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Matthew Marko  
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Basil Seggos  
Commissioner  
NYS Dept. of Environmental Conservation  
625 Broadway  
Albany, NY 12233

**Re: Renewal of mining permit for Cayuga Salt Mine**

October 9, 2017

Dear Messrs. Dlugolenski, Marko, and Seggos:

We are writing to express our view that the application to renew the Cayuga Salt Mine permit does *not* qualify as an application involving no changes to the original plans on which the existing permit is based.

On the contrary, the applicant has raised a significant issue involving mining practices, and apparently intends to deviate from practices approved in the December 22, 2000, Mined Land Use Plan (MLUP)<sup>1</sup> without having assessed the environmental and worker-safety impacts of this change. In our view, this violates §§ 3-4 of the Mined Land Reclamation Permit Conditions (“Conformance With Plans” and “No Deviation From Approved Plan”) and also violates SEQR.

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<sup>1</sup> And presumably in the amended MLUP, dated March 15, 2002, which we have not yet accessed.

In view of this change and the significant underlying issue raised by the applicant, it is our view that the permit renewal application must be treated as a new application which is subject to a detailed environmental review. Such environmental review should include, but not be limited to, the significant mining-practice issue raised by the applicant.

The significant mining-practice issue raised by the applicant consists of 1) the tradeoff between yield-pillar panel (YPP) mining and big-pillar mining, 2) the known roof-fall risk associated with big-pillar mining, and 3) the applicant's apparent intention to revert to big-pillar mining without addressing either its known roof-fall risk or the plan set forth in § 2.2.1 of the MLUP for avoiding such risk.

The significant mining-practice issue raised by the applicant is expressed in an August 27, 2016, document by Gary Petersen entitled "Cayuga Mine, Thoughts on Mining the Northern Reserves." We have not seen a full copy of the Petersen document<sup>2</sup> but have seen text quoted from this document by DEC's consultant Vincent Scovazzo<sup>3</sup> whom we consider a reliable source. The relevant text from Scovazzo is as follows:

Mr. Petersen notes that due to the theory "...that the abnormal closure in U12, U40B and perhaps U24 could be due to hydraulic pressure within the de-stressed zone of the yield pillar panel design, it was wisely decided not to use the YPP design to mine the northern reserves where the potential for high pressure/high volume aquiferic water in conjunction with large geologic anomalies could bring water too close to the mining horizon. The concern being that the YPP design creates a low stress (destressed) zone above that panel that attracts higher pressure fluids in the rock strata, which given a geological conduit will flow into the de-stressed zone resulting in abnormal panel closure." Where YPP denotes yield pillar panel.

Petersen continues "The big pillar design doesn't create a de-stressed zone above the panel, making it a much better design for potential water pressure situations." Thus "...the potential for developing a leak is much lower..." and "We know from experience that the big pillar design is prone to shear the roof along the roof/pillar contact out over the room and in some cases results in a rather large roof fall. Roof falls in East-1 (big pillar design) went as high as 12 feet that went hundreds of feet in length in the worst case."<sup>4</sup>

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<sup>2</sup> CLEAN requests a full copy of this document.

<sup>3</sup> John T. Boyd Co. report authored by Vincent Scovazzo, submitted February 9, 2017 to Matthew Podniesinski of DEC, reviewing Cargill's 2016 annual mine report on behalf of DEC.

<sup>4</sup> Id. at 3.

