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File: 2499.004

New York State Department of Environmental Conservation
Bureau of Resource Management & Development
Division of Mineral Resources
625 Broadway, Third Floor
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Attention: Mr. Matthew Podniesinski
Chief, Resource Development Section
Bureau of Resource Management &
Development

Subject: Annual Report Review - 2014
Cayuga Mine, Cargill, Inc.
Seneca and Tompkins Counties, New York

Gentlemen:

John T. Boyd Company (BOYD) received a CD from Cargill Deicing Technology (Cargill) on January 16, 2015 and post-marked January 14, 2015. The CD included a cover letter¹, the Annual Report², maps as AutoCAD® files, extensometer and closure readings as Excel® files, and consultant reports. Two reports are from RockTec

¹ Plumeau, David B., 2015, untitled letter from Cargill Deicing Technology to Vincent A. Scovazzo, John T. Boyd Company, January 9.

² Cargill Deicing Technology, 2014, "Annual Report for Mine File #709-3-29-0052; Cayuga Salt Mine, Permit ID#0-9999-00075-00001," with cover letter from Shawn G. Wilczynskito to Matthew Podniesinski of New York State Department of Environmental Conservation, November 24.

Solutions^{3, 4}, 13 reports are from ESG Solutions including a velocity model report⁵ and 12 monthly reports⁶, and one from RESPEC⁷.

On February 15, 2006, Mr. Steven M. Potter, then the Director, Bureau of Resource Management & Development, New York State Department of Environmental Conservation (NYSDEC), requested that BOYD review all documents, digital data, and annual reports received by BOYD starting with the 2006 Annual Report.

The recently received documents were reviewed for their adherence to conditions of the revised Permit⁸. §12.8 of this revised permit limit cost for review of annual reports by Consulting Services to \$15,000. For this annual review, BOYD is providing the Consulting Services. It is noted that "Funding relating to permit modifications or alterations requiring consultant review shall be not be capped due to the varying nature of potential future applications. Cargill shall fund the cost of the annual meeting/underground inspections, and will share the cost of joint inspections with American Rock Salt Co., LLC."

The Cargill 2014 Annual Report is accepted, however, additional information is required for further evaluations by BOYD and NYSDEC. This includes:

- A map showing the thin rock overburden, Frontenac Point Anomaly, the 1,000 ft set back, and mine projections.
- The well data referencing the presence of brine on top of and within the beds of the Salina Group and seismic data which may show the presence of this brine.

³ Petersen, Gary, 2014, "Cargill Deicing Technology, Cayuga Mine, Rock Mechanics Evaluation," report to Dave Plumeau of Cargill Deicing Technology, July 21.

⁴ Petersen, Gary, 2014, "Cargill Deicing Technology, Cayuga Mine," report to Dave Plumeau of Cargill Deicing Technology, April 28, with notes attached on MS data.

⁵ ESG Solutions, 2014, "Seismic Velocity Model Optimization at the Cayuga Mine," Reference Number: 2015-0111 Version: 2, Cargill Corp., November.

⁶ ESG Solutions, 2013, "Remote Data Processing, Seismicity & System Health Analysis Report," Reference Number: 2012-003664, submitted to: Cargill, January 7, February 4, March 4, April 4, May 29, June 11, July 4, August 8, September 5, October 4, November 17, and December 12, 2015.

⁷ DeVries, Kerry L., William M. Goodman, and Cody A. Vining, 2014, "Mine Stability Assessment, Cargill Deicing Technology, Cayuga Mine, Lansing, New York," RESPEC Topical Report RSI-2371, prepared for Cargill Deicing Technology, April.

⁸ New York State Department of Environmental Conservation, Region 7, 2007, "Permit" DEC ID 0-9999-00075, expiration December 31, 2012, December 31, Modification # 1 Effective Date: November 8, 2013.

BOYD and NYSDEC request additional assessments, which should be included in the next annual report. These are:

- Salt dissolution and pillar undercutting at the injection point on 4-Level.
- Avoid mining intersecting panels and eliminating breakthroughs to contain mine flooding due to a breach.
- A prudent mine subsidence monitoring plan, which includes survey, survey frequency, data assessment, and monument installation schedules.

Discussion of Annual Report

The Permit has several conditions that affect the Annual Report and its review including:

Condition 3

Condition 3 requires all reports required by the permit to be submitted to Region 7.

