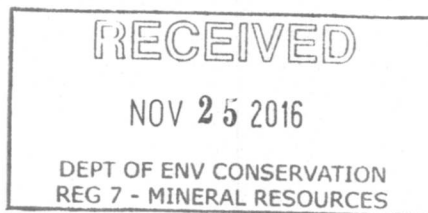




Deicing Technology  
P.O. Box B  
Lansing, NY 14882

November 18, 2016



Mr. Matthew Podniesinski  
Chief, Resource Development Section  
Bureau of Resource Management & Development  
Division of Mineral Resources  
New York State Department of Environmental Conservation  
625 Broadway, Third Floor  
Albany, New York 12233-6500

RE: Annual Report for Mine File #709-3-29-0052; Cayuga Salt Mine  
Permit ID#0-9999-00075-00001  
Towns of Lansing and Ulysses, County of Tompkins  
Town of Covert, County of Seneca

Dear Mr. Podniesinski:

Enclosed is an annual report required in accordance with the Special Conditions section (item numbers 12.a through 12.g) of DEC permit number 0-9999-00075/00001. This report will address each reporting requirement separately (12.a.(1), 12.a.(2), etc.) and drawings are attached as required. As requested, all technical data associated with monitoring of mine stability will be sent to the John T. Boyd Company with attention to Dr. Vincent Scovazzo. A copy of this report is in the mail to Christopher Lucidi, the Region 7 Mined Land Reclamation Specialist and to Steven Army, the Region 8 Mining Program Supervisor.

If any questions arise please bring them to my attention at your earliest convenience.

With Best Regards,

Shawn G. Wilczynski  
Mine Manager – Cargill Deicing Technology

## Annual Reporting, Monitoring, and Notifications

### 12.a.(1) - Cargill Cayuga Mine Manager Certification:

I, Shawn G. Wilczynski, Mine Manager – Cargill Deicing Technology, certify that all mining activities, to the best of my knowledge, conducted during the reporting period from November 4, 2015 to present were in conformance with the DEC Permit # 0-9999-00075/00001 and the approved plans. No variances occurred and none were reported.

Signed: Shawn G. Wilczynski Date: 11/19/16

### 12.a.(2) - Summary of all non-routine mining incidents:

The 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

### 12.a.(3) - 3 Year Mining Plan

A map is attached depicting the current and proposed mining for the next three years.

The Cayuga Mine is currently operating in the northern region of the mine. Active mining is located in panels U-63E to the east under the land, U-74 and U-76 to the west, and NW-3 to the northwest.

### 12.a.(4) - Summary of In-situ Measurements of Rock Mechanics:

The Cayuga Mine continues to collect mine convergence data in accordance with the guidelines previously established in the Mined Land Use Plan. Convergence stations are typically installed at the "face" of active tunnels in mining panels with a profile of three stations located in the center and edges of the yield pillar panels. The convergence stations are usually read daily during the first week and then shifted to a weekly schedule until the next profile is installed. The initial profile will then be monitored on a monthly or quarterly schedule for the duration of mining of the panel. After abandonment of the panel, specific convergence stations are monitored quarterly. Currently, there are over 300 convergence stations being monitored. Once the data from the convergence stations has been collected it is evaluated both internally and externally for trends to ensure that each panel and the mine are behaving properly.

Evaluations of the convergence data indicate that no unusual trends have been identified and the mine is behaving as expected. There continues to be two slight anomalies: the U-40B and U-12 areas. Since backfill placement in U-40B was completed the convergence rates have slowed and are trending back toward historical rates. The U-12 panel is also trending toward normal rates. These areas are being monitored more frequently as we try to understand why the rates were higher than expected.

Roof sag and wall expansion, measured with extensometers, is also monitored as conditions warrant, and is reviewed internally and externally as well. This data indicates the mine is behaving as expected. The Cayuga Mine operates a micro-seismic monitoring network which now has over 65 geophones and covers over 5 square miles of mine workings. The data from this system is reviewed daily in-house and

by Engineering Seismology Group (ESG), and is summarized in a monthly report by ESG. This data indicates the mine is behaving as expected.