While we do not disagree that there may be adverse impacts such as “potential water pressure situations” and “the potential for developing a leak” associated with yield pillar panel (YPP) mining and its overlying distressed zone, we certainly do not agree that big-pillar mining and its increased risk of roof falls can be informally and uncritically substituted for YPP. This is a significant issue that needs substantive review. Consider, for example, the safety benefits of using yield pillars instead of large pillars that have been documented by Cargill’s own consultant and staff:

*The original mine design consisted of a conventional room and pillar method utilizing 26.7 x 26.7 m (88 x 88 ft) pillars... Many roof falls were encountered, some as large as 60 m (200 ft) in length and 3.6 m (12 ft) high. It appeared that no rock bolt system was capable of supporting the roof and action needed to be taken to ensure the ability to continue safely mining the deposit.... As a result of utilizing a practical approach to rock mechanics, a yielding pillar design was developed with great success. Currently pillars are 4.5 x 4.5 m (15 x 15 ft)...and roof bolt support has been significantly reduced. Not only is the roof much safer to mine under but productivity has increased, mining costs have decreased, and ventilation has been made easier and more effective...<sup>5</sup>*

*The improved roof conditions have lessened the need for roof support, have virtually eliminated falls of ground, and have significantly reduced injuries due to falls of ground, or scaling. In addition to better roof conditions, the design has lent itself to easier ventilation...<sup>6</sup>*

Most importantly, this rationale is set forth in the MLUP as the basis for using yield pillars instead of large pillars:

*During the early years of mining on the No. 6 level, there were few ground control problems. Few rock falls occurred from the ceilings. It is theorized that this may have been because of a ‘protective cover’ provided by the overlying No.4 level workings in the multi-seam excavation. The early workings in Level 6 took place under previously mined level 4 workings in the eastern portion of the mine. By the mid- 1970s, however, as the mining moved farther eastward, stresses increased due to the increasing thickness of overlying strata. Active mining was no longer occurring beneath mined out portions of Level No. 4 and ground conditions worsened. It was theorized that the large, stiff pillars in the traditional room-and-pillar design caused the instability by punching through the roof strata around the mine openings. This can lead to roof falls and/or floor heave.*

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<sup>5</sup> G. Petersen, D. Plumeau, and J. Rankin, “Practical Approach to Mine Design at the Cayuga Rock Salt Mine,” in *Seventh Symposium on Salt* (Amsterdam: Elsevier, 1993), Vol. I, 259-264, at 259.

<sup>6</sup> Id. at 264.

*The use of yield pillars has been explored industry-wide to resolve safety and operational concerns associated with large pillars in traditional room and pillar mining (Jeremic, 1994).<sup>7</sup> In 1976, Cargill began to experiment with the use of yield pillars as a potential solution to the ground control problems that were plaguing the eastern workings of the No. 6 Level. While actively mining, Cargill initiated a sequence of testing between 1976 and 1984 on the east side of the Level No. 6 workings. The excavation sequences were carefully designed and instrumented. Cargill employed a systematic and methodical mining approach that included measured response, structural calculations, and industry experience. Extensive monitoring including stress, closure and extensometer measurements, and surface subsidence data were used to assess the performance of the developing mine layout over time. Subsequent layouts were developed, evaluated and adopted based on the specific conditions in existence at the Cayuga Mine.*

*In 1984, Cargill began working the west end of the Level No. 6 workings (i.e. within that portion of the lease area beneath Cayuga Lake), applying all the information, experience and knowledge gained from the mining of the east end. Small pillars within relatively wide panels separated by massive barrier pillars describe the mining layout currently being used at the Cayuga Mine. The layout has evolved since 1976, and represents an approximately 25-year systematic and scientific approach to the establishment of a safe and stable mine through the use of yield pillar panels and massive abutment pillars.<sup>8</sup>*

Given this accepted rationale for using yield pillars “to resolve safety and operational concerns associated with large pillars in traditional room and pillar mining,” big-pillar mining and its increased risk of roof falls cannot be informally and uncritically substituted for YPP. In our view, this involves 1) a change from recent past mining practice that is 2) based on newly developed information and 3) involves a potentially serious impact, all of which point to the fact that renewal of the Cayuga Mine permit can’t be treated as simple permit renewal in which nothing has changed. Our view, as noted above, is that the permit renewal application must be treated as a new application which is subject to a detailed environmental review.

