



LANDFILL – SOLID WASTE COMMITTEE MEETING

MEETING AGENDA

Wednesday, June 5, 2024

3:00PM

419 Fulton Street – Room 404

Virtual option available:

Microsoft Teams meeting

Microsoft Teams meeting

Join on your computer, mobile app or room device

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Meeting ID: 292 507 542 677

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LANDFILL COMMISSION AGENDAS AND MINUTES

**ISSUED BY: STEPHEN M. MORRIS,
CHAIRMAN**

CITY OF PEORIA – LANDFILL – SOLID WASTE COMMITTEE

ATTENDANCE

ANNOUNCEMENTS. ETC.

CITIZENS' OPPORTUNITY TO ADDRESS THE COMMITTEE

ANYONE WISHING TO MAKE A PUBLIC COMMENT CAN DO SO BY SENDING THOSE COMMENTS TO PUBLIC WORKS, BY **12:00 P.M.** ON MAY 31, 2024. PUBLIC COMMENTS CAN BE SENT TO THE PUBLIC WORKS DEPARTMENT, IN WRITING, AT **PUBLICWORKS@PEORIAGOV.ORG** OR VIA FAX AT 309-494-8855. THE EMAIL OR FAX SHOULD BE LABELED "PUBLIC COMMENT FOR MAY 31, 2024, PEORIA CITY/COUNTY LANDFILL COMMITTEE MEETING," AND WE ASK THAT YOU INCLUDE YOUR NAME AND ADDRESS.

CITIZENS WISHING TO ADDRESS AN ITEM NOT ON THE AGENDA SHOULD CONTACT A COMMISSION MEMBER PRIOR TO THE MEETING. ALL OTHER PUBLIC INPUT WILL BE HEARD UNDER PUBLIC COMMENT NEAR THE END OF THE COMMITTEE MEETING.

MINUTES

REQUEST FOR APPROVAL OF THE PEORIA CITY/COUNTY LANDFILL
April 24, 2024, Regular Landfill Meeting Minutes

AGENDA ITEMS

ITEM NO. 1 REPORT FROM FOTH INFRASTRUCTURE & ENVIRONMENT, LLC

- A. Monthly Update
- B. Signature Approvals
- C. Profiled Waste Approvals
- D. Solar Award Approval

ITEM NO. 2 REPORT FROM PUBLIC WORKS ADMINISTRATION

- A. Landfill Monthly Budget Report

ITEM NO. 3 REPORT FROM WASTE MANAGEMENT-Ian Johnson

- A. Monthly Activity Reports
- B. Signature Approvals

ITEM NO 4. REPORT FROM GFL

- A. Monthly Activity Reports
- B. Signature Approvals

UNFINISHED BUSINESS

NEW BUSINESS

None.

EXECUTIVE SESSION

ADJOURNMENT

NEXT MEETING

June 19, 2024 at 3pm

CITIZENS WISHING TO ADDRESS AN ITEM NOT ON THE AGENDA SHOULD CONTACT A COMMISSION MEMBER PRIOR TO THE MEETING. ALL OTHER PUBLIC INPUT WILL BE HEARD UNDER PUBLIC COMMENT NEAR THE END OF THE COMMITTEE MEETING.

NOTE: THE ORDER IN WHICH AGENDA ITEMS ARE CONSIDERED MAY BE MOVED FORWARD OR DELAYED BY AT LEAST 2/3 VOTE



DRAFT

**OFFICIAL PROCEEDINGS
FOR THE CITY OF PEORIA – SOLID WASTE COMMITTEE MEETING
April 24, 2024**

Members Present: Chairman Stephen Morris, Vice-Chair Rick Fox, Timothy Riggensbach, Sharon Williams, Stephen Van Winkle, Shaun Schoonover, Jennie Boswell, Robert Culp – 8

Members Absent: Zachary Oyler – 1

Non-Voting Members: Sharese Kirchgessner, Josh Gabehart (Foth)

Attendees: City of Peoria Corporation Counsel – Patrick Hayes, County Administrator – Scott Sorrell, Benjamin Fries (CIProud), JJ Bullock (Journal Star), Tara Van Hoof (Foth), Andrew Braun (Peoria County), Rebecca Cottrell (Peoria County), KJ Mathews (City of Peoria), Brian Meginnes (GFL Legal Representation)

ANNOUNCEMENTS, ETC.

None

CITIZENS' OPPORTUNITY TO ADDRESS THE COMMITTEE

None

MINUTES TO APPROVE

Request for approval of the Solid Waste – Landfill Committee
March 20, 2024, minutes.

Fox motioned to approve the minutes, seconded by Van Winkle, approved with a unanimous verbal vote.

ITEM NO. 1 REPORT FROM FOTH INFRASTRUCTURE & ENVIRONMENT, LLC

A. MONTHLY UPDATE REQUEST

Gabehart - We exceeded our anticipated budget for Phase 6 Unplanned GCCS Repairs/Emergency from January through March.

Two shutdowns since the last meeting in March required 405 – CAAPP forms. Both events occurred due to high winds preventing the auto restart. Since the previous meeting, 20,000 gallons of leachate have been transported off-site to GPSD. The monthly tonnages through March are attached in the agenda packet, down through March. We are watching tonnage and will discuss more in Item No. 5.

There are no updates on Landfill 3 as of right now. We have not heard back from GFL regarding the second opinion on the mine.

The Entrance Road Dam and Wetland Mitigation Projects: Information from IDNR was received. Foth and GFL met on April 18, 2024, regarding moving dirt as minimally as possible where Landfill 3 construction will be. GFL provided a map, and Foth sent the map to IDNR on April 22, 2024. Foth requested a meeting with IDNR to coordinate more on the wetland project. The wetland permit issued by the U.S. Army Corps of Engineers was provided to IDNR so that they could begin conversations on the timing and phasing of the project. No response on a meeting has been received at this time.

The submission of proposals for the Solar Development was on April 23, 2024. There were two responses: Ameresco and Chaberton[SIC]. Both were higher than our expectations for lease payments. Since the reviewing process has just begun, Gabehart asked Chairman Morris if a committee member would volunteer to help evaluate the proposals and provide recommendations.

Member Fox volunteered.

Chairman Morris asked how the proposals compare to those made when the committee went through the solar development process several years ago.

Gabehart: We are at a much larger scale.

Fox: There is a long delay to energize any solar systems now, so I can lay that to our plan.

Gabehart: I agree. It is not going to be a year from now; it is going to be multiple years. We do have the advantage of an on-site substation and existing infrastructure.

After the report, Gabehart opened a discussion for any questions. Member Williams noted there was a considerable drop in waste received. Gabehart believes waste is starting to anticipate diverting or extending the life of Landfill 2.

B. SIGNATURE APPROVALS

- Summary Report of the Investigation into Methane Exceedances at Gas Monitoring Device (GMD) 3
- 405-CAAPP Forms for Two Flare Shutdowns that Exceeded the One-Hour Duration

C. PROFILED WASTE APPROVALS

No discussion or questions after review.

Van Winkle motioned to first, seconded by Williams, and approved with a unanimous verbal vote.

ITEM NO. 2 REPORT FROM PUBLIC WORKS ADMINISTRATION

March: Revenues for the month were \$35,000 versus the budgeted \$38,000. Last year was \$34,000. Expenses were \$42,000 versus the budgeted \$43,000. The loss for the month was \$7,200.

Year to Date: Revenue was \$109,000, and expenses were \$142,000.

Schoonover: As Foth mentioned, we are a little over budget. Some unplanned services come in a little higher, but nothing significant from the financials. One thing that we might want to discuss at the next meeting with the Waste Management diversion is the way we're budgeting our host fees again. Now, they will be for the full year, but they'll be smaller, I think, than what we have budgeted.

Ending Fund Balance: \$191,000. That is a drop of about \$35,000 from the beginning of the year.

After the report, Schoonover opened a discussion for any questions.

Fox: I would just refer back to our point on revenue budgeting. We should budget to the best of our ability for what we actually expect the real world to bring. So, let's plan to adjust that.

Chairman Morris directed the question of how long it would take to get an idea of what the numbers would look like for volume to Gabehart.

Gabehart responded that WM could not make today's meeting due to department meetings but believes he can receive the numbers within 30 days.

Chairman Morris believes there has been a problem in sharing that information and incorporating it with the anticipated revenue and would like it to be shared moving forward.

ITEM NO. 3 REPORT FROM WASTE MANAGEMENT

A. MONTHLY ACTIVITY REPORTS

WM completed the drone topographic survey on March 29, 2024 and another drone survey will be completed later this year.

To allow sufficient time to respond to short-term submittal requirements that may arise prior to the next Landfill Committee meeting, WM is requesting authorization for the Committee chairperson to sign such documents, subject to review and approval in advance by Foth.

Fox: WM has been talking about their fly-over survey that will do their estimates. Do you know when the committee will get that? It looks like one was completed at the end of March.

Gabehart: I can ask WM for that data.

Williams: The report says that WM anticipates PCC#2 will cease waste acceptance in December 2024.

Fox: December was their estimate based on their March 2024 survey? Some clarity from Waste Management on what is left. What the incoming volumes are going to look like versus what the air space is.

Gabehart: When I ask for the tonnage, I can request for the figures, the cut fill, and volume caps.

B. SIGNATURE APPROVALS

To allow sufficient time to respond to short-term submittal requirements that may arise prior to the next Landfill Committee meeting, WM is requesting authorization for the Committee chairperson to sign such documents, subject to review and approval in advance by Foth.

Fox motioned to first, seconded by Williams, and approved with a unanimous verbal vote.

ITEM NO. 4 REPORT FROM GFL

A. MONTHLY ACTIVITY REPORTS

Brian Meginnes: The engineering report was supposed to be done on Friday. We will get it over to Foth as soon as we can.

Chairman Morris asked about the DNR review.

Meginnes: We have hired a special engineering firm, with my experience, to review all the data and see if we can meet the requirements of the permit section in terms of the engineering.

ITEM NO. 5 REPORT FROM LANDFILL CHAIRMAN

A. Landfill Amendment Approval to Waive the 2025 Minimum Payment from Waste Management

Waste Management has agreed to divert waste away from Landfill 2 to help extend the life of Landfill 2. In exchange for that benefit, WM is requesting to pay the rate of what was actually received in the amount of waste, not the minimum. Member Boswell will

draft or review, and approve the amendment. The amount could be more than the minimum payment, although WM has anticipated it will be less than the minimum based on the fly-over survey and how long Landfill 2 will be open.

Morris: 2024 has already exceeded what the minimum payment would have been. So we are continuing to get what WM would have paid us. WM is going to be able to divert some of their waste and that will extend the time that the city of Peoria's waste is going into Landfill 2 because it will still be open. And WM did not want to be stuck with the minimum payment. To Mr. Fox's point earlier, in the next 60 days, we're going to have a much better handle on when that end is in sight. The anticipated closure has gone from August to December, December is likely to go to July, and July could go longer. It keeps moving because the volume is decreasing, but then the revenue back to the committee will decrease also.

Gabehart wanted to comment that another key component that wasn't mentioned is this will also allow the preload program to still remain active during that time period too.

B. Approve Additional Funds for Foth Infrastructure & Environment, LLC

The committee has asked Foth to perform tasks outside of the original approved budget, which is outlined as:

- a. Investigate a Peoria City/County Owned Transfer Station
- b. Investigate Landfill 1 Expansion
- c. Investigate New Permit Siting at Landfill 3

Gabehart elaborated that a portion of Landfill 1 meets current cover and liner design standards. There are examples across the country of closed landfills being reopened to recapture airspace, and Foth has been a part of a few of those. Landfill 1 is a good candidate for the potential of "Piggyback" versus Landfill 2 because Landfill 1 is flat, and Landfill 2 is more up and down like a mountain. Foth could design and calculate what additional waste on top would do, the impact on potential environmental monitoring program, and the emergency backup airspace. Landfill 1 "Piggyback" will not be a long-term solution, but Foth can investigate and give a report back to the committee to review for pros and cons.

Van Winkle asked the question of how a piggyback would affect closure and post-closure.

Gabehart: Landfill 1 is about 25 years into its minimum 30-year period, so the 30-year clock restarts. After the piggyback, there will also be 30 additional years of care and monitoring.

Morris clarified that 30 years is a minimum and monitoring can continue past 30 years with any landfill.

Chairman Morris continues to the third task the committee is assigning to Foth, which is to investigate PCC's permit for Landfill 3.

The Chairman advised that the committee must engage and explore all the options to be fair to the committee and taxpayers. The committee is only authorizing Foth to begin additional investigations and prep work then return to the committee with a report. However, the committee needs to know there will be additional cost with that.

GFL Legal Representation Meginnes commented that the permit could be [SIC]reassigned.

Van Winkle asked if the current permit would still stand or if it needed to be modified, even though we know a mine impact will not be underneath Landfill 3

Meginnes summarized a discussion with the head of the permit section, during which the permit was paused until IDNR removed the map and received an opinion from a professional engineer stating there was no mine.

Van Winkle asked what the purpose of the third task assigned to Foth was if Meginnes' statements were valid.

Chairman Morris explained that the committee disagrees with GFL's position in this regard. The committee believes that GFL has instituted its own pause, which is why the 15-day notice has been sent to GFL. The committee is going to be prepared to have responsible and affordable disposal of trash in the city and county of Peoria.

C. Approve Additional Funds for Foth Infrastructure & Environment, LLC on-call services.

Van Winkle motioned first, seconded by Williams, approved with a unanimous verbal vote.

UNFINISHED BUSINESS

NONE.

NEW BUSINESS

Discussion on the future meeting location for the committee. The committee may be meeting in downstairs, but to pay attention to the agenda packets.

NEXT MEETING

May 19, 2024

EXECUTIVE SESSION

The chairman moved to go into executive session to discuss probable litigation. Van Winkle motioned first, seconded by Williams, and approved with a unanimous verbal vote.

ADJOURNMENT

There being no further discussion, the chairman declared the meeting adjourned. Van Winkle motioned first, seconded by Riggerbach, and approved with a unanimous verbal vote. The meeting adjourned at 4:32 P.M.



REQUEST FOR DISCUSSION

To: Peoria City/County Landfill Committee Members

From: Mark Williams and Joshua Gabehart, P.E., Foth Infrastructure and Environment, LLC

AGENDA DATE REQUESTED: JUNE 5, 2024

ACTION REQUESTED: Receive and File Monthly Report

BACKGROUND: The following report details engineering items occurring since the last scheduled Committee Meeting.

Financial Information

The attached spreadsheet shows Foth engineering services provided through April 30, 2024. Through April 30, the total amount billed was \$154,593, and the total spend was 33.6% of the January through December 31, 2024 contract, which is consistent with the planned budget spend of 35%, when excluding Phase 6 Unplanned GCCS Repairs/Emergency.

Updates Regarding Compliance Activities, Measures, and Progress

- There were two shutdowns since the last meeting requiring 405 – CAAPP forms. The flare was down for 3 hours and 2 minutes on April 26th due to a storm with high winds preventing auto restart. On May 20th, the flare was down for 16 hours and 1 minute due to a power phase loss which Ameren had to restore.
- Since the last meeting 10,000 gallons of leachate have been transported off-site to GPSD.
- Monthly tonnages through April are attached. Through April, general MSW was less than the 2023 receipts by over 11,800 tons, and total tonnage received was over 8,000 tons less than the 2023 waste receipts. There are no recommended changes to plan at this time.

Landfill 3 Updates

Foth, GFL, and CEC (GFL subcontractor) met on 5/30/24 to discuss the LF3 permit modification application; GFL to provide further details during their presentation.

Landfill Entrance Dam

Foth and GFL met on 5/20/24 with IDNR to discuss path forward for the dam rehabilitation and wetland mitigation projects. Action items from the meeting:

- IDNR needs a plan set to determine which parts of the projects they can move forward with and then will work on obtaining a construction contractor.
- Hanson completed the design work, may need to be updated to a bid document.
- IDNR to check in with Hanson to determine status.

Solar

See separate agenda item.

FINANCIAL IMPACT: The \$15,000 budget for Phase 6 Unplanned GCCS Repairs/Emergency has been exhausted, but we are planning to manage to the overall budget in anticipating that it will level out as conditions at the landfill improve.

				January		February		March		April		May		June	
Phase/ Task	Description	Beginning Estimate	Current Budget Estimate	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual
Phase 1 - 0100230	General Compliance and Guidance	\$ 133,250	\$ 133,250	\$ 20,958	\$ 19,850	\$ 7,208	\$ 5,915	\$ 10,208	\$ 8,563	\$ 12,208	\$ 12,337	\$ 14,511	\$ -	\$ 9,011	\$ -
Phase 2 - 0200231	Groundwater Support and Data Review	\$ 38,750	\$ 38,750	\$ 8,958	\$ 8,576	\$ 3,267	\$ 3,464	\$ 3,076	\$ 2,191	\$ 6,167	\$ 6,301	\$ 2,436	\$ -	\$ 2,436	\$ -
Phase 3 - 0300232	Gas System and Leachate Management Operations	\$ 151,950	\$ 151,950	\$ 18,396	\$ 19,333	\$ 12,746	\$ 14,173	\$ 11,596	\$ 13,833	\$ 8,896	\$ 8,229	\$ 14,518	\$ -	\$ 13,068	\$ -
Phase 4 - 0400200	Solar Development	\$ 25,500	\$ 25,500	\$ 2,125	\$ 435	\$ 800	\$ 730	\$ 600	\$ 514	\$ 500	\$ 484	\$ 2,917	\$ -	\$ 2,917	\$ -
Phase 5 - 0500201	Landfill No. 2 and No. 3 Expansion/Transition	\$ 65,500	\$ 65,000	\$ 5,458	\$ 4,345	\$ 2,500	\$ 1,667	\$ 2,500	\$ 2,045	\$ 7,000	\$ 6,443	\$ 6,313	\$ -	\$ 6,313	\$ -
	Total	\$414,950	\$ 414,450	\$55,896	\$52,539	\$26,521	\$25,949	\$27,980	\$27,147	\$34,771	\$33,792	\$40,695	\$0	\$33,745	\$0
	% Contract Months Complete			8.3%		16.7%		25.0%		33.3%		41.7%		50.0%	
	% Budget Spent			12.7%		18.9%		25.5%		33.6%		33.6%		33.6%	
	% Planned Budget Spend			13.5%		19.9%		26.6%		35.0%		44.8%		53.0%	
Phase 6 - 0600220	Unplanned GCCS Repairs/Emergency	\$ 15,000	\$ 15,000	\$ 1,250	\$ 4,347	\$ 1,250	\$ 3,353	\$ 1,250	\$ 7,323	\$ 1,250	\$ 144	\$ 1,250	\$ -	\$ 1,250	\$ -

Operational Notes:

January - Phase 1: Project planning and set-up. Committee meeting preparation and attendance. Waste profile review. Semiannual CAAPP and NSPS reporting. Phase 2: Annual Corrective Action Report. Phase 3: Leachate pumping. Leachate data management. Leachate tank sampling. Flare re-lit several times after going down. Gas data management. Monthly gas monitoring. Phase 4: Revisions to solar development RFP. Phase 5: IDNR and IEPA meetings regarding mine investigation. Phase 6: Emergency seep repairs (Foth labor for oversight). Flare troubleshooting and repairs due to extreme cold and high winds.

February - Phase 1: Monthly meetings. Project management/administration. Airspace analysis. Waste profile review. Dam inspection report. Phase 2: Submit Annual Corrective Action Report. Groundwater assessments. Phase 3: Leachate pumping several days. Flare re-lit several times after going down. Gas data management. Monthly gas monitoring. Leachate haul. GMD3 assessment report. Phase 4: Revisions to solar development RFP. Meeting with City procurement. Phase 5: Meetings/discussions regarding mine investigation. Phase 6: Flare troubleshooting modem/communication issues.

March - Phase 1: Monthly meetings. Committee meeting agenda prep. Project management/administration. Waste profile review. Post-closure letter to the City auditor. Post-closure costs update. Dam inspection. Permit waiver extentions. Green house gas calculation. Phase 2: Annual groundwater report. Groundwater assessments. Phase 3: Leachate pumping several days. Flare re-lit several times after going down. Gas data management. Monthly gas monitoring. Leachate haul. GMD5 assessment report. Phase 4: Solar development RFP coordination/communications. Phase 5: LF#3 meeting and communications. Mine investigation report review. Dam project correspondence. Phase 6: Continued to troubleshoot flare modem/communication issues. Flare down several times, needed to be relit. Power outage. L303 pump issues. Compressor and pump repairs.

April - Phase 1: Monthly meetings. Committee meeting agenda prep. Project management/administration. Waste profile review. Post-closure costs update. Permit waiver extentions. Green house gas calculation. Phase 2: Annual groundwater report. Groundwater assessments. Phase 3: Leachate pumping several days. Flare re-lit several times after going down. Gas data management. Monthly gas monitoring. Leachate haul. Phase 4: Solar development RFP coordination/communications. Phase 5: LF#3 meeting and communications. Options analysis meetings/coordination. Phase 6: Compressor and pump repairs.

May - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

June - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

July - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

August - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

September - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

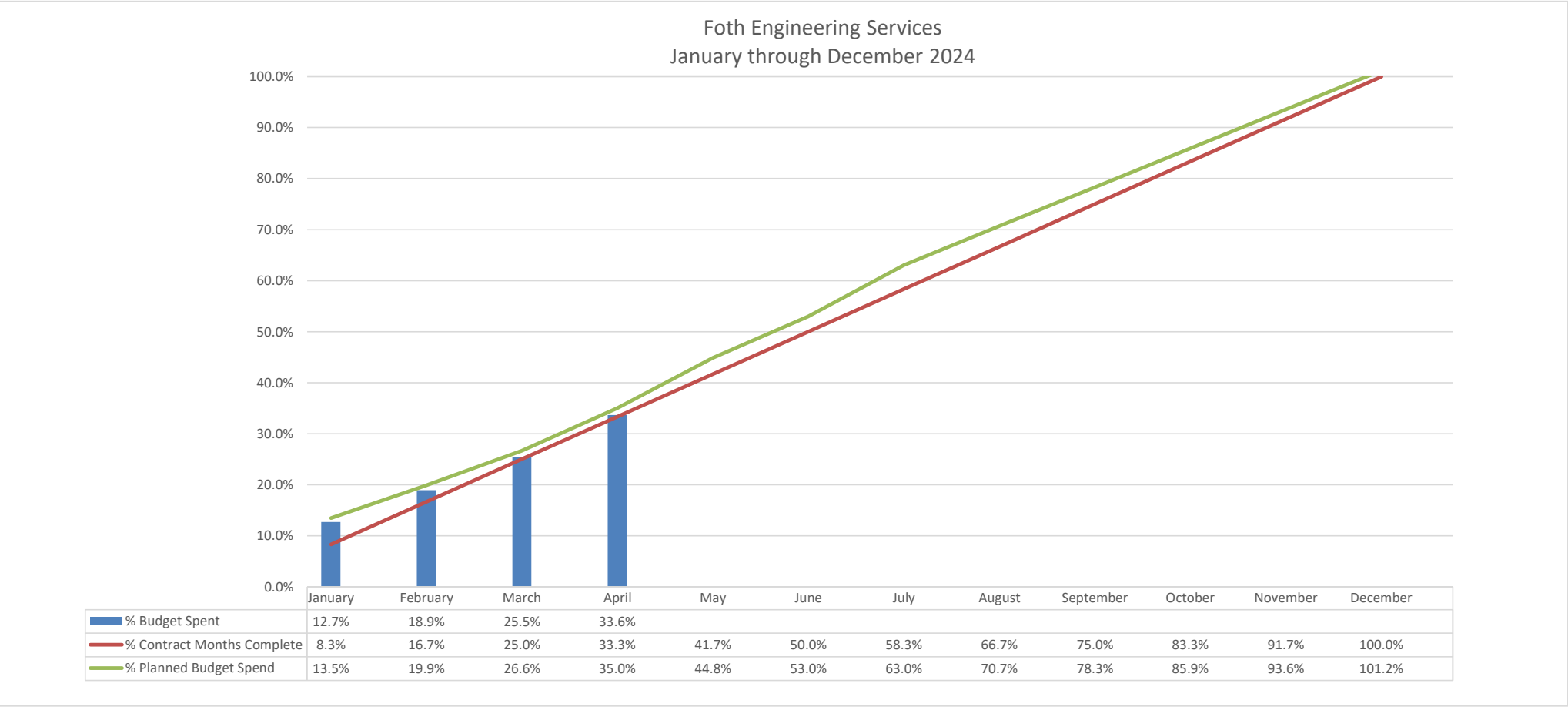
October - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

November - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

December - Phase 1: Phase 2: Phase 3: Phase 4: Phase 5: Phase 6:

Foth Infrastructure & Environment, LLC
24P300.00 - Engineering Services January - December 2024
Joint City and County of Peoria Landfill Committee

		July		August		September		October		November		December		YTD TOTAL		
Phase/ Task	Description	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	Budget	Actual	% Complete
Phase 1 - 0100230	General Compliance and Guidance	\$ 16,011	\$ -	\$ 9,261	\$ -	\$ 9,011	\$ -	\$ 9,011	\$ -	\$ 9,011	\$ -	\$ 9,011	\$ -	\$ 133,250	\$ 46,665	35%
Phase 2 - 0200231	Groundwater Support and Data Review	\$ 2,436	\$ -	\$ 2,436	\$ -	\$ 2,436	\$ -	\$ 2,436	\$ -	\$ 2,436	\$ -	\$ 2,436	\$ -	\$ 38,750	\$ 20,532	53%
Phase 3 - 0300232	Gas System and Leachate Management Operations	\$ 13,818	\$ -	\$ 10,918	\$ -	\$ 10,918	\$ -	\$ 10,918	\$ -	\$ 10,918	\$ -	\$ 10,918	\$ -	\$ 151,950	\$ 55,568	37%
Phase 4 - 0400200	Solar Development	\$ 2,917	\$ -	\$ 2,917	\$ -	\$ 2,917	\$ -	\$ 2,917	\$ -	\$ 2,917	\$ -	\$ 2,917	\$ -	\$ 25,500	\$ 2,162	8%
Phase 5 - 0500201	Landfill No. 2 and No. 3 Expansion/Transition	\$ 6,313	\$ -	\$ 6,313	\$ -	\$ 6,313	\$ -	\$ 6,313	\$ -	\$ 6,313	\$ -	\$ 6,313	\$ -	\$ 65,000	\$ 14,500	22%
	Total	\$41,495	\$0	\$31,845	\$0	\$31,595	\$0	\$31,595	\$0	\$31,595	\$0	\$31,595	\$0	\$ 414,450	\$ 139,427	34%
	% Contract Months Complete	58.3%		66.7%		75.0%		83.3%		91.7%		100.0%				
	% Budget Spent	33.6%		33.6%		33.6%		33.6%		33.6%		33.6%				
	% Planned Budget Spend	63.0%		70.7%		78.3%		85.9%		93.6%		101.2%				
Phase 6 - 0600220	Unplanned GCCS Repairs/Emergency	\$ 1,250	\$ -	\$ 1,250	\$ -	\$ 1,250	\$ -	\$ 1,250	\$ -	\$ 1,250	\$ -	\$ 1,250	\$ -	\$ 15,000	\$ 15,167	101%

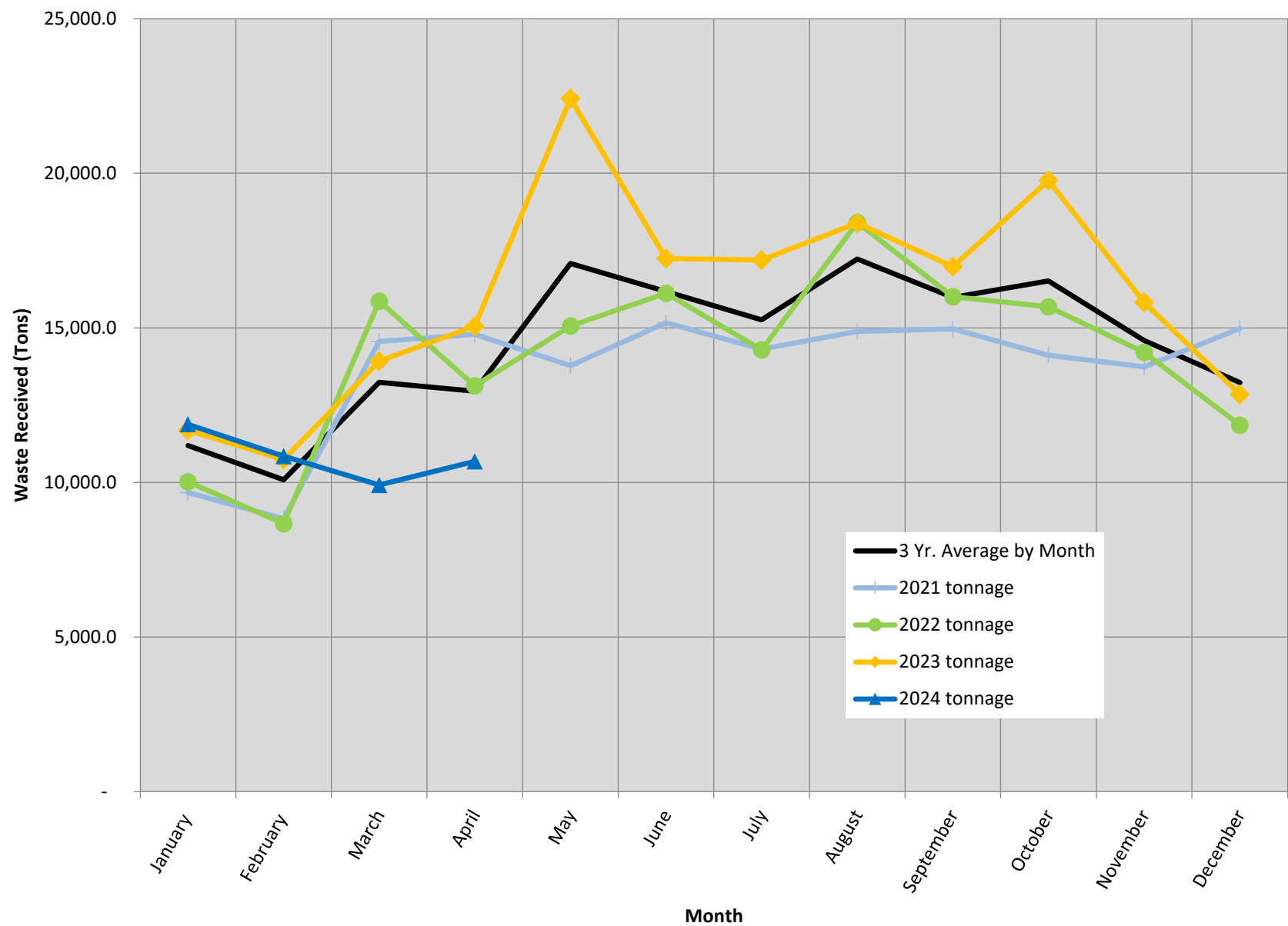


Waste Received by Month PCCL Landfill No 2

Month	2018 Tonnage	2019 Tonnage	2020 tonnage	2021 tonnage	2022 tonnage	2023 tonnage	2024 tonnage	5 Yr. Average by Month	3 Yr. Average by Month	2 Yr. Average by Month
January	11,730.59	12,199.76	13,168.18	9,667.53	10,021.13	11,682.50	11,881.22	11,284.1	11,195.0	11,781.9
February	12,244.04	9,746.12	10,070.59	8,832.31	8,670.38	10,740.68	10,845.83	9,832.0	10,085.6	10,793.3
March	14,516.49	12,533.33	12,128.74	14,559.55	15,860.15	13,919.72	9,921.13	13,277.9	13,233.7	11,920.4
April	14,573.51	15,014.76	13,541.53	14,791.33	13,123.26	15,055.70	10,681.21	13,438.6	12,953.4	12,868.5
May	17,568.27	16,560.81	14,209.21	13,779.53	15,056.74	22,416.18		16,404.5	17,084.2	18,736.5
June	16,896.60	15,267.88	15,037.75	15,171.04	16,120.02	17,242.79		15,767.9	16,178.0	16,681.4
July	16,116.44	15,569.30	17,000.88	14,309.57	14,284.38	17,192.91		15,671.4	15,262.3	15,738.6
August	16,445.70	16,690.04	15,963.12	14,881.66	18,405.77	18,390.25		16,866.2	17,225.9	18,398.0
September	14,809.20	13,953.48	16,095.09	14,965.24	16,009.40	16,979.15		15,600.5	15,984.6	16,494.3
October	16,235.75	19,289.83	15,531.79	14,112.35	15,684.03	19,761.08		16,875.8	16,519.2	17,722.6
November	13,895.01	18,263.39	14,222.22	13,741.19	14,207.94	15,826.20		15,252.2	14,591.8	15,017.1
December	12,208.30	14,534.79	12,708.54	14,983.92	11,853.62	12,847.87		13,385.7	13,228.5	12,350.7
Total	177,239.90	179,623.49	169,677.64	163,795.22	169,296.82	192,055.03	43,329.39	173,656.72	173,541.91	178,503.16
General MSW	173,804.02	161,919.10	161,970.42	159,145.96	160,305.60	176,208.39	37,723.76			
Profiled Waste Tons	3,435.88	17,704.39	7,707.22	4,649.26	8,991.22	15,846.64	5,605.63			

5-yr, 3-yr, and 2-yr averages include 2024 tonnage where data is available.

Waste Received by Month





REQUEST FOR DISCUSSION

To: Peoria City/County Landfill Committee Members
From: Joshua Gabehart, P.E.; Foth Infrastructure and Environment, LLC

AGENDA DATE REQUESTED: June 5, 2024

ACTION REQUESTED: Approval for Chairman Morris' Signature

- 405-CAAPP Forms for Two Flare Shutdowns that Exceeded the One Hour Duration

BACKGROUND:

Flare Shutdowns that Exceeded the One Hour Duration:

During the shutdowns the flare system functioned as designed; there were no releases of landfill gas to the atmosphere. The causes of the shutdowns are discussed in the monthly update.

Foth does not expect other reports requiring Chairman Morris or Director Powers' signatures. However, we respectfully request approval to obtain Chairman Morris' signature should the need arise prior to the next Committee Meeting. If the need does arise, a report will be brought before the board at the next scheduled meeting.

FINANCIAL IMPACT: These submittals are included in the professional services agreement with Foth Infrastructure & Environment, LLC.



REQUEST FOR DISCUSSION

To: Peoria City/County Landfill Committee Members

From: Mark Williams and Joshua Gabehart, P.E.; Foth Infrastructure and Environment, LLC

Agenda Date Requested: June 5, 2024

ACTION REQUESTED: Receive and file one pre-approved waste profile: 637497IL.

BACKGROUND: Please see attached memorandum, which reviews and includes information pertaining to these profiles:

1. Profile 637497IL from J & L Cooling Towers was pre-approved per the Contaminated Soil and Debris and Sandblast Grit Policy.

Foth has included all the technical data in the packet.

Based on the information provided, Foth has no technical objections for acceptance of the waste profiles listed above.

FINANCIAL IMPACT: The waste profiles are expected to generate approximately \$22.56 in host fees.



Memorandum

Foth Infrastructure & Environment, LLC
2314 West Altorfer Drive
Peoria, IL 61615
(309) 691-5300 • Fax: (309) 691-1892
www.foth.com

June 5, 2024

TO: Joint City of Peoria - County of Peoria Solid Waste Disposal Facility Board

CC: Rick Powers, City of Peoria
Scott Sorrel, Peoria County

FR: Mark Williams, Foth Infrastructure & Environment, LLC

RE: Certified Non-Special and Special Waste Permit Approvals

Waste Management has presented the following waste streams.

Pre-Approved Waste Streams (No Action is Required. For Information Only)

- J & L Cooling Towers, Profile 637497IL
 - Contaminated Soil and Debris & Sandblast Grit Policies
 - 8 tons, repeat
 - Estimated Host Fee – \$22.56

See attached profile sheets. SDSs and laboratory reports are provided as appropriate.

Committee approval does not relieve the Generator or Landfill Operator from complying with all applicable laws and regulations. Committee approval is based on information provided by Generator and Landfill Operator.



Requested Facility: Peoria City - County Landfill ☐ Unsure Profile Number: 637497IL
☐ Multiple Generator Locations (Attach Locations) ☐ Request Certificate of Disposal ☐ Renewal? Original Profile Number: _____

A. GENERATOR INFORMATION (MATERIAL ORIGIN)

- Generator Name: J&L Cooling Towers
- Generator Site Address: 1083 Entry Drive
(City, State, ZIP) Bensenville IL 60106
- County: DuPage
- Contact Name: Jose Lopez
- Email: jose@jlcoolingtowers.com
- Phone: (773) 807-5598 7. Fax: (630) 422-1306
- Generator EPA ID: _____ ☒ N/A
- State ID: _____ ☒ N/A

C. MATERIAL INFORMATION

- Common Name: PVC Fill Media
Describe Process(es) Generating Material: ☐ See Attached

PVC Fill Media removed from existing Cooling Tower clogged with scale and sandblasting debris. This is a closed loop cooling system which does not come in contact with any industrial process within the plant.
- Material Composition and Contaminants: ☐ See Attached

1. <u>PVC Fill Media</u>	<u>90 %</u>
2. <u>Sandblasting grid and construction debris</u>	<u>10 %</u>
3. _____	
4. _____	
Total comp. must be equal to or greater than 100%	<u>≥100%</u>
- State Waste Codes: _____ ☒ N/A
- Color: black
- Physical State at 70°F: ☒ Solid ☐ Liquid ☐ Other: _____
- Free Liquid Range Percentage: _____ to _____ ☒ N/A
- pH: _____ to _____ ☒ N/A
- Strong Odor: ☐ Yes ☒ No Describe: _____
- Flash Point: ☐ <140°F ☐ 140°-199°F ☐ ≥200° ☒ N/A

E. ANALYTICAL AND OTHER REPRESENTATIVE INFORMATION

- Analytical attached ☒ Yes
Please identify Lab Report(s) and list specific representative Sample ID#s:

Teklab workorder 23110443
- Other information attached (such as SDS)? ☐ Yes

G. GENERATOR CERTIFICATION (PLEASE READ AND CERTIFY BY SIGNATURE)

By signing this Waste Management ("WM") Profile, I hereby certify that all information submitted in this and all attached documents contain true and accurate descriptions of this material, and that all relevant information necessary for proper material characterization and to identify known and suspected hazards has been provided. Any analytical data attached was derived from a sample that is representative as defined in 40 CFR 261 - Appendix 1 or by using an equivalent method. All changes occurring in the character of the material (i.e., changes in the process or new analytical) will be identified by the Generator and be disclosed to WM prior to providing the material to WM. I am aware that there are significant penalties for knowingly submitting false information.

- ☒ I am authorized to sign on behalf of the Generator and I have confirmed with the Generator that information contained in this profile, as well as supporting documents provided, are accurate and complete.
- ☐ I am a duly authorized employee of Generator holding a position of technical responsibility with direct knowledge of the waste stream and the information contained in this profile, and I confirm that information contained in this profile, as well as supporting documents are accurate and complete.

QUESTIONS? CALL 800 963 4776 FOR ASSISTANCE

B. BILLING INFORMATION☒ SAME AS GENERATOR

- Billing Name: J&L Cooling Towers
- Billing Address: 1083 Entry Drive
(City, State, ZIP) Bensenville IL 60106
- Contact Name: Jose Lopez
- Email: jose@jlcoolingtowers.com
- Phone: (773) 807-5598 6. Fax: (630) 422-1306
- P.O. Number: Caterpillar Chillicothe
- Payment Method: ☒ Credit Account ☐ Cash ☐ Credit Card at Gate

D. REGULATORY INFORMATION

- EPA Hazardous Waste? ☐ Yes* ☒ No
Code: _____
- State Hazardous Waste? ☐ Yes ☒ No
Code: _____
- Is this material non-hazardous due to Treatment, Delisting, or an Exclusion? ☐ Yes* ☒ No
- Contains Underlying Hazardous Constituents? ☐ Yes* ☒ No
- Does the material contain benzene? ☐ Yes* ☒ No
- Facility remediation subject to 40 CFR 63 GGGGG? ☐ Yes* ☒ No
- CERCLA or State-mandated clean-up? ☐ Yes* ☒ No
- NRC, State-regulated, NORM or TENORM waste? ☐ Yes* ☒ No

***If Yes, see Addendum (page 2) for additional questions and space.**

- Contains PCBs? → If Yes, answer a, b and c. ☐ Yes ☒ No
 - Regulated by 40 CFR 761? ☐ Yes ☐ No
 - Remediation under 40 CFR 761.61? ☐ Yes ☐ No
 - Were PCBs imported into the US? ☐ Yes ☐ No
- Regulated and/or Untreated Medical/Infectious Waste? ☐ Yes ☒ No
- Contains Asbestos? ☐ Yes ☒ No
→ If Yes: ☐ Non-Friable ☐ Non-Friable - Regulated ☐ Friable
- Contains Dioxins? (If Yes, please attach analysis) ☐ Yes ☒ No

F. SHIPPING AND DOT INFORMATION

- ☐ One-Time Event ☒ Repeat Event/Ongoing Business
- Estimated Annual Quantity/Unit of Measure: 8
☒ Tons ☐ Yards ☐ Drums ☐ Gallons ☐ Other _____
- Container Type and Size: 40 yard roll off
- USDOT Proper Shipping Name ☒ N/A
- Estimated Start Date 11/06/2023
- Transportation Needed? ☐ Yes* ☒ No

Name (Print): Jose Lopez
Title: President
Company: J&L Cooling Towers Inc
Date: 11/12/2023

Certification Signature

Jose Lopez

F15462467...



**Profile Addendum: State of Illinois
GENERATOR'S NON-SPECIAL WASTE CERTIFICATION**

F. Additional Waste Stream Information

Profile Number: 637497IL

Generators Name: J&L Cooling Towers

Generators SITE Address: 1083 Entry Drive Bensenville IL 60106
(The location where the waste is generated)

Waste Name: PVC Fill Media

The Illinois Environmental Protection Act allows a Generator to certify that their pollution control waste or industrial process waste, is not an Illinois Special Waste (Section 3.45). By completing the following questionnaire, you may certify that the waste stream represented by the Waste Management Profile referenced above is not an Illinois Special Waste as defined in the Act.

Is the waste referenced above any of the following:

- | | | |
|--|------------------------------|--|
| 1. A Potentially Infectious Medical Waste (PIMW)? | ☐ Yes | ☒ No |
| 2. A Hazardous Waste as defined in 40 CFR 261 or in 35 IAC 722.111? | ☐ Yes | ☒ No |
| 3. A Liquid Waste (fails the paint filter test as defined in 35 IAC 811.107)? | ☐ Yes | ☒ No |
| 4. A regulated PCB waste as defined in 40 CFR 761? | ☐ Yes | ☒ No |
| 5. A NESHAP regulated asbestos waste other than waste from renovation or demolition? | ☐ Yes | ☒ No |
| 6. A waste resulting from the shredding recyclable metals (auto fluff)? | ☐ Yes | ☒ No |
| 7. A delisted Hazardous Waste or Treated Characteristic Hazardous Waste, subject to LDR requirements under 35 IAC 728.107? | ☐ Yes | ☒ No |

In determining that this waste is not a liquid, I have used knowledge of the processes generating the waste and the attached supporting documentation: ☐ MSDS ☐ Analytical ☒ Other (explain below):

Generator knowledge

In determining that this waste is not RCRA hazardous, I have used knowledge of the processes generating the waste and the attached supporting documentation: ☐ MSDS ☒ Analytical ☐ Other (explain below):

8. Is the waste represented by this profile sheet exempt from Illinois Solid Waste Management Act fee? ☐ Yes ☒ No

Select option: ☒ Pollution Control Waste ☐ Other

By signing below, I certify my waste is NOT an Illinois Special Waste, and that I understand that a person who knowingly and falsely certifies that a waste is not special waste is subject to the penalties set forth in subdivision (6) of subsection (h) of section 44 of the Illinois Environmental Protection Act.

Name: (Print) Jose Lopez Title: President

Signature: Jose Lopez Date: 11/12/2023



Profile Amendment Request Form

Martha Lopez

(Contact Name)

hereby requests an amendment to WMI profile #: **637497IL**

to include the following:

Amendment Type: ☐ One Time Only Request (Event) ☒ Permanent Addition to Profile (Base)

☐ Additional Analytical/MSDS to be added to profile (see attached) **Analytical ID #(s): _____

☐ Volume Increase (specify volume) _____ ☐ Tons ☐ Cubic Yards ☐ Drums ☐ Gallons ☐ Other (specify) _____

☐ Constituent(s) to be added and/or modify current range in chemical composition:

Chemicals or constituents to be added/modify	Low	High	Units
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

☐ Change current ranges on profile (specify below)

pH Range _____ to _____ Free Liquid Range _____ to _____

☒ Other (specify) generator address revision - Caterpillar 14009 N Old Galena Rd, Chillicothe IL 61523

revising disposal facility to PCC.

GENERATOR CERTIFICATION

By signing this form, the Generator hereby certifies:

The information provided in this document, the referenced Waste Management Generator's Waste Profile Sheet, and all other referenced documents contain true and accurate descriptions of the waste material. All information regarding known or suspected hazards in the possession of the Generator has been disclosed.

Generator/Customer Signature: Jose Lopez

Date: 11/13/23

Company Name: J&L Cooling Towers, Inc.

Name (Print): Jose Lopez

Title: President

FOR WASTE MANAGEMENT USE ONLY

Submitted By: _____ Date: _____ Time: _____
(W.M. Initials)

WM Approval: _____ Date: _____

Agency Approval Required: ☐ Yes ☐ No

☐ Profile Extension

☐ Analytical Extension

Original Expiration Date _____

Analytical Due Date _____

Requested Extension _____

Requested Extension _____

New Expiration Date _____

New Analytical Due Date _____

Conditions/Precautions: _____

November 10, 2023

Jose Lopez
J&L Cooling Towers, Inc.
1083 Entry Drive
Bensenville, IL 60106
TEL: (773) 807-5598
FAX:



Illinois	100226
Kansas	E-10374
Louisiana	05002
Louisiana	05003
Oklahoma	9978

RE: Caterpillar

WorkOrder: 23110443

Dear Jose Lopez:

TEKLAB, INC received 1 sample on 11/7/2023 08:51:00 for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,



Aaron Renner
Project Manager
(630)324-6855
arenner@teklabinc.com



Report Contents

<http://www.teklabinc.com/>

Client: J&L Cooling Towers, Inc.

Work Order: 23110443

Client Project: Caterpillar

Report Date: 10-Nov-23

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	5
Accreditations	6
Laboratory Results	7
Receiving Check List	8
Chain of Custody	Appended

Client: J&L Cooling Towers, Inc.**Work Order:** 23110443**Client Project:** Caterpillar**Report Date:** 10-Nov-23**Abbr Definition**

* Analytes on report marked with an asterisk are not NELAP accredited

CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.

CRQL A Client Requested Quantitation Limit is a reporting limit that varies according to customer request. The CRQL may not be less than the MDL.

DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilution factors.

DNI Did not ignite

DUP Laboratory duplicate is a replicate aliquot prepared under the same laboratory conditions and independently analyzed to obtain a measure of precision.

ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.

IDPH IL Dept. of Public Health

LCS Laboratory control sample is a sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes and analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).

MBLK Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.

MDL "The method detection limit is defined as the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results."

MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).

MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).

MW Molecular weight

NC Data is not acceptable for compliance purposes

ND Not Detected at the Reporting Limit

NELAP NELAP Accredited

PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions.

RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.

RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).

SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.

Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.

TIC Tentatively identified compound: Analytes tentatively identified in the sample by using a library search. Only results not in the calibration standard will be reported as tentatively identified compounds. Results for tentatively identified compounds that are not present in the calibration standard, but are assigned a specific chemical name based upon the library search, are calculated using total peak areas from reconstructed ion chromatograms and a response factor of one. The nearest Internal Standard is used for the calculation. The results of any TICs must be considered estimated, and are flagged with a "T". If the estimated result is above the calibration range it is flagged "ET"

TNTC Too numerous to count (> 200 CFU)

Client: J&L Cooling Towers, Inc.

Work Order: 23110443

Client Project: Caterpillar

Report Date: 10-Nov-23

Qualifiers

- | | |
|---|--|
| # - Unknown hydrocarbon | B - Analyte detected in associated Method Blank |
| C - RL shown is a Client Requested Quantitation Limit | E - Value above quantitation range |
| H - Holding times exceeded | I - Associated internal standard was outside method criteria |
| J - Analyte detected below quantitation limits | M - Manual Integration used to determine area response |
| ND - Not Detected at the Reporting Limit | R - RPD outside accepted recovery limits |
| S - Spike Recovery outside recovery limits | T - TIC(Tentatively identified compound) |
| X - Value exceeds Maximum Contaminant Level | |



Case Narrative

<http://www.teklabinc.com/>

Client: J&L Cooling Towers, Inc.

Work Order: 23110443

Client Project: Caterpillar

Report Date: 10-Nov-23

Cooler Receipt Temp: 2.4 °C

Locations

Collinsville

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email jhriley@teklabinc.com

Collinsville Air

Address 5445 Horseshoe Lake Road
Collinsville, IL 62234-7425
Phone (618) 344-1004
Fax (618) 344-1005
Email EHurley@teklabinc.com

Springfield

Address 3920 Pintail Dr
Springfield, IL 62711-9415
Phone (217) 698-1004
Fax (217) 698-1005
Email KKlostermann@teklabinc.com

Chicago

Address 1319 Butterfield Rd.
Downers Grove, IL 60515
Phone (630) 324-6855
Fax
Email arenner@teklabinc.com

Kansas City

Address 8421 Nieman Road
Lenexa, KS 66214
Phone (913) 541-1998
Fax (913) 541-1998
Email jhriley@teklabinc.com

Client: J&L Cooling Towers, Inc.**Work Order:** 23110443**Client Project:** Caterpillar**Report Date:** 10-Nov-23

State	Dept	Cert #	NELAP	Exp Date	Lab
Illinois	IEPA	100226	NELAP	1/31/2024	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2024	Collinsville
Louisiana	LDEQ	05002	NELAP	6/30/2024	Collinsville
Louisiana	LDEQ	05003	NELAP	6/30/2024	Collinsville
Oklahoma	ODEQ	9978	NELAP	8/31/2024	Collinsville
Arkansas	ADEQ	88-0966		3/14/2024	Collinsville
Illinois	IDPH	17584		5/31/2025	Collinsville
Iowa	IDNR	430		6/1/2024	Collinsville
Kentucky	UST	0073		1/31/2024	Collinsville
Missouri	MDNR	00930		5/31/2023	Collinsville
Missouri	MDNR	930		1/31/2025	Collinsville

Client: J&L Cooling Towers, Inc.

Work Order: 23110443

Client Project: Caterpillar

Report Date: 10-Nov-23

Lab ID: 23110443-001

Client Sample ID: Caterpillar

Matrix: SOLID

Collection Date: 11/02/2023 00:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 1311, 3010A, 6010B, METALS IN TCLP EXTRACT BY ICP								
Arsenic	NELAP	0.250		< 0.250	mg/L	1	11/09/2023 16:09	214464
Barium	NELAP	0.450		3.21	mg/L	1	11/09/2023 16:09	214464
Cadmium	NELAP	0.0200		< 0.0200	mg/L	1	11/09/2023 16:09	214464
Chromium	NELAP	0.100		< 0.100	mg/L	1	11/09/2023 16:09	214464
Lead	NELAP	0.400		< 0.400	mg/L	1	11/09/2023 16:09	214464
Selenium	NELAP	0.500		< 0.500	mg/L	1	11/09/2023 16:09	214464
Silver	NELAP	0.0700		< 0.0700	mg/L	1	11/09/2023 16:09	214464
SW-846 1311, 7470A IN TCLP EXTRACT								
Mercury	NELAP	0.00020		< 0.00020	mg/L	1	11/09/2023 12:11	214466



Receiving Check List

<http://www.teklabinc.com/>

Client: J&L Cooling Towers, Inc.

Work Order: 23110443

Client Project: Caterpillar

Report Date: 10-Nov-23

Carrier: Spee Dee

Received By: HAW

Completed by:

On:

07-Nov-23

Amber Dilallo

Reviewed by:

On:

07-Nov-23

Ellie Hopkins

Pages to follow:

Chain of custody

1

Extra pages included

0

Shipping container/cooler in good condition?

Yes ☒

No ☐

Not Present ☐

Temp °C 2.4

Type of thermal preservation?

None ☐

Ice ☒

Blue Ice ☐

Dry Ice ☐

Chain of custody present?

Yes ☒

No ☐

Chain of custody signed when relinquished and received?

Yes ☒

No ☐

Chain of custody agrees with sample labels?

Yes ☒

No ☐

Samples in proper container/bottle?

Yes ☒

No ☐

Sample containers intact?

Yes ☒

No ☐

Sufficient sample volume for indicated test?

Yes ☒

No ☐

All samples received within holding time?

Yes ☒

No ☐

Reported field parameters measured:

Field ☐

Lab ☐

NA ☒

Container/Temp Blank temperature in compliance?

Yes ☒

No ☐

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water – at least one vial per sample has zero headspace?

Yes ☐

No ☐

No VOA vials ☒

Water - TOX containers have zero headspace?

Yes ☐

No ☐

No TOX containers ☒

Water - pH acceptable upon receipt?

Yes ☐

No ☐

NA ☒

NPDES/CWA TCN interferences checked/treated in the field?

Yes ☐

No ☐

NA ☒

Any No responses must be detailed below or on the COC.

pg. _____ of _____ Work order # 23110443

Client:	JEL Cooling Towers Inc.		Samples on:	☒ ICE	☐ BLUE ICE	☐ NO ICE	2.4 °C	LTG#	1
Address:	1083 Entry drive.		Preserved in:	☐ LAB	☐ FIELD	FOR LAB USE ONLY			
City / State / Zip	Bensenville IL 60106		Lab Notes						
Contact:	Josie Lopez	Phone:	773-807-5598						
E-Mail:	jose@jelcoolingtowers.com	Fax:							
			Client Comments:						

Are there any required reporting limits to be met on the requested analysis?. If yes, please provide limits in the comment section. ☐ Yes ☐ No

Client Comments:

3 DAY RUSH

[illegible]

The individual signing this agreement on behalf of the client, acknowledges that he/she has read and understands the terms and conditions of this agreement, and that he/she has the authority to sign on behalf of the client. See www.teklabinc.com for terms and conditions.



REQUEST FOR DISCUSSION

To: Peoria City/County Landfill Committee Members

From: Joshua Gabehart, P.E.; Foth Infrastructure and Environment, LLC

AGENDA DATE REQUESTED: June 5, 2024

ACTION REQUESTED: Approval to Award the Solar Development Project

BACKGROUND:

The bid opening for the solar development RFP was held on 4/23/24. Two bids were submitted - Ameresco and Chaberton Energy. Foth met with Committee Member Rick Fox on 5/7/24 to evaluate the proposals and again on 5/30/24 to discuss scoring and path forward. Average scoring by Foth and Mr. Fox is as follows:



RFP # 13-24 Peoria Landfill Photovoltaic Project *Scoring Matrix*

Criteria	Max Score	Weight	Ameresco	Chaberton Energy
Qualifications & Related Experience	10	40	9	7
Fees & Pricing	10	20	9	8
References & Past Performance	10	20	9	8
Quality & Completeness of Proposal	10	10	9	8
Advantages & Disadvantages	10	10	9	6
Total:	1000	100	895	734

A more detailed assessment is attached, as well as selected pages from the Ameresco and Chaberton Energy proposals, particularly estimated schedules and pricing.

As a result of the scoring, Foth and Mr. Fox are recommending approval to award the solar development project to Ameresco pending legal review by the State's attorney and financial review by City of Peoria.

FINANCIAL IMPACT: Ameresco estimates lease payments in the first year to total \$149,000 between the two sites. Please see the attachments for pricing details.



RFP # 13-24 Peoria Landfill Photovoltaic Project
Scoring Matrix

Criteria	Max Score	Weight	Ameresco		Chaberton Energy	
Qualifications & Related Experience	10	40	9	Founded in 2000, public since 2010. Larger and more project experience.	7	Began operations as a public benefit corporation in 2020, relatively new company.
Fees & Pricing	10	20	9	Lower lease payment per acre but overall higher lease payment over the project lifetime	8	Higher lease payment per acre but overall lower lease payment over the project lifetime
References & Past Performance	10	20	9	Developed 688 MW DC of solar PV projects, including completed and in construction. Experience in all phases of project, including development, installation, operations, and maintenance. More than 55 MW of solar PV projects across Illinois. Completed Village of De Pue and Danville, IL projects.	8	References - Currently have over 100MW of community solar projects in active development throughout the U.S. with a high percentage of that capacity being developed in Illinois. Project Developer Experience - completed 20 MW since inception and have over 600 MW of projects in process throughout the U.S. in various stages of development. Relatively new to the Illinois market, with 8 locations under site control in Illinois, 3 sites in Scott County on the Illinois Shines Group A waitlist (15 MW), 4 in Whiteside County, and 1 in Peoria County.
Quality & Completeness of Proposal	10	10	9		8	
Advantages & Disadvantages	10	10	9		6	
- Schedule				Could start right away		Counting on getting the Illinois Shines grant. Waitlist is 3 years with possible award at year 4. Given the long wait times for the program, requesting 4 years of Options to develop and have proposed option payments to the County to secure the extra two years of development time.
- O & M				In-house operations and maintenance team		Transfer of ownership to preferred owner/operator, no control
Total:	1000	100	895		734	

Section 5: Price Proposal

Ameresco's completed RFP Attachment C is provided at the end of this section. The following proformas include the estimated financial benefit to the Committee and City/County for the term of the Lease.

SITE 1 - SOLAR ONLY					
Estimated Financial Benefit to the Committee					
Contract Year	Lease Payment (2% Escalation)	Property Tax Revenue to County	Sales Tax to County (1%)	Building Permit Fees	Total Benefit to City
0	\$0	\$0	\$40,177	\$9,890	\$50,067
1	\$47,000	\$41,261	\$0	\$0	\$88,261
2	\$47,940	\$40,600	\$0	\$0	\$88,540
3	\$48,899	\$39,881	\$0	\$0	\$88,780
4	\$49,877	\$39,101	\$0	\$0	\$88,978
5	\$50,874	\$38,257	\$0	\$0	\$89,131
6	\$51,892	\$37,346	\$0	\$0	\$89,238
7	\$52,930	\$36,366	\$0	\$0	\$89,295
8	\$53,988	\$35,313	\$0	\$0	\$89,301
9	\$55,068	\$34,185	\$0	\$0	\$89,253
10	\$56,169	\$32,978	\$0	\$0	\$89,148
11	\$57,293	\$31,690	\$0	\$0	\$88,983
12	\$58,439	\$30,317	\$0	\$0	\$88,756
13	\$59,607	\$28,855	\$0	\$0	\$88,463
14	\$60,800	\$27,301	\$0	\$0	\$88,101
15	\$62,016	\$25,652	\$0	\$0	\$87,668
16	\$63,256	\$23,903	\$0	\$0	\$87,159
17	\$64,521	\$22,051	\$0	\$0	\$86,571
18	\$65,811	\$20,090	\$0	\$0	\$85,902
19	\$67,128	\$19,306	\$0	\$0	\$86,433
20	\$68,470	\$19,788	\$0	\$0	\$88,258
21	\$69,840	\$20,283	\$0	\$0	\$90,123
22	\$71,236	\$20,790	\$0	\$0	\$92,026
23	\$72,661	\$21,310	\$0	\$0	\$93,971
24	\$74,114	\$21,843	\$0	\$0	\$95,957
25	\$75,597	\$22,389	\$0	\$0	\$97,985
Total Estimated Benefit to Committee:					\$2,286,348

SITE 2 - SOLAR PLUS ENERGY STORAGE Estimated Financial Benefit to the Committee					
Contract Year	Lease Payment (2% Escalation)	Property Tax Revenue to County*	Sales Tax to County (1%)	Building Permit Fees	Total Benefit to City
0	\$0	\$0	\$108,618	\$12,172	\$120,790
1	\$102,000	\$41,261	\$0	\$0	\$143,261
2	\$104,040	\$40,600	\$0	\$0	\$144,640
3	\$106,121	\$39,881	\$0	\$0	\$146,002
4	\$108,243	\$39,101	\$0	\$0	\$147,344
5	\$110,408	\$38,257	\$0	\$0	\$148,665
6	\$112,616	\$37,346	\$0	\$0	\$149,962
7	\$114,869	\$36,366	\$0	\$0	\$151,234
8	\$117,166	\$35,313	\$0	\$0	\$152,479
9	\$119,509	\$34,185	\$0	\$0	\$153,694
10	\$121,899	\$32,978	\$0	\$0	\$154,878
11	\$124,337	\$31,690	\$0	\$0	\$156,028
12	\$126,824	\$30,317	\$0	\$0	\$157,141
13	\$129,361	\$28,855	\$0	\$0	\$158,216
14	\$131,948	\$27,301	\$0	\$0	\$159,249
15	\$134,587	\$25,652	\$0	\$0	\$160,239
16	\$137,279	\$23,903	\$0	\$0	\$161,182
17	\$140,024	\$22,051	\$0	\$0	\$162,075
18	\$142,825	\$20,090	\$0	\$0	\$162,915
19	\$145,681	\$19,306	\$0	\$0	\$164,987
20	\$148,595	\$19,788	\$0	\$0	\$168,383
21	\$151,567	\$20,283	\$0	\$0	\$171,850
22	\$154,598	\$20,790	\$0	\$0	\$175,388
23	\$157,690	\$21,310	\$0	\$0	\$179,000
24	\$160,844	\$21,843	\$0	\$0	\$182,686
25	\$164,061	\$22,389	\$0	\$0	\$186,449

Total Estimated Benefit to Committee:

\$4,118,737

*Doesn't include the property tax associated with the BESS. Will request determination from County Assessor

Attachment C - Land Lease Price Proposal

Template Project Site 1

PV System Size	<u>6,890</u> kWdc	Annual System Degradation Factor	<u>0.5%</u> %/year
Year 1 Estimated kWh Generation	<u>11,028,549</u> kWh		

Project Site 2

PV System Size	<u>9,172</u> kWdc	Annual System Degradation Factor	<u>0.5%</u> %/year
Year 1 Estimated kWh Generation	<u>15,025,007</u> kWh		

The Proposer(s) hereby agrees to pay the Committee the following amounts to lease up Project Site 1 and/or Project Site 2 for the construction and operation of a solar energy system for 25 years.

The following is a summary of assumptions for developing the costs for a base solar system. Selected Proposers are responsible for sales tax on equipment purchased and property taxes on leased land if required. Interconnection costs can vary widely depending on system size, interconnection voltage, and other interconnection requirements. For the purposes of establishing a base bid, Respondents should assume interconnection cost of \$0.10 per Watt.

Project Site 1

Year 1 Lease Payment	\$ <u>1,000</u> /Acre (47 Acres)	Annual Lease Escalator	<u>2%</u> %/year
Year 1 Total Lease Payment	\$ <u>47,000</u>	Total Payments over Contract Length (25 Years)	\$ <u>1,505,424</u>

Project Site 2

Year 1 Lease Payment	\$ <u>1,500</u> /Acre (68 Acres)	Annual Lease Escalator	<u>2%</u> %/year
Year 1 Total Lease Payment	\$ <u>102,000</u>	Total Payments over Contract Length (25 Years)	\$ <u>3,267,091</u>

Proposers shall understand that the submitted price proposals must include the scope of work and all deliverables as defined in the Lease Agreement and as specified in this RFP. A Proposer may attach, in substantially the form above, any alternative lease arrangement(s) that the Proposer wishes to include with its proposal

Schedule

Please refer to the following table for Ameresco's proposed project development schedule.

Proposed Project Development Schedule

Milestone	Milestone Date / Estimated Duration
Award	May 2024
Lease Option Agreement Execution	June 2024
Interconnection Applications Submitted	June 2024
Indexed REC RFP	October 2024 – December 2024
Interconnection Agreements Executed*	December 2024
Non-Ministerial Permitting	July 2024 – January 2025
Final Design	January 2025 – March 2025
Procurement	April 2025
Commencement of Construction	August 2025 – May 2026**
Substantial Completion (of Construction)	May 2026
Interconnection/COD*	June 2026

*Interconnection and final completion are subject to work performed by the utility and interconnection queue backlog. We consider these dates reasonable assumptions as to when the utility will complete its interconnection work.

**Weather delays not included

SECTION 4

Price Proposal

Chaberton Energy is proposing a 4-year lease option to allow for the interconnection queue award. Option payments will be separate from the land lease payments and begin upon execution of the agreement and continue for a period of up to 4 years. Land lease payments will begin at the end of the option period contingent on feasibility study and Illinois Shines queue award. The Proposer(s) hereby agrees to pay the Committee the following amounts to lease up Project Site 1 and/or Project Site 2 for the construction and operation of a solar energy system for 25 years.

Project Site 1

PV System Size	<u>7.25</u> kWdc	Annual System Degradation Factor	<u>.5%</u> %/Year
Year 1 Estimated kWh Generation	<u>11,071,699</u> kWdc		

Project Site 2

PV System Size	<u>6.91</u> kWdc	Annual System Degradation Factor	<u>.5%</u> %/Year
Year 1 Estimated kWh Generation	<u>11,200,507</u> kWdc		

OPTION Site 1

Year 1 OPTION Payment	<u>\$ 106 /Acre</u> (47 Acres)	Year 2-4 OPTION Payments	<u>\$7,500</u> Year
Year 1 Total OPTION Payment	<u>\$ 5,000</u>	Total Payments over OPTION Length (4 Years)	<u>\$ 27,500</u>

OPTION Site 2

Year 1 OPTION Payment	<u>\$ 74 /Acre</u> (68 Acres)	Year 2-4 OPTION Payments	<u>\$7,500</u> Year
Year 1 Total OPTION Payment	<u>\$ 5,000</u>	Total Payments over OPTION Length (4 Years)	<u>\$ 27,500</u>

Project Site 1

Year 1 Lease Payment	<u>\$ 958 /Acre</u> (47 Acres)	Annual Lease Escalator	<u>2.0%</u> %/Year
Year 1 Total Lease Payment	<u>\$ 45,025</u>	Total Payments over Contract Length (25 Years)	<u>\$ 791,442</u>

Project Site 2

Year 1 Lease Payment	<u>\$ 2,425 /Acre</u> (68 Acres)	Annual Lease Escalator	<u>2.0%</u> %/Year
Year 1 Total Lease Payment	<u>\$ 165,000</u>	Total Payments over Contract Length (25 Years)	<u>\$ 2,900,343</u>

Description of each task and delivery.

RFP # 13-24 Peoria	Start	End	Days
RFP Award	04/23/24	06/22/24	60
Interconnection & Permitting			
Illinois Shines Queue Submission to Approval	07/01/24	06/30/28	1,460
Interconnection Submission -> Application Approval	Contingent on Queue Award		100
Utility Studies to Interconnection Agreement	Contingent on Queue Award		120
County of Peoria Permit Submission to Approval	Contingent on Queue Award		175
Long Lead Material Procurement	Contingent on Queue Award		172
Construction			
Mobilization	Contingent on Queue Award		3
AC and DC Installation	Contingent on Queue Award		100
System Commissioning	Contingent on Queue Award		10
Closeout			
AHJ Inspection	Contingent on Queue Award		5
Submission to Utility of AHJ Passed Inspection	Contingent on Queue Award		1
Final Tie-in w/ Utility	Contingent on Queue Award		90

Regulatory and permit conditions.

