PB Energy Storage Services, Inc
ENGINEERING – CONSTRUCTION – OPERATIONS – MAINTENANCE

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Houston, Texas 77084

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www.pbenergy.com

October 20, 2011

James W. Rettberg, PE
Project Manager
NYSEG

Dear Mr. Rettberg;

Re: Location of TEPPCO Watkins Glen Propane Storage Facility

Introduction

Task 4.2.2.7 of the Technical Specification for the Cavern Development Consultant is to prepare a Letter Report addressing the proximity of the TEPPCO Propane Storage Cavern to the proposed NYSEG CAES cavern and evaluate any proposed risks associated with the location.

TEPPCO Cavern Description

The TEPPCO (owned by EPCO, Inc) propane storage cavern at Watkins Glen, NY was designed and constructed by Fenix and Scisson (now owned by PB ESS) and began operation during 1984[1]. The facility is located on State Route 14 in Watkins Glen, a rural town with a population of approximately 2,150. The facility risk management plan[2] describes the Watkins Glen propane storage facility as a propane storage and loading facility. The propane is received is received by pipeline and stored in a shallow conventionally mined underground storage cavern.

The cavern was mined in the shales and siltstones at near Watkins Glen, NY between 535 ft MSL and 569 ft MSL. The cavern was mined in a room and pillar pattern within a competent siltstone. The completed cavern volume was approximately 1.3 MMB[3]. Conventionally mined LPG caverns are typically operated at pressures below the hydrostatic gradient.

Location Relative to Proposed NYSEG CAES Cavern

Figure 1 is an aerial photograph of the proposed location of the NYSEG CAES Cavern with the outline of the Watkins Glen Propane Storage Underground Facility superimposed. The outline of the Watkins Glen Facility was obtained from the files of Fenix & Scisson.

The proposed NYSEG CAES Cavern will be located nominally 1,900 ft deeper and approximately ½ mile north of the existing TEPPCO Watkins Glen Underground Storage Chamber.

Impact Evaluation

PB ESS does not believe that the location of the TEPPCO Watkins Glen Propane Storage Cavern relative to the proposed location of the NYSEG CAES Cavern presents any significant risks to either operation.

References

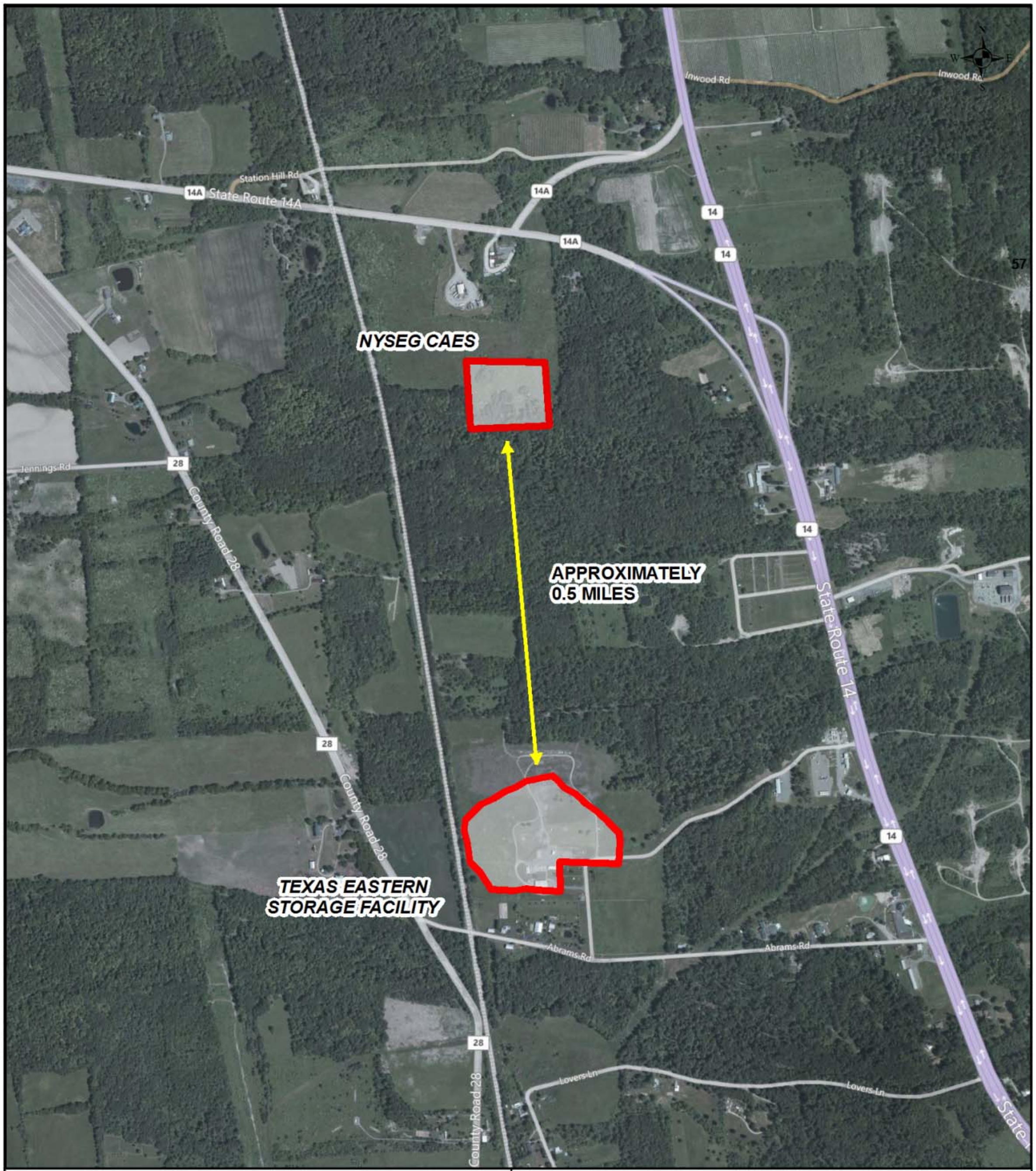
1. Fenix & Scisson. Brochure. ***Mined Storage Caverns***. Undated.
2. Energy Storage Services Inc. Web site: www.pbenergy.com
3. U.S. Environmental Protection Agency. Risk Management Plan – Enterprise Watkins Glen Terminal. www.rtknet.org

Please do not hesitate to call or email if you have questions or suggestions.

Regards,

James M. McHenry

James M McHenry



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PROXIMITY OF NYSEG TO TEPPCO
Seneca Lake, Schuyler County, New York

0 500 1,000 2,000 Feet

DESIGN:	DRAWN: HH	CHECKED: JM	DATE: 09/11	SCALE:

JOB No.