Condition 9.a.

Condition 9.a. requires investigation into the disturbed salt zone and this investigation to be completed and submitted before mining proceeds into the area. Based upon the additional seismic survey and consultant reports, particularly RESPEC's report⁷, Cargill will maintain the planned 1,000 ft setback around the Frontenac Point Anomaly. Further investigation shall be completed and submitted to the Department for review and approval prior to mining within this 1,000 ft buffer.

Condition 9.b.

Condition 9.b. requires investigations and reports on the adequacy of the thin rock overburden where the solid rock overburden is thinner, the glacial till and lake sediments thicken and lake depth increases. The thin rock overburden and Frontenac Point Anomaly may overlap. These Additional investigations and reports have not been performed, and mining in this area should be avoided until reviewed and approved by the NYSDEC.

Condition 12.a.

Condition 12.a. requires an Annual Report to be submitted by Cargill in response to 12.a. sub-conditions 1 through 8 and Condition 12.b through g. These conditions and Cargill's responses are summarized below.

Condition 12.a.1.

Condition 12.a.1. requires the inclusion of the Mine Manager's signed certification that "all mining related activities...were in conformance with this permit and the approved plans, or that variances have been reported and managed."

A certification was included on page 2 §12.a.1. and the certification sent to NYDEC was signed by Mr. Shawn G. Wilczynski, Mine Manager, on November 21, 2014. This certification notes "... that all mining activities, to the best of my knowledge, conducted during the reporting period from November 1, 2013 to present were in conformance with the DEC Permit # 0-9999-00075/00001 and the approved plans. No variances occurred and none were reported."

Condition 12.a.2.

Condition 12.a.2. requires "A summary of all non-routine mining incidents as defined in Special Conditions Part b. ..." Condition 13.b. defines non-routine as "incidents during mining, processing, or other mine related activities that may adversely affect mine stability, ground and surface water or other natural resources, or the health, safety, welfare or property of the general public." During a meeting held on August 17, 2004, with Cargill, NYDEC, and BOYD, it was agreed that statements will be included in the Annual Report "to point out known, encountered, or discovered geologic and geotechnical anomalies and mine action to address such anomalies."

Cargill included a statement in the Annual Report page 2, Section 12.a.2. that "[t]he Cayuga Mine is not aware of any non-routine incidents associated with the mining, processing, or other mine related activities that would have adversely affected any of the following:

- Mine stability.
- Ground and surface water.
- Natural resources.
- Health, safety, welfare or property of the general public".

Condition 12.a.3.

Condition 12.a.3. requires "[a]n updated Mining Plan Map depicting the current extent of mining activities, and the proposed advancement of the working face for the subsequent three years." At the August 2004 meeting, it was agreed that in addition "[a] mine map showing instrumentation location and type and shore line..." will be included in the Annual Report.

Cargill included a statement in the Annual Report, page 2, Section 12.a.3. that "[t]he Cayuga Mine is currently operating in the northern region of the mine. Active mining is located in panels U-62B and U-72 to the west, and NW-3 to the north. As can be seen on the map, mining is proposed to continue east from U-63 under the land, pending acquisition of mineral rights there."

Mine maps as AutoCAD files were supplied by Cargill to fulfill this condition. All AutoCAD maps supplied were overlays and a base map. The base map was included as BASEMAP WITH ROCK LAYER ROOF ROCK FLOOR rock rolls (updated 12-18-14.dwg), which was last modified December 23, 2014, and includes a map entitled "Cayuga Mine, 6 Level Workings," by Cargill Deicing Technology. Also included on this map are roof and floor rolls. Other maps provided are:

