



Finger Lakes LPG Storage, LLC

Finger Lakes LPG Storage Facility  
Reading, New York

Reservoir Suitability Report

Filed: May 14, 2010

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# Finger Lakes LPG Storage, LLC

## Reservoir Suitability Report<sup>1</sup>

### 1. Introduction

In August 2008, Inergy Midstream acquired US Salt, LLC (US Salt) and its property located in the Town of Reading, Schuyler County, north of the Village of Watkins Glen, New York. A general location map is attached as **Exhibit 1**. US Salt and its predecessors<sup>2</sup> at the Facility have been in the business of salt production for over 100 years by solution mining underground salt deposits on property adjacent to Seneca Lake. In order to utilize the depleted salt caverns owned by US Salt, Inergy Midstream formed Finger Lakes LPG Storage, LLC (Finger Lakes) for the purpose of storage of Liquid Petroleum Gas (LPG) in the form of propane and butane. In order to do so, several of the old wells/galleries have been reentered to determine integrity. This Reservoir Suitability Report presents information based on known geology of the salt deposits, US Salt company files, public records and publications, competency of overlying formations, hydraulic pressurization of wells and caverns and a Finite Element Analysis to demonstrate integrity of these caverns and the ability to safely retain LPG.

### 2. Project Overview

Finger Lakes plans to construct an LPG (liquid propane and butane) storage system with a pipeline connection and rail and truck load/unload racks. LPG (Butane or propane) will be stored in caverns in the Syracuse Salt formation on property owned by Finger Lakes' affiliate, US Salt.

Specifically, Finger Lakes plans to convert **Gallery 1** (wells 33, 43, 34 and 44 after workovers and new wells are drilled) and **Gallery 2** (well 58)<sup>3</sup> to LPG storage service according to the plans set forth in this Report. See **Exhibit 2**, which includes the required maps.

The cavern(s) in each gallery will initially be full of brine (as they are now). A multi-stage split case centrifugal pump will be used to transfer product to the cavern from the TE Products Pipeline Company, LLC ("TEPPCO") pipeline or via rail or truck. During the injection cycle, brine will be displaced out the bottom of the cavern as the LPG is pumped in the top. The process will be reversed during the withdrawal cycle when brine is pumped into the bottom of the cavern and LPG is withdrawn from the top.

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<sup>1</sup> This report was prepared by John Istvan of International Gas Consulting (IGC), with the assistance of K. Fuenkajorn, Ph.D., P.E., Leonard Dionisio, Barry Moon, and Barry Cigich. It supersedes the Report submitted with Finger Lakes' initial application submittal of October 9, 2009.

<sup>2</sup> US Salt's predecessors at the Facility include Cargill, Akzo-Nobel, Akzo and International Salt.

<sup>3</sup> In the previously submitted Reservoir Suitability Report, Finger Lakes Gallery 2 consisted of wells 30, 31 and 45. Finger Lakes Gallery 2 now consists of well 58.

A surface pressure of approximately 1000 psi will be maintained when the well is closed and a minimum of 500 psi when in operation when LPG is in the cavern, depending on the surface elevation of the well and depth of the cavern.

LPG can be received by pipeline (TEPPCO), truck or rail. The pipeline will feed the suction of the high pressure pump for injection directly into the cavern in the injection cycle at an initial design rate of 5,100 Barrels Per Day (BPD) to 48,000 BPD. The railrack (to be constructed on property recently acquired by Finger Lakes) is capable of loading or unloading 24 rail cars in 12 hours with space to park 24 rail cars. Surge capacity (bullet storage tanks) will consist of 5-30,000 gallon vessels, which can be used for butane or propane. The truck rack is capable of loading or unloading 30 trucks/day.

A transfer pump system utilizing centrifugal "can" pumps will be installed to load trucks and to supply the required Net Positive Suction Head (NPSH) to the high pressure pumps. A vapor circulation system utilizing compressors will be used to unload rail cars or trucks.

Propane will be withdrawn through a dehydration system to remove any water vapor from the product.

Brine circulated from the caverns will be stored in an above-ground pond. All brine will be circulated through a separator with an active flare before being transferred to storage in the pond.

Out of the existing sonar determined storage capacity for Gallery 1 (wells 33, 43, 34 and 44) of approximately 5 million barrels, Finger Lakes requests authorization to store 1.5 million barrels of LPG in this Gallery.

Finger Lakes seeks authorization to store up to 600,000 barrels of LPG in Gallery 2 (well 58).

### **3. Location and Regional Geology**

The Watkins Glen brine field, located in Schuyler County, is in the south central part of New York State, along the west shore of Seneca Lake. See the general location map in Exhibit 1. It is approximately 2 miles north of the village of Watkins Glen. Physiographically, the region is part of the Finger Lakes district of the Allegheny plateau that has been peneplaned, uplifted and glaciated. Due to glaciation, the area is marked by deep valleys that are now occupied by the Finger Lakes and hanging tributary valleys. Rocks that outcrop in the area are Devonian Age sedimentary formations that dip gently to the southwest. The terrain rises steeply across the site toward the west from the lake shore at about 270 feet/quarter mile. The site is covered with native vegetation.

Sediments encountered by wells drilled in the brinefield range in age from Upper Devonian, Genesee shales, to the Upper Silurian, Salina group, Syracuse salt and

underlying Vernon shale. Several stratigraphic columns are included in **Exhibit 3**.<sup>4</sup> Sediments are composed of shales, sandstones, limestone and dolomites with the shales of the Middle Devonian, Hamilton group, being 800 feet in thickness and separated from the upper Devonian shales by about 30 feet of middle Devonian Tully limestone. The Hamilton group is underlain by the middle-lower Devonian, Onondaga limestone that overlies the lower Devonian Oriskany sandstone. The Oriskany is rather sporadic in occurrence and has not been identified in all wells.

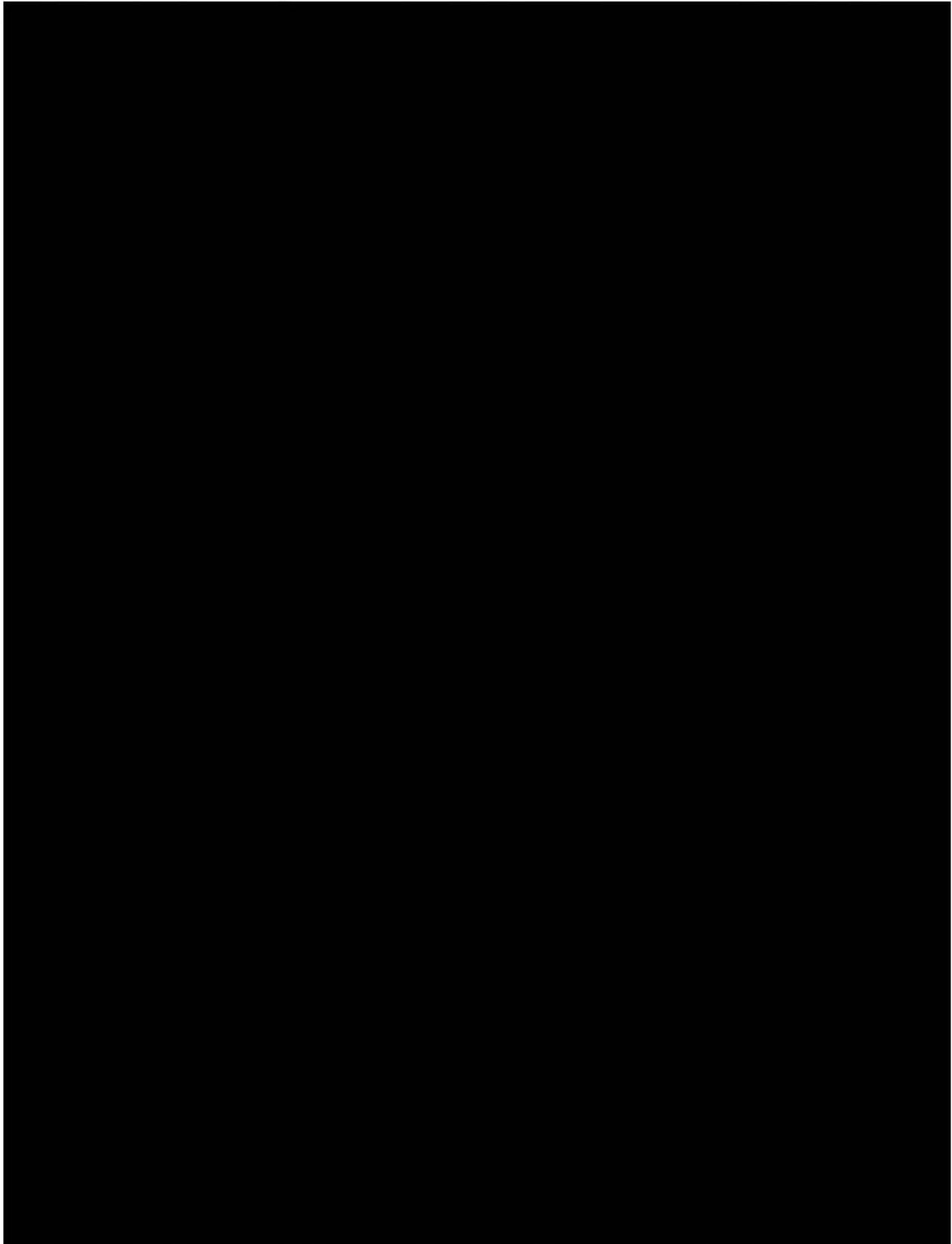
Below the Oriskany, sediments of the Upper Silurian, Bertie and Salina groups are encountered and consist of limestone, dolomite, shale, anhydrite and evaporate salt beds. The salt being dissolved is part of the Syracuse salt formation that is a member of the Salina group of the Cayugan series of the Upper Silurian system. It consists of six distinct beds with the possibility of a thin salt stringer some 40 feet below the sixth salt. See Exhibit 3. The salt beds are intensely folded into a series of local east-west anticlines and synclines with only a few tens of feet from crest to crest (Jacoby, 1963, p. 508). See **Exhibit 4**. It is likely that the salt and incompetent shales of this section flowed plastically and absorbed the shock of the regional tectonic force during the Mesozoic era, and gave rise not only to the intense folding, but also faulting of the salt section. This is apparent when the structure of the salt is compared to the overlying sediments. The overlying sediments are characterized by broad, gentle east-west synclines and anticlines with axes generally paralleling the sharp folds of the underlying evaporites. On the basis of the cores from the Watkins Glen brine fields (see Section 7.3 below), some beds appear to pinch out completely while others double in thickness over a distance of 300-400 feet. Inergy experience is that the gross thickness of the Salina salt beds across the field have been faulted and folded along the decollement at the base of the salt as is the case throughout the New York and Pennsylvania salt basin.

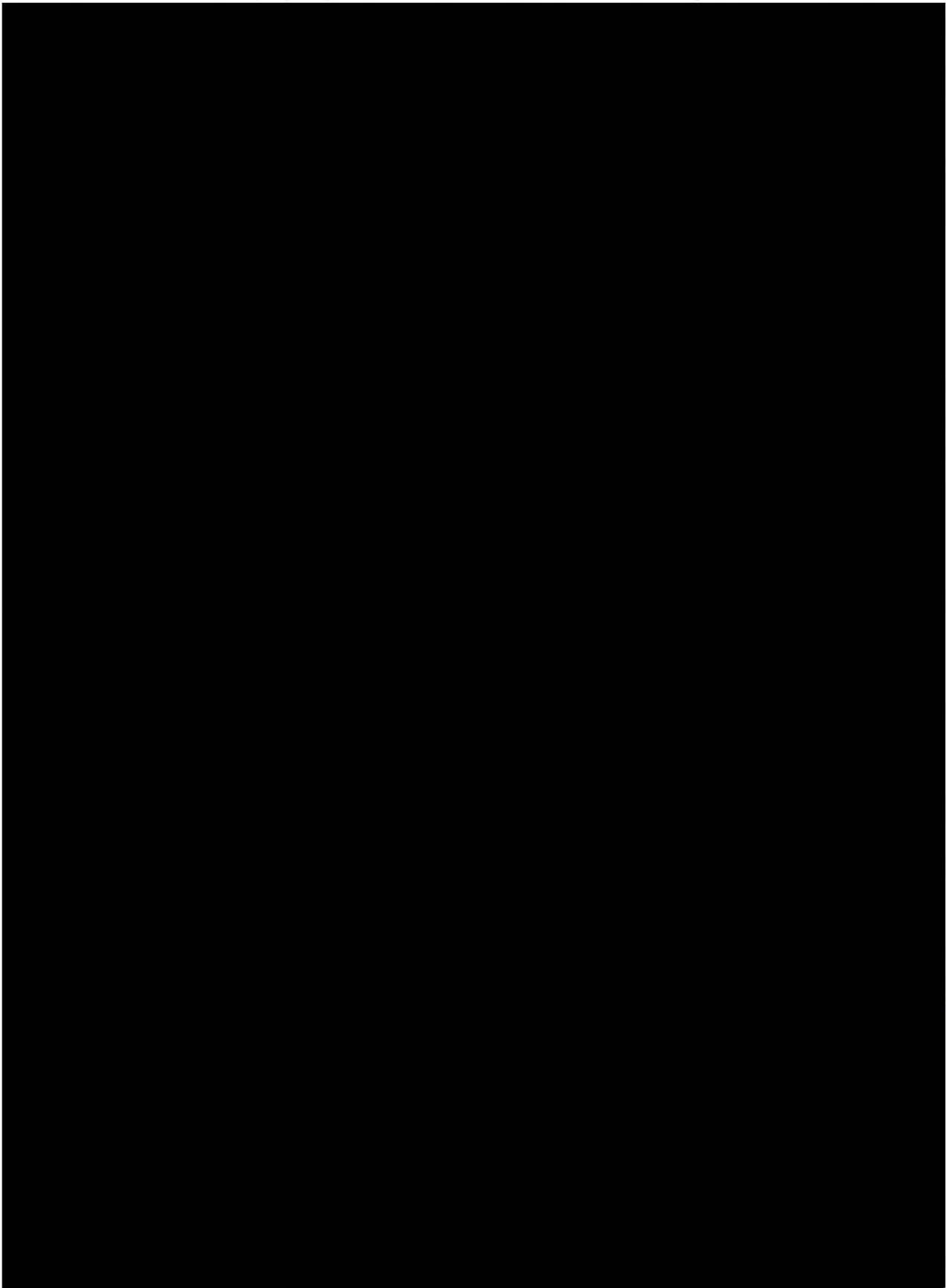
#### 4. Historical Development of Salt Caverns and Previous Usage for Hydrocarbon Storage

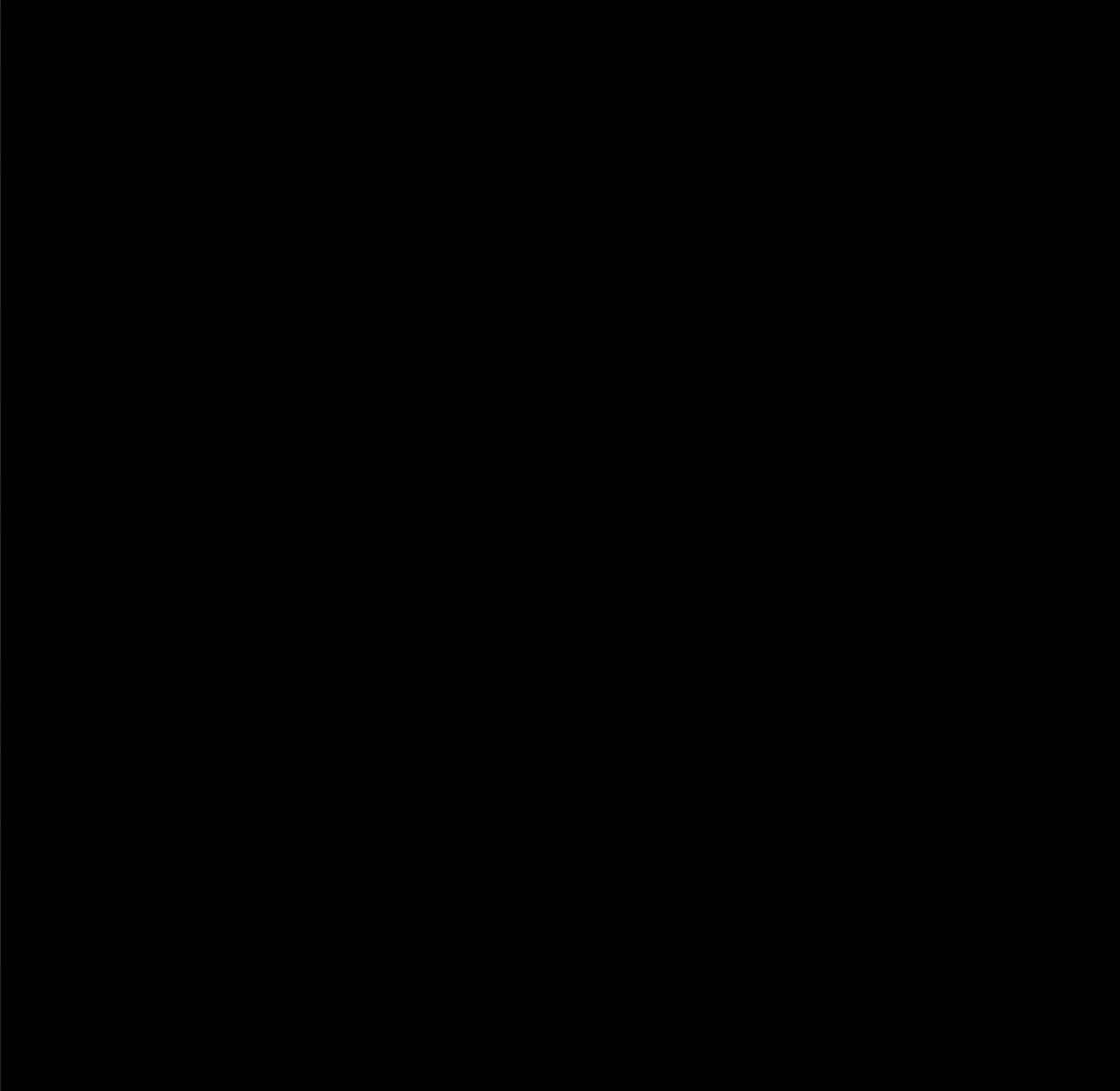


<sup>4</sup> See also Exhibit 17, which provides as part of the cross sections prepared for this report a stratigraphic column with Rickard designations.