Such detailed environmental review should include an assessment under 6 NYCRR 617.9(b)(6)(iii) of the tradeoff identified by Petersen. Each of the two prongs of this tradeoff (one being the “potential water pressure situations” and “the potential for developing a leak” associated with yielding pillars, the other being the documented roof-fall risk associated with large pillars) has “reasonably foreseeable catastrophic impacts” about which precise information may be unavailable for reasons set forth in 617.9(b)(6). This requires an assessment under 617.9(b)(6)(iii) of “the likelihood of occurrence, even if the probability of occurrence is low, and the consequences of the potential impact, using theoretical approaches or research methods

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<sup>7</sup> Jeremic, M.L. 1994. Rock mechanics in salt mining. A.A. Balkema, Rotterdam; Brookfield, VT.

<sup>8</sup> Cayuga Salt Mine, Mined Land Use Plan, December 22, 2000, § 2.2.1.

generally accepted in the scientific community.” Potential water pressure situations associated with yield pillars, including leaks, are reasonably foreseeable catastrophic impacts, based partly on Petersen’s explanation that “YPP design creates a low stress (destressed) zone above that panel that attracts higher pressure fluids in the rock strata, which given a geological conduit will flow into the de-stressed zone,” partly on analyses of the Retsof mine collapse that implicate pockets of fluid above the mine,<sup>9</sup> and partly on other evidence of water intrusion.<sup>10</sup> While roof falls may or may not propagate upward to the surface, the Retsof collapse serves as a worst-case example that demonstrates a reasonably foreseeable catastrophic impact to the environment. For smaller roof falls, the impacts may be highly catastrophic to workers even if not to the natural environment.

With respect to DEC’s legal authority to engage in detailed review of Cargill’s permit renewal application, we note that one of the general conditions that DEC applies to its permits involves “newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit...” In this instance, the issue raised by Petersen (tradeoff between the “potential water pressure situations” of YPP and the roof-fall risk of large pillars) can be considered an example of “newly discovered material information or a material change in environmental conditions.”

We would further note that according to 6 NYCRR 421.1 on permit renewal, Subd. (c) requires an approved mined land use plan that lists conditions the permittee, Cargill, must follow, including an updated mining plan map. During the period, September 2016-February 2017, Cargill produced four different mining plan maps (included for your reference as Attachments A, B, C and D), two of which refer to geological anomalies and related setbacks and two of which do not.

Regarding the two Cargill maps which have a representation for the setback zones using an indicative oval for what we understand to be the Frontenac Point Anomaly (FPA), on the September 2016 map (Attachment A) we see that half of Panel 66 (an offshoot of Panel NW2) violates the setback zone as does half of Panel 62A. And, yet on Cargill’s February 2017 map (Attachment C) the blue oval surrounding the “FPA + 1000” no longer touches either Panel 66 or Panel 62A. The re-drawing and removing of a setback oval is troubling. DEC’s mining consultant, Vincent Scovazzo of John T. Boyd Company, appended to his review of Cargill’s 2015 Annual Report to DEC e-mails dated Feb. 2, 2016, between DEC officials Chris Lucidi, Steve Army, Matthew Podniesinki, and Simone S Rodriguez in which they acknowledge that

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<sup>9</sup> S.W. Gowan and S.M. Trader, “Mine failure associated with a pressurized brine horizon; Retsof salt mine, western New York,” *Environmental & Engineering Geoscience* **6**, 57-70 (2000).

<sup>10</sup> A. Ferguson & J. K. Warren, "Salt Mining and Possible Future Problems in the Cayuga Lake Region: Integration of public-domain seismic with known salt geology," Saltwork Consultants report (June 2017) as submitted to DEC by CLEAN, see pages 11-13.

Cargill's Panel NW2 had indeed violated the 1000' setback associated with the Frontenac Point Anomaly. This would indicate that the ovals and setbacks present in the September 2016 map are a more accurate than the changed representation of the FPA +1000 ft in the February 2017 map.