- The AutoCAD file, COMPLETE MINE OVERLAY W SURFACE Subsidence (12-2014).dwg, last modified December 23, 2014, and containing untitled, undated map, which shows subsidence monument locations, shore line, and the 1st, 4th, and 6th Level workings.
- The AutoCAD file, ROYALTY.DWG, last modified January 08, 2015, and containing the Cargill Deicing Technology, 2014, "Cayuga Mine, Mine Royalty Map, 2014/2015 Fiscal Yr." December. Map shows fiscal year production areas from June 1, 1984 through May 31, 2014.
- The AutoCAD file, BAKER UPDATE U38-36 DUST FILL MAP.DWG, modified January 08, 2015, containing an untitled, undated map and shows U38 areas filled.
- The AutoCAD file, BASEMAP PLANNING FOR MLRP.DWG, modified December 23, 2014, and containing the map Cargill Deicing Technology, 2014, "Cayuga Mine, 3 Yr Mine Plan, 2014/2015 Fiscal Yr.", November. This map shows planned expansion through fiscal year 2017.
- The AutoCAD file, 4 LEVEL POND MAP MLRP VERSION 18NOV14.DWG, modified December 23, 2014, and containing the map, 2015, "Cayuga Mine, 4 Level Pond Map, Updated: 18 Nov 2014," January. This map shows filled levels to January 1, 2015, and remaining potential pond area.
- AutoCAD file 4 LEVEL CONVERGENCE MAP.DWG, modified December 23, 2014 and contains an untitled and undated map showing closure station locations.
- The AutoCAD file, 4A LEVEL FOR JT BOYD.DWG, modified December 23, 2014 containing undated, "4A Level Instrumentation Map." This map shows closure station's locations.
- A hard copy map, undated and untitled, scale 1 in. = 50 ft and AutoCAD file, PAMELPASS.DWG, modified December 23, 2014, and contains the map "4 Level, Pamel Pass - 13 Belt." This map shows locations of extensometers along 13 belt.

- An untitled AutoCAD file, SCREEN PLANT HORIZONTAL ROOF EXT.DWG, modified December 23, 2014, and showing map and cross-section view of installation locations of near horizontal extensometers in the roof of the screen plant gallery.
- The AutoCAD file, SCREEN PLANT INSTRUMENTATION.DWG, modified December 23, 2014, and containing map undated, "Unit # 5 Screenplant," showing instrument locations in and around the screen plant gallery.
- The AutoCAD file, undated, "Current Surge Bin Instrumentation Map as of 9-09" and AutoCAD file, SURGE BIN INSTRUMENT MAP TO JT BOYD.DWG, modified December 23, 2014, and containing undated, "Current Surge Bin Instrumentation Map as of 9-09," showing instrument locations in and around the screen plant gallery.
- AutoCAD file, CONVERGENCE MAP WITH BASEMAP 2013.DWG, modified December 23, 2014, and containing the map Cargill Deicing Technology, undated, "Cayuga Mine, 6 Level Workings, Convergence Stations" This map shows the locations of convergence stations.
- Adobe Acrobat file Cayuga Mine Contour Dec 2014 for JT Boyd Rate Dec-2014.pdf a conversion of a Sony RAW file Cayuga Mine Contour Dec 2013 for JT Boyd Rate Dec-2013.srf modified December 23, 2014 and containing the undated map "Cayuga Mine Closure Rate (Inches/Year) Dec-2013."
- Adobe Acrobat file Cayuga Mine Contour Dec 2014 for JT Boyd Closure Dec-2014.pdf a conversion of a Sony RAW file Cayuga Mine Contour Dec 2013 for JT Boyd Closure Dec-2013.srf modified December 23, 2014 and containing the undated map "Cayuga Mine Closure Rate (Inches) Dec-2013."

The supplied maps show the extent of mining, proposed mine plan, subsidence monument locations, shorelines of both the 4 Level flooding and of Cayuga Lake, total closure, closure rate, and instrument locations.

Condition 12.a.4.

Condition 12.a.4. requires the annual report to include a "summary of in situ measurements of rock mechanics required by Part f. of this Special Condition."

Condition 13.f. requires the measurement and collection of in situ rock mechanics data "in accordance with the approved Mined Land Use Plan." The data are to include "plots of relevant graphs. ..." Furthermore, "[e]xceptions to anticipated trends in rock behavior shall be noted and explained. ..."

At the August 2004 meeting, it was agreed that "[a]ll rock mechanics data" would be incorporated in the Annual Report, "including, but not limited to, all instrumentation readings and observations from the initial readings to present. Data for subsidence, closure, and extensometers are to be provided electronically. These electronic files are

to include raw and processed data, graphs, and explanations of any inconsistencies and anomalous readings including reasons for abandonment, reinstallation, etc., along with applicable observation in the vicinity of the instrument such as floor heave, water inflow, etc. Future reports are to contain comment on whether, in the opinion of Cargill, the instrument readings support or conflict with prior stability models especially in areas employing new mine, panel, or main configurations."