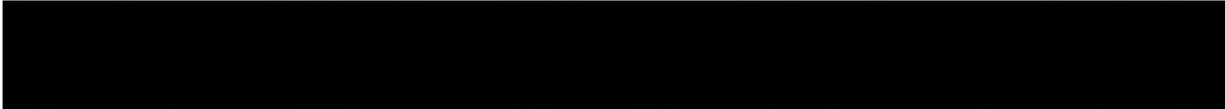
5. Well Construction and Well History





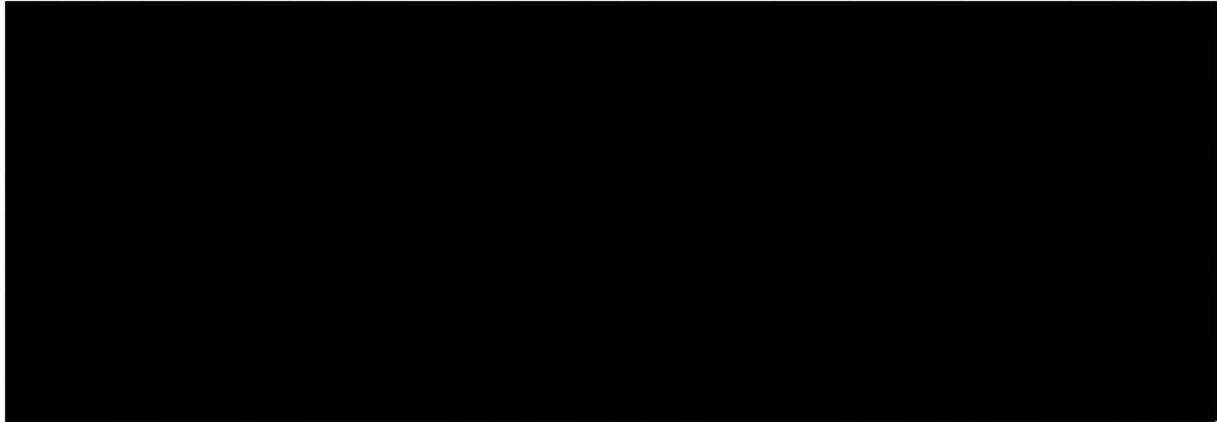


6. Evaluation of Well and Cavern Integrity

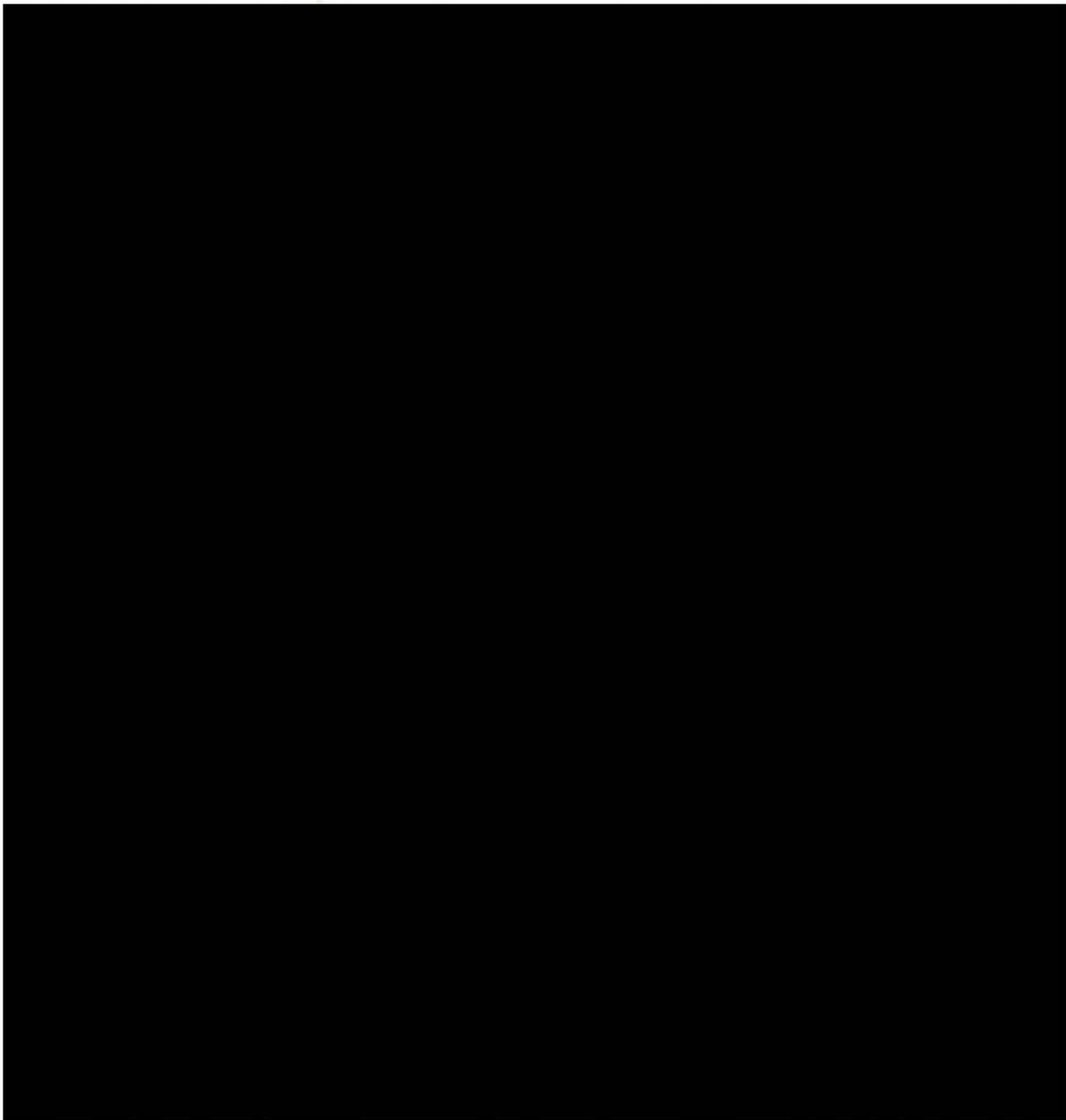


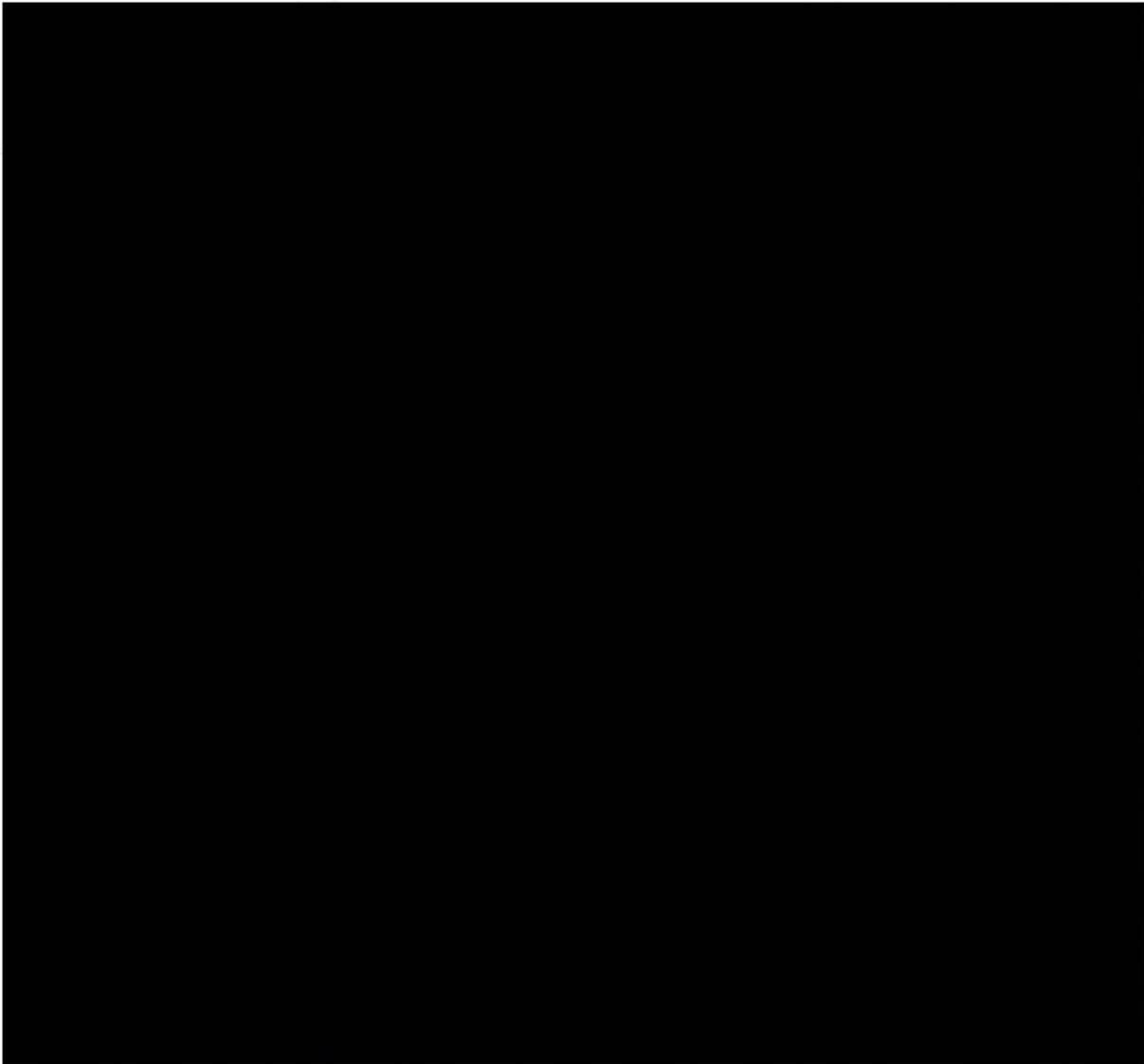
6.1 Vertilogs





6.2 Hydrotests/Brine Pressure Tests

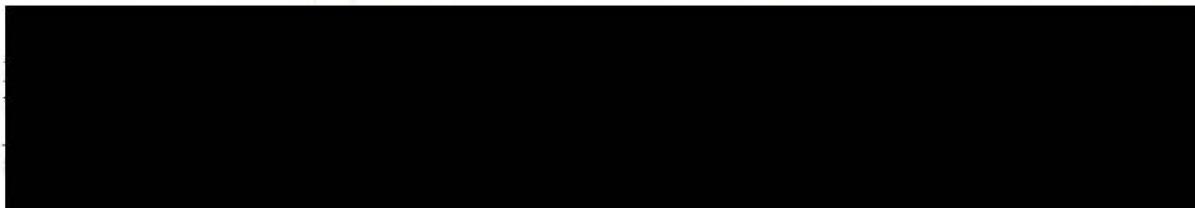


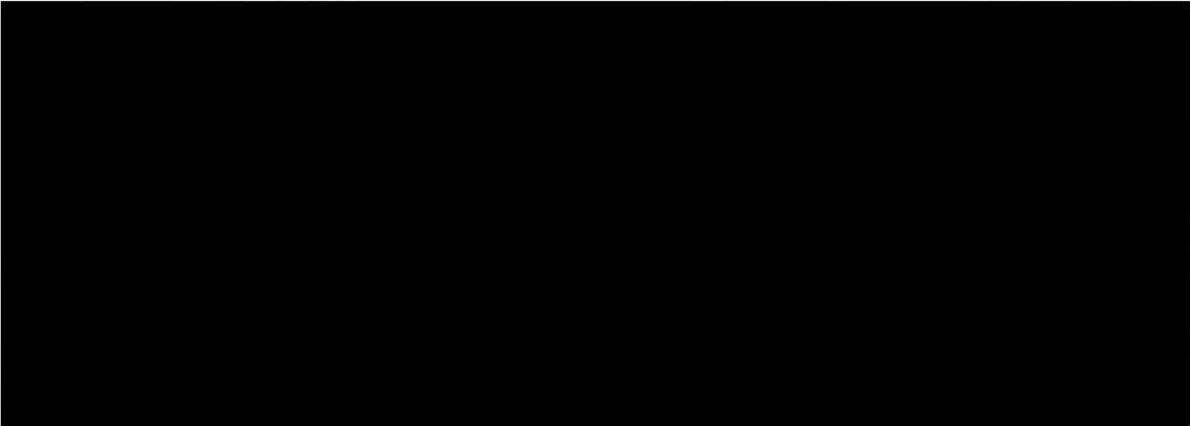


6.3 Gamma Ray and Neutron Logging

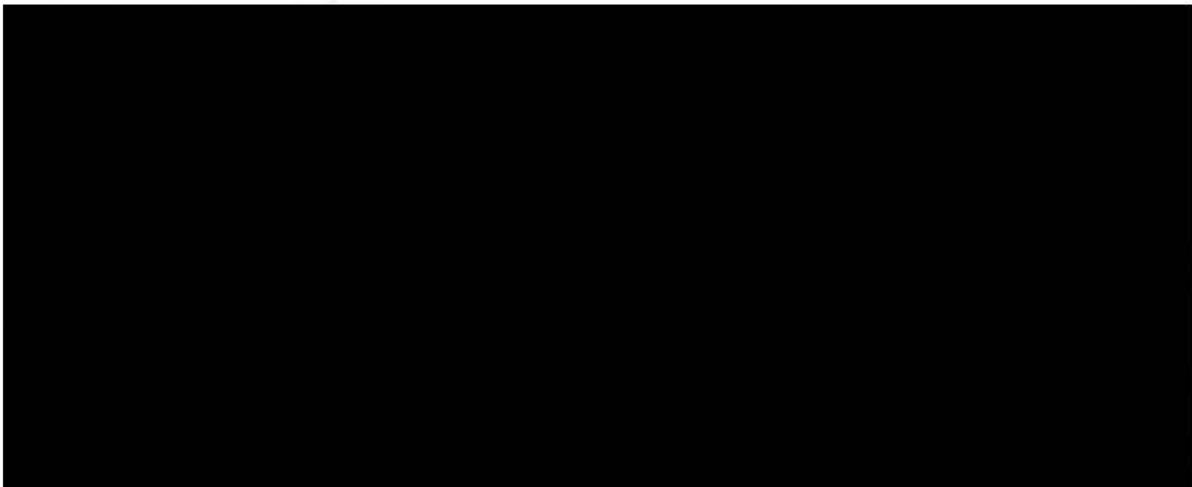


6.4 Lack of Interconnection with International Gallery 10

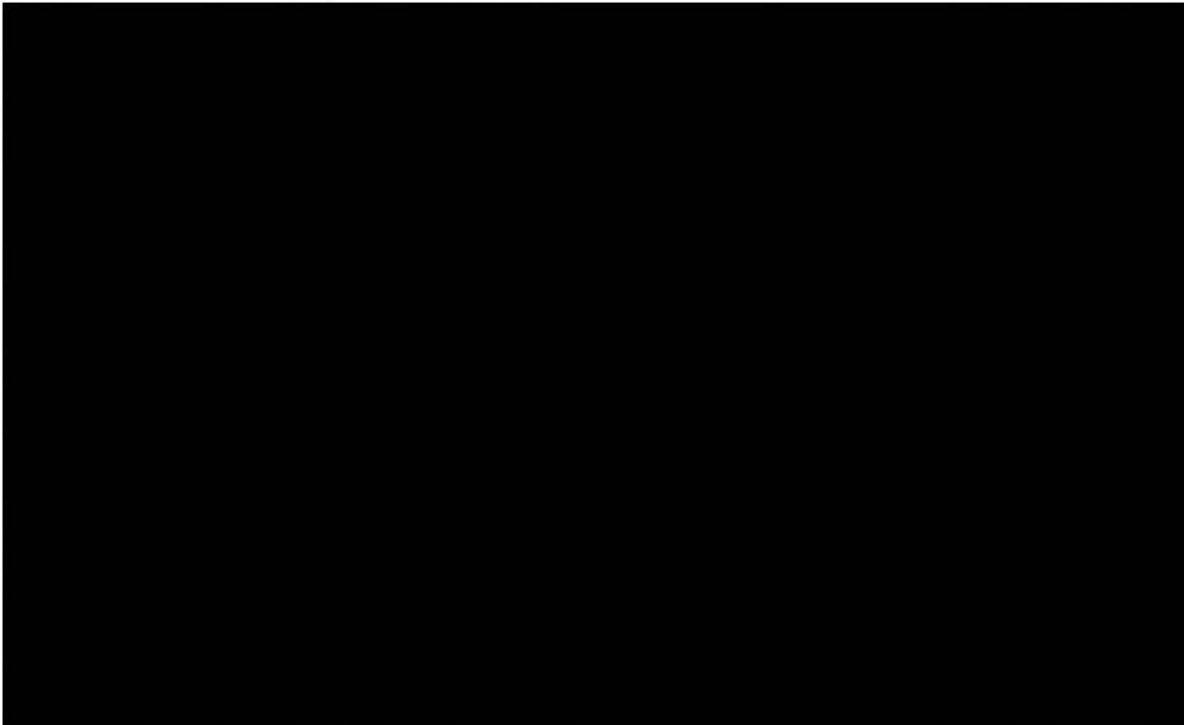


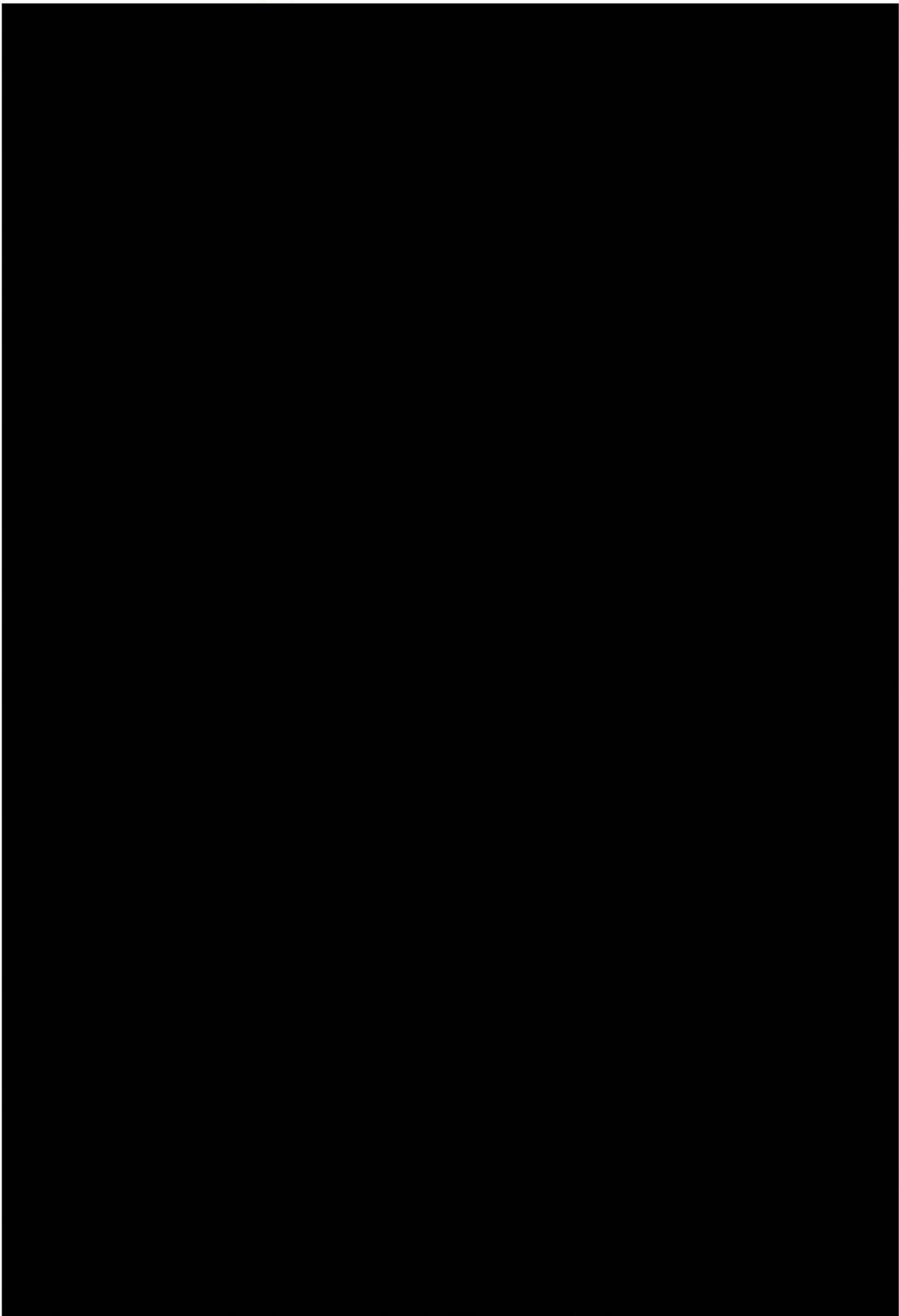


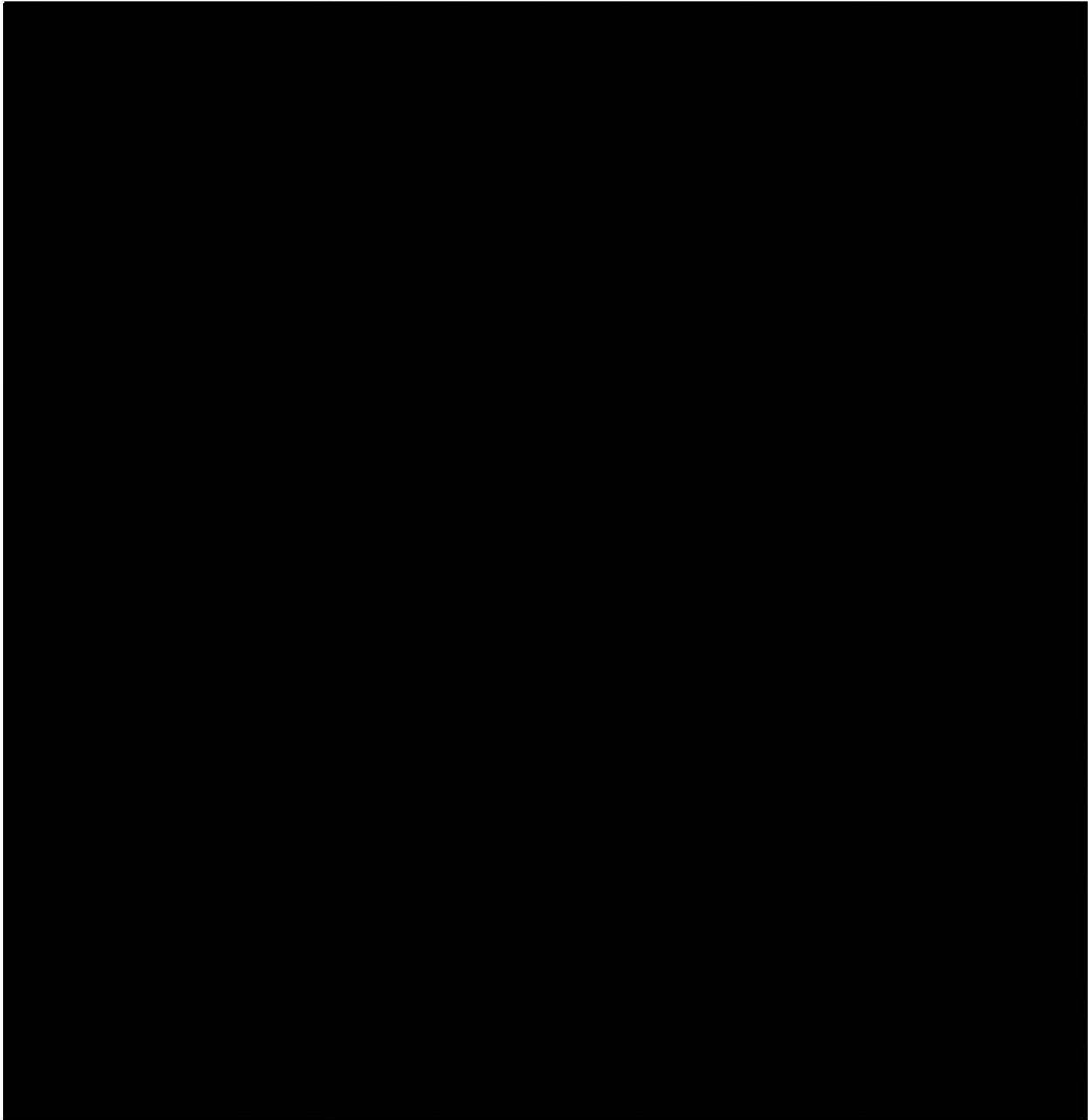
7. Suitability of Caverns to Store LPG



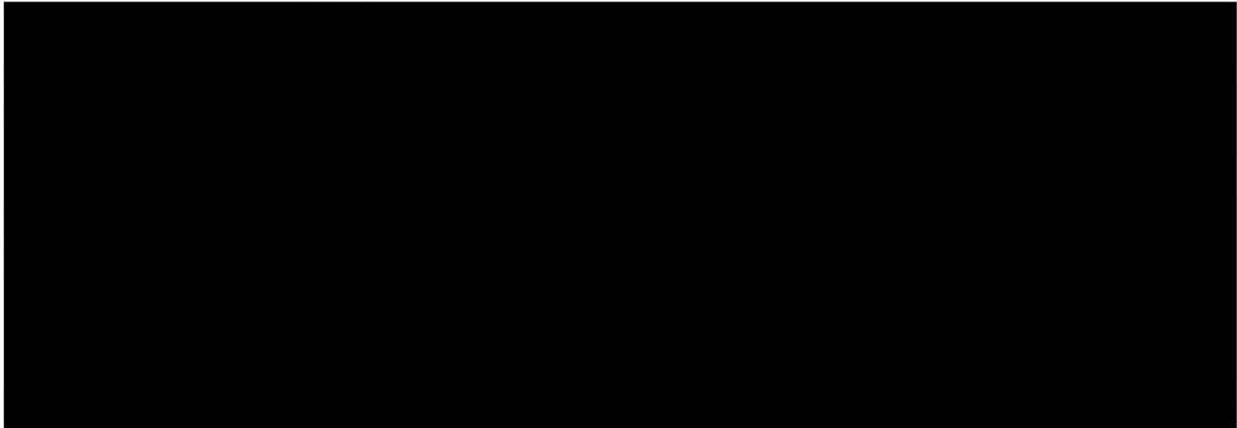
7.2 Discussion of Geologic Cross-Sections, Faults Analysis and Jacoby

