 07 43.14576 W	550382.68	3345612.97	489677.70	2064813.51
	Gustave J. Labarre et al No. 2 (Georgia Gulf No. 2 Well)	142315	30 00 47.87513 N	91 07 38.59039 W	550387.17	3346013.44	489682.19	2065213.98
	Gustave J. Labarre et al No. 3 (Georgia Gulf No. 3 Well)	142316	30 00 47.90922 N	91 07 34.06147 W	550391.33	3346411.59	489686.35	2065612.13
	Gustave J. Labarre et al No. 4 (Georgia Gulf No. 4 Well)	158778	30 00 47.80184 N	91 07 47.68997 W	550378.34	3345213.47	489673.36	2064414.02
	Oxy Geismar No. 1 (Hooker No. 6)	151645	30 00 42.09981 N	91 08 23.55083 W	549796.88	3342061.79	489091.91	2061262.35
	Oxy Geismar No. 2 (Hooker No. 7)	151646	30 00 35.53695 N	91 08 23.02968 W	549133.99	3342108.72	488429.04	2061309.28
	Oxy Geismar No. 3 (Hooker No. 8)	180708	30 00 35.30097 N	91 08 30.48811 W	549109.053	3341453.042	488404.098	2060653.603
	Oxy Geismar No. 3 (Hooker No. 8) Pipeline Riser near well		30 00 35.33888 N	91 08 30.48536 W	549112.88	3341453.28	488407.93	2060653.84

APPENDIX D

NAPOLEONVILLE SOLUTION-MINED CAVERNS AND THE 2013 UPDATED NAPOLEONVILLE SALT DOME STRUCTURE MAP



NOTE:

STRUCTURE CONTOURS FROM:

1. TBC 2013 3D SEISMIC
2. 2007 LEGEND 3D SEISMIC
3. SALT PENETERATIONS
4. GEORGIA GULF WELL No. 6 VSP
5. LOCATION OF PROPERTY BOUNDARIES, HIGHWAYS, ROADS, AND BAYOUS ARE APPROXIMATE.
6. BOTTOM HOLE LOCATIONS SHOWN FOR DIRECTIONAL DRILLING.

PBEnergy Storage Services, Inc.

NAPOLEONVILLE
SALT STRUCTURE MAP AND
CAVERN MAXIMUM RADII

DRAWN BY:	REVIEWED BY:

RSI-1800-13-399