Cargill included a statement in the Annual Report on page 2 and 3, Section 13.a.4. that "Evaluations of weekly and quarterly convergence data indicate that no unusual trends have been identified and the mine is behaving as expected, with the exception of the U-40B and U12 areas. Since backfill placement in the U40B area has been completed the convergence rates have slowed and are trending back toward historical rates. The U-12 panel also shows higher than normal closure near the breakthrough with SW-2 and near the U-12A sub-panel. These areas are being monitored more frequently as we try to understand why the rates are increased. Both of these areas in U-12 were backfilled during the 1990's and both areas show a decreasing rate trend at this time."

Closure measurements can be evaluated to indicate possible instability in three ways:

1. By studying the graphs of the rate of closure over time. The shape of these graphs indicates areas of instability, areas of concern, and areas of stability. Mr. Petersen of RMA (Cargill geotechnical consultant) evaluated the closure in this manner.
2. By establishing trigger values for total closure. This method is applicable in harder, less viscous rock but is not applicable for the Cayuga Mine, as stable closure in salt will continue until the openings are closed.
3. By establishing trigger values for long-term closure rates. Since this is not being completed by the other investigators, BOYD applied such trigger rates in its evaluation of the closure readings.

Closure rate data are significant because they offered insight into the collapses and the inundation of the Retsof Mine. Sustained closure rates of 15 in. per year or less were measured in stable areas of the Retsof Mine, while in the failure areas, closure was regularly measured with sustained rates over 230 in. per year with onset of failure around 600 in. per year. Although Retsof and Cayuga mines have different overburden and material properties, in the general sense, a comparison seems warranted for a relative indicator of stability.

BOYD reviewed the 373 closure stations read in 2014 (365 in Level 6, five in Level 4A, and three in Level 4). Of these, 150 (41%) had the highest closure rate of the year on

the last calculated rate of the year, down from 42%. A similar trend was noted over several years by BOYD. Reviewing in-mine humidity data, it can be seen that the highest humidity in the mine occurred between early July to early November which accounts for this trend and for 142 of the 150 readings.

None of these 373 closure stations showed readings that exceeded 230 in. per year. Below is a list of the 10 highest measured closure rates in 2014 for areas of recent mining defined as areas within 1,000 ft of mining that occurred since October 2013.

Top 10 Closure Rates in Areas of Recent Mining

Closure Station	Rate of Closure (in./yr)	Last Recorded Rate of Closure (in./yr)	Notes
U62PIN No. 33	80.54	-	Initial and only reading
U62BPIN No. 3	77.52	11.45	Initial reading
U62BPIN No. 2	67.21	12.67	Struck by equipment, 2nd reading
U62PIN No. 35	65.82	2.43	Initial reading
U62BPIN No. 1	62.88	8.38	-
U68PIN No. 6	60.59	1.22	Initial reading
U62PIN No. 32	59.25	2.33	Initial reading
U68PIN No. 4	53.50	8.33	Initial reading
U62BPIN No. 4	53.33	7.66	Initial reading
U62PIN No.31	52.40	14.44	Initial reading

All of these rates substantially dropped over time showing that the ground is stable or stabilizing. All 10 of these stations are located in the most northern part of the mine where all production is located, with four stations located in U-62, four in U-62A, and three in U-68.

Also determined are the top 10 closure rates away from recent mining activity as shown below:

Top 10 Closure Rates Away from Recent Mining			
Closure Station	Rate of Closure (in./yr)	Last Recorded Rate of Closure (in./yr)	Notes
U62PIN No. 17	1.1532	0.91	-
U60PIN No. 23	1.127	1.127	Last reading
U63PIN No. 2U	1.012	0.642	-
U40BPIN No. 8	0.9936	0.967	-
U12PIN No. 32	0.9889	0.9889	Last reading
U12PIN No. 28	0.9507	0.9507	Last reading
2B-U40B	0.9291	0.898	-
U12PIN No. 107	0.9051	0.887	-
U4PIN No. 20	0.9029	0.9029	Last reading
U60PIN No. 20	0.8837	0.8837	Last reading

Rates dropped for five of these stations over 2014. Rates did not drop in five stations where high readings occurred during a period of high humidity. The rate drop indicates the ground is stable.