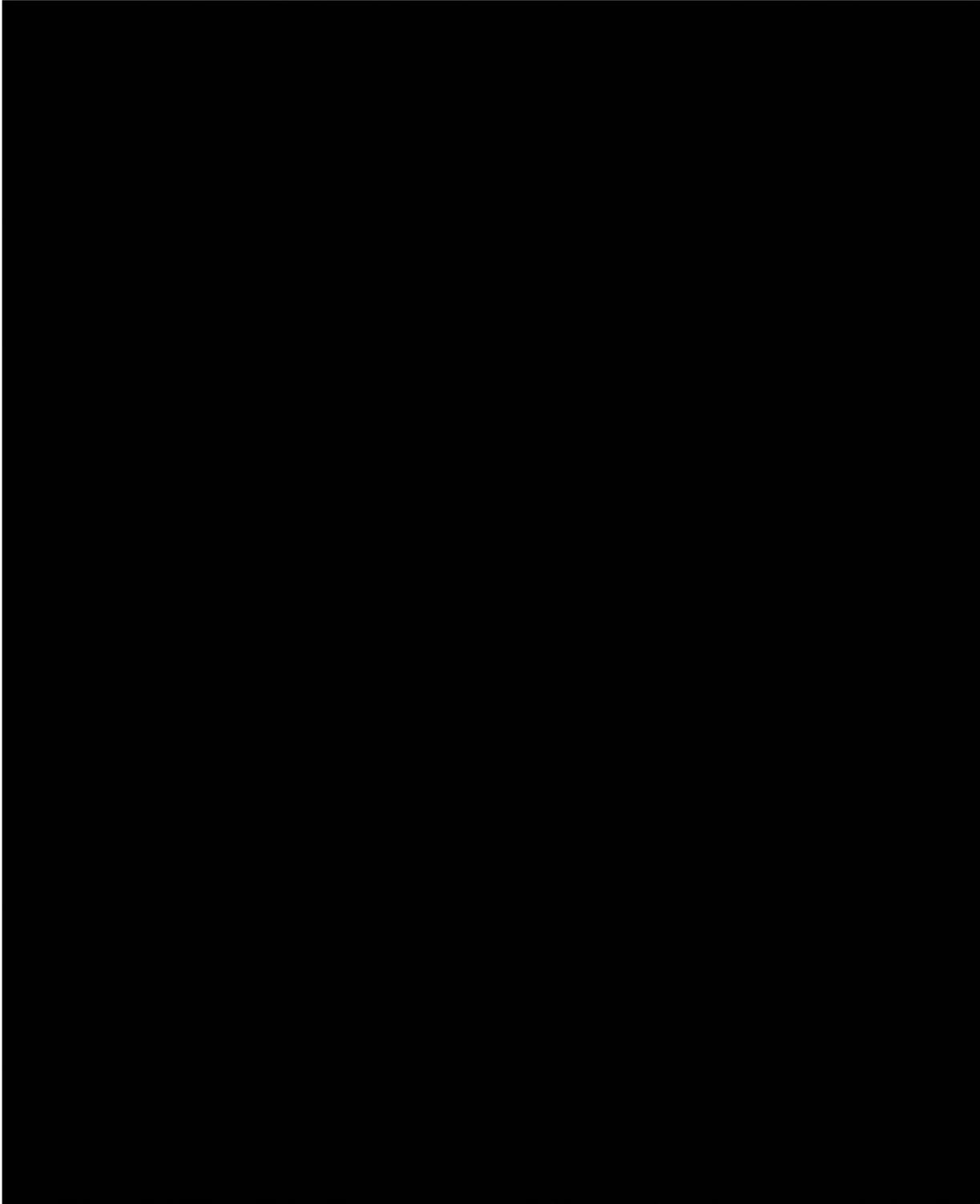




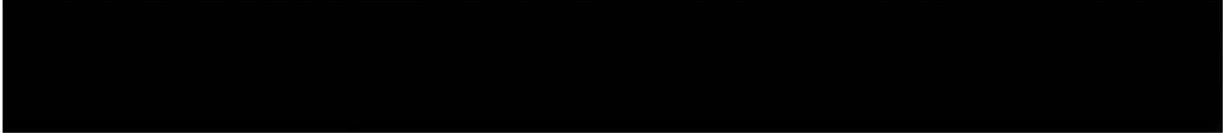


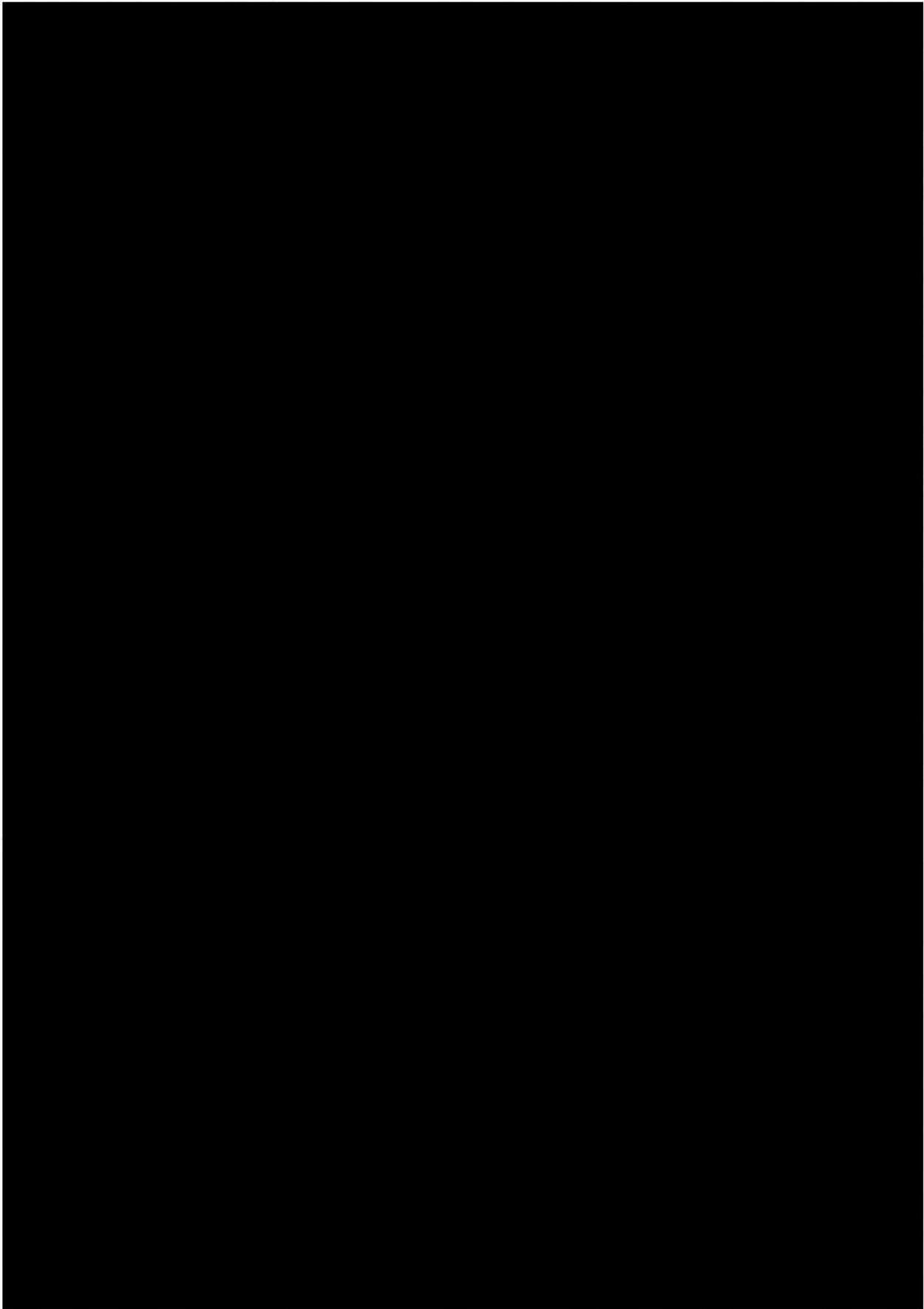
7.3 Core Test Results

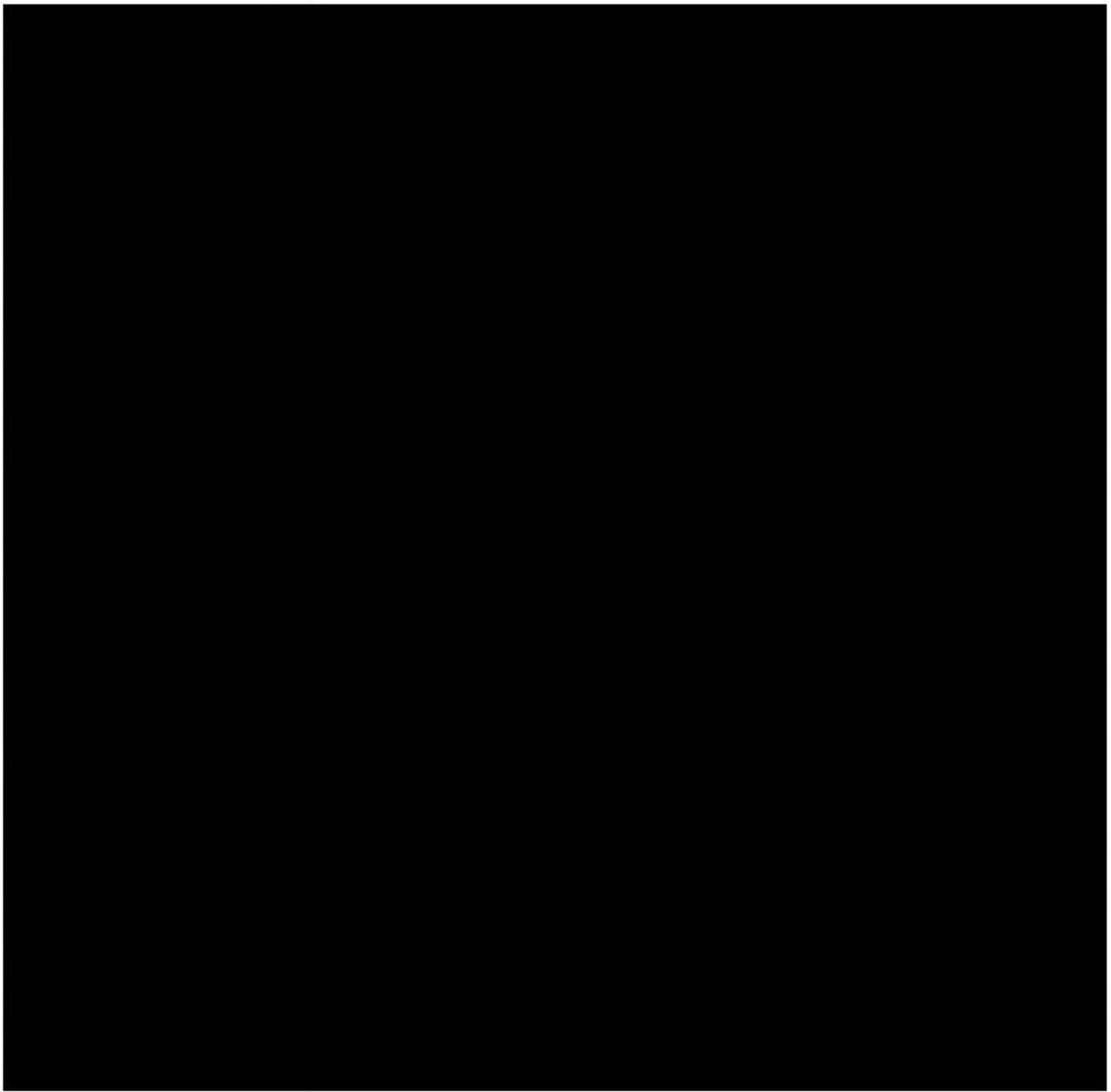




**8. Rock Mechanics and Finite Element Analysis**





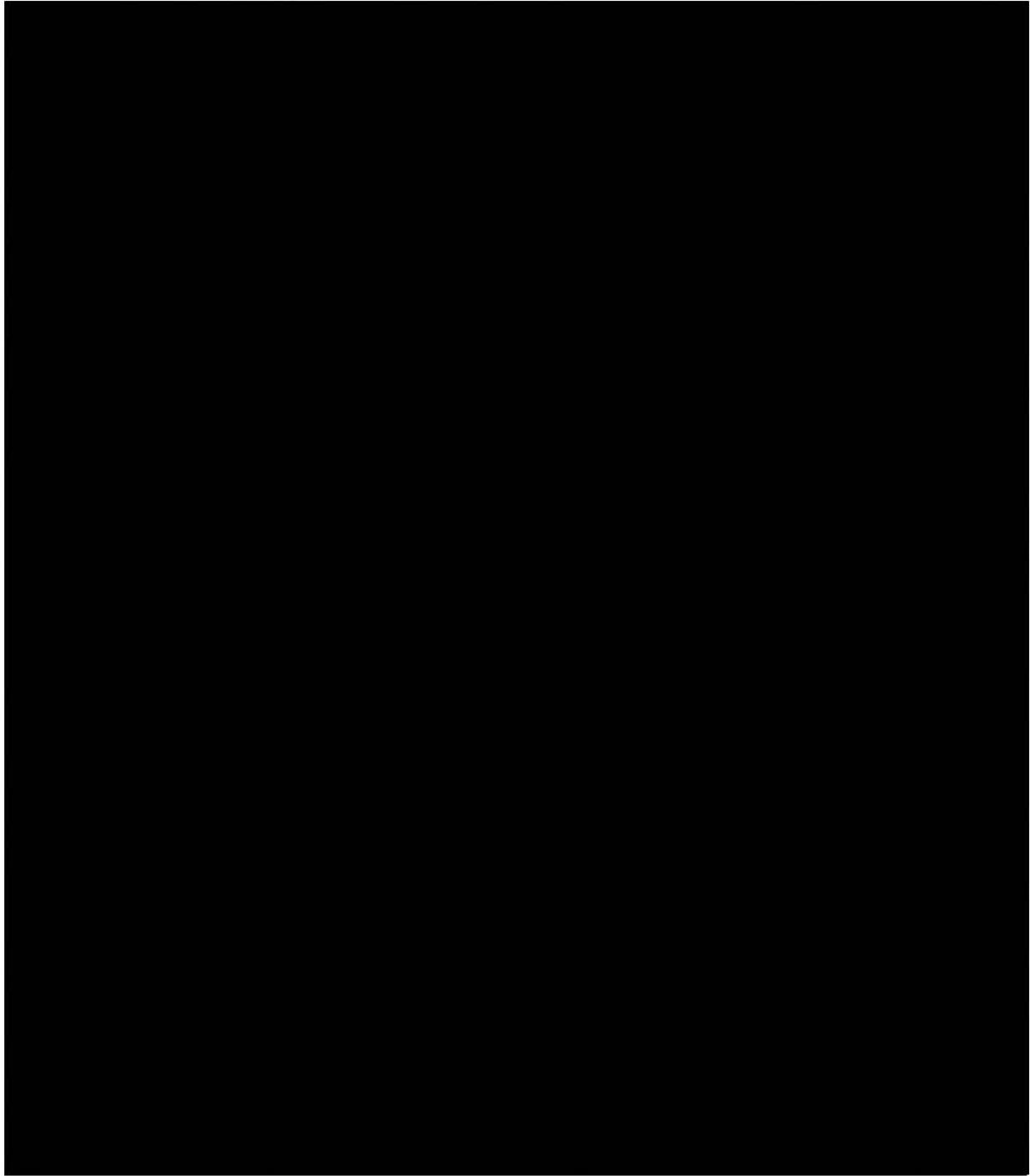


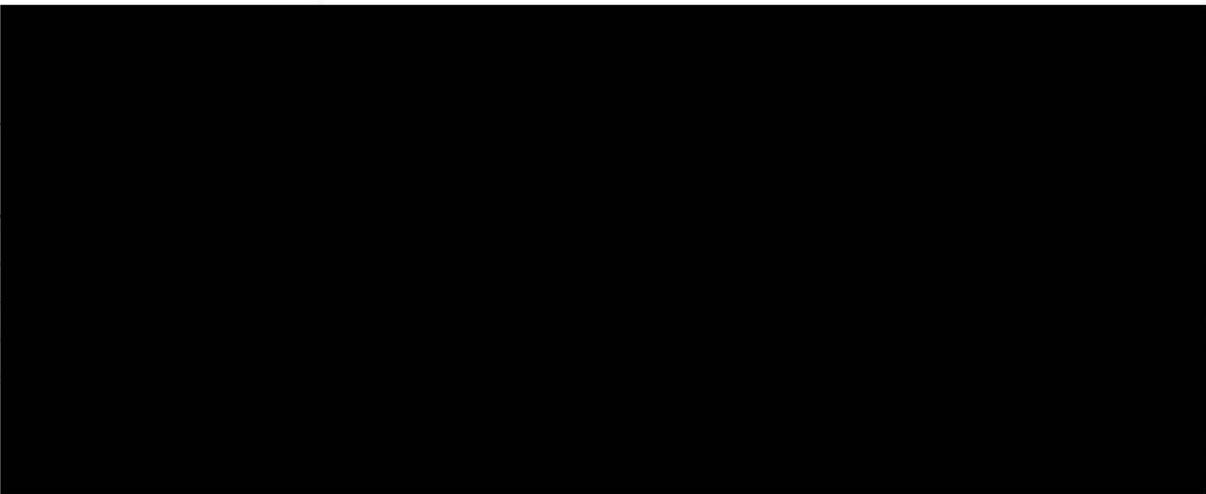
9. Sonar Reports and Surveys



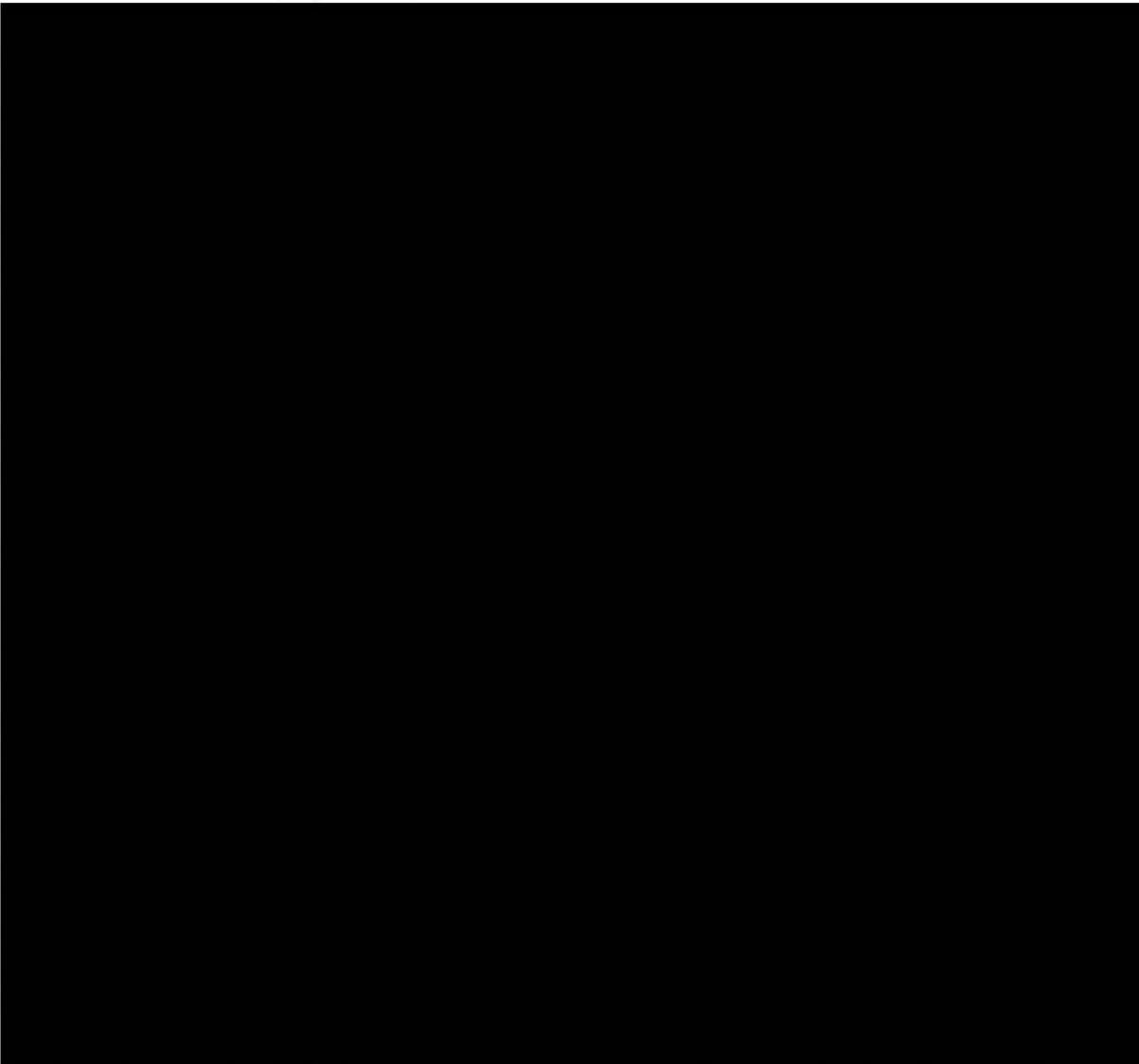


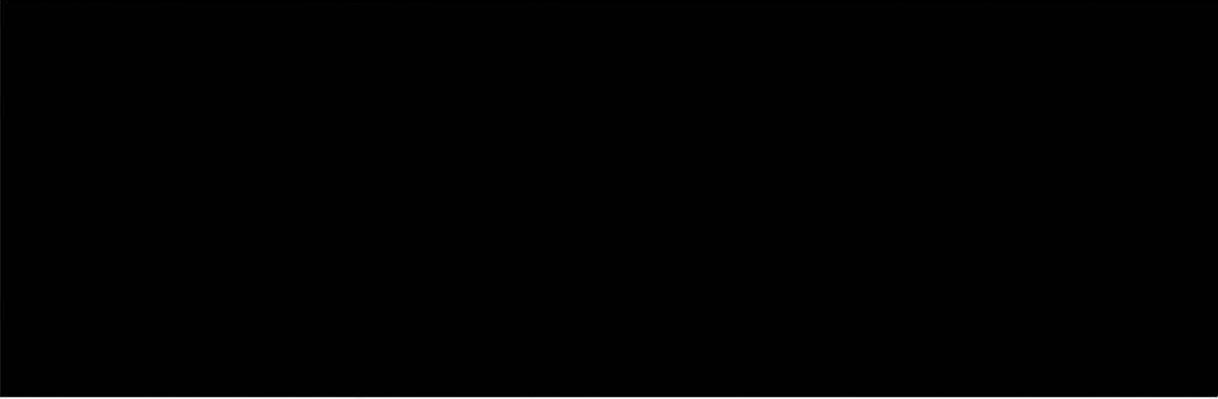
10. Minimum and Maximum Storage Pressures





11. Cavern Development Plan





**12. Review of Historic Earthquake Activity**

Based on data compiled by the National Geophysical Data Center and updated by IGC using USGS data, there are no risks involved at the site with earthquakes within ½ mile of any of the subject Galleries. See attached Exhibit 22.