Architectural Review:	Peoria County
Applicability:	TBD
Anticipated Time Frame:	4-6 Month
Construction Review:	Peoria County
Applicability:	Yes
Anticipated Time Frame:	4-6 Month
Structural Permit:	Peoria County
Applicability:	Yes
Anticipated Time Frame:	4-6 Month
Electrical Permit:	Peoria County
Applicability:	Yes
Anticipated Time Frame:	4-6 Months
Fire Permit:	Peoria County
Applicability:	TBD
Anticipated Time Frame:	4-6 Months
Zoning Review:	Peoria County
Applicability:	Currently Zoned Ag-2. Will require special use permit.
Anticipated Time Frame:	3-4 Months

LANDFILL FUND MONTHLY

REVENUE & EXPENSE BUDGET VS ACTUAL

FOR YEARS ENDING DECEMBER 31, 2023 & 2024

DESCRIPTION	JANUARY			FEBRUARY			MARCH			APRIL		
	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual
REVENUES												
Host Fees	\$ 31,130.61	\$ 33,792.00	\$ 34,656.85	\$ 31,542.80	\$ 35,904.00	\$ 32,987.49	\$ 28,823.05	\$ 35,904.00	\$ 29,985.57	\$ 37,309.99	\$ 35,185.92	\$ 27,368.35
Leases	\$ 1,062.54	\$ 1,819.75	\$ 3,598.28	\$ -	\$ 1,819.75	\$ 1,083.79	\$ 4,971.56	\$ 1,819.75	\$ 4,191.21	\$ 1,077.32	\$ 1,819.75	\$ -
Interest Earned - On Cash Balance	\$ 1,195.40	\$ 791.67	\$ 1,001.39	\$ 866.07	\$ 791.67	\$ 1,193.47	\$ 599.38	\$ 791.67	\$ 800.53	\$ 630.01	\$ 791.67	\$ 832.09
TOTAL REVENUES	\$ 33,388.55	\$ 36,403.42	\$ 39,256.52	\$ 32,408.87	\$ 38,515.42	\$ 35,264.75	\$ 34,393.99	\$ 38,515.42	\$ 34,977.31	\$ 39,017.32	\$ 37,797.34	\$ 28,200.44
EXPENSES												
Municipal Reimbursements												
City Personnel	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33	\$ 6,333.33
County Personnel	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
City Audit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Consultant Guidance and Operational Costs												
General Guidance & Compliance (Clean Air Act Permit Rpt)	\$ -	\$ 10,916.67	\$ 19,849.61	\$ -	\$ 10,916.67	\$ 5,915.09	\$ 28,058.50	\$ 10,916.67	\$ 8,563.39	\$ 6,377.86	\$ 10,916.67	\$ 12,336.83
Groundwater Support/Reporting	\$ -	\$ 3,166.67	\$ 8,576.19	\$ -	\$ 3,166.67	\$ 3,463.69	\$ 11,875.46	\$ 3,166.67	\$ 2,191.37	\$ 544.13	\$ 3,166.67	\$ 6,300.52
LF#1 Gas System & Leache Management Ops.	\$ -	\$ 12,500.00	\$ 19,333.39	\$ -	\$ 12,500.00	\$ 14,172.80	\$ 18,979.08	\$ 12,500.00	\$ 13,833.33	\$ 10,410.99	\$ 12,500.00	\$ 8,228.56
LF #2 to LF #3 Transition Activities	\$ -	\$ 5,416.67	\$ 4,345.06	\$ -	\$ 5,416.67	\$ 1,667.32	\$ 8,194.27	\$ 5,416.67	\$ 2,044.56	\$ 2,214.81	\$ 5,416.67	\$ 6,442.66
Solar Development	\$ -	\$ 1,666.67	\$ 434.94	\$ -	\$ 1,666.67	\$ 729.76	\$ -	\$ 1,666.67	\$ 513.97	\$ 712.25	\$ 1,666.67	\$ 483.59
Unplanned Services and Repairs - Foth	\$ -	\$ 1,250.00	\$ 4,346.60	\$ -	\$ 1,250.00	\$ 3,352.65	\$ 9,075.16	\$ 1,250.00	\$ 7,323.30	\$ 290.85	\$ 1,250.00	\$ 144.20
Transfer Station	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -			
Landfill 1 Expansion	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -			
Additional On Call Services	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -			
Contracted/Capital Improvements												
Post Closure Care	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	
Leachate Extraction Improvements	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	
GCCS Improvement Projects	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	\$ -	\$ -	\$ 208.33	
Committee's Operational Expenses												
Off-Site Liquids Disposal(Transport & Leachate Treatment	\$ -	\$ 833.33	\$ 426.58	\$ -	\$ 833.33	\$ 848.30	\$ 867.70	\$ 833.33	\$ 858.00	\$ 1,287.00	\$ 833.33	\$ 855.58
Telephone	\$ -	\$ 33.33	\$ 36.01	\$ 36.01	\$ 33.33	\$ 36.01	\$ 36.03	\$ 33.33	\$ 36.01	\$ 36.01	\$ 33.33	\$ 36.01
Electricity	\$ -	\$ 583.33	\$ -	\$ 655.93	\$ 583.33	\$ 453.50	\$ 533.17	\$ 583.33	\$ 492.70	\$ 623.39	\$ 583.33	\$ 518.27
Unplanned/Contingency												
Unplanned Services and Repairs	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -		\$ -	\$ -	
TOTAL EXPENSES	\$ 6,333.33	\$ 43,325.00	\$ 63,681.71	\$ 7,025.27	\$ 43,325.00	\$ 36,972.45	\$ 83,952.70	\$ 43,325.00	\$ 42,189.96	\$ 28,830.62	\$ 43,325.00	\$ 41,679.55
EXCESS REVENUES OVER EXPENSES	\$ 27,055.22	\$ (6,921.58)	\$ (24,425.19)	\$ 25,383.60	\$ (4,809.58)	\$ (1,707.70)	\$ (49,558.71)	\$ (4,809.58)	\$ (7,212.65)	\$ 10,186.70	\$ (5,527.66)	\$ (13,479.11)
BEGINNING FUND BALANCE	\$ 180,228.39		\$ 224,594.82	\$ 207,283.61		\$ 200,169.63	\$ 232,667.21		\$ 198,461.93	\$ 183,108.50		\$ 191,249.28
ENDING FUND BALANCE	\$ 207,283.61		\$ 200,169.63	\$ 232,667.21		\$ 198,461.93	\$ 183,108.50		\$ 191,249.28	\$ 193,295.20		\$ 177,770.17

LANDFILL FUND MONTHLY
REVENUE & EXPENSE BUDGET VS ACTUAL
FOR YEARS ENDING DECEMBER 31, 2023 & 2024

DESCRIPTION	MAY			JUNE			JULY			AUGUST		
	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual
REVENUES												
Host Fees	\$ 40,354.88	\$ 35,185.92		\$ 60,560.45	\$ 35,228.16		\$ 46,494.83	\$ 35,228.16		\$ 46,742.66	\$ 35,228.16	
Leases	\$ 1,083.79	\$ 1,819.75		\$ 1,083.79	\$ 1,819.75		\$ 1,083.79	\$ 1,819.75		\$ 3,982.78	\$ 1,819.75	
Interest Earned - On Cash Balance	\$ 833.35	\$ 791.67		\$ 637.63	\$ 791.67		\$ 813.00	\$ 791.67		\$ 979.56	\$ 791.67	
TOTAL REVENUES	\$ 42,272.02	\$ 37,797.34	\$ -	\$ 62,281.87	\$ 37,839.58	\$ -	\$ 48,391.62	\$ 37,839.58	\$ -	\$ 51,705.00	\$ 37,839.58	\$ -
EXPENSES												
Municipal Reimbursements												
City Personnel	\$ 6,333.33	\$ 6,333.33		\$ 6,333.33	\$ 6,333.33		\$ 6,333.33	\$ 6,333.33		\$ 6,333.33	\$ 6,333.33	
County Personnel	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	
City Audit	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -		\$ -	\$ -	
Consultant Guidance and Operational Costs												
General Guidance & Compliance (Clean Air Act Permit Rpt)	\$ 16,224.02	\$ 10,916.67		\$ -	\$ 10,916.67		\$ 15,388.33	\$ 10,916.67		\$ -	\$ 10,916.67	
Groundwater Support/Reporting	\$ 6,034.58	\$ 3,166.67		\$ -	\$ 3,166.67		\$ 3,736.24	\$ 3,166.67		\$ -	\$ 3,166.67	
LF#1 Gas System & Leache Management Ops.	\$ 18,821.05	\$ 12,500.00		\$ -	\$ 12,500.00		\$ 35,380.84	\$ 12,500.00		\$ -	\$ 12,500.00	
LF #2 to LF #3 Transition Activities	\$ 6,415.78	\$ 5,416.67		\$ -	\$ 5,416.67		\$ -	\$ 5,416.67		\$ -	\$ 5,416.67	
Solar Development	\$ 309.32	\$ 1,666.67		\$ -	\$ 1,666.67		\$ 290.46	\$ 1,666.67		\$ -	\$ 1,666.67	
Unplanned Services and Repairs - Foth	\$ 401.70	\$ 1,250.00			\$ 1,250.00		\$ 7,682.07	\$ 1,250.00			\$ 1,250.00	
Transfer Station												
Landfill 1 Expansion												
Additional On Call Services												
Contracted/Capital Improvements												
Post Closure Care	\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33	
Leachate Extraction Improvements	\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33	
GCCS Improvement Projects	\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33	
Committee's Operational Expenses												
Off-Site Liquids Disposal(Transport & Leachate Treatment	\$ 853.16	\$ 833.33		\$ -	\$ 833.33		\$ 1,428.07	\$ 833.33		\$ 1,393.49	\$ 833.33	
Telephone	\$ 36.01	\$ 33.33		\$ 36.01	\$ 33.33		\$ 36.01	\$ 33.33		\$ 36.01	\$ 33.33	
Electricity	\$ -	\$ 583.33		\$ 527.78	\$ 583.33		\$ 1,223.34	\$ 583.33		\$ 613.01	\$ 583.33	
Unplanned/Contingency												
Unplanned Services and Repairs	\$ -	\$ -		\$ -	\$ -		\$ -	\$ -			\$ -	
TOTAL EXPENSES	\$ 55,428.95	\$ 43,325.00	\$ -	\$ 6,897.12	\$ 43,325.00	\$ -	\$ 71,498.69	\$ 43,325.00	\$ -	\$ 8,375.84	\$ 43,325.00	\$ -
EXCESS REVENUES OVER EXPENSES	\$ (13,156.93)	\$ (5,527.66)	\$ -	\$ 55,384.75	\$ (5,485.42)	\$ -	\$ (23,107.07)	\$ (5,485.42)	\$ -	\$ 43,329.16	\$ (5,485.42)	\$ -
BEGINNING FUND BALANCE	\$ 193,295.20		\$ 177,770.17	\$ 180,138.27		\$ 177,770.17	\$ 235,523.02		\$ 177,770.17	\$ 212,415.95		\$ 177,770.17
ENDING FUND BALANCE	\$ 180,138.27		\$ 177,770.17	\$ 235,523.02		\$ 177,770.17	\$ 212,415.95		\$ 177,770.17	\$ 255,745.11		\$ 177,770.17

LANDFILL FUND MONTHLY

REVENUE & EXPENSE BUDGET VS ACTUAL

FOR YEARS ENDING DECEMBER 31, 2023 & 2024

DESCRIPTION	SEPTEMBER			OCTOBER			NOVEMBER			DECEMBER		
	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual	2023 Actual	2024 Budget	2024 Actual
REVENUES												
Host Fees	\$ 49,937.00	\$ 35,185.92		\$ 45,897.53	\$ 35,185.92		\$ 53,564.61	\$ 35,185.92		\$ 42,894.12	\$ 35,185.92	
Leases	\$ 1,083.79	\$ 1,819.75		\$ 1,083.79	\$ 1,819.75		\$ 1,083.79	\$ 1,819.75		\$ 1,083.79	\$ 1,819.75	
Interest Earned - On Cash Balance	\$ 835.08	\$ 791.67		\$ 755.05	\$ 791.67		\$ 1,270.25	\$ 791.67		\$ 1,014.79	\$ 791.67	
TOTAL REVENUES	\$ 51,855.87	\$ 37,797.34	\$ -	\$ 47,736.37	\$ 37,797.34	\$ -	\$ 55,918.65	\$ 37,797.34	\$ -	\$ 44,992.70	\$ 37,797.34	\$ -
EXPENSES												
Municipal Reimbursements												
City Personnel	\$ 6,333.33	\$ 6,333.33		\$ 6,333.33	\$ 6,333.33		\$ 6,333.33	\$ 6,333.33		\$ 6,333.37	\$ 6,333.33	
County Personnel	\$ -	\$ -		\$ -	\$ -		\$ 8,500.00	\$ 8,500.00		\$ -	\$ -	
City Audit	\$ -	\$ -		\$ -	\$ -		\$ -	\$ 2,500.00		\$ 2,500.00	\$ -	
Consultant Guidance and Operational Costs												
General Guidance & Compliance (Clean Air Act Permit Rpt)	\$ 14,487.04	\$ 10,916.67		\$ -	\$ 10,916.67		\$ 8,296.14	\$ 10,916.67		\$ 24,246.42	\$ 10,916.67	
Groundwater Support/Reporting	\$ 6,017.30	\$ 3,166.67		\$ -	\$ 3,166.67		\$ 104.50	\$ 3,166.67		\$ 2,966.90	\$ 3,166.67	
LF#1 Gas System & Leache Management Ops.	\$ 23,018.70	\$ 12,500.00		\$ -	\$ 12,500.00		\$ 14,643.45	\$ 12,500.00		\$ 17,808.48	\$ 12,500.00	
LF #2 to LF #3 Transition Activities	\$ 23,037.63	\$ 5,416.67		\$ -	\$ 5,416.67		\$ 3,250.78	\$ 5,416.67		\$ 17,111.00	\$ 5,416.67	
Solar Development	\$ 484.10	\$ 1,666.67		\$ -	\$ 1,666.67		\$ 1,044.32	\$ 1,666.67		\$ 6,151.67	\$ 1,666.67	
Unplanned Services and Repairs - Foth	\$ 15,297.99	\$ 1,250.00			\$ 1,250.00		\$ 1,528.62	\$ 1,250.00		\$ 290.46	\$ 1,250.00	
Transfer Station												
Landfill 1 Expansion												
Additional On Call Services												
Contracted/Capital Improvements												
Post Closure Care	\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33	
Leachate Extraction Improvements	\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33	
GCCS Improvement Projects	\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33		\$ -	\$ 208.33	
Committee's Operational Expenses												
Off-Site Liquids Disposal(Transport & Leachate Treatment	\$ 879.76	\$ 833.33		\$ 441.09	\$ 833.33		\$ -	\$ 833.33		\$ -	\$ 833.33	
Telephone	\$ 36.01	\$ 33.33		\$ 36.01	\$ 33.33		\$ 36.01	\$ 33.33		\$ 72.02	\$ 33.33	
Electricity	\$ -	\$ 583.33		\$ -	\$ 583.33		\$ 1,745.82	\$ 583.33		\$ 1,176.14	\$ 583.33	
Unplanned/Contingency												
Unplanned Services and Repairs	\$ -	\$ -		\$ -	\$ -		\$ 9,178.00	\$ -		\$ 1,934.16	\$ -	
TOTAL EXPENSES	\$ 89,591.86	\$ 43,325.00	\$ -	\$ 6,810.43	\$ 43,325.00	\$ -	\$ 54,660.97	\$ 54,325.00	\$ -	\$ 80,590.62	\$ 43,325.00	\$ -
EXCESS REVENUES OVER EXPENSES	\$ (37,735.99)	\$ (5,527.66)	\$ -	\$ 40,925.94	\$ (5,527.66)	\$ -	\$ 1,257.68	\$ (16,527.66)	\$ -	\$ (35,597.92)	\$ (5,527.66)	\$ -
BEGINNING FUND BALANCE	\$ 255,745.11		\$ 177,770.17	\$ 218,009.12		\$ 177,770.17	\$ 258,935.06		\$ 177,770.17	\$ 260,192.74		\$ 177,770.17
ENDING FUND BALANCE	\$ 218,009.12		\$ 177,770.17	\$ 258,935.06		\$ 177,770.17	\$ 260,192.74		\$ 177,770.17	\$ 224,594.82		\$ 177,770.17

LANDFILL FUND MONTHLY

REVENUE & EXPENSE BUDGET VS ACTUAL

FOR YEARS ENDING DECEMBER 31, 2023 & 2024

DESCRIPTION	FY2023 ACTUAL	FY2024 BUDGET	FY2024 YTD ACTUAL	FY2024 PROJECTED
REVENUES				
Host Fees	\$ 515,252.53	\$ 422,400.00	\$ 124,998.26	\$ 305,000.00
Leases	\$ 18,680.73	\$ 21,837.00	\$ 8,873.28	\$ 20,000.00
Interest Earned - On Cash Balance	\$ 10,429.57	\$ 9,500.00	\$ 3,827.48	\$ 7,000.00
TOTAL REVENUES	\$ 544,362.83	\$ 453,737.00	\$ 137,699.02	\$ 332,000.00
EXPENSES				
Municipal Reimbursements				
City Personnel	\$ 76,000.00	\$ 76,000.00	\$ 25,333.32	\$ 76,000.00
County Personnel	\$ 8,500.00	\$ 8,500.00	\$ -	\$ 8,500.00
City Audit	\$ 2,500.00	\$ 2,500.00	\$ -	\$ 2,500.00
Consultant Guidance and Operational Costs				
General Guidance & Compliance (Clean Air Act Permit Rpt)	\$ 113,078.31	\$ 131,000.00	\$ 46,664.92	\$ 133,000.00
Groundwater Support/Reporting	\$ 31,279.11	\$ 38,000.00	\$ 20,531.77	\$ 40,000.00
LF#1 Gas System & Leache Management Ops.	\$ 139,062.59	\$ 150,000.00	\$ 55,568.08	\$ 152,000.00
LF #2 to LF #3 Transition Activities	\$ 60,224.27	\$ 65,000.00	\$ 14,499.60	\$ 65,000.00
Solar Development	\$ 8,992.12	\$ 20,000.00	\$ 2,162.26	\$ 10,000.00
Unplanned Services and Repairs - Foth	\$ 34,566.85	\$ 15,000.00	\$ 15,166.75	\$ 20,000.00
Transfer Station	\$ -	\$ 25,000.00	\$ -	\$ 25,000.00
Landfill 1 Expansion	\$ -	\$ 25,000.00	\$ -	\$ 25,000.00
Additional On Call Services	\$ -	\$ 25,000.00	\$ -	\$ 50,000.00
Contracted/Capital Improvements				
Post Closure Care	\$ -	\$ 2,500.00	\$ -	\$ -
Leachate Extraction Improvements	\$ -	\$ 2,500.00	\$ -	\$ -
GCCS Improvement Projects	\$ -	\$ 2,500.00	\$ -	\$ -
Committee's Operational Expenses				
Off-Site Liquids Disposal(Transport & Leachate Treatment	\$ 7,150.27	\$ 10,000.00	\$ 2,988.46	\$ 9,000.00
Telephone	\$ 432.14	\$ 400.00	\$ 144.04	\$ 500.00
Electricity	\$ 7,098.58	\$ 7,000.00	\$ 1,464.47	\$ 4,500.00
Unplanned/Contingency				
Unplanned Services and Repairs	\$ 11,112.16	\$ -	\$ -	\$ -
TOTAL EXPENSES	\$ 499,996.40	\$ 605,900.00	\$ 184,523.67	\$ 621,000.00
EXCESS REVENUES OVER EXPENSES	\$ 44,366.43	\$ (152,163.00)	\$ (46,824.65)	\$ (289,000.00)
BEGINNING FUND BALANCE	\$ 180,228.39		\$ 224,594.82	\$ 207,283.61
ENDING FUND BALANCE	\$ 224,594.82		\$ 177,770.17	\$ (81,716.39)

RESERVES	4/30/2024	PROJECTED 12/31/2024
Operating Expenditures	\$ 124,999.10	\$ (81,716.39)
Capital Expenditures	\$ 50,000.00	\$ -
Self Perpetual Care	\$ 2,771.07	\$ -

**Peoria City/County Landfill
Cash Flow Statement - Cash Basis
April 2024**

Beginning Balance April 1, 2024			\$223,501.93
Plus Deposits:			
4/11/2024	Waste Management - Host Fees	\$27,368.35	
4/22/2024	Landfill Lease Receipts	\$3,107.87	
4/30/2024	Interest	\$832.09	
	Landfill Lease Receipt - SBA		\$31,308.31
Less Electronic Debits & A/P Checks			
4/12/2024	GFL	\$858.00	
4/12/2024	Verizon	\$36.01	
4/19/2024	Ameren	\$518.27	
4/30/2024	City of Peoria Admin Fees	\$6,333.33	
			\$7,745.61
Ending Cash Balance April 30, 2024			<u><u>\$247,064.63</u></u>

Peoria City/County Landfill No. 2
Waste Management of Illinois, Inc.
Monthly Activity Report
Apr-24

Tonnage:		Current Month		Landfill #2 Year to Date	Landfill #2 Year to Date
				2024	2023
	General Refuse				
	Haulers	7,804.22		36,867.05	48,347.05
	County Res. Free Loads	213.34		774.63	1,104.81
	County Res. \$5 Loads	0.00		74.59	0.00
	Roadside	31.15		7.49	100.80
	T O T A L	8,048.71		37,723.76	49,552.66
	Special Wastes				
	Industrial (Declassified)	2,632.50		5,605.63	1,845.94
	Industrial (Exempt)	0.00		0.00	0.00
	T O T A L	2,632.50		5,605.63	1,845.94
TOTAL LANDFILL RECEIPTS		10,681.21		43,329.39	51,398.60
Yard Waste Receipts					
	City Contract -	0.00		0.00	0.00
	All Other	0.00		0.00	0.00
	T O T A L	0.00		0.00	0.00
Payments:	Payable to City/County Committee				
	General Refuse	Tons 7,804.22			
		Rate \$ 2.82			
		\$22,007.90	\$22,007.90	\$103,965.08	\$132,954.39
	Special Waste - Ind.	Tons 2,632.50			
		Rate \$ 2.82			
		\$7,423.65	\$7,423.65	\$15,807.88	\$5,076.34
	T O T A L		\$29,431.55	\$119,772.96	\$138,030.72
	Payable to County				
	General Refuse	Tons 7,804.22			
		Rate \$ 1.27			
		\$9,911.36	\$9,911.36	\$46,821.15	\$61,400.75
	Special Waste - Ind.	Tons 2,632.50			
		Rate \$ 1.27			
		\$3,343.28	\$3,343.28	\$7,119.15	\$2,344.34
	T O T A L		\$13,254.63	\$53,940.30	\$63,745.10
	Payable to/Receivable From County				
	\$5 Loads	Loads 0.00			
		Rate \$ 5.00			
		\$0.00	\$0.00	\$20.00	\$35.00
	Less:				
	State Fee on Free and \$5 Loads	Tons 213.34			
		Rate \$ 2.22			
		(\$473.61)	(\$473.61)	(\$1,885.27)	(\$2,452.68)
	T O T A L		(\$473.61)	(\$1,865.27)	(\$2,417.68)
Tonnage:	General Refuse & Special Waste				
	In county	10,397.27	97.34%	33,076.12	29,668.47
	Out of county	283.94	2.66%	10,253.27	21,730.13
	Mixed	-	0.00%	-	-
	T O T A L	10,681.21	100.00%	43,329.39	51,398.60



REQUEST FOR DISCUSSION

To: Peoria City/County Landfill Committee Members

From: Seth Siergey & Ian Johnson, Waste Management

AGENDA DATE REQUESTED: June 5, 2024

ACTION REQUESTED: Receive and File Monthly Reports and **obtain required signatures as outlined below.**

BACKGROUND: Attached is the monthly activity report through April 2024.

1. All weekly random load checks were completed and documented with no issues to report.
2. To allow sufficient time to respond to short-term submittal requirements that may arise prior to the next Landfill Committee meeting, we respectfully request authorization for the Committee chairperson to sign such documents, subject to review and approval in advance by Foth.

FINANCIAL IMPACT: NA

May 31, 2024

Ms. Jacqueline Cooperider
Solid Waste Branch Manager
Permit Section, Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

**Subject: IEPA Site No. 1430155017 - Peoria County
Peoria City/County Landfill 3
Permit No. 2013-026-LF
Application for Significant Modification
CEC Project 341-979**

Dear Ms. Cooperider:

On behalf of Joint City of Peoria/County of Peoria (JCPCP) and Peoria City/County Landfill, Inc. (PCCL), Civil & Environmental Consultants, Inc. (CEC) respectfully submits this letter and attachments as an application for significant modification (Application) for Peoria City/County Landfill 3 (Landfill No. 3) in Peoria County. This Application addresses comments received by the Illinois Environmental Protection Agency (IEPA) via email on March 8, 2024 (March 8, 2024 Email), and requests the development of Landfill No. 3 to be allowed to continue.

The March 8, 2024 Email (see Attachment 2) indicates that PCCL informed the IEPA in a letter, dated April 28, 2023, that the information used to obtain Permit No. 2013-026-LF (Permit) had changed. Specifically, the Illinois Department of Natural Resources (IDNR) noted the existence of a historical underground mine within the footprint of Landfill No. 3. This information changed the status of the Permit to be on hold until such time as PCCL submits, and the IEPA approves, a significant modification to the permit demonstrating that the facility meets Section 22.36(a) of the Illinois Environmental Protection Act (Act). To be considered for approval, the significant modification application would have to include, at a minimum, the following:

1. A revision to the previously published Illinois State Geologic Survey (ISGS) that currently indicates that the Black Jewel #2 mine is located in the Springfield coal seam to definitively state that the subject mine was located in the surface mined Herrin Coal seam.
2. Completion of a report by the IDNR outlining the exploratory activities and associated results and conclusions. This report must include a signed and professional engineer sealed

statement that the results and conclusions are absolute in their conclusion and that there are not and has never been subsurface mining beneath Landfill 3.

The March 8, 2024 Email also indicated that these requirements are not a comprehensive list and the significant modification application should include any additional relevant and applicable information.

Included in this Application is the following information:

- Attachment 1 - General Application for Permit (LPC-PA1), Notice of Application for Permit to Manage Waste (LPC-PA16), and 39(i) Certifications for Operating a Waste Management Facility; and
- Attachment 2 - March 8, 2024 Email Correspondence from IEPA;
- Attachment 3 - Peer Review of Potential Mine Work, prepared by CEC, dated May 22, 2024 (CEC Peer Review Report);
- Attachment 4 - Recommendations Report, prepared by CEC, dated May 22, 2024 (CEC Recommendations Report); and
- Attachment 5 - Approved Construction Quality Assurance (CQA) Plan and proposed amendment to the CQA Plan.

The reports/information in Attachments 2 through 5 are discussed separately below followed by closing remarks.

1.0 IDNR-AMLRD REPORT

Appendix B of Attachment 3 contains a report from an investigation performed by the IDNR-Abandoned Mine Lands Reclamation Division (IDNR-AMLRD), undated (IDNR-AMLRD Report). The IDNR-AMLRD report concluded that the Black Jewel Mine No. 2 operated in the Herrin coal seam based on the following:

- The results of an investigation performed by the GSG Consultants, Inc. (GSG), which included the ten borings drilled from November 2023 to February 2024 to depths of 125 feet to 140 feet below existing grade.
- The Directory of Coal Mines (Ref. 4) statement that old workings (i.e., old underground mine workings) were encountered while excavating pits (i.e., strip pits that were excavated during surface mining the Herrin coal seam).
- Email correspondence with ISGS indicating that:
 - The Federal Land Bank Report for Peoria County (1934) contained a notation suggesting the mine was located at the Herrin Coal outcrop.

- The E.H. Stenstrom Coal Mine map (Ref. 5) showing the workings appearing to enter from a surface mine highwall.
- The updated Illinois Mine Index (Ref. 7) indicates that the Black Jewel Mine No. 2 was listed as a surface mine from 1934–1936, and then an underground mine.

The IDNR-AMLRD Report meets the above requirement from the IEPA to provide “a report by the IDNR outlining the exploratory activities and associated results and conclusions”. The IDNR-AMLRD Report is also signed and sealed by a professional engineer. However, the IDNR-AMLRD Report does not include a statement that the results and conclusions are absolute in their conclusion and that there are not and has never been subsurface mining beneath Landfill No. 3.

2.0 CEC PEER REVIEW REPORT

As noted above, the IDNR-AMLRD Report does not include a statement that the results and conclusions are absolute in their conclusion and that there are not and has never been subsurface mining beneath Landfill No. 3. CEC performed a peer-review of reports and related information regarding potential mine works underneath the proposed waste boundary of Landfill No. 3. The purpose of this review was to determine whether CEC could provide a report that includes a signed and professional engineer sealed statement with results and an absolute conclusion that there are not and has never been subsurface mining beneath Landfill No. 3. CEC’s Peer Review Report is provided in Attachment 3.

CEC reviewed various informational documents provided by PCCL and related publicly available information, such as original and revised mine maps, well and boring logs, and geological reports and circulars. CEC summarized the key information and findings of various information, including the IDNR-AMLRD Report and the published ISGS information.

As required by the IEPA and discussed in the CEC Peer Review Report, the ISGS updated their information to indicate that the Black Jewel Mine No. 2 was located in the Herrin coal seam. Figure 7 of CEC Peer Review Report contains a figure and Appendix E contains information from the ISGS online database, which indicates that Black Jewel #2 mine was located in the surface mined Herrin Coal seam. However, the ISGS information also shows an Indefinite Underground Mine Boundary in the far northern portion of the proposed Landfill No. 3 footprint, which is associated with an unknown mine (see Figure 7 and Appendix F of the CEC Peer Review Report).

CEC’s Peer Review Report concluded the following:

- The Black Jewel Mine No. 2 was located in the Herrin coal seam and not located in the Springfield coal seam.

- Mining did not occur in the Springfield coal seam underneath Landfill No. 3 except for potentially the far northern portion.
- Additional investigation is required in the far northern portion of Landfill No. 3 to determine whether mining occurred in this area.
- Subsurface mining may have occurred in the Herrin coal seam, and there is not enough data to conclude that voids are not present from previous mining within the Herrin coal seam underneath Landfill No. 3.

Based on the above, CEC's Peer Review Report does not include an absolute conclusion that there are not and has never been subsurface mining beneath Landfill No. 3.

As discussed in the March 8, 2024 Email, we understand that PCCL must demonstrate that the Landfill No. 3 meets Section 22.36(a) of the Act, which states the following:

The Agency may not issue any new permit for the construction or development of any solid waste disposal facility that is proposed to be located above an active or inactive shaft or tunnelled mine or within 200 feet of a fault that has had displacement within Holocene time, unless engineering measures have been incorporated into the facility design to ensure that the integrity of the structural components of the facility will not be disrupted by geological processes.

Based on the above language, we propose that IEPA should not require an absolute conclusion that there are not and has never been subsurface mining beneath Landfill No. 3. Rather, we propose to further investigate whether subsurface mining has occurred beneath Landfill No. 3, and, if subsurface mining may have occurred, to provide protocols to ensure that the integrity of the structural components of the facility will not be disrupted.

3.0 CEC RECOMMENDATIONS REPORT

The CEC Recommendations Report is contained in Attachment 4 and provides recommendations to address the IEPA comments regarding potential subsurface mining beneath Landfill No. 3. CEC recommends:

- Performing an additional investigation of the Herrin coal seam including the following:
 - The installation of additional soil borings within the Landfill No. 3 waste footprint to verify the presence or absence of the Herrin coal seam; determine the elevation of the Herrin coal seam where encountered; and determine if any voids are encountered in the Herrin coal seam.
 - Performing a reconnaissance of the ravines and valleys within Landfill No. 3 that may have provided access to the underground mining of the Herrin coal seam (e.g.,

the ravine orientated from southwest to northeast in the northern portion of Landfill No. 3, the southwest to northeast excavated feature in the southcentral portion of Landfill No. 3, and the upper reaches of Coal Hollow in the southeastern portion of Landfill No. 3 as shown on Drawing G3 in Appendix A of the Peer Review of Potential Mine Works).

- Performing an additional investigation of the Springfield coal seam including the following:
 - Reviewing and discussing the available information with the ISGS and/or IDNR to gain concurrence on our understanding of the available information and areas of focus for an additional investigation.
 - The installation of additional soil borings within the far northern area of Landfill No. 3 to verify the presence or absence of the Herrin and Springfield coal seams; determine the elevation of the Herrin and Springfield coal seams where encountered; and determine if any voids are encountered in the Herrin or Springfield coal seams.
- Performing observations during site development including the following:
 - Using the data from the additional investigation discussed above to augment existing information regarding the top of Pennsylvanian shale, and, to further determine the Herrin coal seam elevations (if present) relative to the Landfill No. 3 excavation grades.
 - Using the data from the additional investigation to potentially create a plan sheet(s), which shows areas where the Herrin coal seam (where present) would be removed during the planned landfill development and the areas where the Herrin coal seam (where present) would not be removed during the planned landfill development.
 - Developing revision(s) to the construction quality assurance (CQA) plan if areas of concern are discovered for Landfill No. 3.

4.0 REVISIONS TO CQA PLAN

The approved CQA Plan for Landfill No. 3 is contained in Attachment 5A. The CQA Plan currently includes actions to be taken in the event of encountered voids, soft soils or saturated sands are encountered in sidewall excavations (see Section 5.1.1) or on the foundation floor (see Section 5.1.3). In general, areas with voids or unsuitable soils would be over-excavated and Foundation Fill (for sidewalls) or Compacted Foundation Fill (for landfill foundation) would be constructed.

A proposed mine stabilization plan is provided in Attachment 5B and would be incorporated into the approved CQA Plan as Attachment 3. In general, mine workings would be filled with flowable grout to minimize the collapsible void spaces and thus reduce or eliminate subsidence, particularly subsidence with the potential to detrimentally impact the liner system.

5.0 CLOSING

As indicated above, this Application requests the Permit for Landfill No. 3 to be “un-paused” and development of Landfill No. 3 to be allowed to continue. We appreciate your consideration of this Application.

If you have questions regarding this submittal, please contact the undersigned at (630) 963-6026.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

Steven E. Kroll, P.G.
Project Manager

John E. Hock, P.E.
Vice President

cc: Mr. Matt Coulter, GFL Environmental Inc. (*electronic delivery*)
Mr. Tim Curry, GFL Environmental Inc. (*electronic delivery*)
Mr. George Armstrong, GFL Environmental Inc. (*electronic delivery*)
Mr. Tony Pelletier, GFL Environmental Inc. (*electronic delivery*)
Mr. Rick Powers, City of Peoria (*electronic delivery*)
Ms. Rebecca Cottrell, Peoria County (*electronic delivery*)
Mr. Joshua Gabehart, Foth Infrastructure and Environment (*electronic delivery*)

Enclosures: Attachment 1 - IEPA Forms
Attachment 2 - IEPA Email Correspondence
Attachment 3 - CEC Peer Review Report
Attachment 4 - CEC Recommendations Report
Attachment 5 - CQA Plan

ATTACHMENT 1

IEPA FORMS



Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

General Application for Permit (LPC - PA1)

This form must be used for any application for permit from the Bureau of Land, except for landscape waste composting or hazardous waste management facilities regulated in accordance with RCRA, Subtitle C. One original, and two copies, or three if applicable, of all permit application forms must be submitted. Attach the original and appropriate number of copies of any necessary plans, specifications, reports, etc. to fully support and describe the activities and modifications being proposed. Attach sufficient information to demonstrate the compliance with all regulatory requirements. Incomplete applications will be rejected. Please refer to the instructions for further guidance. **Note: Applicants must provide a physical address; the post office will not deliver a certified letter (final action letter) to a P.O. Box only. Please provide an extended ZIP+4 code for the site identification and owner/operator information.**

You may complete this form online, save a copy locally, print, sign and submit it to the Bureau of Land at the address below. Note: Hand-delivered permit applications must be delivered between 8:30 am and 5:00 pm, Monday through Friday (excluding State holidays) to:

Bureau of Land, Permit Section, Mail Code #33
1021 North Grand Avenue East, P.O. Box 19276
Springfield, IL 62794-9276

[Instructions](#)

I. Site Identification

Site Name: Peoria City/County Landfill 3 IEPA BOL No.: 1430155017
Street Address: 11501 Cottonwood Road P.O. Box: _____
City: Brimfield State: IL Zip + 4: *61517-9541 *Notification letters will not be sent without a 9-digit zip code. County: Peoria
Existing DE/OP Permit Numbers (if applicable): 2013-026-LF

II. Applicant Identification

Owner

Name: Joint City of Peoria / County of Peoria
Street Address: 419 Fulton Street
PO Box: _____
City: Peoria State: IL
Zip + 4: 61602 Phone: 309-494-8800
Contact: Stephen Morris
Email Address: smorris@hhmlaw.net
FEIN ID No. E995-0485-06

Operator (if Different)

Name: Peoria City/County Landfill, Inc.
Street Address: 4700 N. Sterling Avenue
PO Box: 9071
City: Peoria State: IL
Zip + 4: 61612 Phone: 309-688-0760
Contact: Matthew Coulter
Email Address: matthew.coulter@gflenv.com
FEIN ID No. 37-1223747

Agency correspondence mailed to:

☒ Owner ☒ Operator ☐ Other - Explain: _____

TYPE OF SUBMISSION/REVIEW PERIOD:

- ☐ New Landfill/180 days (35 IAC Part 813)
☐ Landfill Expansion/180 days (35 IAC Part 813)
☐ Sig. Mod. to Operate/90 days (35 IAC Part 813)
☒ Other Sig. Mod./90 days (35 IAC Part 813)
☐ Renewal of Landfill/90 days (35 IAC Part 813)
☐ Development/90 days (35 IAC Part 807)
☐ Operating/45 days (35 IAC Part 807)
☐ Operating/90 days (35 IAC Part 848)
☐ Supplemental/90 days (35 IAC Part 807)
☐ Permit Transfer/90 days (35 IAC Part 807)
☐ Renewal of Experimental Permit (35 IAC Part 807)

TYPE OF FACILITY:

- ☒ Landfill
☐ Land Treatment
☐ Transfer Station
☐ Treatment Facility
☐ Storage
☐ Incinerator
☐ Composting
☒ Recycling/Reclamation
☐ Used Tire Storage/Processing Facility
☐ Other (Specify) _____

TYPE OF WASTE:

- ☒ General Municipal Refuse
☐ Hazardous
☒ Special (Non-Hazardous)
☐ Chemical Only (exec. putrescible)
☐ Inert Only (exec. chem. & putrescible)
☐ Used Oil
☐ Potentially Infectious Medical Waste
☐ Landscape/Yard Waste
☐ Used Tires
☐ Other (Specify) _____

This Agency is authorized to require this information under Section 4 and Title X of the Environmental Protection Act (415 ILCS 5/4, 5/39). Failure to disclose this information may result in: a civil penalty of not to exceed \$50,000 for the violation and an additional civil penalty of not to exceed \$10,000 for each day during which the violation continues (415 ILCS 5/42).

IL 532-1857

LPC 350 Rev. 10/2018

General Application for Permit (LPC-PA1)

Page 1 of 4

III. Description of this Permit Request: (Note: The box below will expand as needed)

This application addresses comments received by the Illinois Environmental Protection Agency via email on March 8, 2024 regarding potential historical mining within the footprint of Peoria City/ County Landfill 3, and requests approval of landfill development to continue.

IV. Completeness Requirements

1. Have all required public notice letters been mailed in accordance with the LPC-PA16 instructions? Yes ☒ No ☐ N/A ☐

(If so, provide a list of those recipients of the required public notice letters for Illinois EPA retention.

Such retention shall not imply any Illinois EPA review and/or confirmation of the list.)

Public Notice Recipients

Name: <u>Neil Anderson</u>	Title: <u>Illinois State Senator District 47</u>
Street Address: <u>103 N. College Avenue #201</u>	P.O. Box: <u></u>
City: <u>Aledo</u> State: <u>IL</u>	Zip Code: <u>61231</u>
Name: <u>Travis Weaver</u>	Title: <u>Illinois State Representative District 93</u>
Street Address: <u>210 West 3rd Street</u>	P.O. Box: <u></u>
City: <u>Kewanee</u> State: <u>IL</u>	Zip Code: <u>61443</u>
Name: <u>Jodi M. Hoos</u>	Title: <u>State's Attorney</u>
Street Address: <u>324 Main Street Room 111</u>	P.O. Box: <u></u>
City: <u>Peoria</u> State: <u>IL</u>	Zip Code: <u>61602</u>
Name: <u>James C. Dillon</u>	Title: <u>Chairman Peoria County Board</u>
Street Address: <u>1230 West Moss Avenue</u>	P.O. Box: <u></u>
City: <u>Peoria</u> State: <u>IL</u>	Zip Code: <u>61602</u>
Name: <u>Stefanie Tarr</u>	Title: <u>City Clerk</u>
Street Address: <u>419 Fulton Street Suite 401</u>	P.O. Box: <u></u>
City: <u>Peoria</u> State: <u>IL</u>	Zip Code: <u>61602</u>
Name: <u>Myrna Klatt</u>	Title: <u>Village Clerk Hanna City</u>
Street Address: <u>313 N. First Street</u>	P.O. Box: <u></u>
City: <u>Hanna City</u> State: <u>IL</u>	Zip Code: <u>61536</u>

- | | Yes | No | N/A |
|--|----------------------------------|----------------------------------|----------------------------------|
| 2. a. Is the Siting Certification Form (LPC-PA8) completed and enclosed? | ☐ | ☐ | ☒ |
| b. Is siting approval currently under litigation? | ☐ | ☒ | ☐ |
| 3. a. Is a closure, and if necessary a post-closure plan covering these activities being submitted, or | ☐ | ☒ | ☐ |
| b. has one already been approved? | ☒ | ☐ | ☐ |
| If yes, provide the permit number: <u>2013-026-LF</u> | | | |
| 4. a. For operating waste disposal sites, only: Has any employee, owner, operator, officer or director of the owner or operator had a prior conduct certification denied, canceled or revoked? | ☐ | ☒ | ☐ |
| b. Have you included a demonstration of how you comply or intend to comply with 35 Ill. Adm. Code 745? | ☐ | ☐ | ☒ |
| 5. a. For waste disposal sites, only: Is the property for the facility held in a beneficial trust? | ☐ | ☒ | ☐ |
| b. If yes, is a beneficial trust certification form (LPC-PA9) completed and enclosed? | ☐ | ☐ | ☒ |
| 6. a. Does the application contain information or proposals regarding the hydrogeology; groundwater monitoring, modeling or classification; a groundwater impact assessment; or vadosezone monitoring for which you are requesting approval? | ☐ | ☒ | ☐ |
| b. If yes, have you submitted a third copy of the application (4 total) and supporting documents? | ☐ | ☐ | ☒ |

7. Has the required 39(i) certification been attached? A 39(i) certification must be submitted with information concerning the following persons or entities:

- a. the owner of the business entity applying for the permit;
- b. the operator of the business entity applying for the permit;
- c. each employee or officer of the owner or operator who signed the permit application or has managerial authority at the site; and
- d. any additional owner, operator, or officer or employee of the owner or operator from whom a certification is requested by the Illinois EPA, including any officer or employee who will be responsible for overseeing or implementing regulated activities governed by the permit.

☒	☐	☐
☒	☐	☐
☐	☒	☐
☐	☐	☒

If no, then complete this certification as indicated.

V. Signatures:

Original signatures are required. Signature stamps or applications transmitted electronically or by FAX are not acceptable.

All applications shall be signed by the person designated below as a duly authorized representative of the owner an/or operator. A printed name for each signature should also be provided.

Corporation - By a principal executive officer of the level of vice-president or above.

Partnership or Sole Proprietorship - By a general partner or the proprietor, respectively.

Government - By either a principal executive officer or a ranking elected official.

A person is a duly authorized representative of the owner and operator only if:

1. They meet the criteria above or the authorization has been granted in writing by a person described above; and
2. Is submitted with this application (a copy of a previously submitted authorization can be used).

I hereby affirm that all information contained in this application is true and accurate to the best of my knowledge and belief. I do herein swear that I am a duly authorized representative of the owner/operator and I am authorized to sign this permit application form.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Owner Signature

Stephen Morris

Printed Name

Date

Chairman

Title

Notary: Subscribed and Sworn before me

this ____ day of _____ 20 ____ .

My commission expires on: _____

Signature & Stamp/Seal of Notary Public

Operator Signature

Matthew Coulter (as agent of PCC3 not as individual)

Printed Name

Date

Regional Vice President

Title

Notary: Subscribed and Sworn before me

this ____ day of _____ 20 ____ .

My commission expires on: _____

Signature & Stamp/Seal of Notary Public

Engineer's Name: John E. Hock

Engineer's Title: Vice President

Company: Civil & Environmental Consultants, Inc.

Registration Number: 062-047623

Street Address: 1230 East Diehl Road, Suite 200

PO Box: _____

City: Naperville

State: IL

Zip Code: 60563

Phone: 630-963-6026

Email Address: jhock@cecinc.com

License Expiration Date: Nov 30, 2025

Signature: _____

Date: _____

Professional Engineer's Seal



Illinois Environmental Protection Agency

Bureau of Land • 1021 N. Grand Avenue E. • Box 19276 • Springfield • Illinois • 62794-9276

Notice of Application for Permit to Manage Waste (LPC-PA16)

Date: May 29, 2024

To Elected Officials and Concerned Citizens:

The purpose of this notice is to inform you that a permit application has been submitted to the Illinois EPA, Bureau of Land, for a solid waste project described below. You are not obligated to respond to this notice, however, if you have any comments, please submit them in writing to the Bureau of Land, Attn: Permit Section, at the above address, or contact the Permit Section at 217/524-3300 within 21 days.

NOTE: Please complete this form online, save a copy locally, print and submit it to the Permit Section #33, at the above.

The permit application, which is identified below, is for a project described at the bottom of this page.

Site Identification:

Site Name: Peoria City/County Landfill 3 IEPA ID Number: 1430155017

Street Address: 11501 Cottonwood Road P.O. Box: _____

City: Brimfield State: IL Zip Code: 61517-9541 County: Peoria

TYPE OF PERMIT SUBMISSIONS:

TYPE OF FACILITY:

TYPE OF WASTE:

- ☐ New Landfill
- ☐ Landfill Expansion
- ☐ First Significant Modification
- ☐ Significant Modification to Operate
- ☒ Other Significant Modification
- ☐ Renewal of Landfill
- ☐ Development
- ☐ Operating
- ☐ Supplemental
- ☐ Transfer
- ☐ Name Change
- ☐ Generic

- ☒ Landfill
- ☐ Land Treatment
- ☐ Transfer Station
- ☐ Treatment Facility
- ☐ Storage
- ☐ Incinerator
- ☐ Composting
- ☒ Recycling/Reclamation
- ☐ Other (Specify) _____

- ☒ General Municipal Refuse
- ☐ Hazardous
- ☒ Special (Non-Hazardous)
- ☐ Chemical Only (exec. putrescible)
- ☐ Inert Only (exec. chem. & putrescible)
- ☐ Used Oil
- ☐ Solvents
- ☐ Landscape/Yard Waste
- ☐ Other (Specify) _____

Description of Project:

This application addresses comments received by the Illinois Environmental Protection Agency via email on March 8, 2024 regarding potential historical mining within the footprint of Peoria City/ County Landfill 3, and requests approval of landfill development to continue.



Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

39(i) Certification for Operating a Waste Management Facility

Pursuant to 415 ILCS 5/39(i), prior to issuing any RCRA permit, or any permit for a waste storage site, sanitary landfill, waste disposal site, waste transfer station, waste treatment facility, waste incinerator, clean construction or demolition debris fill operation, or used tire storage site, the Illinois EPA must conduct an evaluation of the prospective owner's or operator's prior experience in waste management operations, clean construction or demolition debris fill operations, and tire storage site management. As part of that evaluation please complete and submit this form with your permit application.

This form may be completed online and saved locally before printing, signing and submitting it to the Illinois EPA at the address below. If the form is completed manually, please type or print clearly.

Illinois Environmental Protection Agency
Division of Land Pollution Control - #33
39(i) Certification
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

I. Applicant Information

Site Name Peoria City/County Landfill 3 IEPA BOL No.: 1430155017
Site Address 11501 Cottonwood Road
City: Brimfield State: IL Zip Code: 61517-9541
Permit Numbers (if applicable): 2013-026-LF

Owner

Owner Name: Joint City of Peoria / County of Peoria
Street Address: 419 Fulton Street
City: Peoria State: IL Zip: 61602

Operator

Operator Name: Peoria City/County Landfill, Inc.
Street Address: 4700 N. Sterling Ave. P.O. Box 9071
City: Peoria State: IL Zip: 61612

Is this 39(i) certification for the owner or the operator?

☒ Owner ☐ Operator ☐ Owner and operator are the same entity

II. Officers and Employees with Site Responsibility

Unless the owner and operator are the same entity, a separate 39(i) form must be submitted for both the owner and operator. Persons operating under the authority of the owner should be listed on the owner's 39(i) form and persons operating under authority of the operator should be listed on the operator's 39(i) form.

A. Officers: List the name and title of all officers of the owner or operator that will have personal involvement or active participation in the operation or management of the site or facility for which the application is submitted.

Name	Title
Stephen Morris	Chairman - Solid Waste Disposal Facility Board

B. Employees: List the name and title of each employee of the owner or operator that will have personal involvement or active participation in the overall operation or management of the site or facility for which the application is submitted (e.g. site managers, site engineers, and other persons who direct or control the overall day-to-day management of the operation, but not persons whose duties are exclusively limited to equipment operation, labor, or similar non-managerial functions).

Name	Title

III. Owner, Operator, Officer, and Employee Information

A. Prior Conduct Identification

The applicant must answer each of the following questions for every owner or operator, and for any officer or employee identified under Section II. If the answer to any of the following questions is affirmative, the applicant must complete an Attachment A for each person for whom the answer is affirmative and include a copy of each final administrative or judicial determination that required an affirmative response. If the information for each owner, operator, officer, and employee has not changed since the applicant's last submission of a 39(i) certification, the applicant can skip to Section III(C), below.

- 1) Has there been a finding that any person named in Section II violated federal, State, or local laws, regulations, standards, or ordinances in the operation of one or more waste management facilities or sites, clean construction or demolition debris fill operation facilities or sites, or tire storage sites? ☐ Yes
☒ No
- 2) Has any person named in Section II ever been convicted in this or another State of any crime which is a felony under the laws of this State, or convicted of a felony in a federal court; or convicted in this or another state or federal court of any of the following crimes: forgery, official misconduct, bribery, perjury, or knowingly submitting false information under any environmental law, regulation, or permit term or condition? ☐ Yes
☒ No
- 3) Has there been a finding against any person named in Section II of gross carelessness or incompetence in handling, storing, processing, transporting or disposing of waste, clean construction or demolition debris, or used or waste tires, or a finding of gross carelessness or incompetence in using clean construction or demolition debris as fill? ☐ Yes
☒ No

B. Pending Proceedings

The applicant must answer each of the following questions for every owner or operator, and for any officer or employee identified in Section II. If the answer to any of the following questions is affirmative, the applicant must complete an Attachment A for each person for whom the answer is affirmative and provide information identified in Attachment A regarding the pending proceeding.

1. Is there any proceeding currently pending against any person named in Section II that could result in a conviction or finding described in subsection A, above? ☐ Yes
☒ No
2. Is there any proceeding currently pending against any person named in Section II that could result in the reversal of a conviction or finding described in subsection A, above? ☐ Yes
☒ No

C. Prior Application Information

If (i) the applicant has previously submitted the Attachments required pursuant to subsections A and B above and (ii) the Attachments previously submitted are still complete, true, and correct, then the applicant does not need to include Attachments with this submission if the following box is checked:

☐ By checking this box, I affirm that the Attachments previously submitted are still complete, true, and correct and wish to incorporate them into this Certification.

If the above box is checked, identify the application that contains the previously submitted Attachments that are complete, true, and correct.

Authorization for Release of Information

This Certification must be signed by an officer of the applicant.

The undersigned authorizes any representative of the Illinois Environmental Protection Agency bearing this release to obtain any information from the Illinois State Police pertaining to the criminal records of the applicant and hereby directs the Illinois State Police to release such information upon request of the bearer. The undersigned authorizes a review of and full disclosure of all records, or any part thereof, concerning the applicant's criminal records by and to a duly authorized agent of the Illinois Environmental Protection Agency, whether the records are of public, private, or confidential nature. The intent of this authorization is to give consent for full and complete disclosure of the applicant's criminal records.

The undersigned fully understands that any information which is developed directly or indirectly, in whole or in part, as a result of this authorization will be considered in determining whether a permit shall be issued by the Illinois Environmental Protection Agency under the Environmental Protection Act [415 ILCS 5]. The undersigned further agrees to release the Illinois State Police and the Illinois Environmental Protection Agency, its agents and designees under this release, from any and all liability which may be incurred as a result of compliance with this authorization for release of information.

Certification Statements

I certify under penalty of law that the information submitted, including information on any Attachments submitted as part of or incorporated into this Certification, 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.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Signature of Applicant Officer

Stephen Morris

Printed Name

Date

Chairman - Solid Waste Disposal Facility Board

Title

Attachment A (1 of 1)

This Attachment must be completed for each owner or operator, and for each officer or employee identified in Section II, for whom one or more affirmative responses were included in Section III.

Name: _____ Title: _____

Status: ☐ Owner ☐ Operator ☐ Officer ☐ Employee (check all that apply)

A. Prior Findings or Convictions

1. Has there been a finding that the person named above violated federal, State, or local laws, regulations, standards, or ordinances in the operation of one or more waste management facilities or sites, clean construction or demolition debris fill operation facilities or sites, or tire storage sites? ☐ Yes
☐ No
2. Has the person named above ever been convicted in this or another State of any crime which is a felony under the laws of this State, or convicted of a felony in a federal court; or convicted in this or another state or federal court of any of the following crimes: forgery, official misconduct, bribery, perjury, or knowingly submitting false information under any environmental law, regulation, or permit term or condition? ☐ Yes
☐ No
3. Has there been a finding against the person named above of gross carelessness or incompetence in handling, storing, processing, transporting or disposing of waste, clean construction or demolition debris, or used or waste tires, or a finding of gross carelessness or incompetence in using clean construction or demolition debris as fill? ☐ Yes
☐ No

If the answer to any of the above questions is Yes, attach a copy of each final administrative or judicial determination that required an affirmative response.

B. Pending Proceedings

Is there any proceeding currently pending that could result in one of the following:

1. A conviction or finding described in subsection A, above? ☐ Yes
☐ No
2. The reversal of a conviction or finding described in subsection A, above? ☐ Yes
☐ No

If the answer to any of the above questions is Yes, please provide information about the pending proceeding, including the parties involved, the adjudicating body, the docket number, the nature of the proceeding, and the status. The box below will expand as needed. Attach additional sheets if necessary.



Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

39(i) Certification for Operating a Waste Management Facility

Pursuant to 415 ILCS 5/39(i), prior to issuing any RCRA permit, or any permit for a waste storage site, sanitary landfill, waste disposal site, waste transfer station, waste treatment facility, waste incinerator, clean construction or demolition debris fill operation, or used tire storage site, the Illinois EPA must conduct an evaluation of the prospective owner's or operator's prior experience in waste management operations, clean construction or demolition debris fill operations, and tire storage site management. As part of that evaluation please complete and submit this form with your permit application.

This form may be completed online and saved locally before printing, signing and submitting it to the Illinois EPA at the address below. If the form is completed manually, please type or print clearly.

Illinois Environmental Protection Agency
Division of Land Pollution Control - #33
39(i) Certification
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

I. Applicant Information

Site Name Peoria City/County Landfill 3 IEPA BOL No.: 1430155017
Site Address 11501 Cottonwood Road
City: Brimfield State: IL Zip Code: 61517-9541
Permit Numbers (if applicable): 2013-026-LF

Owner

Owner Name: Joint City of Peoria / County of Peoria
Street Address: 419 Fulton Street
City: Peoria State: IL Zip: 61602

Operator

Operator Name: Peoria City/County Landfill, Inc.
Street Address: 4700 N. Sterling Ave. P.O. Box 9071
City: Peoria State: IL Zip: 61612

Is this 39(i) certification for the owner or the operator?

☐ Owner ☒ Operator ☐ Owner and operator are the same entity

II. Officers and Employees with Site Responsibility

Unless the owner and operator are the same entity, a separate 39(i) form must be submitted for both the owner and operator. Persons operating under the authority of the owner should be listed on the owner's 39(i) form and persons operating under authority of the operator should be listed on the operator's 39(i) form.

A. Officers: List the name and title of all officers of the owner or operator that will have personal involvement or active participation in the operation or management of the site or facility for which the application is submitted.

Name	Title
Matthew Coulter (as agent of PCC3 not as an individual)	Regional Vice President

B. Employees: List the name and title of each employee of the owner or operator that will have personal involvement or active participation in the overall operation or management of the site or facility for which the application is submitted (e.g. site managers, site engineers, and other persons who direct or control the overall day-to-day management of the operation, but not persons whose duties are exclusively limited to equipment operation, labor, or similar non-managerial functions).

Name	Title
Dave Bryant (as agent of PCC3 not as individual)	Landfill General Manager

III. Owner, Operator, Officer, and Employee Information

A. Prior Conduct Identification

The applicant must answer each of the following questions for every owner or operator, and for any officer or employee identified under Section II. If the answer to any of the following questions is affirmative, the applicant must complete an Attachment A for each person for whom the answer is affirmative and include a copy of each final administrative or judicial determination that required an affirmative response. If the information for each owner, operator, officer, and employee has not changed since the applicant's last submission of a 39(i) certification, the applicant can skip to Section III(C), below.

- 1) Has there been a finding that any person named in Section II violated federal, State, or local laws, regulations, standards, or ordinances in the operation of one or more waste management facilities or sites, clean construction or demolition debris fill operation facilities or sites, or tire storage sites? ☐ Yes
☒ No
- 2) Has any person named in Section II ever been convicted in this or another State of any crime which is a felony under the laws of this State, or convicted of a felony in a federal court; or convicted in this or another state or federal court of any of the following crimes: forgery, official misconduct, bribery, perjury, or knowingly submitting false information under any environmental law, regulation, or permit term or condition? ☐ Yes
☒ No
- 3) Has there been a finding against any person named in Section II of gross carelessness or incompetence in handling, storing, processing, transporting or disposing of waste, clean construction or demolition debris, or used or waste tires, or a finding of gross carelessness or incompetence in using clean construction or demolition debris as fill? ☐ Yes
☒ No

B. Pending Proceedings

The applicant must answer each of the following questions for every owner or operator, and for any officer or employee identified in Section II. If the answer to any of the following questions is affirmative, the applicant must complete an Attachment A for each person for whom the answer is affirmative and provide information identified in Attachment A regarding the pending proceeding.

1. Is there any proceeding currently pending against any person named in Section II that could result in a conviction or finding described in subsection A, above? ☐ Yes
☒ No
2. Is there any proceeding currently pending against any person named in Section II that could result in the reversal of a conviction or finding described in subsection A, above? ☐ Yes
☒ No

C. Prior Application Information

If (i) the applicant has previously submitted the Attachments required pursuant to subsections A and B above and (ii) the Attachments previously submitted are still complete, true, and correct, then the applicant does not need to include Attachments with this submission if the following box is checked:

☐ By checking this box, I affirm that the Attachments previously submitted are still complete, true, and correct and wish to incorporate them into this Certification.

If the above box is checked, identify the application that contains the previously submitted Attachments that are complete, true, and correct.

Authorization for Release of Information

This Certification must be signed by an officer of the applicant.

The undersigned authorizes any representative of the Illinois Environmental Protection Agency bearing this release to obtain any information from the Illinois State Police pertaining to the criminal records of the applicant and hereby directs the Illinois State Police to release such information upon request of the bearer. The undersigned authorizes a review of and full disclosure of all records, or any part thereof, concerning the applicant's criminal records by and to a duly authorized agent of the Illinois Environmental Protection Agency, whether the records are of public, private, or confidential nature. The intent of this authorization is to give consent for full and complete disclosure of the applicant's criminal records.

The undersigned fully understands that any information which is developed directly or indirectly, in whole or in part, as a result of this authorization will be considered in determining whether a permit shall be issued by the Illinois Environmental Protection Agency under the Environmental Protection Act [415 ILCS 5]. The undersigned further agrees to release the Illinois State Police and the Illinois Environmental Protection Agency, its agents and designees under this release, from any and all liability which may be incurred as a result of compliance with this authorization for release of information.

Certification Statements

I certify under penalty of law that the information submitted, including information on any Attachments submitted as part of or incorporated into this Certification, 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.

Any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Signature of Applicant Officer

Matthew Coulter (agent of PCC3 not as an individual)

Printed Name

Date

Regional Vice President

Title

Attachment A (1 of 1)

This Attachment must be completed for each owner or operator, and for each officer or employee identified in Section II, for whom one or more affirmative responses were included in Section III.

Name: _____ Title: _____

Status: ☐ Owner ☐ Operator ☐ Officer ☐ Employee (check all that apply)

A. Prior Findings or Convictions

1. Has there been a finding that the person named above violated federal, State, or local laws, regulations, standards, or ordinances in the operation of one or more waste management facilities or sites, clean construction or demolition debris fill operation facilities or sites, or tire storage sites? ☐ Yes
☐ No
2. Has the person named above ever been convicted in this or another State of any crime which is a felony under the laws of this State, or convicted of a felony in a federal court; or convicted in this or another state or federal court of any of the following crimes: forgery, official misconduct, bribery, perjury, or knowingly submitting false information under any environmental law, regulation, or permit term or condition? ☐ Yes
☐ No
3. Has there been a finding against the person named above of gross carelessness or incompetence in handling, storing, processing, transporting or disposing of waste, clean construction or demolition debris, or used or waste tires, or a finding of gross carelessness or incompetence in using clean construction or demolition debris as fill? ☐ Yes
☐ No

If the answer to any of the above questions is Yes, attach a copy of each final administrative or judicial determination that required an affirmative response.

B. Pending Proceedings

Is there any proceeding currently pending that could result in one of the following:

1. A conviction or finding described in subsection A, above? ☐ Yes
☐ No
2. The reversal of a conviction or finding described in subsection A, above? ☐ Yes
☐ No

If the answer to any of the above questions is Yes, please provide information about the pending proceeding, including the parties involved, the adjudicating body, the docket number, the nature of the proceeding, and the status. The box below will expand as needed. Attach additional sheets if necessary.

ATTACHMENT 2

IEPA EMAIL CORRESPONDENCE

Hock, John

Subject: FW: Peoria City County LF - Black Jewel #2 Investigation

From: Cooperider, Jacki <Jacki.Cooperider@Illinois.gov>

Sent: Friday, March 8, 2024 3:27 PM

To: Timothy Curry <tim.curry@gflenv.com>; Guttman, Brent <Brent.Guttman@illinois.gov>; Range, Lance L. <Lance.L.Range@Illinois.gov>; Karl, Joseph <Joseph.Karl@Illinois.gov>; Morris, Greg <Greg.Morris@Illinois.gov>; Rhoades, Joshua <Joshua.Rhoades@Illinois.gov>

Cc: Gabehart, Josh <Josh.Gabehart@foth.com>; Matthew Coulter <matthew.coulter@gflenv.com>; George Armstrong <george.armstrong@gflenv.com>

Subject: RE: Peoria City County LF - Black Jewel #2 Investigation

Tim,

You are correct that the permit, as it stands today, cannot be acted upon. In a letter dated April 28, 2023, from Peoria City/County Landfill Inc., the applicant informed the Illinois EPA that the information used to obtain the permit had changed. Specifically, Illinois Department of Natural Resources noted the existence of a historical mine within the footprint of the proposed facility. This information changed the status of the development permit to be on hold until such time as Peoria City/County Landfill submits, and the Illinois EPA approves, a significant modification to the permit demonstrating that the facility meets Section 22.36(a) of the Illinois Environmental Protection Act. To be considered for approval, the significant modification application would have to include, at a minimum, the following:

1. A revision to the previously published ISGS survey that currently indicates that the Black Jewel #2 mine is located in the Springfield coal seam to definitively state that the subject mine was located in the surface mined Herrin Coal seam.
2. Completion of a report by the IDNR outlining the exploratory activities and associated results and conclusions. This report must include a signed and PE sealed statement that the results and conclusions are absolute in their conclusion and that there are not and has never been subsurface mining beneath Landfill 3.

Note these requirements are not a comprehensive list and the significant modification application should include any additional relevant and applicable information.

Please let me know if you have additional questions.

Jacki Cooperider, P.E.
Permits Section Manager
Bureau of Land
217/785-0100



From: Timothy Curry <tim.curry@gflenv.com>

Sent: Tuesday, February 27, 2024 9:22 AM

To: Cooperider, Jacki <Jacki.Cooperider@Illinois.gov>; Guttman, Brent <Brent.Guttman@illinois.gov>; Range, Lance L.

<Lance.L.Range@Illinois.gov>; Karl, Joseph <Joseph.Karl@Illinois.gov>; Morris, Greg <Greg.Morris@Illinois.gov>;

Rhoades, Joshua <Joshua.Rhoades@Illinois.gov>

Cc: Gabehart, Josh <Josh.Gabehart@foth.com>; Matthew Coulter <matthew.coulter@gflenv.com>; George Armstrong <george.armstrong@gflenv.com>

Subject: [External] RE: Peoria City County LF - Black Jewel #2 Investigation

Hello Jackie, thank you very much for sharing the communication below.

I would like to follow up with a couple of questions/clarifications.

As an initial matter, would you please confirm the status of the permit (is the permit revoked, suspended, terminated or otherwise conditioned)? It is our understanding that there is currently no permit authority for construction of Landfill 3 as the previously issued permit was contingent upon all facts and assumptions being consistent with the permit application and, specifically, that there is no evidence of mining activity below the proposed footprint. Thus, please also confirm that if there is indeed no permit authority, no expansion related construction activities associated with Landfill 3 can be initiated at this time and until such time that IEPA re-issues such authorizations.

As for the steps required to move this project forward, in order for the IEPA to authorize Landfill 3 activities to commence, would you please confirm that the following actions need to be completed, reviewed and approved by the IEPA:

1. A revision to the previously published ISGS survey that currently indicates that the Black Jewel #2 mine is located in the Springfield coal seam to definitively state that the subject mine was located in the Herrin Coal seam.
2. Completion of a report by the IDNR outlining the exploratory activities and associated results and conclusions. This report must include a signed and PE sealed statement that the results and conclusions are absolute in their conclusion and that there are not and has never been subsurface mining beneath Landfill 3.
3. A significant permit modification (or other application?) submitted by the Owner and Applicant, which may require other conditions, certifications or investigations that may be unknown at this time in order to provide certainty.

If there are other activities that IEPA will require to be completed before IEPA authorizes activities to commence with respect to Landfill 3, please let us know. Otherwise, would you please confirm that the above enumerated activities are a necessary precondition for IEPA to issue a permit or other authorization to proceed with this project?

At this time, GFL has not been provided a "Draft" of the IDNR report for review or comment. We would also appreciate being copied on future communications and reports as this matter progresses.