- Four of these readings (U62PIN No. 17, U60PIN No. 23, U63PIN No. 2U, and 60PIN No. 20) occurred close to two but just outside the 1,000 ft cut off for recent mining.
- Three high-rate stations are clustered in U-12 areas near the U-12A sub-panel, which are the same stations that have been included over the last three years. U-12 areas have been frequently visited in the past by BOYD and NYDEC to observe conditions and each time the area appears globally stable.
- Two in the U-40 fill area.
- The location of station 2B-U40B could not be determined.

Extensometer data were also evaluated. Extensometers were installed in various manners including vertically into the roof, at low angle (near horizontal) into the roof and then over the pillars, and horizontally into pillars. In addition, extensometers were installed in levels 4 and 6. Thus, four populations exist. These data are further complicated by the varying rod and bay lengths. (Bay length is the length difference

between rods except for the first bay which is the length of the shortest rod.)
Nevertheless, BOYD attempted to ascertain anomalies within these data.

Extensometer Sag or Swell (anomalous rates are in bold)				
Extensometer Location	Station	1 st Bay, in.	2 nd Bay, in.	3 rd Bay, in.
Roof Horizontal – Level 6				
Screen Plant	1A	0.955	-0.885	0.970
	1B	0.008	0.005	0.920
	2A	0.087	0.316	1.072
	2B	0.083	0.355	1.267
	3A	0.071	0.043	0.448
	3B	0.089	0.037	0.285
	4A	-0.059	1.037	1.558
	4B	0.072	0.025	3.748
Pillar – Level 6				
Screen Plant	G Pillar, Hole B1	2.809	-1.378	-0.784
	H Pillar, Hole A1	2.891	-1.203	-0.547
	H Pillar, Hole A3	0.280	0.379	2.016
	I Pillar, Hole B1	1.408	-0.059	-0.778
	J Pillar, Hole B1	1.790	-0.161	-1.321
Roof – Level 4				
Pamel Pass	No. 1	0.116	0.033	0.021
	No. 2	0.021	-0.009	-0.008
	No. 3	0.198	0.023	-0.020
	No. 4	0.477	0.067	0.024
	No. 5	0.563	0.092	0.009
Pillar – Level 4				
Surge Bin	No. 20	0.680	0.278	0.084
	No. 25	1.901	1.261	-0.076
	No. 50	1.066	0.750	0.163
	GA-No. 10	-	0.730	0.049
	GA-No. 11	-	0.539	-0.027
	GA-No. 22	-	2.121	0.202
	GA-No. 27	-	2.791	0.087
	GA-No. 29	-	1.092	0.043
	GA-No. 49	-	0.024	0.017
	GA-No. 60	-	0.653	0.124
	GA-No. 80	-	0.001	0.046
	GA-No. 90	-	0.127	0.021
	GA-No. 100	-	0.045	0.010

A measurement of 0.00030 in. per day is often accepted as a convenient point in examining vertical extensometer data, as this value is close to, but normally less than the value required for bed separation (opening of bedding planes). Horizontal roof extensometers are installed at 5 degrees to 15 degrees from the horizontal as measured in the AutoCAD drawings. This angle would multiply any bed separation, thus the trigger used for horizontal extensometers is 0.02 in. per day or about 2 in. of sag. No extensometer readings were considered alarming.

Condition 12.a.5.

Condition 12.a.5. requires the Annual Report include a "summary of subsidence monitoring data required by Part e. of this Special Condition." Condition 12.e. requires "[s]ubsidence monitoring shall be conducted in accordance with the approved subsidence monitoring plan contained within the approved Mine Land Use Plan." Furthermore, "[e]xceptions to the trends shall be noted and explained..." Points applicable to this condition were agreed upon at the August 2004 meeting and are noted above under Condition 12.a.4.

Cargill included a statement in the 2013 Annual Report page 3, Section 12.a.5 that "A survey of the west shore of Cayuga Lake was performed this year and the data is being evaluated now. Plans are being made to conduct subsidence surveys of the east shore line in the 2014 calendar year. This 2014 Annual Report states on page 3, Section 12.a.5 that "Plans are being made with a new surveying contractor to conduct subsidence surveys of the surface in the 2015 calendar year." A similar statement was included in the 2012 annual report that noted the east line would be completed in 2013.

Cargill includes a statement "Past measurements indicate that the mine is behaving as expected with no anomalous subsidence zones."

Consultant Reports Concerning Conditions 12.a.4. and 5.