**13. Subsidence Monitoring**

US Salt has been monitoring the elevations of wellheads and other subsidence monuments for decades and providing a report every 5 years. Experience has shown that as many monuments show a reduction in elevation as show an increase in elevation. Much of the changes in elevation are due to the change in the weather from warm to cold. This phenomenon is universal and documented surveys show that there has been no significant subsidence across the field mainly due to the stiffness of the overlying formations.

At the DEC's request, Finger Lakes will conduct subsidence monitoring at least every two (2) years at all injection, withdrawal, monitoring and plugged wells in each gallery. More specifically, Finger Lakes proposes to conduct bi-annual subsidence monitoring on wells in Gallery 1 (well 33, 34, 43, 44 and FL 1 (when drilled), and Gallery 2 (well 58). Monuments will include Mon 20/42, Mon 20/02, BM 77-1, BM 77-2, BM 77-3 and BM USGS95 which are used by US Salt for their subsidence program.

**14. Safety Procedures and Emergency Shutdown**

Evidence of well and cavern problems can be quantified simply by careful recording of product injection and comparison with product withdrawal. In most cases, the amount of product injected, much like the ups and downs of subsidence monuments, can be more than what is withdrawn, or vice versa. It becomes obvious however, when product or brine are lost in large numbers. Prudent operators will quickly shut-in operations when pressures do not respond to the norm. Finger Lakes is cognizant of the overall pressures required for safe operations of hydrocarbon storage caverns based on years of experience and will never permit leakage that would jeopardize the public or USDW. Finger Lakes will monitor well head pressures of its storage wells on a daily basis and the procedure for this will be addressed in the facility's Operations Manual.

Finger Lakes intends to have in place, prior to the commencement of operations, a number of different manuals or programs, all designed to prevent accidents. This will be accomplished through an Operations Manual, a Spill Prevention and Control Manual, a Hazard Communication and Assessment Program, a Safety Manual, and a Facility Security Manual.

Each of these manuals will contain the necessary information for safe operation of the Facility. Safe operations are accomplished via training. Employees will be required to take computer based training every two (2) years at a minimum. In addition to the computer-based training, each employee will experience at least six months on the job during which specific training and monthly safety meetings are given to reinforce the computer based training. Also, task specific safety meetings will be held.

Every employee will be familiar with Material Safety Data Sheets (“MSDS”), personal protective equipment required, and the contents of each of the manuals. The MSDS’s for propane and butane are attached as **Exhibits 23 and 24**, respectively. An MSDS for mercaptan is attached as **Exhibit 25**.



The Facility will maintain an Emergency Response Manual (some or all of which may be contained in the other referenced materials). Prior to any injection of storage LPG, Finger Lakes will provide two (2) copies of the Emergency Response Manual to the DEC (Director, Bureau of Oil & Gas Regulation).

15. **Mechanical Integrity Testing Procedures**



## 16. Conclusions

State-of-the art sonars and hydrotesting has been performed on the gallery shown as Finger Lakes Gallery 1 (wells 33, 43, 34 and 44) and Gallery 2 (well 58). That testing shows the shape of the caverns and reflects the success of the hydrotest in each of the cavern wells in Gallery 1 and 2. Careful evaluation was performed to study the well core and logs, including casing inspection, cement bond, gamma ray and neutron logging, and detailed studies of the related geology and geomechanical analysis (FEA). Inergy/Finger Lakes is confident that the aforementioned galleries will be safe to operate LPG injections and withdrawals under constant hydraulic pressures.

## 17. References

- a. Jacoby, C.H., Dellwig, L.F., 1974, Appalachian Foreland Thrusting in Salina Salt, Watkins Glen, New York, 4th International Symposium on Salt, Northern Ohio Geological Society, Inc., pp. 227-233
- b. Jacoby, C.H., 1963, International Salt Brine Field at Watkins Glen, New York, Symposium on Salt, Northern Ohio Geological Society, Inc., 506-520
- c. Jacoby, C.H., Use of Abandoned Solution-Mined Cavities for Storage of Plant Waste, Transactions, Society of Mining Engineers, AIME, Vol. 254, pp. 364-67, December 1973
- d. Jacoby, C.H., Szyprowski, S., Paul, Dilip K., Earth Science Aspects in the Disposal of Inorganic Wastes, 4th International Symposium on Salt, Northern Ohio Geological Society, Inc., pp. 307-12

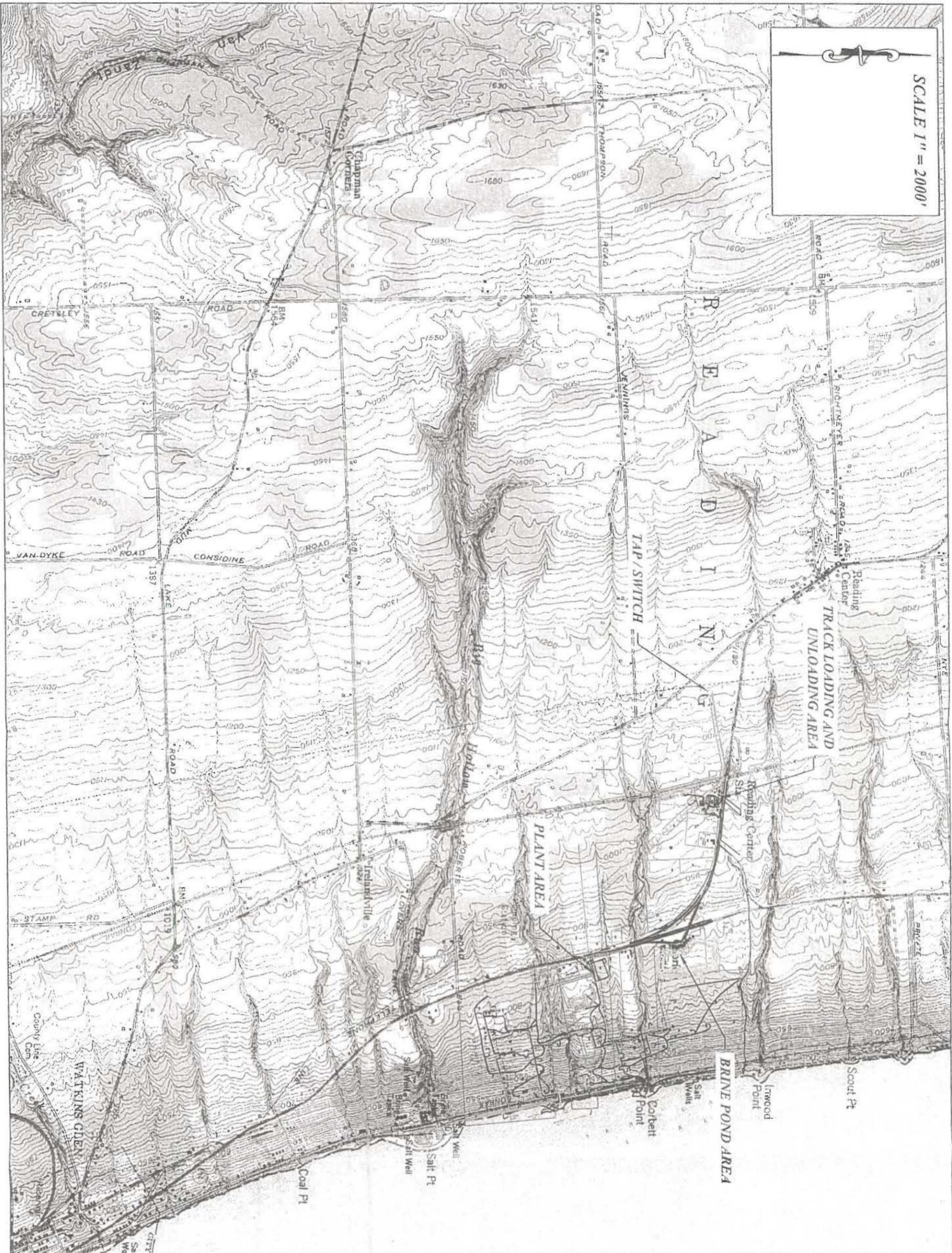
- e. Levorsen, A.I., 1954, Geology of Petroleum, W.H. Freeman & Co., San Francisco, 724 p.
- f. RE/SPEC, Inc., January 1996, Coring Activities – NYSEG Well 59, Seneca Lake Storage Project, Watkins Glen, New York; Topical Report RSI-0655
- g. RE/SPEC, Inc., January 1996 Mechanical Properties of Salt and Dolostone from AKZO Nobel Salt, Inc., Well No. 58 and NYSEG Well No. 59, Seneca Lake Storage Project, Watkins Glen, New York, Topical Report RSI-0668
- h. Rickard, L.V., 1969, Stratigraphy of the Upper Silurian Salina Group – New York, Pennsylvania, Ohio, Ontario, Map and Chart Series No. 12, NYS Education Department

**18. List of Exhibits**

- Exhibit 1 – General Location Map
- Exhibit 2 –
  - Map 1 – Gallery Map (with existing well status and information, API Numbers, gallery outlines, distances to other wells)
  - Map 2 – Overall Site Plan
- Exhibit 3 – Stratigraphic Columns
- Exhibit 4 – Anticline/Syncline Structure Map
- Exhibit 5 – Well 58 Core Log
- Exhibit 6 – Well 58 Compensated Neutron – Density Log for 1992 drilling activities
- Exhibit 7 – Well 58 Sonar for 2009 Sonar
- Exhibit 8 – Well 58 Gamma Ray Segmented Bond Log, Gamma Ray Neutron Log and Microvertilog for 2009 drilling activities
- Exhibit 9 – Well Status and Condition Report
- Exhibit 10 – Well diagrams
- Exhibit 11 – Hydrotest Data for Gallery 1
- Exhibit 12 – Well 58 Long Term Brine Test Report dated February 26, 2010
- Exhibit 13 – Well 58 Mechanical Integrity Test, dated February 24, 2010, submitted to EPA
- Exhibit 14 – Well 52 logs and directional survey for 2009 drilling and sonar activity
- Exhibit 15 – Camillus Shale Isopach Map
- Exhibit 16 – Camillus Shale Structure Map
- Exhibit 17 – Cross-Sections
- Exhibit 18 – Core Descriptions for Well 59 (see references, Section 17(f))
- Exhibit 19 – Rock Mechanics Report for Wells 58 and 59 (see references, Section 17(g))
- Exhibit 20 – Finite Element Analysis
- Exhibit 21 – Capacity Matrix
- Exhibit 22 – Seismic Risk Map

- Exhibit 23 – MSDS for Propane
- Exhibit 24 – MSDS for Butane
- Exhibit 25 – MSDS for Mercaptan
- Exhibit 26 – MIT Procedures





SCALE 1" = 2000'

Approval:

It is a violation of the law for any person unless he is acting under the direction of a licensed professional architect/engineer to alter this drawing in any way. Alterations must have the seal affixed along with a description of the alteration, the signature and date.



Drawn By:  
J. Skinner

Date:  
08/09

Checked By:  
J. Skinner

Date:  
08/09

Location Map  
Underground Storage Permit  
Fingerlakes Storage LLC

SHEET 1 OF 1

DRAWING: Site Plan for stakeout.dwg

DRAWING PATH: K:\Civil 3D 2008\Superior Energy

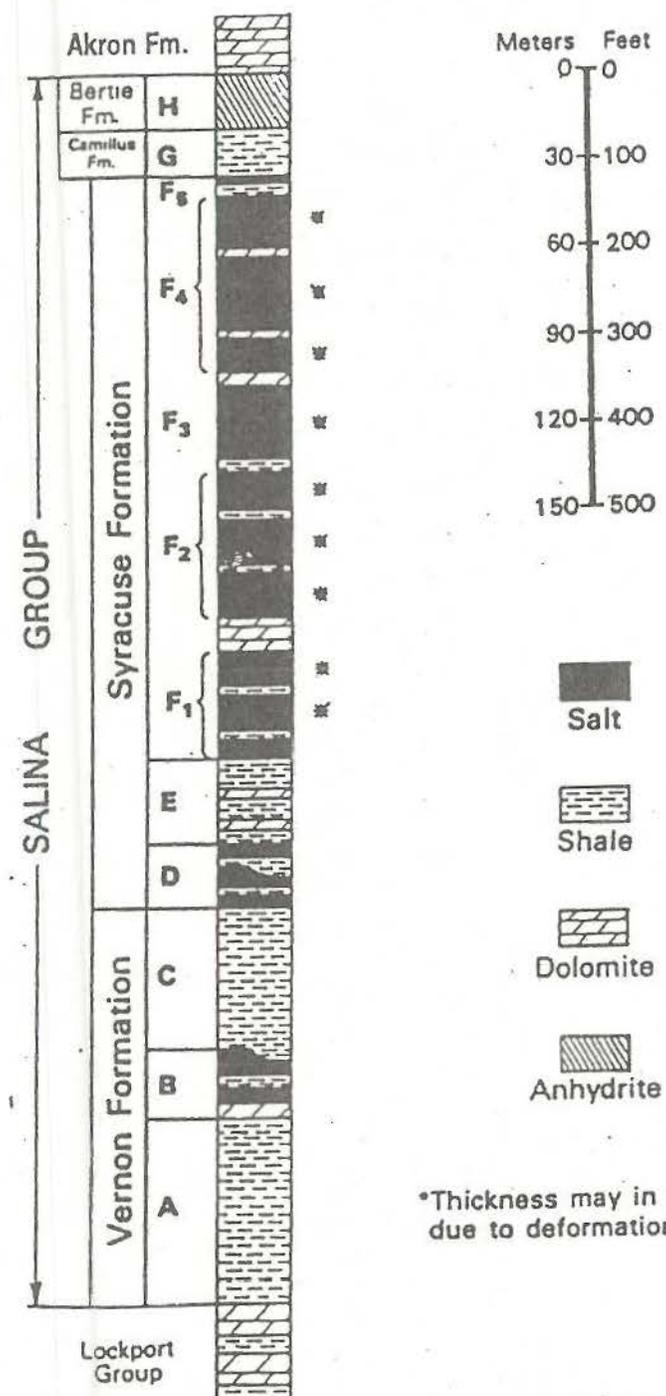




SYSTEM	WESTERN NEW YORK	CENTRAL NEW YORK	EASTERN NEW YORK	
UPPER CRETACEOUS			Raritan Formation	
L. JURASSIC - U. CRETACEOUS			Newark Group	
LOWER PENNSYLVANIAN	Olean Formation			
LOWER MISSISSIPPIAN	Knapp Formation			
UPPER DEVONIAN	Connewango Group Conneaut Group Canadaway Group West Falls Group Sonyea Group Genesee Group	West Falls Group Sonyea Group Genesee Group	Slide Mountain Formation Walton Fm/Delaware River Fm. Oneonta Formation	
MIDDLE DEVONIAN		Tully Formation	Gilboa Formation	
	Hamilton Group Onondaga Formation	Hamilton Group Onondaga Formation	Hamilton Group Onondaga Formation	
LOWER DEVONIAN			Tristate Group	
	Tristate Group (Bois Blanc & Oriskany Fms.)	Tristate Group		
		Helderberg Group	Helderberg Group	
UPPER SILURIAN	Salina Group Lockport Group	Salina Group Lockport Group		Salina Group
LOWER SILURIAN	Clinton Group	Clinton Group		Bloomsburg Formation
	Medina Group	Medina Group		Shawangunk Formation
UPPER ORDOVICIAN				
	Queenston Formation Lorraine Group Utica Formation Trenton Group Black River Group	Queenston Formation Lorraine Group Utica Formation Trenton Group Black River Group	Frankfurt/Quassaic Formations Utica Formation/Snake Hill Fm. Trenton Group, Black River Gp.	
LOWER ORDOVICIAN			Chazy Group	SAUK
		Beekmantown Group	Beekmantown/Wappinger Group	
UPPER CAMBRIAN	Beekmantown Group	Beekmantown Group	Beekmantown/ Wappinger/Stockbridge	
MIDDLE-UPPER CAMBRIAN			Wappinger/Stockbridge	
PRECAMBRIAN	Grenville basement	Grenville basement	Grenville basement	

The generalized stratigraphic columns for rocks in western, central, and eastern New York State.

**SOUTH-CENTRAL  
 NEW YORK**



\*Thickness may in part be due to deformation.

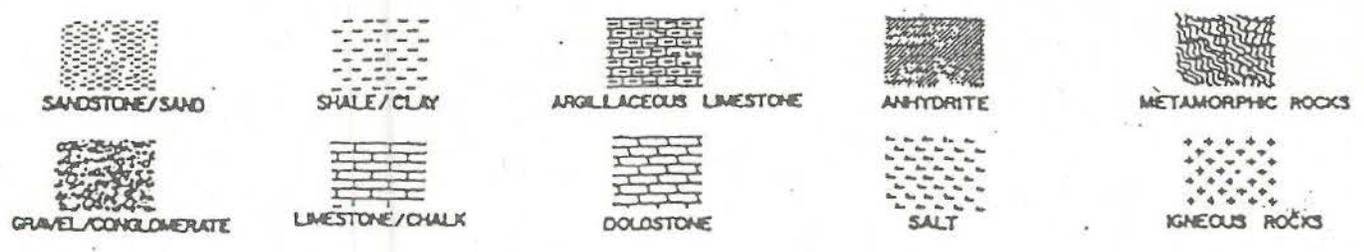
Adapted from a drawing by Kenneth S. Johnson and Serge Gonzales in Salt Deposits in the United States and Regional Geologic Characteristics Important for Storage of Radioactive Waste, March 1978.

Generalized Columnar Section of Salina Group in South-Central New York.



PERIOD	GROUP	UNIT	LITHOLOGY			
PENN.	POTTSVILLE	CLEAN		QUARTZ PEBBLE CONGLOMERATE AND SANDSTONE		
MISS.	POCONO	KNAPP		QUARTZ PEBBLE CONGLOMERATE, SANDSTONE, AND MINOR SHALE		
DEVONIAN	UPPER	CONEWANGO		SHALE AND SANDSTONE SCATTERED CONGLOMERATES		
		CONNEAUT	CHADAKON	SHALE AND SILTSTONE SCATTERED CONGLOMERATES		
		CANADAWAY	UNDIFFERENTIATED		SHALE AND SILTSTONE	
			PERRYSBURG		MINOR SANDSTONE	
		WEST FALLS	JAVA		SHALE AND SILTSTONE	
			MUNDA		MOLLACEOUS LIMESTONE	
	MIDDLE	HAMILTON	RHINESTREET		SHALE AND SILTSTONE	
			SONYEA	MIDDLESEX		SHALE WITH MINOR SILTSTONE AND LIMESTONE
			GENESEE		LIMESTONE WITH MINOR SILTSTONE AND SANDSTONE	
		TULLY	MOSCOW		SHALE WITH MINOR SANDSTONE AND CONGLOMERATE	
			LULOWVILLE		LIMESTONE	
			SKANEATELES MARCELLUS ONONDAGA		LIMESTONE	
LOWER	TRISTATES	ORISKANY		SANDSTONE		
	HELDERBERG	MANLIUS RONDOUT AKRON		LIMESTONE AND DOLOSTONE DOLOSTONE		
SILURIAN	UPPER	SALINA		SHALE, SILTSTONE, ANHYDRITE AND HALITE		
		LOCKPORT	LOCKPORT		LIMESTONE AND DOLOSTONE	
	LOWER	CLINTON	ROCHESTER RONDEQUOT SOUS REYNOLDS THOROLD		SHALE AND SANDSTONE	
		MEDINA	GRIMSBY WHIRLPOOL		LIMESTONE AND DOLOSTONE	
ORDOVICIAN	UPPER	QUEENSTON OSWEGO LORRAINE UTICA		SHALE AND SILTSTONE WITH MINOR SANDSTONE		
	MIDDLE	TRENTON-BLACK RIVER	TRENTON BLACK RIVER		LIMESTONE AND MINOR DOLOSTONE	
	LOWER	BEEKMANTOWN	TRIBES HILL CHUCTANUNDA		LIMESTONE	
CAM-BRIAN	UPPER	LITTLE FALLS GALWAY (THERESA) POTSDAM		QUARTZ SANDSTONE AND DOLOSTONE; SANDSTONE AND SANDY DOLOSTONE; CONGLOMERATE BASE		
PRECAMBRIAN		GNEISS, MARBLE, QUARTZITE, ETC.		METAMORPHIC AND IGNEOUS ROCKS		

EXPLANATION

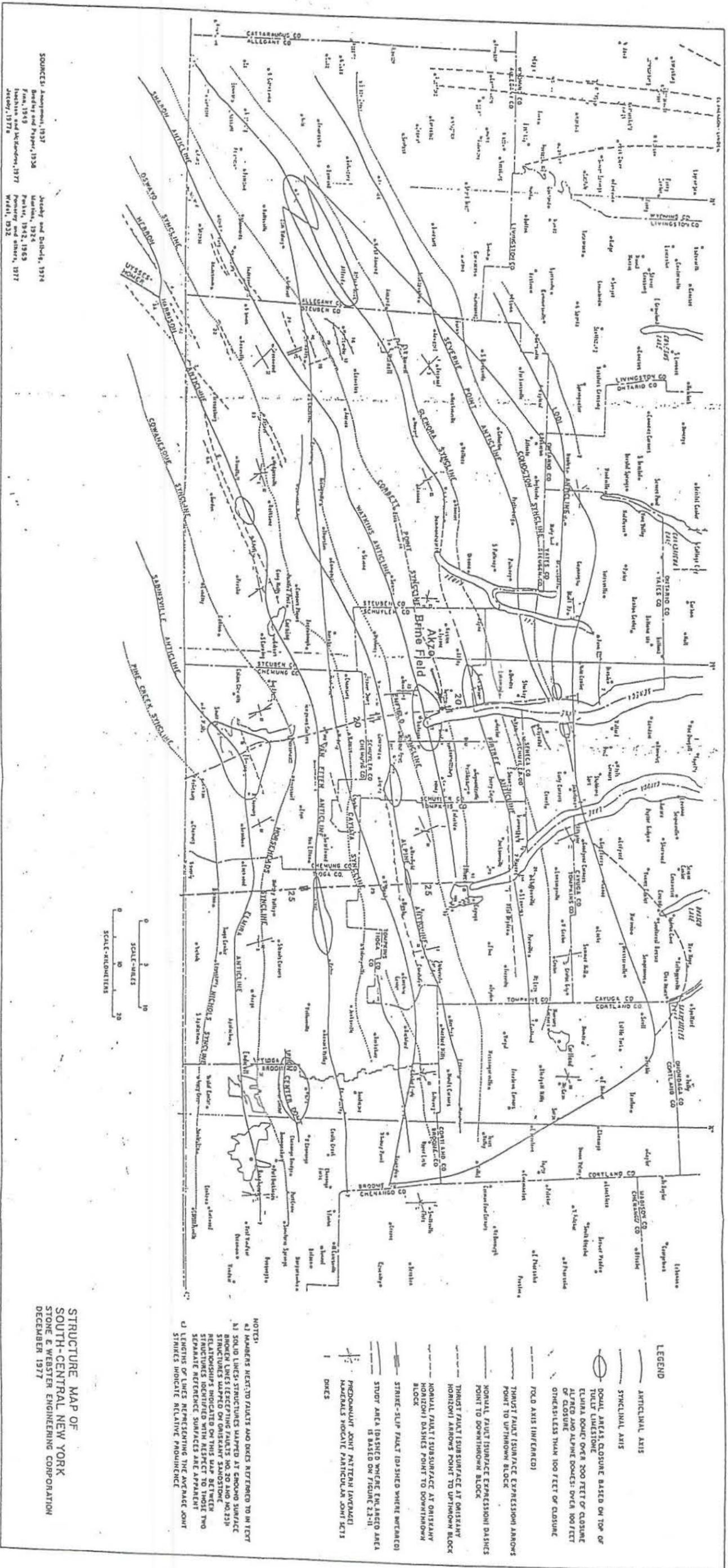


~~CONFIDENTIAL~~  
RE.