12.a.(5) - Summary of Subsidence Monitoring:

Surface subsidence measurements continue to be performed in accordance with the Mined Land Use Plan. No subsidence surveys of the surface were completed during the year. The measurements indicate that the mine is behaving as expected with no anomalous subsidence zones.

12.a.(6) Source and Volume of Water Inflow Into the Mine and Disposition of Such Water:

The following is a list of sources and associated flow rates of water into the Cayuga Mine:

- Production Shaft (#1 shaft) – 20 gallons per minute (gpm)
- Ventilation Shaft (#2 shaft) – 4 gpm
- ED Plant Concentrate discharge – 3 gpm
  
- Total Water Inflow = 27 gpm

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 14,000,000 gallons per year) we have approximately 7.1 years of storage life remaining on 4-level.

Action plans are in place to continue to reduce the inflow into the mine. Better management of run-off water from the surface salt storage pads has reduced the volume of water that is processed at the ED plant. This in turn has reduced the volume of water sent to the mine for storage.

Over the past year inflows in the #1 shaft had slowly increased back to about 30 gpm, but during September grouting was completed achieving a reduction of inflow of 10 gpm. This brings the total mine inflow to about 27 gpm at this time. Plans are being made for further grouting of the #1 shaft during 2017. Dewatering wells were drilled adjacent to the #2 shaft collar to remove a primary source of inflow there. Investigations are under way to determine how to further reduce the inflows at the #2 shaft.

12.a.(7) - Summary of SPDES Monitoring Data:

There was one exceedance of the SPDES limits for the storm water outfalls, and one exceedance for non-contact cooling water temperature at the brine water treatment plant. There were no exceedances for the Waste Water Treatment Plant to report during the past year. The data is included here as an attached spreadsheet. If an exceedance occurs it is reported to the DEC in two ways. Once an exceedance has been identified the DEC is informed via telephone of the occurrence. Each event is also captured in the monthly Report of Non-Compliance, which also lists corrective action taken. The Reports of Exceedance for the two events are attached.

12.b - Notification of Non-routine Mining Incidents:

There were no incidents meeting the guidelines for notification as identified in section 12.a.(2).

12.c - MSHA Correspondence Involving Non-routine Mining Incidents:

The Cayuga Mine has not received any citations or correspondence from MSHA regarding non-routine mining incidents as identified in section 12.a.(2).

12.d. - Changes in Mining Method:

There have been two changes to the Cayuga Mine layout in the past year. The first involved an experiment to mine the #5 salt bed above a pre-existing panel in the #6 salt bed (in U-62). The #5 level mining experiment has been terminated prematurely until the northern reserves geology and the long term ground stability effects are better defined. Several reports and letters of explanation have been previously sent to both the DEC and their consultant. That experiment was conducted between December of 2015 and May of 2016 and a summary is attached to this report.

The second change is occurring in the U-74 mining panel. This change is necessitated by the potential for disturbed or thin rock overburden in the central portion of the Cayuga Lake valley. The panel has converted to a "large pillar" design which provides better support of the overburden with less changes in the stresses in the strata above the mine. Various progress reports and data regarding that change have been, and will be, sent to the DEC's consultant for his review. A summary of results to date is attached to this report.

12.e. - Surface Subsidence:

Surface subsidence surveys continue to be done in accordance with the Mined Land Use Plan. See section 12.a.(5) of this report.

12.f. - In-situ Rock Mechanics Measurements:

See section 12.a.(4) of this report.

12.g. - Written Citizen Complaints:

No written complaints from citizens were received since the last report (November 2015).

9.a and b. - "Cargill shall conduct further investigations of the disturbed rock zone..." and "the adequacy of the thin rock overburden...":

Cargill has undertaken another seismic exploration program to better define the character of the bedrock adjacent to and beneath Cayuga Lake. The seismic survey was shot during May 2016, and data processing and interpretation are under way at this time. This work will address both the rock disturbance and the deep lake valley to allow assessment of the potential impact on the mining operation. Results and reports are expected from the Consultant by January 31, 2017, following which mining impact assessments can begin.