Thank you and we look forward to continuing our discussions as we work through this process.

Timothy Curry | Area Landfill Director

GFL Environmental

119 W. Gundlach St., Columbia, IL 62236

| C (618) 806-7392 | tim.curry@gflenv.com | www.gflenv.com

Confidentiality Notice: This email message (including attachments, if any) is intended for the use of the individual or entity to which it is addressed and may contain information that is privileged, proprietary, confidential and exempt from disclosure. If you are not the intended recipient, you are notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify the sender and erase this email message immediately.

From: Cooperider, Jacki <Jacki.Cooperider@Illinois.gov>

Sent: Wednesday, February 21, 2024 3:00 PM

To: Timothy Curry <tim.curry@gflenv.com>; Guttman, Brent <Brent.Guttman@illinois.gov>; Range, Lance L. <Lance.L.Range@Illinois.gov>; Karl, Joseph <Joseph.Karl@Illinois.gov>; Morris, Greg <Greg.Morris@Illinois.gov>;

Rhoades, Joshua <Joshua.Rhoades@Illinois.gov>

Cc: Gabehart, Josh <Josh.Gabehart@foth.com>; Matthew Coulter <matthew.coulter@gflenv.com>; George Armstrong <george.armstrong@gflenv.com>

Subject: RE: Peoria City County LF - Black Jewel #2 Investigation

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Tim,

For your reference, here is a copy of an email I sent to Brent on Monday regarding the IEPA's ability to provide guidance on the mine investigation.

Jacki

Brent,

The 2012 Illinois State Geological Survey (ISGS) publication *Directory of Coal Mines in Illinois, 7.5-Minute Quadrangle Series, Hanna City Quadrangle, Peoria County*, indicates that the location of the proposed expansion at Peoria City/County Landfill 3 (Landfill 3) is over the Black Jewel Mine No. 2. As you are aware, The Illinois EPA Bureau of Land, Permit Section, per the Illinois Environmental Protection Act Section 22.36 (415 ILCS 5/22.36), "may not issue any new permit for the construction or development of any solid waste disposal facility that is proposed to be located above an active or inactive shaft or tunneled mine or within 200 feet of a fault that has had displacement within Holocene time..."

The Illinois EPA has taken into consideration the numerous uncertainties associated with varying degrees of completeness and accuracy of the sources from which the maps and digital files used for the study were compiled, and further understands that these data are not intended for use in site-specific screening or decision-making as ISGS does not guarantee the mine maps are free of errors and disclaims any responsibility for damages that may result from actions or decision based on them; however, the published maps and data, available electronically to the public via ISGS ILMINES (available at <https://ilmineswiki.web.illinois.edu/wiki/ILMINES>), is understood by the Illinois EPA to be a reasonable interpretation of the geology of the area based on available data.

Based on the information currently available, the Illinois EPA would not be able to issue the expansion permit for Landfill 3 unless sufficient site-specific data exists such that:

1. the ISGS revises their survey to exclude any indication of subsurface mining beneath Landfill 3; or
2. the Illinois Department of Natural Resources (IDNR) Office of Mines and Minerals provides the Illinois EPA with a statement, signed and sealed by a Professional Engineer with a mining discipline, indicating that the investigation performed by IDNR is comprehensive and absolute in the conclusion that there does not currently, not has there ever been, subsurface mining beneath Landfill 3.

As Illinois EPA does not have mine mapping or mining engineering expertise, nor the available resources to provide an investigation plan that aims to provide sufficient information contrary to the data and information provided by ISGS.

The Illinois EPA is willing to meet again with interested parties, but as stated above, does not have the mine mapping or mining engineering expertise to provide an investigation plan that refutes the current data provided by ISGS nor to provide a remediation plan should subsurface mines or features be located beneath Landfill 3.

Regards,

Jacki

From: Timothy Curry <tim.curry@gflenv.com>

Sent: Wednesday, February 21, 2024 12:21 PM

To: Guttman, Brent <Brent.Guttman@illinois.gov>; Range, Lance L. <Lance.L.Range@Illinois.gov>; Karl, Joseph <Joseph.Karl@Illinois.gov>; Cooperider, Jacki <Jacki.Cooperider@Illinois.gov>; Morris, Greg <Greg.Morris@Illinois.gov>

Cc: Gabehart, Josh <Josh.Gabehart@foth.com>; Matthew Coulter <matthew.coulter@gflenv.com>; George Armstrong <george.armstrong@gflenv.com>

Subject: [External] Peoria City County LF - Black Jewel #2 Investigation

Good afternoon all.

It has been communicated that representatives from the IDNR have reached out to the IEPA to discuss the ongoing Black Jewel #2 mine investigation associated with the Peoria City County Landfill #3. Please ensure that my team and I are included in any and all correspondence, calls, meetings, etc. regarding the Black Jewel No. 2 mine, IDNR's investigation and findings regarding same, and anything having to do with the Peoria City County Landfill, Inc. permit for development and construction of Peoria City/County Landfill No. 3.

Thank you

Timothy Curry | Area Landfill Director

GFL Environmental

119 W. Gundlach St., Columbia, IL 62236

| C (618) 806-7392 | tim.curry@gflenv.com | www.gflenv.com

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ATTACHMENT 3

CEC PEER REVIEW REPORT

May 22, 2024

Mr. Timothy Curry
Peoria City/County Landfill, Inc.
119 West Gundlach Street
Columbia, Illinois 62236

**Subject: Peoria City/County Landfill No. 3
Peer Review of Potential Mine Works
CEC Project 341-979**

Dear Mr. Curry:

Civil & Environmental Consultants, Inc. (CEC) is pleased to present to Peoria City/County Landfill, Inc. (PCCL) this report summarizing the findings of our peer-review of reports and related information regarding potential mine works underneath the proposed waste boundary of the Peoria City/County Landfill No. 3 (Landfill No. 3) located at 11501 West Cottonwood Road, Brimfield, Peoria County (site).

The purpose of this review is to determine whether CEC can provide a report that includes a signed and professional engineer sealed statement with results and an absolute conclusion that there are not and has never been subsurface mining beneath Landfill No. 3. The following sections of this report present our understanding of the project background, findings, conclusions, and closing remarks.

1.0 BACKGROUND

We understand that PCCL was awarded the contract to site, permit, construct, and operate Landfill No. 3, which is co-owned by the City of Peoria and County of Peoria. Landfill No. 3 is an approximately 78-acre proposed municipal solid waste landfill located in an area of historic coal mining. Landfill No. 3 is located north of Peoria City/County Landfill No. 1 and east of Peoria City/County Landfill No. 2. Local siting approval was received for Landfill No. 3, and PCCL is in the process of re-authorizing the previously issued development permit for the site from the Illinois Environmental Protection Agency (IEPA). As part of the permitting process, no underground mines were identified to be present underneath Landfill No. 3.

In 2023, PCCL learned that an abandoned underground coal mine in the Springfield (No. 5) coal seam (Black Jewel Mine No. 2) may be present underneath the middle of Landfill No. 3. IEPA

was notified of the potential presence of the underground mine, resulting in the permit being paused by IEPA pending further investigation.

As discussed below, the mapped limits of the Black Jewel Mine No. 2 workings were approximately 1-acre (documented limits). Based on production records, the estimated mined area was approximately 5 acres (estimated mined area). Because the exact area of mining is not known, the general area of mining is shown as an approximately 28-acre area (general area of mining).

2.0 INFORMATION REVIEWED AND KEY FINDINGS

CEC reviewed various informational documents provided by PCCL and related publicly available information, such as original and revised mine maps, well and boring logs, and geological reports and circulars. The following is a list of the key information that was reviewed.

1. Site Investigation Report, Peoria City/County Landfill No. 3, prepared by Shaw Environmental, Inc., dated December 2012 (Shaw Investigation);
2. IDOT PTB 196-072 WO#17-Black Jewel Mine No. 2 Bedrock Investigation, by GSG Consultants, Inc., dated February 29, 2024 (GSG Investigation);
3. Black Jewel No. 2 Mine Investigation Report, prepared by Illinois Department of Natural Resources (IDNR) - Abandoned Mine Land Reclamation District Investigation (AMLRD), undated (IDNR-AMLRD Report);
4. Directory of Coal Mines in Illinois, 7.5-Minute Quadrangle Series, Hanna City Quadrangle, prepared by ISGS, dated 2012 (Directory of Coal Mines);
5. E.H. Stenstrom Coal Mine (Black Jewel No. 2) map, dated January 10, 1938 (Stenstrom Map);
6. Site Plan with Mine Activity, Peoria City/County Landfill No. 3, prepared by GFL Environmental, Inc., dated January 27, 2022;
7. Mine Index 7518 (Black Jewel Mine No. 2) for 1934–1943 published by Illinois State Geologic Survey;
8. Historical topographic maps from the USGS Historical Topographic Map Explorer. USGS Historical Topographic Map Explorer (arcgis.com);
9. Illinois Coal Data available on Illinois State Geologic Service (ISGS) online database (Coal Mine Viewer - <https://ilmineswiki.web.illinois.edu/wiki/ILMINES>); and
10. Historical aerial photographs, 1939.

3.0 SUMMARY OF KEY INFORMATION

3.1 Shaw Investigation

Shaw performed an extensive hydrogeologic investigation in approximately 2010 as part of the permitting for Landfill No. 3 and included an evaluation of the presence of mines underneath Landfill No. 3. Shaw's investigation report indicates the following.

- Shaw reviewed information including directories, maps, boring logs, and Illinois State Geological Survey (ISGS) field notes available at the time that the application was completed, and the most useful information were mine maps that were created by coal companies that operated area mines.
- Extensive surface mining occurred in the Herrin (No. 6) coal.
- There are multiple underground mines identified as being within the Springfield (No. 5) coal seam in the vicinity of Landfill No. 3.
- The major surface mine in the area is known as the Midland Coal Company Edwards Mine. This mine stripped the Herrin coal and left mine spoil which now exists across much of the Landfill No. 3 from the ground surface to the top of bedrock.
- From review of the available information, there is no evidence that mining of any other coal seams below Springfield (No. 5) was performed in the vicinity of Landfill No. 3.
- Shaw concluded that underground mines were not present underneath Landfill No. 3.

Black Jewel Mine No. 2 was not discussed in the report. As part of their site investigation for Landfill No. 3, Shaw performed test borings, surface seismic reflection surveys, and borehole sonar. A total of thirty-nine test borings were drilled as part of the investigation. Of these, three test borings (B-4-10, B-7-10, and C-9) were drilled within the estimated limits of the Black Jewel Mine No. 2 (general area of mining estimated by the ISGS from IDNR production records). Only one test boring (B-7-10) was drilled within the documented limits (1-acre area of documented mine works from Stenstrom Map) of the mine workings. The boring log for B-7-10 noted the Herrin coal seam at an approximate elevation of 592 feet above mean sea level (AMSL) and the Springfield coal seam at approximately 520 feet AMSL. The Herrin coal was present just underlying 60 feet of mine spoil. Several borings were installed to the east, in areas known to have underground mines in the Springfield coal seam. Of the eight borings installed in the area east of Landfill No. 3, three encountered voids at an approximate elevation of 520 feet AMSL, which correlates to the elevation of the Springfield coal seam in the area. No voids were noted in any of the borings correlating to the elevation of the Herrin coal seam, where encountered.

Only surface seismic reflection line SL-11A was located within the estimated Black Jewel Mine No. 2 limits. This line extended into the documented workings. The conclusion was that no voids

were detected in the Springfield coal seam. No borehole sonar was performed within the estimated limits of the mine.

Select drawings from the Shaw Investigation, including drawings showing the locations of boring B-7-10 and seismic line SL-11A are provided in Appendix A.

3.2 GSG Investigation

Due to questions regarding the potential presence of mine works below Landfill No. 3, GSG Consultants, Inc. (GSG) was contracted through an Illinois Department of Transportation Professional Transportation Bulletin purportedly to investigate the bedrock conditions and to determine the presence of bituminous coal layers in areas in order to design a proper grouting treatment. GSG drilled ten borings from November 2023 to February 2024 to depths of 125 feet to 140 feet below existing grade. The borings were drilled through the Springfield coal seam within the estimated general area of mining (approximately 28 acres total) of the Black Jewel Mine No. 2. Nine of the borings were blind-drilled to near the expected elevation of the Springfield coal seam and bedrock cores were collected; samples of the overburden materials were collected from only one location in addition to the bedrock samples.

Four of the test borings were drilled within the documented limits of the workings. None of the borings encountered voids. As indicated above, only one boring (CB-SV-05) was sampled continuously from the surface instead of being blind drilled through the overburden. This boring encountered “bituminous coal” at the elevation that the Herrin coal seam is known to be present. This indicates that at least some of the Herrin coal in the area of the Black Jewel Mine No. 2 was not strip mined and that underground coal workings could still potentially be present. The GSG Investigation is provided in Appendix B (see Attachment 2 to the IDNR-AMLRD Report).

3.3 IDNR-AMLRD Report

The IDNR-AMLRD report states that the Black Jewel Mine No. 2 operated from 1934 to 1943 as a modified room and pillar underground mine, which was assumed to be in the Springfield coal seam based on limited information previously available to the ISGS. Correspondence included as Attachment 3 to the IDNR-AMLRD report indicates that the ISGS stated that the mine was originally placed in the Springfield coal seam due to lack of information (regarding which seam the mine extracted) and to be conservative and prompt further investigation.

The IDNR-AMLRD report indicates that:

- The main objectives of the GSG Investigation were to determine the presence of coal, investigate whether it had been mined out, and document any underground voids present within the Springfield coal seam.
- The surface area of Landfill No. 3 was surface/strip mined by the Midland Coal Company from 1952 to 1975.
- Due to the surface mining, the Herrin coal seam was believed to not be present and was not intercepted by any of the soil borings except boring number CB-SV-05 (note: the remainder of the borings did not collect samples at the expected depth of the Herrin coal).
- All ten exploratory borings intercepted solid coal at the Springfield coal seam depth.

The IDNR-AMLRD report concluded that the Black Jewel Mine No. 2 operated in the Herrin coal seam based on the following:

- The above discussed results of the GSG Investigation.
- The Directory of Coal Mines (Ref. 4) statement that old workings (i.e., old underground mine workings) were encountered while excavating pits (i.e., strip pits that were excavated during surface mining the Herrin coal seam).
- Email correspondence with ISGS indicating that:
 - The Federal Land Bank Report for Peoria County (1934) contained a notation suggesting the mine was located at the Herrin Coal outcrop.
 - The E.H. Stenstrom Coal Mine map (Ref. 5) showing the workings appearing to enter from a surface mine highwall.
 - The updated Illinois Mine Index (Ref. 7) indicates that the Black Jewel Mine No. 2 was listed as a surface mine from 1934–1936, and then an underground mine.

3.4 Directory of Coal Mines

The Directory of Coal Mines indicates the following:

- Landfill No. 3 is located within an area of the Herrin coal seam that was previously surface mined by Midland Coal Co., Edwards Mine from 1952–1975, which is referenced as Mine Index 881. Figure 1 shows the documented surface mine locations and the approximate limits of the Landfill No. 3.
- The geology discussion for Mine Index 881 indicates that “Some old workings were encountered while excavating some of the pits.” No other details regarding the old workings were provided.

- The Springfield coal seam is about 70 feet below the Herrin coal in the area of the landfill expansion and varies from elevation 512 to 523 feet. The seam varies in thickness from 3.2 feet to 5.3 feet. The Springfield coal has been deep mined to the east, north, and west of the proposed landfill expansion. These mines operated during time periods ranging from 1932 to 1952. Figure 2 shows the documented subsurface mine locations and the approximate limits of the Landfill No. 3.
- Reportedly, 18,885 tons of coal were mined from the Black Jewel No. 2 Mine (previously known as the Stenstrom Mine) between 1934 and 1943. Based on the amount of coal extracted, the IDNR estimated that 5 acres were mined. The IDNR-defined general area of mining shown on Attachment 1 of this report totals approximately 28 acres, apparently due to uncertainty in the direction of mining after 1938 (the date of the Stenstrom Map). Figures 3 and 4 show the estimated Black Jewel Mine No. 2 limits (both the estimated '5-acre' limits and the documented 1-acre limit) with respect to Landfill No. 3.
- A "General Area of Mining" (Mine Index No. 7535) is shown immediately north of the Black Jewel No. 2 Mine on the map of Springfield Coal mines – see attached Figure 2. Mine Index No. 7535 is also listed in the section "Other Mines Shown on Hanna City Quadrangle", with its location identified as "NE NW SW 23-T9N-R6E". The mine sources (Atlas Map of Peoria County (1873) and Federal Land Bank Report (4-1934)) are identified as "Secondary Sources". No name is assigned to this mine.

Relevant excerpts of the Directory of Coal Mines and Illinois Mine Index is provided as Appendix C.

3.5 Stenstrom Map

The Stenstrom Map was provided to CEC and was reviewed (see Appendix D). The Stenstrom Map appears to be a certified survey, which shows the location and dimensions of a mine (i.e., the Black Jewel Mine No. 2). The Stenstrom Map has a scale and a reference to the center of Section 23. The township is also noted on the Stenstrom Map.

CEC independently scaled the location of the mine and confirmed that the location matches the locations shown on the IDNR-AMLRD Report. The area of the mine shown on the Stenstrom Map is approximately one acre. The Stenstrom Map and location of the mine is also provided on Figure 5. It is noted that the Directory of Coal Mines indicates that approximately 6,000 tons of production occurred prior to or during 1938, approximately 13,000 tons of production occurred from 1938 to 1943, and the total mined areas was approximately five acres based on the production amounts.

The Stenstrom Map (Figure 5) appears to show that the entrances of Black Jewel Mine No. 2 were constructed in a high wall and does not show long entrance slopes similar to the other subsurface mines in the area. The shorter entrance for Black Jewel Mine No. 2 suggests that the mine did not advance to deeper depths, and was mining the Herrin coal seam and not the Springfield coal seam.

3.6 Historical Aerial Photographs

Historic aerial photographs were provided including a 1939 aerial. Based on the dates of mining discussed above, mining activity would have been occurring prior to the 1939 aerial photograph. The 1939 aerial photograph is provided in Figure 6. Analysis of the historical aerial photographs of the area was inconclusive as there were no obvious signs of mining in the suspected area. The clarity of the photographs and vegetative cover seem to preclude any definite conclusions regarding the presence or absence of mining activity in the area.

3.7 Coal Mine Entry Information

Numerous borings were installed during the Shaw Investigation for Landfill No. 3 in 2012. Most of these borings penetrated both the Herrin and Springfield coal seams where present; the Herrin coal seam was noted in only a few of the borings as it had mostly been stripped but did identify that portions of the Herrin coal seam remained intact. Where the Herrin coal seam was encountered, it was present at elevations from 590 feet to 600 feet AMSL.

The Shaw Investigation also contained maps of known mines in the area; four distinct maps are illustrated on Figure 3 (Hoffman, Black Jewel No. 1, Banner Block, and Pete Hoffman). All four of these known mines (the Black Jewel No. 1 and Pete Hoffman mines were actually encountered while drilling) have entrances and air shafts constructed in the sides of the bluffs. Based on the figures provided in the Shaw Investigation, all of the mapped entrances are at an approximate elevation of 540 feet to 550 feet AMSL, which would correlate to these mines extracting the Springfield coal seam (520 feet AMSL) as shown on Figure 3. The two mapped entrances to the Black Jewel Mine No. 2 would be at an approximate elevation of 630 feet to 640 feet AMSL based on analysis of current and historical topographic maps (Ref. 8).

3.8 ISGS Online Database

The ISGS online database (Ref. 9) contains various mine information. The information for the Black Jewel Mine No. 2 [<https://ilmineswiki.web.illinois.edu/wiki/7518>] is provided in Appendix E. The information indicates that the Black Jewel Mine No. 2 (Mine Index 7518) was a “surface, underground” mine located in the Herrin coal seam, and provides additional information (e.g., estimated production, image of Stenstrom Map) consistent with the sources

discussed above. The information also indicates that the online information was updated on February 28, 2024, presumably based on the findings of the IDNR-AMLRD report.

The information from the ArcGIS viewer for the online database for the location of the Black Jewel Mine No. 2 is provided in Figure 7. Consistent with the above information, the ArcGIS viewer depicts the area of the Black Jewel Mine No. 2 as a Herrin coal mine.

Figure 7 also shows the footprint of Landfill No. 3 and additional information from the website. An Indefinite Underground Mine Boundary (Mine Index 7535) is shown in the far northern portion of the footprint, which is associated with an unknown mine. The information for the unknown mine from the online database [<https://ilmineswiki.web.illinois.edu/wiki/7535>] is provided in Appendix F. The information is limited, indicating that the mine was located in the Springfield coal seam, and is based on the 1873 Atlas Map of Peoria County and a 1934 Federal Land Bank Report. The GSG Investigation did not perform any borings in this area. The Shaw Investigation appears to have performed borings only on the periphery of this area. One surface seismic reflection line (SL-6) crossed the northern portion of the subject area.

4.0 CONCLUSIONS

It is CEC's opinion that the Black Jewel Mine No. 2 was located in the Herrin coal seam and not located in the Springfield coal seam based on the following.

- Five test borings were drilled to the Springfield coal seam within the potentially 1-acre mined area and ten within the 5-acre area and no voids were encountered in the Springfield coal seam. Voids would likely have been encountered in the Springfield coal seam in at least one of the borings if mining had occurred in the Springfield coal seam in this area.
- The updated Mine Index 7518 production records for the Black Jewel Mine No. 2 indicate it first operated as a surface mine and then an underground mine; the original Mine Index listing from the Directory of Coal Mines in Illinois indicated that mining was only underground. The depth of the Springfield coal seam is approximately 110 feet in depth, which made surface mining of the Springfield coal seam impractical.
- The Stenstrom Map suggests entries extend from a highwall. The elevation of the Black Jewel Mine No. 2 entry is 90 feet higher than mines operating in the Springfield coal seam so a highwall into the Springfield coal seam would have been impractically deep.
- The Stenstrom Map is to scale and indicates that the entry lengths are less than 30 feet. Based on the location of the Black Jewel No. 2 Mine, it would not be possible to have entries to the Springfield coal seam that are only 30 feet long due to the depth of the Springfield coal seam.

- The 1939 aerial is inconclusive regarding the type and/or location of mining occurring at that time. The 1939 aerial does not appear show strip mining or any deep mine support facilities, structures, or spoil piles.

It is CEC's opinion that mining did not occur in the Springfield coal seam underneath Landfill No. 3 except for potentially the far northern portion based on the following.

- The above conclusion that the Black Jewel Mine No. 2 was not located in the Springfield coal seam.
- The borings from the Shaw Investigation did not show any voids in the Springfield coal seam in the boring locations within the boundary of Landfill No. 3 (and which were outside of the estimated 5-acre boundary of the Black Jewel Mine No. 2).
- The available information suggests the other underground mines in the area in the Springfield coal seam are located outside of the boundary of Landfill No. 3 with the exception of the Mine Index 7535 in the far northern portion of Landfill No. 3.
- GSG installed ten borings within the 5-acre boundary of the Black Jewel Mine No. 2; all ten borings encountered intact coal at the expected elevation of the Springfield coal seam.

It is CEC's opinion that additional investigation is required in the far northern portion of Landfill No. 3 to determine whether mining of the Springfield coal occurred in this area based on the following.

- The Directory of Coal Mines and ISGS online database indicates that underground mining in the Springfield coal seam may have occurred in the far northern portion of Landfill No. 3.
- Mine Index 7535 was not addressed in the IDNR-AMLRD investigation and no borings have been drilled within the general area of mining that is shown in the Directory of Coal Mines.

It is CEC's opinion that subsurface mining may have occurred in the Herrin coal seam, and there is not enough data to conclude that voids are not present from previous mining within the Herrin coal seam underneath Landfill No. 3 based on the following.

- Although subsequent surface mining of the Herrin coal seam occurred and Midland Coal Co. records indicate that underground mine workings were encountered during this mining, the results of borings conducted within the 5-acre area indicate that the Herrin coal seam is still present in at least a portion of this area.

- The GSG Investigation included only one boring which sampled elevations consistent with the Herrin coal seam, which is not considered sufficient for an evaluation of potential voids in the Herrin coal seam.
- Based on the geological information presented in the Shaw Investigation (Appendix A), the planned base grade elevations of Landfill No. 3 are approximately 5 feet to 15 feet below the elevation of the Herrin coal seam in the vicinity of the expansion. The planned excavation to develop Landfill No. 3 would remove any mine workings or voids that may be present in the Herrin coal seam above the base of the landfill. However, the IDNR's estimated limits of the Black Jewel Mine No. 2 extend beyond the proposed landfill floor and, because areas underneath the side-slopes of Landfill No. 3 will not be excavated below the depth of the Herrin coal seam, the Black Jewel Mine No. 2 potentially extends beyond (and hence beneath) the Landfill No. 3 side-slopes.

5.0 CLOSING

CEC appreciates the opportunity to be of service to GFL on this project. CEC's conclusions are based on the available information and CEC's experience. Our conclusions may change if additional or differing information becomes available. Please let us know of any questions.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.



Steven E. Kroll, P.G.
Project Manager



John E. Hock, P.E.
Vice President

cc: Mr. Matt Coulter, GFL Environmental Inc. (*electronic delivery*)
Mr. George Armstrong, GFL Environmental Inc. (*electronic delivery*)
Mr. Tony Pelletier, GFL Environmental Inc. (*electronic delivery*)

Attachments: Figure 1 - Expansion Boundary in Relation to Previous Surface Mining
Figure 2 - Expansion Boundary in Relation to Previous Subsurface Mining
Figure 3 - Compiled Boring Locations
Figure 4 - Compiled Boring Locations Landfill No. 3
Figure 5 - E.H. Stenstrom Map
Figure 6 - 1939 Aerial with Landfill No. 3 Waste Boundary
Figure 7 - Landfill No. 3 Proximity to Surface and Underground Mines

Appendix A - Select Geological Drawings from IEPA Permit Application
(by Shaw)

Appendix B - IDNR-AMLRD Investigation Report

Appendix C - Directory of Coal Mine and Illinois Mine Index Excerpts

Appendix D - Stenstrom Map

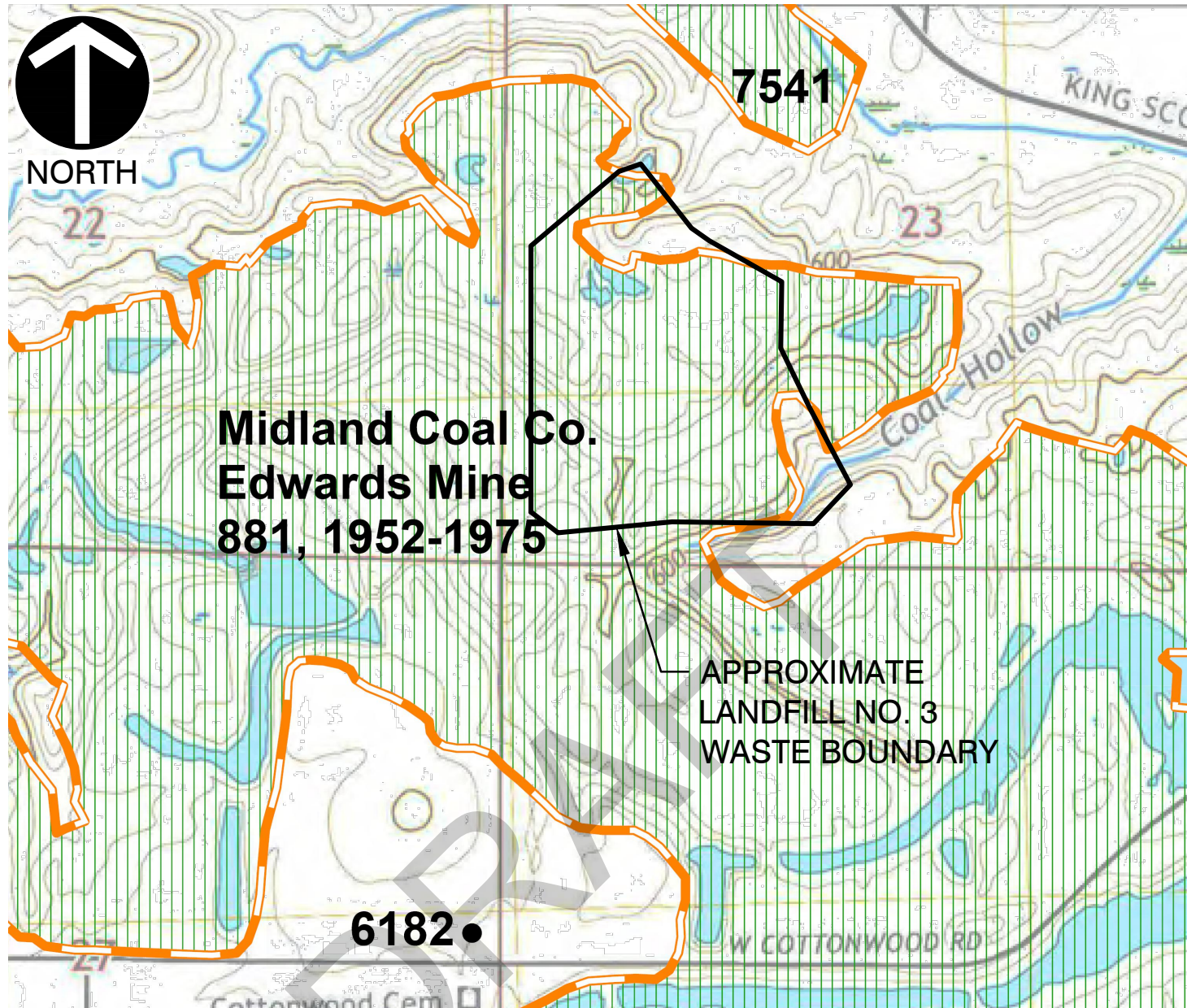
Appendix E - Black Jewel Mine No. 2 ILMINES Information

Appendix F - Mine Index 7535 ILMINES Information

DRAFT

FIGURES

P:\340-000\341-979\CADD\DWG\SW01-Mining and Landfill Operations\341979-SW01-S101-Expansion Boundary Surface Mining.dwg[FIG 1] LS:(5/9/2024 - mkarpt) - LP: 5/22/2024 1:13 PM



Mining Method



Strip Mine

Source of Mine Outline



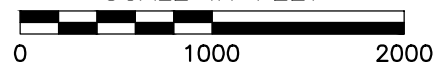
Secondary Source Map

REFERENCE

1. MINING IMAGE PROVIDED BY PRAIRIE RESEARCH INSTITUTE ILLINOIS STATE GEOLOGIC SURVEY, DATED OCTOBER 29, 2012.

*HAND SIGNATURE ON FILE

SCALE IN FEET



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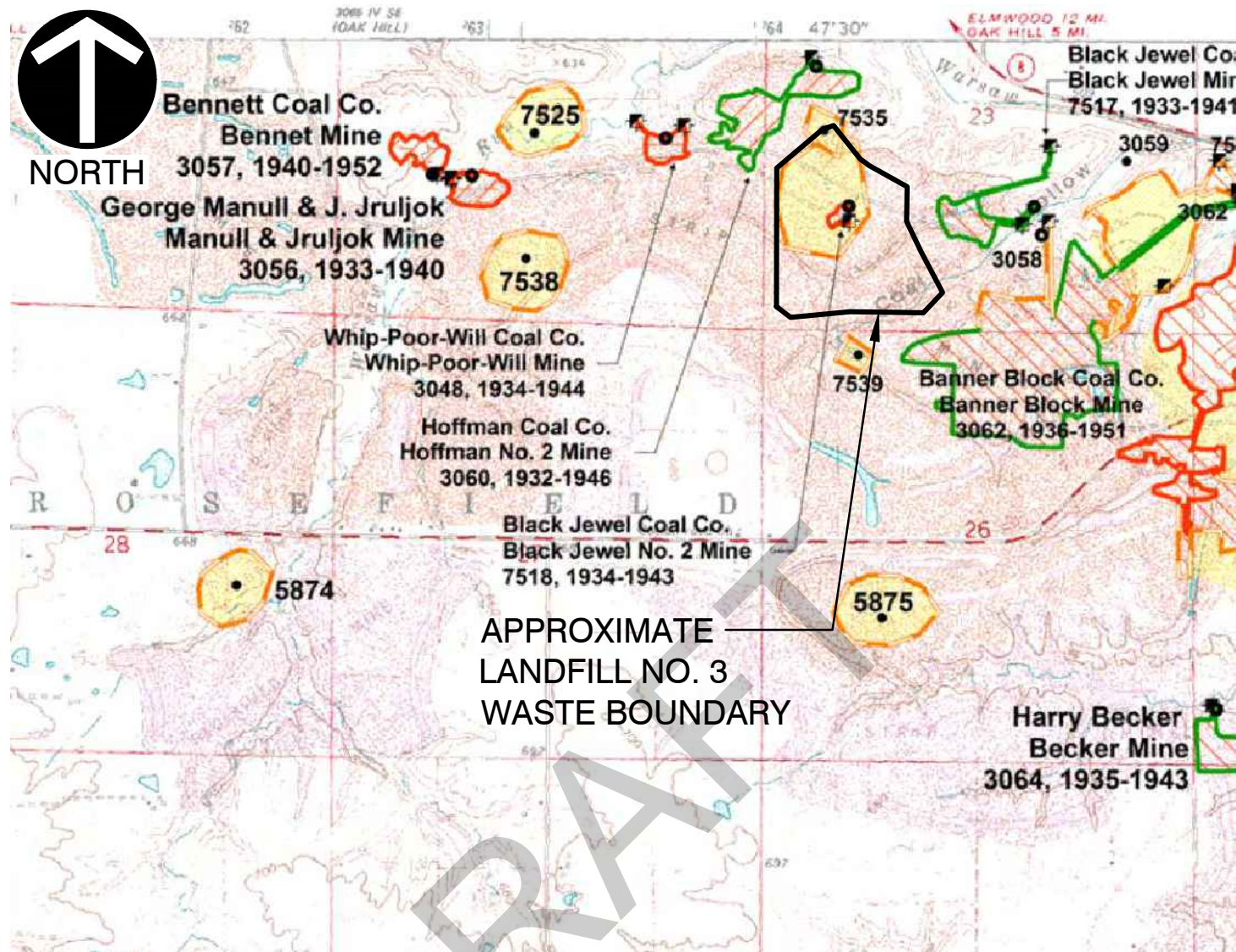
LANDFILL NO. 3 WASTE BOUNDARY IN
RELATION TO PREVIOUS SURFACE MINING

DRAWN BY:	MSK	CHECKED BY:	SEK	APPROVED BY:	JEH*	FIGURE NO.:
DATE:	05/22/2024	DWG SCALE:	1"=1000'	PROJECT NO:	341-979.0001	1

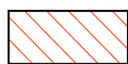
P:\340-000\341-979\CADD\DWG\SW01-Mining and Landfill Operations\341979-SW01-S102-Expansion Boundary Sub-Surface Mining.dwg[FIG 2] LS:(5/9/2024 - mkarpf) - LP: 5/22/2024 1:12 PM



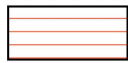
NORTH



Mining Method



Modified Room & Pillar (MRP)



Underground, Method Unknown



General Area of Mining

Source of Mine Outline



Final Mine Map



Not Final Mine Map



Undated Mine Map



Incomplete Mine Map



Secondary Source Map

REFERENCE

1. MINING IMAGE PROVIDED BY PRAIRIE RESEARCH INSTITUTE ILLINOIS STATE GEOLOGIC SURVEY, DATED OCTOBER 29, 2012.

*HAND SIGNATURE ON FILE

SCALE IN FEET



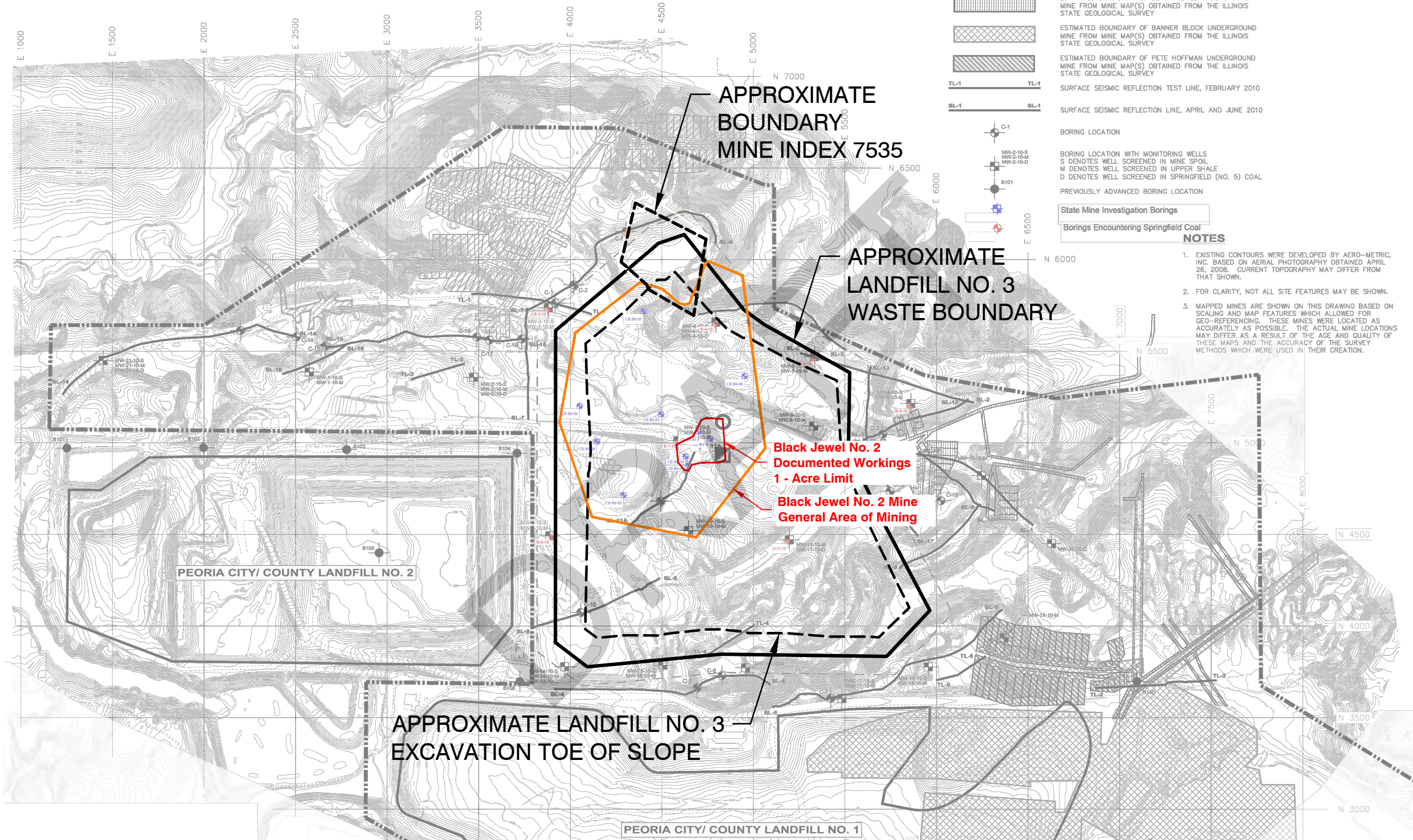
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PEORIA CITY/COUNTY LANDFILL, INC.
11501 W. COTTONWOOD ROAD
BRIMFIELD, ILLINOIS

LANDFILL NO. 3 WASTE BOUNDARY IN
RELATION TO PREVIOUS SUBSURFACE MINING

DRAWN BY:	MSK	CHECKED BY:	SEK	APPROVED BY:	JEH*	FIGURE NO.:
DATE:	05/22/2024	DWG SCALE:	1"=2000'	PROJECT NO:	341-979.0001	2



LEGEND

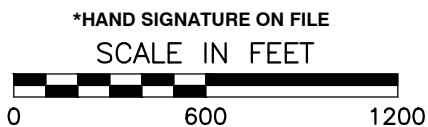
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- PROPOSED LANDFILL NO. 3 WASTE BOUNDARY
- EXISTING PERMITTED WASTE BOUNDARIES
- ZONE OF ATTENUATION
- ESTIMATED BOUNDARY OF HOFFMAN UNDERGROUND MINE FROM MINE MAP OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- ESTIMATED BOUNDARY OF BLACK JEWEL UNDERGROUND MINE FROM MINE MAP(S) OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- ESTIMATED BOUNDARY OF BANNER BLOCK UNDERGROUND MINE FROM MINE MAP(S) OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- ESTIMATED BOUNDARY OF PETE HOFFMAN UNDERGROUND MINE FROM MINE MAP(S) OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- SURFACE SEISMIC REFLECTION TEST LINE, FEBRUARY 2010
- SURFACE SEISMIC REFLECTION LINE, APRIL AND JUNE 2010
- BORING LOCATION
- BORING LOCATION WITH MONITORING WELLS
S DENOTES WELL SCREENED IN MINE SPOIL
M DENOTES WELL SCREENED IN UPPER SHALE
D DENOTES WELL SCREENED IN SPRINGFIELD (NO. 5) COAL
- PREVIOUSLY ADVANCED BORING LOCATION
- State Mine Investigation Borings
- Borings Encountering Springfield Coal

NOTES

- EXISTING CONTOURS WERE DEVELOPED BY AERO-METRIC, INC. BASED ON AERIAL PHOTOGRAPHY OBTAINED APRIL 26, 2008. CURRENT TOPOGRAPHY MAY DIFFER FROM THAT SHOWN.
- FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
- MAPPED MINES ARE SHOWN ON THIS DRAWING BASED ON SCALING AND MAP FEATURES WHICH ALLOWED FOR GEO-REFERENCING. THESE MINES WERE LOCATED AS ACCURATELY AS POSSIBLE. THE ACTUAL MINE LOCATIONS MAY DIFFER AS A RESULT OF THE AGE AND QUALITY OF THESE MAPS AND THE ACCURACY OF THE SURVEY METHODS WHICH WERE USED IN THEIR CREATION.

REFERENCE

- BASE MAP PROVIDED BY SHAW ENVIRONMENTAL, INC. PROJECT NUMBER 137618, DRAWING G5, DATED DECEMBER 2012.
- BORING LOCATIONS PROVIDED BY SHAW ENVIRONMENTAL, INC. AND IDNR-AMLRD REPORT.
- BLACK JEWEL NO. 2 MINE LIMITS PROVIDED BY PRAIRIE RESEARCH INSTITUTE ILLINOIS STATE GEOLOGIC SURVEY, DATED OCTOBER 29, 2012.



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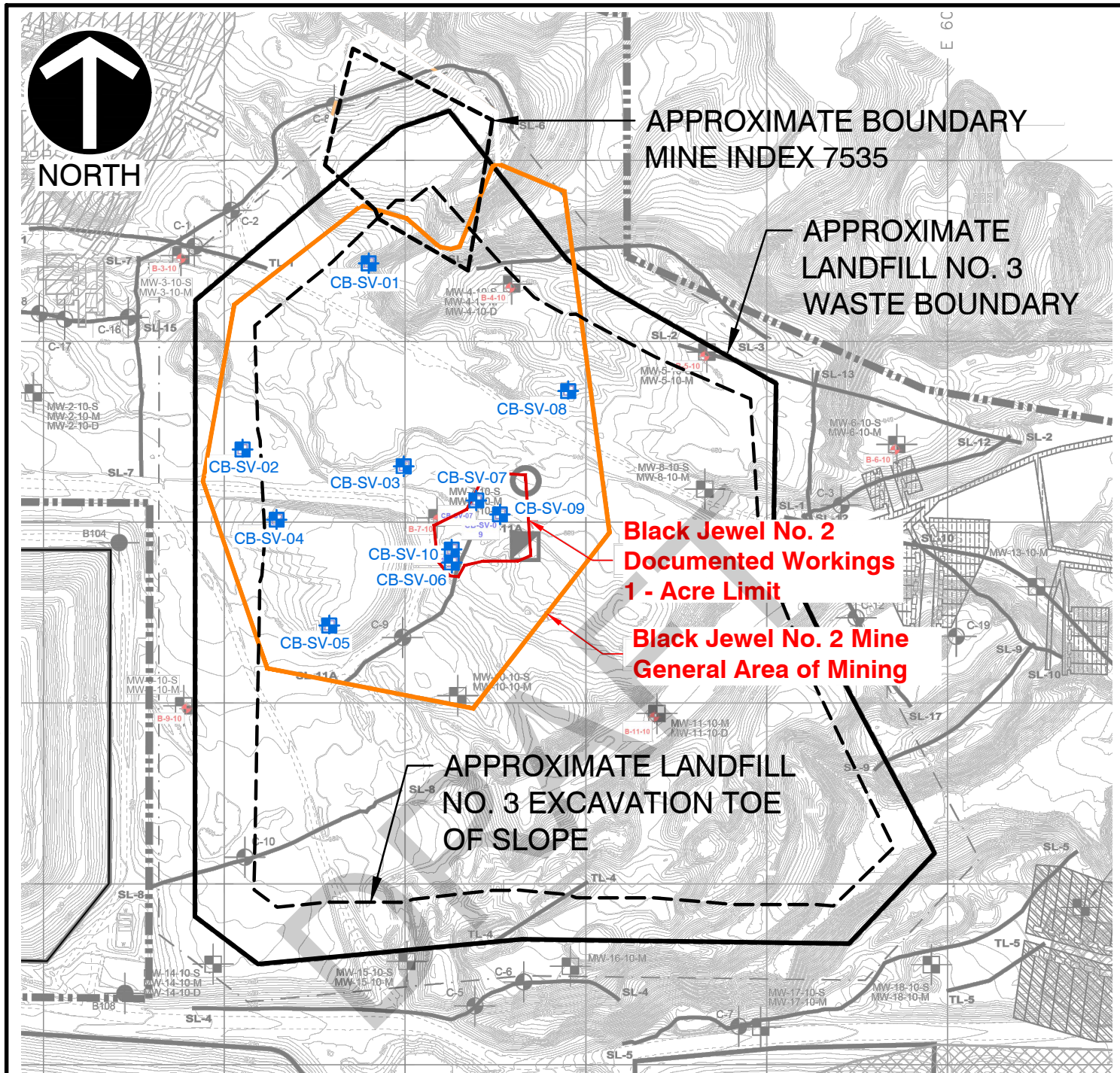
1230 East Diehl Road
Suite 200
Naperville, IL 60563
Ph: 630.963.6026
www.cecinc.com

PEORIA CITY/COUNTY LANDFILL, INC.
11501 W. COTTONWOOD ROAD
BRIMFIELD, ILLINOIS

COMPILED BORING LOCATION MAP

DRAWN BY:	MSK	CHECKED BY:	SEK	APPROVED BY:	JEH*	FIGURE NO.:
DATE:	05/22/2024	DWG SCALE:	1"=600'	PROJECT NO:	341-979.0001	

P:\340-000\341-979\CADD\DWG\SW01-Mining and Landfill Operations\341979-SW01-S104-Landfill No 3 Borings.dwg{FIG 4} LS:(5/22/2024 - mkarpf) - LP: 5/22/2024 1:57 PM



REFERENCE

1. BASE MAP PROVIDED BY SHAW ENVIRONMENTAL, INC. PROJECT NUMBER 137618, DRAWING G5, DATED DECEMBER 2012.
2. BORING LOCATIONS PROVIDED BY SHAW ENVIRONMENTAL, INC. AND IDNR-AMLRD REPORT.
3. BLACK JEWEL NO. 2 MINE LIMITS PROVIDED BY PRAIRIE RESEARCH INSTITUTE ILLINOIS STATE GEOLOGIC SURVEY, DATED OCTOBER 29, 2012.

*HAND SIGNATURE ON FILE

SCALE IN FEET



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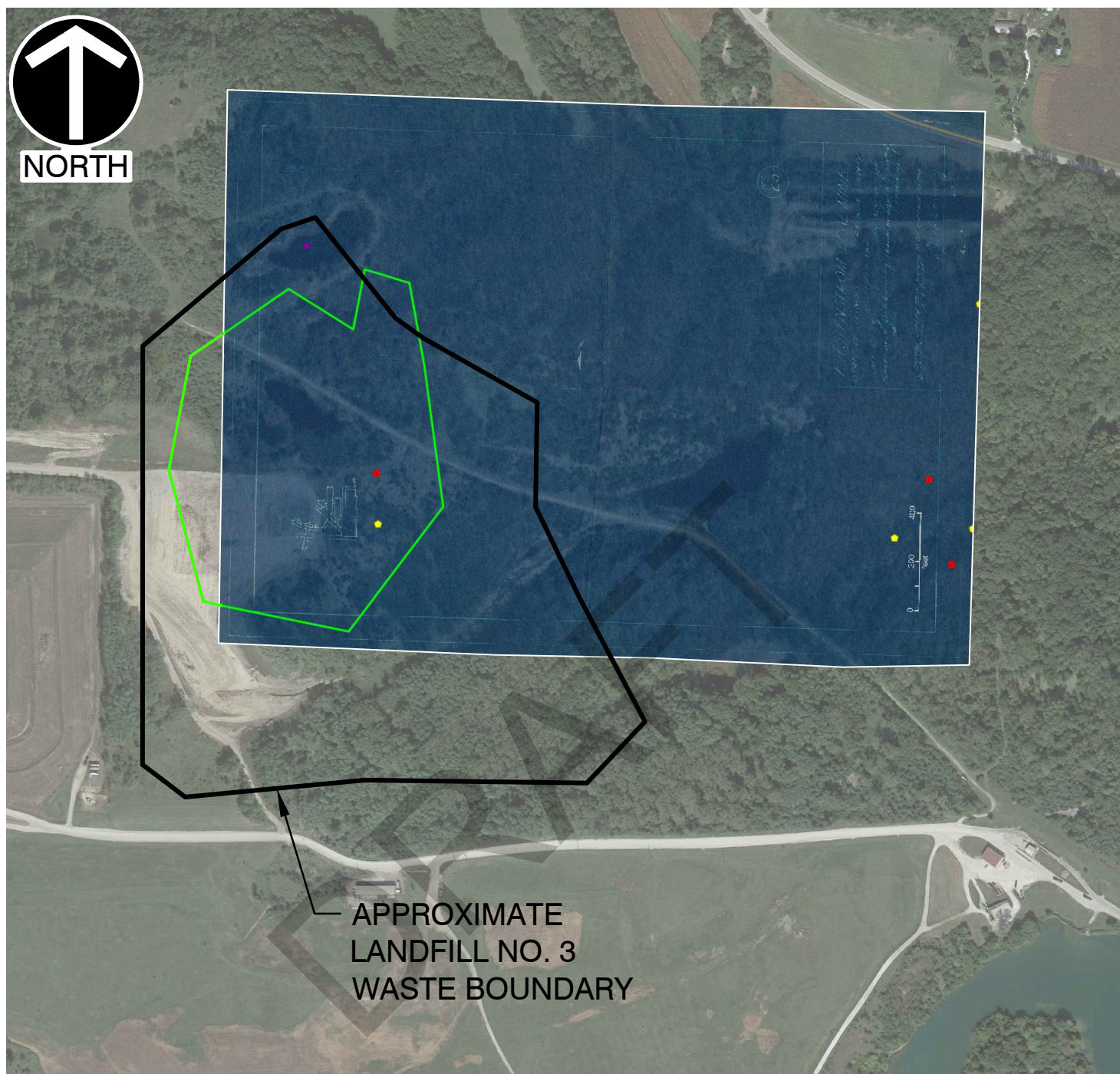
1230 East Diehl Road
Suite 200
Naperville, IL 60563
Ph: 630.963.6026
www.cecinc.com

PEORIA CITY/COUNTY LANDFILL, INC.
11501 W. COTTONWOOD ROAD
BRIMFIELD, ILLINOIS

LANDFILL NO. 3 WASTE BOUNDARY
BORING LOCATION MAP

DRAWN BY:	MSK	CHECKED BY:	SEK	APPROVED BY:	JEH*	FIGURE NO.:
DATE:	05/22/2024	DWG SCALE:	1"=400'	PROJECT NO:	341-979.0001	4

P:\340-000\341-979-CADD\DWG\SW01-Mining and Landfill Operations\341979-SW01-S105-Stenstrom Map.dwg{FIG 5} LS:5/9/2024 - mkarpf) - LP: 5/22/2024 1:11 PM



APPROXIMATE
LANDFILL NO. 3
WASTE BOUNDARY

REFERENCE

1. E.H. STENSTROM COAL MINE IMAGE DATED JANUARY 10, 1938.
2. BACKGROUND IMAGE PROVIDED BY GOOGLE EARTH. DATE OF IMAGE: SEPTEMBER 30, 2022.
3. LOCATION OF STENSTROM COAL MINE AND ESTIMATED GENERAL AREA OF MINING PROVIDED BY IDNR-AMLRD, 2023.

*HAND SIGNATURE ON FILE
SCALE IN FEET



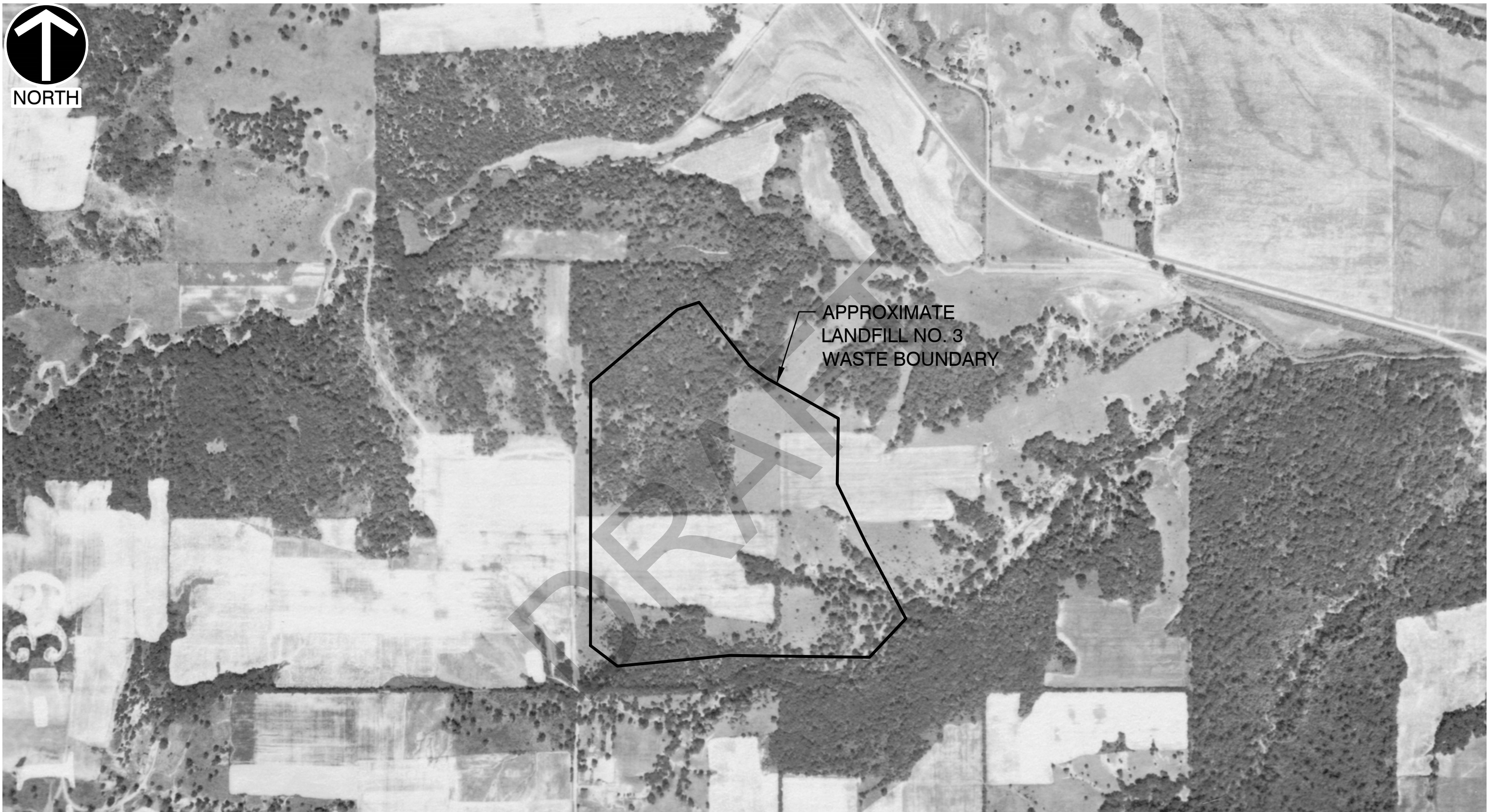
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11501 W. COTTONWOOD ROAD
BRIMFIELD, ILLINOIS

E. H. STENSTROM MAP

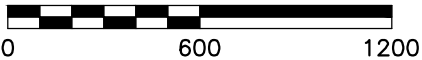
DRAWN BY:	MSK	CHECKED BY:	SEK	APPROVED BY:	JEH*	FIGURE NO.:
DATE:	05/22/2024	DWG SCALE:	1"=600'	PROJECT NO:	341-979.0001	5



REFERENCE

1. IMAGE PROVIDED BY ILLINOIS GEOSPATIAL DATA CLEARINGHOUSE. PANEL 14 DATED JULY 11, 1939.

*HAND SIGNATURE ON FILE
SCALE IN FEET



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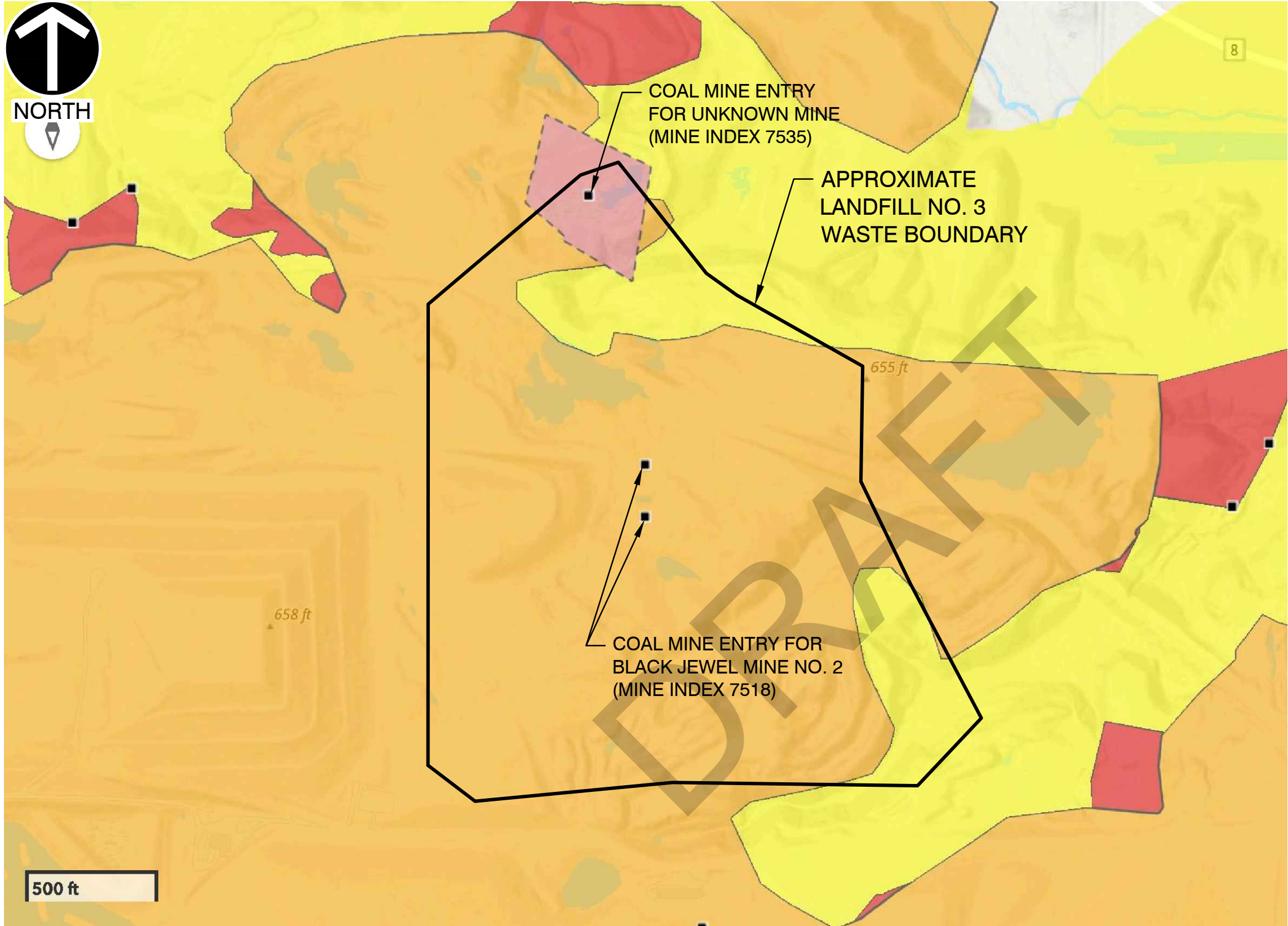
1230 East Diehl Road
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Naperville, IL 60563
Ph: 630.963.6026
www.cecinc.com

PEORIA CITY/COUNTY LANDFILL, INC.
11501 W. COTTONWOOD ROAD
BRIMFIELD, ILLINOIS

LANDFILL NO. 3 WASTE BOUNDARY WITH
1939 HISTORIC AERIAL PHOTO

DRAWN BY:	MSK	CHECKED BY:	SEK	APPROVED BY:	JEH*	FIGURE NO.:
DATE:	05/22/2024	DWG SCALE:	1"=600'	PROJECT NO:	341-979.0001	6

P:\340-000\341-979\--CADD\DWG\SW01-Mining and Landfill Operations\341979-SW01-S107-Surface and Underground Mines.dwg[FIG 7] LS:(5/9/2024 - mkarp) - LP: 5/22/2024 1:10 PM



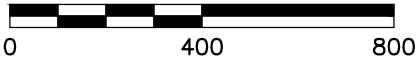
LEGEND

- COAL MINE ENTRIES
- SURFACE
- UNDERGROUND
- INDEFINITE UNDERGROUND MINE BOUNDARY
- UNDERGROUND MINE BUFFER REGION

REFERENCE

- BACKGROUND MINING IMAGE PROVIDED BY ISGS ILMINES, LAST UPDATED 03/07/2024.