Our cartographer has produced a clearer map of "suspected anomalies" and associated setbacks as shown in Attachment E. The issue of whether DEC-mandated setbacks are binding requirements associated with Cargill's compliance with its mining permit or "recommendations" that Cargill is free to ignore is another example of an issue that needs detailed review.

We remain interested in the renewal process for this permit and ask to be kept informed about its progress.

Sincerely,

A handwritten signature in black ink, appearing to read "J. V. Dennis". The signature is fluid and cursive, with a large initial "J" and "D".

John V. Dennis, PhD

Member, Steering Committee, CLEAN

Copies: -Andrew Cuomo, Governor, State of New York

-Roann M. Destito, Commissioner, NYS Office of General Services

-Eric Schneiderman, Attorney General, NYS Office of the Attorney General

-Patricia W. Silvey, Dep. Asst. Sec. for Operations, Mine Safety and Health Administration, US Dept of Labor

-Wayne Palmer, Dep Assistant Secretary for Policy, MSHA

-Peter Montali, District Manager, MSHA, Warrendale, PA

-Pamela Helming, Senator, 54<sup>th</sup> NYS Senate District

-Barbara Lifton, Assemblywoman, NYS Assembly District 125

Article 78 2017-1 municipal petitioners:

Village of Aurora; Mayor Bonnie Bennett

Town of Caroline: Supervisor Mark Witmer

Town of Danby: Supervisor Ric Dietrich

City of Ithaca: Mayor Svante Myrick

Village of Lansing: Mayor Donald Hartill

Village of Trumansburg: Mayor A. Martin Petrovic

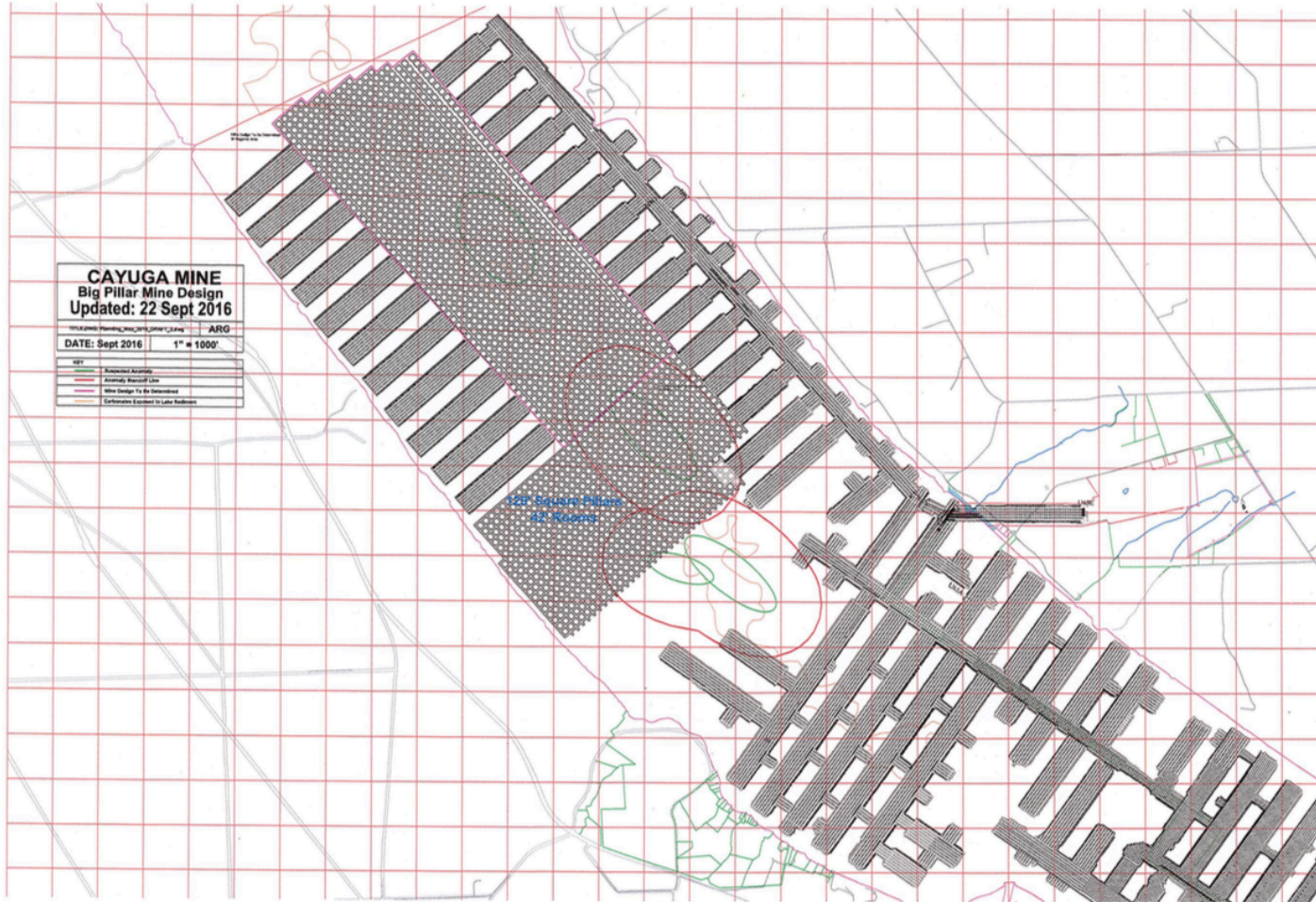
Town of Ulysses: Supervisor Elizabeth Thomas