Mr. Petersen discussed his visit to the Cayuga Mine on February 25 through 26, 2014. This visit did not include underground observations. He noted that the closure rate for U-40B, U12, and U28 were "... higher than expected, are declining, which is a good thing." And that for U-40B he is "... no longer concerned with excessive closure occurring in this area." He noted that intersections U12/SW2 and U12/U12A closures rates are declining.

Mr. Petersen cautions about mining around the northern anomaly and that Cargill should "... avoid mining intersecting panels in that area." because "This increases the effective panel width, making the intersection more vulnerable for higher closure and problems." He also recommended eliminating the breakthroughs between panels, to contain mine flooding if a breach were to occur.

Mr. Petersen analyzed the microseismic data over the past four years starting with 2010. He noted that when there were periods of no blasting, the frequency of the triggered events declined. "Triggered" events are events recorded by any geophone.

"Large" events are those with a magnitude of 0.5 or greater. The frequency of large events located north of U52, peaked in January 2011 when mining was occurring beneath a line defined by the location of these events. The frequency of large event south of S3 has declined since early 2012.

Mr. Petersen noted in his second report that "... mine-wide closure rate graphs and, except for those areas mentioned in this report, they were all indicating very stable conditions." Drawing the same conclusions for U-40B, U12, and U28, he repeated recommendations for mining near the anomaly in the north, and repeated the microseismic discussion as in the first report.

A RESPEC report was also reviewed. RESPEC discussed the closure rate for U40B which peaked in 2008. The increase in rate started in 2006 and backfilling started in August 2007. RESPEC does not expect closure rates to slow until after the openings close approximately 4 ft. But in contradiction RESPEC noted that closure rates for some stations are less than those before 2006 but they do not expect other stations' closure rate to be below pre-2006 rates for several years to come.

Panel U12 experienced an upturn in closure rates between 2006 and 2008, which was most pronounced in and near the intersections U12A/SW2 and U12/U12A. "The closure rates in U12 have declined since 2011, but are still greater than expected based on pre-2005 measurements ..." and as experienced throughout the mine. U12's 1993 backfill has not compacted enough to curtail closure.

RESPEC also notes "Well data in the northern part of the Cayuga Lake Valley have determined that brine is present on top of and in between beds in the Salina Group. The Frontenac Point Anomaly may reflect the southern extent of water infiltration." RESPEC opines that the planned 1,000 ft buffer around Frontenac Point Anomaly should prevent a hydraulic connection with the mine. Further, "As the mine progresses north, microseismic monitoring to detect anomalies and drilling in advance of the faces to detect an increase in moisture or presence of water is recommended as a precaution."

RESPEC notes that "Salt dissolution near the injection point on the 4-Level is visible and the pillars are being undercut ...", which can possibly result in mine collapse. And noting "A major collapse in this area could have a significant effect on Cayuga Lake's shoreline and the mine shafts. Continued dumping of waste salt at the base of the No. 2 Shaft is encouraged to increase salt saturation before the inflow enters the west pond."

In addressing ESG work in micro-seismic RESPEC opined about select events being located along sets of lines that "Three linear features indicative of echelon tear faults are identifiable by the northern seismic network. In the southern mine workings, the events cluster around a single linear feature." "RESPEC recommends that salt dust and waste rock be backfilled under those areas that are seismically active as a precaution."

RESPEC discussed their numerical analyses related to changes in mine layout and changes in geology as the mine expands northward under the lake. In part, these analyses were addressed by BOYD in 2014^{9,10}.

In the 2014 Annual Report, a series of reports of ESG Canada Inc. were included along with a report about development of a new velocity model. The original seismic velocity model for the Cayuga Mine was optimized using new velocity log information from corehole No. 18 and No. 17 waypoints located within the No. 6 Salt layer. ESG used 12 calibration blasts.

Condition 12.a.6.

Condition 12.a.6. requires the inclusion of "[i]nformation regarding the source and volume of any water inflow into the mine, and the disposition of such water." At the August 2004 meeting, it was agreed that a discussion about water disposal in Level 4 would be included in the Annual Report, noting: "Updates of Level 4 filling including data on shore line advance." However in 2012 it was noted that "Access to view the pond is not possible due to ground conditions." However, RESPEC appears to have viewed the site in 2014.