# 2016 DEC Report Outfall Results (Oct 2015 through Sept 2016)

Red = exceedance

October 2016 not reported at the time of submittal

NF = No Flow

CYANIDE									
OUTFALLS									
Acid Disociable	001	002	003	004	005	006	007	008	012
Permit Limit	1.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Month/Year				Eliminated	Eliminated			Eliminated	
October	0.13	<0.01	<0.01			<0.01	<0.01		<0.01
November	0.39	<0.01	<0.01			NF	<0.01		<0.01
December 2015	0.062	<0.01	<0.01			<0.01	<0.01		<0.01
January 2016	<0.01	<0.01	<0.01			<0.01	<0.01		<0.01
February	0.029	<0.01	<0.01			<0.01	<0.01		<0.01
March	0.046	<0.01	<0.01			NF	<0.01		<0.01
April	0.038	<0.01	<0.01			<0.01	<0.01		0.01
May	0.31	<0.01	<0.01			<0.01	<0.01		<0.01
June	0.074	0.011	<0.01			NF	<0.01		<0.01
July	0.039	NF	<0.01			NF	NF		NF
August	0.084	0.014	<0.01			NF	NF		NF
September	0.22	<0.1	<0.1			NF	<0.1		NF

CHLORIDE									
OUTFALLS									
Permit Limit	001	002	003	004	005	006	007	008	012
	40,000 mg/l	10,000 mg/l	10,000 mg/l			5,000 mg/l	5,000 mg/l		5,000 mg/l
Month/Year				Eliminated	Eliminated			Eliminated	
October	27,000	2,600	1,000			2,100	460		2,800
November	26,000	1,800	640			NF	650		4,900
December 2015	18,000	4,900	680			4,100	530		2,000
January 2016	21,000	2,100	700			2,500	350		1,500
February	30,000	1,500	1,100			2,500	380		940
March	20,000	1,200	770			NF	340		1,500
April	20,000	3,500	1,100			4,100	330		1,100
May	15,000	1,700	900			5,100	350		960
June	34,000	2,900	750			NF	660		4,000
July	19,000	NF	720			NF	NF		NF
August	30,000	5,400	920			NF	NF		NF
September	16,000	5,400	1,300			NF	2,800		NF

TDS									
OUTFALLS									
Permit Limit	001	002	003	004	005	006	007	008	012
	80,000 mg/l	40,000 mg/l	40,000 mg/l			10,000 mg/l	10,000 mg/l		10,000 mg/l
Month/Year				Eliminated	Eliminated			Eliminated	
October	43,000	4,800	2,600			3,900	1,200		
November	44,000	3,100	2,000			NF	1,500		7,800
December 2015	29,000	8,200	1,900			6,900	1,300		3,400
January 2016	31,000	3,600	1,800			4,300	880		2,800
February	48,000	2,900	3,000			4,600	1,000		2,100
March	29,000	2,000	2,000			NF	900		2,900
April	32,000	6,100	2,600			6,900	890		2,200
May	24,000	3,400	2,500			8,200	950		2,100
June	53,000	4,900	2,300			NF	1,600		6,800
July	29,000	NF	2,100			NF	NF		NF
August	45,000	8,600	2,500			NF	NF		NF
September	30,000	9,700	2,700			NF	5,600		NF

**ZINC**

**OUTFALL**

Permit Limit	001	20 mg/l
Month/Year		
October	0.2	
November	0.2	
December 2015	0.2	
January 2016	0.36	
February	0.2	
March	0.064	
April	0.31	
May	0.02	
June	NF	
July	0.31	
August	0.31	
September	NF	

**NON CONTACT COOLING WATER**

Permit Limit	Min/Max	Intake Water	Temp. deg. F.

Min/75 Max	Effluent Water	Temp. deg. F.