Modified after Van Tyne and Copley, 1983

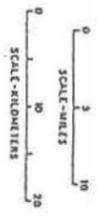
Figure 2. Stratigraphic Section, Southwestern New York





SOURCES: Anonymous, 1937  
 Bondy and Pappert, 1938  
 Fink, 1949  
 Inghite and McKeown, 1977  
 Wafar, 1932

Shady and Duffield, 1914  
 Martin, 1924  
 Peltis, 1942, 1963  
 Penney and others, 1977  
 Wafar, 1932



LEGEND

- ARTICULAR AXIS
- SYNCLINAL AXIS
- DOAL AREA'S CLOSURE BASED ON TOP OF TULLY LIMESTONE
- ELIHA DOAL OVER 200 FEET OF CLOSURE
- ALFRED AND ALPHE DOALS: OVER 100 FEET OF CLOSURE
- OTHERS: LESS THAN 100 FEET OF CLOSURE
- TRUST FAULT (SUBSURFACE EXPRESSION ARROWS POINT TO UPRIGHT BLOCK)
- NORMAL FAULT (SUBSURFACE EXPRESSION) DASHES POINT TO DOWNTHROW BLOCK
- THOUST FAULT (SUBSURFACE AT ONISSEAN HORIZONTAL ARROWS POINT TO UPRIGHT BLOCK)
- NORMAL FAULT (SUBSURFACE AT ONISSEAN HORIZONTAL) DASHES POINT TO DOWNTHROW BLOCK
- STRIKE-SLIP FAULT (DASHED WHERE WRITATED)
- STUDY AREA (DASHED WHERE ENLARGED AREA IS BASED ON FIGURE 2.1-1)
- PREDOMINANT JOINT PATTERNS (ARROWS)
- MEASUREMENTS INDICATE PATTERNS JOINT SCIS
- DICES

NOTES

- a) MEASUREMENTS NEXT TO FAULTS AND DICES REFERRED TO IN TEXT
- b) SOLID LINES STRUCTURES MAPPED AT GROUND SURFACE
- c) DOTTED LINES (EXCEPTING FAULTS NO. 20 AND NO. 21) STRUCTURES MAPPED ON ONISSEAN SANDSTONE
- d) RELATIONSHIPS INDICATED ON THIS MAP BETWEEN STRUCTURES IDENTIFIED WITH RESPECT TO THOSE TWO SEPARATE REFERENCE SURFACES ARE APPARENT
- e) LENGTHS OF LINES REPRESENTING THE AVERAGE JOINT STRIKES INDICATE RELATIVE PROMINENCE

STRUCTURE MAP OF  
 SOUTH-CENTRAL NEW YORK  
 STONE & WEBSTER ENGINEERING CORPORATION  
 DECEMBER 1977





Schlumberger

SIMULTANEOUS  
**COMPENSATED NEUTRON-  
 FORMATION DENSITY**

COUNTY	WATKINS GLEN	COMPANY	AKZO SALT, INC.			
FIELD	WATKINS GLEN	WELL	INTERNATIONAL SALT #58			
LOCATION	WATKINS GLEN	FIELD	WATKINS GLEN			
WELL	WATKINS GLEN	COUNTY	SCHUYLER	STATE	NEW YORK	
COMPANY	AKZO SALT, INC.	LOCATION				Other Services: DENSITY NEUTRON
		API SERIAL NO.	SECT.	TWP.	RANGE	GAMMA RAY CALIPER
		31-097-21467	N/A	READING	N/A	
Permanent Datum	GROUND LEVEL	Elev.	812.7 F			Elev.: K.B.826.0 F
Log Measured From	KELLY BUSHING	13.3 F	above Perm. Datum			D.F.825.0 F
Drilling Measured From	KELLY BUSHING				G.L.812.7 F	
Date	21 OCTOBER 1992					
Run No.	One					
Depth Driller	2639.0 F					
Depth Logger (Schl.)	2642.0 F					
Btm. Log Interval	2638.0 F					
Top Log Interval	176.0 F					
Casing-Driller	13 3/8"	@ 179.0 F		@		@
Casing-Logger	176.0 F					
Bit Size	12 1/4"	@		@		@
Type Fluid in Hole	SALT MUD					
Dens.	Visc.	10.00 LB/G				
pH	Fld. Loss					
Source of Sample						
Rm @ Meas. Temp.					@	@
Rmf @ Meas. Temp.					@	@
Rmc @ Meas. Temp.					@	@
Source: Rmf	Rmc					
Rm @ BHT					@	@
TIME	Circulation Ended					
	Logger on Bottom					SEE LOG
Max. Rec. Temp.						
Equip.	Location	8317	BRADFORD.PA			
Recorded By	TIM LYON					
Witnessed By	NONE					

The well name, location and borehole reference data were furnished by the customer.

All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretations made by any of our officers, agents or employees. These interpretations are also subject to Clause 4 of our General Terms and Conditions set forth in our current Price Schedule.







Baker Atlas

# MicroVertilog

Magnetic Flux Leakage Inspection

Sensor on Tuesday

Company	Inergy Midstream		
Well	U_S_Salt Well # 58		
Field	US Salt		
County	Schyler		
State	New York		
Location:			
Section	Township	Range	
Date	Oct. 14, 2009		
Service Order	571581		
Recorded by	A. Anderson		
Witnessed by	Mr. Robert Tune		
API Serial No.	N/A		
Permanent Datum:	G.L.	Elevation: 0.000 ft.	Depth 2100.000
Log Measured From:	Driller Floor	15.000 ft. above Perm. Datum	Btm. Log Interval 2050.000
Drilling Measured From:	Kelly Bushing	0.000 ft. above Perm. Datum	Top Log Interval 0.000
		Fluid Type	Fresh Water

Case No. Data



*Gamma Ray Neutron*

**Baker Atlas**

File No: 584731	Company Energy Midstream
API No: 31-097-21467	Well Us Salt #58
	Field Us Salt
	County Schuyler
	State New York

Thank You.	Location Twp: Watkins Glen	Other Services
	SEC N/A TWP RGE N/A	

Permanent Datum	G.L.	Elevation	814 ft	Elevations
Log Measured From	M.G.	2 ft	Above P.D.	KB N/A
Drill Measured From	Kelly Bushing			DF N/A
				GL 814 ft

Date	November 4, 2009		
Run	One		
Service Order	584731		
Depth Driller	2425 ft		
Depth Logger	2440 ft		
Bottom Logged Interval	2438.1 ft		
Top Logged Interval	Surface		
Time Started	9:00		
Time Finished	11:00		
Operator Rig Time	2 Hrs.		
Type of Fluid in Hole	Brine		
Fluid Density	N/A		
Salinity	N/A		
Fluid Level	Full		
Logged Cement Top	N/A		
Wellhead Pressure	0 psi		
Maximum Hole Deviation	N/A		
Nominal Logging Speed	45 fpm		
Maximum Recorded Temperature	N/A		
Reference Log	N/A		
Reference Log Date	N/A		
Equipment No.	Location	9703	Buckhannon, Wv.
Recorded By	Matthew J. Wood		
Witnessed By	Mr. Tom Cole		

- FOLD HERE

In making interpretations of logs, our employees will give the customer the benefit of their best judgement. But since all interpretations are opinions based on inferences from electrical or other measurements, we



# Gamma Ray Segmented Bond Log

Baker Atlas

File No: 571581	Company Inergy Midstream		
API No: N/A	Well US Salt #58		
	Field US Salt		
	County Schlyer	State New York	
Thank You	Location		Other Services MicroVertilog 9 5/8"
	SEC N/A	TWP N/A	RGE N/A
Permanent Datum	G.L.	Elevation N/A	Elevations
Log Measured From	D.F.	15 ft Above P. D.	KB N/A
Drill Measured From	Kelly Bushing		DF N/A
			GL N/A

Date	14-October-09	
Run	One	
Service Order	571581	
Depth Driller	2100 ft	
Depth Logger	2050 ft	
Bottom Logged Interval	2050 ft	
Top Logged Interval	100 ft	
Time Started	8:00	
Time Finished	10:00	
Operator Rig Time	2 Hrs.	
Type of Fluid in Hole	Fresh Water	
Fluid Density	N/A	
Salinity	N/A	
Fluid Level	100 ft	
Logged Cement Top	100 ft	
Wellhead Pressure	0 psi	
Maximum Hole Deviation	N/A	
Nominal Logging Speed	30 fpm	
Maximum Recorded Temperature	N/A	
Reference Log	N/A	
Reference Log Date	N/A	
Equipment No.	Location	4112   Buckhannon W7
Recorded By	A. Anderson	
Witnessed By	Mr. Robert Ture	



# Finger Lakes LPG Storage, LLC

## Reservoir Suitability Report

### Exhibit 9

#### WELL STATUS AND CONDITION REPORT<sup>1</sup>

##### Finger Lakes Gallery 1

###### Well 33

API No.:31-097-52932-00-01

Ground elevation = ~681 feet      Total Depth – 2,257 feet

Casing seat = 2,000 feet

Top of cavern = 2,013 feet

Top of rubble, bottom of existing cavern = 2,220 feet.

Status: Reentered for pressure testing. Completed With 8 5/8" casing cemented to surface, with 4 1/2" hanging tubing. Will be converted to LPG storage.

###### Well 43

API No.: 31-097-61199-00-01

Ground elevation = ~703 feet      Total Depth – 2,314 feet

Casing seat = 2,123 feet

Top of cavern = 2,123 feet

Top of rubble, bottom of existing cavern = 2,314 feet.

Status: rework to use for monitoring well with possible use for product movement. 4" FJ installed cemented to surface

###### Well 34

API No.: 31-097-61190-00-01

Ground elevation = ~706      Total Depth – 2,383 feet

Casing seat = 2,212 feet

Top of cavern = 2,209 feet

Top of rubble, bottom of existing cavern = 2,383 feet.

Status: to be plugged and abandoned.

---

<sup>1</sup> See the well diagrams contained in Exhibit 10.

#### **Well 44**

API No.: 31-097-61200-00-01

Ground elevation = ~706 feet                      Total Depth – 2,423 feet

Casing seat = 2,270 feet

Top of cavern = 2,274 feet

Top of rubble, bottom of existing cavern = 2,423 feet.

Status: 6 5/8" liner cemented from 2120' to surface. For conversion to monitoring well with possible use for product movement. LPG storage brine well (Possible withdrawal only)

#### **Finger Lakes Gallery 2**

#### **Well 58**

API No.: 31-097-21467-00-01

Ground elevation = 814 feet                      Total Depth – 2,425 feet

Casing seat = 2,183 feet

Top of cavern = 2,150 feet

Top of rubble, bottom of existing cavern = 2,425 feet

Status: reopened in 2009; permit to convert from a stratigraphic well to brine well issued on March 4, 2010. 9 5/8" casing at 2,183 feet with 5 1/2" hanging tubing at 2420 feet.

#### **Adjacent Well Information**

#### **Well 18**

API No.: 31-097-51496

Ground elevation = 687 feet                      Total Depth – 2,494 feet

Casing seat = 588 feet

Top of cavern = TBD

Top of rubble, bottom of existing cavern = 2,494 feet

Status: P&A on 7/1/1977; drilling permit to re-open issued on January 19, 2010

#### **Well 29**

API No.: 31-097-03940

Ground elevation = 605 feet                      Total Depth – 2,694 feet

Casing seat = 2,684 feet

Top of cavern = Unknown

Top of rubble, bottom of existing cavern = Unknown

Status: P&A on 7/16/71

**Well 52**

API No.: 31-097-61208-00-01

Ground elevation = 687 feet

Casing seat = 2,750 feet

Top of cavern = Unknown

Top of rubble, bottom of existing cavern = Unknown

Status: P&A on 4/11/96; redrilled on 11/7/09 per DEC permit issued on November 6, 2009

Total Depth – original (1972) 2,782 feet; (2009)  
2,697 feet

**Well 57**

API No.: 31-097-12858-00-00

Ground elevation = 695 feet

Casing seat = 2,770 feet

Top of cavern = TBD

Top of rubble, bottom of existing cavern = TBD

Status: P&A on 6/5/96; drilling permit to re-open issued on January 19, 2010

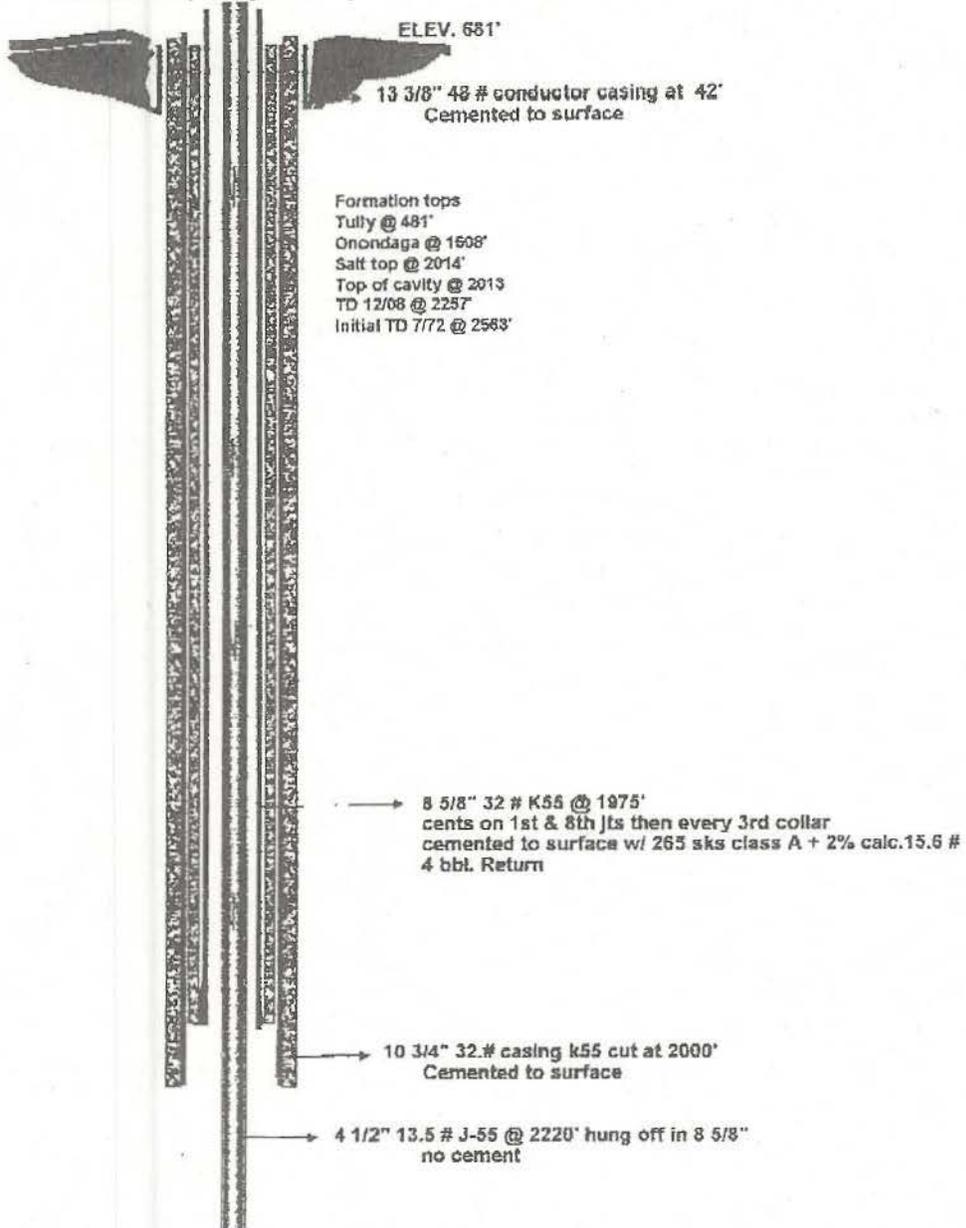
Total Depth – 2,764 feet



# ENERGY MIDSTREAM

## Well-# 33

Watkins Glen ; Schuyler County NY



ELEV. 681'

13 3/8" 48 # conductor casing at 42'  
Cemented to surface

Formation tops  
Tully @ 481'  
Onondaga @ 1608'  
Salt top @ 2014'  
Top of cavity @ 2013  
TD 12/08 @ 2287'  
Initial TD 7/72 @ 2563'

8 5/8" 32 # K55 @ 1975'  
cents on 1st & 8th Jts then every 3rd collar  
cemented to surface w/ 265 sks class A + 2% calc. 15.6 #  
4 bbl. Return

10 3/4" 32.# casing k55 cut at 2000'  
Cemented to surface

4 1/2" 13.5 # J-55 @ 2220' hung off in 8 5/8"  
no cement

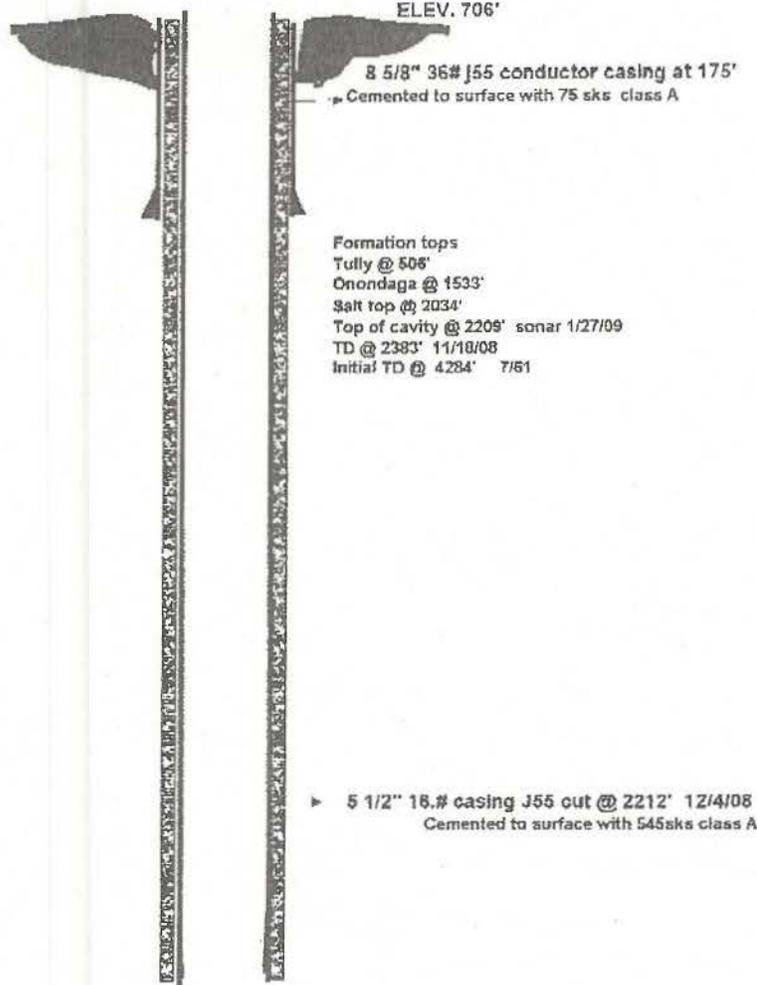
date drilled 07-72 date of p&a 8/23/1976 date redrilled 12-09

Well Name & Number	#03 AP# 31-097-62932-00-01	Lease	US SALT		
County or Parish	Schuyler	State/Prov.	NY	Country:	US
Perforations: (MD)		(TVD)			
Angle/Plots	Angle @KOP and Depth:		KOP (V/D)	0	
BHP:	0	BHT:	0	Completion Fluid:	Brine
FWIP:	FBHP:	FWHT:	FBHT:	Other:	
Date Completed:	09/23/09			RKB:	
Prepared By	Tom Cole	Last Revision Date:	12/23/09	Tom Cole	

# ENERGY INDUSTRIES

## Well # 94

Watkins Glen ; Schuyler County NY



▶ 5 1/2" 18.# casing J55 out @ 2212' 12/4/08  
Cemented to surface with 545sks class A