DRAWING No. FIGURE 1

PB Energy Storage Services, Inc.
ENGINEERING - CONSTRUCTION - OPERATIONS - MAINTENANCE

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October 24, 2011

James Rettberg, P.E.
Project Manager
NYSEG
18 Link Drive, Box 5224
Binghamton, NY 13902-5224

Dear Mr. Rettberg;

Re: Submittal 4.2.2.6 Constituents and Quality of Formation's Salts

Technical Specification Deliverable 4.2.2.6 is a letter report detailing the constituents and quality of the formation salt. This submittal discusses impurities and contaminants which have been identified in the brine produced at Watkins Glen.

Background

The brine produced from the proposed NYSEG cavern will be used as feedstock to the US Salt plant at Watkins Glen, NY. In order to be useful to the plant, the brine needs to be saturated and relatively free of impurities.

The brine produced from creation of the CAES caverns will not be saturated in sodium chloride. The brine from the wells will need to be cascaded through an existing large cavern to become fully saturated and suitable for plant use.

Impurities in the Salina Salt formation of New York State include shale, anhydrite, gypsum, dolomite, and pyrite. These rocks and minerals can break down to produce clay, sand, calcite, iron, magnesium, carbonate and sulfate. The impurities will occur as admixes to the brine. Typical analyses of brine produced from the Salina salt are listed in Table 1 (from Kaufmann, 1960.)

Table 1 Typical Compositions of Salina Brines

Chemical	**Well A – Weight Percent**	**Well B – Weight Percent**
Sodium Chloride	25.42	25.48
Calcium Chloride	0.09	0.58
Magnesium Chloride	0.04	0.14
Calcium Sulfate	0.45	0.25

The impurities that occur within the Salina formation have not caused difficulties in processing brine produced from the salt. However, some treatment is required to remove sulfates to produce a purified salt suitable for some purposes.

Solid particles such as clay are generally not in the brine due to the low velocity of the brine in the large diameter strings used for mining. Any particulate matter that may be carried with the brine will have opportunities to settle out when the brine is cascaded through another cavity to become saturated.

In some past in the US Salt Brinefield, there have been instances of hydrogen sulfide contaminating the brine. Historical cases have been traced to mining the salt to the overlying Camillus with subsequent collapse of roof. This allowed "black water" to flow into the cavity. This black water in the Camillus does not appear to be present everywhere in the field, but has been seen in the northern sections (Wells 17, 18 and 57) and possibly in the old wells along the lake shore. Another source of past contamination of the brine has been the overlying Oriskany/Marcellus section of the geology. Hydrogen sulfide bearing black water from this section has corroded through casing (particularly in old wells that were not cemented to surface), allowing the black water to mix with the cavern brine.

Issues related to hydrogen sulfide contamination can be prevented by leaving a salt roof above the cavity and by properly cementing the casing through the black water bearing zones.

Summary

The brine that will be produced from the proposed NYSEG CAES caverns will be of a quality, other than sodium chloride saturation, that can be processed in the US Salt plant without causing any upsets.

The major possible source of chemical impurities is black water in the overlying formations. This can be prevented from becoming an issue by leaving a thick salt roof as proposed and properly cementing the casings.

As discussed above, the produced brine from the CAES caverns will not be saturated. The brine will need to be cascaded through existing US Salt wells to become saturated before being sent to the refinery.

References

Kaufmann, Dale W., 1960. Sodium Chloride. American Chemical Society, Washington, D.C.

Sincerely,

Tom Eyermann
Solution Mining Engineer

cc: James McHenry, Joe Ratigan, Joel Nieland, John Osnes

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November 30, 2011

James W. Rettberg, PE
Project Manager
NYSEG

Dear Mr. Rettberg;

Re: Letter Report Update of Earthquake Data (1998 – 2011)

The NYSEG Cavern Development Consultant Technical Specification deliverable 4.2.2.8 directs PB ESS to prepare a letter report updating the seismic study dated 1998 with all seismic data generated to the current date. To support this effort NYSEG transmitted a report titled Earthquake Data Base Search Update[1] to PB ESS. This letter report documents the update of earthquake data performed for the time period 1998 to 2011.

Introduction

In June 1994 Fenix & Session, owned by PBESS, prepared a geological report[2] describing an investigation to assess possible geological impacts related to the pressure integrity of Gallery No. 1 at the Akzo Salt Brinefield near Watkins Glen, NY. The report was prepared in support of NYSEG's permit application for conversion of AKZO Gallery No. 1 to Natural Gas Storage. Included in the report was a brief discussion of historical earthquakes in the area surrounding Gallery No. 1.

The historical data presented in the F&S report was acquired from the National Geophysical Data Center of the National Oceanic and Atmospheric Administration. Earthquake data was acquired for a 150 kilometer radius circle centered at latitude 42.417°N, longitude 76.892°W (Akzo Gallery No. 1. The report concluded that “The Watkins Glen area, including the AKZO brinefield, is in a very quiet seismic area in which no appreciable seismic events have occurred during recorded history.” The four closest earthquake centers were approximately of 35 to 36 kilometers from Gallery No. 1.

In 2001 PB-KBB (now PBESS) updated the data in the 1994 earthquake database in support of a permit application by Seneca Lake Storage to convert AKZO Gallery No. 2[1] to natural gas storage. PB-KBB concluded in the report that “New earthquake data obtained for the period of

January 1, 1991 to the present indicate that the area containing Galleries Nos. 1 and 2 continues to be an area of very low seismicity."

The historical data presented in the PB-KBB report were acquired from the USGS National Earthquake Information Center (NEIC). PB-KBB reported that the original data source for the 1994 report was no longer available from the National Geophysical Data Center; the service being transferred to the USGS. Three earthquakes with magnitudes 2.7 to 3.6 were reported in 1994, 1999, and 2001.

Earthquake Data 1998 to 2011

NYSEG has directed PB ESS to update the earthquake database for the period 1998 to present. The earthquake data for this update was obtained from the USGS website[3]. The database search revealed 7 earthquakes within the 150 kilometer radius of AKZO Gallery No. 2 between 1998 and 2011. The output from the NEIC search is provided below in Table 1 and the data is plotted on a Google Earth Image[4] in Figure 1. All of the earthquakes were magnitude 3.2 and lower; the closest located approximately 25 miles from the NYSEG Site.