*HAND SIGNATURE ON FILE
SCALE IN FEET



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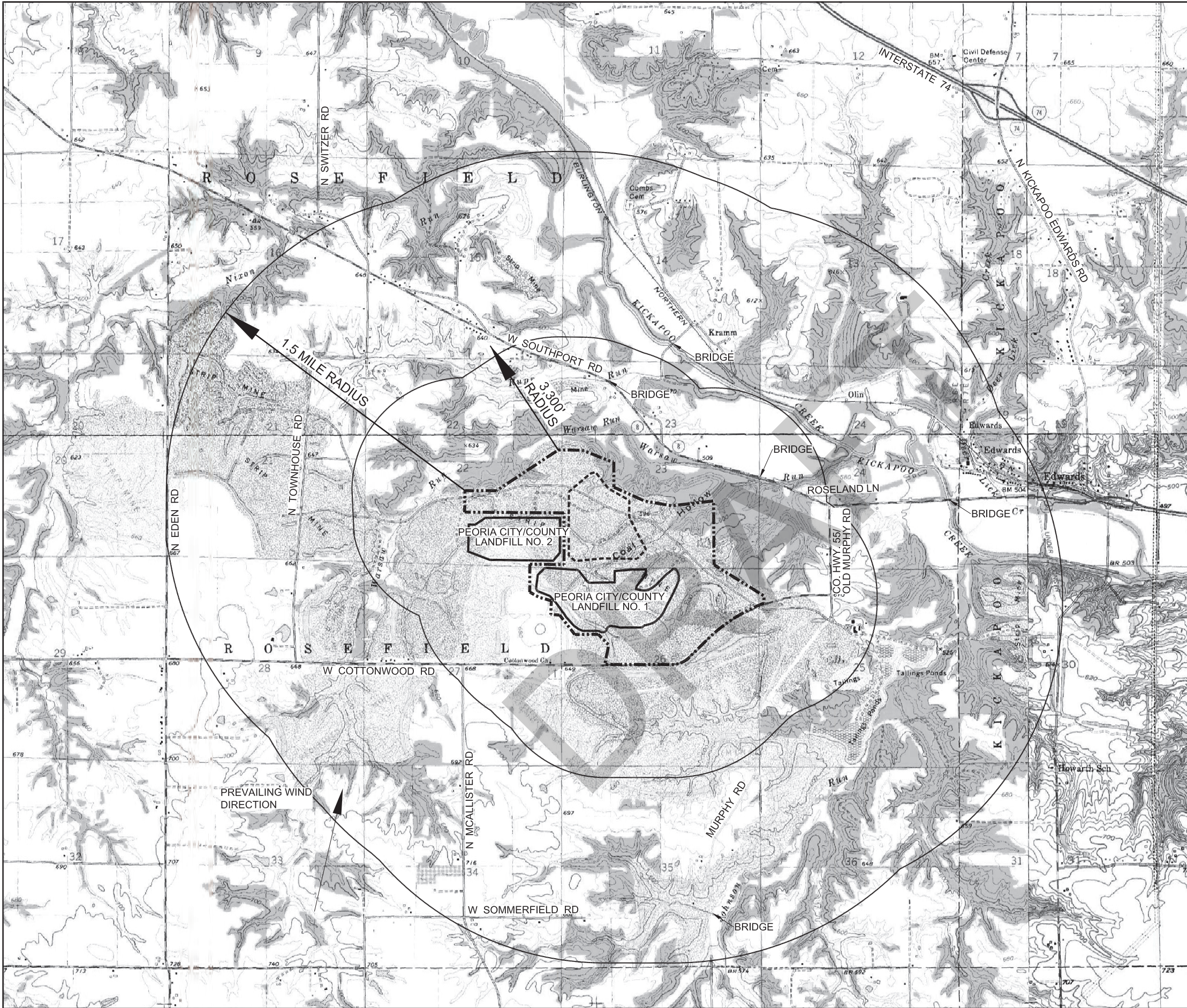
PEORIA CITY/COUNTY LANDFILL, INC.
11501 W. COTTONWOOD ROAD
BRIMFIELD, ILLINOIS

LANDFILL NO. 3 PROXIMITY TO
SURFACE AND UNDERGROUND MINES

DRAWN BY:	MSK	CHECKED BY:	SEK	APPROVED BY:	JEH*	FIGURE NO.:
DATE:	05/22/2024	DWG SCALE:	1"=400'	PROJECT NO:	341-979.0001	

APPENDIX A

**SELECT GEOLOGICAL DRAWINGS FROM
IEPA PERMIT APPLICATION
(BY SHAW ENVIRONMENTAL, INC.)**



- LEGEND**
- PROPOSED FACILITY BOUNDARY
 - PROPOSED LANDFILL NO. 3 WASTE BOUNDARY
 - EXISTING PERMITTED WASTE BOUNDARIES

- NOTES**
- THERE ARE NO PUBLIC OR PRIVATE USE AIR OPERATIONS AREAS WITHIN 10,000 FEET OF THE PROPOSED FACILITY. THE NEAREST AIRPORT, GENERAL WAYNE A. DOWNING INTERNATIONAL AIRPORT, IS LOCATED APPROXIMATELY 5.0 MILES SOUTHEAST OF THE PROPOSED FACILITY BOUNDARY.
 - THERE ARE NO REGULATORY 100-YEAR FLOODPLAINS, AS DEFINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA), PRESENT WITHIN THE FACILITY BOUNDARY. PLEASE REFER TO APPENDIX F.2 FOR AN EXHIBIT OF THE WASTE BOUNDARY OVERLAIN ON APPLICABLE FLOOD INSURANCE RATE MAPS. LANDFILL NO. 3 WILL NOT RESTRICT THE FLOW OF THE FEMA 100-YEAR FLOOD FROM OFF-SITE AREAS, REDUCE THE TEMPORARY WATER STORAGE CAPACITY, OR RESULT IN WASHOUT OF SOLID WASTE. THE STORMWATER MANAGEMENT PLAN FOR THE FACILITY HAS BEEN DESIGNED TO CONTROL SURFACE WATER FLOW ON AND AROUND THE FACILITY TO MINIMIZE FLOODING.
 - IN ACCORDANCE WITH SECTION 404 OF THE CLEAN WATER ACT, A WETLAND DETERMINATION AND DELINEATION WAS CONDUCTED BY SHAW ENVIRONMENTAL, INC. FOR THE FACILITY. A 4.2 ACRE WETLAND WAS IDENTIFIED WITHIN COAL HOLLOW RUN, OF WHICH APPROXIMATELY 1.6 ACRES WILL BE DISTURBED AS PART OF THE LANDFILL NO. 3 DEVELOPMENT. PEORIA CITY/COUNTY LANDFILL, INC. WILL ACQUIRE AN INDIVIDUAL PERMIT FROM THE UNITED STATES ARMY CORPS OF ENGINEERS FOR DEVELOPMENT OF THE PEORIA CITY/COUNTY LANDFILL NO. 3. THE PERMIT WILL INCLUDE MITIGATING LOSS OF WATERS OF THE US OR WETLANDS AT A MINIMUM 2:1 REPLACEMENT RATIO.
 - THERE ARE NO FAULTS THAT HAVE DISPLACEMENT DURING THE HOLOCENE EPOCH WITHIN 200 FEET OF THE FACILITY, INCLUDING THE PROPOSED LANDFILL EXPANSION AREA.
 - THE PROPOSED FACILITY IS NOT LOCATED WITHIN A SEISMIC IMPACT ZONE THAT HAS A 10% CHANCE OF EXCEEDING 0.10 G IN 250 YEARS. THE EXPANSION HAS BEEN DESIGNED TO ACHIEVE A SAFETY FACTOR GREATER THAN 1.3 AGAINST SLOPE FAILURE UNDER SEISMIC CONDITIONS.
 - THE FACILITY IS NOT LOCATED IN AN UNSTABLE AREA BASED ON REGIONAL AND SITE SPECIFIC HYDROGEOLOGICAL AND GEOTECHNICAL INVESTIGATIONS. THE RESULTS OF THE INVESTIGATIONS INDICATE THAT THERE ARE NO COAL MINES LOCATED UNDER THE PROPOSED LANDFILL NO. 3 FOOTPRINT OR WITHIN THE ANGLE-OF-DRAW PROXIMITY. PLEASE REFER TO SECTION 2.2.
 - THERE ARE NO RIVERS DESIGNATED FOR PROTECTION UNDER THE WILD AND SCENIC RIVERS ACT WITHIN THE PROPOSED FACILITY WATERSHED.
 - A PHASE I ARCHAEOLOGICAL SURVEY HAS BEEN PERFORMED THROUGHOUT THE ENTIRE FACILITY, INCLUDING THE PROPOSED EXPANSION AREA. THE SURVEY REPORTS INDICATE THAT NO SIGNIFICANT HISTORIC, ARCHITECTURAL, OR ARCHAEOLOGICAL RESOURCES ARE LOCATED WITHIN THE PROPOSED FACILITY. THERE ARE NO HISTORIC OR ARCHAEOLOGICAL SITES DESIGNATED BY THE NATIONAL HISTORIC PRESERVATION ACT OR THE ILLINOIS HISTORIC PRESERVATION ACT WITHIN 3,300 FEET OF THE PROPOSED FACILITY.
 - THE DEVELOPMENT AND OPERATIONS OF THE PROPOSED FACILITY WILL NOT IMPACT ANY POTENTIALLY ENDANGERED OR THREATENED SPECIES.
 - THE DEVELOPMENT AND OPERATIONS OF THE FACILITY WILL NOT VIOLATE AN AREA-WIDE OR STATE-WIDE WATER QUALITY MANAGEMENT (WQM) PLAN.
 - NO KNOWN OFF-SITE WATER SUPPLY WELLS ARE LOCATED WITHIN 200 FEET OF THE LANDFILL NO. 3 WASTE BOUNDARY, NOR ARE THERE ANY COMMUNITY WATER SUPPLY WELLS WITHIN 2,500 FEET OF THE WASTE BOUNDARY, PER THE SETBACK ZONES DEFINED IN SECTION 14.2 AND 14.3 OF THE ILLINOIS ENVIRONMENTAL PROTECTION ACT. RECORDED WATER SUPPLY WELLS IN THE SURROUNDING AREA OF THE SITE ARE SHOWN ON DRAWING NO. G2 AND DISCUSSED WITHIN THE HYDROGEOLOGICAL REPORT.
 - NO DESIGNATED SOLE SOURCE AQUIFERS OR REGULATED RECHARGE AREAS ARE LOCATED WITHIN THE PROPOSED FACILITY.
 - FACILITY OPERATIONS WITHIN 500 FEET OF PUBLIC ROADS WILL BE SCREENED FROM VIEW BY A COMBINATION OF VEGETATED EARTHEN BERMS AND/OR A FENCE A MINIMUM OF 8 FEET HIGH.
 - THE PROPOSED LANDFILL NO. 3 WASTE BOUNDARY IS LOCATED OVER 500 FEET FROM ALL OCCUPIED DWELLINGS, SCHOOLS, RETIREMENT HOMES, HOSPITALS OR LIKE INSTITUTIONS.
 - THERE ARE NO NATURAL AREAS DESIGNATED AS A DEDICATED ILLINOIS NATURE PRESERVE PURSUANT TO THE ILLINOIS NATURAL AREAS PRESERVATION ACT EITHER WITHIN THE FACILITY BOUNDARY OR WITHIN 3000 FEET OF THE PROPOSED FACILITY.
 - THE PREVAILING WIND DIRECTION WAS CALCULATED AS AN AVERAGE OF ALL WIND DIRECTION READINGS RECORDED AT THE GREATER PEORIA MUNICIPAL AIRPORT FROM JANUARY 1, 2005 THROUGH JUNE 1, 2012. DATA OBTAINED FROM NOAA NATIONAL CLIMATIC DATA CENTER WEBSITE ON JULY 12, 2012.

- MAP REFERENCES**
- U.S.G.S. 7.5 MINUTE SERIES (TOPOGRAPHIC) QUADRANGLE MAPS, OAK HILL, ILLINOIS (1979), DUNLAP, ILLINOIS (1979), HANNA CITY, ILLINOIS (1979) AND PEORIA WEST, ILLINOIS (1979).

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REV. NO.	DATE	DESCRIPTION
4	03-2016	ADJUSTED FACILITY BOUNDARY AND ASSOCIATED BUFFERS
3	10-2015	REVISED NOTE 8 PER JULY 8, 2015 IEPA COMMENTS.
2	06-2015	REVISED PER JUNE 15, 2015 RESPONSE TO IEPA COMMENTS.
1	08-2014	ADDED 3000' BUFFER AND MODIFIED NOTES 8 AND 15.



Peoria City/County Landfill, Inc.



Shaw® Shaw Environmental, Inc.

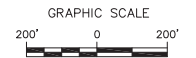
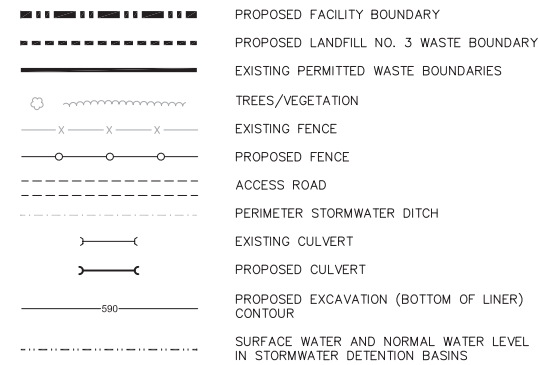
PEORIA CITY/COUNTY LANDFILL, INC.
PEORIA CITY/COUNTY LANDFILL NO. 3

REGIONAL FACILITY LOCATION

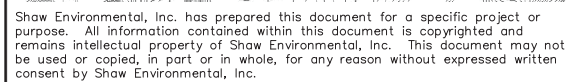
PROJ. NO.:	137618	DATE:	DECEMBER 2012
DESIGNED BY:	RDS	DRAWING NO.	
DRAWN BY:	BWM		
CHECKED BY:	RDS		
APPROVED BY:	DAM		

D2

2 OF 35 SHEETS



1. EXISTING CONTOURS WERE DEVELOPED BY AERO-METRIC, INC. BASED ON AERIAL PHOTOGRAPHY OBTAINED APRIL 26, 2008 AND THE PEORIA COUNTY GEOGRAPHIC INFORMATION SYSTEM ONLINE ASSESSMENT FRONT DESK TOOL, ACCESSED DECEMBER 14, 2010, (www.peoriacounty.org/gis/). CURRENT TOPOGRAPHY MAY DIFFER FROM THAT SHOWN.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. THE NEED FOR FLEXIBILITY TO ACCOMMODATE ADJUSTMENTS AND MODIFICATIONS DURING PERMITTING AND CONSTRUCTION IS ANTICIPATED CONSIDERING THE SIZE, COMPLEXITY, AND LIFE OF THE PROJECT.
4. PERIMETER STORMWATER CONTROL WILL BE CONSTRUCTED AS FILLING PROGRESSES TO PREVENT RUN-ON ONTO THE LANDFILL.
5. EXCAVATION GRADING MAY BE REVISED TO ACCOMMODATE ANY CONDITIONS OR DESIGN CHANGES REQUIRED BY THE ILLINOIS ENVIRONMENTAL PROTECTION AGENCY.
6. SITE DEVELOPMENT GENERALLY SHALL PROCEED ACCORDING TO THE NUMERICAL SEQUENCE OF CELLS SHOWN ON THIS PLAN. THE DEVELOPMENT AND PERMITTING OF THE SUBSEQUENT CELLS WILL OCCUR PROGRESSIVELY AS THE PREVIOUS CELL IS FILLED. FINAL COVER WILL BE PLACED WITHIN 60 DAYS OF THE PLACEMENT OF THE FINAL LIFT OF SOLID WASTE. SEE DRAWINGS D28-D35 FOR LANDFILL PHASING PLANS.
7. THE PROPOSED CONTOURS WITHIN THE PROPOSED LANDFILL NO. 3 WASTE BOUNDARY ON THIS DRAWING REPRESENT THE APPROXIMATE EXCAVATION GRADES (BOTTOM OF LINER GRADES) FOR THE LANDFILL. EXCAVATION GRADES WITHIN THE LEACHATE COLLECTION SUMPS ARE NOT SHOWN, SEE TYPICAL DETAILS ON DRAWING D16.
8. FOR CLARITY, THE AREAS WITHIN THE FACILITY BOUNDARY SOUTH OF NORTHING N 3000 ARE NOT SHOWN ON THIS DRAWING. NO CHANGES ARE PROPOSED FOR THIS AREA AS PART OF THE EXPANSION. PLEASE REFER TO DRAWING D4 FOR TOPOGRAPHY IN THIS AREA.



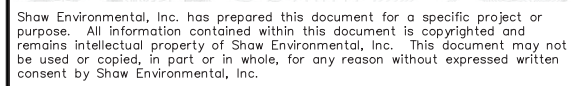
B-107		
REV. NO.	DATE	DESCRIPTION
1	03-2016	ADJUSTED PROPOSED FACILITY BOUNDARY



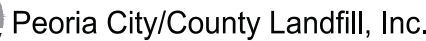
PEORIA CITY/COUNTY LANDFILL, INC.
PEORIA CITY/COUNTY LANDFILL NO. 3

EXCAVATION GRADES

PROJ. NO.:	137618	DATE:	DECEMBER 2012
DESIGNED BY:	RDS	DRAWING NO.	D5 5 OF 35 SHEETS
DRAWN BY:	BWM		
CHECKED BY:	RDS		
APPROVED BY:	DAM		



1	03/2016	REVISED FACILITY BOUNDARY.
REV. NO.	DATE	DESCRIPTION



PEORIA CITY/COUNTY LANDFILL, INC.
PEORIA CITY/COUNTY LANDFILL NO. 3

LOCATION OF ADJACENT UNDERGROUND MINES

PROJ. NO.:	137618	DATE:	DECEMBER 2012
DESIGNED BY:	MNF	DRAWING NO.	G3 3 OF 40 SHEETS
DRAWN BY:	PEL		
CHECKED BY:	MNF		
APPROVED BY:	DAM		



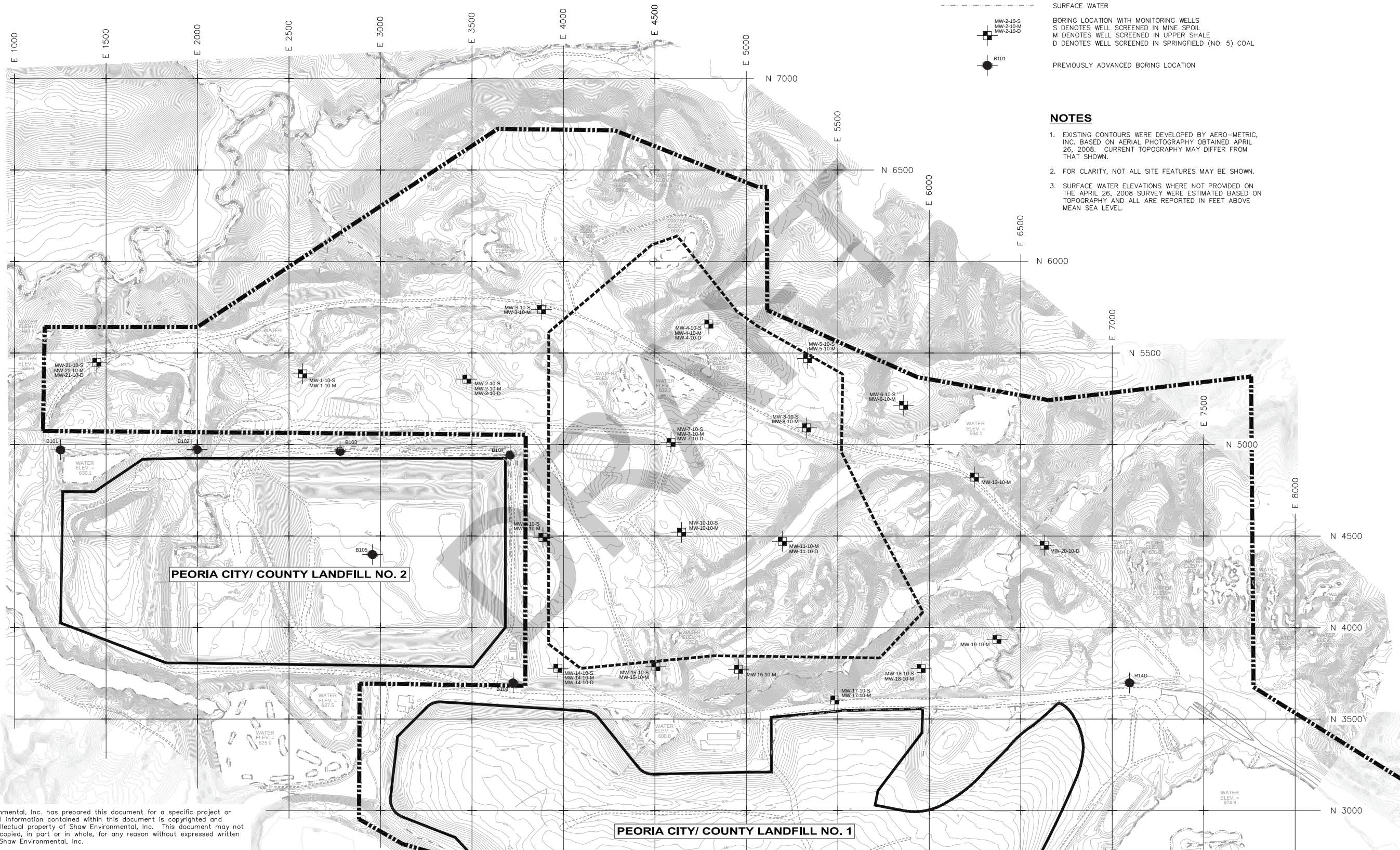
GRAPHIC SCALE
200' 0 200'

LEGEND

- PROPOSED FACILITY BOUNDARY
- PROPOSED LANDFILL NO. 3 WASTE BOUNDARY
- EXISTING PERMITTED WASTE BOUNDARIES
- SURFACE WATER
- BORING LOCATION WITH MONITORING WELLS
S DENOTES WELL SCREENED IN MINE SPOIL
M DENOTES WELL SCREENED IN UPPER SHALE
D DENOTES WELL SCREENED IN SPRINGFIELD (NO. 5) COAL
- PREVIOUSLY ADVANCED BORING LOCATION

NOTES

- EXISTING CONTOURS WERE DEVELOPED BY AERO-METRIC, INC. BASED ON AERIAL PHOTOGRAPHY OBTAINED APRIL 26, 2008. CURRENT TOPOGRAPHY MAY DIFFER FROM THAT SHOWN.
- FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
- SURFACE WATER ELEVATIONS WHERE NOT PROVIDED ON THE APRIL 26, 2008 SURVEY WERE ESTIMATED BASED ON TOPOGRAPHY AND ALL ARE REPORTED IN FEET ABOVE MEAN SEA LEVEL.



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REV. NO.	DATE	DESCRIPTION
1	03/2016	REVISED FACILITY BOUNDARY.



PEORIA CITY/COUNTY LANDFILL, INC. PEORIA CITY/COUNTY LANDFILL NO. 3
INITIAL BORING AND MONITORING WELL LOCATION MAP

PROJ. NO.: 137618	DATE: DECEMBER 2012
DESIGNED BY: MNF	DRAWING NO.
DRAWN BY: PEL	G4
CHECKED BY: MNF	4 OF 40 SHEETS
APPROVED BY: DAM	

LEGEND

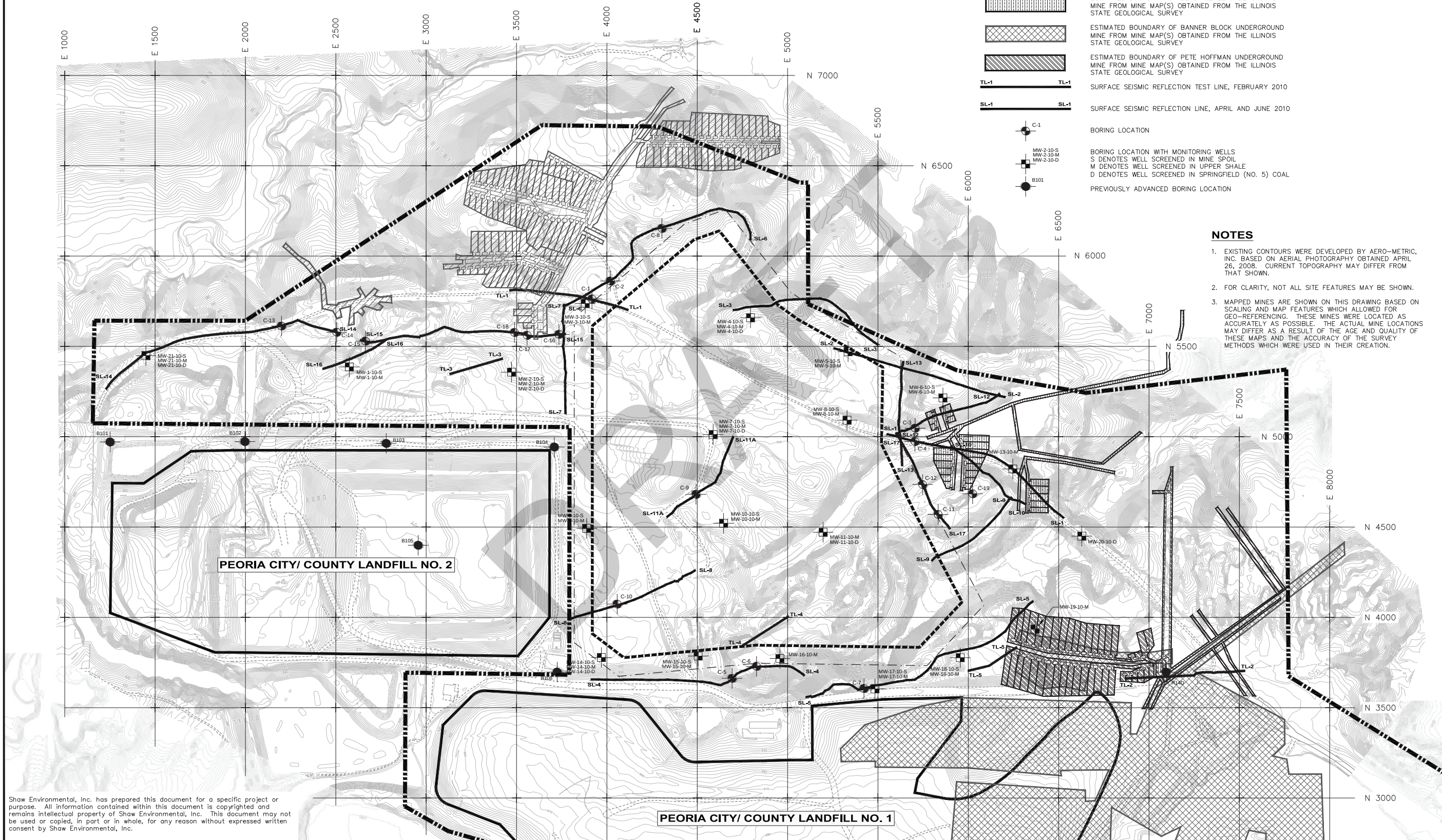
- PROPOSED FACILITY BOUNDARY
- PROPOSED LANDFILL NO. 3 WASTE BOUNDARY
- EXISTING PERMITTED WASTE BOUNDARIES
- ZONE OF ATTENUATION
- ESTIMATED BOUNDARY OF HOFFMAN UNDERGROUND MINE FROM MINE MAP OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- ESTIMATED BOUNDARY OF BLACK JEWEL UNDERGROUND MINE FROM MINE MAP(S) OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- ESTIMATED BOUNDARY OF BANNER BLOCK UNDERGROUND MINE FROM MINE MAP(S) OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- ESTIMATED BOUNDARY OF PETE HOFFMAN UNDERGROUND MINE FROM MINE MAP(S) OBTAINED FROM THE ILLINOIS STATE GEOLOGICAL SURVEY
- SURFACE SEISMIC REFLECTION TEST LINE, FEBRUARY 2010
- SURFACE SEISMIC REFLECTION LINE, APRIL AND JUNE 2010
- BORING LOCATION
- BORING LOCATION WITH MONITORING WELLS
S DENOTES WELL SCREENED IN MINE SPOIL
M DENOTES WELL SCREENED IN UPPER SHALE
D DENOTES WELL SCREENED IN SPRINGFIELD (NO. 5) COAL
- PREVIOUSLY ADVANCED BORING LOCATION



GRAPHIC SCALE
200' 0 200'

NOTES

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REV. NO.	DATE	DESCRIPTION
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Peoria City/County Landfill, Inc.



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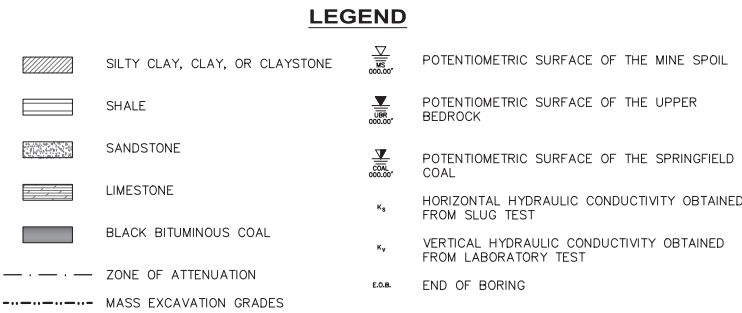
PEORIA CITY/COUNTY LANDFILL, INC.
PEORIA CITY/COUNTY LANDFILL NO. 3

FINAL BORING, MONITORING WELL, AND
GEOPHYSICAL SURVEY LOCATION MAP

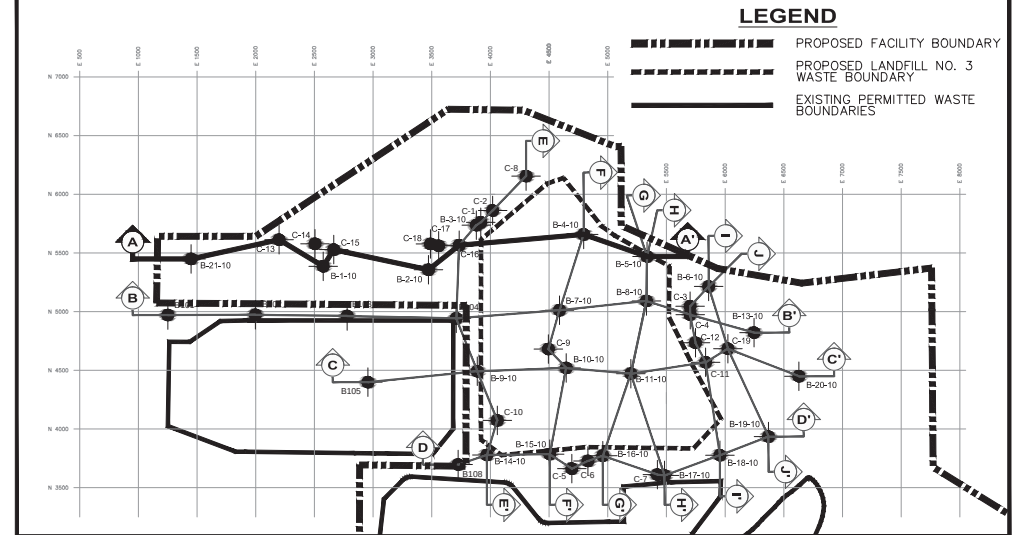
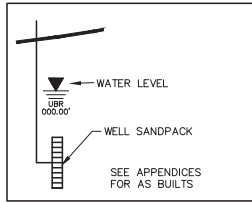
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DESIGNED BY:	MNF	DRAWING NO.	
DRAWN BY:	PEL		
CHECKED BY:	MNF		
APPROVED BY:	DAM		

G5

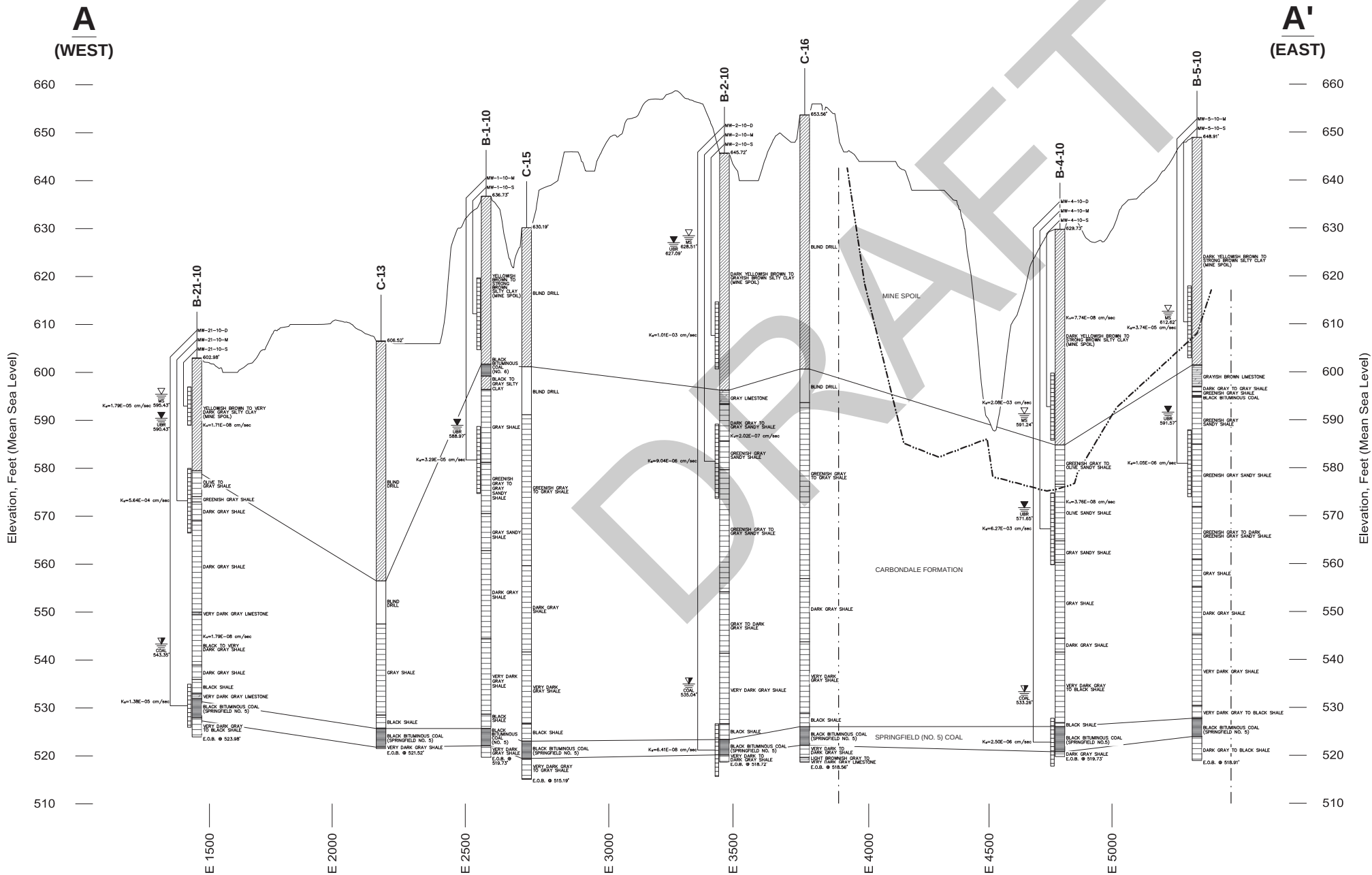
5 OF 40 SHEETS



MONITORING WELL SCHEMATIC

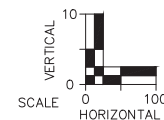


KEY MAP
NOT TO SCALE



NOTES

- UNCONSOLIDATED MATERIAL AND BEDROCK INFORMATION CONTAINED ON THIS DRAWING IS INTERPOLATED BETWEEN BORING LOCATIONS.
- DESCRIPTIONS DEPICTED ON THIS DRAWING ARE GENERALIZED. THE COMPLETE DESCRIPTIONS ARE CONTAINED ON THE BORING LOGS.
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GEOLOGICAL CROSS SECTION A - A'

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6 OF 40 SHEETS



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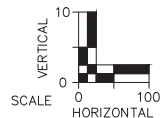
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GEOLOGICAL CROSS SECTION B - B'

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5. GROUNDWATER ELEVATIONS SHOWN ON THIS CROSS SECTION WERE MEASURED ON AUGUST 23-24, 2010.
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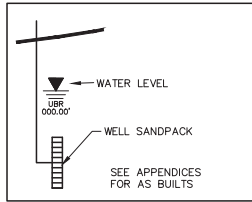
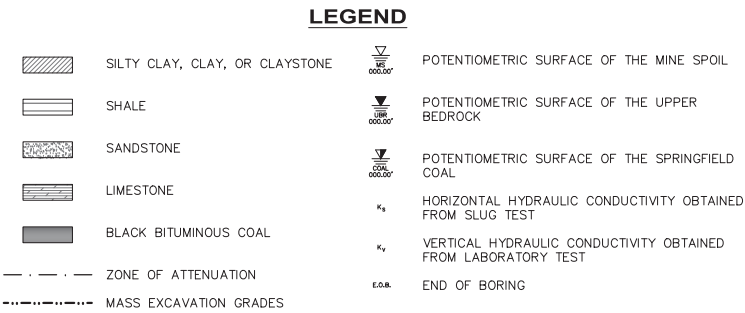


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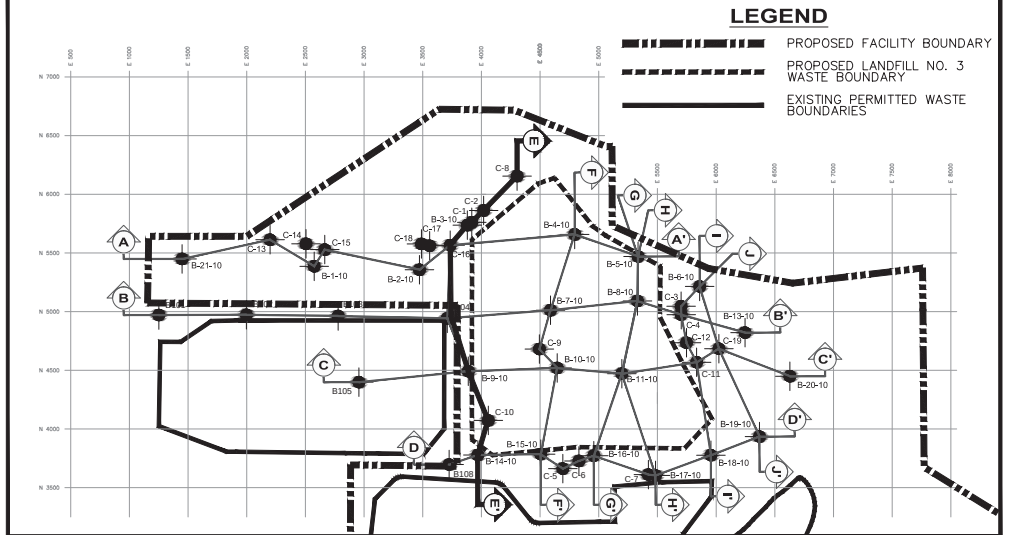
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GEOLOGICAL CROSS SECTION C - C'

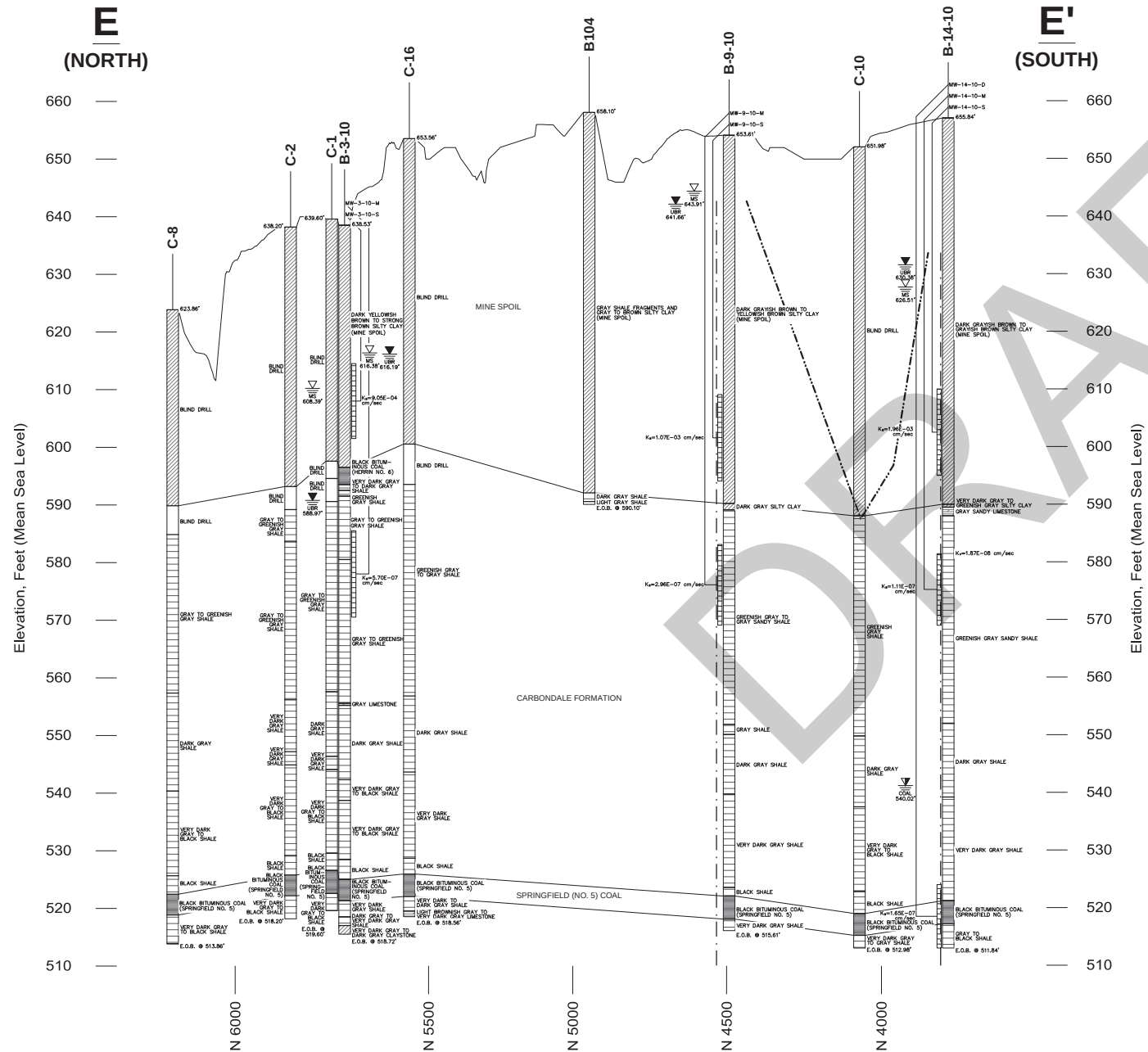
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CHECKED BY:	MNF		
APPROVED BY:	DAM		



MONITORING WELL SCHEMATIC

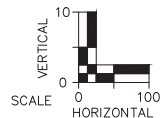


KEY MAP
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GEOLOGICAL CROSS SECTION E - E'

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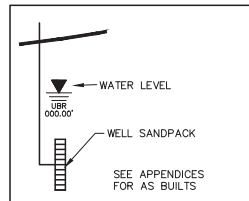
Peoria City/County Landfill, Inc.



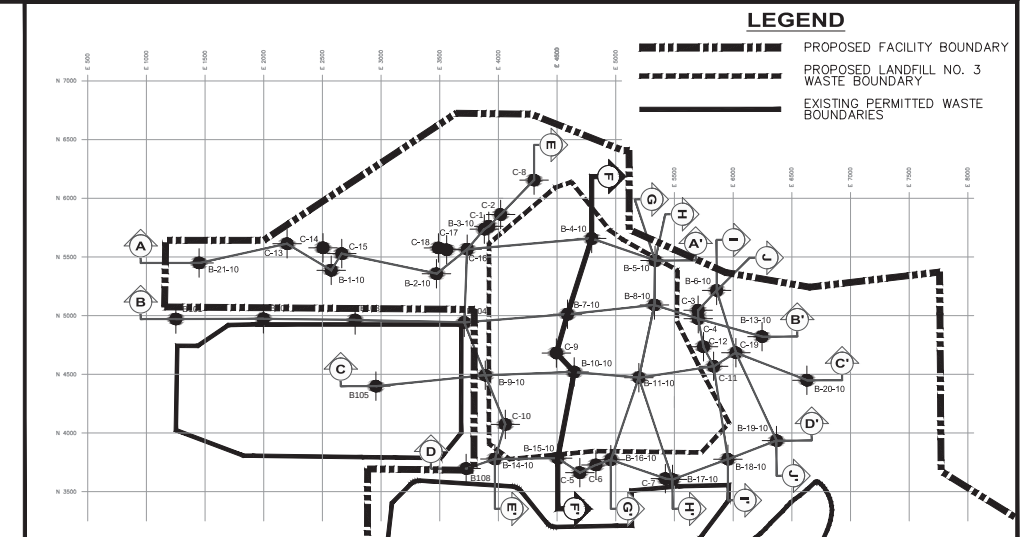
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1	03/2016	REVISED FACILITY BOUNDARY.

	SILTY CLAY, CLAY, OR CLAYSTONE		POTENTIOMETRIC SURFACE OF THE MINE SPOIL
	SHALE		POTENTIOMETRIC SURFACE OF THE UPPER BEDROCK
	SANDSTONE		POTENTIOMETRIC SURFACE OF THE SPRINGFIELD COAL
	LIMESTONE	K_h	HORIZONTAL HYDRAULIC CONDUCTIVITY OBTAINED FROM SLUG TEST
	BLACK BITUMINOUS COAL	K_v	VERTICAL HYDRAULIC CONDUCTIVITY OBTAINED FROM LABORATORY TEST
	ZONE OF ATTENUATION	E.O.B.	END OF BORING
	MASS EXCAVATION GRADES		



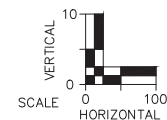
MONITORING WELL SCHEMATIC



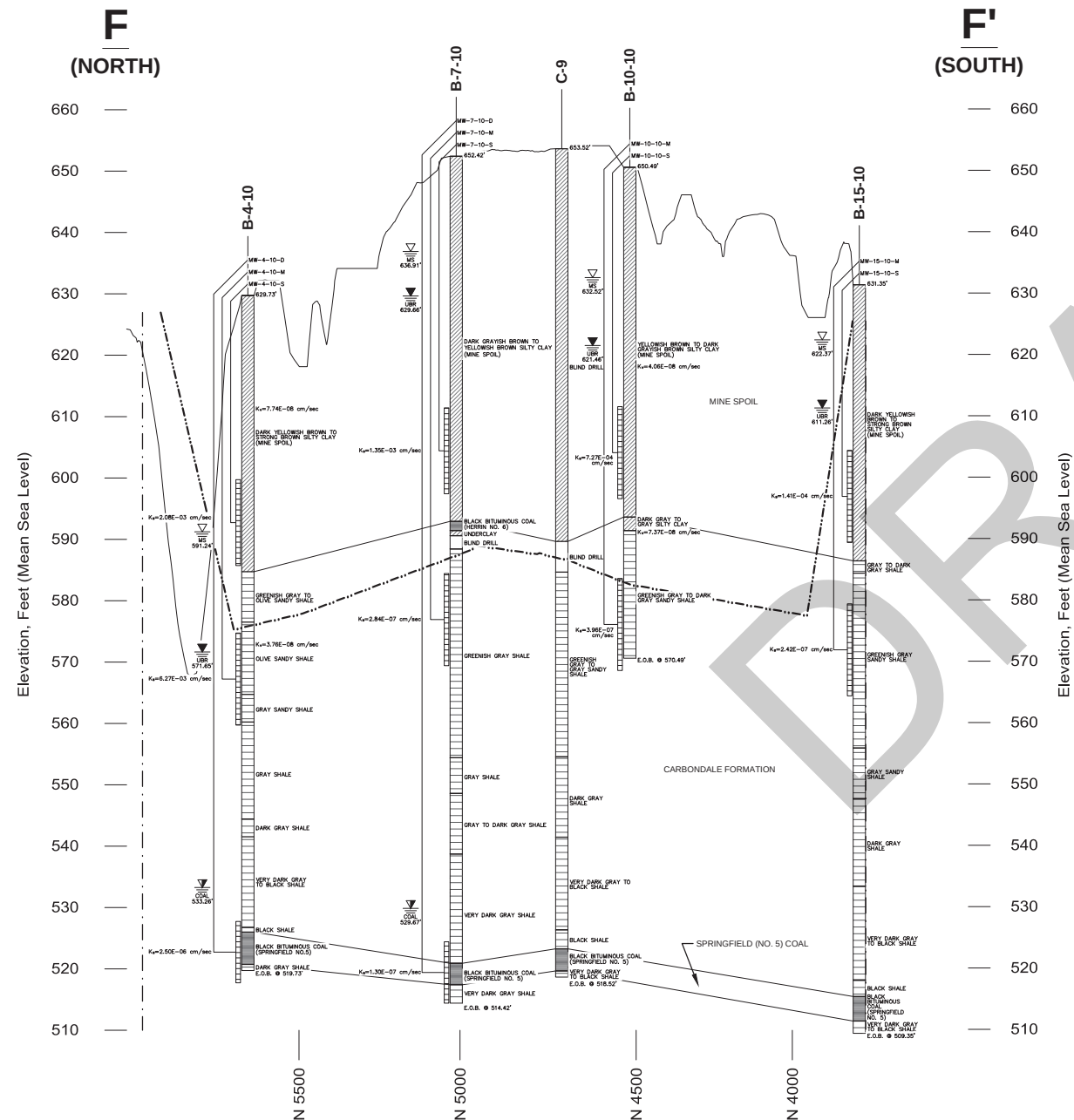
KEY MAP
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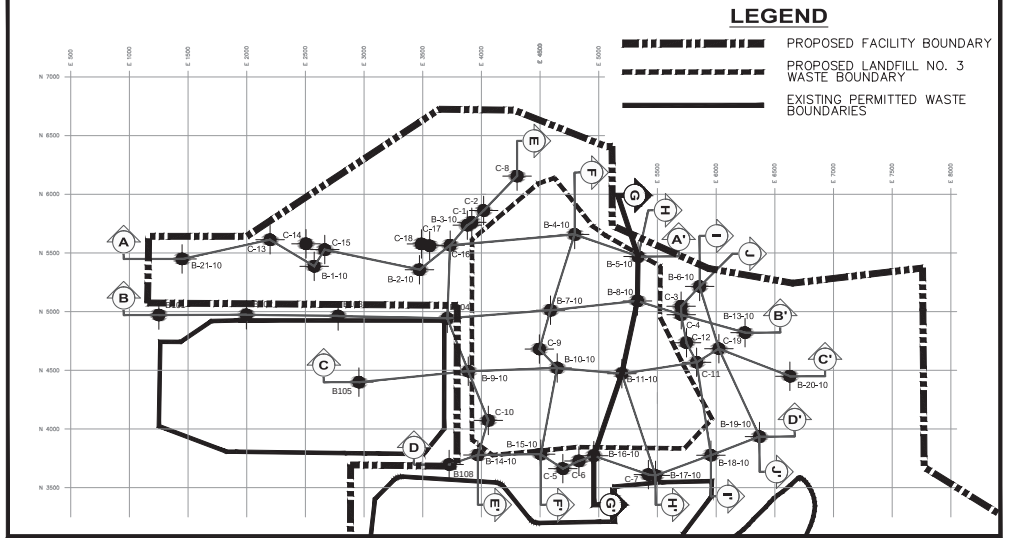
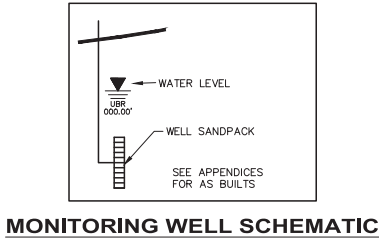
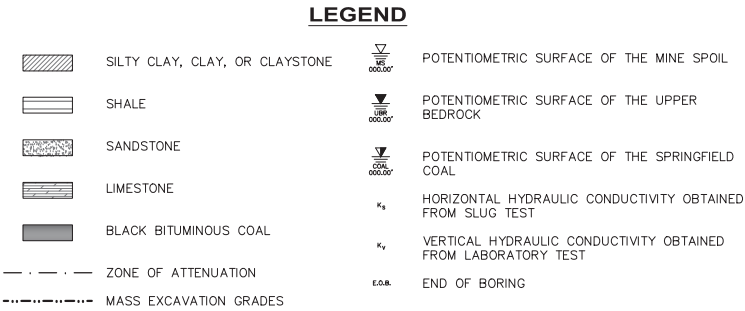


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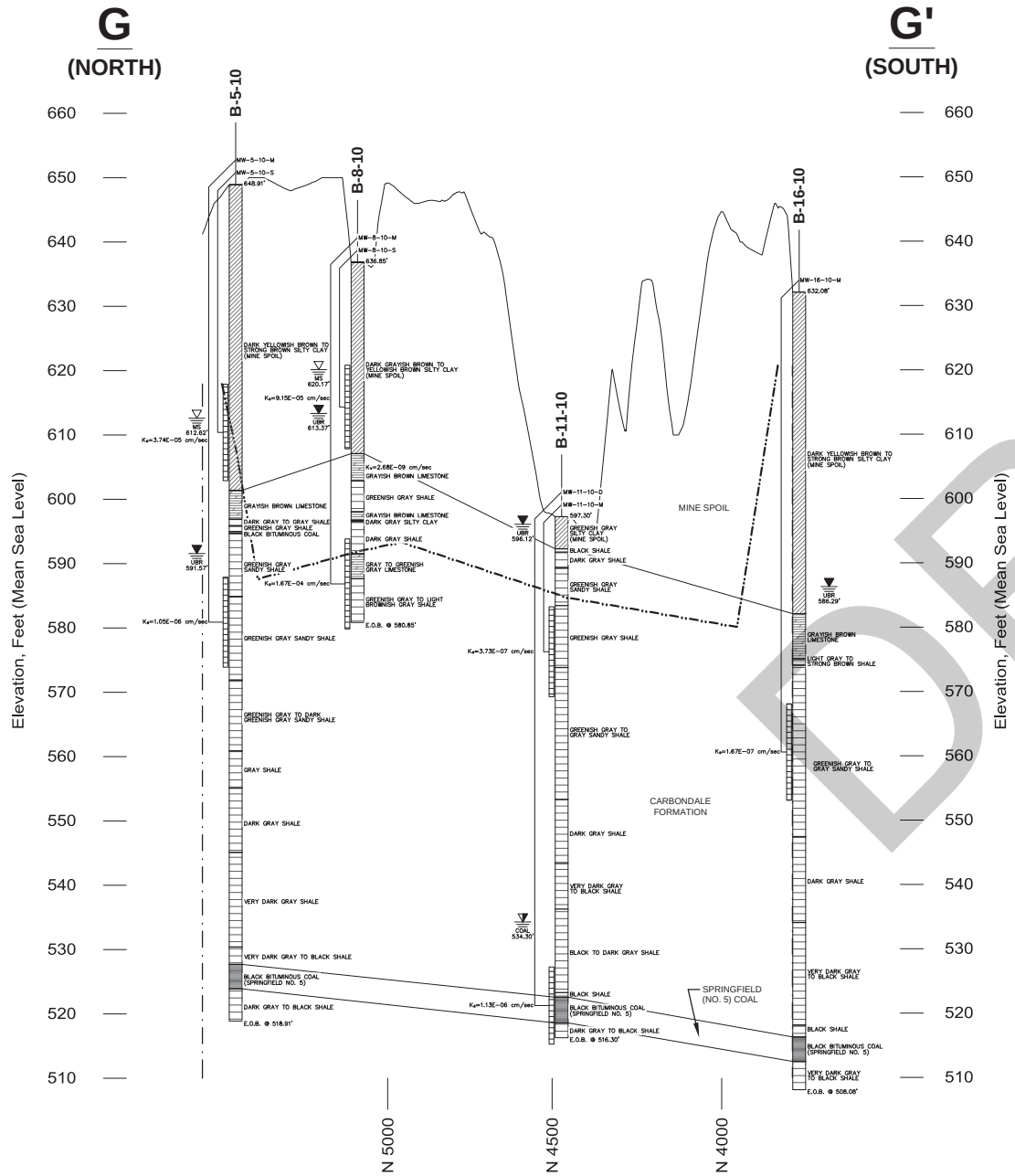
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GEOLOGICAL CROSS SECTION F - F'

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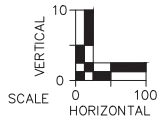


KEY MAP
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GEOLOGICAL CROSS SECTION G - G'

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APPENDIX B

IDNR-AMLRD INVESTIGATION REPORT

Black Jewel No. 2 Mine Investigation Report

Peoria City/County Proposed Landfill 3, Peoria County, Edwards, Illinois

Background:

The Peoria City/County Landfill intends to construct a new landfill – Landfill 3. At some point, it was discovered that the Illinois State Geological Survey (ISGS) had documented newly discovered abandoned underground mine workings potentially beneath the proposed Landfill 3 location. The Black Jewel Coal Company, Black Jewel No. 2 mine (ISGS Mine Index 7518) operated from 1934 to 1943 as a modified room and pillar underground mine, which was assumed to be in the Springfield (No. 5) coal seam based on limited information previously available to ISGS.

Subsurface Investigation:

The Illinois Department of Natural Resources Abandoned Mined Land Reclamation Division (IDNR-AMLRD) approved a work order to conduct ten exploratory soil borings on October 16, 2023. The work order was with engineering consultant Midwest Engineering Associates, Inc. and their geotechnical engineering subconsultant GSG Consultants, Inc.

GSG Consultants, Inc. staked the boring locations on October 31, 2023 and mobilized to the landfill on November 13, 2023. The attached map, *Attachment 1*, indicates the locations and coordinates of the proposed boring locations. Soil boring work began on November 14, 2023. The main objectives of the exploratory work were to determine the presence of coal, investigate whether it had been mined out, and document any underground voids present within the Springfield (No. 5) coal seam. Due to site access issues and weather delays, all-terrain drilling and water hauling equipment were supplemented in January of 2024. The exploratory drilling field work continued until February 1, 2024.

Ten exploratory soil borings / rock cores were completed to a sufficient depth to fully penetrate the Springfield (No. 5) coal seam. Since the surface area of proposed Landfill 3 had been surface/strip mined by the Midland Coal Company, Edwards Mine (ISGS Mine Index 881) mine from 1952 to 1975, the Herrin (No. 6) coal seam was not present and was not intercepted by any of the soil borings except boring number CB-SV-05. The All ten exploratory drilling locations intercepted solid coal at the Springfield (No. 5) coal seam depth. Attached for reference as *Attachment 2* is the consultant report along with soil boring / rock core logs for each of the drilling locations.

Conclusions:

Based on results of IDNR-AMLRD's investigation, it has been determined that the Black Jewel No. 2 mine was in fact an underground mine located in the Herrin (No. 6) coal seam, not the Springfield (No. 5) coal seam. This finding is further substantiated by the ISGS Directory of Coal Mines in Illinois, 7.5-Minute Quadrangle Series, Hanna City Quadrangle, Peoria County authored by Alan R. Myers & C. Chenoweth. The Geological Problems Reported section for the Midland Coal Company, Edwards Mine (ISGS Mine Index 881) states "*Some old workings were encountered while excavating some of the pits.*" The statement "old workings" refers to old

underground mine workings and “pits” refers to the strip pits that were excavated during the surface mining operations. These surface mining strip pits were excavated to the depth of the shallower Herrin (No. 6) coal seam. The IDNR-AMLRD exploratory findings along with this information from the ISGS Directory of Coal Mines were reported to Alan R. Myers with the Illinois State Geological Survey, and he confirmed the likelihood that the mine was in the Herrin seam and needed to be moved out of the Springfield (No. 5) coal seam. This email communication with Alan R. Myers and other ISGS Coal Section members is included as *Attachment 3*. As of February 29, 2024, the ISGS indicated that their records for the Black Jewel Coal Company, Black Jewel No. 2 mine (ISGS Mine Index 7518) were updated to indicate that this underground mine operated in the Herrin (No. 6) coal seam, and not the Springfield (No. 5) coal seam, as previously documented.

Questions or inquiries regarding this investigation and related documents can be directed to the following contacts:

Lance Range, Division Manager
Illinois Department of Natural Resources
Office of Mines and Minerals
Abandoned Mined Lands Reclamation Division
Division Manager
One Natural Resources Way
Springfield, IL 62702
Lance.L.Range@illinois.gov
(217) 782-0357

Joseph Karl, Project Manager
Joseph.Karl@illinois.gov
(217)303-8437

Brent Guttman, Project Engineer
Brent.Guttman@illinois.gov
(618)650-3197

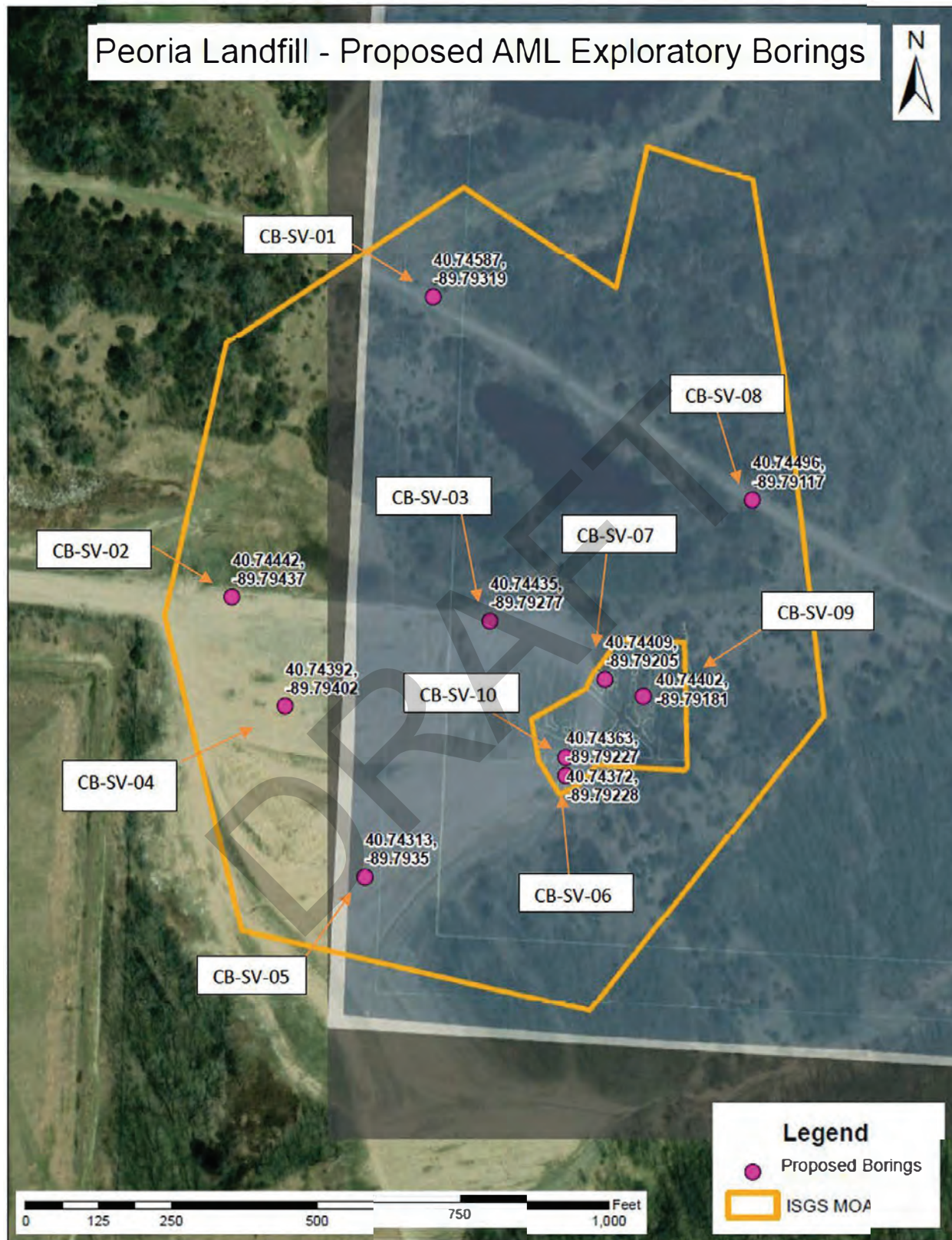
Approved By:



Exp. 11/30/2025



Brent A. Guttman, P.E.
IL Licensed Professional Engineer
No. 062-054487



Attachment 1 - Boring Locations

TECHNICAL MEMORANDUM

To: Robert D. Culp, P.E., CFM
Midwest Engineering Associates, Inc.

From: Thomas Kasang, P.E.
Dawn Edgell, P.E.

Date: February 29, 2024

Subject: IDOT PTB 196-072 WO#17 – Black Jewel Mine No. 2
Bedrock Investigation
Peoria County Landfill, Peoria County, Illinois

This technical memorandum presents a summary of the bedrock investigation for IDOT PTB 196-072 Work Order #17. The Peoria County Landfill is attempting to construct a new landfill cell. During the final stages of preparation, it was discovered that there are underground mine works under the proposed location. Per the project scope received via email on September 1, 2023, from Midwest Engineering Associates, Inc. (Midwest), soil borings were requested to investigate the bedrock conditions and to determine the presence of bituminous coal layers in the area in order to design a proper grouting treatment.

The boring locations were proposed by the Illinois Department of Natural Resources (IDNR) and Midwest and were completed where accessible due to field conditions. The subsurface investigation was conducted between November 14, 2023, and February 1, 2024, and included advancing ten (10) soil borings to depths between 125 and 140 feet below existing grade. Nine of the locations were blind-drilled and bedrock cores were collected; one location collected samples of the overburden materials in addition to the bedrock samples. Representatives from IDNR and Foth Infrastructure and Environment, LLC (Foth) were present onsite during drilling activities. The **Soil Boring Location Plan (Appendix A)** shows the as-drilled locations of the soil borings. **Table 1** presents a summary of the borings completed.

Table 1 - Borehole Summary

Boring ID	Northing	Easting	Elevation	Depth Total (ft)
CB-SV-01	1485799.952	2400064.375	639.1	125.0
CB-SV-02	1485270.601	2399739.794	658.4	140.0
CB-SV-03	1485246.685	2400183.174	653.9	140.0
CB-SV-04	1485088.598	2399837.485	648.1	130.0
CB-SV-05*	1484801.556	2399982.719	640.9	130.0
CB-SV-06	1485017.854	2400319.903	647.0	130.0
CB-SV-07	1485152.097	2400377.042	649.2	135.0
CB-SV-08	1485470.889	2400625.489	637.3	126.0
CB-SV-09	1485127.431	2400359.211	653.8	135.0
CB-SV-10	1484983.938	2400322.757	648.7	130.0

*Standard Penetration Test (SPT) boring and no rock coring performed

The soil borings were drilled using a truck mounted CME-75 drill rig and track mounted Diedrich D-50 and D-70 drill rigs, equipped with 4¼-inch I.D. hollow stem augers and an automatic hammer. Soil sampling was performed in boring CB-SV-05 according to AASHTO T 206, “Penetration Test and Split Barrel Sampling of Soils.” Soil samples were obtained at 5-foot intervals to the boring termination depth. Per subsequent email correspondence and phone calls with the IDNR on November 15, 2023, the remaining soil borings were blind drilled through the existing mine refuse material and upper bedrock layers to the anticipated bituminous coal depths. The blind drill depths were determined based on the evaluation of boring logs previously completed which were provided by Foth.

Except for boring CB-SV-05, no soil sampling was performed in the borings; rock core samples were collected in the borings with the use of a ten-foot, diamond bit, NQ-2 wire line core barrel. The collected bedrock cores were evaluated in the field for texture, physical condition, recovery percentage, Rock Quality Designation (RQD), and field hardness. The extracted samples were visually inspected and classified, and the Rock Quality Designation (RQD) was determined by totaling all sections with a length in excess of four inches (4”) and dividing it by the total length of the core run.

Table 2 - Bedrock Core Summary presents a summary of the bedrock cores extracted during the investigation. Bituminous coal was noted in each boring, with layers ranging in thickness between 2 and 4 feet between elevations of 516.4 and 526.8 feet. The results of the subsurface

investigation are shown on the **Soil Boring & Rock Core Logs (Appendix B)**. Rock core and soil samples were not retained, and the borings were backfilled using bentonite grout cement mixture upon the completion of drilling.

Table 2 - Bedrock Core Summary

Boring	Core Run	Core Depth (feet)	Rock Type	Recovery (%)	RQD (%)	RQD Classification	Depth / Elevation of Bituminous Coal (ft)
CB-SV-01	1	110-120	Shale	70	58	Good	118-120.5 / 521.1-518.6
	2	120-125	Shale	80	72	Good	
CB-SV-02	1	115-125	Shale	100	92	Excellent	132-136 / 526.4-522.4
	2	125-132	Shale	100	92	Excellent	
	3	132-140	Shale	100	85	Good	
CB-SV-03	1	120-130	Shale	100	83	Good	135.5-137.5 / 518.4-516.4
	2	130-140	Shale	75	60	Fair	
CB-SV-04	1	110-120	Shale	100	100	Excellent	122-126 / 526.1-522.1
	2	120-130	Shale	100	61	Fair	
CB-SV-05	*	*	*	*	*	*	118.5-121 / 522.4-519.9
CB-SV-06	1	120-130	Shale	90	60	Fair	124.5-126.5 / 522.5-520.5
CB-SV-07	1	125-135	Shale	90	60	Fair	128-132 / 521.2-517.2
CB-SV-08	1	120-126	Shale	100	95	Excellent	**
CB-SV-09	1	125-135	Shale	80	55	Fair	127-131 / 526.8-522.8
CB-SV-10	1	120-130	Shale	90	75	Fair	123-126 / 525.7-522.7

*Bedrock cores not collected during subsurface investigation

**Bituminous coal not in core sample as boring was drilled past anticipated coal depth, which is estimated to be approximately 117-120 feet (el. 520.3-517.3 feet) based on drilling bit drill rate and drilling fluid color

The RQD is given a classification based upon the numeric value as indicated in **Table 3**.

Table 3 – Rock Quality Designation Summary

Rock Quality Designation (RQD)	Descriptions
< 25%	Very Poor
25 – 50%	Poor
51 – 75%	Fair
76 – 90%	Good
91 – 100%	Excellent

Should you have any questions or require any additional information, please call us at 630-994-2600.