**Outfall #014**

500 Max Gpm.	Flow Rate	Effluent Gross

Month/Year					
October	58.5/65.1	58.7/65.1	294		
November	50/57.6	51/55.6	274		
December 2015	44.7/54.3	50/55.3	244		
January 2016	41.9/50	49.3/50.2	301		
February	44.6/48.8	49.7/49.9	241		
March	43.1/49.7	49.4/51.5	248		
April	49.8/49.8	51.5/51.5	112		
May	44.9/49.2	50.0/50.8	176		
June	54.0/64.7	55.2/65.1	288		
July	71.8/74.7	72.3/74.9	281		
August	71.3/78.9	72.9/79.7	292		
September	68.2/74.1	69.9/74.9	256		

**WASTE WATER TREATMENT PLANT**

**Outfall #009**

Item	Flow Rate	BOD	pH	Total Suspended Solids	Settleable Solids	Chlorine	Fecal Coliform # per 100 ml	Permit Limit	Month/Year
	Avg	Avg	Min	Avg	Daily max	Max Daily Avg	Avg		
	Gal / day	30 Day		30 Day			30 Day		
	Report	45	6	30	45	1.0 mg/l	Report	Report	
October	703	3.0	3.0	6.6	8.4	<0.1	0	0	0
November	703	3.0	3.3	6.5	8.1	<0.1	0	0	0
December 2015	635					<0.1	0.6	178	178
January 2016	300	12.6	7.2	8.2	3	<0.1	0.3	178	178
February	488	6.6	6.8	8	9	<0.1	0.1	178	178
March	488	10.2	7.2	7.6	9	<0.1	0.1	178	178
April	575	4.8	7.2	7.8	7	<0.1	0	0	0
May	575	4.1	6.3	7.3	2	<0.1	0	0	0
June	561	14.4	6.2	6.5	13	<0.1	0	0	0
July	561	2.0	6.0	5	5	<0.1	0	0	0
August	561	4.5	6.8	7	11	<0.1	0	0	0
September						<0.1			

## SECTION 1



New York State Department of Environmental Conservation  
Division of Water



## Report of Noncompliance Event

To: DEC Water Contact Ed Hampston DEC Region: 7

Report Type: 5 Day ☒ Permit Violation ☐ Order Violation ☐ Anticipated Noncompliance ☐ Bypass/Overflow ☐ Other

## SECTION 2

SPDES #: NY-0101290 Facility: Cargill Inc. - Cayuga Mine

Date of noncompliance: May 2016 Location (Outfall, Treatment Unit, or Pump Station): outfall # 6 (006-M)

Description of noncompliance(s) and cause(s): The bottom cone of our 750-ton salt storage bin collapsed, causing us to cease the production. In order to continue to run and hoist salt out of the mine, we started to load trucks out of our hoist head frame. Loading trucks in this location caused salt dust to accumulate in the area and to be wash away with the rain via outfall #6. We exceeded our chloride limit by 100 mg/L (limit is 5000 mg/L, we had 5100 mg/L for the month.)

Has event ceased? (Yes) ☒ (No) If so, when? ~3 months' time Was event due to plant upset? ☒ (Yes) (No) SPDES limits violated? ☒ (Yes) (No)

Start date, time of event: 4/20/16 9:00 ☒ (AM) ☒ (PM) End date, time of event: Repairs ongoing (AM) (PM) Date, time oral notification made to DEC? 5/19/16, 1:30 (AM) ☒ (PM) DEC Official contacted: Matt Russo Region 7 NYSDEC

Immediate corrective actions: The catch basin in the area where we are now loading trucks has been covered. Cleaning of the area is occurring daily to decrease the amount of salt that accumulates in the area and goes into the outfall #6. We plan to bump up efforts to cleaning multiple times a day.

Preventive (long term) corrective actions: Replace the 750 ton bin. Once the bin is replaced we can begin conveying the salt across the plant rather than transporting it via truck. This will eliminate the issue and bring our facility back to normal. The construction of a replacement is expected to be complete in late July, early August timeframe.

## SECTION 3

Complete this section if event was a bypass:

Bypass amount: \_\_\_\_\_ Was prior DEC authorization received for this event? (Yes) (No)

DEC Official contacted: \_\_\_\_\_ Date of DEC approval: \_\_\_\_/\_\_\_\_/\_\_\_\_

Describe event in "Description of noncompliance and cause" area in Section 2. Detail the start and end dates and times in Section 2 also.