Earthquake Probabilities

The probability of an earthquake with a magnitude of greater than 5.0 near the NYSEG CAES Site was estimated using software developed by the USGS. The software was based upon the 2008 USGS National Seismic Hazard Mapping Project Update[5], which was designed to predict the probability of the occurrence of an earthquake of magnitude 5.0 or greater within a specified distance from a location. PB ESS ran the USGS earthquake model for a 150 kilometer radius of Latitude 42.417°N / Longitude 76.892°W.

The annual probability of an earthquake occurrence and the cumulative probability of an earthquake occurrence, centered within a 150 kilometer radius of the NYSEG CAES Site, is given in Table 2. Figure 2 shows the probability of an earthquake of magnitude 5.0 or greater with an epicenter within 50 kilometers for locations within South Central New York and Pennsylvania.

The USGS earthquake probability prediction model implies that the probability of occurrence of an earthquake, with a magnitude greater than 5.0, within 150 kilometers of the NYSEG CAES Site is approximately 0.04 within a 30 year period.

Conclusion

In the 1994 report[1], PB-KBB states that “The entire Salina basin that covers parts of New York, Pennsylvania, Ohio, Michigan and West Virginia is characterized by a general lack of any significant seismic activity”. The USGS earthquake data collected for the time period 1998 to 2011 is consistent with this statement. PB ESS considers earthquake risk at the NYSEG Watkins Glen CAES site to be low.

References:

1. PB-KBB Inc. ***Earthquake Data Base Search Update***. Prepared for Seneca Lake Storage, Inc. Undated.

2. Fenix & Scisson Inc. ***Geological Report AKZO Cavern Gallery No 1, Schuyler County, New York***. Prepared for New York State Electric and Gas, Binghamton, NY 1994.

3. United States Geological Survey. National Earthquake Information Center. http://earthquake.usgs.gov/earthquakes/eqarchives/epic/epic_circ.php

4. United States Geological Survey. Circular Search 150 km Radius from N42.491° - W 76.892°. Google Earth. November 8, 2011.

5. Petersen, Mark D. et al. ***Documentation for the 2008 Update of the United States National Seismic Hazard Maps.*** United States Geological Survey. Open File Report 2008-1128. May 2008.

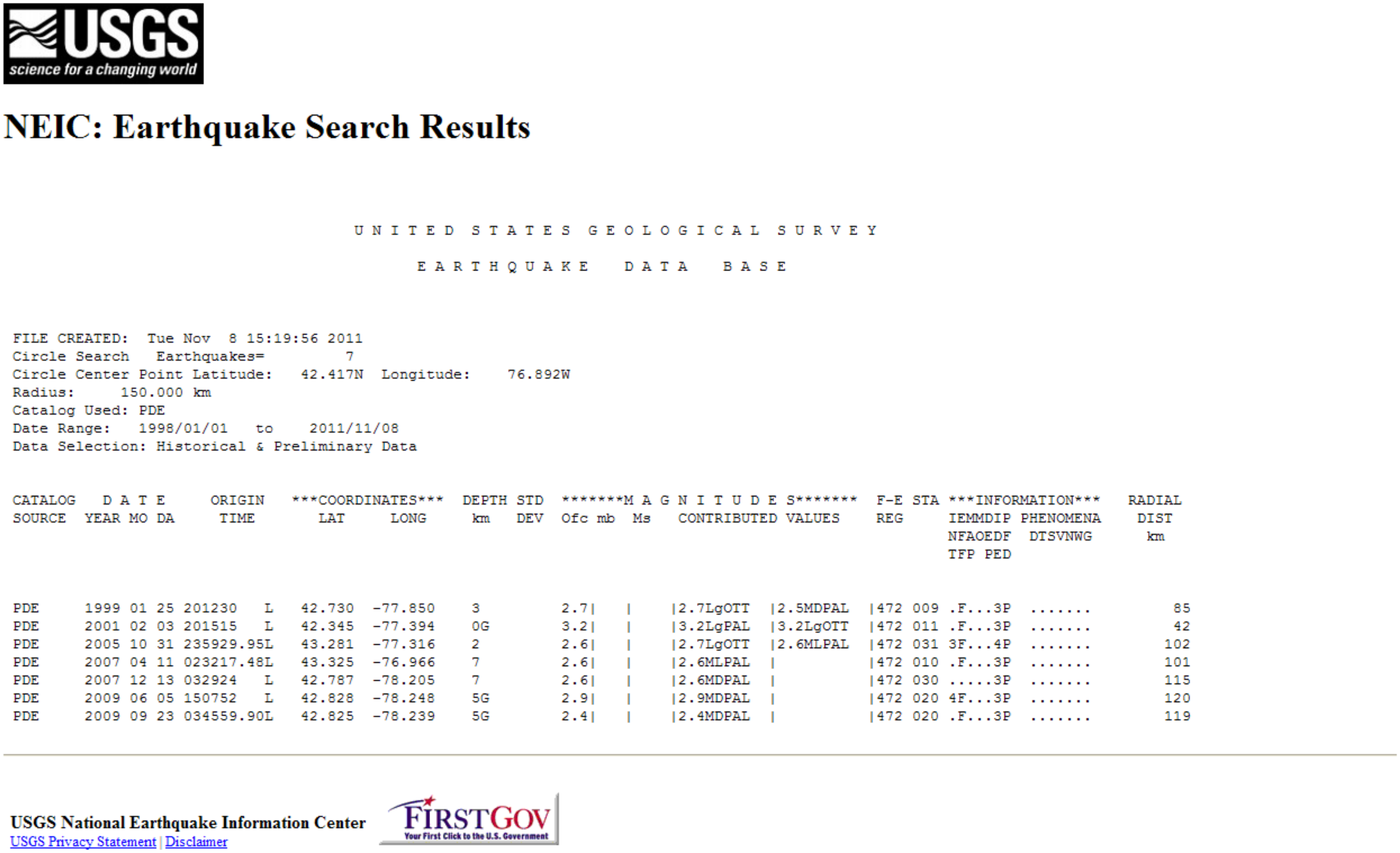
Please do not hesitate to call or email if you have questions or suggestions.