-Attorney Richard Lippes, Lippes & Associates, Buffalo, NY

Attachment A:

September 2016 Map:

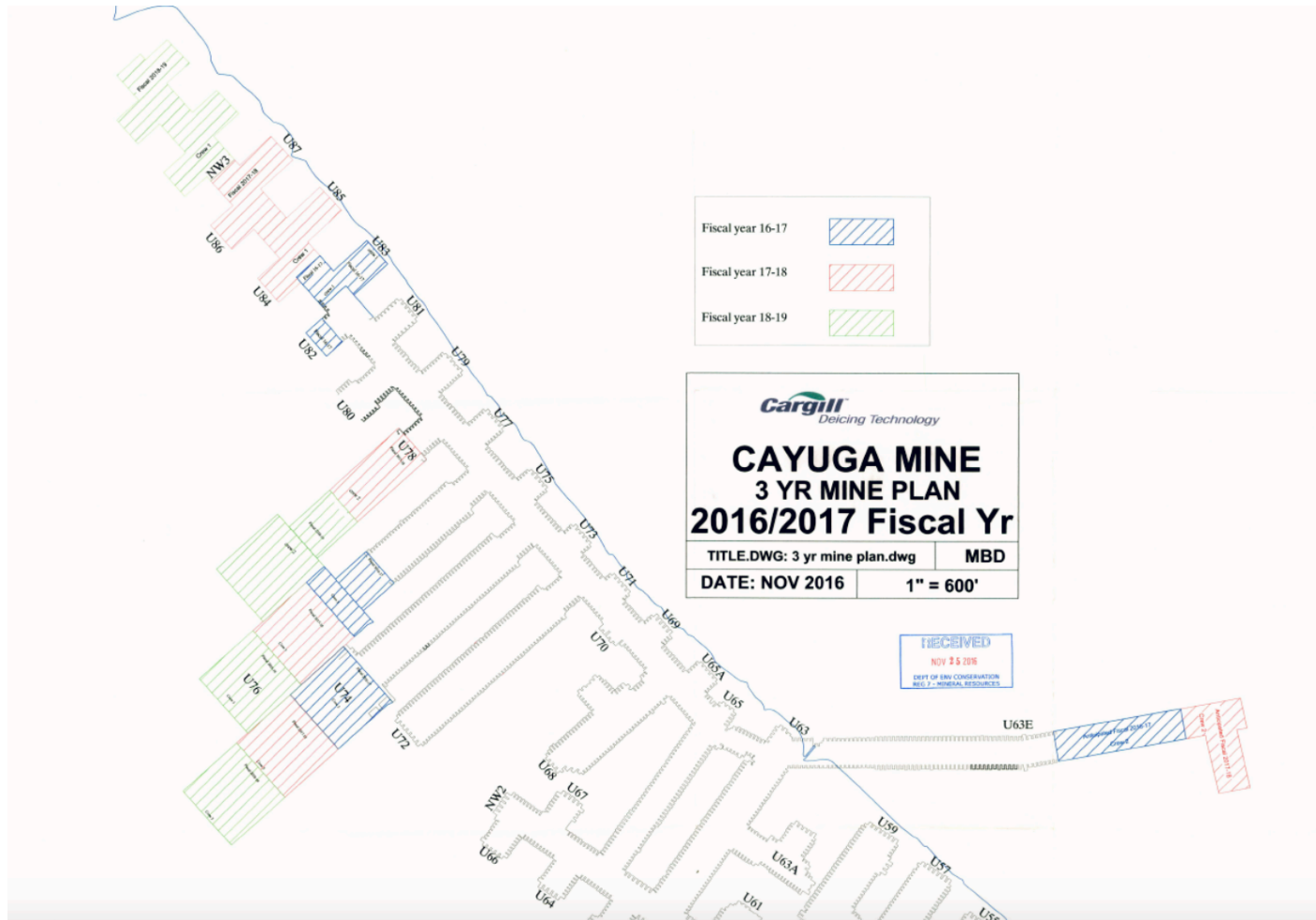
Clearly shows anomalies (green ovals) with defined 1000 ft setbacks (red ovals); also shows “carbonates exposed to lake sediments” (difficult to see orange lines)