Mr. Plumeau notes that "All of the water is directed to a settling pond located on the 4-level of the mine. The water is then pumped from the settling pond to abandoned areas at the far east end of 4-level as well as to various areas of the active mine for dust control. Recent volume calculations indicated that at our current rate of storage (about 16,800,000 gallons per year) we have approximately 7.9 years of storage life remaining on 4-level" These values have changed from the 2013 Annual report that noted "... our current rate of storage (about 12,000,000 gallons per year) we have approximately 13 years of storage life remaining on 4-level."

⁹ Scovazzo, V.A., 2014, "DRAFT Review of Permit Modification Application for Cayuga Mine, Cargill, Inc." prepared for Matthew Podniesinski, New York State Department of Environmental Conservation, John T. Boyd Company File: 2499.004, July 31.

¹⁰ Scovazzo, V.A., 2014, "DRAFT Review of RESPEC's Response Cayuga Mine, Cargill, Inc." prepared for Matthew Podniesinski, New York State Department of Environmental Conservation, John T. Boyd Company File: 2499.004, December 9.

Cargill also notes that an "Action plans are in place to continue to reduce the inflow into the mine. A system for collecting the #1 shaft water inflow and for pumping it to surface for processing has been installed and is now operational. It is being optimized now. Once the processing system is fully operational it is expected to reduce inflow by an additional 3 gpm." This value is down from 6 gpm as noted in last year's annual report. Also reported is that "The shaft water inflows have been increasing over the past 10 years and have become a concern. The Cayuga Mine is now pursuing contractors that can help grout the #1 shaft inflows to reduce them to tolerable levels."

Cargill included a Level 4 pond map, as noted above, and an Excel file, UG Pond Volume Calculation 3Nov14.xls, which was last modified November 03, 2014. This spreadsheet reports the inflow in 2014 at 16,844,053 gallons with 7.9 years of storage remaining.

Condition 12.a.7.

Condition 12.a.7. requires the inclusion of "[a] summary of all other monitoring data required under the terms of this permit or Department SPDES permit issued to Cargill." Cargill included a statement in the Annual Report page 3, Section 12.a.7. that "There were no exceedances of the SPDES limits for the outfalls or the Waste Water Treatment Plant to report during the time of this report." An included spreadsheet last modified November 21, 2014, provides information on outfall water quality including cyanide, chloride, zinc, total dissolved solids, and cooling and treatment water.

SPDES data and a discussion of these data are included in the Annual Report. These data are to be reviewed by NYSDEC.

Condition 12.b. and c.

Condition 12.b and c. addresses Mine Safety and Health Administration (MSHA) reporting involving non-routine mining incidents as defined in Condition 12.b. Condition 12.c. requires Cargill to submit "all correspondence with the Mine Safety and Health Administration involving non-routine mining incidents..."

Cargill includes a statement on page 3 section 12.b. of the Annual Report that "[t]here were no incidents meeting the guidelines for notification as identified in section 12.a.2." and section 12.c. of the Annual Report that "[t]he Cayuga Mine has not received any citations or correspondence from MSHA regarding non-routine mining incidents as identified in section 12.a.2." The Annual Report does not note reports or letters from MSHA concerning any non-routine mining incidents.

Condition 12.d.

Condition 12.d. addresses reporting requirements "Prior to undertaking any material change in the approved mining methods or techniques ... Cargill shall submit to the Department a description of such modification ..." This condition does not require the reporting to occur in the Annual Report.

Cargill notes on page 4 in section 12.d. that, "There have been no changes to the Cayuga Mine layout in the past year."

Condition 13.g.

Condition 13.g. addresses the reporting and recording of citizen complaints.

Cargill includes a statement on page 4 section 13.g. of the Annual Report that "[n]o written complaints from citizens were received since the last report (November 2013)."

Site Visit

A site visit to discuss these findings among NYSDEC, Cargill, and BOYD should be arranged. Suggested areas to visit in the mine are U62 and U62B.

Topics for discussion at the meeting should include:

- Pillars being undercut in Level 4 which possibly can result in mine collapse.
- Subsidence survey schedule.
- Brine present on the top of and within the Salina Group at the Frontenac Point anomaly.
- The potential for a mine breach and flooding referenced in the Peterson report.

Please contact us if you require additional information or if we may be of further service.

Respectfully submitted,

JOHN T. BOYD COMPANY

By:



Vincent A. Scovazzo
Director of Geotechnical Services