Regards,

James M. McHenry

James M McHenry

Table 1 - USGS Earthquake Search Results 1998-2011



USGS science for a changing world

NEIC: Earthquake Search Results

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                                      U N I T E D   S T A T E S   G E O L O G I C A L   S U R V E Y

                                             E A R T H Q U A K E    D A T A    B A S E


FILE CREATED:  Tue Nov  8 15:19:56 2011
Circle Search   Earthquakes=         7
Circle Center Point Latitude:   42.417N  Longitude:    76.892W
Radius:     150.000 km
Catalog Used: PDE
Date Range:   1998/01/01   to    2011/11/08
Data Selection: Historical & Preliminary Data


CATALOG   D A T E     ORIGIN   ***COORDINATES***  DEPTH STD   *******M A G N I T U D E S*******  F-E STA ***INFORMATION***   RADIAL
SOURCE  YEAR MO DA     TIME       LAT     LONG     km    DEV   Ofc mb  Ms   CONTRIBUTED VALUES    REG     IEMMDIP PHENOMENA    DIST
                                                                                                        NFAOEDF  DTSVNWG      km
                                                                                                        TFP PED


PDE     1999 01 25 201230   L   42.730  -77.850    3         2.7|   |    |2.7LgOTT  |2.5MDPAL  |472 009 .F...3P  .......         85
PDE     2001 02 03 201515   L   42.345  -77.394    0G        3.2|   |    |3.2LgPAL  |3.2LgOTT  |472 011 .F...3P  .......         42
PDE     2005 10 31 235929.95L   43.281  -77.316    2         2.6|   |    |2.7LgOTT  |2.6MLPAL  |472 031 3F...4P  .......        102
PDE     2007 04 11 023217.48L   43.325  -76.966    7         2.6|   |    |2.6MLPAL  |          |472 010 .F...3P  .......        101
PDE     2007 12 13 032924   L   42.787  -78.205    7         2.6|   |    |2.6MDPAL  |          |472 030 .....3P  .......        115
PDE     2009 06 05 150752   L   42.828  -78.248    5G        2.9|   |    |2.9MDPAL  |          |472 020 4F...3P  .......        120
PDE     2009 09 23 034559.90L   42.825  -78.239    5G        2.4|   |    |2.4MDPAL  |          |472 020 .F...3P  .......        119
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USGS National Earthquake Information Center
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FIRSTGOV Your First Click to the U.S. Government

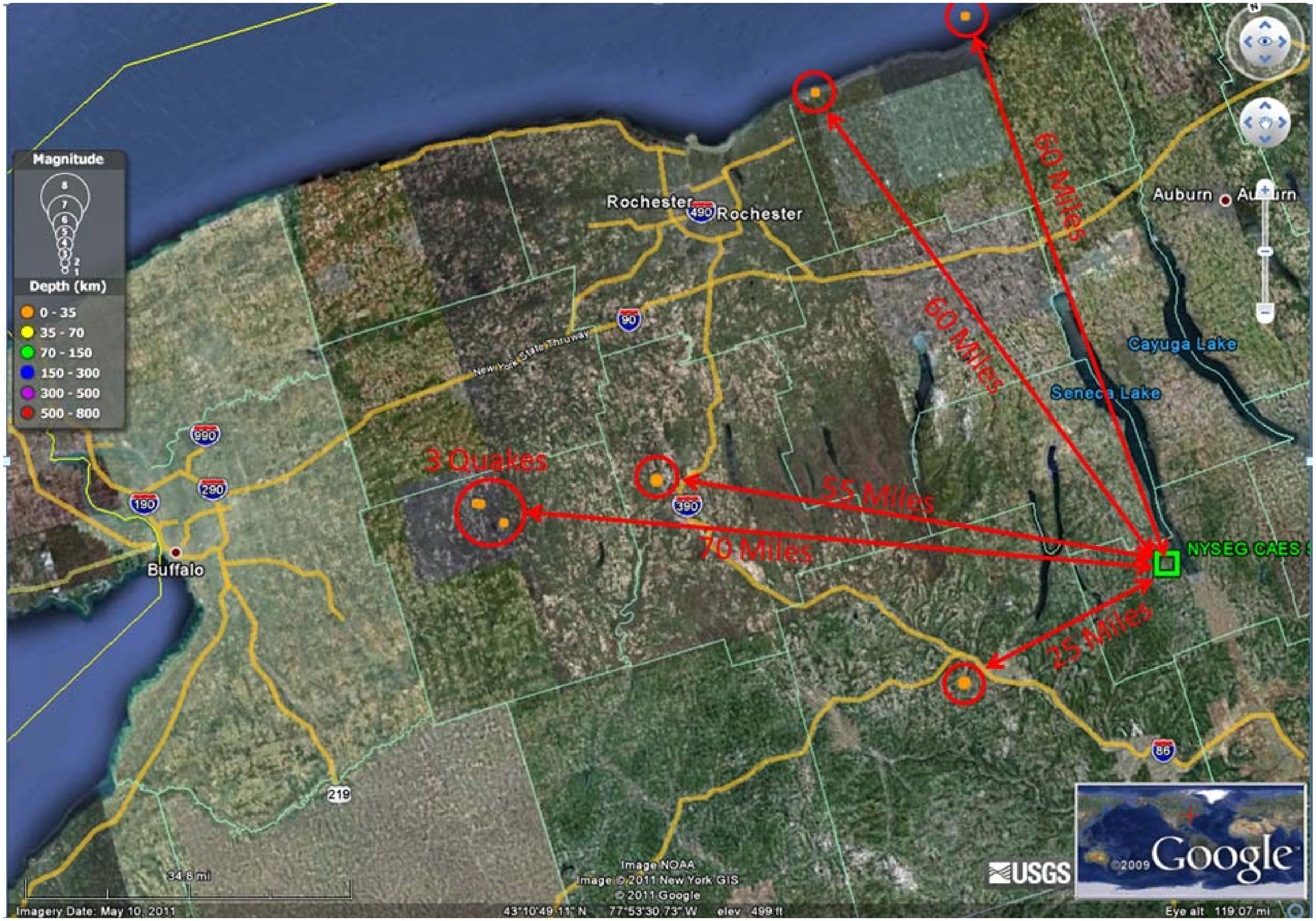
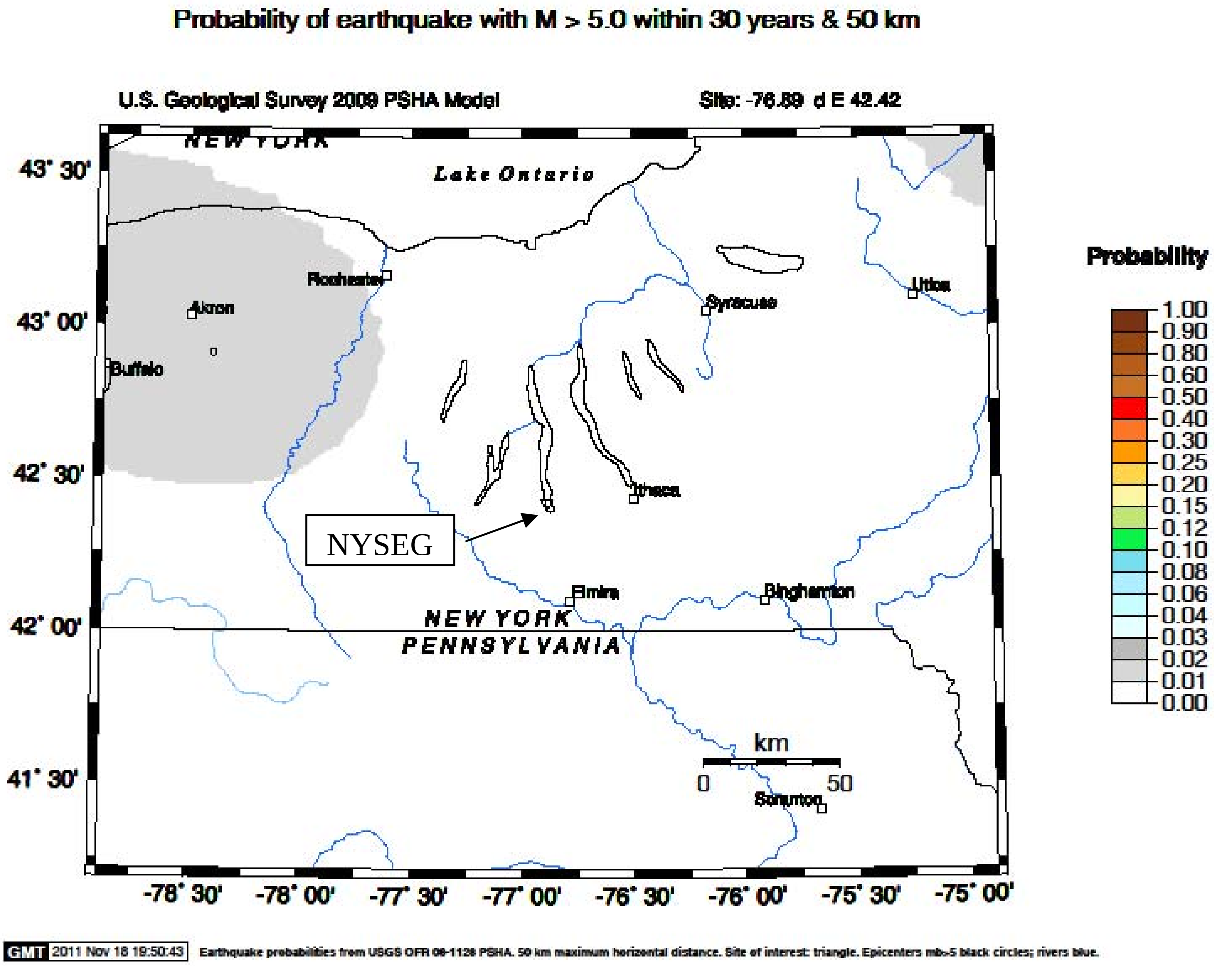