## SECTION 4

Facility Representative: Marty Christofferson Title: EHS Professional Date: 5/19/2016

Phone #: (607) 533 3815 Fax #: (607) 533 4501

I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

X

Signature of Principal Executive  
Officer or Authorized Agent

## SECTION 1



New York State Department of Environmental Conservation  
Division of Water



## Report of Noncompliance Event

To: DEC Water Contact Matt Russo DEC Region: 7

Report Type: ☐ 5 Day ☒ Permit Violation ☐ Order Violation ☐ Anticipated Noncompliance ☐ Bypass/Overflow ☐ Other

## SECTION 2

SPDES #: NY-0101290 Facility: Cargill Inc. - Cayuga Mine

Date of noncompliance: August 1, 2016 Location (Outfall, Treatment Unit, or Pump Station): outfall # 14 (014-M)

Description of noncompliance(s) and cause(s): During the month of August, the non-contact cooling water loop at outfall #14 was intaking water warmer than what we are permitted to discharge. Our permit allows us to discharge water up to 75 degrees Fahrenheit. We found that we were discharging water between 72.9 and 79.7 degrees Fahrenheit during the month of August. Our intake water was between 71.3 and 78.9 degrees Fahrenheit during the month of August. An abnormally warm summer and a severe drought caused lake water levels to drop and water temperatures to rise during the month. Both of these conditions are out of our control.

Has event ceased? ☒ (Yes) ☐ (No) If so, when? 8/22/16 Was event due to plant upset? (Yes) ☒ (No) SPDES limits violated? ☒ (Yes) ☐ (No)

Start date, time of event: 8/1/16 ☒ (AM) ☐ (PM) End date, time of event: 8/22/16 (AM) (PM) Date, time oral notification made to DEC? 8/1/16, 3:19 (AM) ☒ (PM) DEC Official contacted: Matt Russo Region 7 NYSDEC

Immediate corrective actions: Once we noticed that the discharge temperature was above our permitted level we immediately investigated and notified the DEC.

Preventive (long term) corrective actions:

Continue to monitor lake temperatures and notify the DEC of any abnormal conditions

## SECTION 3

Complete this section if event was a bypass:

Bypass amount: \_\_\_\_\_ Was prior DEC authorization received for this event? (Yes) (No)

DEC Official contacted: \_\_\_\_\_ Date of DEC approval: \_\_\_\_/\_\_\_\_/\_\_\_\_

Describe event in "Description of noncompliance and cause" area in Section 2. Detail the start and end dates and times in Section 2 also.

## SECTION 4

Facility Representative: Marty Christofferson Title: EHS Professional Date: 8/26/2016

Phone #: (607) 533 3815 Fax #: (607) 533 4501

I Certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

X

Signature of Principal Executive  
Officer or Authorized Agent

# MEMORANDUM

DATE: November 4, 2016

TO: Steve Army, Christopher Lucidi,

FROM: Dave Plumeau

RE: Summary of Results of "Large Pillar" mine design in U-74

The Cayuga Mine determined that a "large pillar" mine design would be more appropriate under certain regions of its mineral reserves. Those regions may have areas of weak overburden strata.

Unit 74 (U-74) had advanced far enough toward one of those regions that it was stopped and converted to a large pillar mine design. This design provides better support for the overburden and creates lower stress changes within the strata above the mine.

Rock behavior studies were conducted using analysis of the mine's data, results from the Whiskey Island Mine that Cargill operates in Cleveland, Ohio, and theoretical mine closure calculations. Computer modeling of the new design was conducted and, along with the other studies, showed that the design would be stable.

With the review of the DEC and its consultant, Cargill began mining a limited distance in order to establish ventilation methods and equipment and to monitor roof and pillar behavior for possible local instability. Mining has advanced about 160' feet into the new design as shown on the attached mine map.