Attachment B

Cargill's Nov 2016 Three-year Mine Plan Map

No mention of Frontenac Point Anomaly (FPA) and required setbacks



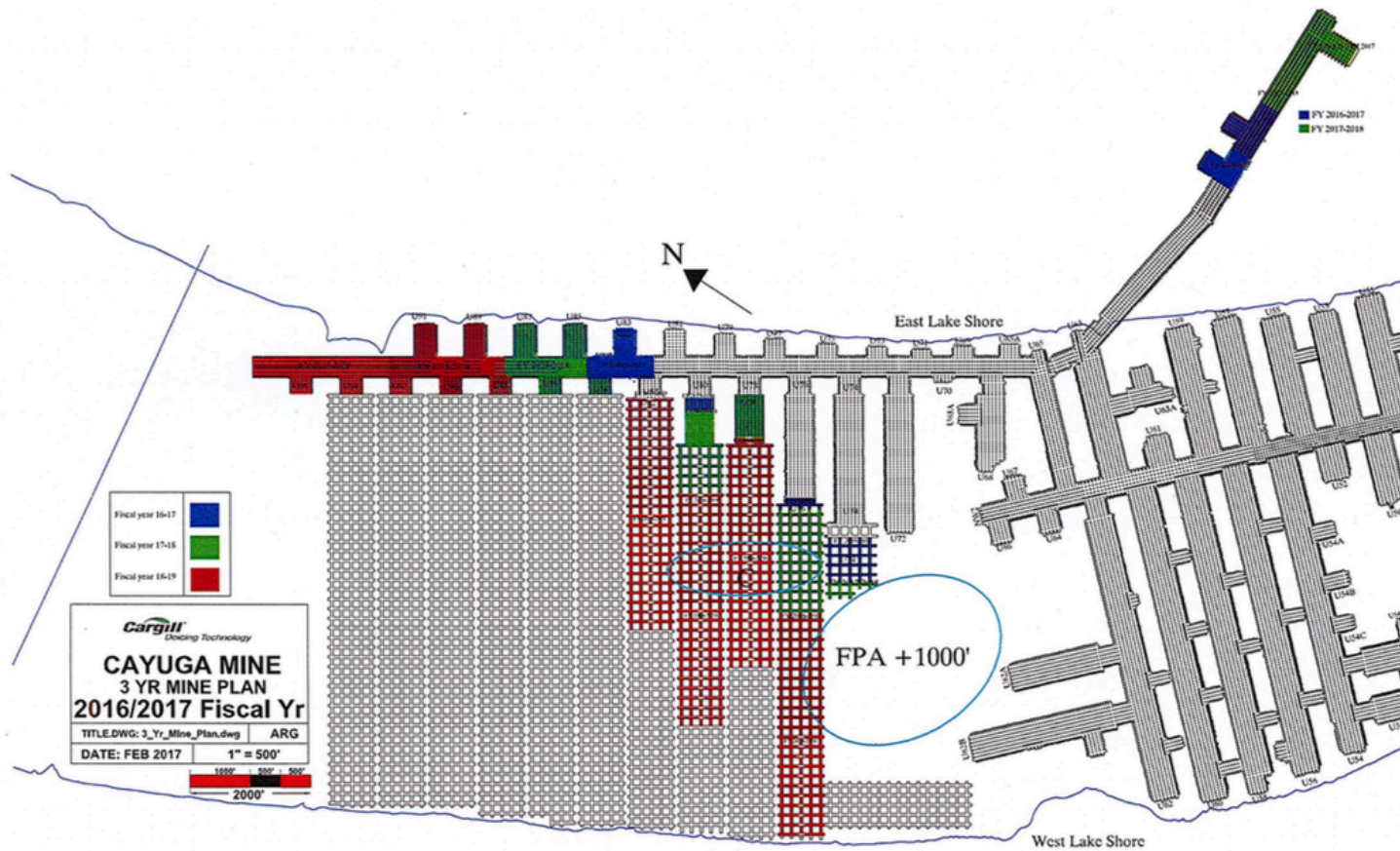


Attachment C:

Cargill's Feb 2017 Three-Year Mine Plan Map

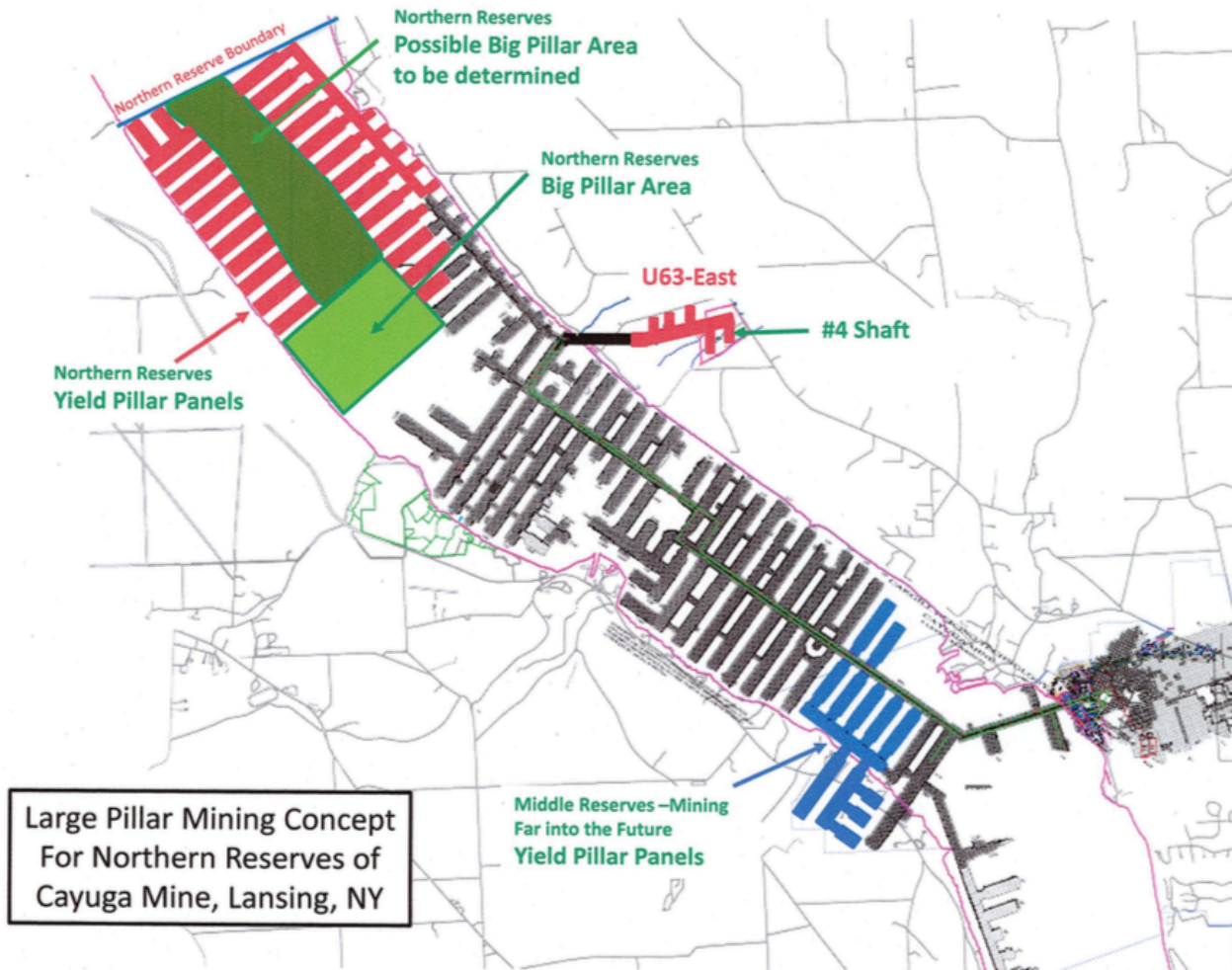
FPA + 1000 ft setback is shown however the indicated area is now significantly smaller than the area indicated in the Sept 2016 map presented in Attachment A.

If mining setback presented in the September 2016 map had been observed then Planned (or completed mining) in Fiscal years 16-17 and 17-18 would be in violation of those setbacks.

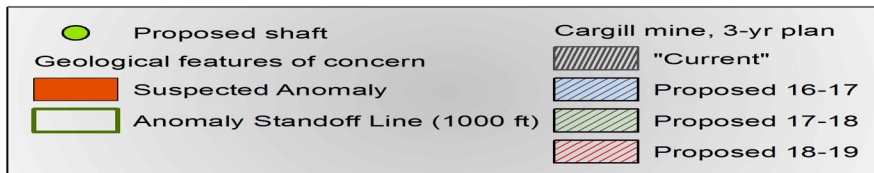


Attachment D:

No date (but likely Sept 2016 as it was included in a September 9, 2016 letter from David Plumeau to Steve Army). Large Pillar Mining Concept for Northern Reserves of Cayuga Mine, Lansing, NY



Attachment E: Overlay of 3 defined anomalies and associated setbacks with the 2017 mine map showing FY 16-17 and 17-18 mining.



Data: ESRI, NYS GIS Clearinghouse, "Cargill Mine Big Pillar Design: Updated September 22, 2016", "Cargill Mine, 3 Yr Plan: 2016/2017 Fiscal Year".  
Map updated: 9 October 2017