Figure 1 - Earthquakes Near NYSEG CAES Location 1998 - 2001

Table 2 – Earthquake Probabilities - NYSEG CAES Site

Earthquake Magnitude	Cumulative Rate of Annual Occurrence	Cumulative Probability of Occurrence within 30 Years
7.65	0.000001	0.000017
7.55	0.000001	0.000028
7.45	0.000004	0.000123
7.35	0.000010	0.000297
7.25	0.000013	0.000390
7.15	0.000019	0.000572
7.05	0.000031	0.000941
6.95	0.000037	0.001113
6.85	0.000048	0.001432
6.75	0.000069	0.002054
6.65	0.000077	0.002314
6.55	0.000094	0.002805
6.45	0.000124	0.003720
6.35	0.000137	0.004104
6.25	0.000178	0.005320
6.15	0.000208	0.006227
6.05	0.000266	0.007938
5.95	0.000289	0.008624
5.85	0.000362	0.010794
5.75	0.000417	0.012433
5.65	0.000521	0.015522
5.55	0.000566	0.016833
5.45	0.000707	0.020978
5.35	0.000882	0.026112
5.25	0.001100	0.032464
5.15	0.001100	0.032464
5.05	0.001372	0.040311



Earthquake probabilities from USGS OFR 08-1128 PSHA. 50 km maximum horizontal distance. Site of interest: triangle. Epicenters mb>5 black circles; rivers blue.

Figure 2 – Probability of Earthquake Within 30 Years - Centered Within 50 KM

NYSEG

INITIAL CAVERN DESIGN
WATKINS GLEN CAES

Revision 2

Watkins Glen, New York

Prepared for

NYSEG

Binghamton, NY

Prepared by

Thomas Eyermann

PB Energy Storage Services, Inc.
ENGINEERING · CONSTRUCTION · OPERATIONS · MAINTENANCE
A Parsons Brinckerhoff Company

PB ENERGY STORAGE SERVICES, INC.

Houston, TX

Project No. 50756B
October 2011

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1 BACKGROUND

The NYSEG Compressed Air Energy Storage (CAES) cavern at Watkins Glen will be developed on property in Inergy's US Salt brinefield. Brine from development will be disposed by sending it to the US Salt facility for use in the salt refinery. This will restrict solution mining rates to an average rate of about 350 gpm.

The schedule in the Technical Specification allows about 730 days for mining. This includes all downtime associated with mining such as interface logs, sonar surveys and workovers, as well as any outside-induced events such as power outages. This conceptual report limits cavern development to 730 days and *does not include* any allowance for downtimes or contingency.

The cavern will be mined in the F unit of the Salina formation. Figure 1 is a conceptual diagram of the F unit at the proposed location. The F unit extends from about 2,352 feet to about 2,827 feet in depth, about 475 feet thick of which about 334 feet is salt. For the conceptual design 50 feet of salt will be left to form the roof of the cavern.

Initial design of the cavern was done looking at three depths ranges:

- 2,402 feet to 2,827 feet
- 2,402 feet to 2,632 feet
- 2,402 feet to 2,532 feet

A cavern developed in each of the three depth ranges ends up being roughly similar in shape to the other depth ranges. However, the open space that is developed from each of the plans is different and the maximum diameter is significantly different. Key items of the three depth ranges are listed in Table 1.