Sincerely,



Thomas E. Kasang, P.E.
Project Engineer



Dawn Edgell, P.E.
Senior Project Engineer

Appendix A – Soil Boring Location Plan

Appendix B – Soil Boring & Rock Core Logs

DRAFT

APPENDIX A
SOIL BORING LOCATION PLAN



DRAWN BY EM DATE 2/22/2024 CHECKED BY TK DATE 2/22/2024	GSG GSG CONSULTANTS, INC. 735 Remington Road, Schaumburg, IL 60173 Tel: 630.994.2600, www.gsg-consultants.com	 Illinois Department of Transportation	PTB 196-072 WO#17 BLACK JEWEL MINE NO. 2 SOIL BORING LOCATION PLAN	SHEET NO. 1 of 1
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DRAFT

APPENDIX B
SOIL BORING & ROCK CORE LOGS



Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

ROCK CORE LOG

Page 1 of 1

Date 12/21/23

ROUTE CO HWY 35 DESCRIPTION Black Jewel Mine No. 2 Bedrock Investigation LOGGED BY EH

SECTION 11501 W Cottonwood Rd,
Brimfield, IL 61517 LOCATION Peoria County Landfill, SEC. 26, TWP. 9N, RNG. 6E, 4th PM,

Latitude 40.7458696, Longitude -89.7931900

COUNTY PEORIA CORING METHOD NQ2

STRUCT. NO. N/A CORING BARREL TYPE & SIZE NQ2 Wire Line

Station _____

BORING NO. CB-SV-01

Station N/A

Offset _____

Ground Surface Elev. 639.10 ft

Core Diameter 2 in

Top of Rock Elev. _____ ft

Begin Core Elev. 529.10 ft

DEPTH (ft)	CORE (#)	RECOVERY (%)	R.Q.D. (%)	CORE TIME (min/ft)	STRENGTH (tsf)
---------------	-------------	-----------------	---------------	--------------------------	-------------------

Blind drill to 110 feet

529.10 -110

Dark Gray
SHALE, slightly weathered and fractured

1

70

58

521.10

Black
BITUMINOUS COAL

-120

518.60

2

80

72

Dark Gray
SHALE, slightly weathered and fractured

514.10 -125

End of Boring

Color pictures of the cores _____

Cores will be stored for examination until _____

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

ROCK CORE LOG

Page 2 of 2

Date 11/22/23

ROUTE CO HWY 35 DESCRIPTION Black Jewel Mine No. 2 Bedrock Investigation LOGGED BY EH

SECTION 11501 W Cottonwood Rd, Brimfield, IL 61517 LOCATION Peoria County Landfill, SEC. 26, TWP. 9N, RNG. 6E, 4th PM,
Latitude 40.7444204, Longitude -89.7943696

COUNTY PEORIA CORING METHOD NQ2

STRUCT. NO.	STATION	CORING BARREL TYPE & SIZE	DEPTH (ft)	CORE (#)	RECOVERY (%)	RQD (%)	CORE TIME (min/ft)	STRENGTH (tsf)
N/A		NQ2 Wire Line						
		Core Diameter <u>2</u> in						
BORING NO.		Top of Rock Elev. <u>543.40</u> ft						
		Begin Core Elev. <u>543.40</u> ft						
		Ground Surface Elev. <u>658.40</u> ft						

Black SHALE, slightly weathered and fractured	526.40							
Black BITUMINOUS COAL	-135	3	100	85				
Dark Gray SHALE, slightly weathered and fractured	522.40							
End of Boring	518.40 -140							
	-145							
	-150							

Color pictures of the cores _____

Cores will be stored for examination until _____

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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BBS, form 138 (Rev. 8-99)



BBS, form 138 (Rev. 8-99)



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Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Page 1 of 4

Date 11/14/23

ROUTE CO HWY 35 DESCRIPTION Black Jewel Mine No. 2 Bedrock Investigation LOGGED BY EH

SECTION 11501 W Cottonwood Rd,
Brimfield, IL 61517 LOCATION Peoria County Landfill, SEC. 26, TWP. 9N, RNG. 6E, 4th PM,

COUNTY PEORIA DRILLING RIG CME-75 HAMMER TYPE Auto
DRILLING METHOD MUD ROTARY HAMMER EFF (%)

STRUCT. NO. N/A
Station

BORING NO. CB-SV-05
Station N/A

Offset

Ground Surface Elev. 640.90 ft

D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
-----------------------------------	------------------------------------	--------------------------	----------------------------------

Surface Water Elev.	N/A	ft
Stream Bed Elev.	N/A	ft
Groundwater Elev.:		
First Encounter	N/A	ft
Upon Completion	N/A	ft
After <u> </u> Hrs.	N/A	ft

D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
-----------------------------------	------------------------------------	--------------------------	----------------------------------

Light Gray, Moist
FILL: SILTY CLAY, trace gravel

Gray, Moist
FILL: SILTY CLAY LOAM, trace
coal (*continued*)

6			
6	4.5		
7	P		

21			
17	2.1		
15	B		

20			
40	4.5		
17	P		

2			
5	2.1		
7	B		

627.40

Gray, Moist
FILL: SILTY CLAY LOAM, trace
coal

6			
7	1.7		
7	B		

5			
12	2.9		
10	B		

3			
3	2.1		
5	B		

602.40

Brown and Gray, Moist
FILL: SILTY CLAY, trace gravel

4			
6	2.5		
10	B		

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Page 2 of 4

Date 11/14/23

ROUTE CO HWY 35 DESCRIPTION Black Jewel Mine No. 2 Bedrock Investigation LOGGED BY EH

SECTION 11501 W Cottonwood Rd,
Brimfield, IL 61517 LOCATION Peoria County Landfill, SEC. 26, TWP. 9N, RNG. 6E, 4th PM,

COUNTY PEORIA DRILLING RIG CME-75 DRILLING METHOD MUD ROTARY HAMMER TYPE Auto
HAMMER EFF (%)

STRUCT. NO. N/A
Station

BORING NO. CB-SV-05
Station N/A
Offset

Ground Surface Elev. 640.90 ft

D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
-----------------------------------	------------------------------------	--------------------------	----------------------------------

Surface Water Elev. <u>N/A</u> ft	Stream Bed Elev. <u>N/A</u> ft	Groundwater Elev.: First Encounter <u>N/A</u> ft Upon Completion <u>N/A</u> ft After <u></u> Hrs. <u>N/A</u> ft
-----------------------------------	--------------------------------	--

D E P T H (ft)	B L O W S (/6")	U C S (tsf)	M O I S T (%)
-----------------------------------	------------------------------------	--------------------------	----------------------------------

Brown and Gray, Moist
FILL: SILTY CLAY, trace gravel
(continued)

Extremely Dense
Gray, Moist
SILT, with clay, trace shale (ML)
(continued)

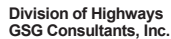
Coal seam at 43.5 ft

592.40

Extremely Dense
Gray, Moist
SILT, with clay, trace shale (ML)

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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[illegible]

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Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

SOIL BORING LOG

Page 4 of 4

Date 11/14/23

ROUTE CO HWY 35 DESCRIPTION Black Jewel Mine No. 2 Bedrock Investigation LOGGED BY EH

SECTION 11501 W Cottonwood Rd, Brimfield, IL 61517 LOCATION Peoria County Landfill, SEC. 26, TWP. 9N, RNG. 6E, 4th PM,

COUNTY PEORIA DRILLING RIG CME-75 DRILLING METHOD MUD ROTARY HAMMER TYPE Auto HAMMER EFF (%)

STRUCT. NO. N/A
Station

BORING NO. CB-SV-05
Station N/A
Offset

Ground Surface Elev. 640.90 ft

D E P T H (ft)	B L O W S (/6")	U C S Qu (tsf)	M O I S T (%)
-------------------------------	--------------------------------	----------------------------	------------------------------

Surface Water Elev. N/A ft
Stream Bed Elev. N/A ft
Groundwater Elev.:
First Encounter N/A ft
Upon Completion N/A ft
After Hrs. N/A ft

Black
BITUMINOUS COAL (*continued*) 519.90

Extremely Dense
Dark Gray, Moist
SHALES

50/3"

-125

50/2"

510.90 -130

End of Boring

-135

-140

The Unconfined Compressive Strength (UCS) Failure Mode is indicated by (B-Bulge, S-Shear, P-Penetrometer)
The SPT (N value) is the sum of the last two blow values in each sampling zone (AASHTO T206)

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Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

ROCK CORE LOG

Page 1 of 1

Date 2/1/24

ROUTE CO HWY 35 DESCRIPTION Black Jewel Mine No. 2 Bedrock Investigation LOGGED BY EH

SECTION 11501 W Cottonwood Rd,
Brimfield, IL 61517 LOCATION Peoria County Landfill, SEC. 26, TWP. 9N, RNG. 6E, 4th PM,

COUNTY PEORIA CORING METHOD NQ2 Latitude 40.7437198, Longitude -89.7922798

STRUCT. NO.	CORING BARREL TYPE & SIZE	DEPTH	CORE	RECOVERY	R.Q.D.	CORE TIME	STRENGTH
Station		(ft)	(#)	(%)	(%)	(min/ft)	(tsf)
N/A	NQ2 Wire Line						
	Core Diameter <u>2</u> in						
BORING NO. <u>CB-SV-06</u>	Top of Rock Elev. <u></u> ft						
Station <u>N/A</u>	Begin Core Elev. <u>527.00</u> ft						
Offset <u></u>							
Ground Surface Elev. <u>647.00</u> ft							

Blind drill to 120 feet

Dark Gray
SHALE, slightly weathered and fractured

Black
BITUMINOUS COAL

Gray
SHALE, slightly weathered and fractured

End of Boring

Color pictures of the cores

Cores will be stored for examination until

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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Page 1 of 1

Date 2/1/24

Interval	Depth (ft)	Interval (ft)	Interval (ft)	Interval (ft)	Interval (ft)
Blind drill to 125 feet					
Gray SHALE, slightly weathered and fractured	524.20 -125	1	90	60	
Black BITUMINOUS COAL	521.20				
	-130				
Gray SHALE, slightly weathered and fractured	517.20				
	514.20 -135				
End of Boring					
	-140				

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Illinois Department of Transportation

Division of Highways
GSG Consultants, Inc.

ROCK CORE LOG

Page 1 of 1

Date 12/19/23

ROUTE CO HWY 35 DESCRIPTION Black Jewel Mine No. 2 Bedrock Investigation LOGGED BY EH

SECTION 11501 W Cottonwood Rd, Brimfield, IL 61517 LOCATION Peoria County Landfill, SEC. 26, TWP. 9N, RNG. 6E, 4th PM,
Latitude 40.7449598, Longitude -89.7911700

COUNTY PEORIA CORING METHOD NQ2

STRUCT. NO.	N/A	CORING BARREL TYPE & SIZE	NQ2 Wire Line	DEPTH	CORE	RECOVERY	R.Q.D.	CORE TIME	STRENGTH
Station		Core Diameter	2 in	(ft)	(#)	(%)	(%)	(min/ft)	(tsf)
BORING NO.	CB-SV-08	Top of Rock Elev.							
Station	N/A	Begin Core Elev.	517.30						
Offset									
Ground Surface Elev.	637.30								

Black BITUMINOUS COAL	520.30								
Blind drill to 120 feet	517.30	-120							
Gray SHALE, slightly weathered and fractured			1	100	95				
Gray LIMESTONE, slightly weathered and fractured	513.80								
End of Boring	511.30	-125							
		-130							
		-135							

Color pictures of the cores _____

Cores will be stored for examination until _____

The "Strength" column represents the uniaxial compressive strength of the core sample (ASTM D-2938)

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Attachment 3

From: Elrick, Scott D
To: Guttman, Brent; Myers, Alan R
Cc: Range, Lance L.; Karl, Joseph; Greco, Jennifer
Subject: [External] Re: ISGS Mine Index 7518
Date: Wednesday, February 28, 2024 4:42:22 PM
Attachments: image001.png
image002.png
image003.png
image006.png

Hi Everyone,

Below is a copy and paste email (with some light editing from me) from Alan on #7518 where he reviews a short history and rationale for changing the seam to the Herrin Coal.

From Alan:

All available information we have for this mine has now been uploaded to ilmines wiki
<https://ilmineswiki.web.illinois.edu/wiki/7518>

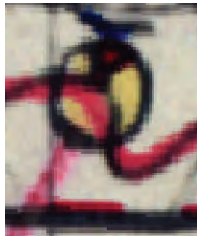
There are no mine notes or field notes that relate to this mine in ISGS archives.

We have moved this mine from the Springfield coal seam to the Herrin Coal seam. That means #7518 was stripped out by the Edwards Mine (mine index 881).

Part of our reasoning back in 2012 when we made our first pass at investigating, was to put #7518 in the Springfield seam as we didn't have enough evidence to be sure which coal seam it existed in, and wanted this mine to show up on our maps out of caution, and to prompt further investigation. Both the Herrin and Springfield seams have been mined in this area, but the Herrin was known to be stripped, leaving the Springfield seam as a remaining candidate.

Reviewing this for Brent Guttman, see emails below, it now looks clear, based on the test drilling they conducted and a further review of the limited data we have on this mine, that #7518 mined the Herrin seam. A couple items of note that supports this are below:

1. The Federal Land Bank Report for Peoria County (1934) (screenshot) shows what appears to be this mine. The black circle with yellow shading indicating the possible mine location, and the red line crossing through the mine where the map makers drew the Herrin Coal Crop (extent of coal)



2. Not conclusive, but the mine map may be trying to communicate that mine entries may be originating from the highwall of a strip mine.



3. Jen noted that the Illinois Coal Reports called #7518 a strip mine from 1934-1936, then it reported as an underground mine. This bolsters the notion that the underground workings entered off of the highwall and that the likely coal seam mined was the Herrin (the Herrin ranges from 25-100 feet deep in this area while the Springfield ranges from 75-125 feet deep).

Cheers all!
Scott

Scott D. Elrick
Head – Bedrock Geology Section
University of Illinois, Urbana-Champaign
Prairie Research Institute
Illinois State Geological Survey
615 E. Peabody Drive, Champaign, IL 61820
429 Natural Resources Building | M/C 650
Office (217) 333-3222 Cell (217) 898-1975
elrick@illinois.edu www.isgs.illinois.edu

From: Brent Guttman <Brent.Guttman@illinois.gov>

Date: Wednesday, February 28, 2024 at 8:56 AM

To: Alan Myers <amyers76@illinois.edu>

Cc: "Range, Lance L." <Lance.L.Range@illinois.gov>, "Karl, Joseph" <Joseph.Karl@illinois.gov>, "Elrick, Scott D" <elrick@illinois.edu>, Jennifer Greco <jobrad@illinois.edu>

Subject: RE: ISGS Mine Index 7518

Alan,

Will Mine Index 7518 be updated in the Directory and on the ILMines Wiki to show that the Herrin seam was mined? If so, do you know how soon that would happen?

I should receive the boring logs later this week.

Thanks,

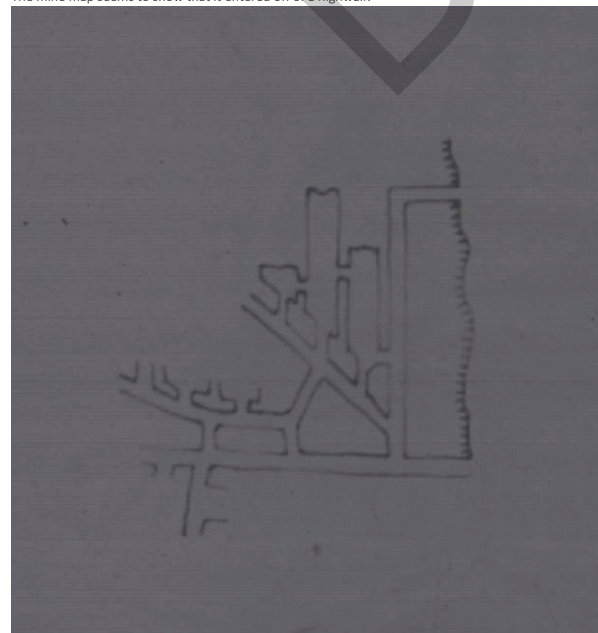
Brent

From: Guttman, Brent

Sent: Friday, February 2, 2024 6:45 AM

To: Myers, Alan R <amyers76@illinois.edu>

Cc: Range, Lance L. <Lance.L.Range@illinois.gov>; Karl, Joseph <Joseph.Karl@illinois.gov>; Elrick, Scott D <elrick@illinois.edu>; Greco, Jennifer <jobrad@illinois.edu>



With this I would say that the mine was likely in the Herrin seam and we need to move it out of the Springfield. Looking the other mined in the mine index number range of 75xx nearby, they too may need to be moved to the shallower Herrin seam

From: Guttman, Brent <Brent.Guttman@illinois.gov>
Sent: Thursday, February 1, 2024 3:18 PM
To: Myers, Alan R <amyers76@illinois.edu>
Cc: Range, Lance L. <Lance.L.Range@illinois.gov>; Karl, Joseph <Joseph.Karl@illinois.gov>; Elrick, Scott D <elrick@illinois.edu>; Greco, Jennifer <jobrad@illinois.edu>
Subject: RE: ISGS Mine Index 7518

Alan,

Sorry to bug you yet again on this, but we are scratching our heads over here trying to figure out what our next steps should be...

Attached is a map along with the approximate coordinates of 10 exploratory borings that have been completed for a proposed landfill cell at the Peoria City/County Landfill. All borings encountered coal at the expected elevation/depth to the Springfield (No. 5) coal seam. Also included on the 3rd page is a plan sheet showing borings conducted by others previously for GFL.

We are theorizing that the Black Jewel No. 2 mine may have actually been an underground mine in the Herrin (No. 6) coal seam. The Herrin (No. 6) coal seam was later surface mined by the Midland Coal Company, Edwards Mine (ISGS Mine Index 881):

Note that the Geological Problems Reported section for the Edwards mine states: *Some old workings were encountered while excavating some of the pits.*

We would be interested in knowing your thoughts regarding this theory. Is there definitive information that puts the Stenstrom / Black Jewel No. 2 in the Springfield seam?

Feel free to give me a call to discuss.

Thanks,

Brent Guttman, PE
Illinois Department of Natural Resources
Office of Mines & Minerals, AMLR Division
SIUE – Box 1459 – Alumni Hall Room 1302
Edwardsville, IL 62026
Office 618-650-3197
Mobile 618-444-2635
Fax 618-650-2350

From: Guttman, Brent
Sent: Tuesday, November 21, 2023 4:57 PM
To: Greco, Jennifer <jobrad@illinois.edu>; Elrick, Scott D <elrick@illinois.edu>; Myers, Alan R <amyers76@illinois.edu>
Cc: Range, Lance L. <Lance.L.Range@illinois.gov>; Karl, Joseph <Joseph.Karl@illinois.gov>
Subject: RE: ISGS Mine Index 7518

Jen,

Thanks a bunch for checking!

Hope you all have a great Thanksgiving.

From: Greco, Jennifer <jobrad@illinois.edu>
Sent: Tuesday, November 21, 2023 4:11 PM
To: Elrick, Scott D <elrick@illinois.edu>; Guttman, Brent <Brent.Guttman@illinois.gov>; Myers, Alan R <amyers76@illinois.edu>
Cc: Range, Lance L. <Lance.L.Range@illinois.gov>; Karl, Joseph <Joseph.Karl@illinois.gov>
Subject: [External] RE: ISGS Mine Index 7518

Hi all-

I've done some digging, and I haven't come across any additional info about this mine (no mine notes, field notes, etc.). There isn't anything more in our documentation either. If you need a copy of the microfilm that was used, just let me know.

Jen

From: Elrick, Scott D <elrick@illinois.edu>
Sent: Tuesday, November 21, 2023 2:58 PM
To: Guttman, Brent <brent.guttman@illinois.gov>; Myers, Alan R <amyers76@illinois.edu>; Greco, Jennifer <jobrad@illinois.edu>
Cc: Range, Lance L. <Lance.L.Range@illinois.gov>; Karl, Joseph <Joseph.Karl@illinois.gov>
Subject: Re: ISGS Mine Index 7518

Hi folks,

Alan is out today (early vacation), so forwarding this on to Jen Greco for an answer.

Cheers all,
Scott

Scott D. Elrick
Head – Bedrock Geology Section
University of Illinois, Urbana-Champaign
Prairie Research Institute
Illinois State Geological Survey
615 E. Peabody Drive, Champaign, IL 61820
429 Natural Resources Building | M/C 650
Office (217) 333-3222 Cell (217) 898-1975
elrick@illinois.edu www.isgs.illinois.edu
ILLINOIS

From: Brent Guttman <Brent.Guttman@illinois.gov>
Date: Tuesday, November 21, 2023 at 2:38 PM
To: Alan Myers <amyers76@illinois.edu>
Cc: "Elrick, Scott D" <elrick@illinois.edu>, "Range, Lance L." <Lance.L.Range@illinois.gov>, "Karl, Joseph" <Joseph.Karl@illinois.gov>
Subject: ISGS Mine Index 7518

Alan,

We are working with Peoria City/County Landfill on a potential mine grouting project and are currently conducting a subsurface investigation in order to determine whether mine voids are present in an area where a new landfill cell is proposed. You may have already been asked this by others, but is there any additional information beyond what is included in the directory you could provide regarding ISGS Mine Index 7518 (Stenstrom / Black Jewel No. 2)?

Thanks,

Brent Guttman, PE
Illinois Department of Natural Resources
Office of Mines & Minerals, AMLR Division
SIUE – Box 1459 – Alumni Hall Room 1302
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APPENDIX C

DIRECTORY OF COAL MINE AND ILLINOIS MINE INDEX EXCERPTS

DIRECTORY OF COAL MINES IN ILLINOIS

7.5-MINUTE QUADRANGLE SERIES

HANNA CITY QUADRANGLE

PEORIA COUNTY

Alan R. Myers & C. Chenoweth



2012

Prairie Research Institute
William W. Shilts, Executive Director
ILLINOIS STATE GEOLOGICAL SURVEY
E. Donald McKay III, Director

Natural Resources Building
615 East Peabody Drive
Champaign, Illinois 61820

Phone 217-244-4610
Fax 217-333-2830



This material is based upon work supported by the Illinois Mine Subsidence Insurance Fund. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the Illinois Mine Subsidence Insurance Fund.

DRAFT

Cover photo Track-mounted duckbill loading machine at a Peabody Coal Company mine, ca. 1915.

DISCLAIMER: The accuracy and completeness of mine maps and directories vary with the availability of reliable information. Maps and other information used to compile this mine map and directory were obtained from a variety of sources and the accuracy of some of the original information cannot be verified. Consequently, the Illinois State Geological Survey (ISGS) cannot guarantee the mine maps are free of errors and disclaims any responsibility for damages that may result from actions or decisions based on them.

The ISGS updates the maps and directories periodically, and welcomes any new information or corrections. Please contact the Coal Section of the ISGS at the address shown on the title page of this directory, or telephone (217) 244-4610.

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Mine Index 881
Midland Coal Company, Edwards Mine

Type: Surface Total mined-out acreage shown: 2,525

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Tipple	Peoria	9N 6E	25	NE SE NW

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft)			Mining Method
		Min	Max	Avg	
Herrin	34-60			3.67-4.75	Surface

Geologic Problems Reported: Some old workings were encountered while excavating some of the pits. The Brereton Limestone above the Herrin Coal was up to 5 feet thick in some places, absent in some places, and was sometimes lenticular. In some places the upper part of the limestone was nodular. Sandstone was present 5 to 10 feet above the coal. Clay dikes were common in some pits. The blue band in this area was about 9 inches from the top of the seam.

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
Morgan Coal Company	Edwards	1952-1963	1,796,340
Peabody Coal Company	Edwards	1963-1970	3,617,743
Midland Coal Company	Edwards	1970-1975	<u>1,844,226</u>
			7,258,309

Last reported production: September 1975

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
USGS topographic map	1996	1:24000	1:24000	Secondary source
USGS topographic map	1971, PR 1979	1:24000	1:24000	Secondary source
NAIP digital ortho-photo quadrangles	2004	1:6000	1:6000	Secondary source
Company, 6-110 (a-c)	Undated	1:15840	1:15840	Not final
Company, 6-113	Undated	1:3600	1:3600	Not final
Company, 6-189	1969	1:62500	1:62500	Not final

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation, depth, mining method.
 Directory of Illinois Coal Mines (Peoria County) - Mine names, mine index, ownership, years of operation.
 Mine notes (Peoria County) - Mine location, seam, thickness.
 USGS topographic map, Peoria West Quadrangle, 1996 - Mine outline, mining method.
 USGS topographic map, Hanna City Quadrangle, 1971, Photorevised 1979 - Mine outline.
 National Agriculture Imagery Program map, digital ortho-photo quadrangle map, Hanna City Quadrangle, 2004 - Mine outline.
 National Agriculture Imagery Program map, digital ortho-photo quadrangle map, Farmington East Quadrangle, 2004 - Mine outline.
 Company map, Coal Section files, 6-110 (a-c) - Pit identification.
 Company map, Coal Section files, 6-113 - Pit identification.
 Company map, Coal Section files, 6-189 - Pit identification.

Mine Index 7518**Black Jewel Coal Company, Black Jewel No. 2 Mine**

Type: Underground Total mined-out acreage shown: 1 Production indicates approximately 5 acres were mined.

SHAFT, SLOPE, DRIFT or TIPPLE LOCATIONS

Type	County	Township-Range	Section	Quarters-Footage
Main slope	Peoria	9N 6E	23	SE NW SW
Air shaft	Peoria	9N 6E	23	SE NW SW

GEOLOGY

Seam(s) Mined	Depth (ft)	Thickness (ft)			Mining Method
		Min	Max	Avg	
Springfield					MRP

Geologic Problems Reported:

PRODUCTION HISTORY

Company	Mine Name	Years	Production (tons)
Arthur Stenstrom	Stenstrom	1934-1935	4,300
E. H. Stenstrom	Stenstrom	1936-1937	1,568
E. H. Stenstrom	Stenstrom	1938-1940 *	5,137 **
Carl F. Goetz	Black Jewel No. 2	1941-1942	7,680 **
Black Jewel Coal Company	Black Jewel No. 2	1943-1943	200 **
			18,885

* Idle 1940

** Production after map date

Last reported production: 1943

SOURCES OF DATA

Source Map	Date	Original Scale	Digitized Scale	Map Type
Microfilm, document 352295	1-10-1938	1:2400	1:1986	Not final
Federal Land Bank Report	4-1934	1:142560	1:142560	Secondary source

Annotated Bibliography (data source, brief description of information)

Coal Reports - Production, ownership, years of operation.

Directory of Illinois Coal Mines (Peoria County) - Mine names, mine index, ownership, years of operation.

Microfilm map, document 352295, reel 03138, frame 366 - Slope & shaft locations, mine outline, mining method.

OTHER MINES SHOWN ON HANNA CITY QUADRANGLE

Mine Index 4257, Burns Brothers NE NW NW 30-T9N-R7E, Springfield Coal source: Microfilm map, document 352175, map of Silver Creek No. 2 Mine (mine index 5885, 10-3-1925)

Mine Index 5845 SW SE NE 34-T8N-R6E, Herrin Coal source: ISGS field notes (A. C. Bevan, 8-21-1928) and Federal Land Bank Report (4-1934)

Mine Index 5874 W ½ NE SE 28-T9N-R6E, Springfield Coal source: Federal Land Bank Report

Mine Index 5875 SW NE SW 26-T9N-R6E, drift, Springfield Coal source: ISGS field notes (D. L. Carroll, 10-1-1929) and Federal Land Bank Report (4-1934) and Glasford Quadrangle (USGS 15-minute topographic map, 1930)

Mine Index 5876 * SW SW SE 35-T9N-R6E, Herrin Coal source: Federal Land Bank Report (4-1934)

Mine Index 6181 * SW SW NW 26-T9N-R6E, Herrin Coal source: ISGS mine database

Mine Index 6182 SE SE NE 27-T9N-R6E, Herrin Coal source: ISGS mine database

Mine Index 7519 SW SW NW 35-T8N-R6E, "small coal mine", Herrin Coal source: ISGS map library, 4103.P41 i5.1-35

Mine Index 7520 NE SW NE 34-T8N-R6E, circa 1870-1873, Herrin Coal source: Atlas Map of Peoria County (1873)

Mine Index 7522 * NW SE NE 31-T9N-R6E, drift, Herrin Coal source: ISGS field notes (D. L. Carroll, 10-2-1929)

Mine Index 7523 NW NE SE 34-T9N-R6E, surface, Chapel Coal, 1.5 feet thick source: ISGS field notes (A. C. Bevan, 10-1-1929)

Mine Index 7524 NW SE SE 35-T9N-R6E, drift, Herrin Coal source: ISGS field notes (D. L. Carroll, 10-1-1929)

Mine Index 7525 NE NE SW 22-T9N-R6E, drift, Springfield Coal source: ISGS field notes (A. C. Bevan & D. L. Carroll, 9-26-1929) and Federal Land Bank Report (4-1934)

Mine Index 7526 NW SW SE 32-T8N-R6E, drift, Herrin Coal source: ISGS field notes (A. C. Bevan, 7-26-1928)

Mine Index 7527 NE SW NW 27-T8N-R6E, mine, Danville Coal, 1.2 feet thick source: ISGS field notes (S. E. Ekblaw, 7-26-1928)

Mine Index 7528 NW SE NE 5-T8N-R6E, drift, Herrin Coal source: ISGS field notes (A. C. Bevan, 7-26-1928)

Mine Index 7529 SE NE NE 2-T8N-R6E, two drifts, Herrin Coal source: ISGS field notes (A. C. Bevan, 1929)

Mine Index 7530 NW NE NE 2-T8N-R6E, drift, Herrin Coal source: ISGS field notes (H. R. Wanless, 1929)

Mine Index 7531 NE SE NE 24-T9N-R6E, Springfield Coal source: Atlas Map of Peoria County (1873)

Mine Index 7532 SW SE NE 25-T9N-R6E, Springfield Coal source: Atlas Map of Peoria County (1873)

Mine Index 7533 SE SE NE 25-T9N-R6E, Springfield Coal source: Atlas Map of Peoria County (1873) and microfilm, document 352175, map of Silver Creek No. 2 Mine (mine index 5885, 10-3-1925)

Mine Index 7534 SW NE SE 25-T9N-R6E, Springfield Coal source: Atlas Map of Peoria County (1873)

Mine Index 7535 NE NW SW 23-T9N-R6E, Springfield Coal source: Atlas Map of Peoria County (1873) and Federal Land Bank Report (4-1934)

Mine Index 7536 NW NE SW 36-T9N-R6E, drift, Herrin Coal source: ISGS field notes (D. L. Carroll, 1929)

Mine Index 7537 NE NE SW 36-T9N-R6E, drift, Herrin Coal source: ISGS field notes (D. L. Carroll, 1929)

Mine Index 7538 NE SE SW 22-T9N-R6E, underground, Springfield Coal source: Federal Land Bank Report (4-1934)

Mine Index 7539 NE NW NW 26-T9N-R6E, Springfield Coal source: Atlas Map of Peoria County (1873)

Mine Index 7540 NW NW SW 24-T9N-R6E, slope (air slope at SW SW SW), Springfield Coal source: microfilm, document 352278, map of Glenwood Mine (mine index 827, 6-1-1917)

Mine Index 7541 NW 23-T9N-R6E, surface, Herrin Coal source: ISGS field notes (R. C. Anderson, 1964) and Federal Land Bank Report (4-1934)

* Not shown on accompanying map because of later surface mining

Mine Index 7518 Black Jewel Coal Company, Black Jewel No. 2 Mine

Mine Index Number: 7518

Company Name:	Black Jewel Coal Company		
Mine Name:	Black Jewel No. 2 Mine		
Start Date:	1934	End Date:	1943
Type of Mine:	Surface, Underground		
Total acres shown:	None		
Production Indicated Acres:	5	General Area of mining acres shown:	
This mine was later surface mined by Midland Coal Company, Edwards Mine (mine index 0881).			

Shaft, Slope, Drift or Tipple Location(s)

Type	County	Township-Range	Section	Part Section
Main slope	Peoria	9N 6E	23	SE NW SW
Air shaft	Peoria	9N 6E	23	SE NW SW

Geology

Seam	Depth (ft)	Min	Thickness (ft)		Mining Method
			Max	Ave	
Herrin					Surface, MRP

Geological Problems Reported

Production

Company	Mine Name	Date	Production (tons)
Arthur Stenstrom	Stenstrom	1934-1935	4,300
E. H. Stenstrom	Stenstrom	1936-1940	6,705
Carl F. Goetz	Black Jewel No. 2	1941-1942	7,680
Black Jewel Coal Company	Black Jewel No. 2	1943-1943	200

Production Notes

Coal Report production (if available)

Sources of Data

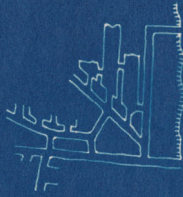
<u>Source Map</u>	<u>Map Date</u>	<u>Original Scale</u>	<u>Digitized Scale</u>	<u>Map Type</u>
State archive, IL_2490_01	1-10-1938	1:2400	1:2400	Not final
Federal Land Bank Report	4-1934	1:142560	1:142560	Secondary source

Annotated Bibliography (Data source - brief description of information)

Coal Reports - Production, ownership, years of operation, mining method.
Directory of Illinois Coal Mines (Peoria County) - Mine names, mine index, ownership, years of operation.
State archive, IL_2490_01 - Slope & shaft locations, mine outline, mining method.
Federal Land Bank Report (Peoria County) - General area of mining.

Mine Notes**Mine Images****Photographs**

APPENDIX D
STENSTROM MAP



DRAFT

23

E. H. STENSTROM COAL MINE
STATE OF ILLINOIS PECOIA COUNTY
SCALE 1" = 200' ADDEFIELD TWP. JANUARY 10, 1930
SWAMP OR L. JACK CONWAY, owner or Lynch Conway
PECOIA, ILL.

0 200 400
feet

I hereby certify this survey to be correct to the
best of knowledge & belief

Lynch Conway

APPENDIX E

BLACK JEWEL MINE NO. 2 ILMINES INFORMATION

Mine Index 7518 Black Jewel Coal Company, Black Jewel No. 2 Mine

Disclaimer	
INTERPRETING A MINE SUMMARY SHEET	
	Unlocated Mines in:
	County:
	Quadrangle:
	County Coal Data:
	Shown On Map:
	Unlocated:
	MSHA ID:

Mine Index Number: 7518

Company Name:	Black Jewel Coal Company		
Mine Name:	Black Jewel No. 2 Mine		
Start Date:	1934	End Date:	1943
Type of Mine:	Surface, Underground		
Total acres shown:	None		
Production Indicated Acres:	5	General Area of mining acres shown:	
This mine was later surface mined by Midland Coal Company, Edwards Mine (mine Index 0881).			

Shaft, Slope, Drift or Tipple Location(s)

Type	County	Township-Range	Section	Part Section
Main slope	Peoria	9N 6E	23	SE NW SW
Air shaft	Peoria	9N 6E	23	SE NW SW

Geology

Seam	Depth (ft)	Thickness (ft)			Mining Method
		Min	Max	Ave	
Herrin					Surface, MRP

Geological Problems Reported

Production

Company	Mine Name	Date	Production (tons)
Arthur Stenstrom	Stenstrom	1934-1935	4,300
E. H. Stenstrom	Stenstrom	1936-1940	6,705
Carl F. Goetz	Black Jewel No. 2	1941-1942	7,680
Black Jewel Coal Company	Black Jewel No. 2	1943-1943	200
Total Production:			18,885

Production Notes

Coal Report production (if available)

Sources of Data

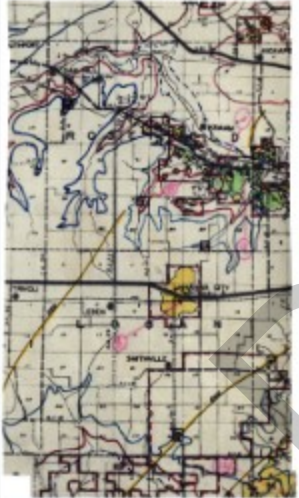
Source Map	Map Date	Original Scale	Digitized Scale	Map Type
State archive, IL_2490_01	1-10-1938	1:2400	1:2400	Not final
Federal Land Bank Report	4-1934	1:142560	1:142560	Secondary source

Annotated Bibliography (Data source - brief description of information)

Coal Reports - Production, ownership, years of operation, mining method.
Directory of Illinois Coal Mines (Peoria County) - Mine names, mine index, ownership, years of operation.
State archive, IL_2490_01 - Slope & shaft locations, mine outline, mining method.
Federal Land Bank Report (Peoria County) - General area of mining.

Mine Notes

Mine Images

	Map Type:	State Archive
	Map ID:	IL_2490_01
	Company:	E. H. Stenstrom
	Mine Name:	Stenstrom
	Caption:	
	Map Date:	01-10-1938
	Map Status:	Not Final
	Image Credit:	
	Note:	
	More Info:	M7518 IL 2490 01
Full Rec Download: 		https://go.illinois.edu/ILMImages/peoria/m7518_IL_2490_01.zip
	Map Type:	Federal Land Bank Report
	Map ID:	Peoria County
	Company:	
	Mine Name:	
	Caption:	
	Map Date:	4-1934
	Map Status:	Secondary
	Image Credit:	
	Note:	Clipped version of the Federal Land Bank Report. Full Federal Land Bank (Quade) Download Download
	More Info:	Hanna city quade
Full Rec Download: 		https://go.illinois.edu/ILMImages/peoria/hanna_city_quade.zip

Photographs

Categories: Peoria-County | Hanna City-Quadrangle | Mine | Coal Mine

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APPENDIX F

MINE INDEX 7535 ILMINES INFORMATION

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[County Coal Data](#)
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Mine Index 7535 Unknown, Unknown Mine

Disclaimer	
INTERPRETING A MINE SUMMARY SHEET	
	Unlocated Mines In:
	County:
	Quadrangle:
	County Coal Data:
	Shown On Map:
	Unlocated:
MSHA ID:	

Mine Index Number: 7535

Company Name:	Unknown		
Mine Name:	Unknown Mine		
Start Date:	Unknown	End Date:	Unknown
Type of Mine:			
Total acres shown:			
Acres after map date:		General Area of mining acres shown:	

Shaft, Slope, Drift or Tipple Location(s)

Type	County	Township-Range	Section	Part Section
	Peoria	9N 6E	23	NE NW SW

Geology

Beam	Depth (ft)	Thickness (ft)			Mining Method
		Min	Max	Ave	
Springfield					

Geological Problems Reported

Production

Company	Mine Name	Date	Production (tons)
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Production Notes

Coal Report production (if available)

Sources of Data

Source Map	Map Date	Original Scale	Digitized Scale	Map Type
Atlas Map of Peoria County	1873			
Federal Land Bank Report	4-1934			

Annotated Bibliography (Data source - brief description of information)

Mine Notes

Mine Images

Photographs

Categories: [Peoria-County](#) | [Hanna City-Quadrangle](#) | [Mine](#) | [Coal Mine](#)

ATTACHMENT 4

CEC RECOMMENDATIONS REPORT

May 22, 2024

Mr. Timothy Curry
Peoria City/County Landfill, Inc.
119 West Gundlach Street
Columbia, Illinois 62236

**Subject: Peoria City/County Landfill No. 3
Recommendations Report Regarding Potential Mine Works
CEC Project 341-979**

Dear Mr. Curry:

Civil & Environmental Consultants, Inc. (CEC) provided to Peoria City/County Landfill, Inc. (PCCL) a report, dated May 22, 2024 (Peer Review of Potential Mine Works), which summarizes the findings of our peer review of reports and related information regarding potential mine works underneath the proposed waste footprint of the Peoria City/County Landfill No. 3 (Landfill No. 3) located at 11501 West Cottonwood Road, Brimfield, Peoria County (site). The Peer Review of Potential Mine Works summarized the key information and provided the following CEC opinions.

- The Black Jewel Mine No. 2 (if present) was located in the Herrin coal seam and not located in the Springfield coal seam.
- Mining did not occur in the Springfield coal seam underneath Landfill No. 3 except for potentially the far northern portion.
- Additional investigation is required in the far northern portion of Landfill No. 3 to determine whether mining occurred in the Springfield coal seam in this area.
- Subsurface mining may have occurred in the Herrin coal seam, and there is not enough data to conclude that voids are not present from previous mining within the Herrin coal seam underneath Landfill No. 3.

As requested by PCCL, this submittal provides recommendations to further evaluate and/or demonstrate whether:

- Subsurface mining occurred in the Herrin coal seam underneath Landfill No. 3;
- Voids are present from previous mining within the Herrin coal seam underneath Landfill No. 3; and
- Subsurface mining occurred in the Springfield coal seam underneath the northern portion of Landfill No. 3.

The recommendations are intended to address comments from the Illinois Environmental Protection Agency regarding subsurface mining beneath Landfill No. 3.

1.0 ADDITIONAL SUBSURFACE INVESTIGATION OF HERRIN COAL SEAM

As discussed in the Peer Review of Potential Mine Works, soil borings have been advanced within the waste footprint of Landfill No. 3 during both a 2010 to 2012 investigation performed by Shaw Environmental, Inc. (Shaw Investigation) and the subsequent 2023 to 2024 investigation documented in a report prepared by the Illinois Department of Natural Resources-Abandoned Mine Land Reclamation District (IDNR-AMLRD Report). However, only limited borings have sampled the approximate elevation of the Herrin coal seam within the approximately 28-acre general area of mining, and only two of those borings encountered the Herrin coal seam. In addition, none of these limited borings are located within the side slopes of the Landfill No. 3 as designed and permitted.

The Shaw Investigation indicates that:

- Four test borings (B-4-10, B-7-10, B-10-10, and C-9) were drilled within the estimated mine limits of the Black Jewel Mine No. 2 (general area of mining estimated by the Illinois State Geological Survey [ISGS] from IDNR production records).
- One test boring (B-7-10) was drilled within the documented limits (1-acre area of documented mine works from Stenstrom Map) of the mine workings and noted the Herrin coal seam at an approximate elevation of 592 feet above mean sea level (AMSL). The Herrin coal was present underlying approximately 60 feet of mine spoil, and the Springfield coal seam was noted at approximately 520 feet AMSL.
- A site reconnaissance was performed of all mapped underground mine areas to attempt to identify underground mine features and to help geo-reference the mapped underground mine locations. The reconnaissance included hiking the ravines and valleys within the range of elevation that would have most likely facilitated access to the Springfield coal seam.

The IDNR-AMLRD Report indicates that:

- Ten exploratory borings were performed.
- Due to the surface mining, the Herrin coal seam was believed to not be present and sampling was not performed at the expected depth of the Herrin coal seam in any of the soil borings except boring number CB-SV-05.
- The Herrin coal seam was encountered at boring CB-SV-05.

The presence of the Herrin coal seam in two borings within the general area of mining of the Black Jewel Mine No. 2 indicates the need for additional information on both the potential presence and

elevation of the Herrin coal seam, especially within the areas of the planned side-slopes. In addition, the site reconnaissance performed during the Shaw Investigation did not appear to include potential areas of underground mine features associated with the Herrin coal seam.

CEC recommends the installation of additional soil borings within the Landfill No. 3 waste footprint to verify the presence or absence of the Herrin coal seam; determine the elevation of the Herrin coal seam where encountered; and determine if any voids are encountered in the Herrin coal seam as follows:

- Approximately fifteen borings will be advanced to the Pennsylvanian shale known to underlie the Herrin coal seam from previous investigations.
- The borings will focus on the Landfill No. 3 side-slope areas within the general area of mining of the Black Jewel Mine No. 2 and on areas where there are data gaps.
- The number and locations of borings will be based on field conditions and accessibility.

CEC also recommends performing a reconnaissance of the ravines and valleys within Landfill No. 3 that may have provided access to the underground mining of the Herrin coal seam (e.g., the ravine orientated from southwest to northeast in the northern portion of Landfill No. 3, the southwest to northeast excavated feature in the southcentral portion of Landfill No. 3, and the upper reaches of Coal Hollow in the southeastern portion of Landfill No. 3 as shown on Drawing G3 in Appendix A of the Peer Review of Potential Mine Works).

If voids are identified via the boring event, an attempt will be made to delineate the extent of the void and to develop a remedial plan to ensure that the voids will not compromise the integrity of the landfill.

2.0 ADDITIONAL SUBSURFACE INVESTIGATION OF SPRINGFIELD COAL SEAM

As discussed in the Peer Review of Potential Mine Works, the ISGS Directory of Coal Mines in Illinois and online database indicate that underground mining in the Springfield coal seam may have occurred in the far northern portion of Landfill No. 3. The information in the ISGS information is very limited.

CEC recommends reviewing and discussing the available information with the ISGS and/or IDNR to gain concurrence on our understanding of the available information and areas of focus for an additional investigation. This step seems intrinsic to the process since, if it is demonstrated that mining of the Springfield coal seam did not occur in this area, the ISGS will be requested to update their documentation to reflect these findings.

CEC also recommends the installation of additional soil borings within this area to verify the presence or absence of the Herrin and Springfield coal seams; determine the elevation of the Herrin and Springfield coal seams where encountered; and determine if any voids are encountered in the Herrin or Springfield coal seams as follows:

- Borings will be advanced through the Springfield coal seam (to at least approximately 520 feet AMSL based on previous investigations).
- The borings will focus on the northern portion of Landfill No. 3 and may be performed as part of the same borings recommended above for the investigation of the Herrin coal seam.
- The number and locations of borings will be based on field conditions and accessibility.

If voids are identified via the boring event, an attempt will be made to delineate the extent of the void and to develop a remedial plan to ensure that the voids will not compromise the integrity of the landfill.

3.0 OBSERVATIONS DURING LANDFILL DEVELOPMENT

Within the Landfill No. 3 waste footprint, the Herrin coal seam was encountered at elevations ranging from 593 feet to 597 feet AMSL. The excavation grades of Landfill No. 3, as currently designed, have elevations ranging from approximately 574 feet to 594 feet AMSL, with side-slopes to elevations of 620 feet AMSL on the east side to 650 feet AMSL on the west side. Specifically, the elevation of the Herrin coal seam at B-7-10 is approximately 593 feet AMSL while the maximum planned excavation grade in that area of the landfill is approximately 588 feet AMSL (the Herrin coal seam is approximately 5 feet above the planned excavation grade); the elevation of the coal seam at CB-SV-05 is approximately 597 feet AMSL while the maximum planned excavation grade in that area of the landfill is approximately 586 feet AMSL (the Herrin coal seam is approximately 11 feet above the planned excavation grade). As such, the available information indicates that, even if the Herrin coal seam or potential voids within the coal seam are encountered, the excavation of the landfill will likely remove the coal seam and any abandoned mine workings across the floor of the landfill.

Information from the Shaw Investigation (see Drawing No. 16 from Shaw Investigation) indicates that the top of the Pennsylvanian shale appears to dip to the north/northwest. The Herrin coal seam (if present) may be similarly dipping to the north/northwest. If this is the case, there is the potential for the coal seam to be present at or below the planned excavation grades of the landfill in the northern portion of the waste footprint. Additional information on the elevation of the Herrin coal seam is necessary to determine areas where the coal seam may be at or below the Landfill No. 3 planned excavation grades. In addition, the IDNR's estimated limits of the Black Jewel Mine No. 2 extend beyond the proposed landfill floor and, because areas underneath the side-slopes of Landfill No. 3 will not be excavated below the depth of the Herrin coal seam, the Black Jewel Mine No. 2 may potentially extend beyond (and hence beneath) the Landfill No. 3 side-slopes.

While we believe that the additional subsurface investigation described above will identify with a reasonable degree of confidence the presence/absence of voids within the Herrin coal seam beneath the Landfill No. 3 footprint, it will not provide absolute proof of the absence of voids or full extent of voids beneath Landfill No. 3 (if encountered). In order to provide additional assurances that the landfill is not developed over mine voids within the Herrin coal, CEC recommends:

- Using the data from the additional investigation discussed above to augment existing information regarding the top of Pennsylvanian shale, and, to further determine the Herrin coal seam elevations (if present) relative to the Landfill No. 3 excavation grades.
- Using the data from the additional investigation to potentially create a plan sheet(s), which shows areas where the Herrin coal seam (where present) would be removed during the planned landfill development and the areas where the Herrin coal seam (where present) would not be removed during the planned landfill development.
- Develop revision(s) to the construction quality assurance (CQA) plan for Landfill No. 3 to include:
 - Training for personnel assigned to CQA tasks to recognize the presence of the Herrin coal seam, potential voids, and/or former mine workings (especially near side slopes);
 - Documentation of related observations;
 - Notification procedures if pertinent features are observed; and
 - Procedures for addressing areas of concern that are discovered (e.g., over excavation and backfill, grouting, etc.).

4.0 CLOSING

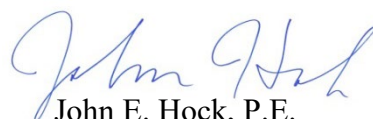
CEC appreciates the opportunity to be of service to GFL on this project. CEC's recommendations are based on the available information and CEC's experience. Our recommendations may change if additional or differing information becomes available. Please let us know of any questions.

Sincerely,

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.



Steven E. Kroll, P.G.
Project Manager



John E. Hock, P.E.
Vice President

cc: Mr. Matt Coulter, GFL Environmental Inc. (*electronic delivery*)
Mr. George Armstrong, GFL Environmental Inc. (*electronic delivery*)
Mr. Tony Pelletier, GFL Environmental Inc. (*electronic delivery*)

ATTACHMENT 5

CQA PLAN

ATTACHMENT 5A

APPROVED CQA PLAN

CONSTRUCTION QUALITY ASSURANCE PLAN

1.0 SCOPE AND APPLICABILITY

The purpose of this Construction Quality Assurance (CQA) Plan is to provide an organizational framework for testing, observation and monitoring activities that will be performed during facility construction in order to document that the constructed facility will meet or exceed all design criteria, drawings and specifications. The CQA Plan also outlines the organization, the implementation and the review of the various CQA activities, the responsibilities of the parties involved in the program, and provides sampling and testing programs to be carried out during the construction of critical facility components. The ultimate goal of the CQA program is to provide a means of evaluating and controlling the quality of the constructed facility so that the intent and minimum material and construction specifications of the design have been met. The purpose of this plan is not to detail every aspect of the quality monitoring programs, but rather to provide a framework for which a thorough construction-monitoring program can be implemented.

This plan, at a minimum, applies to the construction of the following features:

- ☐ Landfill foundation and subgrade materials and preparation,
- ☐ Compacted Earth Liner, materials, placement, compaction, and protection,
- ☐ Geomembrane materials, installation, and protection,
- ☐ Leachate drainage, collection and recirculation system materials and construction,
- ☐ Final cover materials and construction,
- ☐ Gas extraction wells, gas transmission piping, and condensate management system materials and construction, and
- ☐ Ponds, ditches, lagoons, and berm construction.



2.0 RESPONSIBILITY AND AUTHORITY

2.1 Regulatory Agency

The IEPA has the legal and regulatory authority to review and approve or deny permit applications for the construction and operation of the subject landfill. As part of this process, the IEPA has the responsibility and authority to review CQA documents and certifications during and after construction. The intent of this review is to confirm that the CQA program was properly followed, that the facility was constructed in conformance with the appropriate regulations and permit conditions, and that the facility was constructed in substantial conformance with the drawings and specifications. Based on this review, the IEPA will either grant or deny the permit application requesting authorization to utilize the constructed facilities that are the subject of the operating permit request.

2.2 Landfill Operator

The Landfill Operator is responsible for obtaining all required permits for construction and operation of the landfill. The Landfill Operator is also responsible for complying with all applicable regulatory requirements of the Regulatory Agency. The Landfill Operator has the authority to select and dismiss organizations charged with design, CQA, and construction activities. Although subject to the Regulatory Agency's concurrence, the Landfill Operator also has the authority to accept or reject design plans and specifications, CQA plans, project review and recommendations by the CQA Officer, and the materials and/or workmanship of the construction contractors. In addition, the Landfill Operator may serve as the construction contractor and/or the Design Engineer.

2.3 Design Engineer

The Design Engineer is responsible for designing the facility to meet the design and operational requirements of the Regulatory Agency and Landfill Operator. The Design Engineer shall be properly licensed to provide professional engineering services in the State of Illinois. The Design Engineer has the additional responsibility and authority for modifying the design as necessary during construction in order to address unexpected conditions. The Design Engineer also has the authority to recommend and/or specify corrective measures where deviation from the design or failure to meet design criteria is detected by CQA Personnel. All such design and construction changes shall conform to the appropriate regulations, and shall be documented in the CQA Report. If, in the event that landfill regulations change or laboratory testing of construction materials cannot meet the minimum specifications outlined in this Siting Application, the Design Engineer shall be responsible for overseeing the development of alternative design(s), construction techniques, or implementing new technologies that are demonstrated to be protective of the public health, welfare and safety. Any modifications to the design must be reviewed and approved by the Illinois Environmental Protection Agency and other governing bodies prior to implementation.

2.4 CQA Personnel

The overall responsibility of the CQA Personnel is to observe and test the construction activities and materials in order to confirm whether the work and materials are in



conformance with the drawings and specifications. CQA Personnel include the CQA Officer and CQA Technicians.

The CQA Officer shall be independent of the Owner and Landfill Operator, and shall not be an employee of the Owner or Landfill Operator, or any companies affiliated with the Owner or Landfill Operator. The CQA Officer shall be a properly licensed professional engineer in Illinois.

The CQA Officer is responsible for ensuring that all inspections, testing, meetings, and other activities required by this CQA Plan are conducted in accordance with this CQA Plan. Specific responsibilities of the CQA Officer include:

- ☐ Review design criteria, drawings and specifications for clarity and completeness,
- ☐ Assure that the CQA Technicians, Contractor(s) and Manufacturer(s) are knowledgeable regarding the facility design criteria, project drawings and specifications, permit requirements, CQA requirements, and inspection/testing procedures, as related to their work activities,
- ☐ Verify whether a Test Liner is required prior to, or during, each phase of liner construction. The term "phase" denotes any cell construction project that will require a construction quality assurance report in order to secure an operating permit. The term "phase" is used because the operator may not need to construct an entire cell based on filling rates and the variable sizes of the waste unit cells.
- ☐ Coordinate and schedule CQA activities,
- ☐ Verify that the test equipment in use is appropriate for the test and site conditions, and that the equipment is properly calibrated,
- ☐ Confirm that test data are accurately recorded, reduced, summarized, interpreted, and maintained,
- ☐ Confirm that the facilities are constructed to the lines and grades shown on the drawings,
- ☐ Establish the random sampling program,
- ☐ Identify the need for design modifications and communicate such need to the Design Engineer and/or Landfill Operator,
- ☐ Review Contractor's quality control (CQC), Manufacturer's quality control (MQC) and Manufacturer's quality assurance (MQA) data for conformance with the project specifications and this CQA Plan,
- ☐ Identify materials and construction that do not comply with the drawings or specifications, communicate such non-compliance to the Contractor or Manufacturer, and Landfill Operator (if necessary), and observe, test, and document work conducted to correct such non-compliance,



- ☐ Record all modifications to the plans and construction procedures,
- ☐ Prepare an acceptance report documenting the construction of all landfill components outlined in 35 Ill. Admin. Code Section 811.503(a) that is to be submitted to the IEPA for approval, and
- ☐ Confirm that the required meetings are held.

The CQA Technicians shall possess adequate training and sufficient practical experience to execute the observation and testing activities required. Specific responsibilities of the CQA Technicians include:

- ☐ Observe the work as it is performed to assess compliance with the facility design criteria, drawings, and specifications,
- ☐ Conduct the required sampling and testing,
- ☐ Monitor all tests conducted by the Contractor(s) as may be required by the project specifications and/or this CQA Plan,
- ☐ Perform the required measurements and surveys to verify proper construction grades, lines, depths, thicknesses, elevations, etc.,
- ☐ Promptly report to the Contractor(s) the results of observations and tests as the work progresses,
- ☐ Promptly report to the CQA Officer the results of all observations and tests, including deficiencies, and
- ☐ Prepare and maintain onsite documentation, including daily reports and photographs, as required by this CQA Plan.

During periods of routine, repetitive activities, the CQA Officer may periodically be absent from the project site and may designate, in writing, a "CQA Officer-in-Absentia." The CQA Officer is responsible for selecting a CQA Officer-in-Absentia that is capable of exercising competent judgment in carrying out the CQA Officer duties. The CQA Officer shall routinely communicate with the CQA Officer-in-Absentia, and is responsible for the actions of the CQA Officer-in-Absentia. The CQA Officer is also responsible for determining the need for his/her personal observations of the onsite construction activities. As a general guidance, however, the CQA Officer should be onsite at least once per week to directly observe the work during periods with continuous construction activities covered under this Plan. During periods of sporadic construction activities covered under this Plan, the CQA Officer should, as a general rule, personally observe onsite construction work no less frequently than about once per five full days of construction activity. If the CQA Officer is unable to perform the duties as defined herein, the Landfill Operator will assign a replacement CQA Officer. The replacement CQA Officer must meet the minimum requirements as set forth herein. Multiple CQA Officers are allowed provided each CQA Officer is assigned to a specific task and follows previously defined communication protocol that is compatible with the procedures described herein. The CQA officer will provide in writing the reason for his or her absence. A signed statement will be submitted that indicates the CQA Officer assumes full responsibility for all inspections performed and reports prepared by designated CQA Officer-in-Absentia during the absence.



2.5 Contractor(s)

The Contractors have the responsibility to construct the facility in accordance with the design criteria, drawings, and specifications to the satisfaction of the CQA Officer and Landfill Operator. Contractors are required to implement the quality control programs described in the specifications. The Contractors may implement their own supplemental quality control program for purposes of monitoring their respective construction.

2.6 Manufacturer(s)

The Manufacturers are responsible for manufacturing and/or fabricating their respective components in accordance with the design criteria, drawings, and specifications to the satisfaction of the CQA Officer and Landfill Operator. The Manufacturers are required to implement the MQA and MQC programs described in the specifications. The Manufacturers may implement their own supplemental quality assurance/quality control program for purposes of monitoring the manufacture or fabrication of their respective components.

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3.0 PROJECT MEETINGS

Meetings shall be held periodically during the course of the project to enhance communication and coordination between the various involved organizations. Required meetings are described in the following sections.

3.1 Preconstruction Meeting

A Preconstruction Meeting will be held prior to, or at the onset of, each substantial phase of the construction activities that are subject to this CQA Plan. The term "phase" denotes any cell construction project that will require a construction quality assurance report in order to secure an operating permit. The term "phase" is used because the operator may not need to construct an entire cell based on filling rates and the variable sizes of the waste unit cells. Representatives of the Landfill Operator, Design Engineer, CQA Officer, and Contractor shall attend the Preconstruction Meetings. The purpose of these meetings is listed below:

- ☐ Provide each organization with all relevant CQA documents and supporting information,
- ☐ Familiarize each organization with the site-specific CQA Plan and its role relative to the design criteria, plans, and specifications,
- ☐ Determine any changes to the CQA Plan that are needed to ensure that the facility will be constructed to meet or exceed the specified design,
- ☐ Review the responsibilities of each organization,
- ☐ Review lines of authority and communication for each organization,
- ☐ Discuss the established procedures or protocol for observations and tests including sampling strategies,
- ☐ Discuss the established procedures or protocol for handling construction deficiencies, repairs and retesting,
- ☐ Review methods for documenting and reporting test data,
- ☐ Review methods for distributing and storing documents and reports,
- ☐ Review work area security and safety protocols,
- ☐ Discuss procedures for the location and protection of construction materials and for the prevention of damage to the materials from inclement weather or other adverse events,
- ☐ Conduct a site walk-around to review construction material and testing equipment storage locations, and
- ☐ Establish contractors intended work schedule.



The Landfill Operator will coordinate the Preconstruction Meetings. Meeting minutes will be recorded and distributed to each attendee.

3.2 Progress Meetings

Progress Meetings shall be held periodically to discuss ongoing or upcoming construction activities. Progress Meetings shall be held no less frequently than weekly during periods of ongoing construction activities that are subject to this CQA Plan. The purpose of the meeting is to:

- ☐ Review the construction progress, accomplishments, and outstanding unresolved deficiencies,
- ☐ Review the work location and activities for upcoming new construction activities,
- ☐ Identify the contractor's personnel and equipment assignments for the new activities, and
- ☐ Discuss any potential construction problems

Any involved party can call a Progress Meeting; however, CQA Personnel are responsible for ensuring that Progress Meetings are held at least weekly during periods of ongoing construction activities. At a minimum, the Contractor and CQA Personnel shall attend Progress Meetings. Progress Meetings shall be documented in the CQA Personnel field notes.

3.3 Problem or Work Deficiency Meetings

Special meetings may be held when and if a problem or deficiency is present or likely to occur. At a minimum, the Contractor and CQA Personnel will attend the meeting. The CQA Officer shall attend those meetings that address severe or recurring problems. The CQA Personnel, Contractor, Landfill Operator, or the Design Engineer can request the meeting. The purpose of the meeting is to define and resolve the problem or work deficiency in the following manner:

- ☐ Define and discuss the problem or work deficiency,
- ☐ Review alternative solutions (as appropriate), and
- ☐ Implement a plan to resolve the problem or deficiency.

Any solutions requiring a design change or significant change in construction procedures shall be reviewed and approved by the Design Engineer. Any changes requiring a permit modification shall be reviewed and approved by the IEPA prior to implementation. If deemed necessary by any involved party, an additional meeting may be held to review the success of the actions taken to resolve the problem or deficiency.

At a minimum, the CQA Personnel shall document the meeting in the field notes. At the discretion of the CQA Officer, or as requested by the Contractor, formal minutes of



meetings that address severe and/or recurring problems shall be prepared and distributed to all meeting attendees, the Landfill Operator, and the Design Engineer.

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4.0 TEST LINER

4.1 General Requirements

The purpose of a test liner is to confirm, prior to full-scale liner construction, that the full-scale liner will meet the construction specifications and regulatory requirements using the anticipated Earth Liner materials, construction procedures, and construction equipment. While it is noted that a test liner was constructed for Landfill No. 2, the liner configuration, procedures, and construction equipment are anticipated to be different than at Landfill No. 3. Therefore, at least one Test Liner will be constructed prior to construction of the actual, full-scale Earth Liner to be used for Landfill No. 3. The Test Liner can be incorporated into the full-scale liner provided the testing demonstrates compliance with the Specifications.

The Test Liner to be constructed for Landfill No. 3 shall be constructed using the Earth Liner materials derived from the mine spoil or Carbondale Shale, construction procedures, and construction equipment that are anticipated to be used during full-scale liner construction. At least three lifts shall be constructed. Additional Test Liners shall be constructed if the earth materials, equipment or construction methods vary substantially from those during previous Test Liner construction. Specifically, an additional Test Liner shall be constructed if, in the opinion of the CQA Officer, any of the following occur:

- ☐ The Earth Liner material differs from that of which the original Test Liner was derived;
- ☐ The Earth Liner material within the geologic unit varies substantially in the opinion of the CQA Officer,
- ☐ The compaction equipment is smaller, lighter, or is otherwise believed to result in less compactive energy in the opinion of the CQA Officer, or
- ☐ The construction methods are expected to result in less compactive energy than the construction methods used during previous Test Liner construction.

CQA Personnel, upon consultation with the Landfill Operator, will choose and delineate the limits of the Test Liner in accordance with the Test Liner Plan (See Drawing CQA-1 provided in Attachment 1). The dimensions specified on the Test Liner Plan are minimums; the Test Liner shall be enlarged as necessary to ensure that the Test Area is at least four times the width of the widest piece of compaction equipment, and to ensure that the compaction equipment reaches its normal operating speed prior to entering the Test Area.

4.2 Earth Liner Materials

Earth Liner material specifications are provided in Part 2.01 of the Earthwork Specifications (Specifications Section 02200). CQA Personnel shall observe and test Earth Liner material for the following:

- ☐ Confirmation that the Earth Liner material is derived from the mine spoil or Carbondale Shale,



- ☐ Uniformity of gradation, texture, and moisture content to the satisfaction of the CQA Officer,
- ☐ Atterberg limits, grain-size distribution, and maximum dry density/moisture content relationship (i.e. Proctor test) by ASTM Test Methods D4318, D422, and D698, respectively. At least one of each of these tests shall be performed for each Test Liner, and
- ☐ Free of excessive organics, frozen materials, and oversized stone/clods.

4.3 Earth Liner Subgrade Preparation

Earth Liner subgrade preparation specifications are provided in Part 3.05 of the Earthwork Specifications. The intent of the subgrade preparation specifications is to provide a firm base upon which the compacted Earth Liner can be constructed to ensure that the full thickness of the compacted Earth Liner achieves the specified compaction and hydraulic conductivity criteria. In order to ensure a firm subgrade, the specifications require that the Contractor proof-roll the liner subgrade using equipment acceptable to the CQA Officer. The CQA Personnel shall observe the proof-rolling and note any areas that appear unacceptably soft. The CQA Personnel shall also observe the liner subgrade to confirm the absence of frozen soil, organic-rich soil, standing or running water, or saturated sands at the foundation subgrade. Such soils shall be delineated, removed, and replaced with compacted Earth Liner soil as described in the specifications or as otherwise approved by the Design Engineer.

4.4 Earth Liner Placement and Compaction

CQA Personnel shall observe and test Earth Liner material as it is placed and compacted for the following:

- ☐ Construction methods including type of equipment, number of equipment passes, addition of water, etc.,
- ☐ Maximum lift thickness (prior to compaction), at a minimum frequency of one measurement per lift, and
- ☐ In-place (field) moisture content and dry density to confirm whether the specified moisture content and relative compaction are achieved.

Field density and moisture content tests shall be performed using a properly calibrated nuclear densiometer in accordance with ASTM D-6938, or other generally accepted method approved by the CQA Officer. The CQA Personnel shall select field density/moisture content test locations by random and judgmental processes as described in Attachment 2 of this Application. The testing frequency at randomly selected locations shall be no less than two tests per lift of Test Liner placed.

The CQA Personnel shall record the approximate location of all field density and moisture content tests and hydraulic conductivity samples to a nominal accuracy of ten (10) feet horizontally and three (3) inches vertically referencing the project coordinate and elevation system.



4.5 Hydraulic Conductivity Testing

One location within the Test Liner shall be randomly selected using the procedures outlined in Attachment 2 of this Application and tested for field hydraulic conductivity using a Two-Stage Boutwell Permeameter, or other field hydraulic conductivity test method approved by the Regulatory Agency and Design Engineer.

At least three locations within the Test Liner shall be randomly selected using the procedures outlined in Attachment 2 of this Application and sampled for laboratory hydraulic conductivity testing. These samples shall be collected using thin-wall "Shelby" tubes pushed vertically into the Earth Liner. Where the Test Liner will be incorporated into the full-scale liner, holes resulting from the laboratory hydraulic conductivity sampling activities shall be backfilled with sodium bentonite chips or powder. The bentonite shall be placed in six-inch (6") lifts; each lift shall be charged with sufficient water to adequately hydrate the bentonite. The ends of the Shelby tube shall be sealed to prevent moisture loss or gain. The Shelby tube samples shall be promptly transported (in a vertical position) to the soils laboratory. Once at the laboratory, the tubes shall be fully extruded and inspected by laboratory personnel for evidence of disturbance, improper lift bonding and non-uniformity of soil type. Any such evidence shall immediately be reported to the CQA Officer. The sample shall then be trimmed as required and tested in accordance with ASTM D5084 test methods.

An aliquot of each sample analyzed for laboratory hydraulic conductivity shall also be tested for Atterberg limits and percent passing the No. 200 sieve by ASTM Test Methods D4318 and D422, respectively.

The CQA Personnel shall record the approximate location of all field hydraulic conductivity tests and laboratory hydraulic conductivity samples to a nominal accuracy of ten (10) feet horizontally and three (3) inches vertically referencing the project coordinate and elevation system. The lift number that is subjected to the testing shall also be recorded.

The laboratory hydraulic conductivity test results will be compared with the field hydraulic conductivity test results to determine whether a statistical correlation exists. Revisions to the test methods, additional field testing, and/or additional laboratory testing may be performed in the event a correlation is not observed.



5.0 FULL-SCALE CONSTRUCTION FIELD OBSERVATIONS AND TESTING ACTIVITIES

This section describes the nominal field observation and testing activities that shall be performed by the CQA Personnel. The results of these observation and testing activities shall be compared to the project specifications and drawings to determine work conformance.

5.1 Landfill Foundation

The landfill is designed to ensure that the Landfill No. 3 foundation provides a structurally stable subgrade to support the overlying liner system under the loads that will result from the waste. The foundation is also designed to minimize the possibility of groundwater contamination in the event the liner system is breached.