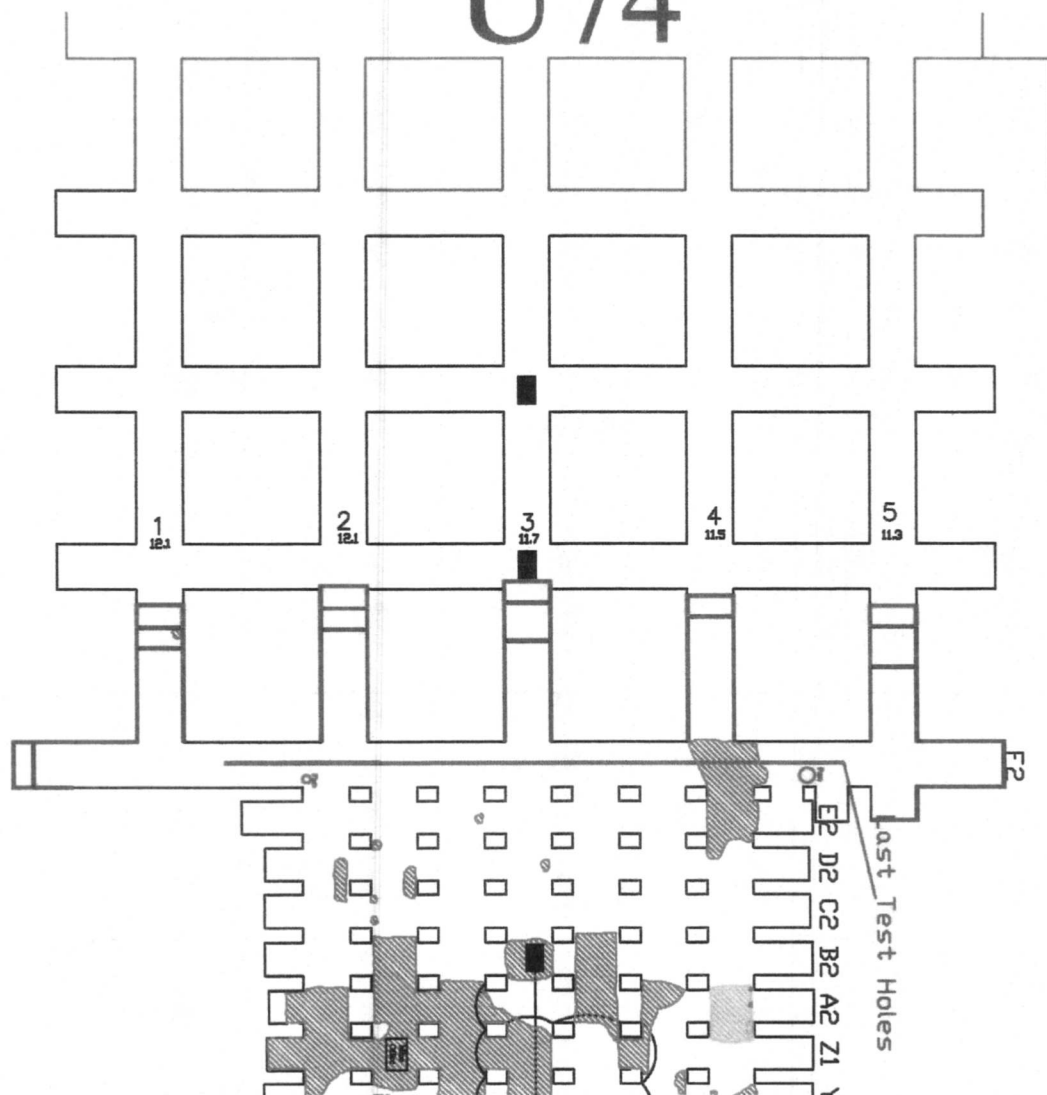
To date the mine roof in the large pillar area is behaving excellently. Mining is very slow due to ventilation issues after blasting has occurred, but more ventilation equipment is being installed to help improve the situation.

Cargill will continue to provide progress reports to the DEC as mining advances.