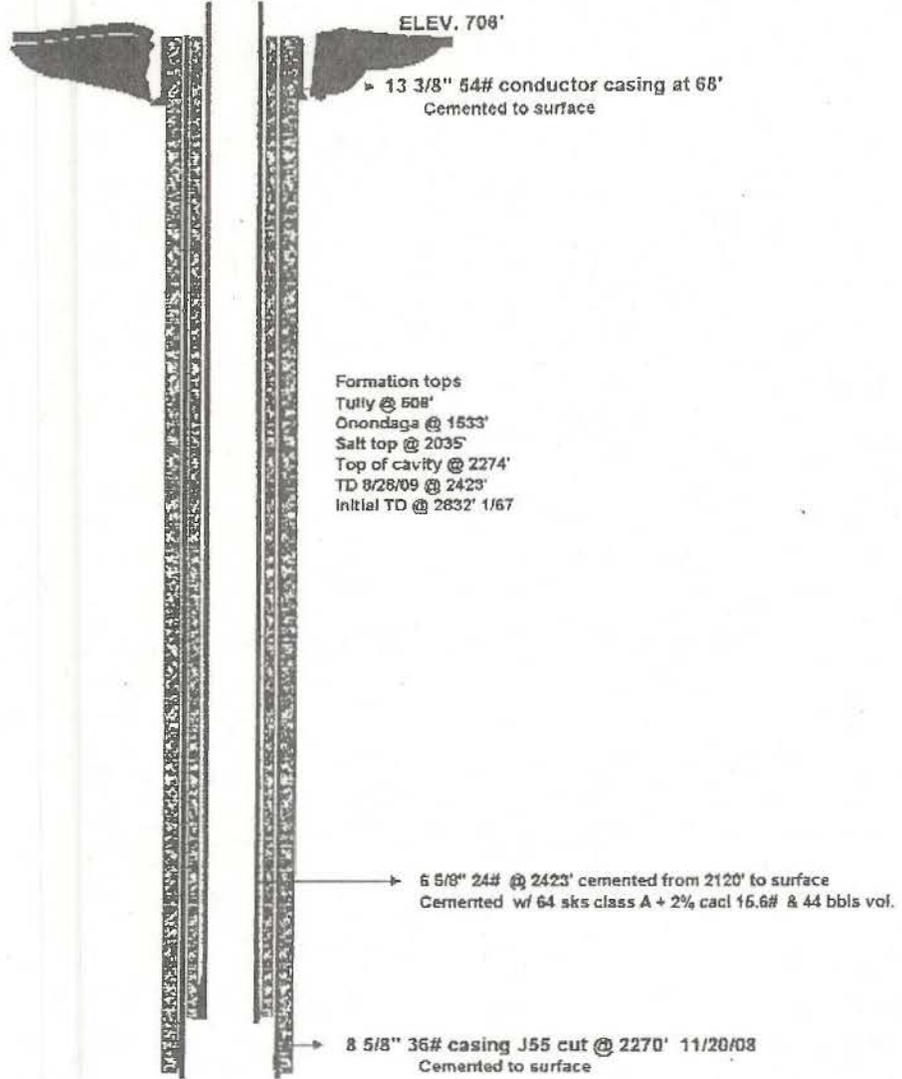
plugging permit 09-13433p 91009 will be plugged by 31010

Well Name & Number:	# 94	AP# 21-097-51-190-00-01	Lease	US SALT	
County or Parish:	Schuyler	State/Prov.	NY	Country:	US
Permit/Reg. (MU):			(TVD):		
Angle/Ports	Angle to KOP and Depth		KOP TVD		0
BHP:	0	SHT:	0	Completion Fluid:	Brine
FWHP:		FBHP:		FWHT:	
Date Completed:	06/12/09		Other:		
Prepared By:	Tom Cole		Last Revision Date:	12/28/08 Tom Cole	

# ENERGY INDUSTRIES

## Well # 44

Watkins Glen ; Schuyler County NY

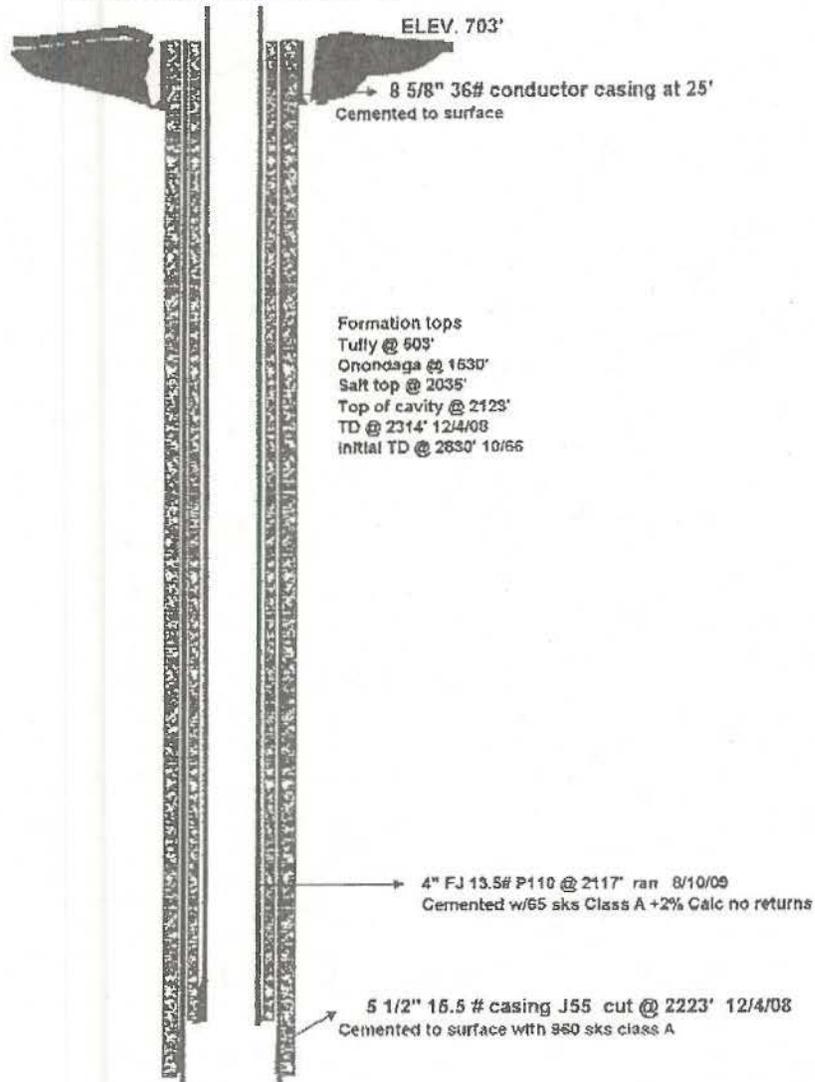


Well Name & Number	44	AP# 31-097-81200-00-01	Lease	US SALT	
County or Parish	Schuyler	State/Prov.	NY	Country:	US
Perforations (MD)		(TVD)			
Angle/Perfs	Angle (2KOP and Depth)			KOP (VD)	0
RHP	0	RHT	0	Completion Fluid:	Brine
F-WHP	F6-RP		FWHT	FBIIT	Other
Date Completed	01/17/08			RKB	
Prepared By	Tom Cole		Last Revision Date:	12/28/08	Tom Cole

# ENERGY INDUSTRIES

## Well # 43

Watkins Glen ; Schuyler County NY

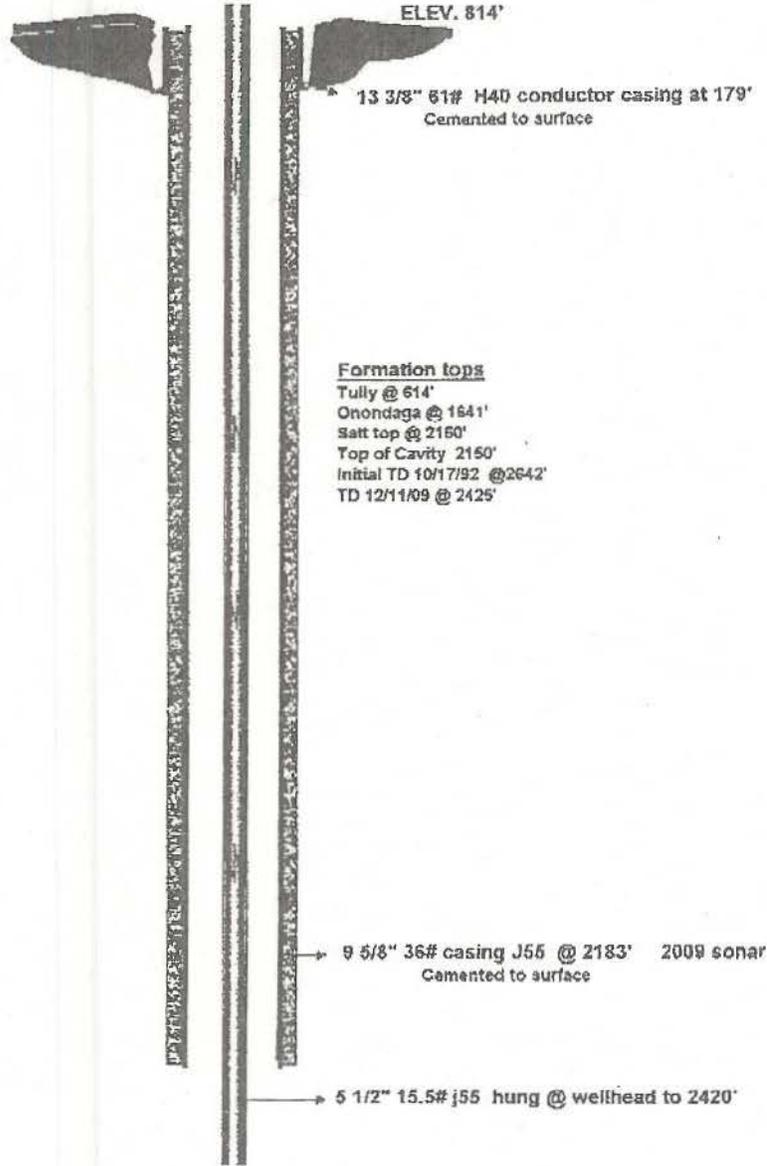


Well Name & Number:		#43 API# 31-097-61198-00-01		date drilled 10/66		redrilled 12/08	
County or Parish:		Schuyler		State/Prov:		NY	
Perforations: (MD)				Country:		US	
Angle/Perfs		Angle @KOP and Depth		:TVD:		KOP TVD	
BHP		0 BHT		Completion Fluid:		Brine	
FWIP:		FBIP:		FWHT:		FBHT:	
Date Completed		09/10/09		Cpac:		RKB:	
Prepared By		Tom Cole		Last Revision Date:		12/29/09 Tom Cole	

# ENERGY INDUSTRIES

## Well- # 53

Watkins Glen ; Schuyler County NY

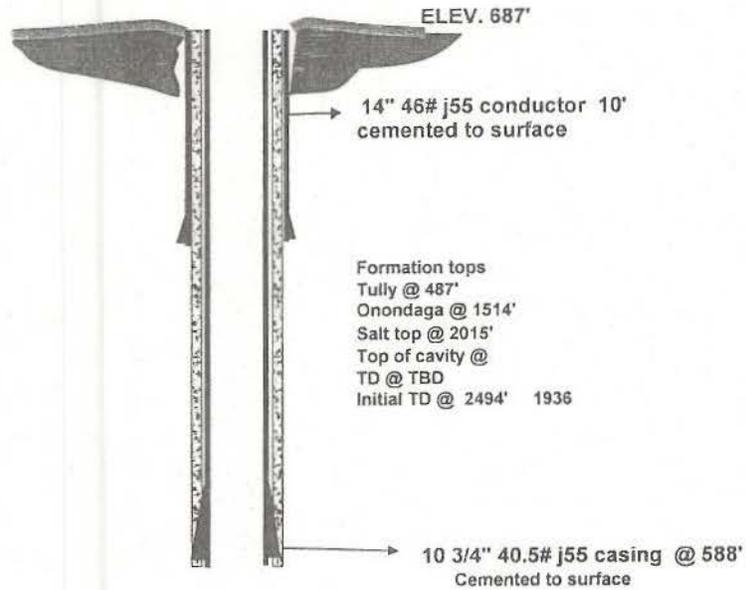


date drilled		10/17/1992		date plugged		10/14/2003		date redrilled		10/8/09	
Well Name & Number:			#50 AP# 31-097-21467-00-01			Lesse			US SALT		
County or Parish:			Schuyler		State/Prov.		NY		Country:		US
Perforations: (MO)						(TVD)					
Angle/Meta		Angle @KOP and Depth				KOP (VD)		0			
BHP:		0		WIT:		0		Completion Fluid:		Brine	
FWHP:		FBHP:		PWHT:		FBHT:		Other:			
Date Completed:			11/12/09			RKB:					
Prepared by:			Tom Cole			Last Revision Date:			12/20/09 Tom Cole		

# ENERGY MIDSTREAM

## Well- # 18

Watkins Glen ; Schuyler County NY



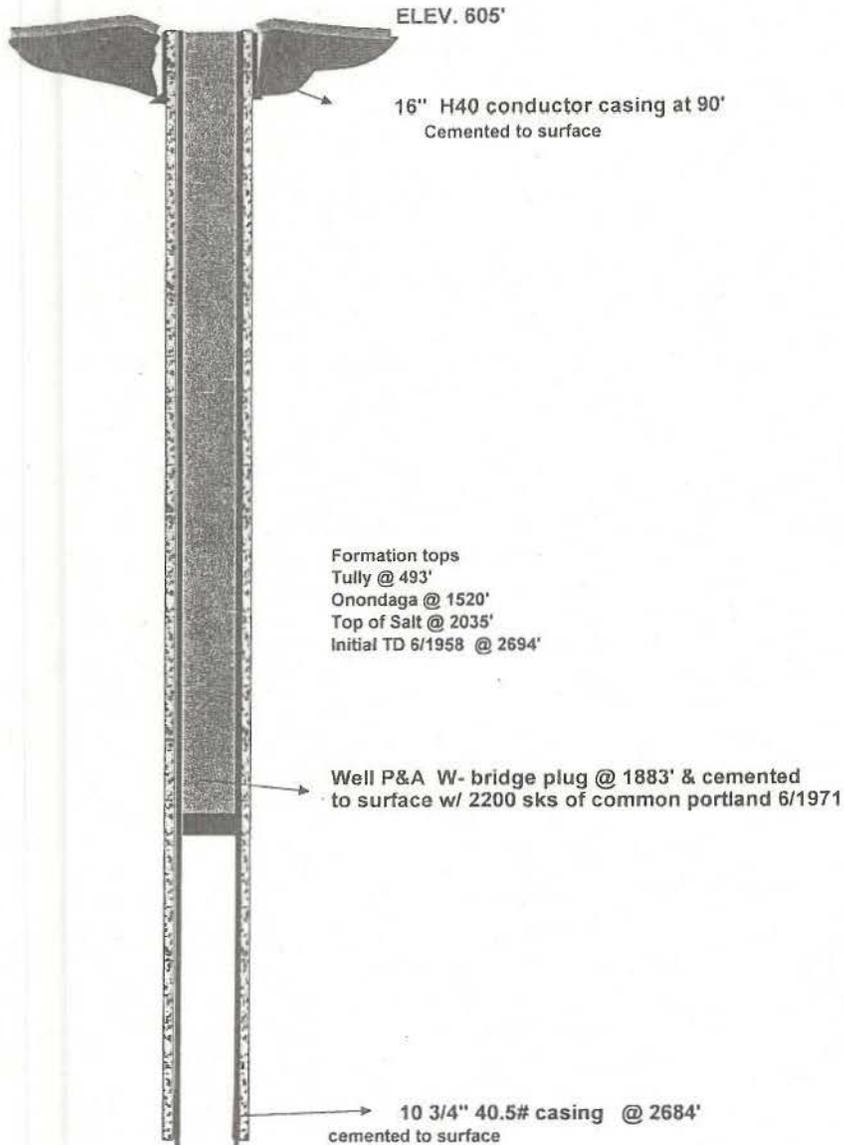
→ AT THIS TIME 1/29/2010 WELL IS P&A FROM 1906' TO SURFACE  
W/ HALI-LITE 550 SKS WITH NO RECORD OF MAN. PLUG

plugging permit # 77-5402p to 1906'

date p&a		7/1/1977		date drilled		1/19/1936 redrilled	
Well Name & Number:		# 18 API# 31-097-51-496-00-01		Lease		US SALT	
County or Parish:		Schuyler State/Prov.		NY		Country: US	
NAD83 LAT. LONG.		42.423106 / 76.896697		(TVD)			
Angle/Perfs	Angle @KOP and Depth			KOP TVD		0	
BHP:	0	BHT:	0	Completion Fluid:		Brine	
FWHP:	FBHP:	FWHT:	FBHT:	Other:		RKB:	
Date Completed:							
Prepared By:		Tom Cole		Last Revision Date:		01/29/10 Tom Cole	

# US SALT Well- # 29

Watkins Glen ; Schuyler County NY

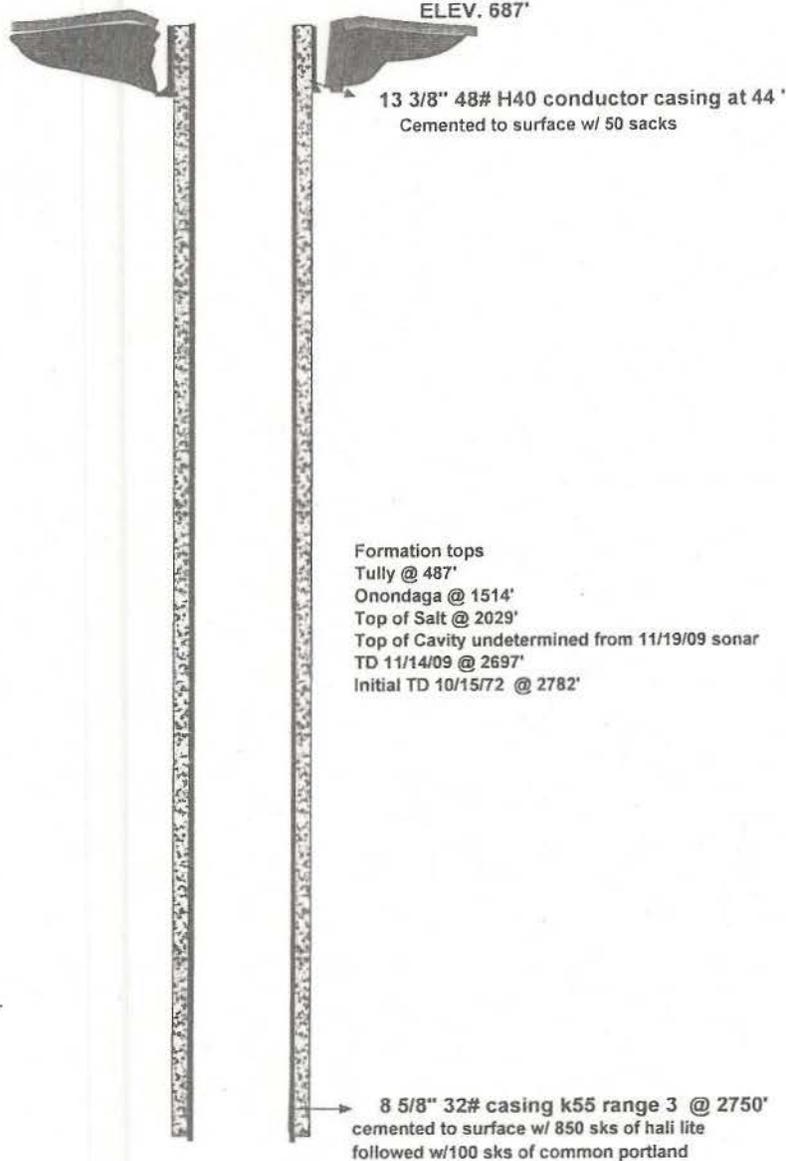


date drilled		6/1/1958		date plugged		7/16/1971	
Well Name & Number:		#29 API# 31-097-0394-00-00		Lease		US SALT	
County or Parish:		Schuyler		State/Prov.		NY	
Country:		US		Perforations: (MD)		(TVD)	
Angle/Perfs		Angle @KOP and Depth		KOP TVD		0	
BHP:		0		Completion Fluid:		Brine	
FWHP:		FBHP:		FWHT:		FBHT:	
Date Completed:		01/27/10		Other:		RKB:	
Prepared By:		Tom Cole		Last Revision Date:		01/27/10 Tom Cole	

# ENERGY MIDSTREAM

## Well- # 52

Watkins Glen ; Schuyler County NY



Formation tops  
 Tully @ 487'  
 Onondaga @ 1514'  
 Top of Salt @ 2029'  
 Top of Cavity undetermined from 11/19/09 sonar  
 TD 11/14/09 @ 2697'  
 Initial TD 10/15/72 @ 2782'