The Landfill No. 3 foundation shall consist of bedrock (or Compacted Foundation Fill founded on bedrock) across the landfill base and mine spoil or Foundation Fill along the sidewalls. The following observation and testing activities shall be performed by CQA Personnel to ensure that the landfill foundation conforms to the intent of the design, drawings, and specifications.

5.1.1 Sidewall Excavations

The CQA Personnel shall observe the completed sidewall liner excavations over the mine spoil to confirm that the excavation slopes are stable and ensure achievement of liner strength on sidewalls. Specific items to check that, if present, could indicate marginally stable conditions include:

- ☐ Cracks in the ground surface parallel to the slope along and/or near the top of the slope,
- ☐ Presence of weak soils and/or voids,
- ☐ Bulges along the slope or near the toe of the slope, and
- ☐ Significant groundwater seepage from the excavation slope or near its toe.

Part 3.05 of Specifications Section 02200 detail the actions to be taken in the event of encountered voids, soft soils, or saturated sands are encountered in the sidewall excavation. Other evidence of instability shall be reported to the Design Engineer for further evaluation and, if necessary, development of corrective measures to ensure that adequate factors of safety against slope instability are attained.

5.1.2 Groundwater Seepage

Excessive groundwater seepage can result in inadequate fill subgrade conditions (i.e. too soft to allow the first lift of Compacted Foundation Fill or Earth Liner to be compacted to



the specified density), and/or can result in excessive hydrostatic uplift pressures on the completed liner system.

The CQA Personnel shall observe excavations and fill subgrades for evidence of excessive groundwater seepage. The CQA Personnel shall notify the Contractor and the Design Engineer in the event that excessive seepage is noted. Work in areas with excessive groundwater seepage shall be suspended until a solution that is acceptable to the Design Engineer and CQA Officer is developed. Example solutions may include allowing the excess seepage water to naturally drain (acceptable for pockets with limited water), installing and temporarily operating a dewatering system until sufficient overburden is placed to resist hydrostatic uplift, and/or installing a drain tile. Perforated drain tiles that are to remain operational after waste is placed in the nearby landfill cell shall be maintained at an elevation at least 1 foot above the nearest landfill floor elevation to the extent possible in order to prevent a potential preferential leachate pathway. Where this is not possible, the Operating Permit application shall include a request to include the drain tile discharge in the facility water monitoring plan. After de-watering activities have been stopped the drain tile will be grouted in accordance with IEPA regulations.

5.1.3 Landfill Floor

The landfill floor is intended to be founded on, or within, shale bedrock. As such, the landfill floor is anticipated to be competent. Any unsuitable soils shall be removed from the limits of the landfill floor and replaced with Compacted Foundation Fill (reference Parts 2.02 and 3.06 of the Earthwork Specifications).

The CQA Personnel shall observe the materials exposed in the landfill floor and lower portions of the sidewalls to confirm that the floor is directly founded on competent bedrock or Compacted Foundational Fill that is founded on bedrock as described above and in the Earthwork Specifications. The CQA Personnel shall also observe the cell floor foundation to confirm the absence of mine spoil, significant fractures, soft soil, frozen soil, organic-rich soil, standing or running water, or saturated sands at the foundation subgrade.

Where unsuitable foundation material is present at the cell floor foundation elevation, the CQA Personnel may conduct a limited exploration program, such as trenches, borings, or observation pits, to delineate the vertical and lateral extent of the unsuitable materials. The unsuitable material shall be completely removed where only a nominal volume of unsuitable material exists beneath cell floor. The Design Engineer, however, shall be notified immediately if the limited exploration program indicates a substantial volume of unsuitable material exists. In that case, the Design Engineer may conduct additional investigations, as appropriate, to delineate the extent of the unsuitable material and establish the limits of the over-excavation. The CQA officer shall document the removal and filling of local sand deposits on the landfill foundation (subbase) as-built drawing as required by 35 Ill. Adm. Code 811.506(a) and (b) and 812.305(c)(5).

5.1.4 Compacted Foundation Fill

Fill placed beneath the landfill floor Earth Liner shall meet the specified requirement of Compacted Foundation Fill, as provided in the Earth Specifications (Section 02200).



Compacted Foundation Fill Materials

CQA Personnel shall observe and test Compacted Foundation Fill material for the following:

- ☐ Confirmation that the Compacted Foundation Fill material is derived from the mine spoil or Carbondale Shale,
- ☐ Uniformity of gradation, texture, and moisture content,
- ☐ Soil type according to the United Soil Classification System (visual-manual method), at a minimum testing frequency of one sample each day that Compacted Foundation Fill is placed,
- ☐ Atterberg limits and grain-size distribution by ASTM Test Methods D4318 and D422 (including hydrometer), respectively, at a nominal testing frequency of one test per 30,000 cubic yards of Compacted Foundation Fill placed,
- ☐ Maximum dry density/moisture content relationship (i.e. Proctor test) by ASTM Test Method D698. Each soil type derived from each geologic unit used for Compacted Foundation Fill construction shall be tested. Subsequent testing shall be at the discretion of the CQA Officer; however, at a minimum, one-point "check points" shall be performed and correlated to full Proctor curves at a nominal frequency of one checkpoint per 10,000 cubic yards of Compacted Foundation Fill placed. A full Proctor test shall be conducted on material for which the checkpoint does not correlate to a previously completed Proctor curve,
- ☐ Free of excessive organics, frozen materials, and oversized stone/clods,
- ☐ Undrained shear strength. Undrained shear strength shall be tested on samples remolded to the minimum specified dry density and maximum specified moisture content in accordance with ASTM Test Methods D2166, D2850, or D4767. Alternatively, undisturbed samples of in-place Compacted Foundation Fill may be tested. At least one sample for every 10,000 cubic yards of Compacted Foundation Fill placed shall be tested. Undrained shear strength testing is not required where less than 2,000 cubic yards of Compacted Foundation Fill is placed during any phase of construction. The average of the samples shall be used to determine compliance with the project specifications; however, no single test result shall be less than 75 percent of the specified strength value, and
- ☐ Hydraulic conductivity. Hydraulic conductivity shall be tested on samples remolded to the minimum specified dry density and maximum specified moisture content in accordance with ASTM Test Methods D2166 or D2850. Alternatively, undisturbed samples of in-place Compacted Foundation Fill may be tested. At least one sample for every 10,000 cubic yards of Compacted Foundation Fill placed shall be tested. The average of the samples shall be used to determine compliance with the



project specifications; however, no single test result shall be more than three times greater than the specified hydraulic conductivity value.

Compacted Foundation Fill Subgrade Preparation

Compacted Foundation Fill subgrade preparation specifications are provided in the Earthwork Specifications. The intent of the subgrade preparation specifications is to provide a firm base upon which the Compacted Foundation Fill can be constructed. In order to ensure a firm sub5.1.4. grade, the specifications require that the Contractor proof-roll the liner subgrade using equipment acceptable to the CQA Officer. The CQA Personnel shall observe the proof-rolling and note any areas that appear unacceptably soft (i.e. is too soft to allow the first lift of Compacted Foundation Fill to be compacted to the specified relative compaction). The CQA Personnel shall also observe the subgrade to confirm the absence of frozen soil, organic-rich soil, standing or running water, or saturated sands at the foundation subgrade. Such soils shall be delineated, removed, and replaced with Compacted Earth Fill as described in the specifications or as otherwise approved by the Design Engineer. Prior to fill, a reasonable attempt will be made to remove all rocks including those less than four (4) inches in diameter.

Compacted Foundation Fill Placement and Compaction

CQA Personnel shall observe and test Compacted Foundation Fill material as it is placed and compacted for the following:

- ☐ Maximum lift thickness (prior to compaction), at a nominal frequency of two measurements per acre per lift,
- ☐ In-place (field) moisture content and dry density to confirm whether the specified moisture content and relative compaction are achieved,
- ☐ Proper lift bonding, and
- ☐ Measures taken to adequately protect the in-place Compacted Foundation Fill from excessive moisture, desiccation, or disturbance,

Field density and moisture content tests shall be performed using a properly calibrated nuclear densiometer in accordance with ASTM D-6938, or other generally accepted method approved by the CQA Officer. The CQA Personnel shall judgmentally select field density/moisture content test locations to provide uniform testing coverage of the fill. CQA Personnel shall test field density and moisture content at a nominal frequency of one test per 2,500 cubic yards of in-place fill material.

The CQA Personnel shall record the approximate location of all field density and moisture content tests to a nominal accuracy of ten (10) feet horizontally and three (3) inches vertically referencing the project coordinate and elevation system.



5.2 Liner

5.2.1 Earth Liner

Earth Liner is to be constructed along the landfill liner floor and sidewalls. Material and subgrade preparation, placement, and compaction specifications are provided in Parts 2.01 and 3.05, respectively, of the Earthwork Specifications.

Earth Liner Materials

CQA Personnel shall observe and test Earth Liner material for the following:

- ☐ Confirmation that the Earth Liner material is derived from the mine spoil and/or Carbondale Shale,
- ☐ Confirmation shall be based on a review of the location and elevation of the borrow source with respect to the geologic cross-sections, and a comparison of the physical descriptions (e.g. color and consistency) of the source earth materials and those described for the material/geologic units.
- ☐ Verification that the Earth Liner material is consistent with that used in a previous successful Test Liner that has been constructed for the proposed expansion. Verification shall include confirmation that the source materials are derived from the same materials used for a successful Test Liner. As an example, the results of the source material tests described in this section can be compared to the results of the Test Fill material test results as further confirmation that the Earth Liner material is consistent with that used in a previous successful Test Liner,
- ☐ Uniformity of gradation, texture, and moisture content,
- ☐ Soil type according to the United Soil Classification System (visual-manual method), at a minimum testing frequency of one sample each day that Earth Liner is placed,
- ☐ Atterberg limits and grain-size distribution by ASTM Test Methods D4318 and D422 (including hydrometer), respectively, at a nominal testing frequency of one test per acre of Earth Liner placed,
- ☐ Maximum dry density/moisture content relationship (i.e. Proctor test) by ASTM Test Method D698. Each soil type derived from each geologic unit used for Earth Liner construction shall be tested. Subsequent testing shall be at the discretion of the CQA Officer; however, at a minimum, one-point "check points" shall be performed and correlated to full Proctor curves at a nominal frequency of one checkpoint per acre of Earth (Cohesive Soil Liner Liner) placed. A full Proctor test shall be conducted on material for which the checkpoint does not correlate to a previously completed Proctor curve.



- ❑ Free of excessive organics, frozen materials, and oversized stone/clods, and
- ❑ Undrained shear strength. Undrained shear strength shall be tested on samples remolded to the minimum specified dry density and maximum specified moisture content in accordance with ASTM Test Methods D2166, D2850 or D4767 (nominal consolidation pressure of 10,000 psf). At least three samples per phase of liner construction shall be tested. Alternatively, at least three undisturbed samples of in-place Earth Liner may be tested. The average of the three samples shall be used to determine compliance with the project specifications; however, no single test result shall be less than seventy five (75) percent of the specified strength value.
- ❑ Interface shear testing of earth liner with geosynthetics shall be conducted in accordance with Section 02640 (Geotextiles), Section 02646 (Geocomposite Drainage Layer), and Section 02650 (Geomembranes).
- ❑ Observe that completed liner sections are protected from damage. In the event that damage is observed, the damage will be documented and appropriate repair methods will be implemented based on the guidance of the CQA Officer to ensure compliance with this Plan. Repair activities and necessary testing will be documented.

Earth Liner Subgrade Preparation

Earth Liner subgrade preparation specifications are provided in Part 3.05 of the Earthwork Specifications. The intent of the subgrade preparation specifications is to provide a firm base upon which the compacted Earth Liner can be constructed to ensure that the full thickness of the compacted Earth Liner achieves the specified compaction and hydraulic conductivity criteria. In order to ensure a firm subgrade, the specifications require that the Contractor proof-roll the liner subgrade using equipment acceptable to the CQA Officer. The CQA Personnel shall observe the proof-rolling and note any areas that appear unacceptably soft (i.e. is too soft to allow the first lift of Compacted Foundation Fill to be compacted to the specified relative compaction). The CQA Personnel shall also observe the liner subgrade to confirm the absence of frozen soil, organic-rich soil, standing or running water, or saturated sands at the foundation subgrade. Such soils shall be delineated, removed, and replaced with Compacted Foundation Fill as described in the specifications or as otherwise approved by the Design Engineer.

Earth Liner Placement and Compaction

CQA Personnel shall observe and test Earth Liner material as it is placed and compacted for the following:

- ❑ Verification that the compaction equipment, techniques, and minimum number of passes are equivalent to, or better than that used to construct a successful Test Liner,



- ☐ Confirmation that construction proceeds only during favorable climatic conditions,
- ☐ Confirmation that the Earth Liner ties into previously constructed adjacent Earth Liner segments,
- ☐ Maximum lift thickness (prior to compaction), at a nominal frequency of two measurements per acre per lift,
- ☐ In-place (field) moisture content and dry density to confirm whether the specified moisture content and relative compaction are achieved,
- ☐ Proper lift bonding,
- ☐ Measures taken to adequately protect the in-place Earth Liner from excessive moisture, desiccation, or disturbance,
- ☐ Confirmation that the liner is adequately protected against freeze-damage during periods of sustained freezing temperatures prior to waste placement. Confirmation may occur by comparing the liner to subsurface temperature data or from visual frost penetration observation,
- ☐ Laboratory hydraulic conductivity of the in-place floor Earth Liner, and
- ☐ Retesting of liner suspected of any damaging effects to verify that the liner still meets the required hydraulic conductivity of 1×10^{-7} cm/sec, and oversight any liner reconstruction that may be necessary.

Field density and moisture content tests shall be performed using a properly calibrated nuclear densiometer in accordance with ASTM D-6938, or other generally accepted method approved by the CQA Officer. The CQA Personnel shall select field density/moisture content test locations by random and judgmental processes as described in Attachment 2 of this Application. The testing frequency at randomly selected locations shall be no less than five tests per acre per lift of liner placed (i.e. thirty (30) tests per acre, assuming six (6) lifts are placed).

At least one laboratory hydraulic conductivity test shall be performed for every two (2) acres (or portion thereof) of landfill floor under construction. Samples for hydraulic conductivity testing shall be collected using thin-wall "Shelby" tubes pushed vertically into the Earth Liner. The sample locations (horizontal and vertical) shall be randomly selected in accordance with the procedures described in Attachment 2 of this Application. Holes resulting from the hydraulic conductivity sampling activities shall be backfilled with sodium bentonite chips or powder. The bentonite shall be placed in six-inch (6") lifts; each lift shall be charged with sufficient water to adequately hydrate the bentonite. The ends of the Shelby tube shall be sealed to prevent moisture loss or gain. The Shelby tube samples shall be promptly transported (in a vertical position) to the soils laboratory. Once at the laboratory, the tubes shall be fully extruded and inspected by laboratory personnel for evidence of disturbance, improper lift bonding and non-uniformity of soil type. Any such evidence shall immediately be reported to the CQA Officer. The sample shall then be trimmed as required and tested in accordance with ASTM D5084 test methods.



The CQA Personnel shall record the approximate location of all field density and moisture content tests and hydraulic conductivity samples to a nominal accuracy of ten (10) feet horizontally and three (3) inches vertically referencing the project coordinate and elevation system. The lift number that is subjected to the testing shall also be recorded.

The CQA Personnel shall survey the edges of the in-place Earth Liner to provide adequate construction documentation and to ease verification that future phases of liner construction tie into the Earth Liner.

Earth Liner Thickness

CQA Personnel are responsible for confirming that the minimum specified Earth Liner thickness is achieved. This shall be accomplished by surveying the elevations of the subgrade prior to placing Earth Liner and the completed Earth Liner surface at the same location, or by other positive means approved by the Regulatory Agency. Thickness measurements shall be made at a nominal frequency of one measurement per 10,000 square feet.

Earth Liner Grades

CQA Personnel shall survey the as-constructed Earth Liner surface to confirm that the Earth Liner was constructed to the lines and grades shown on the drawings. Line and grade tolerances are provided in Part 1.06 of the Earthwork Specifications.

5.2.2 Geomembrane

The landfill will be lined with a high density polyethylene (HDPE) geomembrane placed directly above the compacted Earth Liner. Specifications for the manufacture and installation of the geomembrane are provided in Specifications Section 02650 (Geomembranes).

This Plan details the quality assurance activities related to manufacturing and installing the geomembrane. Geomembrane manufacturing quality control (MQC) activities are the responsibility of the geomembrane Manufacturer and are specified in Part 2.02 of the Geomembranes Specifications. The geomembrane Installer is responsible for the installation quality control requirements that are specified in Part 3.09 of the Geomembrane Specifications.

Preinstallation Activities

The Owner (or the Owner's designee) shall submit a representative sample of the geomembrane and other applicable materials (e.g. earth liner materials, sand drainage layer materials, and geonet or geocomposite materials) to a qualified laboratory independent of the geomembrane Manufacturer for interface shear testing. Geomembrane-earth liner and geomembrane-sand drainage layer interface shear testing shall be conducted prior to each phase of geomembrane installation, but no more frequently than once during any 18 month period. The interface shear testing frequency can be relaxed to once every 48 months for interfaces which have demonstrated



compliance with the specified minimum interface adhesion and friction angle (or secant angle) criteria during each of the three most recent interface shear tests that were performed on different lots of geosynthetic materials. The relaxed testing frequency only applies when the materials comprising the interfaces have not changed, e.g. the earth materials have not changed appreciably and are from the same source as previously tested (i.e. the same borrow pit for imported material and the same geological unit for earth materials obtained onsite). The geosynthetic materials also must be of the same type and manufacture, and sourced from the same manufacturer as materials which were previously tested. Geomembrane-geonet (or geomembrane-geocomposite) interface shear testing shall be conducted prior to the first phase of sidewall liner installation and shall be retested whenever interface shear testing of the materials to be used has not been conducted during the previous 48 months. Interface shear test methods and criteria shall conform with those provided in Specifications Section 02650-Geomembranes.

Prior to each phase of geomembrane installation, the Owner (or the Owner's designee) shall submit representative sample(s) of geomembrane to a qualified laboratory independent of the geomembrane Manufacturer for the following manufacturing quality assurance (MQA) tests:

- ☐ Thickness,
- ☐ Density,
- ☐ Tensile Properties,
- ☐ Puncture Properties,
- ☐ Tear Resistance, and
- ☐ Carbon Content.

At least one MQA test shall be performed for each 50,000 square feet (or portion thereof) of geomembrane to be supplied. Test methods shall conform with those provided in Specifications Section 02650-Geomembranes.

Neither interface shear nor MQA testing shall be required for repairs and/or installations totaling less than 1,000 square feet individually, and 10,000 square feet combined over a 12 month period.

CQA Personnel shall conduct the following prior to beginning geomembrane installation:

- ☐ Review all MQC certifications provided by the geomembrane Manufacturer,
- ☐ Review the MQA test results for conformance with the specifications,
- ☐ Review and verify the Installer's inventory of delivered geomembrane rolls,
- ☐ Confirm that the delivered rolls of geomembrane are specifically covered under the Manufacturer's MQC certifications,
- ☐ Confirm that the MQA sample(s) was (were) obtained from roll(s) delivered to the site,



- ☐ Review interface shear test data to confirm that the interface shear strengths conform with the specifications.
- ☐ Review the Installer's Project Superintendent's resume for conformance with Part 1.04 of the Geomembrane Specifications,
- ☐ Review and approve the Installer's panel layout shop drawings,
- ☐ Observe the geomembrane subgrade immediately prior to installation to ensure that the subgrade meets the requirements of Part 3.02 of the Geomembranes Specifications, and
- ☐ Review the Installer's subgrade certification.

Geomembrane Placement and Protection

Specifications for the placement and protection of geomembranes are provided in Parts 3.03 and 3.04 of the Geomembranes Specifications. CQA Personnel shall perform the following during geomembrane placement:

- ☐ Verify that the panels are placed as shown on the approved panel layout shop drawing, or as otherwise approved by the CQA Officer,
- ☐ Confirm that the geomembrane protection requirements of the specifications are enforced,
- ☐ Observe geomembrane anchor trenches every fifty (50) feet (plus or minus) for conformance with the drawings and specifications,
- ☐ Observe the Contractor's methods of placing and constructing the geomembrane into the anchor trenches, and backfilling and compacting the anchor trench backfill to confirm that such methods do not damage the geomembrane.
- ☐ Verify that the geomembrane anchor trenches are backfilled and compacted as specified to confirm construction does not damage geomembrane,
- ☐ Disapprove geomembrane deployment during inclement weather as described in the specifications, unless specifically approved by the CQA Officer,
- ☐ Observe the geomembrane for defects,
- ☐ Confirm that adjoining panels are overlapped and shingled as specified,
- ☐ Observe for excessive slack or wrinkles in the geomembrane, and
- ☐ Confirm that the in-place geomembrane is adequately ballasted to prevent displacement.



Geomembrane Welds and Defect Repairs

Specifications for welding geomembrane seams and repairing defects are provided in Parts 3.05 and 3.06 of the Geomembranes Specifications. CQA Personnel shall perform the following activities:

- ☐ Verify that the seams being welded are not excessively tensioned or wrinkled,
- ☐ Confirm the use of the specified welding techniques and equipment for each seam,
- ☐ Observe each welder's methods for a sufficient amount of time to confirm that the welding procedures are in accordance with the specifications,
- ☐ Verify that each welding equipment/operator combination are properly pre-qualified in accordance with Part 3.09 of the Geomembranes Specifications,
- ☐ Review the Installer's methods of defect repair for conformance with the specifications, and
- ☐ Observe the completed repairs for workmanship.

Field Quality Control

Specifications for the Installer's field quality control are provided in Part 3.09 of the Geomembranes Specifications. CQA Personnel shall perform the following:

- ☐ Verify that the welding equipment/operator pre-qualification testing is conducted in accordance with the specifications,
- ☐ Confirm that all geomembrane seams are non-destructively tested as specified,
- ☐ Randomly select locations for destructive seam tests, as specified. Random locations shall be selected as described in Attachment 2 of this Application; sampling frequencies are provided in Part 3.09 of the Geomembranes Specifications,
- ☐ Specify other locations for destructive seam tests where, in the CQA Officer's opinion, the seam quality is questionable (if any),
- ☐ Verify that the destructive sample locations are repaired and tested in accordance with the specifications,
- ☐ Review the laboratory test results for conformance with the specifications, and
- ☐ Confirm that failed seams are repaired as specified.



Documentation

CQA Personnel shall confirm that the Installer maintains the documentation as specified in Part 3.10 of the Geomembranes Specifications.

5.3 Leachate Drainage, Collection, Recirculation, and Storage System

The following section describes the CQA activities that shall be conducted to ensure that the leachate drainage, collection, recirculation, and storage system conforms to the intent of the design, drawings and specifications.

5.3.1 Leachate Collection Pipe and Washed Gravel Envelope

The leachate collection pipes in Landfill No. 3 drain leachate into sumps along the edges of the landfill floor for extraction via submersible pumps. The leachate collection pipe system includes cleanout risers. The cleanout risers are intended to provide access to the collection pipe system for cleaning equipment.

The leachate collection pipes are bedded on, and enveloped within, Washed Gravel. The Washed Gravel serves three functions: 1) provides proper bedding support for the pipe, 2) serves as a filter to prevent the pipe from clogging with sand and fine-grained materials, and 3) serves as a secondary leachate flow path in the unexpected event of the leachate pipe crushing or clogging. Material specifications for the leachate collection pipe are provided in Parts 2.01 and 2.02 of the HDPE Pipe and Fittings Specifications (Specifications Section 15105); installation and testing requirements are provided in Parts 3.01 and 3.02 of the HDPE Pipe and Fittings Specifications. Material specifications for the Washed Gravel are provided in Part 2.07 of the Earthwork Specifications; placement and compaction requirements are provided in Part 3.10 of the Earthwork Specifications.

At least one sample (per phase of leachate collection pipe construction) of the material to be used as Washed Gravel shall be tested for the following prior to material import:

- ☐ Grain-size distribution in accordance with ASTM D422. Hydrometer analysis of the particles passing the No. 200 sieve is not required, and
- ☐ Reactivity with dilute hydrochloric acid in accordance with ASTM D2488. If visible reaction is observed, a sample shall be tested for carbonate loss in accordance with ASTM D3042.
- ☐ Visual or manual determination of roundness (ASTM D4288)

Certified test results provided by the Washed Gravel supplier are acceptable at the discretion of the CQA Officer.

CQA Personnel shall conduct the following activities prior to the Contractor placing the leachate collection and riser pipe:

- ☐ Review the pipe manufacturer's certifications as required by Part 1.04 of the HDPE Pipe and Fittings Specifications to confirm that the pipe and



fittings meet the criteria specified in Parts 2.01 and 2.02 of the HDPE Pipe and Fittings Specifications,

- ☐ Verify that the pipe and fittings are properly marked as specified in Part 2.02 of the HDPE Pipe and Fittings Specifications,
- ☐ Visually inspect the pipe and fittings for fractures, cracks, gouges, damaged ends, or other evidence of damage or poor manufacture (reference Part 3.02 of the HDPE Pipe and Fittings Specifications), and
- ☐ Confirm that the leachate collection pipe is perforated in accordance with the perforation details shown on the drawings.

CQA Personnel shall conduct the following during and after leachate collection pipe and gravel envelope placement:

- ☐ Observe pipe and gravel placement to confirm that the proper equipment and placement procedures are employed to protect from overstressing the underlying geomembrane and to ensure that geomembrane wrinkles are minimized (reference Part 3.11 of the Earthwork Specifications),
- ☐ Confirm the thickness of the Washed Gravel placed as bedding to verify the minimum specified thickness is provided. Thickness measurements shall occur every fifty (50) feet (plus or minus),
- ☐ Observe the Washed Gravel placement and compaction for conformance with the specifications provided in Part 3.10 of the Earthwork Specifications,
- ☐ Verify that the Washed Gravel directly abuts the leachate collection layer placed during a preceding phase of construction (if any) and that any previously placed rainflap has been removed,
- ☐ Observe the Contractor's method of handling the pipe to ensure that the pipe is not overstressed or otherwise damaged, as described in Part 3.01F of the HDPE Pipe and Fittings Specifications,
- ☐ Observe the Contractor's method of joining the pipe and fittings to verify compliance with the specifications provided in Part 3.01 of the HDPE Pipe and Fittings Specifications,
- ☐ Survey the pipe elevation at fifty (50) feet (nominal) spacing to ensure compliance with the grades shown on the drawings within the tolerances specified in Part 1.06 of the Earthwork Specifications,
- ☐ Observe the Contractor's pressure testing of the pipe and fittings, and review the pressure test results, for compliance with Part 3.02C of the HDPE Pipe and Fittings Specifications,
- ☐ Verify that adequate measures are taken to protect the Washed Gravel from contamination by fine-grained materials, or other damage due to storm water runoff from adjacent parts of the landfill,



- ☐ Confirm that the final connection to a previously installed leachate collection pipe is completed in accordance with the specifications provided in Part 3.01 of the HDPE Pipe and Fittings Specifications.

5.3.2 *Leachate Collection Sumps and Sideslope Risers*

The leachate collection sumps are sized to prevent excessive leachate pump cycling while maintaining less than twelve (12) inches of leachate head above the liner. The sideslope riser pipes are sized to allow the installation of commercially available submersible pumps on sideslope transporters.

Material specifications for the leachate collection sump and sideslope riser pipe are provided in Parts 2.01 and 2.02 of the HDPE Pipe and Fittings Specifications (Specifications Section 15105); installation and testing requirements are provided in Parts 3.01 and 3.02 of the HDPE Pipe and Fittings Specifications.

CQA Personnel shall conduct the following activities prior to the Contractor placing the leachate collection sump and sideslope riser pipe:

- ☐ Review the pipe manufacturer's certifications as required by Part 1.04 of the HDPE Pipe and Fittings Specifications to confirm that the pipe and fittings meet the criteria specified in Parts 2.01 and 2.02 of the HDPE Pipe and Fittings Specifications,
- ☐ Verify that the pipe and fittings are properly marked as specified in Part 2.02 of the HDPE Pipe and Fittings Specifications,
- ☐ Visually inspect the pipe and fittings for fractures, cracks, gouges, damaged ends, or other evidence of damage or poor manufacture (reference Part 3.02 of the HDPE Pipe and Fittings Specifications), and
- ☐ Confirm that the leachate collection sump is perforated in accordance with the perforation details shown on the drawings.

CQA Personnel shall conduct the following during and after leachate collection sump and sideslope riser placement:

- ☐ Observe pipe placement to confirm that the proper equipment and placement procedures are employed to protect from overstressing the underlying geomembrane and to ensure that geomembrane wrinkles are minimized (reference Part 3.11 of the Earthwork Specifications),
- ☐ Observe the Contractor's method of handling the pipe to ensure that the pipe is not overstressed or otherwise damaged, as described in Part 3.01F of the HDPE Pipe and Fittings Specifications,
- ☐ Observe the Contractor's method of joining the pipe and fittings to verify compliance with the specifications provided in Part 3.01 of the HDPE Pipe and Fittings Specifications,



- ☐ Ensure that the leachate collection sump and sideslope riser pipe is plumb,
- ☐ Confirm that the final connections to the leachate collection pipes are completed in accordance with the specifications provided in Part 3.01 of the HDPE Pipe and Fittings Specifications.

5.3.3 Granular Drainage Layer

The design incorporates a Granular Drainage Layer directly above the landfill floor to drain leachate into the leachate collection piping system. Material specifications for the Granular Drainage Layer are provided in Part 2.05 of the Earthwork Specifications; placement and compaction requirements are provided in Part 3.09 of the Earthwork Specifications.

At least one sample (per phase of Granular Drainage Layer construction) of the material to be used as the Granular Drainage Layer shall be tested for the following prior to material import:

- ☐ Grain-size distribution in accordance with ASTM D422. Hydrometer analysis of the particles passing the No. 200 sieve is not required,
- ☐ Reactivity with dilute hydrochloric acid in accordance with ASTM D2488. If visible reaction is observed, a sample shall be tested for carbonate loss in accordance with ASTM D3042, and
- ☐ Hydraulic conductivity in accordance with ASTM D2434.

The term "phase" denotes any cell construction project that will require a construction quality assurance report in order to secure an operating permit. The term "phase" is used because the operator may not need to construct an entire cell based on filling rates and the variable sizes of the waste unit cells. Certified test results for grain-size distribution and reactivity provided by the Granular Drainage Layer material supplier are acceptable at the discretion of the CQA Officer.

CQA Personnel shall conduct the following during and after Granular Drainage Material Layer placement:

- ☐ Observe Granular Drainage Layer placement to confirm that the proper equipment and placement procedures are employed to protect from overstressing the underlying geomembrane and to ensure that geomembrane wrinkles are minimized (reference Part 3.11 of the Earthwork Specifications),
- ☐ Measure the thickness of the Granular Drainage Layer to verify the minimum specified thickness is provided. Thickness measurements shall occur at nominal frequency of one measurement per 10,000 square feet.
- ☐ Verify that the Granular Drainage Layer directly abuts the leachate drainage layer placed during a preceding phase of construction (if any) and that any previously placed rainflap has been removed,



- ☐ Verify that adequate measures are taken to protect the Granular Drainage Layer from contamination by fine-grained materials, or other damage due to storm water runoff from adjacent parts of the landfill,
- ☐ Confirm that the specified protective soil layer on the liner sideslope is placed in accordance with the drawings and specifications (Part 3.11 of the Earthwork Specifications) prior to waste placement.

5.3.4 Geonet/Geocomposite

Either HDPE geonet or geocomposite is placed on the landfill sidewall liner to drain leachate toward the leachate collection piping system. Material specifications for the geonet are provided in Part 2.01 of the Geonet Specifications (Specifications Section 02645); installation requirements are provided in Parts 3.01 through 3.03 of the Geonet Specifications. Material specifications for the geocomposite are provided in Part 2.01 of the Geocomposite Specifications (Specifications Section 02646); installation requirements are provided in Parts 3.01 through 3.03 of the Geocomposite Specifications. Either selected material may be used on the sidewall liner provided that the minimum material specifications are met.

The Landfill Operator (or the Landfill Operator's designee) shall submit a representative sample of the geonet or geocomposite and other applicable materials (e.g. geomembrane and geotextile as appropriate) to a qualified laboratory independent of the geonet/geocomposite manufacturer for interface shear testing. Geonet-geomembrane (or geocomposite - geomembrane) and geonet-geotextile interface shear testing shall be conducted prior to the first phase of sidewall liner installation and shall be retested whenever interface shear testing of the materials to be used has not been conducted during the previous 48 months or change in product. Interface shear test methods and criteria shall conform with those provided in Specifications Section 02645-Geonet or Section 02646-Geocomposite.

Interface shear testing shall not be required for repairs and/or installations totaling less than 1,000 square feet individually, and 10,000 square feet combined over a 12-month period.

Prior to geonet or geocomposite installation, CQA Personnel shall:

- ☐ Obtain and review the manufacturer's certification of compliance with the material specifications prior to installation (reference Part 1.04 of the Geonet or Geocomposite Specifications), and
- ☐ Observe and record the labeling on the material rolls to confirm delivery of properly certified products.
- ☐ Review interface shear test data to confirm that the interface shear strengths conform with the specifications.



During or following installation, CQA Personnel shall:

- ☐ Observe the techniques used by the installer to confirm conformance with Part 3.01 of the Geonet or Geocomposite Specifications,
- ☐ Inspect representative sections of the material to confirm that the material is free of blisters, undispersed raw materials, contamination from foreign matter, or other defects,
- ☐ Confirm that the geonet or geocomposite installed on the sidewall liner is anchored in the geomembrane anchor trench as shown on the Drawings,
- ☐ Verify that the installed geonet or geocomposite is oriented to provide maximum transmissivity downslope,
- ☐ Confirm the geonet or geocomposite is overlapped and fastened in accordance with Part 3.02 of the Geonet or Geocomposite Specifications,
- ☐ Observe repairs and penetrations to verify conformance with Part 3.03 of the Geonet or Geocomposite Specifications, and
- ☐ Confirm that the geonet or geocomposite is adequately ballasted to prevent displacement by wind.

5.3.5 Geotextile

The design includes geotextile over the Granular Drainage Material Layer and Geonet to prevent migration of fines into, and clogging of, the leachate drainage and collection system. The purpose of the geotextile beneath the leachate recirculation piping system is to improve the subgrade support for the leachate recirculation pipes. Material specifications for the geotextile are provided in Part 2.01 of the Geotextile Specifications (Specifications Section 02640); installation requirements are provided in Parts 3.01 and 3.02 of the Geotextile Specifications.

CQA Personnel shall perform the following activities prior, during, or after geotextile installation:

- ☐ Review the supplier's certification, as required by Part 1.04 of the Geotextile Specifications, to verify that the geotextile meets the specified material criteria,
- ☐ Confirm that the correct grade of geotextile is placed as specified by Part 2.01B of the Geotextile Specifications,
- ☐ Confirm that the geotextile installed on the sidewall liner is anchored in the geomembrane anchor trench as shown on the drawings,
- ☐ Observe the techniques used by the geotextile installer to confirm conformance with Part 3.01 of the Geotextile Specifications,
- ☐ Confirm that the geotextile overlaps are as required by Part 3.01 of the Geotextile Specifications,



- ☐ Verify that geotextile repairs and penetrations conform to the requirements of Part 3.02 of the Geotextile Specifications, and
- ☐ Confirm that the geotextile is adequately ballasted to prevent displacement by wind.

5.3.6 *Protective Soil Layer*

A layer of protective soil is to be placed over the sideslope leachate drainage system, as shown on the drawings. The purpose of the protective soil is to ensure that the underlying geotextile is not punctured or otherwise damaged by the first layer of waste, and to protect the underlying Earth Liner from freezing. The protective soil shall meet the Random Fill material specifications (Part 2.04 of the Earthwork Specifications). Placement criteria are provided in Part 3.11 of the Earthwork Specifications.

CQA Personnel shall conduct the following during and after the placement of the Protective Soil Layer:

- ☐ Observe the soil material used as the protective soil to confirm compliance with Part 2.04 of the Earthwork Specifications,
- ☐ Observe the Protective Soil Layer placement techniques used by the Contractor to ensure that the underlying geosynthetic materials are protected in accordance with Part 3.11 of the Earthwork Specifications,
- ☐ Verify the minimum thickness of the Protective Soil Layer at a nominal frequency of one measurement per 10,000 square feet, and
- ☐ During periods of sustained freezing temperatures, the CQA Officer shall confirm that the protective soil layer and/or waste provide sufficient protection against freeze-damage to the underlying liner system. Confirmation may occur by comparing the protective soil layer/waste thickness to subsurface temperature data from nearby weather or agronomy stations or from visual frost penetration observations. Liner systems covered by at least three (3) feet of waste/ protective soil may be presumptively assumed to be sufficiently protected from freeze damage.

Earth Liner systems suspected of being damaged by freezing temperatures shall be further tested to demonstrate that the Earth Liner retains its specified hydraulic conductivity and/or shall be reconstructed in accordance with the specifications.

5.3.7 *Leachate Piping System*

Leachate is pumped to either the leachate recirculation system or the storage tank via a pressure piping system. At the storage tank, pressure piping will be used to transfer leachate from the storage tank to the truck loading facility, whereas a gravity drain will drain any spilled leachate on the truck loading pad back into the storage tank. All leachate piping that is buried outside the waste boundary will be double-walled and incorporate leak detection manholes. The piping and leak detection manholes will be constructed of HDPE. Material specifications for the leachate piping are provided in Parts 2.01 and 2.02



of the HDPE Pipe and Fittings Specifications; installation and testing requirements are provided in Parts 3.01 and 3.02 of the HDPE Pipe and Fittings Specifications. Material specifications for the trench backfill are provided in Parts 2.04 (Random Fill) and 2.06 (Granular Bedding Material) of the Earthwork Specifications; placement and compaction requirement are provided in Part 3.12 of the Earthwork Specifications.

CQA Personnel shall review the HDPE pipe manufacturer certification for conformance with the material specifications (as required by Part 1.04 of the HDPE Pipe and Fittings Specifications).

At least one sample (per phase of pipe installation) of the material to be used as Granular Bedding be tested for grain-size distribution in accordance with ASTM D422 prior to material import. The term "phase" denotes any cell construction project that will require a construction quality assurance report in order to secure an operating permit. The term "phase" is used because the operator may not need to construct an entire cell based on filling rates and the variable sizes of the waste unit cells. Hydrometer analysis of the particles passing the No. 200 sieve is not required. Certified test results provided by the Sand Bedding Material supplier is acceptable at the discretion of the CQA Officer. Random Fill used as backfill can be approved based on visual observations.

CQA Personnel shall conduct the following during leachate piping system installation:

- ☐ Confirm the thickness of the Granular Bedding Material at a nominal frequency of every fifty (50) feet to verify the minimum specified thickness is provided,
- ☐ Observe the Granular Bedding Material and Random Fill placement and compaction for conformance with the specifications provided in Part 3.12 of the Earthwork Specifications,
- ☐ Observe the Contractor's method of handling the pipe to ensure that the pipe is not overstressed or otherwise damaged, as described in Part 3.01F of the HDPE Pipe and Fittings Specifications,
- ☐ Observe the Contractor's method of joining the pipe and fittings to verify compliance with the specifications provided in Part 3.01 of the HDPE Pipe and Fittings Specifications,
- ☐ Survey the as-built pipe crown coordinates and grade to ensure proper placement for construction documentation, and
- ☐ Observe the Contractor's pressure testing of the pipe and fittings, and review the pressure test results, for compliance with Part 3.02D of the HDPE Pipe and Fittings Specifications.

5.3.8 Leachate Storage Tank(s)

At least one leachate storage tank will be installed to store excess leachate, as required. The storage tank shall be installed in accordance with the tank manufacturer's



recommendations. Leachate storage tanks shall be double-walled or shall be provided with secondary containment.

Prior to installation, CQA Personnel shall confirm that the leachate storage tank and appurtenances conform with fabrication and material specifications. CQA Personnel shall observe the following during storage tank installation:

- ☐ Tank installation;
- ☐ Testing of the transfer pump, leak detection system, and other leachate system controls for proper operation.

5.3.9 Leachate Recirculation System

The leachate recirculation system consists of a series of HDPE pipes to distribute leachate throughout the waste mass. The precise location of the leachate recirculation piping system will be field determined in accordance with the guidelines shown on the drawings. Material specifications for the leachate recirculation piping are provided in Parts 2.01 and 2.02, installation and field quality control requirements are provided in Parts 3.01 and 3.02 of the HDPE Pipe and Fittings Specifications. Material specifications for the Granular Bedding Material are provided in Parts 2.06 of the Earthwork Specifications.

CQA Personnel shall review the HDPE pipe manufacturer certification for conformance with the material specifications (as required by Part 1.04 of the HDPE Pipe and Fittings Specifications).

CQA Personnel shall perform the following during Leachate Recirculation System construction:

- ☐ Observe the geotextile and Granular Bedding Material for compliance with the intent of the material specification. Supplier certifications and/or testing are only required at the discretion of the CQA Officer,
- ☐ Verify that the piping layout is in substantial conformance with the drawings,
- ☐ Observe the techniques used by the geotextile installer to confirm conformance with Part 3.01 of the Geotextile Specifications,
- ☐ Confirm that the geotextile overlaps are as required by Part 3.01 of the Geotextile Specifications,
- ☐ Verify that geotextile repairs and penetrations conform to the requirements of Part 3.02 of the Geotextile Specifications,
- ☐ Confirm the thickness of the Granular Bedding Material every 100 feet (plus or minus) to verify the minimum specified thickness is provided,
- ☐ Observe the Contractor's method of handling the pipe to ensure that the pipe is not overstressed or otherwise damaged, as described in Part 3.01F of the HDPE Pipe and Fittings Specifications,



- ☐ Observe the Contractor's method of joining the pipe and fittings to verify compliance with the specifications provided in Part 3.01 of the HDPE Pipe and Fittings Specifications,
- ☐ Survey the as-built pipe crown coordinates and grade for construction documentation, and
- ☐ Observe the Contractor's pressure testing of the pipe and fittings, and review the pressure test results, for compliance with Part 3.02D of the HDPE Pipe and Fittings Specifications.

5.4 Final Cover

The final cover system will be constructed in phases as the landfill is developed. Each phase of final cover construction will include earthwork to construct the Final Cover Barrier Soil and Vegetative Cover, and installation of the HDPE geomembrane. The following sections describe the CQA activities for each component of the final cover.

5.4.1 Final Cover Barrier Soil

Final Cover Barrier Soil is incorporated into the final cover system. Material and subgrade preparation, placement, and compaction specifications are provided in the Earthwork Specifications.

Final Cover Barrier Soil Materials

CQA Personnel shall observe and test Final Cover Barrier Soil material for the following:

- ☐ Confirmation that the Final Cover Barrier Soil material is derived from the mine spoil and/or Carbondale Shale,
- ☐ Uniformity of gradation, texture, and moisture content,
- ☐ Soil type according to the United Soil Classification System (visual-manual method) at a minimum testing frequency of one sample each day Final Cover Barrier Soil material is being placed,
- ☐ Atterberg limits and grain-size distribution by ASTM Test Methods D4318 and D422, respectively, at a nominal testing frequency of one test for every three acres of Final Cover Barrier Soil placed. Hydrometer analysis of the particles passing the No. 200 sieve is not required,
- ☐ Maximum dry density/moisture content relationship (i.e. Proctor test) by ASTM Test Method D698. Each soil type derived from each geologic unit used for Final Cover Barrier Soil construction shall be tested. Subsequent testing shall be at the discretion of the CQA Officer; however, at a minimum, one-point "check points" shall be performed and correlated to full Proctor curves at a nominal frequency of one check point for every three acres of Final Cover Barrier Soil placed. A full Proctor test shall be



conducted on material for which the check point does not correlate to a previously completed Proctor curve, and

- ☐ Free of excessive organics, frozen materials, and oversized stone/clods.

Final Cover Barrier Soil Subgrade Preparation

Final Cover Barrier Soil subgrade preparation specifications are provided in the Earthwork Specifications. The intent of the subgrade preparation specifications is to provide a firm base upon which the compacted Final Cover Barrier Soil can be construction to ensure that the full thickness of the compacted Final Cover Barrier Soil achieves the specified compaction and hydraulic conductivity criteria. In order to ensure a firm subgrade, the specifications require that the Contractor proof-roll the liner subgrade using equipment acceptable to the CQA Officer. The CQA Personnel shall observe the proof-rolling and note any areas that appear unacceptably soft (i.e. too soft to allow proper compaction of the overlying Final Cover Barrier Soil). The CQA Personnel shall also observe the subgrade to confirm the absence of frozen soil, organic-rich soil, standing or running water, or exposed waste material at the foundation subgrade. Such soils shall be delineated, removed, and replaced with compacted Final Cover Barrier Soil as described in the specifications or as otherwise approved by the Design Engineer.

Final Cover Barrier Soil Placement and Compaction

CQA Personnel shall observe and test Final Cover Barrier Soil material as it is placed and compacted for the following:

- ☐ Confirmation that the Final Cover Barrier Soil ties into previously constructed adjacent Final Cover Barrier Soil segments,
- ☐ Maximum lift thickness (prior to compaction), at a nominal frequency of two measurements per acre per lift,
- ☐ In-place (field) moisture content and dry density to confirm whether the specified moisture content and relative compaction are achieved,
- ☐ Proper lift bonding,
- ☐ Measures taken to adequately protect the in-place Final Cover Barrier Soil from excessive moisture, desiccation, freeze damage, or disturbance, and
- ☐ Laboratory hydraulic conductivity of the in-place Final Cover Barrier Soil.

Final Cover Barrier Soil suspected of being damaged by freezing temperatures shall be further tested to demonstrate that the Final Cover Barrier Soil retains its specified hydraulic conductivity and/or shall be reconstructed in accordance with the specifications.

Field density and moisture content tests shall be performed using a properly calibrated nuclear densiometer in accordance with ASTM D-6938, or other generally accepted method approved by the CQA Officer. The CQA Personnel shall judgmentally select field



density/moisture content test locations to provide uniform testing coverage of the fill. CQA Personnel shall test field density and moisture content at a nominal frequency of ten (10) tests per acre of Final Cover Barrier Soil placed.

At least one laboratory hydraulic conductivity test shall be performed for every five (5) acres (or portion thereof) of Final Cover Barrier Soil under construction. Samples for hydraulic conductivity testing shall be collected using thin-wall "Shelby" tubes pushed vertically into the Final Cover Barrier Soil. The sample locations (horizontal and vertical) shall be randomly selected in accordance with the procedures described in Attachment 2 of this Application. Holes resulting from the hydraulic conductivity sampling activities shall be backfilled with sodium bentonite chips or powder. The bentonite shall be placed in six-inch (6") lifts; each lift shall be charged with sufficient water to adequately hydrate the bentonite. The ends of the Shelby tube shall be sealed to prevent moisture loss or gain. The Shelby tube samples shall be promptly transported (in a vertical position) to the soils laboratory. Once at the laboratory, the tubes shall be fully extruded and inspected by laboratory personnel for evidence of disturbance, improper lift bonding and non-uniformity of soil type. Any such evidence shall immediately be reported to the CQA Officer. The sample shall then be trimmed as required and tested in accordance with ASTM D5084 test methods.

The CQA Personnel shall record the approximate location of all field density and moisture content tests and hydraulic conductivity samples to a nominal accuracy of ten (10) feet horizontally and three (3) inches vertically referencing the project coordinate and elevation system. The lift number that is subjected to the testing shall also be recorded.

The CQA Personnel shall survey the edges of the in-place Final Cover Barrier Soil to provide adequate construction documentation and to ease verification that future phases of final cover construction tie into the Final Cover Barrier Soil.

Final Cover Barrier Soil Thickness

CQA Personnel are responsible for confirming that the minimum specified Final Cover Barrier Soil thickness is achieved. This shall be accomplished by small diameter probes through the full thickness of the Final Cover Barrier Soil, by surveying the elevations of the subgrade prior to placing Final Cover Barrier Soil and the completed Final Cover Barrier Soil surface, or by other positive means approved by the Regulatory Agency. Thickness measurements shall be made at a nominal frequency of one measurement per 10,000 square feet. Probe holes shall be backfilled with bentonite chips or powder. The bentonite shall be placed in six-inch (6") lifts; each lift shall be charged with sufficient water to adequately hydrate the bentonite. If the thickness is confirmed by survey, the elevation data shall then be input into a computer digital terrain model or other suitable software to develop elevation contours of the two surfaces (i.e. Final Cover Barrier Soil subgrade and completed surface), which shall then be compared to confirm the Final Cover Barrier Soil thickness.



5.4.2 Final Cover Geomembrane

The final cover incorporates a geomembrane placed directly above the Final Cover Barrier Soil. Specifications for the manufacture and installation of the geomembrane are provided in Specifications Section 02650 (Geomembranes).

This Plan details the quality assurance activities related to manufacturing and installing the geomembrane. Geomembrane manufacturing quality control (MQC) activities are the responsibility of the geomembrane Manufacturer and are specified in Part 2.02 of the Geomembranes Specifications. The geomembrane Installer is responsible for the installation quality control requirements that are specified in Part 3.09 of the Geomembrane Specifications.

Preinstallation Activities

The Owner (or the Owner's designee) shall submit a representative sample of the textured geomembrane and other applicable materials (e.g. geonet (or geocomposite) and Final Cover Barrier Soil) to be used on the 4:1 (horizontal to vertical) final cover slopes to a qualified laboratory independent of the geomembrane Manufacturer for interface shear testing. Geomembrane-Final Cover Barrier Soil interface shear testing shall be conducted prior to each phase of geomembrane installation on the 4:1 (horizontal to vertical) final cover slopes, but no more frequently than once during any 18 month period. The interface shear testing frequency can be relaxed to once every 48 months for interfaces which have demonstrated compliance with the specified minimum interface adhesion and friction angle (or secant angle) criteria during each of the three most recent interface shear tests that were performed on different lots of geosynthetic materials. The relaxed testing frequency only applies when the materials comprising the interfaces have not changed, e.g. the earth materials have not changed appreciably and are from the same source as previously tested (i.e. the same borrow pit for imported material and the same geological unit for earth materials obtained onsite). The geosynthetic materials also must be of the same type and manufacture, and are sourced from the same manufacturer as materials which were previously tested. Geomembrane-geonet (or geomembrane-geocomposite) interface shear testing shall be conducted prior to the first phase of 4:1 (horizontal to vertical) final cover slope installation and shall be retested whenever interface shear testing of the materials to be used has not been conducted during the previous 48 months. Interface shear test methods and criteria shall conform with those provided in Specifications Section 02650-Geomembranes.

Prior to each phase of geomembrane installation, the Owner (or the Owner's designee) shall submit representative sample(s) of each type of geomembrane (i.e. smooth and textured) to a qualified laboratory independent of the geomembrane Manufacturer for the following manufacturing quality assurance (MQA) tests:

- ☐ Thickness,
- ☐ Density,
- ☐ Tensile Properties,
- ☐ Puncture Resistance,



- ☐ Tear Resistance, and
- ☐ Carbon Content.

At least one MQA test shall be performed for each 50,000 square feet (or portion thereof) of geomembrane to be supplied. Test methods shall conform with those provided in Specifications Section 02650-Geomembranes.

Neither interface shear nor MQA testing shall be required for repairs and/or installations totaling less than 1,000 square feet individually, and 10,000 square feet combined over a 12-month period. CQA Personnel shall conduct the following prior to beginning geomembrane installation:

- ☐ Review all MQC certifications provided by the geomembrane Manufacturer,
- ☐ Review the MQA test results for conformance with the specifications,
- ☐ Review and verify the Installer's inventory of delivered geomembrane rolls,
- ☐ Confirm that the delivered rolls of geomembrane are specifically covered under the Manufacturer's MQC certifications,
- ☐ Confirm that the MQA sample(s) was (were) obtained from roll(s) delivered to the site,
- ☐ Review interface shear test data to confirm that the interface shear strengths conform with the specifications,
- ☐ Review the Installer's Project Superintendent's resume for conformance with Part 1.04 of the Geomembrane Specifications,
- ☐ Review and approve the Installer's panel layout shop drawings,
- ☐ Observe the geomembrane subgrade immediately prior to installation to ensure that the subgrade meets the requirements of Part 3.02 of the Geomembranes Specifications, and
- ☐ Review the Installer's subgrade certification.

Geomembrane Placement and Protection

Specifications for the placement and protection of geomembranes are provided in Parts 3.03 and 3.04 of the Geomembranes Specifications. CQA Personnel shall perform the following during geomembrane placement:

- ☐ Verify that the panels are placed as shown on the approved panel lay-out-layout shop drawing, or as otherwise approved by the CQA Officer,
- ☐ Verify the placement of textured geomembrane where shown on the drawings,



- ☐ Confirm that the geomembrane protection requirements of the specifications are enforced,
- ☐ Disapprove geomembrane deployment during inclement weather as described in the specifications, unless specifically approved by the CQA Officer,
- ☐ Observe the geomembrane for defects,
- ☐ Confirm that adjoining panels are overlapped and shingled as specified,
- ☐ Observe for excessive slack or wrinkles in the geomembrane, and
- ☐ Confirm that the in-place geomembrane is adequately ballasted to prevent displacement.

Geomembrane Welds and Defect Repairs

Specifications for welding geomembrane seams and repairing defects are provided in Parts 3.05 and 3.06 of the Geomembranes Specifications. CQA Personnel shall perform the following activities:

- ☐ Verify that the seams being welded are not excessively tensioned or wrinkled,
- ☐ Confirm the use of the specified welding techniques and equipment for each seam,
- ☐ Observe each welder's methods for a sufficient amount of time to confirm that the welding procedures are in accordance with the specifications,
- ☐ Verify that each welding equipment/operator combination are properly pre-qualified in accordance with Part 3.09 of the Geomembranes Specifications,
- ☐ Review the Installer's methods of defect repair for conformance with the specifications, and
- ☐ Observe the completed repairs for workmanship.

Field Quality Control

Specifications for the Installer's field quality control are provided in Part 3.09 of the Geomembranes Specifications. CQA Personnel shall perform the following:

- ☐ Verify that the welding equipment/operator pre-qualification testing is conducted in accordance with the specifications,
- ☐ Confirm that all geomembrane seams are non-destructively tested as specified,



- ☐ Randomly select locations for destructive seam tests, as specified. Random locations shall be selected as described in Attachment 2 of this Application; sampling frequencies are provided in Part 3.09 of the Geomembranes Specifications,
- ☐ Specify other locations for destructive seam tests where, in the CQA Officer's opinion, the seam quality is questionable (if any),
- ☐ Verify that the destructive sample locations are repaired and tested in accordance with the specifications,
- ☐ Review the laboratory test results for conformance with the specifications, and
- ☐ Confirm that failed seams are repaired as specified.

Documentation

CQA Personnel shall confirm that the Installer maintains the documentation as specified in Part 3.10 of the Geomembranes Specifications.

5.4.3 Geonet/Geocomposite

Either HDPE geonet or geocomposite, is placed on the final cover geomembrane to drain infiltration water from the final cover. Material specifications for the geonet are provided in Part 2.01 of the Geonet Specifications (Specifications Section 02645); installation requirements are provided in Parts 3.01 through 3.03 of the Geonet Specifications; installation requirements are provided in Parts 3.01 through 3.03 of the Geocomposite Specifications (Specifications Section 02646). Material specifications for the geocomposite are provided in Part 2.01 of the Geocomposite Specifications.

The Landfill Operator (or the Landfill Operator's designee) shall submit a representative sample of the geonet (or geocomposite) and other applicable materials (e.g. geomembrane, geotextile and vegetative cover soil as appropriate) to be used on the 4:1 (horizontal to vertical) or greater final cover slopes to a qualified laboratory independent of the geonet/geocomposite Manufacturer for interface shear testing. Geocomposite-earth liner interface shear testing shall be once per construction season installation of the 4:1 (horizontal to vertical) or greater final cover slopes, but no more frequently than once during any 12 month period. Geonet-geomembrane (or geocomposite - geomembrane), and geonet-geotextile interface shear testing shall be conducted prior to the first phase of 4:1 (horizontal to vertical) final cover slope installation and shall be retested whenever interface shear testing of the materials to be used has not been conducted during the previous 48 months. Interface shear test methods and criteria shall conform with those provided in Specifications Section 02645-Geonet or Section 02646-Geocomposite.

Interface shear testing shall not be required for repairs and/or installations totaling less than 1,000 square feet individually, and 10,000 square feet combined over a 12-month period.

Prior to geonet or geocomposite installation, CQA Personnel shall:



- ☐ Obtain and review the manufacturer's certification of compliance with the material specifications prior to installation (reference Part 1.04 of the Geonet or Geocomposite Specifications), and
- ☐ Observe and record the labeling on the material rolls to confirm delivery of properly certified products.
- ☐ Review interface shear test data to confirm that the interface shear strengths conform with the specifications.

During or following installation, CQA Personnel shall:

- ☐ Observe the techniques used by the installer to confirm conformance with Part 3.01 of the Geonet or Geocomposite Specifications,
- ☐ Inspect representative sections of the material to confirm that the material is free of blisters, undispersed raw materials, contamination from foreign matter, or other defects,
- ☐ Confirm that the geonet or geocomposite is terminated at the toe of the final cover slopes as shown on the drawings,
- ☐ Verify that the installed geonet or geocomposite is oriented to provide maximum transmissivity downslope,
- ☐ Confirm the geonet or geocomposite is overlapped and fastened in accordance with Part 3.02 of the Geonet or Geocomposite Specifications,
- ☐ Observe repairs and penetrations to verify conformance with Part 3.03 of the Geonet or Geocomposite Specifications, and
- ☐ Confirm that the geonet or geocomposite is adequately ballasted to prevent displacement by wind.

5.4.4 Geotextile

The design includes a geotextile over the geonet (if used instead of a geocomposite) to prevent migration of fines into, and clogging of, the final cover drainage system. Material specifications for the Geotextile are provided in Part 2.01 of the Geotextile Specifications (Specifications Section 02640); installation requirements are provided in Parts 3.01 and 3.02 of the Geotextile Specifications.

The Landfill Operator (or the Landfill Operator's designee) shall submit a representative sample of the geotextile and other applicable materials (e.g. geonet and vegetative cover soil as appropriate) to be used on the 4:1 (horizontal to vertical) or greater final cover slopes to a qualified laboratory independent of the geotextile Manufacturer for interface shear testing. Geotextile- earth liner interface shear testing shall be conducted once per construction season prior to installation on the 4:1 (horizontal to vertical) or greater final cover slopes, but no more frequently than once during any 12 month period. Geotextile-geonet interface shear testing shall be conducted prior to the first phase of 4:1 (horizontal to vertical) final cover slope installation and shall be retested whenever



interface shear testing of the materials to be used has not been conducted during the previous 48 months. Interface shear test methods and criteria shall conform with those provided in Specifications Section 02640-Geotextile.

Interface shear testing shall not be required for repairs and/or installations totaling less than 1,000 square feet individually, and 10,000 square feet combined over a 12-month period.

CQA Personnel shall perform the following activities prior, during, or after geotextile installation:

- ☐ Review the supplier's certification, as required by Part 1.04 of the Geotextile Specifications, to verify that the geotextile meets the specified material criteria,
- ☐ Confirm that the correct grade of geotextile is placed as specified by Part 2.01B of the Geotextile Specifications,
- ☐ Confirm that the geotextile is terminated at the toe of the final cover slopes as shown on the Drawings,
- ☐ Observe the techniques used by the geotextile installer to confirm conformance with Part 3.01 of the Geotextile Specifications,
- ☐ Confirm that the geotextile overlaps are as required by Part 3.01 of the Geotextile Specifications,
- ☐ Verify that geotextile repairs and penetrations conform to the requirements of Part 3.02 of the Geotextile Specifications, and
- ☐ Confirm that the geotextile is adequately ballasted to prevent displacement by wind.

5.4.5 Vegetative Cover

The intent of the Vegetative Cover is to protect the underlying geomembrane and Final Cover Barrier Soil layers from damage due to freezing, sunlight exposure, equipment, etc. In order to provide this protection, the vegetative cover itself is designed to resist erosion. The establishment of turf and storm water controls consisting of berms, sideslope terraces and letdown pipes will provide erosion protection. Vegetative Cover material specifications are provided in Part 2.09 of the Earthwork Specifications; placement and compaction specifications are provided in Part 3.07B (final cover components) of the Earthwork Specifications.

CQA activities during Vegetative Cover placement and compaction are as follows:

- ☐ Observe the Vegetative Cover materials for compliance with the liquid limit and gradation requirements of Part 2.09 of the Earthwork Specifications. Laboratory testing frequencies for these properties are at the discretion of the CQA Officer,



- ☐ Verify that the first lift of Vegetative Cover over geosynthetic materials does not contain stones greater than two (2) inches in diameter, sharp objects, or other materials that could damage the underlying geosynthetic material. This shall be based on continuous observation of the placement of the first lift,
- ☐ Confirm that the first lift of Vegetative Cover over geosynthetic materials on the final cover sideslopes greater than 4H:1V is placed from the bottom of the slope upwards toward the top of the slope,
- ☐ Measure lift thickness for conformance with the specifications at a nominal frequency of one (1) measurement per acre per lift,
- ☐ Observe compaction methods for conformance with the specifications,
- ☐ Measure the Vegetative Cover thickness for compliance with the minimum thickness shown on the Drawings. The Vegetative Cover Thickness shall be verified by measurements taken at a maximum of 100-foot intervals. A grid system, consisting of perpendicular lines spaced no more than 100-feet apart, shall be established. Measurements of Vegetative Cover Thickness shall be verified by measurements at the intersections of the grid lines. Supplemental thickness measurements shall be made at changes in grades along each grid line, and
- ☐ Verify the construction of berms, letdown pipes, and energy dissipaters as shown on the drawings.

5.4.6 Turf Establishment

Turf will be established on the final cover to protect the vegetative cover from excessive erosion. Turf Establishment material specifications are provided in Parts 2.01 through 2.03 of the Turf Establishment Specifications (Section 02900 of the Specifications); seedbed preparation, seeding, and mulching specifications are provided in Parts 3.01 through 3.03 of the Turf Establishment Specifications.

CQA Personnel shall perform the following during Turf Establishment:

- ☐ Review the Contractor's planned seed mix, fertilizers, and soil amendment activities for conformance with the specifications,
- ☐ Verify that the final cover vegetation becomes well established.

5.5 Landfill Gas Control Facilities

A landfill gas (LFG) control system will be installed at this facility. The LFG control system will include a series of LFG extraction wells. The extraction wells will be connected to a control device (e.g. flare) via gas transmission piping. Condensate that forms in the gas transmission piping will either be directly recirculated into the landfill via driplegs, or pumped to the leachate storage tank for management as leachate. The control device will include a blower, compressor, or other device to exert a negative pressure on the gas transmission piping. The control device will convert and/or destruct the landfill gas as required to ensure air quality objectives are achieved. Specifications for the gas



transmission piping, condensate drain and transmission piping, and condensate traps are provided in the HDPE Pipe and Fittings Specifications.

5.5.1 Gas Monitoring System

The gas monitoring system consists of the following elements to be constructed/installed.

Interior Gas Monitoring Wells

Interior gas monitoring wells are to be constructed as gas extraction wells. CQA activities for interior gas monitoring wells shall be as described in Section 5.5.2 of this CQA Plan.

Perimeter Gas Monitoring Probes

Perimeter gas monitoring probes will be constructed in phases as illustrated on the landfill phasing plans. Perimeter gas monitoring probe design details are shown on the Design Drawings.

CQA Personnel shall conduct the following activities to confirm that the perimeter gas monitoring probes are constructed in accordance with the Drawings and specifications:

- ☐ Review the Washed Gravel Pack sieve analysis report (provided by Contractor) for compliance with the specifications. Visually observe the other backfill materials for compliance with the material specifications. Testing of these other backfill materials is not required unless material quality is questionable at the discretion of the CQA Officer.
- ☐ Review the perimeter gas monitoring probe as-built drawings to confirm that they were constructed in accordance with the Drawings,
- ☐ Survey the as-built well locations referencing the project coordinate system, and
- ☐ Verify that the wellheads comply with the Drawings.

Continuous Air Monitoring Device

A continuous air monitoring device (CAMD) will be installed within all onsite buildings (i.e. the Maintenance, Office, and Scalehouse Building). CQA Personnel shall verify that the CAMD is properly installed and operational. CQA Personnel shall also confirm that the CAMD includes the proper detector (i.e. combustible gas detector).



5.5.2 Gas Extraction Wells

Landfill gas extraction wells will be installed in phases as waste nears final grade within specific areas of the landfill. Landfill gas extraction well material and installation specifications are provided in Specifications Section 02610 (Gas Extraction Wells and Driplegs).

CQA Personnel shall perform the following activities during landfill gas extraction well installation:

- ☐ Verify the diameter and wall thickness (schedule) of the well piping,
- ☐ Review the Washed Gravel Pack sieve analysis report (provided by Contractor) for compliance with the specifications. Visually observe the other backfill materials for compliance with the material specifications.
- ☐ Verify that dry drilling techniques are used,
- ☐ Confirm the minimum borehole diameter and plumbness,
- ☐ Verify and document any conditions that prevent drilling gas extraction wells to their full planned depth,
- ☐ Confirm the length of time the Contractor attempts to drill through obstructions,
- ☐ Observe well pipe installation for compliance with the specifications,
- ☐ Verify that the well pipe joining methods are as specified,
- ☐ Observe placement of backfill materials for conformance with the specifications,
- ☐ Confirm the as-completed well depths,
- ☐ Survey the as-built well locations referencing the project coordinate system,
- ☐ Confirm that waste removed from the boring is managed according to the specifications, and
- ☐ Verify that the wellheads comply with the drawings and specifications.
- ☐ Inspect the completed extension of the landfill gas extraction wells.

5.5.3 Driplegs

Driplegs will be installed at low points within the gas transmission piping within the waste boundaries. Dripleg installation requirements are provided in the Gas Extraction Wells and Driplegs Specifications; dripleg material specifications are provided in the HDPE Pipe and Fittings Specifications (Specifications Section 15105).



CQA Personnel shall perform the following activities during dripleg installation:

- ☐ Verify that the driplegs were fabricated as shown on the drawings,
- ☐ Review the Washed Gravel Pack sieve analysis report (provided by Contractor) for compliance with the specifications. Visually observe the other backfill materials for compliance with the material specifications. Testing of these other materials is not required unless material quality is questionable at the discretion of the CQA Officer.
- ☐ Verify that dry drilling techniques are used,
- ☐ Confirm the minimum borehole diameter and plumbness,
- ☐ Verify and document any conditions that prevent drilling dripleg boreholes to their full planned depth,
- ☐ Confirm the length of time the Contractor attempts to drill through obstructions,
- ☐ Observe dripleg installation for compliance with the specifications,
- ☐ Observe placement of backfill materials for conformance with the specifications,
- ☐ Survey the dripleg locations referencing the project coordinate system, and
- ☐ Confirm that waste removed from the boring is managed according to the specifications.

5.5.4 Gas and Condensate Piping

The gas and condensate piping, including condensate traps, will be constructed of HDPE. Material specifications for the gas and condensate piping are provided in Parts 2.01 and 2.02 of the HDPE Pipe and Fittings Specifications; installation and testing requirements are provided in Parts 3.01 and 3.02 of the HDPE Pipe and Fittings Specifications. Material specifications for the trench backfill are provided in Parts 2.04 (Random Fill) and 2.06 (Granular Bedding) of the Earthwork Specifications; placement and compaction requirements are provided in Part 3.12 of the Earthwork Specifications.