*Dave...*

WEEKLY FACE ADVANCE  
WEEK OF :  
10/10/16 - 10/16/16  
UNIT# U74  
STOCKPILE = 0 Tons  
■ = STAMLER  
▨ = ROCK ROOF  
\$=150 TONS OF STOCK

U74



## **MEMORANDUM**

**DATE:** November 4, 2016

**TO:** Steve Army, Christopher Lucidi,

**FROM:** Dave Plumeau

**RE:** Summary of Results of Experimental Mining of the #5 Salt Bed

In the fall of 2015 the Cayuga Mine started developing two slope tunnels up to and into the #5 salt bed, located about 32' above the roof of the current #6 bed mining level. This experiment was designed to give Cargill specific information about the behavior of the #5 mine level, the #6 mine level and the rock above, between and below the two levels. The salt produced from the #5 bed was also tested to determine if its purity was high enough to take to market.

Prior to starting this experiment, computer modeling of the behavior of the strata was done and the results used to establish a rock movement monitoring plan as well as alert personnel to possible rock behavior problems. The rock movement instruments were placed and monitored to give detailed feedback to alert the mine to possible developing stability problems as well as to "calibrate" the computer model to make it more accurate in predicting behavior of the rock.

The #5 salt bed was reached in December of 2015 and during the spring of 2016 several thousand tons were mined. This allowed about 600 tons to be crushed and fed through the mine's processing plant in order to sample the resulting product and determine if it was marketable. The initial results were encouraging, but not acceptable. In July of 2016 another bulk sample was run through the processing plant and favorable results were obtained.

During the spring of 2016 additional mine behavior research indicated a possibility of mine instability after 25+ years if both beds were mined under some areas of the northern reserves. In the interest of caution, experimenting with mining the #5 salt bed was terminated and there are no further plans for mining of the #5 bed at this time. Please note that there are regions of the mineral reserves that may be very conducive to multi-level mining and further work is anticipated, although probably many years in the future.

During the annual DEC MLRP mine visit and inspection in July of 2016, the #5 level mining experiment was examined by DEC personnel and found to be stable and behaving as expected. The area mined is very small and is expected to have no adverse effects on mine stability for the life of the mine.

*Dave...*

<b>Water Volume Calculation</b> <b>Ultimate Pond Potential Volume</b> <b>16-Nov-16</b>						
Area	Total Area	Pillar Area Ft2	Fillable Area Ft2	Roof Height	Volume	Gallons
Far East Pond	6,598,278	2,831,750	3,766,528	12	45,198,336	338,083,553
Overflow Basin	832,750	64,788	767,962	10	7,679,620	57,443,558
Small Pond #2	128,409	0	128,409	7	898,863	6,723,495
Bowl Edge Pond	Not planned					
Small Pond #1	Not planned					
Southern Pond	Not planned					
Total Gallons						402,250,606
Incoming gallons per year @ 40gpm						21,021,000
Ultimate Pond Life (yrs) as of 6 Feb2001						19
Water added = (46 months/12 mo.) X 21,024,000 = (6 Feb 2001 - 1 Jan 2005)						80,592,000
Water added during 2005 (measured)						16,030,800
Water added during 2006 (measured)						18,272,329
Water added during 2007 (measured)						13,507,200
Water added during 2008 (measured)						10,886,400
Water added during 2009 (estimated)						10,401,624
Water added during 2010 (estimated)						8,894,769
Water added during 2011 (estimated)						10,669,680
Water added during 2012 (flow meter)						11,861,287
Water added during 2013 (flow meter)						15,102,252
Water added during 2014 (flow meter)						16,844,053
Water added during 2015 (flow meter)						18,193,910
Water added during 2016 (flow meter)						14,293,130
Mar 2010 Adjustment (Final fill -1520 elevation to -1540 elevation)						55,753,706
Volume remaining						100,947,466
Remaining Pond Life @ 2016 inflow rates.						7.1

Pond volumes are calculated by using the "area" function of Auto Cad. A polygon is drawn around the perimeter of the entire pond and Auto Cad is used to calculate the area of the polygon (in square feet). A polygon is drawn around each individual pillar within the pond limits and an area is calculated using Auto Cad. The pillar area's are subtracted from the total area to give the total pond area. Roof heights are determined by visual inspection, historical information where available, and the use of raw estimates. Water added values are estimates from the mine pumping system flowmeter.