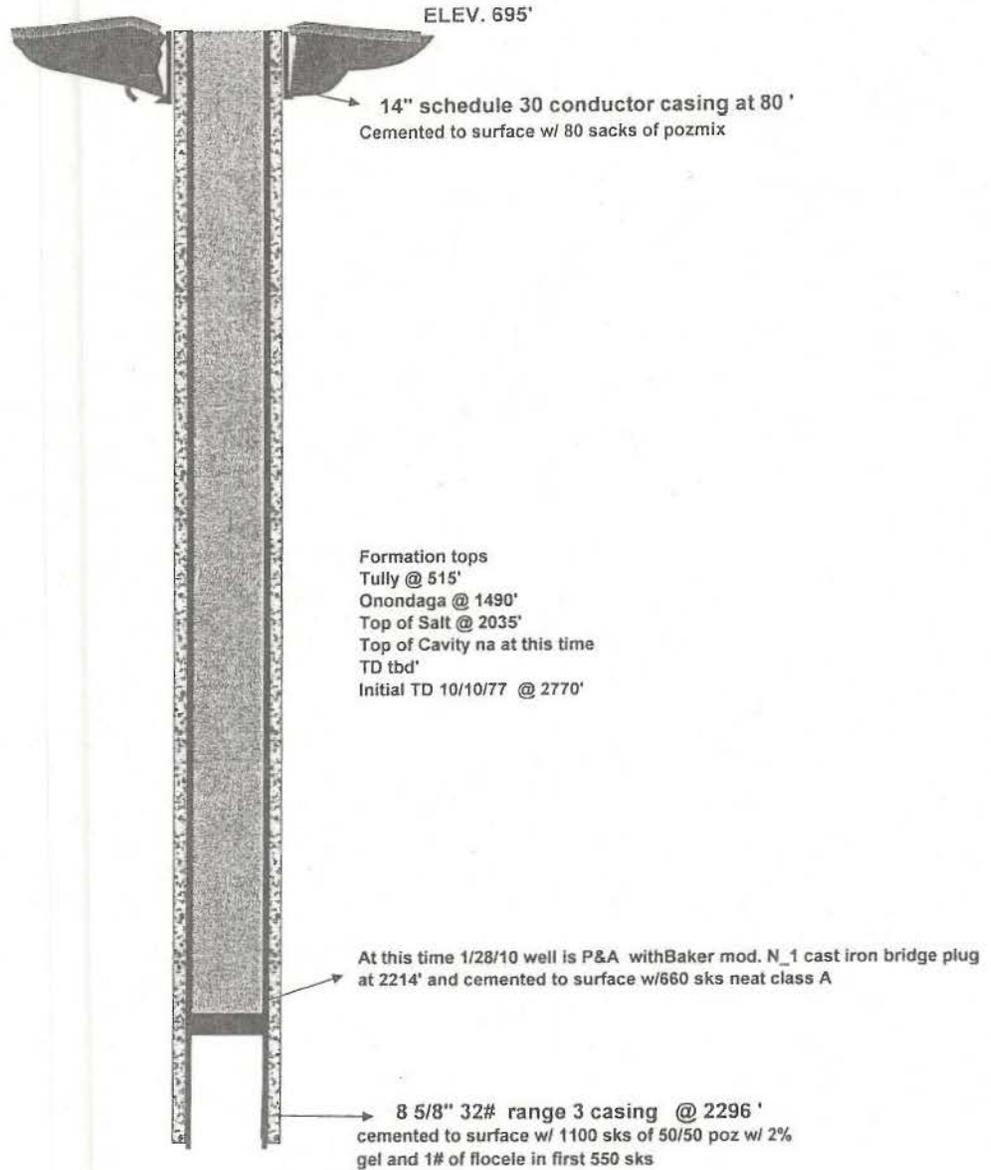
8 5/8" 32# casing k55 range 3 @ 2750'  
 cemented to surface w/ 850 sks of hali lite  
 followed w/100 sks of common portland

date drilled		10/15/1972	date plugged		4/11/1996	date redrilled		11/7/09
Well Name & Number:	#52 API# 31-097-61208-00-01			Lease	US SALT			
County or Parish:	Schuyler	State/Prov.	NY		Country:	US		
Perforations: (MD)				(TVD)				
Angle/Perfs	Angle @KOP and Depth			KOP TVD	0			
BHP:	0	BHT:	0	Completion Fluid:	Brine			
FWHP:	FBHP:		FWHT:	FBHT:	Other:			
Date Completed:	11/12/09			RKB:				
Prepared By:	Tom Cole		Last Revision Date:	12/30/09	Tom Cole			

# INERGY MIDSTREAM

## Well- #57

Watkins Glen ; Schuyler County NY



Formation tops  
 Tully @ 515'  
 Onondaga @ 1490'  
 Top of Salt @ 2035'  
 Top of Cavity na at this time  
 TD tbd'  
 Initial TD 10/10/77 @ 2770'

At this time 1/28/10 well is P&A with Baker mod. N\_1 cast iron bridge plug at 2214' and cemented to surface w/660 sks neat class A

8 5/8" 32# range 3 casing @ 2296 '  
 cemented to surface w/ 1100 sks of 50/50 poz w/ 2% gel and 1# of flocele in first 550 sks

date drilled		9/1/1977	date plugged		6/5/1996	date redrilled		
Well Name & Number:		#57 API# 31-097-12858-00-01		Lease		US SALT		
County or Parish:		Schuyler	State/Prov.		NY	Country:		US
Perforations: (MD)				(TVD)				
Angle/Perfs	Angle @KOP and Depth				KOP TVD	0		
BHP:	0	BHT:	0	Completion Fluid:		Brine		
FWHP:	FBHP:		FWHT:		FBHT:		Other:	
Date Completed:		01/27/10				RKB:		
Prepared By:		Tom Cole		Last Revision Date:		01/28/10 Tom Cole		









Survey File: 11093325

Date: 11-17-09  
Time: 21:00:25

INERGY MIDSTREAM

WELL#52  
WATKINS GLENN  
NY.REYNOLDS/LAWSON  
DEC 11.5  
SCHUYLER CO.Survey Reference Point : 327.5  
Local Grid Offset : 0.0Drift Correction Method: Constant Rate from initial to final sighting  
Survey Computation Method: Minimum Curvature

Target Direction: 0.00

## FINAL DATA (INRUN)

Measured Depth (feet)	Course Inclination	Course Direction	Vertical Depth (feet)	Rectangular Coordinates		Vertical Section	Dogleg Severity (per100)
				N/S	E/W		
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.64	3.37	100.00	0.56	0.03	0.56	0.64
200.00	0.62	14.88	199.99	1.64	0.21	1.64	0.13
300.00	0.59	17.84	299.99	2.66	0.50	2.66	0.04
400.00	0.43	10.15	399.98	3.52	0.73	3.52	0.17
500.00	0.20	76.10	499.98	3.94	0.97	3.94	0.40
600.00	0.68	131.80	599.98	3.58	1.58	3.58	0.59
700.00	0.97	120.64	699.96	2.76	2.75	2.76	0.33
800.00	1.02	110.96	799.95	2.00	4.32	2.00	0.18
900.00	1.20	95.62	899.93	1.58	6.19	1.58	0.34
1000.00	1.04	92.73	999.91	1.44	8.13	1.44	0.17
1100.00	0.82	104.58	1099.90	1.21	9.73	1.21	0.29
1200.00	0.69	107.69	1199.89	0.85	11.00	0.85	0.14
1300.00	0.80	129.46	1299.88	0.22	12.11	0.22	0.30
1400.00	0.85	133.61	1399.87	-0.73	13.18	-0.73	0.07
1500.00	1.07	123.92	1499.86	-1.76	14.49	-1.76	0.27
1600.00	1.02	124.60	1599.84	-2.78	16.00	-2.78	0.04
1700.00	0.98	125.37	1699.82	-3.79	17.43	-3.79	0.04
1800.00	0.92	90.01	1799.81	-4.28	18.93	-4.28	0.58
1900.00	0.81	98.50	1899.80	-4.39	20.43	-4.39	0.17
2000.00	0.57	87.82	1999.79	-4.47	21.63	-4.47	0.27
2100.00	0.62	89.44	2099.79	-4.45	22.66	-4.45	0.05
2200.00	0.89	62.80	2199.78	-4.09	23.89	-4.09	0.44
2300.00	2.15	36.87	2299.74	-2.23	25.71	-2.23	1.40
2400.00	2.60	36.29	2399.65	1.10	28.18	1.10	0.45
2500.00	2.75	29.92	2499.54	5.02	30.73	5.02	0.33
2600.00	2.44	21.24	2599.44	9.08	32.69	9.08	0.50
2700.00	2.77	4.25	2699.34	13.47	33.64	13.47	0.84

Final Closure - Direction: 68.18 degrees  
- Distance: 36.24 feet



*Gammad Ray Segmented  
Bond*

### Baker Atlas

File No: 584713  
API No: 31-097-61200

Company Well Field County

US Salt Co. #52  
Watkins Glenn Shuyler

State New York

Other Services  
8 5/8" Micro vert

Location SEC TWP RGE

Permanent Datum  
Log Measured From  
Drill Measured From

G.L. \_\_\_\_\_ Elevation 687 ft  
D.F. 10 ft Above P. D.  
K.B. \_\_\_\_\_

Elevations  
KB NA  
DF NA  
GL 687 ft

Date	11-14-2009	
Run	ONE	
Service Order	584714	
Depth Driller	2697 ft	
Depth Logger	2680 ft	
Bottom Logged Interval	2680 ft	
Top Logged Interval	500 ft	
Time Started	11:30	
Time Finished	13:00	
Operator Rig Time	1.5	
Type of Fluid In Hole	WATER	
Fluid Density	NA	
Salinity	NA	
Fluid Level	1100 ft	
Logged Cement Top	NA	
Wellhead Pressure	0 psi	
Maximum Hole Deviation	NA	
Nominal Logging Speed	32 fpm	
Maximum Recorded Temperature	NA	
Reference Log	NA	
Reference Log Date	NA	
Equipment No. Location	9701 BUCKHANNON WV	
Recorded By	WILLSON	
Witnessed By	R TINE	

- FOLD HERE

In making interpretations of logs, our employees will give the customer the benefit of their best judgement. But since all interpretations are opinions based on inferences from electrical or other measurements, we cannot, and we do not guarantee the accuracy or correctness of any interpretation. We shall not be liable or responsible for any loss, cost, damages, or expenses whatsoever incurred or sustained by the customer resulting from any interpretation made by any of our employees.



Baker Atlas

# MicroVertilog

Magnetic Flux Leakage Inspection

Company	US Salt Company			
Well	52			
Field	Watkins Glenn			
County	Shuyler			
State	New York			
Location:				
Section	Township	Range		
Date	Nov. 14, 2008			
Service Order	584714			
Recorded by	Wilson			
Witnessed by	R Tune			
API Serial No.	31-097-61200			
Permanent Datum:	GL	Elevation: 687.000 ft.	Depth	2675.000
Log Measured From:	MG	3.000 ft. above Perm. Datum	Btm. Log Interval	2670.700
Drilling Measured From:	KB	10.000 ft. above Perm. Datum	Top Log Interval	-0.500
			Fluid Type	WATER











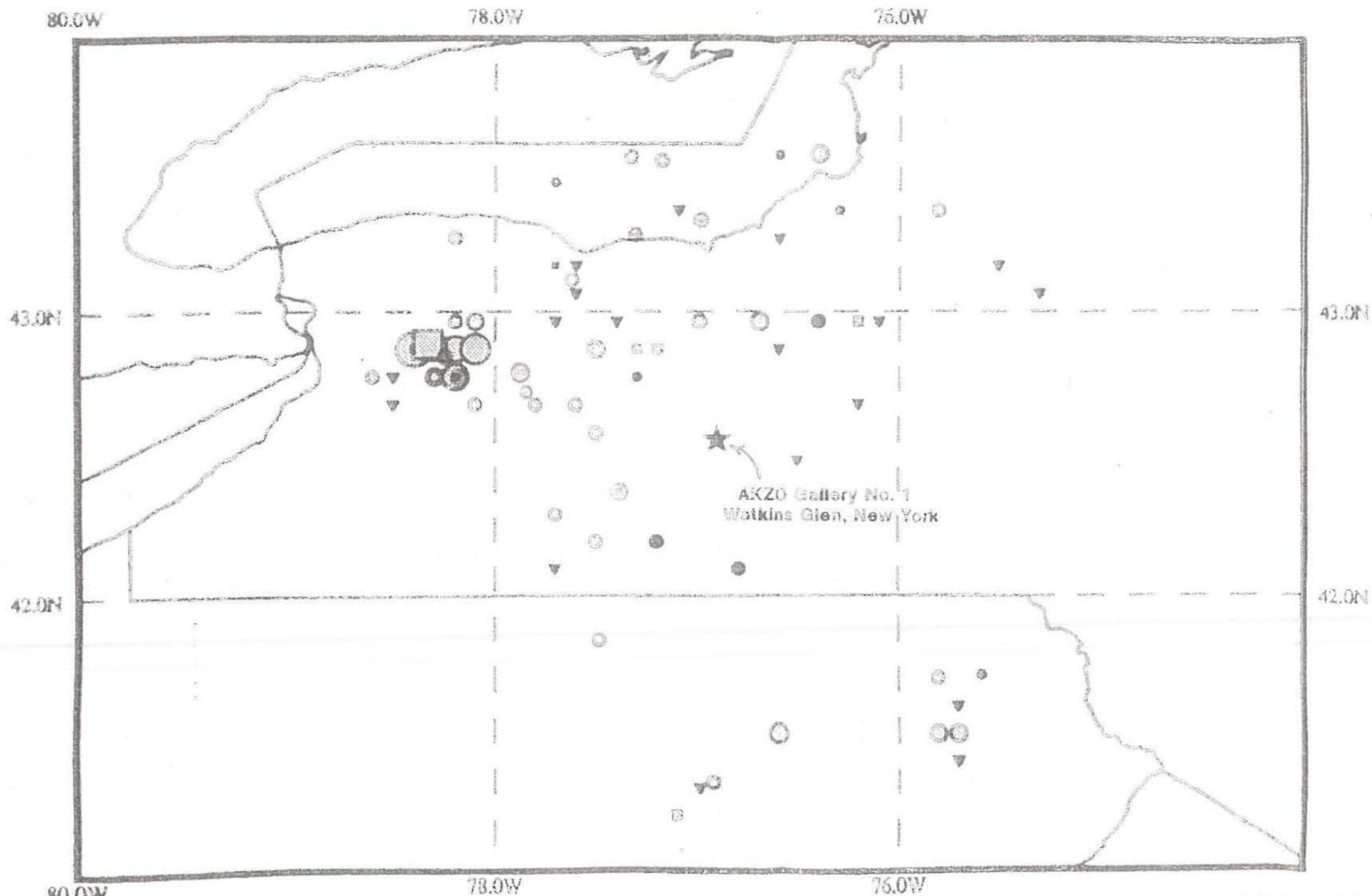






# SEISMICITY WITHIN 150 KM OF 42.417N 76.892W

● Indicates 1994-2009 area seismic events as recorded by the USGS (Magnitude range 2.6-3.6)



MAGNITUDES	
0.1 - 1.9	●
2.0 - 2.9	○
3.0 - 3.4	⊙
3.5 - 3.9	⊚
4.0 - 4.4	⊛
4.5 - 4.9	⊜
5.0 - 5.4	⊝
> 5.4	⊞



NATIONAL GEOPHYSICAL DATA CENTER / NOAA BOULDER, CO, 80303

182 Earthquakes Plotted

NO INTENSITY OR MAGNITUDE ▼

INTENSITIES	
I-III	■
IV	▣
V	▤
VI	▥
VII	▧
VIII	▨
IX	▩
X-XII	▪





# NEIC: Earthquake Search Results

U. S. GEOLOGICAL SURVEY  
EARTHQUAKE DATABASE

FILE CREATED: Wed Sep 16 20:01:19 2009  
Circle Search Earthquakes= 7  
Circle Center Point Latitude: 42.417N Longitude: 76.892W  
Radius: 150.000 km  
Catalog Used: PDE  
Data Selection: Historical & Preliminary Data

CAT	YEAR	MO	DA	ORIG TIME	LAT	LONG	DEP	MAGNITUDE	IEM	DTSVNWG	DIST
									NFO		km
									TF		
PDE	1994	03	12	104315.74	42.78	-77.88	1	3.6 LgGS	3D.	....I..	90
PDE	1999	01	25	201230	42.73	-77.85	3	2.7 LgOTT	.F.	.....	85
PDE	2001	02	03	201515	42.35	-77.39	0	3.2 LgPAL	.F.	.....	42
PDE	2005	10	31	235929.95	43.28	-77.32	2	2.6 MLPAL	3F.	.....	102
PDE	2007	04	11	023217.48	43.33	-76.97	7	2.6 MLPAL	.F.	.....	101
PDE	2007	12	13	032924	42.79	-78.21	7	2.6 MDPAL	...	.....	115
PDE-W	2009	06	05	150752	42.83	-78.25	5	2.9 MDPAL	4F.	.....	120

USGS National Earthquake Information  
Center  
[USGS Privacy Statement](#) | [Disclaimer](#)





**Finger Lakes LPG Storage Facility**

**MSDS – Propane**



MATERIAL SAFETY DATA SHEET

MSDS No. 01822000  
ENGLISH

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**1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION****PRODUCT NAME:** PROPANE WITHOUT ODORANT**MANUFACTURER/SUPPLIER:**Amoco Oil Company  
200 East Randolph Drive  
Chicago, Illinois 60601 U.S.A.**EMERGENCY HEALTH INFORMATION:**

1 (800) 447-8735

**EMERGENCY SPILL INFORMATION:**

1 (800) 424-9300 CHEMTREC (USA)

**OTHER PRODUCT SAFETY INFORMATION:**

(312) 856-3907

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**2.0 COMPOSITION/INFORMATION ON INGREDIENTS**

<u>Component</u>	<u>CAS#</u>	<u>Range % by Wt.</u>
Propane	74-98-6	100

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

---

**3.0 HAZARDS IDENTIFICATION****EMERGENCY OVERVIEW:** Danger! Extremely flammable. Compressed gas. At very high concentrations; can displace the normal air and cause suffocation from lack of oxygen. Liquid can cause burns similar to frostbite.**POTENTIAL HEALTH EFFECTS:****EYE CONTACT:** Extremely cold material; can cause burns similar to frostbite.**SKIN CONTACT:** Liquid can cause burns similar to frostbite.**INHALATION:** At very high concentrations, can displace the normal air and cause suffocation from lack of oxygen. See "Toxicological Information" section (Section 11.0).**INGESTION:** Ingestion of liquid can cause burns similar to frostbite.**HMIS CODE:** (Health:1) (Flammability:4) (Reactivity:0)**NFPA CODE:** (Health:1) (Flammability:4) (Reactivity:0)

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**4.0 FIRST AID MEASURES****EYE:** Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.**SKIN:** Contact with liquid: Immediately flush with plenty of tepid water (105-115°F; 41-46°C). DO NOT USE HOT WATER. Get immediate medical attention.**INHALATION:** If adverse effects occur, immediately remove to uncontaminated area. Give artificial respiration if not breathing. Give oxygen if breathing is difficult. Get immediate medical attention.**INGESTION:** Get immediate medical attention.

Issued: November 25, 1996

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## 5.0 FIRE FIGHTING MEASURES

**FLASHPOINT:** -156°F(-104°C) (closed cup)

**UEL:** 9.5%

**LEL:** 2.1%

**AUTOIGNITION TEMPERATURE:** 842°F (450°C)

**FLAMMABILITY CLASSIFICATION:** Extremely flammable. Compressed gas.

**EXTINGUISHING MEDIA:** Stop flow of gas if possible; if not, allow to burn. Do NOT direct water into liquid spill. Dry chemical can be used.

**UNUSUAL FIRE AND EXPLOSION HAZARDS:** Product gives off vapors that are heavier than air which can travel considerable distances to a source of ignition and flashback. Extinguishment of fire before source of vapor is shut off can create an explosive mixture in air. Extremely flammable vapor/air mixtures form.

**FIRE-FIGHTING EQUIPMENT:** Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.

**PRECAUTIONS:** Keep away from sources of ignition (e.g., heat and open flames). Use with adequate ventilation. Ground and bond all lines and equipment.

**HAZARDOUS COMBUSTION PRODUCTS:** Burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

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## 6.0 ACCIDENTAL RELEASE MEASURES

Remove or shut off all sources of ignition. Isolate area. Increase ventilation if possible. Wear respirator and spray with water to disperse vapors.

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## 7.0 HANDLING AND STORAGE

**HANDLING:** Do not breathe vapors. Ground and bond all lines and equipment.

**STORAGE:** Outside storage is recommended. Store in cool, dry, well-ventilated area. Do not store in areas containing flammable or combustible products. Do not store at or above 120°F (49°C). Store away from heat, ignition sources, and open flame in accordance with applicable regulations.

**SPECIAL PRECAUTIONS:** Avoid strong oxidizers.

---

## 8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

**EYE:** Do not get in eyes. Wear chemical goggles.

**SKIN:** As needed to prevent contact with liquid - wear gloves, impervious clothing and face shield.

**INHALATION:** Avoid breathing vapor. Use with adequate ventilation. If ventilation is inadequate, use supplied-air respirator approved by NIOSH.

**ENGINEERING CONTROLS:** Control airborne concentrations below the exposure guidelines.

**EXPOSURE GUIDELINES:**

<u>Component</u>	<u>CAS#</u>	<u>Exposure Limits</u>
Propane	74-98-6	OSHA PEL: 1000 ppm (1989)(1971) ACGIH TLV-TWA: simple asphyxiant

**9.0 CHEMICAL AND PHYSICAL PROPERTIES**

APPEARANCE AND ODOR:	Gas. Colorless. Natural gas odor.
pH:	Not determined.
VAPOR PRESSURE:	189 - 208 psig at 100° F
VAPOR DENSITY:	1.56 at 32°F
BOILING POINT:	-44°F(-42°C)
MELTING POINT:	-310°F(-190°C)
SOLUBILITY IN WATER:	Slight, 0.1 to 1.0%.
SPECIFIC GRAVITY (WATER = 1):	0.51 at 60°F

**10.0 STABILITY AND REACTIVITY**

**STABILITY:** Burning can be started easily.

**CONDITIONS TO AVOID:** Keep away from ignition sources (e.g. heat, sparks, and open flames).

**MATERIALS TO AVOID:** Avoid chlorine, fluorine, and other strong oxidizers.

**HAZARDOUS DECOMPOSITION:** None identified.

**HAZARDOUS POLYMERIZATION:** Will not occur.

**11.0 TOXICOLOGICAL INFORMATION**

**ACUTE TOXICITY DATA:**

**EYE IRRITATION:** Testing not conducted. See Other Toxicity Data.

**SKIN IRRITATION:** Testing not conducted. See Other Toxicity Data.

**DERMAL LD50:** Testing not conducted. See Other Toxicity Data.

**ORAL LD50:** Testing not conducted. See Other Toxicity Data.

**INHALATION LC50:** Testing not conducted. See Other Toxicity Data.

**OTHER TOXICITY DATA:**

Specific toxicity tests have not been conducted on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience.

This material is an asphyxiant. Asphyxiants may reduce the oxygen concentration in the air to dangerous levels. Symptoms of lack of oxygen include increased depth and frequency of breathing, air hunger, dizziness, headache, nausea or loss of consciousness.

No component of this product at levels greater than 0.1% is identified as a carcinogen by ACGIH or the International Agency for Research on Cancer (IARC). No component of this product present at levels greater than 0.1% is identified as a carcinogen by the U.S. National Toxicology Program (NTP) or the U.S. Occupational Safety and Health Act (OSHA).

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### 12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product by Amoco.

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### 13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations. Vent vapor at a safe location. Insure dissipation of gas below the lower explosive limit. Consult local ordinances for compliance.