CQA Personnel shall review the HDPE pipe manufacturer certification for conformance with the material specifications (as required by Part 1.04 of the HDPE Pipe and Fittings Specifications).

At least one sample of the material to be used as Granular Bedding Material shall be tested for grain-size distribution in accordance with ASTM D422 during each phase of piping installation. Hydrometer analysis of the particles passing the No. 200 sieve is not required. Certified test results provided by the Granular Bedding Material supplier is acceptable. Random Fill used as backfill can be approved based on visual observations.



CQA Personnel shall conduct the following during gas and condensate piping system installation:

- ☐ Confirm the thickness of the Granular Bedding Material to verify the minimum specified thickness is provided,
- ☐ Observe the Granular Bedding Material and Random Fill placement and compaction for conformance with the specifications provided in Part 3.12 of the Earthwork Specifications,
- ☐ Observe the Contractor's method of handling the pipe to ensure that the pipe is not overstressed or otherwise damaged, as described in Part 3.01F of the HDPE Pipe and Fittings Specifications,
- ☐ Observe the Contractor's method of joining the pipe and fittings to verify compliance with the specifications provided in Part 3.01 of the HDPE Pipe and Fittings Specifications,
- ☐ Survey the as-built pipe line and grade (buried pipe only) to ensure proper placement of traps and for construction documentation,
- ☐ Inspect representative samples of the pipe and fitting materials for conformance with Part 3.03A of the HDPE Pipe and Fittings Specifications,
- ☐ Inspect the pipe penetration welds on the condensate trap for quality, and
- ☐ Observe the Contractor's pressure testing of the pipe and fittings, and review the pressure test results for compliance with Part 3.02D of the HDPE Pipe and Fittings Specifications. Condensate traps and temporary above-ground piping do not require pressure testing.

5.5.5 Flare Station

The flare station will be premanufactured according to the Flare Station Specifications (Specifications Section 11920). CQA Personnel shall review the flare station drawings, and observe the flare station installation and a demonstration of its operations to ensure conformance with the Drawings and Specifications.

5.6 Storm Water Control Features

Storm water around the landfill perimeter will be controlled by terrace berms, downslope ditches, perimeter ditches, culverts, and sedimentation basins. The following sections describe the CQA activities to be performed to ensure that these facilities are constructed in accordance with the drawings and specifications.

5.6.1 Random Fill

Random Fill is specified for use in temporary and permanent berms, the sedimentation basin dikes, and fill embankments. Material specifications are provided in Part 2.04 of the



Earthwork Specifications; placement and compaction specifications are provided in Part 3.08 of the Earthwork Specifications.

5.6.2 *Random Fill Material Quality*

CQA Personnel shall observe and test Random Fill material for the following:

- ☐ Soil type according to the United Soil Classification System (visual-manual method) at a nominal frequency of one test per 5,000 cubic yards on in-place foundation fill,
- ☐ Atterberg limits at the discretion of the CQA Officer,
- ☐ Maximum dry density/moisture content relationship (i.e. Proctor test) by ASTM Test Method D698. Each soil type derived from each geologic unit used for Random Fill construction shall be tested. Subsequent testing shall be at the discretion of the CQA Officer; however, at a minimum, one-point "check points" shall be performed and correlated to full Proctor curves at a nominal frequency of one checkpoint per acre of Earth (Random Fill) placed. A full Proctor test shall be conducted on material for which the checkpoint does not correlate to a previously completed Proctor curve.
- ☐ Uniformity of gradation, texture, and moisture content,
- ☐ Free of excessive organics, frozen materials, and oversized stone/clods, and
- ☐ Undrained Shear strength at a frequency greater than one test per 50,000 cubic yards (required for random fill embankments greater than 10 feet in height).

5.6.3 *Random Fill Subgrade Preparation*

CQA Personnel shall observe the subgrade prior to placing Random Fill. These CQA activities shall include observing the Contractor proof-roll the subgrade, and verifying the absence of unsuitable material s. The CQA Personnel shall delineate areas of soft, unstable or pumping soil that prevent adequate compaction of the first lift of Random Fill and require over excavation. Backfilling such over excavations shall be subject to the CQA activities defined for Random Fill placement and compaction.

5.6.4 *Random Fill Placement and Compaction*

CQA Personnel shall observe and test Random Fill material as it is placed and compacted for the following:

- ☐ Maximum lift thickness (prior to compaction and following compaction) at a nominal frequency of two measurements per acre per lift,



- ☐ In-place moisture content and dry density to determine relative compaction,
- ☐ Proper lift bonding,
- ☐ Measures taken to adequately protect the in-place Random Fill from excessive moisture, desiccation, or disturbance, and
- ☐ Proper equipment and methods to protect underlying geosynthetic materials and other in-place installations.

Field density and moisture content tests shall be performed using a properly calibrated nuclear densiometer in accordance with ASTM D-6938, or other generally accepted method approved by the CQA Officer. Field density/moisture content tests should be performed at a nominal frequency of one test per 2,000 cubic yards of in-place Random Fill, or one test per 1,000 cubic yards of in-place Random Fill in areas where the completed fill is greater than 10 feet in height. Field density/moisture content test locations shall be judgmentally selected by the CQA Personnel in order to obtain data that is representative of the whole fill, and/or areas of special concern by the CQA Officer.

The CQA Personnel shall record the approximate location of all field density and moisture content tests to a nominal accuracy of ten (10) feet horizontally and three (3) inches vertically referencing the project coordinate and elevation system.

5.6.5 Downslope Ditches, Culverts, Etc.

Downslope ditches are used to drain water off the final cover and into the perimeter ditch at the toe of the landfill. Fabricated energy dissipaters will be installed at the letdown pipe outlets where necessary to prevent erosion at the point of discharge. Culverts will be installed at road crossings.

CQA Personnel shall verify that the piping used in these applications is as shown on the drawings. CQA Personnel shall also observe the energy dissipaters and sedimentation basin dewatering device for conformance with the drawings.

5.6.5 Erosion Control Armor

Erosion control armor includes turf reinforcement material (TRM), riprap, and fabric-formed concrete. The locations and type of erosion control armor are shown on the Drawings. Riprap material specifications are provided in Part 2.08 of the Earthwork Specifications; placement and compaction specifications are provided in Part 3.13 of the Earthwork Specifications. Fabric-formed concrete and TRM shall be installed in accordance with the manufacturers' recommendations.

CQA Personnel shall conduct the following during Riprap installation:

- ☐ Verify the Riprap supplier's certification that the Riprap meets the specified material criteria,



- ☐ Confirm the preparation of the Riprap subgrade, including the placement of Granular Bedding Material and geotextile if applicable,
- ☐ Observe Riprap placement methods for conformance with the specifications, and
- ☐ Verify the thickness of the in-place Riprap.

CQA Personnel shall observe the following during TRM installation:

- ☐ The installed TRM in accordance with manufacturer specifications and/or recommendations,
- ☐ The subgrade is prepared in accordance with the Manufacturer's recommendations,
- ☐ The TRM is anchored as specified by the Manufacturer,
- ☐ Confirm that the seed and soil amendments (if used) conform with Parts 2.01 and 2.02 of the Turf Establishment Specifications, and
- ☐ Verify that check slots or other previously seeded areas that are disturbed during TRM placement are reseeded.

CQA Personnel shall observe the following during fabric-formed concrete installation:

- ☐ The installed fabric-formed concrete will be in accordance with manufacturer specifications and/or recommendations.
- ☐ The fabric form subgrade is prepared in accordance with the Manufacturer's recommendations,
- ☐ The fabric form is anchored as specified by the Manufacturer,
- ☐ The supplied concrete meets the fabric form Manufacturer's recommendations. This determination can be based on review of the concrete supplier's certification and field observations at the CQA Officer's discretion. Field or laboratory testing requirements are at the CQA Officer's discretion, and
- ☐ Concrete is pumped into and evenly distributed throughout the fabric form.

5.6.4 Lines and Grades

CQA Personnel shall check the lines and grades of the ditches, culverts and sedimentation berms for compliance with the drawings within the tolerances provided for in Part 1.06 of the Earthwork Specifications. The frequency of the measurements shall be at the discretion of the CQA Officer.



6.0 STATISTICAL SAMPLING PROGRAM

6.1 General

Certain tests and samples will be conducted/collected at randomly selected locations. This section describes the methods that will be used in order to ensure that selected locations are statistically random.

The following tests and samples are subject to this statistical sampling program:

- ☐ Earth Liner field density and field moisture content tests,
- ☐ Earth Liner field and laboratory hydraulic conductivity samples,
- ☐ Final Cover Barrier Soil laboratory conductivity samples, and
- ☐ Geomembrane seam destructive samples.

6.2 Earth Liner Field Density and Field Moisture Content Tests

CQA Personnel shall establish the limits of the Earth Liner that will be constructed at the start of each phase of Earth Liner construction. The CQA Personnel shall then grid the Earth Liner construction area into cells that are approximately twenty (20) feet by twenty (20) feet in plan (the grid lines need not be perpendicular). Nonuniform cells, such as those along the edges of the construction area, may be necessary in which case the cells will be sized to be approximately one hundred (100) square feet in area. The grids shall be oriented to minimize the number of nonuniform grids.

Once the testing cells are established and numbered, CQA Personnel shall randomly select field density and moisture content test locations in the following manner, or other manner approved by the CQA Officer:

- ☐ Using a random number generator algorithm or table, randomly select the cell to be tested, and
- ☐ Randomly select another number between one (1) and the total number of lifts in which the Earth Liner will be constructed using a random number algorithm or table.

The first randomly selected number is the cell number to be tested, the second randomly selected number is the lift number to be tested in that cell. Repeat the process until all locations of the minimum required number of field density/moisture content tests are selected. Record the cells and lifts to be tested.

During construction, CQA Personnel shall perform field density/moisture content tests at the randomly selected locations (i.e. anywhere within the randomly selected cell). CQA Personnel shall supplement the random testing with "judgmental" testing. Judgmental test locations shall be selected by the CQA Personnel in the field to check areas that the CQA Personnel believe have the lowest likelihood of achieving the specified degree of compaction and/or moisture content. Judgmental testing can also be performed to ensure



that no substantial gaps in time (or volume of Earth Liner placed) occur. In general, judgmental testing should comprise at least ten (10) percent of the total number of tests conducted during any phase of construction.

Areas with failing field density and or field moisture content shall be retested following reworking by the Contractor. Retests shall be within thirty (30) feet horizontally and within the same lift as the previously failing test. Failing tests shall not be counted towards the minimum required number of field density/moisture content tests.

6.3 Field and Laboratory Hydraulic Conductivity Tests

Field hydraulic conductivity test locations, and laboratory hydraulic conductivity sample locations shall be randomly selected using the same procedures used to randomly select the field density/moisture content test locations. Furthermore, the depths at which the laboratory hydraulic conductivity samples are to be collected shall be determined using the same methodology as that used to randomly select the lift to be subjected to field density/moisture content testing at each location.

6.4 Geomembrane Seam Destructive Tests

CQA Personnel shall assign a unique seam location identifier by length (i.e. in feet) for each seam welded during a specific day. Destructive test sample locations shall then be selected as follows:

- ☐ Obtain a random number (with at least as many significant figures as that of the footage of seam welded during the day in question) between zero and one (1) using a random number generator (or table), and
- ☐ Multiply the random number by the total length of seam (in feet) welded on the day in question, round the resulting number to the nearest whole number (round exactly one-half ($\frac{1}{2}$) upwards to the nearest whole number).

The resulting number is the previously determined unique seam location identifier from which the destructive sample is to be collected. Repeat the above process until there are enough random sample locations to provide a sampling frequency no less than that provided in Part 3.09 of the Geomembranes Specifications.

At the CQA Officer's discretion, the collection of destructive samples can be waived for days during which less than 200 feet of seams are welded. As another alternative at the CQA Officer's discretion, the seam lengths welded on days during which less than 150 feet of geomembrane is seamed can be added to the seam lengths welded on the next day that seaming occurs for random sample location selection. As part of this decision, the CQA Officer shall consider the stress that the seams will be subjected to during the geomembrane service life, the previous destructive sample test results, and the Contractor's pre-qualification test weld results.



7.0 DOCUMENTATION AND REPORTS

7.1 Field Documentation

CQA Personnel shall maintain detailed documentation of the field conditions, construction activities, and construction materials. The following sections describe the minimum documentation that is required. Typical forms used for field documentation are provided in Appendix O. These forms are examples and actual forms may vary slightly.

7.1.1 Daily Report

CQA Personnel shall prepare a narrative Daily Report for each day that they are onsite. The narrative Daily Report shall at a minimum include the following information:

- ☐ Date, project name, and site location,
- ☐ Weather conditions,
- ☐ Description of work conducted during the day, including work locations, equipment used, all materials used, and names of Contractor supervisory personnel,
- ☐ Description of any meetings held, attendees, and the meeting results, including required action items,
- ☐ Names, affiliations, and activities of site visitors whom had contact with the CQA Personnel,
- ☐ Description of the earthwork materials used, including soil type and, in the case of Earth Liner construction, the geologic unit(s) from which the earth material was derived,
- ☐ Documentation of the observations and measurements required by this Plan (e.g. subgrade proof-rolling, number of compaction equipment passes, Earth Liner thickness measurements, etc.),
- ☐ Description of imported earth and/or manufactured materials received onsite, including material specifications compliance verification and/or documentation,
- ☐ Calibration, or recalibration of test equipment, including actions taken as a result of recalibration;
- ☐ Decisions made regarding approval of material or of work blocks, and/or corrective actions already taken or to be taken in instances of substandard quality;
- ☐ Copy of the Daily Inspection Report prepared by each inspector containing information regarding the location, type of inspection, procedure used, test data, results of the activity, personnel involved, and signature of the inspector.



- ☐ List of Test Data Sheets, survey notes, field sketches, Photographic Logs, and other field documents generated, and
- ☐ Signature of the originating CQA Personnel, and signature of the CQA Officer (documenting his/her review).

Appendix 0.3 contains an example of the Daily Inspection Form and Appendix 0.4 contains an example of the Daily Summary Form.

7.1.2 Test Data Sheets

CQA Personnel shall record all test data and results on appropriate Test Data Sheets. Test Data Sheets shall be attached to the corresponding Daily Report. The Test Data Sheets shall, at a minimum, include the following information:

- ☐ Identifying sheet number for cross-referencing and document control,
- ☐ Description or title of the testing/observation activity,
- ☐ Personnel involved in the testing/sampling activity,
- ☐ Date of testing,
- ☐ Location of the monitoring activity or location from which the sample was obtained,
- ☐ Type of testing/monitoring activity and procedure used (reference to standard method when appropriate),
- ☐ Identification of testing equipment by manufacturer, model number and any other appropriate identifier,
- ☐ Recorded observation and test data, with all necessary calculations,
- ☐ Results of the testing/monitoring activity; comparison with specification requirements (i.e. pass or fail), and
- ☐ Signature of the appropriate CQA Personnel.

Any errors found in data sheets shall be corrected by striking a line through the incorrect value and writing in the correct value adjacent to it. Corrections shall be initialed and dated by the CQA Personnel.



7.1.3 Photographs and Photographic Logs

CQA Personnel shall take photographs documenting the construction activities, methods and materials used. Each photograph shall be dated by a film imprint, embedded digital code, or other appropriate means.

CQA Personnel shall also maintain a Photographic Log, which shall be attached to the corresponding Daily Report. Each Photographic Log shall include the following:

- ☐ The date of the photograph,
- ☐ The subject or location of the photograph, and
- ☐ and Name and signature of the photographer.

An example photographic log is provided in Appendix O.2.

7.2 Acceptance Reports

Upon completion of the construction of each major phase (or subphase) as directed by the Landfill Operator, the CQA Officer will submit a written Acceptance Report to the IEPA. The Acceptance Reports will be submitted as a permit modification requesting operating authorization from the IEPA. The Acceptance Reports shall, at a minimum, include the following:

- ☐ A certification by the CQA Officer that the work described in the report was completed in accordance with the intent of the drawings, specifications, and approved permit,
- ☐ Description of the work approved by the CQA Officer,
- ☐ Description of any significant deviations from the drawings or specifications, and justification for such deviations,
- ☐ Documentation of any significant deviations on as-built drawings,
- ☐ Copies of all earth and manufactured material laboratory test reports,
- ☐ Copies of all manufacturers' or suppliers' material specifications compliance certifications,
- ☐ All Daily Reports and attachments, including test data sheets,
- ☐ Selected photographs,
- ☐ As-built drawings (as appropriate) showing coordinates and elevations of liners and final cover, and thickness measurements of Earth Liner, Granular Drainage Material Layer, and Final Vegetative Cover, and
- ☐ The CQA Officer's signature and Professional Engineer's stamp.



7.3 Document Control

The CQA Officer shall be responsible for maintaining the CQA documentation. The CQA Officer shall provide copies of the Field Daily Reports and attachments to the Landfill Operator on a timely basis. The Landfill Operator shall also maintain these copies at their offices or the site.

DRAFT



ATTACHMENT 1

TEST LINER PLAN

DRAFT





1	9	17	25	33	41	49	57
2	10	18	26	34	42	50	58
3	11	19	27	35	43	51	59
4	12	20	28	36	44	52	60
5	13	21	29	37	45	53	61
6	14	22	30	38	46	54	62
7	15	23	31	39	47	55	63
8	16	24	32	40	48	56	64

LIMITS OF CONSTRUCTION

EXAMPLE PLAN OF CONSTRUCTION AREA

EXAMPLE RANDOM SAMPLE LOCATION SELECTION PROCESS:

STEP 1: RANDOMLY SELECT A NUMBER BETWEEN 0 AND 64 (INCLUSIVE).
USING A RANDOM NUMBER ALGORITHM OR TABLE.
ASSUME RANDOM NUMBER = 55.

STEP 2: CELL TO BE TESTED = 55.

STEP 3: RANDOMLY SELECT A SECOND WHOLE NUMBER BETWEEN 1 AND
THE TOTAL NUMBER OF LIFTS TO BE PLACED USING A RANDOM
NUMBER ALGORITHM OR TABLE.
ASSUME RANDOM NUMBER = 3

STEP 4: LIFT TO BE TESTED = 3.

**PEORIA CITY/COUNTY LANDFILL INC.
PEORIA CITY COUNTY LANDFILL NO. 3**



Shaw Shaw Environmental, Inc.

EXAMPLE RANDOM SAMPLE LOCATION SELECTION PROCESS

APPROVED BY:

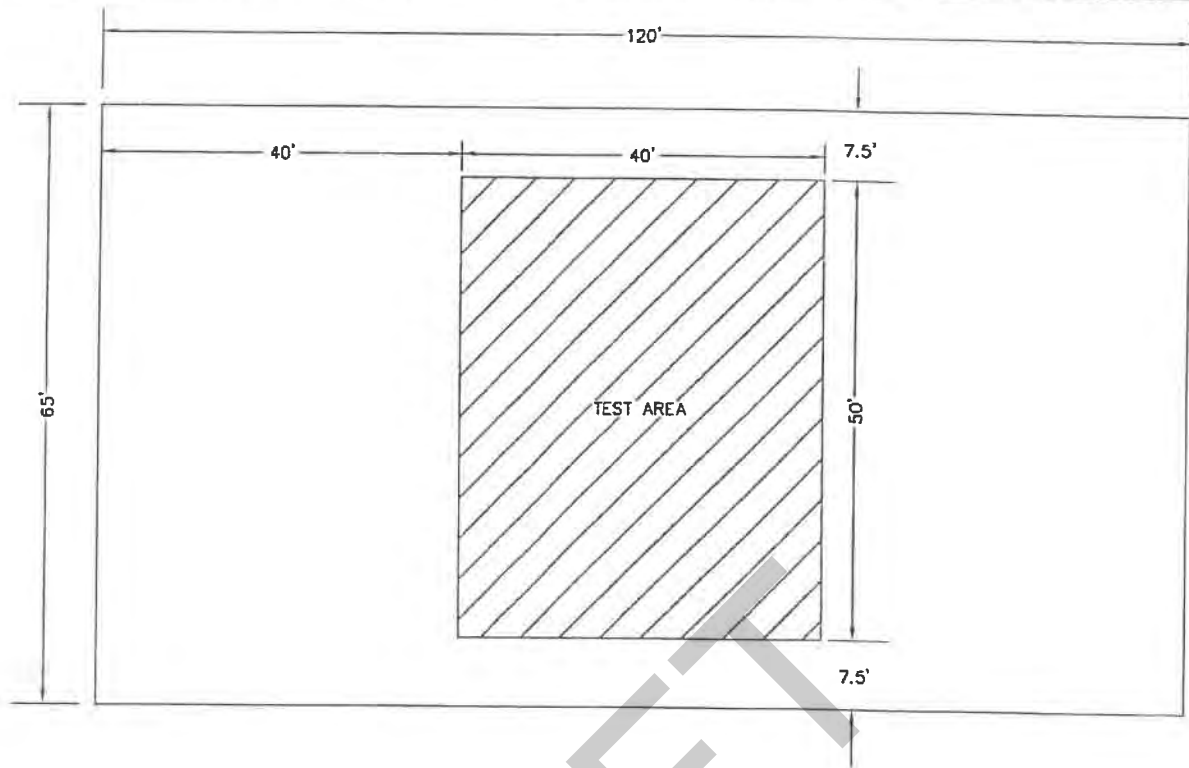
RDS

PROJ. NO.:

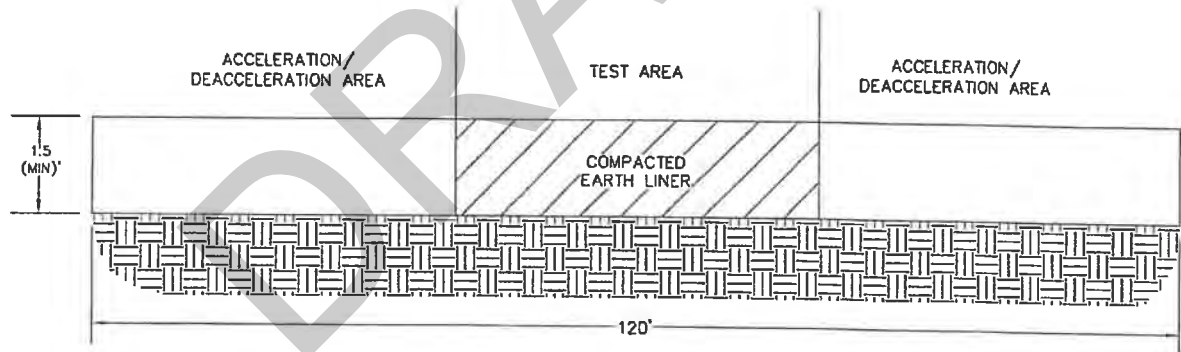
137618

DATE:

JULY 2012



PLAN
NOT TO SCALE



SECTION
NOT TO SCALE

NOTES:

1. ALL DIMENSIONS ARE MINIMUMS.
2. COA PERSONNEL SHALL STAKE TEST AREA AND ACCELERATOR/DEACCELERATOR AREAS.
3. ONLY TEST AREA IS SUBJECT TO TESTING.
4. AT LEAST THREE LIFTS OF EARTH LINER SHALL BE PLACED AND COMPACTED FOR THE TEST LINER.

TEST LINER PLAN

**PEORIA CITY/COUNTY LANDFILL INC.
PEORIA CITY COUNTY LANDFILL NO. 3**

TEST LINER PLAN


Shaw® Shaw Environmental, Inc.

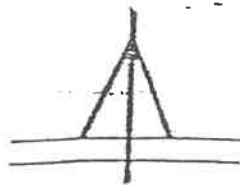
APPROVED BY:	RDS	PROJ. NO.:	137618	DATE:	JULY 2012
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ATTACHMENT 2

**TWO-STAGE BOUTWELL FIELD HYDRAULIC
CONDUCTIVITY TEST METHOD**

DRAFT





SOIL TESTING ENGINEERS, INC.

GEOTECHNICAL ENVIRONMENTAL & MATERIALS CONSULTANTS

316 HIGHLANDIA DRIVE • P.O. BOX 63710 • BATON ROUGE, LOUISIANA 70884 • PHONE (504) 752-0790

GORDON P. BOUTWELL, JR., Ph.D.
CHARLES W. MCCURSEY
RONALD H. JONES, ME
CHARLES S. HEDGES, MS
REGISTERED PROFESSIONAL ENGINEERS

August 28, 1991

Rapp Engineering
P. O. Box 7349
Springfield, Illinois 62791-7349

Attention: Mr. David Favero

Re: Two-Stage Field Permeability Tests
Proposed Illinois Landfill

Gentlemen:

Thank you for your interest in this procedure; it was a pleasure to discuss it with Mr. Favero during his call on August 28, 1991. Enclosed is the most recent version of our Manual on this test method as he requested.

The Two-Stage (or "Boutwell") Field Permeability Test has undergone intense development over the past year, in response to its growing use. Some features are:

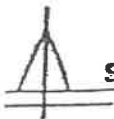
* Speed. With most liners/test pads, pass-or-fail is obvious within 24 to 48 hours after beginning the test. Obtaining the actual values takes 1 to 2 weeks.

* Compatibility. We have several case histories from around the country where Sealed Double-Ring Infiltrometer Tests (which usually take 3 to 6 months) and Two-Stage Tests were performed on the same test pad/liner. The results are virtually the same.

* Acceptance. The method has been accepted by regulatory authorities in CA, LA, MI, and NJ. It is being required in OH and some regions of PA. Texas will soon begin requiring either the Two-Stage or the SDRI (their only allowable procedures) on all solid waste liners.

In addition, the writer is preparing a proposed ASTM Standard for the Two-Stage Test as requested by Subcommittee D18.04 of ASTM.

Of course, we will be happy to provide a geologist or technician with experience at this procedure to help you on your first set of such tests. The writer can also assist at the beginning and meet with regulatory personnel to discuss the procedure. We can also provide data reduction services and prepare the overall report.



SOIL TESTING ENGINEERS, INC.

PAGE 2

Please feel free to contact the writer at (504) 752-4790 (FAX: 752-4878) should you have any questions. We look forward to working with you on this project.

Sincerely,

SOIL TESTING ENGINEERS, INC.



Gordon P. Bourwell, Jr., P.E.

GPB/stp

David - I forget to mention that the average individual test affects a volume equal to about 75-100 lab test specimens.

A group of 5 therefore tests 350 - 500 lab sample volumes.



THE STEI TWO-STAGE FIELD PERMEABILITY TEST

JANUARY, 1991 *

SYNOPSIS

The Two-Stage Field Permeability Test is a falling-head infiltration test conducted in a cased borehole, typically 4 inches in diameter. The first stage is performed with the bottom of the hole flush with the bottom of the casing for maximum effect of vertical permeability (K_v). After steady-state is achieved, the hole is advanced some 6 to 8 inches below the bottom of the casing so that horizontal permeability (K_h) has a greater effect. The two stages yield two equations which can then be solved for (K_h , K_v). Procedures are available for reduction of the data in the cases of both above and below water table testing.

The major test precautions include proper sealing of the casing along the outside, accounting for temperature effects, and correcting for sidewall smear during the second stage. The test is quick, simple, and relatively inexpensive. It allows results in days, rather than months. Multiple installations are feasible so that statistical confidence can be achieved. It is recognized in the literature, including U.S. EPA publications.

I. BASIC CONCEPTS

1.1 Anisotropy. In general, the hydraulic conductivity (permeability) of soils is anisotropic. The horizontal value ($K_x = K_y = K_n$) is normally larger than the vertical ($K_z = K_v$), even in compacted materials (Boutwell & Rauser, 1990). This phenomenon affects all current field permeability test procedures; if the observed "permeability" is taken to be the vertical permeability, then the result is too high by factors on the order of 2 to 5.

Which is the proper value (K_h or K_v) to use in evaluating a compacted clay liner? On the relatively horizontal bottom, the flow potential is obviously vertical, i.e., normal to the liner surface and thus the plane of compaction. The "vertical" permeability ($K_n = K_v$) obviously governs. On the sides, the situation is less clear. However, flow net studies have shown that the mean angle of flow deviates from the normal (perpendicular to liner face) by angles of 30 to 40 degrees using typical side slopes [1(V):3 to 4(H)] and anisotropies ($K_h/K_v = 2$ to 10). The permeability along the flow path (K_θ) can then be calculated from the permeability ellipsoid equation:

$$K_\theta/K_v = (K_h/K_v) / \sqrt{1 + [(K_h/K_v)^2 - 1] \cos^2 \theta} \quad (1)$$

θ = Angle Between Flow Path and Line Normal to Slope

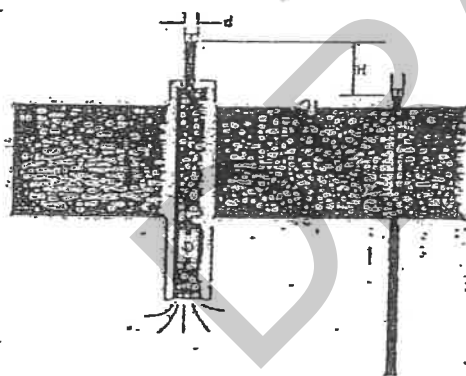
* Minor modifications June, 1991

The results show that even if (K_h/K_v) approaches infinity, (K_θ/K_v) will be less than 2.0 for angles (θ) up to 60 degrees. As an example, at $(K_h/K_v = 10)$ and $(\theta = 45 \text{ degrees})$, $(K_\theta/K_v = 1.4)$ but $(K_\theta/K_h = 0.14)$. Thus, (K_θ) is always much closer to (K_v) than to (K_h) , even on the side liners.

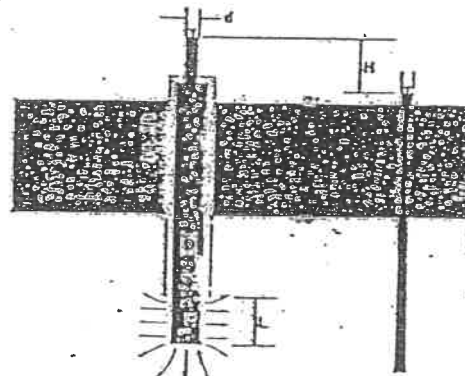
The proper measure of clay barrier performance is thus (K_v) . Yet, anisotropy affects all field tests to some degree. The two-stage test was therefore developed to separate these effects so that (K_v) can be determined. Naturally, it also yields (K_h) .

1.2 Theory of Test. The Two-Stage Test is a field infiltration test, conducted in a cased borehole so that the geometry of the infiltrating zone can be controlled. It is normally conducted as a falling-head test. Although a constant-head procedure could be used, measurement of the small flow volumes would be a problem. The test was first developed in 1982 for evaluating a liner during Adjudicatory Hearings. It was first published in Boutwell & Derick, 1986.

The basic idea is to vary the geometry of the infiltrating area so as to vary the relative effects of (K_h) and (K_v) . In the first stage, the geometry is chosen so that (K_v) has its maximum effect. The second stage geometry is such that (K_h) has its maximum effect. The results of the two stages yield two equations in two unknowns (K_h, K_v) , which can then be solved. This concept is illustrated below:



FLUSH-BOTTOM TEST



CYLINDRICAL TEST

Stage 1 is normally conducted using a flat bottom flush with the base of the casing. Infiltration proceeds until a steady-state condition is achieved. Then, the borehole is advanced some 6 to 8 inches below the bottom of the casing. The apparatus is refilled, and infiltration in this Stage 2 continues until it achieves steady-state flow.

1.3 Hvorslev Equations. Attached as Figure A-1 is a figure from Juul Hvorslev's 1951 paper where the equations for flow from various geometries in an anisotropic mass are given. These equations form the basis for the current method of data reduction. Figure A-1 illustrates several geometries not normally used in the Two-Stage Test, but illustrates that the technique is not limited to the simple case presented in the current literature (e.g., EPA, 1988; Daniel, 1989; Sai, 1990). However, these equations are based on a cross-anisotropic $(K_x=K_y=K_r=K_h \neq K_z=K_v)$ infinite or semi-infinite medium, with no vertical gravitational gradient within the flow field. They are therefore most applicable to very thick layers below the groundwater level.

1.4 Modifications for Lower Boundary. These tests are commonly performed in test pads or real liners which are:

- * Finite in Thickness (36"-48" Typical)
- * Underlain by a Drainage Blanket

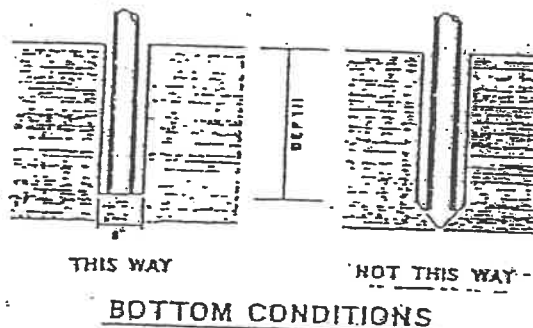
The finite thickness problem can be handled as described in Section 2.1.C. The underlying drainage blanket, usually kept dry or at virtually an atmospheric head level, distorts the flow patterns by creating a gravitational downwards gradient ($i=1.0$).

The vertical gradient problem cannot be totally overcome by the clearances of Section 2.1.C. Rather, new equations have been developed to describe the flow field, using the Image Potential method. The new equations and their application are discussed in Section V. They will henceforth be termed the Hvorslev-Image ("H-I") equations.

II. FIELD PROCEDURES

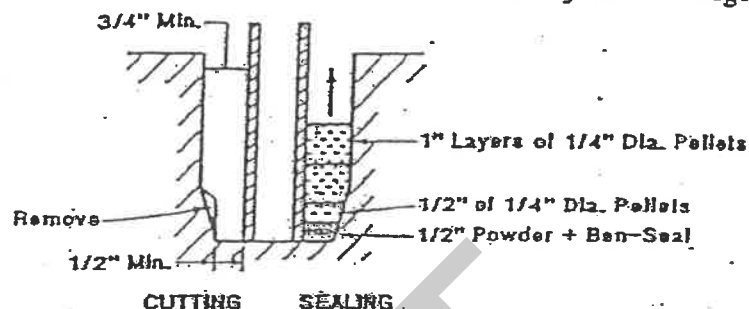
2.1 Installation. The geometry of the infiltrating area must be known for any of the Hvorslev or H-I equations to apply. Hence, the casing must be properly sealed against the walls of the borehole. Also, the boundary conditions (bounded, semi-infinite, or infinite medium) must be approximated. These considerations are handled as illustrated below.

2.1.A. Bottom. In Stage 1, the bottom of the borehole should be flat and flush with the bottom of the casing in order to correspond with Hvorslev's (or H-I) case "B" or "C" (See Figure A-1 for the Hvorslev equations, Section V for the H-I equations). This is accomplished with a special "flat auger" and measurement from the top of the casing. If the bottom of the hole is above the bottom of the casing, Hvorslev's "D" or "E" (or the equivalent H-I) should apply but there is a strong possibility of leakage along the boundary between the encased soil and the inside of the casing. Hvorslev's (or H-I) Cases "F" or "G" would apply if the hole extends past the bottom of the casing.



In practice, the diameter of the basic borehole should be at least 2 and preferably 3 inches larger than the OD of the casing. The borehole is advanced by hand or mechanical auger until the point of the auger is about 1 inch above the testing level. Then, the large flat auger is used to advance the hole to the testing level. The large

flat auger should cut a hole at least 1 1/2 inches larger in diameter than the casing OD to allow the annular seal (see Section 2.1.B) to penetrate to the testing level. The inside walls of the hole are hand-trimmed so that there is a fairly constant slope from the basic borehole (maximum) diameter to that cut by the flat auger.

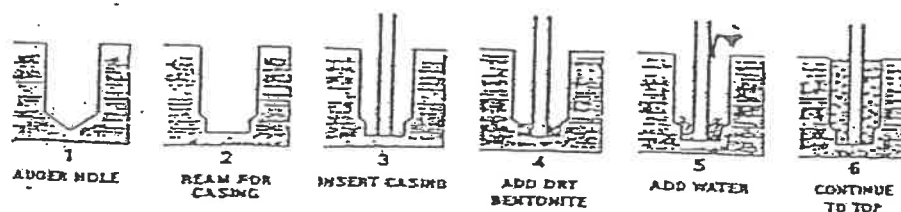


2.1.B Sealing. The annular space between the casing and the wall of the borehole is sealed with bentonite. Best results have been attained using 1/4" (not 3/8" or larger) bentonite pellets. Crushed bentonite (Baroid "Hole-Plug" or equivalent) has also been satisfactory. The procedure is:

- " Crush sufficient pellets, "Ben-Seal", or "Hole-Plug" to fill about 1/2 inch of the annulus. This should have about 1/16" size fragments with some powder.
- " Place this material into the annular space.
- " Place about 1/2 inch of bentonite pellets or "Hole-Plug" into hole,
- " Tamp the bentonite pellets,
- " Add water until it shows above the bentonite,
- " Repeat the process (but using only the pellets) in 1 inch increments to the ground surface.

When seals have been made in this manner, no water (even that added for hydration) enters the casing.

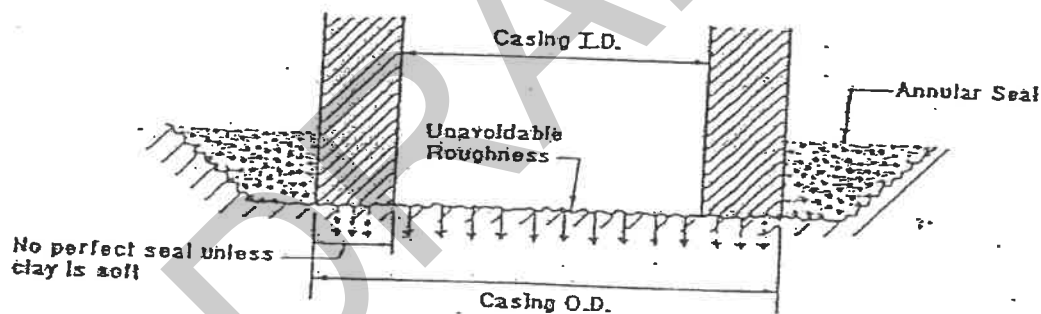
The bentonite seal is then allowed to hydrate overnight before any head is applied to the system.



SETTING THE CASING

It is virtually impossible to seal the flat bottom of the casing against the bottom of the hole, although the annular space between the wall of the casing and that of the borehole can be fully sealed. STEI conducted some laboratory tests on this phenomenon; clay liner material was compacted, trimmed smooth, and a smooth-bottom casing pressed against the trimmed soil surface with a force of some 50+ pounds. No external seal was applied. When water was introduced into the casing, there was always leakage at the casing-soil interface, until the compacted material was medium to stiff in consistency (shear strength $< 2000 \text{ lb./sq.ft.}$). The sample corresponded to 95% Modified Proctor and 4 percentage points over optimum. The laboratory-prepared soil surface was, of course, much smoother than could be achieved in the field, especially with material containing a significant proportion of large particles. The high vertical force is not maintained in the field.

A field test for determination of which test diameter (D) to use for the first stage is performed. A borehole is prepared as outlined in Paragraph (2.1A). The casing is then inserted into the hole and seated firmly against the bottom soil. Then, water is introduced into this test casing. If outward seepage is noted, the OD (rather than the ID) of the casing should be used for the Stage 1 (D). *



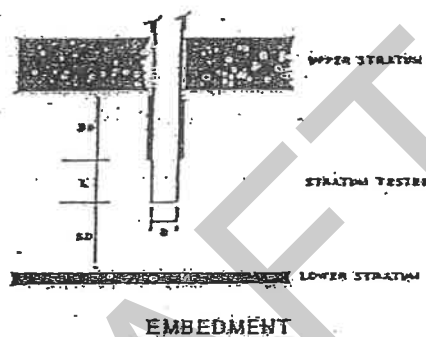
The obvious inferences are:

- * If the casing bottom is flat, the OD of the casing should be used for the test diameter during Stage 1, depending on the field test casing's results. *
- * This phenomenon could be overcome by tapering the bottom of the casing on its outside.

The downhole activity associated with preparing for Stage 2 apparently seals this disk-shaped infiltrating area. Also, the total infiltrating area of Stage 2 is some 6 to 8 times that of Stage 1, so that any remaining effect of the "disk" would be minor. The actual borehole diameter (Casing ID) should therefore be used in reducing the data for Stage 2.

* NOTE: One can also check the inside of each casing for inflow of the water added to hydrate the bentonite.

2.1.C Boundaries. A typical liner or natural deposit is not an infinite medium; it has a finite thickness. The U.S. Bureau of Reclamation (USBR, 1987) recommends that field permeability tests have a clearance of at least 5 test diameters from any boundary (region of significantly higher or lower permeability). The typical Two-Stage Test has a 4 inch diameter and is extended 6 to 8 inches for Stage 2. The USBR clearance is thus ($4 \times 5 = 20$ inches) above the top of the test and below its bottom. Following this recommendation, the bottom of the casing should therefore be 20 or more inches below the liner surface and 26 to 28 inches above the bottom of the liner.



These embedments have been evaluated with the H-I equations of Section V for Stage 2, which would be closest to the boundary. The Stage 2 permeabilities as calculated from the basic Hvorslev equations would be 10 to 15% too high if the remaining clay were 2.5 diameters, only 4 to 7% too high at 5.0 diameters. The H-I equations can be used for geometries where the remaining clay exceeds 1 to 2 diameters, but the maximum possible remaining clay is still recommended.

Another boundary concern is the horizontal distance to a boundary. Both the Hvorslev and the H-I equations assume an infinite horizontal extent of the tested stratum. A criterion used successfully in the past by STEI is to multiply the 5-diameter vertical clearance by a factor of 5 to 10 in order to account for anisotropy. Typical (K_h/K_v) ratios for compacted materials range from 2 to 10. A 50-diameter horizontal clearance equates to 16 feet for a 4-inch diameter test.

STEI tries to maintain at least 15 feet clear between tests and between any test and the crest of a test pad. However, there have been successful tests in a bench cut into the side of a levee, where the clearance at test level was about 9 feet (26 diameters).

2.1.D. Protecting the Infiltration Surface. STEI has received a report that during some very-long-term tests (over 2 months), the Stage 2 permeability increased suddenly. Excavation showed that the sidewalls of the Stage 2 cylindrical hole had collapsed, increasing the infiltration area. This problem can be overcome by a simple pervious support: a gravel-filled "sock". The sock is a rigid cylinder of open-mesh plastic, lined with a filter geofabric. The cylinder is some 1/4 inch smaller in diameter than the casing ID (and thus the Stage 2 hole), and an inch or so longer than the extension for Stage 2. It is fitted with retrieving lines and not left in the

hole. The sock also protects the infiltration surface from erosion when water is introduced into the casing, so is also used in Stage 1. The effect of the sock ($K > 10^{-1}$ cm/sec) is negligible when testing a typical liner material ($K < 10^{-6}$ cm/sec). If testing a high-permeability material, Hvorslev Cases "D" or "E" as appropriate could be used.

2.1.E. Hydraulic Fracturing. This can occur if the water pressure exceeds the overburden pressure; it is a well known phenomenon in oil-field work. The effect is a horizontal separation of the stratum which yields a falsely high horizontal permeability. Theoretically, it could affect either stage or both stages. Note that this is strictly a test phenomenon. In a real-life surface impoundment, for example, the water pressure becomes part of the total overburden pressure since it is an area load.

STEI has conducted several tests where hydraulic fracturing should have occurred based on the simple concept above. No effects have been noted. In reality, the head dissipates rapidly with distance away from the test point. While the pressure may exceed overburden, the force available is insufficient to cause hydraulic fracturing. Calculations for a typical set up (4-inch diameter) show that fracturing will not occur with a head up to 8 embedment depths using a shear strength in the fill of 250 lb./sq.ft. However, it is still recommended that the water pressure at the test point not exceed 1.5 times the overburden pressure. The applied head should therefore be less than about 3 times the depth to the bottom of the casing.

2.2. Measurement/Pressure System. The falling-head procedure allows close measurement of both flow and pressure. The usual apparatus is a 1/2 to 1 inch ID clear plastic standpipe (clear Schedule 40 PVC seems best) with a scale (aluminum yardstick) permanently attached. The bottom of the yardstick should be at a level which can easily be re-determined if, for some reason, the yardstick falls off. Such a system can be read to 1/32 inch, which equates to 0.10 cc for a half-inch pipe. The standpipe system is attached to the cap for the casing. After the casing seal has hydrated, the casing and standpipe system are filled with water and the test begins. The "plumbing" system is carefully checked for leaks, and any found are repaired. The system is illustrated on the attached Figure A-2. A plastic elbow ("Ell") is attached to the top of the standpipe to prevent entry of rainwater. Evaporation losses are minimized by covering the open end of the Ell with aluminum foil, held in place with a rubber band, and having a pinprick hole in the foil for air pressure equalization.

Measurements are taken frequently on the first day. The rates of flow are usually slow enough so that readings thereafter can be on a twice-a-day basis, or even daily. When the fluid level in the standpipe approaches the bottom of the measurement scale, the standpipe is refilled and a new test increment begins. Caution is needed for overnight readings. The rate of fall should be checked against the overnight time increment (usually 13 to 15 hours). If it appears that the standpipe might run dry, it should be refilled after the last afternoon reading.

2.3 Apparent Permeabilities. The Hvorslev equations on Figure A-1 and the H-I equations in Section V all have a common format (See Figures A-1, A-4, and A-5 for nomenclature):

$$q = G Kh \quad \text{or} \quad K = q/(Gh) \quad (2)$$

for the constant-head case and

$$K = (Ap/G) \ln(H1/H2)/(t_2 - t_1) \quad (3)$$

for the falling-head case, where:

K	=	Permeability
t_1, t_2	=	Time at Beginning and End
$H1, H2$	=	Heads at (t_1, t_2)
Ap	=	Standpipe Area
G	=	Geometric Factor (function of m, b, L, D)
m	=	$\sqrt{Kh/K_v}$
b	=	Remaining clay below test

All of the factors of Equation (3) are known during the test, except (m) and, of course, (K).

If the water table is above the base of the test, there is no question of how to measure the head: it is the vertical distance from the top of the water column in the standpipe to the water table (before the test began). Where the water table is below the test, the head should be calculated in the same manner. If there is an unsaturated drainage blanket at some depth (b) below the test, the head should be taken as the vertical distance from the top of the water column in the standpipe to the top of the drainage blanket. However, in no case should the depth to water below bottom of test exceed 20 to 40 test diameters.

The lowest likely value for (m) is 1, which is not only the most conservative for (K_v) but also simplifies the field calculations. Keeping up with the data in terms of apparent permeabilities has a physical meaning and so yields a better "feel" for the test than does merely plotting the ratio of logarithm divided by time. In the "normal" situation, Case "C" applies to Stage 1 and Case "G" to Stage 2. Setting ($m=1$) into the equations for the "normal" situation, one has for Stages 1 and 2, respectively:

Direct Hvorslev:

$$K1 = (\pi d^2/11D) \ln(H1/H2)/(t_2 - t_1) \quad (4)$$

$$K2 = (d^2/8L) \ln(L/D + \sqrt{1 + (L/D)^2}) \ln(H1/H2)/(t_2 - t_1) \quad (5)$$

Hvorslev - Image (H-I):

$$K1 = (\pi d^2/11D)[1 - (D/4b)] \ln(H1/H2)/(t_2 - t_1) \quad (6)$$

$$K2 = (d^2/16L) \ln[g(L/D, b)] \ln(H1/H2)/(t_2 - t_1) \quad (7)$$

$$g = \frac{(\sqrt{1 + (L/D)^2} + L/D)(4b/D - L/D + \sqrt{1 + (4b/D - L/D)^2})}{(\sqrt{1 + (L/D)^2} - L/D)(4b/D + L/D + \sqrt{1 + (4b/D + L/D)^2})} \quad (8)$$

The function for (K2) can also be written with the simpler notation of Section V as:

$$K2 = (\pi d^2 / 16L) [\ln \{u(1,r,0)/u(1,r,2b)\}] \ln(H1/H2)/(t_2 - t_1) \quad (8A)$$

Note that the remaining clay (b) will be different in Stage 1 and Stage 2. Also, the acting diameter of Stage 1 may be greater than that of Stage 2 (See Section 2.1B.).

The H-I equations have only a small effect on the geometric constants used in computing (K1, K2), but the heads should be the distance from the top of the standpipe water column to the potentiometric level in the underlying drainage blanket (the latter usually being zero). Returning to the nomenclature of Equations (2 and 3), and taking (b₂) as the clay thickness remaining below the test during Stage 2, the following comparisons can be made.

b ₂ /D	Ratio of H-I Values to H Values					
	L/D = 1.5			L/D = 2.0		
	F1	F1*	F2	F1	F1*	F2
1.0	0.967	0.962	0.954	0.967	0.965	0.950
5.0	0.962	0.956	0.945	0.964	0.960	0.942
4.0	0.955	0.949	0.934	0.958	0.953	0.931
3.0	0.944	0.938	0.916	0.950	0.944	0.913
2.0	0.929	0.920	0.886	0.938	0.930	0.884
1.0	0.900	0.887	0.820	0.917	0.906	0.825

Note: F1* is F1 using the OD of the casing.

It must be emphasized that neither (K1) nor (K2) is "the" permeability, but rather a convenient notation. Obviously, the geometric portions do not change during a test stage. For field use, these complex equations are solved once for the constants (F1, F2) so that the field calculations are simply:

$$K1 = F1 \ln(H2/H1)/(t_2 - t_1) \quad (9)$$

$$K2 = F2 \ln(H2/H1)/(t_2 - t_1)^* \quad (10)$$

*Note: F2 should contain the correction for small (L/D) given in Equation (27), Section 3.2.

2.4. Steady-State. Whether one uses the Laplacian or the Green-Ampt model for groundwater flow, there are still transient effects at the beginning of every type of field or laboratory permeability test. The observed effect is to indicate a high permeability, gradually decreasing to some relatively constant value corresponding to a steady-state flow condition. Such an effect is usually noted in the Two-Stage Test. Therefore, the test must be conducted "long enough" to achieve virtually the steady-state condition or the results will be not only too high but also erratic.

There is no reliable method for pre-calculating the length of time required to achieve steady-state. Rather, the observational method is used. The appropriate apparent permeability (K_1 or K_2) is calculated for each the increment, and/or over longer periods of time; when these appear to be stable, they are checked using arithmetic time-weighted averages, e.g.,

$$K' = \Sigma (T_i K_i) / \Sigma (T_i) \quad (11)$$

where K' = Arithmetic Time-Weighted Average (ATWA) Permeability

T_i = Time Duration of Test Increment (i)

K_i = Permeability Measured during Test Increment (i)

This is theoretically exact for a single run (between refills). Since the test stabilizes with increasing times, the (K') values are computed beginning with the last test increment and proceeding towards the initial increments.

2.5 Ambient Conditions. At slow rates of flow, the field readings are affected by temperature, as has been noted on many such projects. Rising temperature causes the water column in the pressure/measurement standpipe to expand, so that the drop in water level is less than flow alone would produce. The net effect is a lower apparent permeability. Conversely, falling temperature produces a higher apparent permeability. A normal day's temperature variations can easily cause a 0.5 to 1 order of magnitude change in the apparent permeability. These effects have been much stronger for smaller-diameter standpipes, since a given change in overall volume creates a larger change in height with a smaller area. They are very strong for 1/2 inch standpipes, but still noticeable with 3/4 inch standpipes. Since the total water column is partially exposed and partially below grade, any calculations for the volumetric change would be a crude approximation.

Therefore, a complete "dummy" test setup is installed but with the bottom of the casing sealed with a cap. This dummy, or temperature effect gauge (TEG) is of the same construction and embedded to the same depth as the regular test setups. Since there is no flow from the TEG, any change in its readings must be due to changes in the ambient conditions; such changes would affect the regular test setups to exactly the same degree.

This correction is applied to the regular tests by:

- Reading the TEG at the same times as readings are taken on the regular tests.
- Determining any increase (decrease) in water levels in the TEG between regular test readings.
- Subtracting any increase (adding any decrease) at the TEG from the readings at the regular tests for the ends of the time increments.

The third step of this procedure is not theoretically precise. The theoretical solution yields a complex implicit equation in which the true permeability is a function of its own logarithm. However, for the geometry of the test setups and the observed magnitudes of increases/decreases, the apparent permeabilities calculated in this manner differ from the true permeabilities by no more than 2 to 5 percent. The net result is to "smooth" the apparent permeabilities. This smoothing is most apparent (and most useful) when the soil permeability is less than about 5×10^{-7} cm/sec.

An alternate procedure is to calculate the apparent permeability (K_1 , K_2) over roughly 24-hour periods so that the temperatures are about the same at the beginning and end of the test. This method yields adequate results, but takes far longer because of the number of 24-hour periods required to verify steady-state.

2.6 Freezing. These tests can be conducted in very cold weather, but there is a possibility of the water in the exposed standpipe freezing. Insulation would not prevent freezing if the mean daily temperature is less than 32°F , and could interfere with readings. Heating could be employed, but would be difficult to control to the degree necessary to prevent erratic and uneven expansion of water in the various standpipes.

Some form of antifreeze is indicated but it should not affect the test or pollute the test area permanently. STEI has used grain alcohol (normally 100 Proof Vodka) for this purpose. A mixture of 1 part Vodka to 3 parts water will prevent freezing to about 20°F , and 1(Vodka):2(Water) to 10°F . Withstanding 0°F requires a 1(Vodka):1(water) ratio. The viscosity (ν) of ethyl alcohol is about 1.3 times that of water at temperatures of 20 degrees to 100 degrees F. Its specific gravity is about 0.8, and of 100-Proof (0.9). Using the proper equation to account for kinematic effects, the ratio of observed permeabilities with respect to pure Vodka (K_a) and Water (K_w) should be:

$$\frac{K_a}{K_w} = \frac{\nu_w}{\nu_a} \frac{G_a}{G_w} = \frac{1.0}{1.15} \frac{0.9}{1.0} \quad (12)$$

$$= 0.78$$

The kinematic effect of using a small amount as an antifreeze should be small (5 to 6%).

There are, however, chemical effects on the absolute permeability which are independent of the kinematic effects. A review of the literature does not disclose any tests at present using grain or ethyl alcohol (ethanol). There are tests on illites and montmorillonites using wood or methyl alcohol (methanol). These indicate for illite an increase in permeability of 3 orders of magnitude using reagent grade methanol. After re-permeation with water, the residual effect was an increase of 1.5 orders of magnitude. In the STEI procedure, the concentration of ethanol is very small by the time the fluid reaches the soil. Analogy with the results of testing with high and low concentrations of other organic solvents indicates that the effect of the ethanol should be small.

Automobile antifreeze (ethylene glycol) has been used. However, this chemical should be limited to test pads where the affected soil can be removed and treated. Kinematic effects must be considered.

* NOTE: Double these Vodka proportions for a given temperature.

2.7 Kinematic Effects of Temperature. Permeability is normally reported as the value for water at 20°C (68°F). The density and viscosity of liquids, including water, are affected by temperature. The effect on permeability is in direct ratio to the kinematic viscosity (v), which is the viscosity divided by the density. The kinematic viscosity decreases at higher temperatures. The net effect is that the apparent permeability is greater than the 68°F value at low temperatures.

The kinematic viscosity (v_0) of water at 68°F is 1.06×10^{-5} sq.ft./sec. Using this value as a base and the normal kinematic correction for flow,

$$K_c/K = v/v_0 \quad (13)$$

where K_c = Corrected permeability

K = Measured permeability

v = Kinematic viscosity at Temperature other than 68°F *

The required corrections are illustrated on Figure A-3 for the case of pure water. They are small for typical laboratory tests, but can be significant (20 to 50%) for field tests in very cold or very hot conditions. These corrections should be applied to the (K_1 , K_2) values from the field in determining (K_1' , K_2').

2.8 Special Items - Stage 2. The casing should be emptied of water (siphon and/or bailing) before any of the following operations commence. An undisturbed "Shelby Tube" sample is normally secured from the borehole as part of advancing that hole for Stage 2. This sample is then tested in the laboratory for classification (Atterberg Limits and/or Particle Size), moisture, density, plus horizontal and vertical permeability. Such sampling is not advised when the liner material has a significant content of large-sized particles such as gravel. The sampling process can loosen the walls of Stage 2 in soils which contain gravel.

Extreme caution is needed to minimize sidewall smear effects. The final reaming to full diameter should be done with an undersize device having full diameter only at the cutting edge. It is still good practice to roughen the sides of the hole with a wire brush.

III. DATA REDUCTION - GENERAL

3.1 Basic Procedure. The real values (K_h , K_v) can be determined once the final values for (K_1' , K_2') are determined using the ATWA procedure described in paragraph (2.4). These two apparent permeabilities were computed using ($m = \sqrt{K_h/K_v} = 1.0$). The problem is to find the true (m), then (K_h) or (K_v) can be calculated from either (K_1') or (K_2'). Returning to the nomenclature of equation (2),

$$K_1 = [A_p/G_1(1)] \ln (H_1/H_2)/(l_2-l_1) \quad (14)$$

$$K_2 = [A_p/G_2(1)] \ln (H_1/H_2)/(l_2-l_1) \quad (15)$$

Where $G(1)$ means taking ($m=1$) in the proper equation, either Hvorslev or H-I.

* NOTE: Use a thermometer or thermocouple to the bottom of the TEG to obtain the temperature of the infiltrating water.

Thus

$$K_v = [A_p/G_1(m)] \ln (H_1/H_2)/(t_2-t_1) \quad (16)$$

$$= [G_1(1)/G_1(m)] K_1' \quad (17)$$

$$K_v = [A_p/G_2(m)] \ln (H_1/H_2)/(t_2-t_1) \quad (18)$$

$$= [G_2(1)/G_2(m)] K_2' \quad (19)$$

$$\text{or } K_2'/K_1' = [G_2(m)/G_2(1)] [G_1(1)/G_1(m)] \quad (20)$$

As an illustration, assume the "normal" case in which (K_1) was computed using Hvorslev Case "C" and (K_2) from Case "G". Then:

$$A_p/G_1 = \pi d^2 m / 11 D \quad (21)$$

$$A_p/G_2 = (d^2/8L) \ln (mL/D + \sqrt{1 + (mL/D)^2}) \quad (22)$$

and

$$K_2'/K_1' = \frac{m \ln (L/D + \sqrt{1 + (L/D)^2})}{\ln (mL/D + \sqrt{1 + (mL/D)^2})} \quad (23)$$

Which is the procedure cited in current literature. Obviously, it is a special case of the generalized case given above as Equation (20). Since (m) is an implicit function of its own logarithm, solution is by trial-and-error. Once (m) is determined, it is introduced into Equation (17) or (19) to obtain (K_v), and ($K_h = m^2 K_v$).

3.2 Non-Convergence. Reference to Figure A-1 shows that Hvorslev Case "G" should reduce to Case "C" if ($L=0$). It does not; rather, it converges to the solution for a spherical discharge geometry.

$$\lim_{L \rightarrow 0} \frac{K_v^G}{K_v^C} = \frac{(md^2/8D)}{\pi(md^2/11D)} \quad (24)$$

$$= \pi(md^2/11D) \quad (25)$$

$$\text{Ratio } K_v^G/K_v^C = 1/8 \div \pi/11 = .438 \quad (26)$$

This is accounted for using a correction factor, necessary only at small (L/D) for Stage 2. The Stage 1 value from Case "C" is taken as correct since it is quite close to Case "B". An exact theoretical solution for Case "B" is available and confirms Hvorslev's value. Another part of Hvorslev's 1951 paper gives the proper value for ($L/D = 1$), so that an exponential transition could be applied to Stage 2; it becomes:

$$F = [1.0 - 0.5623 \exp (-1.566 L/D)] \quad (27)$$

and (K_2) is replaced by (K_2/F). This correction is normally carried in the field (see Section 2.3), and applied to both Hvorslev and H-I equations for Stage 2.

3.3 Soil Suction. The pore-water pressure of unsaturated clay is below atmospheric, a phenomenon which produces "soil suction". The effect on a permeability test is to create a negative water pressure at the wetting front (i.e., where saturation reaches 100%). The actual hydraulic gradient is therefore greater than would be calculated without suction. The permeability determined by disregarding suction is therefore too high. Soil suction is accounted for in the one-dimensional Green-Ampt analysis, often applied to surface infiltrometer testing. Mathematically, the effect is the same as adding the suction value to the applied head.

During a (field) permeability test, the location of the wetting front is constantly changing; the radius to the wetting front increases with the volume of flow. Hence, the effect of suction on the test is constantly decreasing, at least until the wetting front reaches a pervious boundary.

In the case of a spherical flow source in an infinite isotropic medium, it can be shown that the observed test permeability (K_o) will differ from the real, saturated permeability by:

$$K_o/K_s = [1 + (h_s/h_t)]\{1/(1 - r_o/R)\} \quad (28)$$

where: h_s = Head due to Soil Suction
 h_t = Head Applied at Test Level
 r_o = Radius of Test Casing
 R = Radius to Wetting Front

NOTE: This is a very approximate procedure for a cylindrical source (i Stage 2). Correct equations have been derived but are not yet included.

The first term becomes (1.0) if the (h_t) is replaced by ($h_t + h_s$) when (K_o) was calculated. The remaining second term does not depend on suction. Hence, if quasi-steady state flow is reached during the test, the second term becomes essentially (1.0).

Typical liner soils are compacted wet of optimum, and hence will have air voids of around 2 to 4 percent of their total volume. A water flow of 200cc during the test will thus saturate 5000 - 10000 cc (300-600 cu.in.) of soil. For a 4-inch diameter test, this equates to ($r_o/R = 0.3$), so that the observed permeability should be some 1.4 times the saturated value. In practice, both (K_1) and (K_2) become quite steady after total flows less than 200 cc, and do not exhibit the continually decreasing observed permeability predicted by the Green-Ampt Model.

The effects of soil suction can therefore be taken into account by adding the suction value to the applied head. In most tests, the applied head (measured with respect to the drainage layer) is on the order of 7 feet. Soils compacted wet of optimum have comparatively low soil suctions, on the order of 1 to 2 feet. Hence, the total effect of soil suction on the test is on the percentage level, not at the order-of-magnitude level.

3.4 Outliers. Experience with this test procedure has shown that some (one out of 5, on the average) will leak enough to affect the results but with no surface expression. Since the testing is usually performed in groups of 3 or more (preferably 5 or more), such an occurrence is usually quite clear by comparison with the other tests. A numerical evaluation can be made statistically, as shown below. However, a bad test may indicate a bad area of the tested unit. If it is clear that a test is behaving significantly different from the others, it should be replaced. If the replacement test follows the original test's behavior, there is something wrong in that area. The test for significance is:

$$\frac{\log K' - \log K_j}{S} > 2.5$$

(29)

where: K = Logarithmic Mean K of other tests

K_j = K for suspect test

S = Logarithmic standard deviation of other tests

IV. DATA REDUCTION (HVORSLEV)

4.1. Applicability. The basic Hvorslev equations apply most directly to infinite, isotropic or anisotropic, masses below the water table. Where the test is above the water table, the Hvorslev-Image equations in Section V should be used. The nomenclature for the following Section is illustrated on Figure A-4.

4.2. Basic Solution. The first step is to obtain the time-weighted values of apparent permeability, $(K1')$ from Stage 1 and $(K2')$ from Stage 2 - See Section (3.1). Then, Equation (20) or the more specialized Equation (23) is solved by trial-and-error for (m) , leading to (K_h, K_v) through Equation (17) or (19). However, in many tests the ratio $(K2'/K1')$ is so low that Equation (23) fails to converge.

4.3. $(K2'/K1')$ Less Than 1.0 (Hvorslev Equations). Physically, $(K_h > K_v)$, and therefore $(K2'/K1')$ should be greater than 1.0. However, on many field tests in several states (LA, MI, NJ, OH, PA, SD, TX) ratios less than 1.0 have been observed. The reason is normally sidewall smear, which reduces the effective (K_h) acting near the sidewalls during Stage 2.

Mathematically, $(K2'/K1' < 1.0)$ can lead to a condition where no solution of Equation (20) or the more specialized and common Equation (23) is possible. In the case of Equation (23), for example, the limit as (m) approaches zero is:

$$\text{Lim (23)} = (D/L) \ln (L/D + \sqrt{1 + (L/D)^2}) \quad (30)$$

For $(L/D = 1.5)$, the limit is $(K2'/K1' = 0.797)$. On the other hand, if $(m = 0)$, (K_v) is infinite. Hence, $(K2'/K1')$ values less than predicted by Equation (30) cannot exist. They are test artifacts due to sidewall smear.

4.4. Smear Corrections. From the concepts of Section (4.3), it appears that some correction is necessary for sidewall smear, especially when $(K2'/K1' < 1.0)$. There are two basic approaches to accounting for smear effects:

4.4.A. Purely Empirical. Barron (1948) proposed using an effective diameter of one-half the true diameter to account for sidewall smear in the case of sand drains (L/D) approaching infinity). The mathematical effect is the same as replacing Hvorslev Case "G" (Infinite Medium) with Case "F" (Semi-Infinite Medium).

4.4.B. Smear Equation. The case of flow from a lined cylindrical hole in a semi-infinite anisotropic medium was solved by Bourwell, Adams, and Brown (1980). This solution is easily converted to a falling-head test in an infinite anisotropic medium having a smeared zone along its sidewalls. Various radiographic studies on "undisturbed" samples indicate that the smeared zone is probably around 1/4 inch thick. The ratio ($p = K_h/K_s$) of the natural horizontal permeability (K_h) to that of the smeared zone (K_s) is not determined in the regular test (although a 3rd stage might do so). Back calculations from numerous projects in various materials indicate that this ratio is between 10 and 20, i.e., that the horizontal permeability of the smeared zone is about 5 to 10% that of the natural soils. The smear equation for the normal situation Hvorslev Equation (K_1' from "C", K_2' from "G") is:

$$\frac{K_2'}{K_1'} = \frac{m \ln(L/D + \sqrt{1 + (L/D)^2})}{\ln(A) + p \ln(B)} \quad (31)$$

where

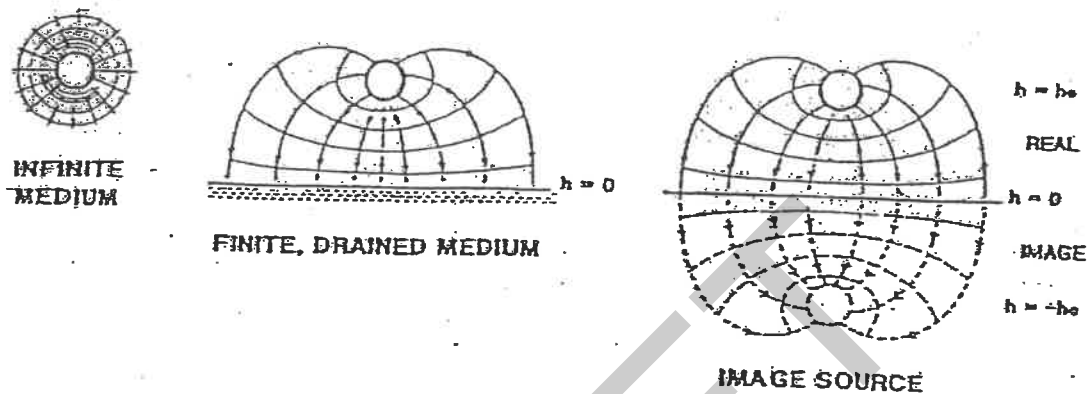
- $A = mL/(D+2T) + \sqrt{1 + [mL/(D+2T)]^2}$
- $B = 1 + 2T/D$
- L = Height of Cylindrical Cavity
- K_s = Permeability of Smeared Zone
- K_h = Natural Horizontal Permeability
- T = Thickness of Smeared Zone
- D = Inner Diameter of Cavity = $2r_2$
- $m = \sqrt{K_h/K_v}$

V. HVORSLEV/IMAGE EQUATIONS

As noted previously, the basic Hvorslev equations apply most directly to masses of infinite depth and below the groundwater level. Neither test pads nor liners often meet these criteria. Therefore, results calculated by using the Hvorslev equations directly for such cases will not be correct. For a given permeability, both proximity to a drainage zone and the vertical gradient due to gravity cause the flow to be greater than the basic Hvorslev equations would predict. The basic Hvorslev equations therefore predict a higher permeability than the material really has. A method for accounting for these effects was needed.