Table 1 Comparison of Caverns Developed at Three Depth Ranges

Modeled Depth Range Feet	Open Volume Barrels	Floor Depth Feet	Maximum Diameter Feet	Vertical Thickness of Salt Percent
2,402 – 2,832 (tall)	933,000	2,567	258	66
2,402 – 2,632 (medium)	970,000	2,527	266	71
2,402 – 2,532 (short)	974,000	2,508	284	79

The open cavern volume changes between the plans (depth intervals) are due to the increasing thickness of exposed non-salt beds relative to the thickness of salt mined in each plan. As the non-salt units are exposed, they fall to the bottom of the cavern and bulk up (increase in volume due to void (brine) space between the slabs and particles in the floor), thus filling up more of the cavern interval than the non-salt material originally occupied. Although the tall cavern plan mines 286 feet of salt compared to only 103 feet of salt in the short plan, the tall plan has 144 feet of non-salt beds included in the mining interval compared to only 27 feet in the short plan and 63 feet in the medium plan

Based on the almost equal open cavern volume between the medium and short interval and the large reduction in diameter (266 feet versus 284 feet), the medium depth range of 2,402 feet to 2,632 feet was chosen for development of a conceptual cavern design. The conceptual design is described in this report.

2 TECHNICAL APPROACH

The study used the SANSMIC cavern simulation model to project the development of caverns from a single well. SANSMIC, a widely used cavern modeling program developed by Sandia National Laboratories, is a two-dimensional numerical simulation code, which approximates the dissolution of salt by water.

The basic input for the model consists of average radii of the well, the depth of the water injection and brine production strings, the depth of the product level, water injection rates, and duration of mining. If a cavern exhibits a region of abnormal or nonsymmetric growth, SANSMIC cannot fully evaluate continued growth in such a region. However, the simulated growth can be interpreted to closely approximate future growth in regions of concern.

As with all numerical models, SANSMIC does not fully represent the actual salt caverns. This is due to (1) the axisymmetric assumption in the model (that the cavern will develop evenly about the central wellbore) and (2) limitations in the equations for flow within the cavern. In addition, SANSMIC was developed primarily for modeling in domal salts, where the salt is relatively clean without significant nonsalt interbeds.

The axisymmetric assumption is not necessarily a significant limitation to modeling the development of salt caverns in the Syracuse salt. The caverns developed in this salt tend to be reasonably uniform in horizontal cross sections when developed by means of a single well. The limitations in the hydraulic equations result in overestimation of development near the bottom of the injection tubing in both reverse and direct mining and a corresponding underestimation of mining in the upper portions of the cavern.

The major difficulty in applying SANSMIC to bedded salt lies in its inability to comprehensively model the layers that are either nonsalt or have a low percentage of salt. SANSMIC has no ability to model the collapse of the nonsalt beds or to predict the behavior of units that are mostly nonsalt material. These limitations can be partially compensated for by altering the insoluble content and the dissolution factors of the various beds.

For the purposes of the simulation, the section between the depths of 2,352 feet to 2,632 feet was divided into fifteen 20-foot intervals. The percentage of salt within each interval was estimated from the Well 58 gamma log with the assumption that “clean” salt contains 5% nonsalt material and dirtier salts (higher gamma counts) contain up to 20% non-salt material. The non-salt units were estimated to have varying amounts of salt from 5% to 20% depending upon the gamma counts in the Well 58 log.

Salt was given a dissolution factor of “1”. To approximate conditions that will be experienced during mining of the insoluble beds, the dissolution factor of the various nonsalt intervals was also set at “1.” These values allow the nonsalt rocks to fall to the bottom of the cavern as mining progresses, which approximates the conditions seen in the Watkins Glen caverns where there are few or no overhanging ledges seen in the sonar surveys. The main consequence of the dissolution factor of the nonsalt units is in determining the amount of cavern space that will be filled by the fallen insoluble material. The non-salt material was given a bulking factor of 1.4, that is, the non-salt material on the floor of the cavity occupies 140% of the space it occupied in the undisturbed sequence.

Mining was simulated at a brine production rate of 350 gallons per minute. The tubing strings used for mining were 8-5/8 inches inside 13-3/8 inches. The actual tubing sizes are not material to the mining except in the very early days of mining.

The top of the cavern was placed at about 2,402 feet, about fifty feet below the top of salt estimated to be at a depth of 2,352 feet. The well was assumed to be drilled to 2,632 feet. Mining was simulated for 710 days, allowing 20 days of downtime for a workover and other events.