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### 14.0 TRANSPORTATION INFORMATION

#### U.S. DEPT OF TRANSPORTATION

Shipping Name	:	Liquefied Petroleum Gas
Hazard Class	:	2.1
Identification Number	:	UN1075

#### INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)  
Shipping Name : Not determined.

Air (ICAO/IATA)  
Shipping Name : Not determined.

European Road/Rail (ADR/RID)  
Shipping Name : Not determined.

Canadian Transportation of Dangerous Goods  
Shipping Name : Propane  
Hazard Class : 2.1  
UN Number : UN1978  
Packing Group : X

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### 15.0 REGULATORY INFORMATION

**CERCLA SECTIONS 102A/103 HAZARDOUS SUBSTANCES (40 CFR PART 302.4):** This product is not reportable under 40 CFR Part 302.4.

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR PART 355):** This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

**SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR PART 370):** This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).

**SARA TITLE III SECTION 313 (40 CFR PART 372):** This product is not regulated under Section 313 of SARA and 40 CFR Part 372.

**U.S. INVENTORY (TSCA):** Listed on inventory.

**OSHA HAZARD COMMUNICATION STANDARD:** Flammable gas. Compressed gas. Contains a component listed by OSHA. Contains a component listed by ACGIH.

**WHMIS CONTROLLED PRODUCT CLASSIFICATION:** A. B1.

**EC INVENTORY (EINECS/ELINCS):** In compliance.

**JAPAN INVENTORY (MITI):** Listed on inventory.

**AUSTRALIA INVENTORY (AICS):** Listed on inventory.

**KOREA INVENTORY (ECL):** Not determined.

**CANADA INVENTORY (DSL):** All of the components of this product are listed on the DSL.

**PHILIPPINE INVENTORY (PICCS):** Not determined.

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### 16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department

Issued: November 25, 1996

Supersedes: November 10, 1995

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*This material Safety Data Sheet conforms to the requirements of ANSI Z400.1.*

*This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.*

## MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PROPANE (WITH ODOR)  
DEFSI MSDS NO: DEFSI003

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM.

### SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT  
NAME: PROPANE (WITH ODOR)

SYNONYMS:  
DIMETHYL METHANE  
HD-5 PROPANE  
LIQUEFIED PETROLEUM GAS  
LP- GAS

CHEMICAL FAMILY: ALIPHATIC HYDROCARBON  
CHEMICAL FORMULA:  $CH_3 CH_2 CH_3$

MANUFACTURER / DISTRIBUTOR:  
DUKE ENERGY FIELD SERVICES  
900 REPUBLIC PLAZA  
370 17TH ST.  
DENVER, CO 80202

EMERGENCY PHONE NUMBERS:  
(303) 595-3331 (DEFSI)  
(800) 424-9300 (CHEMTREC)

CAS NO: 74-98-6

### SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT  
-40 F

MELTING POINT  
N. A. F

SPECIFIC GRAVITY (H<sub>2</sub>O= 1)  
0.5077

% SOLUBILITY IN WATER  
SLIGHT

VAPOR DENSITY (AIR= 1)  
1.5

VAPOR PRESSURE  
mmHG @ 20 C.:5,600

PH  
N. A.

ODOR  
MERCAPTAN

APPEARANCE  
COLORLESS GAS

### SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT  
-156 F

AUTOIGNITION TEMP  
N. D. A. F

EXPLOSIVE LIMITS (% BY VOLUME IN AIR)  
LOWER / UPPER 2.1 \ 9.5

NFPA CLASSIFICATION:

HEALTH: 1 FIRE: 4

REACTIVITY: 0 OTHER:

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO<sub>2</sub> OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING PROCEDURES:

STOP THE FLOW OF GAS AND ALLOW FIRE TO BURN OUT. EXTINGUISHING THE FLAME BEFORE SHUTTING OFF THE SUPPLY CAN CAUSE THE FORMATION OF EXPLOSIVE MIXTURES. IN SOME CASES IT MAY BE PREFERRED TO ALLOW THE FLAME TO CONTINUE TO BURN. KEEP THE SURROUNDING AREA COOL WITH WATER SPRAY AND PREVENT FURTHER IGNITION OF COMBUSTIBLE MATERIAL.

**MATERIAL SAFETY DATA SHEET**

PRODUCT NAME: PROPANE (WITH ODOR)  
 DEFSI MSDS NO: DEFSI003

---

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (cont.)

---

STABILITY: THE MATERIAL IS STABLE  
 CONDITIONS TO AVOID: SOURCES OF HEAT OR IGNITION

HAZARDOUS DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

INCOMPATIBLE MATERIALS: - STRONG OXIDIZERS (E. G. CHLORINE), MINERAL ACIDS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

---

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

---

CAS NO. (OSHA)	REL(NIOSH)	COMPONENTS:	PERCENT RANGE	TLV (ACGIH)	PEL
74-98-6	PROPANE	97 - 98	NE	1000 PPM**	1000 PPM
106-97-8	BUTANES	< 1.5	NE	800 PPM*	800 PPM
115-07-1	PROPYLENE	< 5	NE	NE	NE
75-08-1	ETHYL MERCAPTAN	< 2	0.5	0.5 ***	

8HR TWA UNLESS OTHERWISE SPECIFIED

- \* FOR N-BUTANE
  - \*\* PROPANE IS A SIMPLE ASPHYXIAN BY ACGIH STANDARDS.
  - \*\*\* THE INTENSITY OF ETHLY MERCAPTAN STENCH (ITS ODOR) MAY FACE DUE TO CHEMICAL OXIDATION (IN THE PRESENCE OF RUST, AIR OR MOISTURE), ADSORPTION OR ABSORPTION. SOME PEOPLE HAVE NASAL PERCEPTION PROBLEMS AND MAY MASK OR HIDE THE ETHLY MERCAPTAN STENCH. WHILE ETHLY MERCAPTAN MAY NOT IMPART THE WARNING OF THE PRESENCE OF PROPANE IN EVERY INSTANCE, IT IS GENERALLY EFFECTIVE IN A MAJORITY OF SITUATIONS.
-

## MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PROPANE (WITH ODOR)  
DEFSI MSDS NO: DEFSI003

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### SECTION 5 - POTENTIAL HEALTH EFFECTS

---

**EYE:**

PROPANE IS GENERALLY NON-IRRITATING TO EYES. PRESSURIZED GAS CAN CAUSE MECHANICAL INJURY TO THE EYE. LIQUEFIED GAS MAY CAUSE FREEZE BURNS UPON DIRECT CONTACT.

**SKIN:**

LIQUEFIED GAS MAY CAUSE FREEZE BURNS UPON DIRECT CONTACT.

**INGESTION:**

INGESTION NOT LIKELY

**INHALATION:**

SIMPLE ASPHYXIANT

**ADDITIONAL TOXICITY INFORMATION:**

EXTREME OVER EXPOSURE MAY PRODUCE DIZZINESS, HEADACHE, DISORIENTATION, EXCITATION, FATIGUE, INABILITY TO CONCENTRATE, VOMITING, COUGHING, ANESTHESIA, UNCONSCIOUSNESS AND DEATH.

---

### EMERGENCY FIRST AID PROCEDURES

---

**EYE:**

IMMEDIATELY FLUSH EYES WITH RUNNING WATER FOR AT LEAST FIFTEEN MINUTES.  
CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

**SKIN:**

IMMEDIATELY FLUSH SKIN WITH RUNNING WATER FOR AT LEAST FIFTEEN MINUTES.  
CALL A PHYSICIAN IF SYMPTOMS OR IRRITATION OCCUR.

**INHALATION:**

MOVE PERSON TO FRESH AIR IF NOT BREATHING OR IF NO HEARTBEAT,  
GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION.  
IMMEDIATELY CALL PHYSICIAN.

**INGESTION:**

INGESTION NOT LIKELY.

---

### SECTION 6 - SPECIAL PROTECTION INFORMATION

---

**VENTILATION:**

LOCAL OR GENERAL EXHAUST REQUIRED IF USED IN AN ENCLOSED AREA IN ORDER TO KEEP CONCENTRATIONS BELOW THE LOWER EXPLOSIVE LIMIT.

## MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PROPANE (WITH ODOR)  
DEFSI MSDS NO: DEFSI003

---

### SECTION 6 - SPECIAL PROTECTION INFORMATION (cont.)

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#### RESPIRATORY:

USE ATMOSPHERE SUPPLIED RESPIRATORS IN THE EVENT OF OXYGEN DEFICIENCY. SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

USE A NIOSH / MSHA APPROVED SCBA.

#### EYE PROTECTION:

GOGGLES OR FACE SHIELD MAY BE NEEDED WHEN HANDLING PRESSURIZED GASES.

#### OTHER PROTECTIVE EQUIPMENT:

USE EXPLOSION-PROOF EQUIPMENT.

---

### SECTION 7 - SPILL OR LEAK PROCEDURES

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#### ENVIRONMENTAL EFFECTS:

MOST COMPONENTS OF PROPANE ARE HEAVIER THAN AIR AND WILL STAY IN LOW LYING AREAS IF VENTILATION OR WIND IS NOT PRESENT.

#### STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. SHUT OFF SOURCE IF POSSIBLE TO DO SO WITHOUT HAZARD. WEAR APPROPRIATE SAFETY EQUIPMENT IF CONDITIONS WARRANT. PROTECT FROM IGNITION. VENTILATE AREA THOROUGHLY. ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES, IF APPROPRIATE.

#### WASTE DISPOSAL METHOD:

PREFERRED METHOD OF DISPOSAL IS BURNING AS A VAPOR IN A PROPERLY DESIGNED FLARE. SPECIAL CARE MUST BE TAKEN TO ENSURE COMPLETE DISSIPATION OF PROPANE BELOW LOWER EXPLOSIVE LIMIT.

---

### SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

---

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, STRONG OXIDIZERS OR OTHER SOURCES OF IGNITION.

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### SECTION 9 - HAZARD WARNING

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**DANGER !**  
**EXTREMELY FLAMMABLE**  
**GAS UNDER PRESSURE**

## MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PROPANE (WITH ODOR) -  
DEFSI MSDS NO: DEFSI003

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SECTION 10 - COMMENTS NONE

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SECTION 11 - REGULATORY INFORMATION

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SARA TITLE III / SUPERFUND AMENDMENTS AND RE-AUTHORIZATION ACT OF 1986 -  
SECTIONS 302, 304, 311, 312 AND 313.

THE FOLLOWING REGULATIONS APPLY TO THIS PRODUCT:

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS:

40 CFR PART 370 (52 FR 38344 - OCTOBER 15, 1987).

DEPENDING ON LOCAL, STATE, AND FEDERAL REGULATIONS, MATERIAL SAFETY  
DATA SHEETS (MSD'S) OR LIST OF MSD'S (PRODUCT NAMES) MAY BE  
REQUIRED TO BE SUBMITTED TO THE STATE EMERGENCY RESPONSE  
COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, AND LOCAL FIRE  
DEPARTMENT IF YOU HAVE:

10,000 POUNDS OR MORE OF AN OSHA HAZARDOUS SUBSTANCE\* OR  
500 POUNDS OR THE THRESHOLD PLANNING QUANTITY WHICHEVER  
IS LESS, OF AN EXTREMELY HAZARDOUS SUBSTANCE.

- \* REPORTABLE QUANTITY LEVELS CAN VARY FROM STATE TO STATE AND YEAR  
TO YEAR DEPENDING ON APPLICABLE STATE AND/OR FEDERAL REGULATIONS.

THIS PRODUCT IS COVERED UNDER THE CRITERIA DEFINED IN OSHA'S HAZARD  
COMMUNICATION STANDARD 29 CFR 1910.1200 (52 FR 31852 - AUGUST 24,  
1987) AND SHOULD BE REPORTED UNDER THE FOLLOWING EPA HAZARD  
CATEGORIES:

IMMEDIATE (ACUTE) HEALTH HAZARD  
DELAYED (CHRONIC) HEALTH HAZARD  
XX FIRE HAZARD  
XX SUDDEN RELEASE OF PRESSURE HAZARD  
REACTIVE HAZARD

DEPARTMENT OF TRANSPORTATION:

49 CFR 172.01 AS REVISED ON MAY 1, 1997.

PROPER SHIPPING NAME:	LIQUEFIED PETROLEUM GAS
DOT CLASSIFICATION:	FLAMMABLE GAS
DOT IDENTIFICATION NUMBER:	UN 1075
PLACARD:	FLAMMABLE GAS / 1075
HAZARD CLASS:	2.1

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SECTION 12 - REGULATIONS / COMMENTS

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MSDS DATE: 02 / 22 / 94

REVISED: 05 / 13 / 02

MSDS PREPARED BY THE DUKE ENERGY FIELD SERVICES INC. CORPRATE SAFETY GROUP

## MATERIAL SAFETY DATA SHEET

Page 6 of 6

PRODUCT NAME: PROPANE (WITH ODOR)  
DEFSI MSDS NO: DEFS1003

\*\*\* DISCLAIMER \*\*\*

THIS INFORMATION RELATES ONLY TO THE SPECIFIC MATERIAL DESIGNATED AND MAY NOT BE VALID FOR SUCH MATERIAL USED IN COMBINATION WITH ANY OTHER MATERIALS OR IN ANY PROCESS. SUCH INFORMATION IS, TO THE BEST OF DEFSI'S KNOWLEDGE AND BELIEF, ACCURATE AND RELIABLE AS OF THE DATE INDICATED. HOWEVER, NO REPRESENTATION, WARRANTY OR GUARANTEE IS MADE AS TO ITS ACCURACY RELIABILITY OR COMPLETENESS. IT IS THE USER'S RESPONSIBILITY TO SATISFY HIMSELF AS TO THE SUITABLENESS AND COMPLETENESS OF SUCH INFORMATION FOR HIS OWN PARTICULAR USE.



**Finger Lakes LPG Storage Facility**

**MSDS – Butane**



Amoco Canada  
Petroleum Company Ltd.

# Warning and Safety Information Bulletin

## Normal Butane

---

**DANGER!**

Vapors are ***EXTREMELY FLAMMABLE AND EXPLOSIVE.***  
Contact with liquid causes ***FREEZE BURNS.***  
Butane gas may cause ***SUFFOCATION.***

Chemical Name: Normal Butane

Trade Name: Butane, Normal Butane

Chemical Formula:  $C_4H_{10}$

Hazard Class: Flammable Gas

Dot I.D. No.: UN1011

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## DISCLAIMERS

Amoco Canada Petroleum Company Ltd. does not know all the ways its shippers, customers, or transporters will handle, store or use butane and makes no warranty regarding it after delivery from one of its terminals.

Amoco recommends that its customers provide their own employees, customers and other concerned parties with information regarding the characteristics of butane.

This Safety Bulletin has been prepared by Amoco Canada Petroleum Company Ltd., and is intended to enhance the safe use of butane. The company has used all possible care to ensure the accuracy of the information contained in this bulletin but assumes no liability for any errors, omissions, or defects whatsoever in the content, or for any damage or injury resulting from the use of this bulletin or from reliance by any person or entity on its content.

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MANUFACTURER/SUPPLIER:  
Amoco Canada  
Petroleum Company Ltd.  
240 - 4 Avenue S.W.  
P. O. Box 200, Station M  
Calgary, Alberta T2P 2H8

EMERGENCY HEALTH INFORMATION: 1 (312) 856-5371  
(U.S.A.)  
EMERGENCY SPILL INFORMATION: 1 (613) 996-6666  
CANUTEC (Canada)  
OTHER PRODUCT SAFETY INFORMATION: 1 (312) 856-5430  
(U.S.A.)

IMPORTANT COMPONENTS:	COMPONENT	WT%	CAS No.	ACGIH TLV
	Butane	100	106-97-8	TWA 800 ppm

WARNING STATEMENT: Extremely flammable. Compressed gas. High vapor concentrations can cause headaches, dizziness, drowsiness and nausea. Contact with liquid causes frostbite.

APPEARANCE AND ODOR: Colorless gas; natural gas odor.

#### HEALTH HAZARD INFORMATION

##### EYE

EFFECT: Liquid can cause burns similar to frostbite.  
FIRST AID: Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes, then get immediate medical attention.  
PROTECTION: Wear chemical goggles.

##### SKIN

EFFECT: Liquid can cause burns similar to frostbite.  
FIRST AID: Contact with liquid: immediately flush with plenty of tepid water (105-115°F; 41-46°C). DO NOT USE HOT WATER. Get prompt medical attention.  
PROTECTION: As needed to prevent contact with liquid - wear gloves, impervious clothing and face shield.

##### INHALATION

EFFECT: High vapor concentrations can cause headaches, dizziness, drowsiness and nausea. Asphyxiant in high concentrations. See Toxicology Section.  
FIRST AID: If adverse effects occur, remove to uncontaminated area. Give oxygen if breathing is difficult. Get immediate medical attention.  
PROTECTION: If ventilation is inadequate, use supplied-air respirator.

##### INGESTION

EFFECT: Not applicable.  
FIRST AID: Not applicable.

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TOXICOLOGICAL INFORMATION

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Inhalation of butane at very high concentrations (10,000 ppm) may cause drowsiness. At extremely high concentrations, butane gas may reduce oxygen concentrations below life support levels. Symptoms of lack of oxygen include increased depth and frequency of breathing, air hunger, dizziness, headache, nausea or loss of consciousness. LC50: 658 g/m<sup>3</sup> (280,000 ppm), 4-hour exposure-rat.

No component of this product present at levels greater than 0.1% is identified as a carcinogen by ACGIH or IARC.

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REGULATORY INFORMATION

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WHMIS: A, B1,

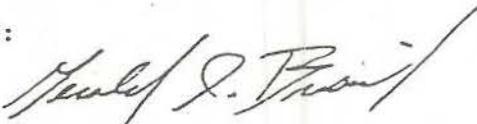
TDG: Butane, 2.1, UN1011, X.

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ISSUE INFORMATION

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BY:



G. I. Bresnick, Director  
Product Stewardship & Toxicology

ISSUED: July 12, 1991  
SUPERSEDES: November 21, 1988

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This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.



**Finger Lakes LPG Storage Facility**

**MSDS – Mercaptan**



## ETHYL MERCAPTAN

### Physical Properties

<b>Boiling Range</b>			<b>Reid Vapor Pressure</b>	
IBP	94.8 °F	34.9 °C	psia @ 100 °F	16.1
95%	95.7 °F	35.4 °C	kg./cm <sup>2</sup> @ 37.78 °C	1.13
D.P.	95.9 °F	35.5 °C		
<b>Average Molecular Weight</b>			<b>Mercaptan Content (% by Vol)</b>	
		62		99+
<b>Specific Gravity (60/60 °F)(15 °C)</b>			<b>Sulfur Content (% by Wgt.)</b>	
		0.845		51.7
<b>Density (60 °F) lbs./gal. (15 °C) kgm./l</b>			<b>Corrosion - Copper Strip (24 hr. immersion test)</b>	
		7.04 0.844		Negligible
<b>Cloud Point (Max.)</b>			<b>Solubility in Water</b>	
		-50 °F -45.6 °C		Trace
<b>Freezing Point (below)</b>			<b>Flash Point (open cup)</b>	
		-100 °F -73.3 °C	F	-38
			C	-38.9

### Analysis

Component	Weight %		
	Minimum	Typical	Maximum
Ethyl Mercaptan	98.5	99.5	99.95
Isopropyl Mercaptan	0.0	< 0.1	0.5
Tertiary Butyl Mercaptan	0.0	< 0.1	0.5
Methyl Ethyl Sulfide	0.0	< 0.1	0.5
Diethyl Disulfide	0.0	< 0.1	0.5
Other Components	0.0	0.2	0.5

The information set forth herein is furnished free of charge and is based on technical data that M Chemical believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents.

# W.F. McDONALD COMPANY

Division of  
**M CHEMICAL COMPANY, INC.**

**PACKAGING and SHIPPING:** ETHYL MERCAPTAN is shipped as Ethyl Mercaptan, 3, UN2363, PG I, Marine Pollutant, in the following containers:

100	Gallon Cylinders.....	700 lbs. (318 kg.) - net weight
50	Gallon Cylinders.....	350 lbs. (159 kg.) - net weight
5	Gallon Cylinders.....	30 lbs. (14 kg.) - net weight
55	Gallon Drums.....	350 lbs. (159 kg.) - net weight
10	Gallon Drums.....	65 lbs. (30 kg.) - net weight
5	Gallon Drums.....	30 lbs. (14 kg.) - net weight
Tank Trucks: 3,000 to 6,000 Gallons .....		20,000 to 42,000 lbs. net weight (9,100 to 19,000 kg.)

## STORAGE and HANDLING

Drums should be stored in such a manner that they are protected from the elements. Direct sunlight or heat will increase the vapor pressure inside the drum causing excessive release of odor when the drums is opened. If drums are stored outside, they should be in a horizontal position to avoid accumulating water on the drum. Eye protection and chemical resistant gloves are recommended when handling ETHYL MERCAPTAN. In case of contact, shower with soap if possible.

## WARNING

THE INTENSITY OF NATURAL GAS AND LIQUID PETROLEUM GAS ODORANT ("ODORANT") MAY FADE DUE TO CHEMICAL OXIDATION, ADSORPTION OR ABSORPTION. SOME PEOPLE HAVE NASAL PERCEPTION PROBLEMS AND MAY NOT BE ABLE TO SMELL THE ODORANT. SLEEPING PERSONS MAY NOT BE AWAKENED BY, AND THEREFORE MAY NOT DETECT THE ODORANT. OTHER ODORS MAY MASK OR HIDE THE STENCH OF THE ODORANT. WHILE THE ODORANT MAY NOT IMPACT THE WARNING OF THE PRESENCE OF NATURAL GAS OR LIQUID PETROLEUM GAS IN EVERY INSTANCE, IT IS GENERALLY EFFECTIVE IN A MAJORITY OF SITUATIONS. FAMILIARIZE YOURSELF, YOUR EMPLOYEES AND YOUR CUSTOMERS WITH THIS WARNING AND OTHER FACTS ASSOCIATED WITH THE SO-CALLED ODOR-FADE PHENOMENON, INCLUDING THE STANDARD WARNING INFORMATION SHIPPED WITH THE ODORANT. IF YOU DO NOT ALREADY KNOW ALL THE FACTS, WRITE AND ASK FOR MORE INFORMATION ABOUT THE ODORANT AND THE OTHER SAFETY CONSIDERATIONS ASSOCIATED WITH ITS USE.

11/13/2002  
EM1

SUPERCEDES: 01/24/2002