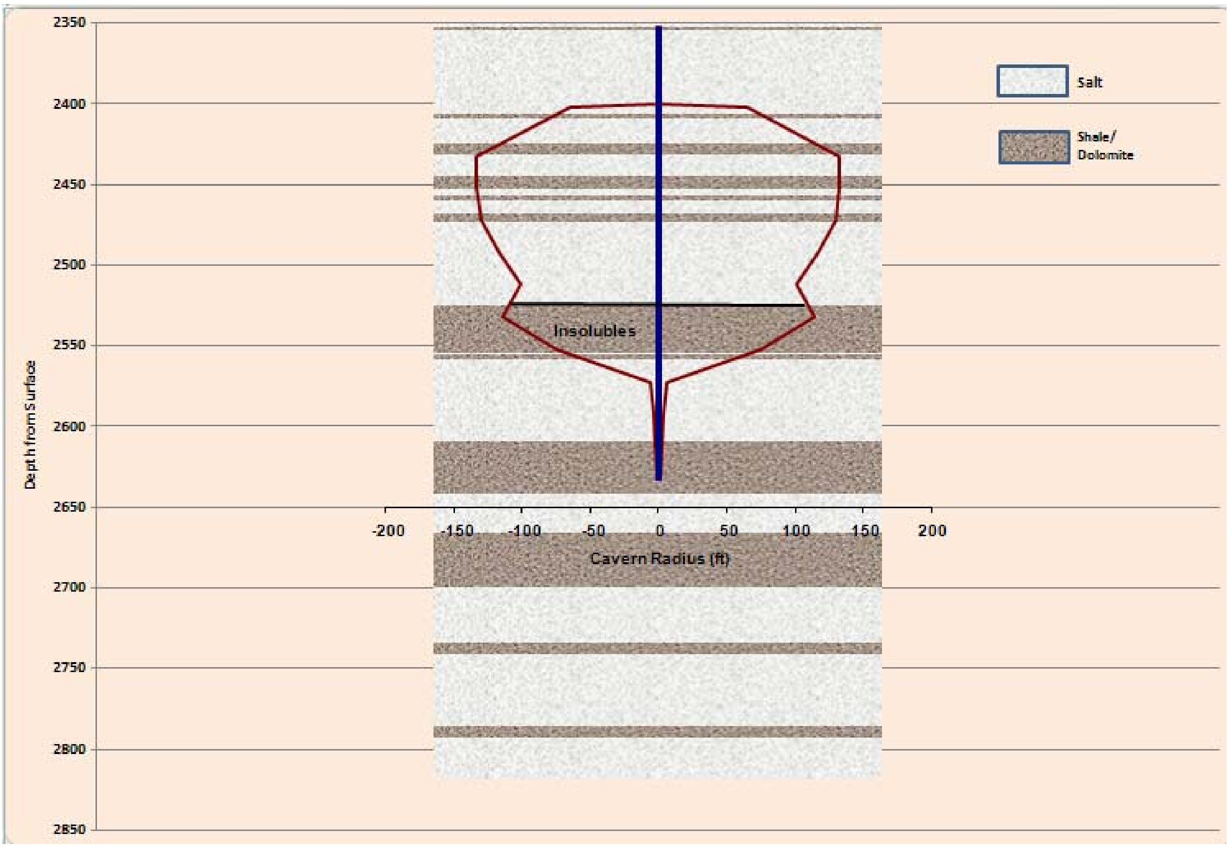

Figure 1 Conceptual Stratigraphy of the F Unit at the CAES Facility

3 CAVERN DESIGN

In the selected depth range, cavern design for a single well cavern was developed. To meet the air storage capacity desired by the CAES project, three caverns will be required, but all three caverns will be developed from the same basic plan. Detailed design of the mining program for each cavern may vary slightly depending upon the specific geology intersected by each well when drilled.

The well design requires one planned workover to reposition the string depths after development of an initial sump at the bottom of the selected interval. This initial step will be mined in direct mode – water injected in the inner deeper string and brine produced from the shallower outer string. Mining should be conducted at as high a rate as is feasible in order to mine the lower salt before it is covered with non-salt material from the overlying dolomitic shale.

For this initial sump stage, the blanket should be set low in order to mine the lowermost salt. Blanket refers to an insoluble liquid or gas which is used to stop upward solution mining and help control cavern shape. The blanket and tubing depths are shown in Table 2. The cavern volume and salinity of the produced brine at the end of each step are shown in Table 3.

Table 2 Setting Depths for Development of CAES Cavern

Mining Step	Blanket Setting Depth Feet	Production Setting Depth Feet	Injection Setting Depth Feet	Insoluble Depth Feet
Sump/Chimney	2,520	2,530	2,630	2,538
Reverse	2,420	2,530	2,472	2,535
Reverse	2,410	2,515	2,472	2,531
Reverse	2,402	2,515	2,472	2,528
Reverse	2,402	2,515	2,472	2,527

Table 3 Duration and Volumes for Development of CAES Cavern

Mining Step	Step Time at 350 gpm Days	Total Mining Time Days	Open Mined Volume Barrels	Gross Cavern Volume Barrels	Brine Saturation Percent
Sump/Chimney	130	130	67,000	105,000	52.1
Reverse	150	280	272,000	324,000	84.8
Reverse	150	430	506,000	575,000	88.6
Reverse	150	580	752,000	840,000	90.8
Reverse	130	710	970,000	1,073,000	90.8

At the end of the sump/chimney stage, a workover is required to raise both strings for continued mining. After the workover, mining should be changed to reverse – water injected in the outer, shallower string and brine produced from the inner, deeper string. This reverse mining continues until completion of the cavern. During reverse mining the blanket depth will need to be reset at shallower depths twice as shown in Table 2.

The depth of the insolubles on the floor of the cavern will need to be monitored during reverse mining to ensure that the inner string remains above them. If the inner string becomes buried in insolubles, it will likely plug and require a workover to clean out.

The cavern volume that can be developed in the allotted time of 730 days (including 20 days an intermediate workover) is about 970,000 barrels. This will allow dewatering of about 940,000 barrels of space for air storage operations.

The simulated cavern shape at completion at each of the solution mining stages is shown in Figure 2 and the shape at completion of mining is shown in Figure 3.

4 DISCUSSION

The conceptual plan is not optimized. Further effort in optimization at this time may result in minor changes to the single well cavern volume and dimensions, but is probably best deferred until the well has been drilled. *Detailed design for the cavern(s) will need to be developed once the well(s) has been drilled and completed.* The actual geology (salt thickness particularly) may then result in significant changes to the cavern design including the cavern volume. The roof development plan particularly will need to be refined in order to shape the roof.

The mined volumes shown in this conceptual report do not include provision for any downtime in mining, except for a 20 day period for the workover at the end of the sump/chimney stage. **There is no allowance for other interruptions (electrical outages, pump failures, plant outages, etc.) that are likely to occur.**

Due to the relatively large volume of non-salt material in the Syracuse Salt, a plan that does not require a workover to reposition the strings is not feasible. The plan discussed above creates a sump for accumulation of insolubles that will be liberated in the reverse stages of mining when the main cavern is developed for compressed air storage. Without this initial sump stage, the cavern floor is shallower and the open cavern volume is about 15% lower.

Cost issues and well sizes are not considered in the cavern solution mining conceptual plan. Further treatment of the brine to bring it to saturation for use in the US Salt plant is likewise not considered.

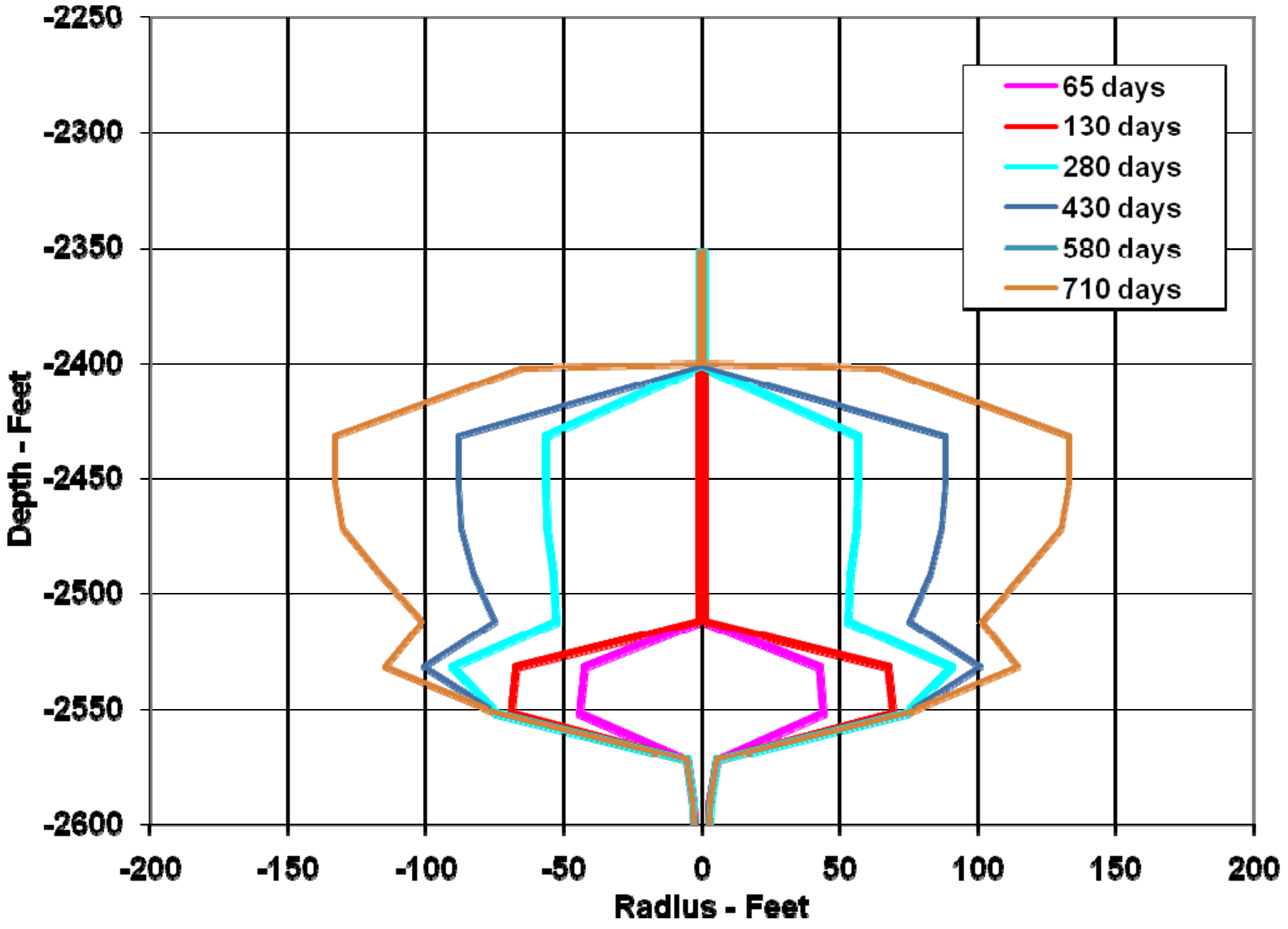

Figure 2 Cavern Shape at Each Solution Mining Stage

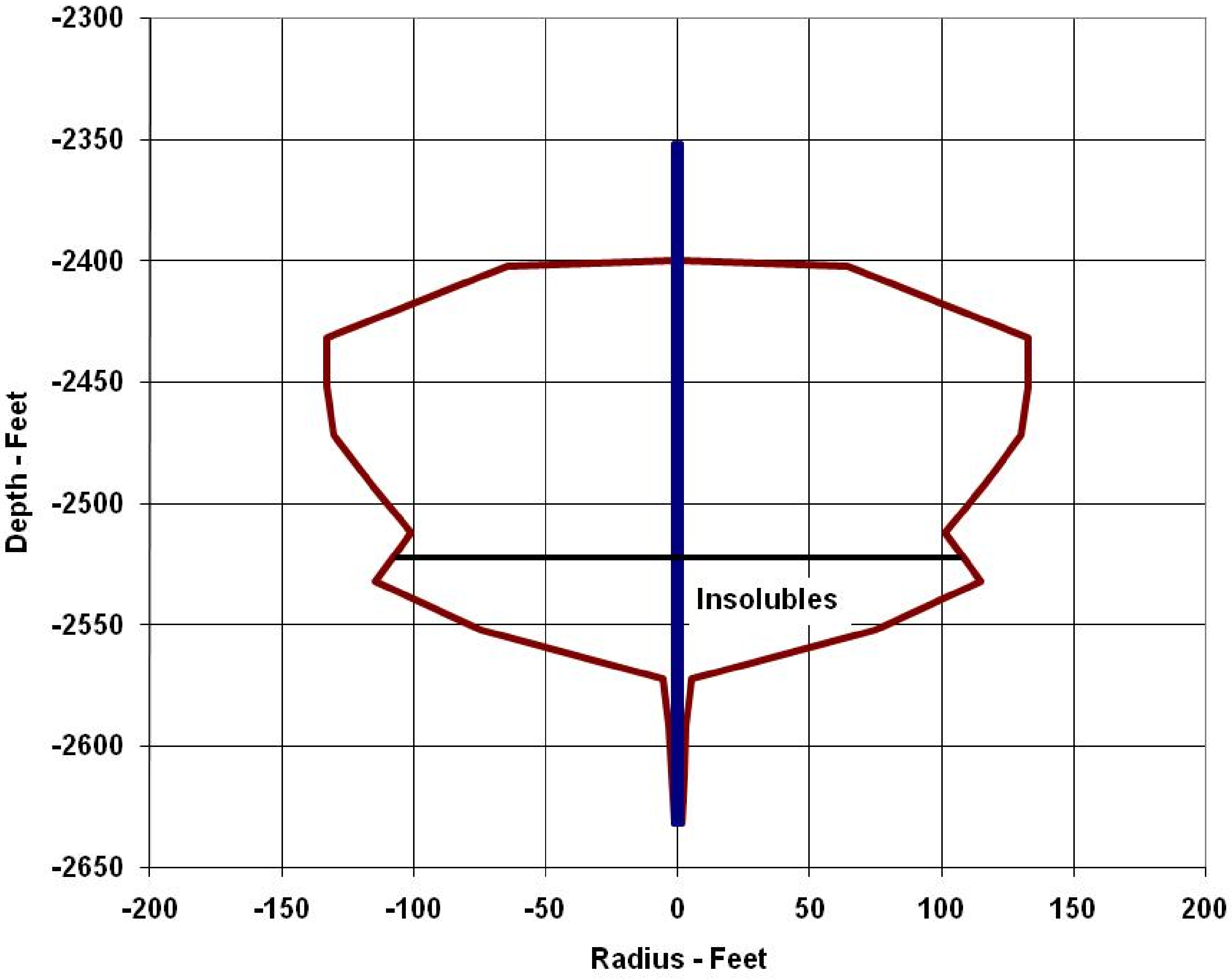

Figure 3 SANSMIC Simulated Shape of a CAES Single Well Cavern at Watkins Glen