5.1 Image Potential Technique. The method of image wells has been used in geohydrology for years. The classic example is the solution for a well near a river, found in many textbooks. However, the method is not limited to two-dimensional situations such as this illustration. Any solution for an infinite or semi-infinite medium which describes the potential field (head distribution) can be converted to a solution for a finite medium bounded by a plane by using the Image Potential technique.

The basic idea is that halfway between a source and a sink of equal but opposite strength will be a plane of zero potential. So, if there is a plane of zero potential (head), its effect can be replaced by an "image" source/sink located twice as far away from the sink/source as is the plane. If the test (source) is set a distance (b) above the drainage blanket, the flow field will be the same as if there were no blanket but there was an image test (sink) with negative head at a distance of ($2b$) below the real test. Since the drainage blanket is at zero head, the head at the test is taken as the total head lost: (b) plus the excess pressure (h_t) applied at the infiltration point of the test.



The Image Potential technique thus accounts both for the less-than-infinite drainage path lengths in the real world and for the gravitational gradient ($i=1.0$).

The generalized procedure is to describe the head at a point where head is known in terms of the heads induced at that point by flows from the real and image sources, i.e.,

$$\begin{array}{ccccc} \text{Known Head} & = & \text{Head at Point as} & & \text{Head at Point as} \\ \text{At Point} & & \text{Function of Real Flow} & - & \text{Function of Image Flow} \end{array}$$

This procedure has been applied to several applicable cases, as described below. The nomenclature for the following Sections is illustrated on Figure A-5.

5.2. H-I Equations for Stage 2 (No Smear). The basic Hvorslev equation approximates the flow from a cylindrical source (such as Stage 2) by that from an ellipsoidal source. The head distribution for the anisotropic, infinite medium is given by (Harr, 1962):

$$h(r,z) = [Q/(4\pi m^2 K_v L)] \ln \left[\frac{(mz/r) + (mL/2r) + \sqrt{1 + [(mz/r) + (mL/2r)]^2}}{(mz/r) - (mL/2r) + \sqrt{1 + [(mz/r) - (mL/2r)]^2}} \right] \quad (32)$$

where: z = Vertical distance from center of ellipsoid
 r = Radial distance from center of ellipsoid
 L = Length of Ellipsoid (cylinder)
 Q = Flow from Ellipsoid (cylinder)

For simplicity, one can define the function

$$u(m,r,z) = \frac{(mz/r) + (mL/2r) + \sqrt{1 + [(mz/r) + (mL/2r)]^2}}{(mz/r) - (mL/2r) + \sqrt{1 + [(mz/r) - (mL/2r)]^2}} \quad (33)$$

And

$$h(r,z) = [Q/(4\pi m^2 K_v L)] \ln[u(m,r,z)] \quad (34)$$

The head at the center of the cylinder (h_o) is the sum of the positive head (h_r) due to the real source and the negative head ($-h_i$) due to the image source. The vertical distance (z) from the real source's center is zero and that from the image well ($2b$). The vertical line ($r=0$) is a mathematical singularity. Therefore, the evaluation must be done at the test radius ($r=r_2$), i.e., the wall of the test, to avoid divisions by zero. Thus:

$$h_o = h_r - h_i = [Q/(4\pi m^2 K_v L)] [\ln(u(\text{Real})) - \ln(u(\text{Image}))] \quad (35)$$

$$h_o = [Q/(4\pi m^2 K_v L)] \ln [u(\text{Real})/u(\text{Image})] \quad (36)$$

where the functions (u) are defined in Equation (33). Note that Equation (36) has the same format as Equation (2), so that it can be converted to a falling-head situation using Equation (3). Introducing the real ($z=0$) and image ($z=2b$) values, rearranging terms, and simplifying,

$$K_v = [d^2/(16m^2 L)] \ln[u(m, r_2, 0)/u(m, r_2, 2b_2)] \ln(H_2/H_1)/(t_2 - t_1) \quad (37)$$

And (K2) is obtained by setting ($m=1$) in Equation (37).

5.3 H-I Equations for Stage 1. Concerning the flush-bottom (Stage 1) configuration, Hvorslev states "a formal mathematical solution is not known." However, one can invoke St. Venant's principle that the further away from a disturbance, the less the exact manner of its application matters to its effect. The head due to a spherical source is given by:

$$h = h_w + (Q/4\pi K)[(1/r) - (1/r_o)] \quad (38)$$

At a distance from the flush-bottom image source, then:

$$h_i = h_w + [(Q/5.5K)((1/R) - (1/r_o))] \quad (39)$$

where: r = Radius from center of Real test
 R = Radius from center of Image test
 r_o = Radius of both test sources

At the real (test) source, the head (h_o) is the sum of the applied head (h_w) and the negative image head (h_i), leading to:

$$h_o = (Q/(5.5K))((1/r_o) - (1/2b_1)) \quad (40)$$

Again, rearranging, using Equation (2) for the falling-head test, and introducing anisotropy,

$$K_v = (\pi d^2/11Dm)[1 - (D/4mb_1)] \ln(H_1/H_2)/(t_2 - t_1) \quad (41)$$

And (K1) is obtained by setting ($m=1$) in Equation (41). Of course, the proper (D) to use in Stage 1 (ID or OD) should be determined - see Section (2.1.B.).

5.4 Final Calculations: H-I Equations, No Smear. The procedure is as outlined in Section (3.1), especially Equation (20):

$$K2'/K1' = [G2(m)/G2(1)][G1(1)/G1(m)] \quad (20)$$

Following the format of Equation (2) and the results of Section (5.3),

$$G1(1) = 5.5r_1/[1-(r_1/2b_1)] \quad (42)$$

$$G1(m) = 5.5mr_1/[1-(r_1/2mb_1)] \quad (43)$$

where r_1 = Radius during Stage 1

b_1 = Clay remaining under bottom of Stage 1

In the same format from Section (5.2)

$$G2(1) = 4\pi L/Lh[u(1,r_2,0)/u(1,r_2,2b_2)] \quad \text{See } b_2 \text{ definitions below} \quad (44)$$

$$G2(m) = 4\pi m^2 L/Ln[u(m,r_2,0)/u(m,r_2,2b_2)] \quad " \quad (45)$$

As in previous sections, Equation (20) is solved by trial-and-error until some value of (m) yields the correct ($K2'/K1'$). The actual (K_h, K_y) are determined from Equations (17) or (19) as described in Section (3.1).

5.5 H-I Equations for Stage 2 (With Smear). In this case, smear is taken as affecting a thin zone around Stage 2, in a manner similar to that described in Section (4.4.B). Letting (K_s) again be the (horizontal) permeability of the smeared zone, the Image Potential technique yields:

$$Q = \frac{4\pi L m^2 K_v h}{(K_h/K_s) \ln[u(m,r_2,0)/u(m,r_2+T,0)] + \ln[u(m,r_2+T,0)/u(m,r_2,2b_2)]} \quad (46)$$

Which, in the format of Equation (2), becomes

$$\begin{aligned} G &= \frac{4\pi L m^2}{\ln[u(m,r_2+T,0)/u(m,r_2,2b_2)] + (K_h/K_s) \ln[u(m,r_2,0)/u(m,r_2+T,0)]} \quad (47) \\ &= G2T(m) \end{aligned}$$

where L = Length of Stage 2 Extension

r_2 = Radius of Stage 2

b_2 = Distance from Center of Stage 2 cylinder to underlying boundary.

T = Thickness of Smeared Zone

And the other terms are as defined previously. The smear effect is not normally taken into account in the field calculations for (K_1, K_2) . Therefore, data reduction following Equation (20) becomes:

$$K_2'/K_1' = [G_2T(m)/G_2(1)][G_1(1)/G_1(m)] \quad (48)$$

where $G_2T(m)$ = Equation 47

$G_2(1)$ = Equation 44

$G_1(1)$ = Equation 42

$G_1(m)$ = Equation 43

$u(m, r, z)$ = Equation 33

The normal trial-and-error solution of Equation (48) yields the proper (m) for Equation (17) or (19).

5.6 Limitations. As mentioned in Section (5.1), the plane (drainage blanket) at $(z=b)$ below the test is at zero head with respect to the head (h_o) at the test. Therefore, the head at the test is the head applied by the standpipe $(h_t = R_1 + R_2 + Z)$ plus the elevation change to the plane (b) . As (b) becomes infinite, so does the flow predicted by the H-I equations. Or, alternatively, as (b) becomes infinite the predicted (K) becomes zero. This problem does not affect two-dimensional solutions, where the area through which flow occurs is proportional to (b) ; in three-dimensional solutions, the flow area is proportional to (b^2) .

As an analogy, Two-dimensional flow from a well into a medium bounded in depth approaches zero as the radius of the medium approaches infinity; no solution is possible. Yet, geohydrology uses these solutions by assuming an "effective" radius of influence of the well which is less than infinity. The effective radius is taken as 200-500 times the well radius. Taking these limits to the $2/3$ power (to account for 3 vs 2 dimensions), the maximum value for (b) should be 20 to 40 test diameters.

V. ADVANTAGES/LIMITATIONS

6.1 Advantages. The Two-Stage Test has several positive features:

6.1.A. Cost. Compared with other field permeability tests, it is relatively inexpensive. The equipment for one test costs less than \$100.00.

6.1.B. Speed. The entire test normally takes 1 to 3 weeks, not 3 to 5 months. However, since (K_1) is the maximum possible real value for (K_v) , the liner or test pad can usually be given "Pass" or "Fail" within 48 hours.

6.1.C. Multiplicity. There is really little extra cost in running 5 tests as opposed to 1 test. A greater number of tests allows more confidence in the results.

6.1.D. Low-K. The test has successfully measured permeabilities as low as 2×10^{-9} cm/sec, and could probably evaluate even lower values.

6.1.E. Simplicity. While the computations are quite involved, the test concept and execution are simple. The test is performed with readily available materials and uses physical measurements.

6.1.F. Acceptability. Although not the only procedure so described, the test is positively cited in the U.S. EPA's manual "Design, Construction, and Evaluation of Clay Liners for Waste Management Facilities", 1988.

6.1.G. Side Liners. The test can be performed on a slope, with some minor benching.

6.1.H. Field Correlations. The results, both (Kh) and (Kv), have compared quite closely with the results from laboratory testing on undisturbed "plugs" from the liners. The test has also correlated well with Infiltrometer tests and long-term (4+ years) Pan Lysimeter installations.

6.2. Limitations. Two limitations of the procedure are apparent:

6.2.A. Volume Tested. The infiltration area is small compared with a full-size surface infiltrometer. However, the major advantage to large volume is that secondary structure is more likely to affect the results. The Two-Stage Test does a similar evaluation through multiple installations.

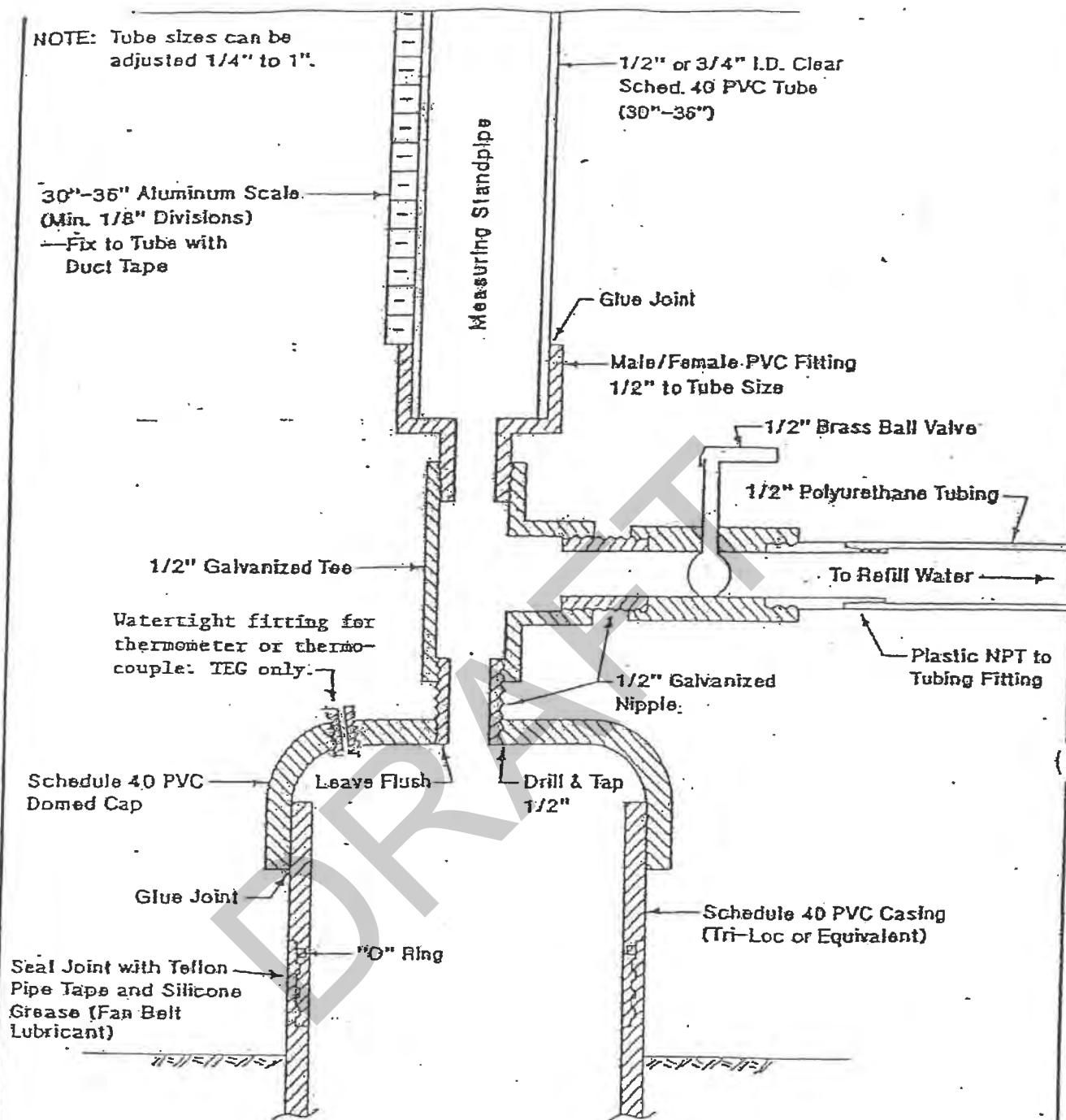
6.2.B. Soil Suction. The Hvorslev Equations are derived basically from the Steady-State Laplacian Model, not the Green-Ampt (Transient) Model which accounts for soil suction. The latter phenomenon is mathematically the same as adding head at the infiltration point. Surface infiltrometers use a head of around one to two feet. The Two-Stage uses an applied head (ht) of 4 to 7 feet, so that any suction effect is relatively far less.

Approximate solutions for the effects of non-saturation (distance to wetting front and value of soil suction) are included herein. A full procedure has been developed and is forthcoming.

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NOTE: Tube sizes can be adjusted 1/4" to 1".



FLOW MEASURING SYSTEM

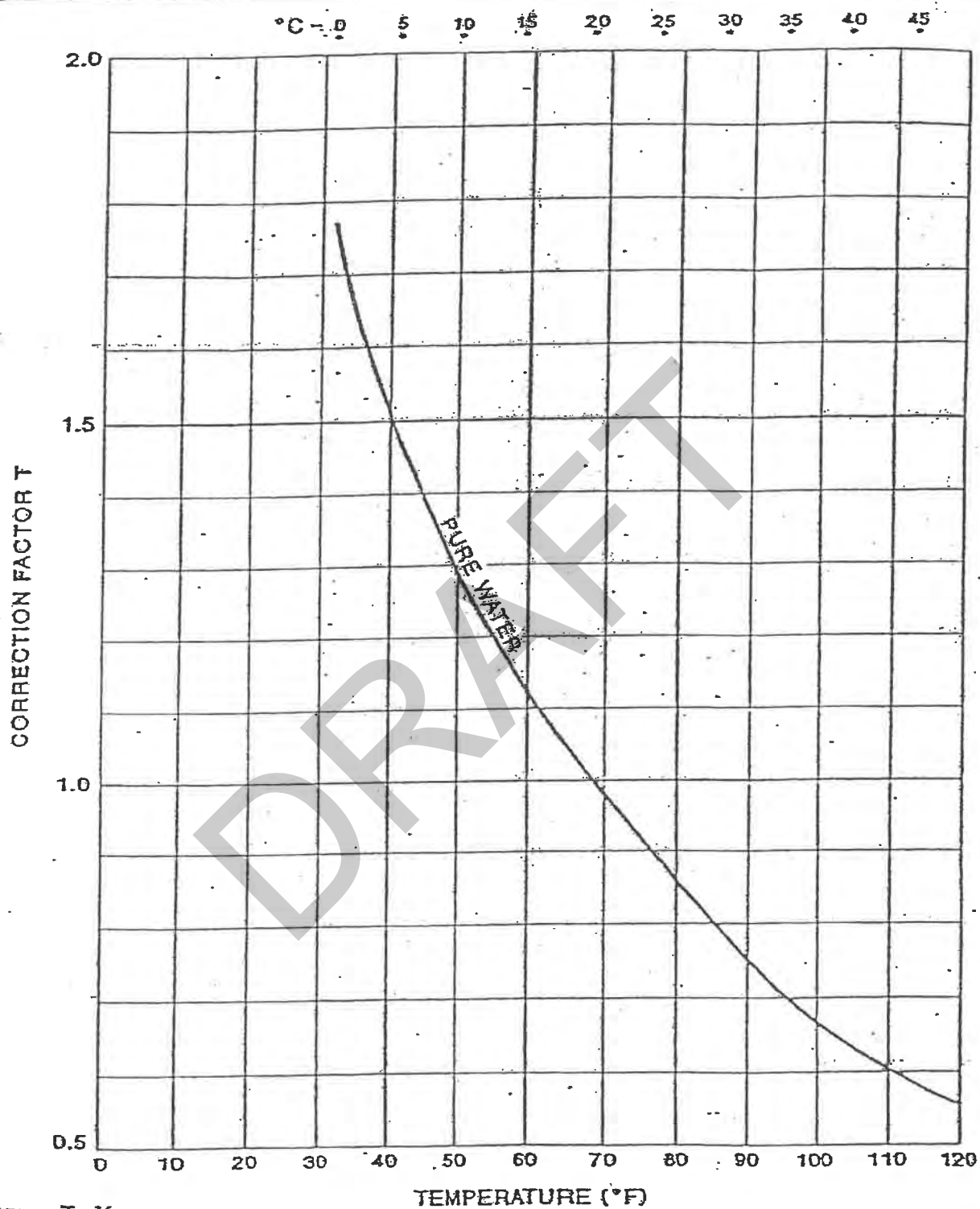
NOTE: Use Teflon Tape and Silicone Grease on all piping joints.



SOIL TESTING ENGINEERS, INC.

FIGURE NO.: A-2

DATE: 12/90



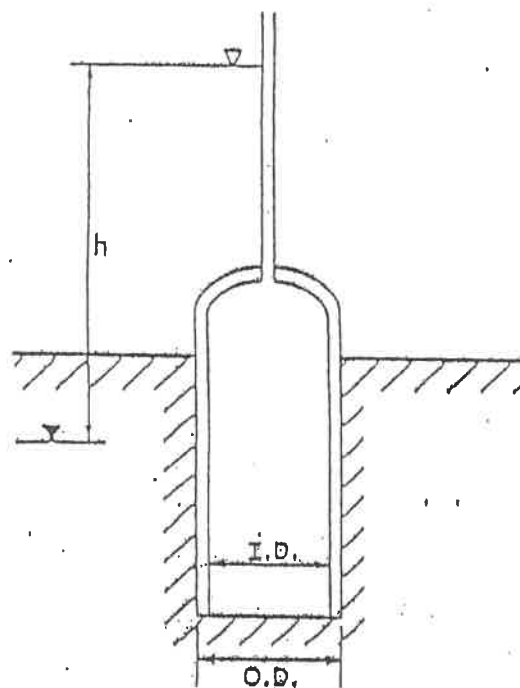
$$K_{CORR} = T \cdot K_{MEAS}$$

TEMPERATURE CORRECTIONS FOR PERMEABILITY



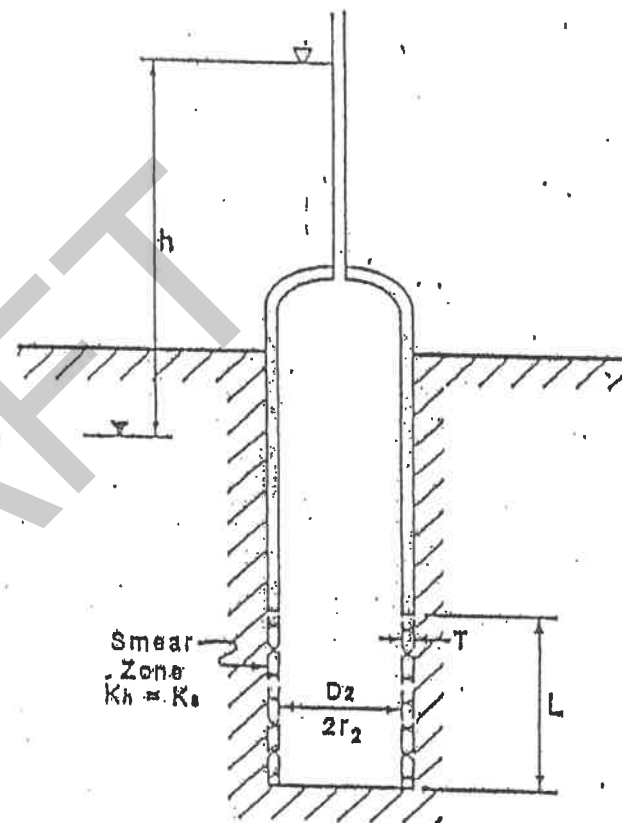
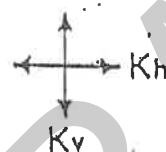
SOIL TESTING ENGINEERS, INC.

FIGURE A-3



$$D_1 = 2r_1 = \text{I.D. or O.D.}$$

STAGE 1



STAGE 2

NOMENCLATURE
BASIC HYDROLOGICAL CASE

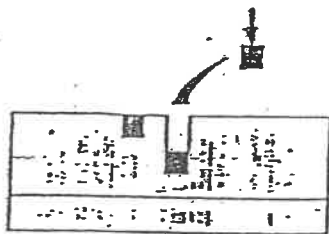
FIGURE : A-4



FIGURE 1

4-6

TEST IMPOUNDMENT HW SITE - LA

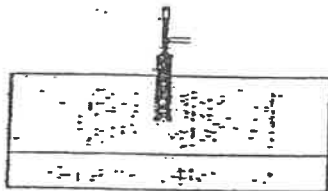


LAB TESTS ON PLUGS

1 WEEK
7 TESTS

Kn

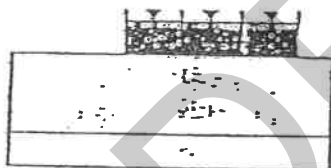
3×10^{-9}



TWO-STAGE FIELD TEST

4 WEEKS
6 TESTS

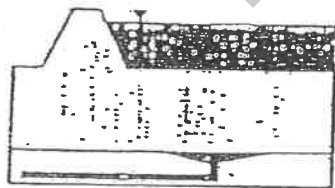
4×10^{-9}



SDRI

5 MONTHS
1 TEST

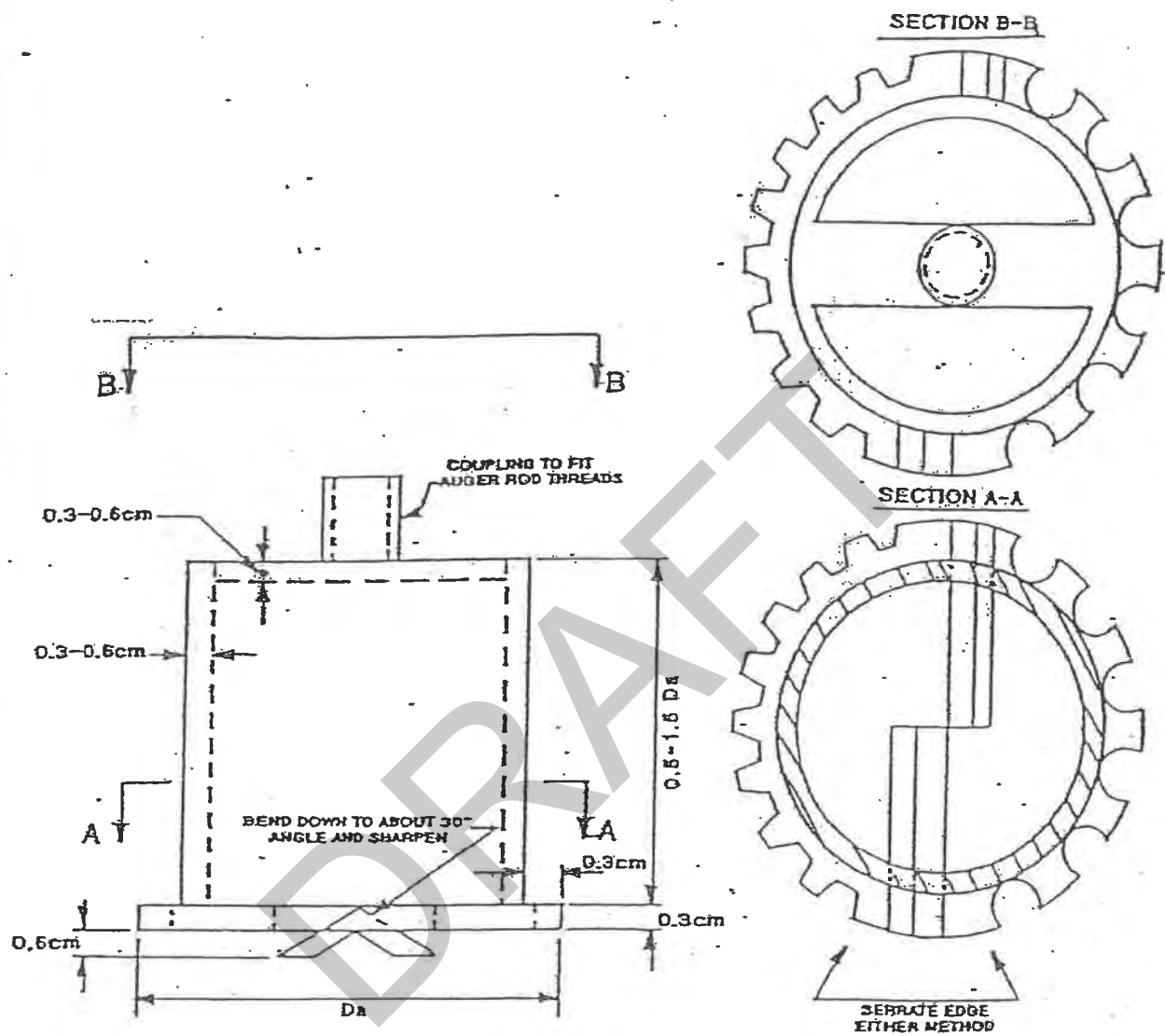
4×10^{-9}



PAN LYSIMETERS

4 YEARS
6 TESTS

2×10^{-9}



not to scale

ELEVATION

SECTION A-A

NOTE: FOR FLAT AUGER, $D_a = D + 5\text{cm}$
 FOR REAMER, $D_a = D - 0.1\text{cm}$

REPRESENTATIVE TWO-STAGE PROJECTS
LINERS AND TEST PADS
AS OF 7 AUGUST 91

Project No.	Soil Type	LL (%)	Fines (%)	Kv or Kh	Mean Permeability (cm/sec)			AEP	State	Year
					UD Plugs	2-Stage	SDRI			
Aa	CH	101	98	V H	3.5x10(-9) 4.0x10(-9)	1.6x10(-8) 1.5x10(-7)	2.6x10(-8)	-	LA	1991
A	CH	85	97	V H	4.4x10(-9) 2.8x10(-9)	9.0x10(-9) 9.5x10(-8)	5.0x10(-9)	-	LA	1991
B	CH	62	97	V H	3.5x10(-9) 3.5x10(-8)	9.9x10(-9) 2.7x10(-8)	-	-	LA	1983
C	CH	59	96	V	1.4x10(-8)	2.2x10(-8)	-	-	LA	1982
D	CH	56	95	V H	8.8x10(-9) 2.5x10(-8)	9.5x10(-9) 3.6x10(-8)	-	-	LA	1987
E	CH	54	?	V	1.7x10(-8)	5.8x10(-9)	2.7x10(-8)	-	PA	1991
F	CH	50	96	V H	7. x10(-9) 1. x10(-8)	5. x10(-9) 2. x10(-8)	4. x10(-9)	-	LA	1986
G	CL	48	85	V	4.6x10(-9)	8.6x10(-9)	-	-	OH	1990
H	CL	48	84	V	1.1x10(-7)	1.6x10(-7)	LP.	2.2x10(-8)	CA	1991
I	CL	45	-	V	1.8x10(-8)	2.9x10(-8)	-	-	SD	1988
J	CL	41	98	V	1.6x10(-8)	2.7x10(-8)	-	-	OH	1990
K	CL	41	94	V H	1.6x10(-8) 3.7x10(-8)	9.3x10(-9) 3.7x10(-8)	-	-	LA	1983
L	CL	41	-	V	2.6x10(-8)	2.3x10(-7)	3.1x10(-7)	9.3x10(-7)	CA	1988
La	CL	39	86	V	1.3x10(-8)	1.4x10(-8)	LP.	-	PA	1991
M	CL	36	91	V H	1.3x10(-8) 1.1x10(-8)	9.8x10(-9) 3.3x10(-8)	-	-	LA	1990
N	CL	36	92	V	1.6x10(-8)	1.1x10(-8)	1.2x10(-8)*	-	LA	1991
Na	CL	36	83	V	1.4x10(-8)	4.6x10(-8)	-	-	NJ	1990

REPRESENTATIVE TWO-STAGE PROJECTS
LINERS AND TEST PADS
AS OF 7 AUGUST 91
(CONTINUED)

Project No.	Soil Type	LL (%)	Fines (%)	Kv or Kh	Mean Permeability (cm/sec)			AEP	State	Year
					UD Plugs	2-Stage	SDRI			
Nb	CL	34	?	V	2.8×10^{-8}	2.8×10^{-8}	-	-	OH	1991
O	SC-G	34	44	V	1.1×10^{-7}	5.9×10^{-8}	-	-	PA	1990
Oo	CL	33	95	V	5.8×10^{-8}	6.1×10^{-8}	-	-	OH	1991
P	CL	33	?	V	5.7×10^{-8}	4.3×10^{-8}	4.7×10^{-8}	-	PA	1990
Pa	CL	33	?	V	8.1×10^{-9}	8.7×10^{-9}	-	-	LA	1991
				H	1.0×10^{-8}	2.8×10^{-8}	-	-		
Q	SC	30	49	V	6.7×10^{-8}	5.8×10^{-8}	-	-	OH	1990
R	SC-G	31	30	V	3.8×10^{-7}	1.0×10^{-7}	-	-	PA	19
S	CL	28	-	V	1.5×10^{-8}	1.7×10^{-8}	-	-	LA	1988
T	SC	28	31	V	6.8×10^{-8}	1.4×10^{-7}	6.7×10^{-7}	4.8×10^{-8}	CA	1989
U	SC	28	30	V	2.6×10^{-8}	1.9×10^{-7}	5.3×10^{-8}	1.2×10^{-7}	CA	1989

* PDRI Test
IP - Test in Progress

APPENDIX O



PHOTOGRAPHIC RECORD FORM

PROJECT
DATE / TIME
PHOTOGRAPHER
SIGNATURE

DRAFT

Location Sketch

Description of Activity:

Comments:



	PROJECT
	LOCATION
	DATE / TIME
	FIELD ACTIVITY

[illegible]

DAILY INSPECTION REPORT

Project Number: _____

Page _____ of _____

Project Name: _____

Date: _____

Project Location: _____

Temperature: _____

Weather Conditions: _____

Location of Activity \ Activities: _____

Equipment Calibration \ Recalibration: _____

Documentation and/or Commentary (Include equipment and personnel involved, description of procedures used, description of materials obtained, results of the activity and testing and a summary of observations.)

Inspector's Signature: _____

DAILY INSPECTION REPORT, CONTINUED

Project Number: _____

Page _____ of _____

Project Name: _____

Date: _____

Inspector's Signature: _____

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Revision 9: June 1, 2009
Revision schedule on pg. 11

GRI Test Method GM13*

Standard Specification for

“Test Methods, Test Properties and Testing Frequency for
High Density Polyethylene (HDPE) Smooth and Textured Geomembranes”

This specification was developed by the Geosynthetic Research Institute (GRI), with the cooperation of the member organizations for general use by the public. It is completely optional in this regard and can be superseded by other existing or new specifications on the subject matter in whole or in part. Neither GRI, the Geosynthetic Institute, nor any of its related institutes, warrant or indemnifies any materials produced according to this specification either at this time or in the future.

1. Scope

- 1.1 This specification covers high density polyethylene (HDPE) geomembranes with a formulated sheet density of 0.940 g/ml, or higher, in the thickness range of 0.75 mm (30 mils) to 3.0 mm (120 mils). Both smooth and textured geomembrane surfaces are included.
- 1.2 This specification sets forth a set of minimum, physical, mechanical and chemical properties that must be met, or exceeded by the geomembrane being manufactured. In a few cases a range is specified.
- 1.3 In the context of quality systems and management, this specification represents manufacturing quality control (MQC).

Note 1: Manufacturing quality control represents those actions taken by a manufacturer to ensure that the product represents the stated objective and properties set forth in this specification.

- 1.4 This standard specification is intended to ensure good quality and performance of HDPE geomembranes in general applications, but is possibly not adequate for the complete specification in a specific situation. Additional tests, or more restrictive

*This GRI standard is developed by the Geosynthetic Research Institute through consultation and review by the member organizations. This specification will be reviewed at least every 2-years, or on an as-required basis. In this regard it is subject to change at any time. The most recent revision date is the effective version.

values for test indicated, may be necessary under conditions of a particular application.

Note 2: For information on installation techniques, users of this standard are referred to the geosynthetics literature, which is abundant on the subject.

2. Referenced Documents

2.1 ASTM Standards

- D 792 Specific Gravity (Relative Density) and Density of Plastics by Displacement
- D 1004 Test Method for Initial Tear Resistance of Plastics Film and Sheeting
- D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
- D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
- D 1603 Test Method for Carbon Black in Olefin Plastics
- D 3895 Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis
- D 4218 Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- D 4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
- D 5199 Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
- D 5397 Procedure to Perform a Single Point Notched Constant Tensile Load – (SP-NCTL) Test: Appendix
- D 5596 Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
- D 5721 Practice for Air-Oven Aging of Polyolefin Geomembranes
- D 5885 Test method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry
- D 5994 Test Method for Measuring the Core Thickness of Textured Geomembranes
- D 6693 Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
- D 7466 Test Method for Measuring the Asperity Height of Textured Geomembranes

2.2 GRI Standards

- GM10 Specification for the Stress Crack Resistance of Geomembrane Sheet
- GM 11 Accelerated Weathering of Geomembranes using a Fluorescent UVA-Condensation Exposure Device

- 2.3 U. S. Environmental Protection Agency Technical Guidance Document "Quality Control Assurance and Quality Control for Waste Containment Facilities," EPA/600/R-93/182, September 1993, 305 pgs.

3. Definitions

Manufacturing Quality Control (MQC) - A planned system of inspections that is used to directly monitor and control the manufacture of a material which is factory originated. MQC is normally performed by the manufacturer of geosynthetic materials and is necessary to ensure minimum (or maximum) specified values in the manufactured product. MQC refers to measures taken by the manufacturer to determine compliance with the requirements for materials and workmanship as stated in certification documents and contract specifications.

ref. EPA/600/R-93/182

Manufacturing Quality Assurance (MQA) - A planned system of activities that provides assurance that the materials were constructed as specified in the certification documents and contract specifications. MQA includes manufacturing facility inspections, verifications, audits and evaluation of the raw materials (resins and additives) and geosynthetic products to assess the quality of the manufactured materials. MQA refers to measures taken by the MQA organization to determine if the manufacturer is in compliance with the product certification and contract specifications for the project.

ref. EPA/600/R-93/182

Formulation, n - The mixture of a unique combination of ingredients identified by type, properties and quantity. For HDPE polyethylene geomembranes, a formulation is defined as the exact percentages and types of resin(s), additives and carbon black.

4. Material Classification and Formulation

- 4.1 This specification covers high density polyethylene geomembranes with a formulated sheet density of 0.940 g/ml, or higher. Density can be measured by ASTM D1505 or ASTM D792. If the latter, Method B is recommended.
- 4.2 The polyethylene resin from which the geomembrane is made will generally be in the density range of 0.932 g/ml or higher, and have a melt index value per ASTM D1238 of less than 1.0 g/10 min.
- 4.3 The resin shall be virgin material with no more than 10% rework. If rework is used, it must be a similar HDPE as the parent material.
- 4.4 No post consumer resin (PCR) of any type shall be added to the formulation.

5. Physical, Mechanical and Chemical Property Requirements

- 5.1 The geomembrane shall conform to the test property requirements prescribed in Tables 1 and 2. Table 1 is for smooth HDPE geomembranes and Table 2 is for single and double sided textured HDPE geomembranes. Each of the tables are given in English and SI (metric) units. The conversion from English to SI (metric) is soft.

Note 3: The tensile strength properties in this specification were originally based on ASTM D 638 which uses a laboratory testing temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Since ASTM Committee D35 on Geosynthetics adopted ASTM D 6693 (in place of D 638), this GRI Specification followed accordingly. The difference is that D 6693 uses a testing temperature of $21^{\circ}\text{C} \pm 2^{\circ}\text{C}$. The numeric values of strength and elongation were not changed in this specification. If a dispute arises in this regard, the original temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ should be utilized for testing purposes.

Note 4: There are several tests often included in other HDPE specifications which are omitted from this standard because they are outdated, irrelevant or generate information that is not necessary to evaluate on a routine MQC basis. The following tests have been purposely omitted:

- Volatile Loss
- Dimensional Stability
- Coeff. of Linear Expansion
- Resistance to Soil Burial
- Low Temperature Impact
- ESCR Test (D 1693)
- Wide Width Tensile
- Water Vapor Transmission
- Water Absorption
- Ozone Resistance
- Modulus of Elasticity
- Hydrostatic Resistance
- Tensile Impact
- Field Seam Strength
- Multi-Axial Burst
- Various Toxicity Tests

Note 5: There are several tests which are included in this standard (that are not customarily required in other HDPE specifications) because they are relevant and important in the context of current manufacturing processes. The following tests have been purposely added:

- Oxidative Induction Time
- Oven Aging
- Ultraviolet Resistance
- Asperity Height of Textured Sheet (see Note 6)

Note 6: The minimum average value of asperity height does not represent an expected value of interface shear strength. Shear strength

associated with geomembranes is both site-specific and product-specific and should be determined by direct shear testing using ASTM D5321/ASTM D6243 as prescribed. This testing should be included in the particular site's CQA conformance testing protocol for the geosynthetic materials involved, or formally waived by the Design Engineer, with concurrence from the Owner prior to the deployment of the geosynthetic materials.

Note 7: There are other tests in this standard, focused on a particular property, which are updated to current standards. The following are in this category:

- Thickness of Textured Sheet
- Puncture Resistance
- Stress Crack Resistance
- Carbon Black Dispersion (In the viewing and subsequent quantitative interpretation of ASTM D 5596 only near spherical agglomerates shall be included in the assessment).

Note 8: There is a GRI test currently included in this standard. Since this topic is not covered in ASTM standards, this is necessary. It is the following:

- UV Fluorescent Light Exposure

5.2 The values listed in the tables of this specification are to be interpreted according to the designated test method. In this respect they are neither minimum average roll values (MARV) nor maximum average roll values (MaxARV).

5.3 The properties of the HDPE geomembrane shall be tested at the minimum frequencies shown in Tables 1 and 2. If the specific manufacturer's quality control guide is more stringent and is certified accordingly, it must be followed in like manner.

Note 9: This specification is focused on manufacturing quality control (MQC). Conformance testing and manufacturing quality assurance (MQA) testing are at the discretion of the purchaser and/or quality assurance engineer, respectively.

6. Workmanship and Appearance

6.1 Smooth geomembrane shall have good appearance qualities. It shall be free from such defects that would affect the specified properties of the geomembrane.

- 6.2 Textured geomembrane shall generally have uniform texturing appearance. It shall be free from agglomerated texturing material and such defects that would affect the specified properties of the geomembrane.
- 6.3 General manufacturing procedures shall be performed in accordance with the manufacturer's internal quality control guide and/or documents.
- 7. MQC Sampling
 - 7.1 Sampling shall be in accordance with the specific test methods listed in Tables 1 and 2. If no sampling protocol is stipulated in the particular test method, then test specimens shall be taken evenly spaced across the entire roll width.
 - 7.2 The number of tests shall be in accordance with the appropriate test methods listed in Tables 1 and 2.
 - 7.3 The average of the test results should be calculated per the particular standard cited and compared to the minimum value listed in these tables, hence the values listed are the minimum average values and are designated as "min. ave."
- 8. MQC Retest and Rejection
 - 8.1 If the results of any test do not conform to the requirements of this specification, retesting to determine conformance or rejection should be done in accordance with the manufacturing protocol as set forth in the manufacturer's quality manual.
- 9. Packaging and Marketing
 - 9.1 The geomembrane shall be rolled onto a substantial core or core segments and held firm by dedicated straps/slings, or other suitable means. The rolls must be adequate for safe transportation to the point of delivery, unless otherwise specified in the contract or order.
- 10. Certification
 - 10.1 Upon request of the purchaser in the contract or order, a manufacturer's certification that the material was manufactured and tested in accordance with this specification, together with a report of the test results, shall be furnished at the time of shipment.

Table 1(a) – High Density Polyethylene (HDPE) Geomembrane -Smooth

Properties	Test Method	Test Value							Testing Frequency (minimum)
		30 mils	40 mils	50 mils	60 mils	80 mils	100 mils	120 mils	
Thickness (min. ave.)	D5199	nom.	Nom.	Nom.	Nom.	Nom.	Nom.	Nom.	Per roll
• lowest individual of 10 values		-10%	-10%	-10%	-10%	-10%	-10%	-10%	
Density mg/l (min.)	D 1505/D 792	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	200,000 lb
Tensile Properties (1) (min. ave.)	D 6693								20,000 lb
• yield strength	Type IV	63 lb/in.	84 lb/in.	105 lb/in.	126 lb/in.	168 lb/in.	210 lb/in.	252 lb/in.	
• break strength		114 lb/in.	152 lb/in.	190 lb/in.	228 lb/in.	304 lb/in.	380 lb/in.	456 lb/in.	
• yield elongation		12%	12%	12%	12%	12%	12%	12%	
• break elongation		700%	700%	700%	700%	700%	700%	700%	
Tear Resistance (min. ave.)	D 1004	21 lb	28 lb	35 lb	42 lb	56 lb	70 lb	84 lb	45,000 lb
Puncture Resistance (min. ave.)	D 4833	54 lb	72 lb	90 lb	108 lb	144 lb	180 lb	216 lb	45,000 lb
Stress Crack Resistance (2)	D5397 (App.)	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	per GRI-GM10
Carbon Black Content (range)	D 1603 (3)	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	20,000 lb
Carbon Black Dispersion	D 5596	note (4)	note (4)	note (4)	note (4)	note (4)	note (4)	note (4)	45,000 lb
Oxidative Induction Time (OIT) (min. ave.) (5)									200,000 lb
(a) Standard OIT	D 3895	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	
— or —									
(b) High Pressure OIT	D 5885	400 min.	400 min.	400 min.	400 min.	400 min.	400 min.	400 min.	
Oven Aging at 85°C (5), (6)	D 5721								
(a) Standard OIT (min. ave.) - % retained after 90 days	D 3895	55%	55%	55%	55%	55%	55%	55%	per each formulation
— or —									
(b) High Pressure OIT (min. ave.) - % retained after 90 days	D 5885	80%	80%	80%	80%	80%	80%	80%	
UV Resistance (7)	GM 11								
(a) Standard OIT (min. ave.)	D 3895	N.R. (8)	N.R. (8)	N.R. (8)	N.R. (8)	N.R. (8)	N.R. (8)	N.R. (8)	per each formulation
— or —									
(b) High Pressure OIT (min. ave.) - % retained after 1600 hrs (9)	D 5885	50%	50%	50%	50%	50%	50%	50%	

- (1) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
Yield elongation is calculated using a gage length of 1.3 inches
Break elongation is calculated using a gage length of 2.0 in.
- (2) The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.
- (3) Other methods such as D 4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D 1603 (tube furnace) can be established.
- (4) Carbon black dispersion (only near spherical agglomerates) for 10 different views:
9 in Categories 1 or 2 and 1 in Category 3
- (5) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
- (6) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
- (7) The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
- (8) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
- (9) UV resistance is based on percent retained value regardless of the original HP-OIT value.

Table 1(b) – High Density Polyethylene (HPDE) Geomembrane - Smooth

Properties	Test Method	Test Value							Testing Frequency (minimum)
		0.75 mm	1.00 mm	1.25 mm	1.50 mm	2.00 mm	2.50 mm	3.00 mm	
Thickness - mils (min. ave.) • lowest individual of 10 values	D5199	nom. (mil) -10%	nom. (mil) -10%	nom. (mil) -10%	nom. (mil) -10%	nom. (mil) -10%	nom. (mil) -10%	nom. (mil) -10%	per roll
Density (min.)	D 1505/D 792	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	90,000 kg
Tensile Properties (1) (min. ave.) • yield strength • break strength • yield elongation • break elongation	D 6693 Type IV	11 kN/m 20kN/m 12% 700%	15 kN/m 27 kN/m 12% 700%	18 kN/m 33 kN/m 12% 700%	22 kN/m 40 kN/m 12% 700%	29 kN/m 53 kN/m 12% 700%	37 kN/m 67 kN/m 12% 700%	44 kN/m 80 kN/m 12% 700%	9,000 kg
Tear Resistance (min. ave.)	D 1004	93 N	125 N	156 N	187 N	249 N	311 N	374 N	20,000 kg
Puncture Resistance (min. ave.)	D 4833	240 N	320 N	400 N	480 N	640 N	800 N	960 N	20,000 kg
Stress Crack Resistance (2)	D 5397 (App.)	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	per GRI GM-10
Carbon Black Content - %	D 1603 (3)	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	2.0-3.0%	9,000 kg
Carbon Black Dispersion	D 5596	note (4)	note (4)	note (4)	note (4)	note (4)	note (4)	note (4)	20,000 kg
Oxidative Induction Time (OIT) (min. ave.) (5) (a) Standard OIT — or — (b) High Pressure OIT	D 3895 D 5885	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	100 min. 400 min.	90,000 kg
Oven Aging at 85°C (5), (6) (a) Standard OIT (min. ave.) - % retained after 90 days — or — (b) High Pressure OIT (min. ave.) - % retained after 90 days	D 5721 D 3895 D 5885	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	per each formulation
UV Resistance (7) (a) Standard OIT (min. ave.) — or — (b) High Pressure OIT (min. ave.) - % retained after 1600 hrs (9)	D 3895 D 5885	N. R. (8) 50%	N.R. (8) 50%	N.R. (8) 50%	N.R. (8) 50%	N.R. (8) 50%	N.R. (8) 50%	N.R. (8) 50%	per each formulation

- (1) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction
Yield elongation is calculated using a gage length of 33 mm
Break elongation is calculated using a gage length of 50 mm
- (2) The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.
- (3) Other methods such as D 4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D 1603 (tube furnace) can be established.
- (4) Carbon black dispersion (only near spherical agglomerates) for 10 different views:
9 in Categories 1 or 2 and 1 in Category 3
- (5) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
- (6) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
- (7) The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
- (8) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
- (9) UV resistance is based on percent retained value regardless of the original HP-OIT value.

Table 2(a) – High Density Polyethylene (HDPE) Geomembrane - Textured

Properties	Test Method	Test Value						Testing Frequency (minimum) per roll
		30 mils	40 mils	50 mils	60 mils	80 mils	100 mils	120 mils
Thickness mils (min. ave.)		nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%
• lowest individual for 8 out of 10 values	D 5994							
• lowest individual for any of the 10 values								
Asperity Height mils (min. ave.) (1)	D 7466	10 mil	10 mil	10 mil	10 mil	10 mil	10 mil	10 mil
Density (min. ave.)	D 1505/D 792	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc
Tensile Properties (min. ave.) (3)	D 6693							
• yield strength	Type IV	63 lb/in.	84 lb/in.	105 lb/in.	126 lb/in.	168 lb/in.	210 lb/in.	252 lb/in.
• break strength		45 lb/in.	60 lb/in.	75 lb/in.	90 lb/in.	120 lb/in.	150 lb/in.	180 lb/in.
• yield elongation		12%	12%	12%	12%	12%	12%	12%
• break elongation		100%	100%	100%	100%	100%	100%	100%
Tear Resistance (min. ave.)	D 1004	21 lb	28 lb	35 lb	42 lb	56 lb	70 lb	84 lb
Puncture Resistance (min. ave.)	D 4833	45 lb	60 lb	75 lb	90 lb	120 lb	150 lb	180 lb
Stress Crack Resistance (4)	D 5397 (App.)	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.
Carbon Black Content (range)	D 1603 (5)	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %
Carbon Black Dispersion	D 5596	note (6)	note (6)	note (6)	note (6)	note (6)	note (6)	note (6)
Oxidative Induction Time (OIT) (min. ave.) (7)								
(a) Standard OIT	D 3895	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.
— or —								
(b) High Pressure OIT	D 5885	400 min.	400 min.	400 min.	400 min.	400 min.	400 min.	400 min.
Oven Aging at 85°C (7), (8)	D 5721							
(a) Standard OIT (min. ave.) - % retained after 90 days	D 3895	55%	55%	55%	55%	55%	55%	55%
— or —								
(b) High Pressure OIT (min. ave.) - % retained after 90 days	D 5885	80%	80%	80%	80%	80%	80%	80%
UV Resistance (9)	GM11							
(a) Standard OIT (min. ave.)	D 3895	N.R. (10)	N.R. (10)	N.R. (10)	N.R. (10)	N.R. (10)	N.R. (10)	N.R. (10)
— or —								
(b) High Pressure OIT (min. ave.) - % retained after 1600 hrs (11)	D 5885	50%	50%	50%	50%	50%	50%	50%

(1) Of 10 readings; 8 out of 10 must be ≥ 7 mils, and lowest individual reading must be ≥ 5 mils; also see Note 6.

(2) Alternate the measurement side for double sided textured sheet

(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.

Yield elongation is calculated using a gage length of 1.3 inches

Break elongation is calculated using a gage length of 2.0 inches

P-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used for the textured sheet materials.

The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.

Other methods such as D 4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D 1603 (tube furnace) can be established.

Carbon black dispersion (only near spherical agglomerates) for 10 different views:

9 in Categories 1 or 2 and 1 in Category 3

The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.

It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.

Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.

UV resistance is based on percent retained value regardless of the original HP-OIT value.

Table 2(b) – High Density Polyethylene (HDPE) Geomembrane - Textured

Properties	Test Method	Test Value							Testing Frequency (minimum)
		0.75 mm	1.00 mm	1.25 mm	1.50 mm	2.00 mm	2.50 mm	3.00 mm	
Thickness mils (min. ave.) • lowest individual for 8 out of 10 values • lowest individual for any of the 10 values	D 5994	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	nom. (-5%) -10% -15%	per roll
Asperity Height mils (min. ave.) (1)	D 7466	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm	0.25 mm	every 2 nd roll (2)
Density (min. ave.)	D 1505/D 792	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	0.940 g/cc	90,000 kg
Tensile Properties (min. ave.) (3) • yield strength • break strength • yield elongation • break elongation	D 6693 Type IV	11 kN/m 8 kN/m 12% 100%	15 kN/m 10 kN/m 12% 100%	18 kN/m 13 kN/m 12% 100%	22 kN/m 16 kN/m 12% 100%	29 kN/m 21 kN/m 12% 100%	37 kN/m 26 kN/m 12% 100%	44 kN/m 32 kN/m 12% 100%	9,000 kg
Tear Resistance (min. ave.)	D 1004	93 N	125 N	156 N	187 N	249 N	311 N	374 N	20,000 kg
Puncture Resistance (min. ave.)	D 4833	200N	267 N	333 N	400 N	534 N	667 N	800 N	20,000 kg
Stress Crack Resistance (4)	D 5397 (App.)	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	300 hr.	per GRI GM10
Carbon Black Content (range)	D 1603 (5)	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	2.0-3.0 %	9,000 kg
Carbon Black Dispersion	D 5596	note (6)	note (6)	note (6)	note (6)	note (6)	note (6)	note (6)	20,000 kg
Oxidative Induction Time (OIT) (min. ave.) (7) (a) Standard OIT — or — (b) High Pressure OIT	D 3895	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	100 min.	90,000 kg
Oven Aging at 85°C (7), (8) (a) Standard OIT (min. ave.) - % retained after 90 days — or — (b) High Pressure OIT (min. ave.) - % retained after 90 days	D 5721 D 3895 D 5885	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	55% 80%	per each formulation
UV Resistance (9) (a) Standard OIT (min. ave.) — or — (b) High Pressure OIT (min. ave.) - % retained after 1600 hrs (11)	GM11 D 3895 D 5885	N.R. (10) 50%	N.R. (10) 50%	N.R. (10) 50%	N.R. (10) 50%	N.R. (10) 50%	N.R. (10) 50%	N.R. (10) 50%	per each formulation

(1) Of 10 readings; 8 out of 10 must be ≥ 0.18 mm, and lowest individual reading must be ≥ 0.13 mm; also see Note 6.

(2) Alternate the measurement side for double sided textured sheet

(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.

Yield elongation is calculated using a gage length of 33 mm

Break elongation is calculated using a gage length of 50 mm

(4) The SP-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used for the textured sheet materials.

The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.

(5) Other methods such as D 4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D 1603 (tube furnace) can be established.

(6) Carbon black dispersion (only near spherical agglomerates) for 10 different views:

9 in Categories 1 or 2 and 1 in Category 3

(7) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.

(8) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

(9) The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.

(10) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.

(11) UV resistance is based on percent retained value regardless of the original HP-OIT value.

Adoption and Revision Schedule
for
HDPE Specification per GRI-GM13

“Test Methods, Test Properties, Testing Frequency for
High Density Polyethylene (HDPE) Smooth and Textured Geomembranes”

- Adopted: June 17, 1997
- Revision 1: November 20, 1998; changed CB dispersion from allowing 2 views to be in Category 3 to requiring all 10 views to be in Category 1 or 2. Also reduced UV percent retained from 60% to 50%.
- Revision 2: April 29, 1999: added to Note 5 after the listing of Carbon Black Dispersion the following: “(In the viewing and subsequent quantitative interpretation of ASTM D5596 only near spherical agglomerates shall be included in the assessment)” and to Note (4) in the property tables.
- Revision 3: June 28, 2000: added a new Section 5.2 that the numeric table values are neither MARV or MaxARV. They are to be interpreted per the the designated test method.
- Revision 4: December 13, 2000: added one Category 3 is allowed for carbon black dispersion. Also, unified terminology to “strength” and “elongation”.
- Revision 5: May 15, 2003: Increased minimum acceptable stress crack resistance time from 200 hrs to 300 hrs.
- Revision 6: June 23, 2003: Adopted ASTM D 6693, in place of ASTM D 638, for tensile strength testing. Also, added Note 2.
- Revision 7: February 20, 2006: Added Note 6 on Asperity Height clarification with respect to shear strength.
- Revision 8: Removed recommended warranty from specification.
- Revision 9: June 1, 2009: Replaced GRI-GM12 test for asperity height of textured geomembranes with ASTM D 7466.

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GRI GT13(a) – ASTM Version*

Standard Specification for

“Test Methods and Properties for Geotextiles Used as Separation Between Subgrade Soil and Aggregate”

This specification was developed by the Geosynthetic Research Institute (GRI) with the cooperation of the member organizations for general use by the public. It is completely optional in this regard and can be superseded by other existing or new specifications on the subject matter in whole or in part. Neither GRI, the Geosynthetic Institute, nor any of its related institutes, warrant or indemnifies any materials produced according to this specification either at this time or in the future.

1. Scope

- 1.1 This specification covers geotextile test methods properties for subsequent use as separation between subgrade soil and aggregate predominantly in pavement systems.

Note 1: While separation occurs in every geotextile application, this pavement-related specification focuses on subgrade soils being “firm” as indicated by CBR values in ASTM D1883 higher than 3.0 (soaked) or 8.0 (unsoaked).

- 1.2 This specification sets forth a set of physical, mechanical and endurance properties that must be met, or exceeded, by the geotextile being manufactured.
- 1.3 In the context of quality systems and management, this specification represents a manufacturing quality control (MQC) document. However, its general use is essentially as a recommended design document.
- 1.4 This specification is intended to assure both good quality and performance of fabrics used as geotextile separators but is possibly not adequate for the complete

*This GRI standard is developed by the Geosynthetic Research Institute through consultation and review by the member organizations. This specification will be reviewed at least every 2-years, or on an as-required basis. In this regard it is subject to change at any time. The most recent revision date is the effective version.

specification in a specific situation. Additional tests, or more restrictive values for the tests indicated, may be necessary under conditions of a particular application.

- 1.5 This standard specification does not address installation practice. This item is addressed in the geosynthetics literature dealing with this particular application and under unique situations might require modifications, e.g., higher values and/or additional test properties.

2. Referenced Documents

2.1 ASTM Standards

- D 1883 Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils
- D 4354 Practice for Sampling of Geosynthetics for Testing
- D 4355 Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
- D 4533 Test Method for Trapezoidal Tearing Strength of Geotextiles
- D 4632 Test Method for Grab Breaking Load and Elongation of Geotextiles
- D 4759 Practice for Determining the Specification Conformance of Geosynthetics
- D 4873 Guide for Identification, Storage and Handling of Geotextiles
- D 5261 Test Method for Measuring Mass per Unit Area of Geotextiles
- D 6241 Test Method for Static Puncture Strength of Geotextiles and Geotextile Related Product Using a 50-mm Probe

2.2 AASHTO Specification

- M288-00 Geotextile Specification for Highway Applications

3. Definitions

- 3.1 Formulation - The mixture of a unique combination of ingredients identified by type, properties and quantity. For geotextiles, a formulation is defined as the exact percentages and types of resin(s), additives and/or carbon black.
- 3.2 Manufacturing Quality Control (MQC) - A planned system of inspections that is used to directly monitor and control the manufacture of a material which is factory originated. MQC is normally performed by the manufacturer of geosynthetic materials and is necessary to ensure minimum (or maximum) specified values in the manufactured product. MQC refers to measures taken by the manufacturer to determine compliance with the requirements for materials and workmanship as stated in certification documents and contract specifications [ref. EPA/600/R-93/182].
- 3.3 Minimum Average Roll Value (MARV) - For geosynthetics, a manufacturing quality control tool used to allow manufacturers to establish published values such that the user/purchaser will have a 97.7% confidence that the property in question will meet published values. For normally distributed data, "MARV" is calculated

as the typical value minus two (2) standard deviations from documented quality control test results for a defined population from one specific test method associated with one specific property.

- 3.4 Minimum Value – The lowest sample value from documented manufacturing quality control test results for a defined population from one test method associated with one specific property.
- 3.5 Maximum Value – The highest sample value from documented manufacturing quality control test results for a defined population from one test method associated with one specific property.
- 3.6 Separation – The placement of a flexible porous geosynthetic between dissimilar materials so the integrity and functioning of both materials can remain intact or be improved.

Note 2: For separation of stone base courses overlying soil subgrades this primary function simultaneously prevents the stone from intruding down into the soil and the soil from pumping up into the stone.

4. Material Classification and Formulation

- 4.1 This specification covers geotextiles used as separation materials.
- 4.2 The polymer types are mainly polypropylene, but also polyester or polyethylene. Other polymers are also possible in this regard.
- 4.3 The type of geotextile style is not designated. However a distinction can be made based on the elongation criteria of 50%.

Note 3: It is assumed that nonwoven fabrics break at elongations higher than 50%. Woven fabrics always break at elongations significantly lower than 50%.

5. Specification Requirements

- 5.1 The geotextiles for use as separator shall conform to Tables 1 or 2. Table 1 is given in English units and Table 2 is in SI (Metric) units. The conversion from English to SI units is “soft”, i.e., rounded off to an approximate value. All test methods are based on ASTM Standards.

Note 4: The numeric relationships between this specification based on ASTM Test Methods and GRI GT13(b) based on ISO Test Methods have been developed at the Geosynthetic Institute.

- 5.2 The required values for most properties in Tables 1 and 2 are to be minimum average roll values (MARV). The exceptions are AOS which is a maximum average roll value (MaxARV), and UV stability which is a minimum average value.

- 5.3 The required class is determined by the severity of installation conditions (i.e., size of equipment, condition of subgrade, thickness of covering lift, etc.). Table 3 gives guidance in this respect.
6. Workmanship and Appearance
- 6.1 The finished geotextile shall have good appearance qualities. It shall be free from such defects that would affect the specific properties of the geotextile, or its proper functioning.
- 6.2 General manufacturing procedures shall be performed in accordance with the manufacturer's internal quality control guide and/or documents.
7. MQC Sampling, Testing, and Acceptance
- 7.1 Geotextiles shall be subject to sampling and testing to verify conformance with this specification. Sampling shall be in accordance with the most current modification of ASTM Standard D 4354, using the section titled, "Procedure for Sampling for Purchaser's Specification Conformance Testing." In the absence of purchaser's testing, verification may be based on manufacturer's certifications as a result of testing by the manufacturer of quality assurance samples obtained using the procedure for Sampling for Manufacturer's Quality Assurance (MQA) Testing. A lot size shall be considered to be the shipment quantity of the given product or a truckload of the given product, whichever is smaller.
- 7.2 Testing shall be performed in accordance with the method referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method. Geotextile product acceptance shall be based on ASTM D4759. Product acceptance is determined by comparing the average test results of all specimens within a given sample to the specification MARV. Refer to ASTM D 4759 for more details regarding geotextile acceptance procedures.
8. MQC Retest and Rejection
- 8.1 If the results of any test do not conform to the requirements of this specification, retesting to determine conformance or rejection should be done in accordance with the manufacturing protocol as set forth in the manufacturer's quality manual.
9. Shipment and Storage
- 9.1 Geotextile labeling, shipment, and storage shall follow ASTM D 4873. Product labels shall clearly show the manufacturer or supplier name, style, and roll number. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.

- 9.2 Each geotextile roll shall be wrapped with a material that will protect the geotextile, including the ends of the roll, from damage due to shipment, water, sunlight and contaminants. The protective wrapping shall be maintained during periods of shipment and storage.

Note 5: The project specification shall be very explicit as to the maximum exposure time between the geotextile being removed from the wrapper and being backfilled with soil or covered with another geosynthetic.

- 9.3 During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, temperatures in excess of 160°F (71°C), and any other environmental condition that may damage the property values of the geotextile.

10. Certification

- 10.1 The contractor shall provide to the engineer a certificate stating the name of the manufacturer, product name, style number, chemical composition of the filaments or yarns, and other pertinent information to fully describe the geotextile.
- 10.2 The manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.
- 10.3 The manufacturer's certificate shall state that the finished geotextile meets the requirements of the specification as evaluated under the manufacturer's quality control program. A person having legal authority to bind the manufacturer shall attest to the certificate.
- 10.4 Either mislabeling or misrepresentation of materials shall be reason to reject those geotextile products.

English Units

Table 1(a) – Geotextile Properties Class 1 (High Survivability)

Property ⁽¹⁾	ASTM Test Method	Unit	Elongatio n < 50%	Elongatio n ≥ 50%
Grab Tensile Strength	D 4632	lb	315	203
Trapezoid Tear Strength	D 4533	lb	112	79
CBR Puncture Strength	D 6241	lb	630	440
Permittivity	D 4491	sec-1	0.02	0.02
Apparent Opening Size	D 4751	in.	0.024	0.024
Ultraviolet Stability ⁽²⁾	D 4355	% Ret. @ 500 hrs	50	50

Table 1(b) – Geotextile Properties Class 2 (Moderate Survivability)

Property ⁽¹⁾	ASTM Test Method	Unit	Elongatio n < 50%	Elongatio n ≥ 50%
Grab Tensile Strength	D 4632	lb	248	158
Trapezoid Tear Strength	D 4533	lb	90	56
CBR Puncture Strength	D 6241	lb	500	320
Permittivity	D 4491	sec-1	0.02	0.02
Apparent Opening Size	D 4751	in.	0.024	0.024
Ultraviolet Stability ⁽²⁾	D 4355	% Ret. @ 500 hrs	50	50

Table 1(c) – Geotextile Properties Class 3 (Low Survivability)

Property ⁽¹⁾	ASTM Test Method	Unit	Elongatio n < 50%	Elongatio n ≥ 50%
Grab Tensile Strength	D 4632	lb	180	113
Trapezoid Tear Strength	D 4533	lb	68	41
CBR Puncture Strength	D 6241	lb	380	230
Permittivity	D 4491	sec-1	0.02	0.02
Apparent Opening Size	D 4751	in.	0.024	0.024
Ultraviolet Stability ⁽²⁾	D 4355	% Ret. @ 500 hrs	50	50

Notes:

- (1) All values are minimum average roll values (MARV) except AOS which is a maximum average roll value (MaxARV) and UV stability which is a minimum average value.

(2) Evaluation to be on 50 mm strip tensile specimens after 500 h

SI Metric Units

Table 2(a) – Geotextile Properties Class 1 (High Survivability)

Property ⁽¹⁾	ASTM Test Method	Unit	Elongation n < 50%	Elongation n ≥ 50%
Grab Tensile Strength	D 4632	N	1400	900
Trapezoid Tear Strength	D 4533	N	500	350
CBR Puncture Strength	D 6241	N	2800	2000
Permittivity	D 4491	sec-1	0.02	0.02
Apparent Opening Size	D 4751	mm	0.60	0.60
Ultraviolet Stability ⁽²⁾	D 4355	% Ret. @ 500 hrs	50	50

Table 2(b) – Geotextile Properties Class 2 (Moderate Survivability)

Property ⁽¹⁾	ASTM Test Method	Unit	Elongation n < 50%	Elongation n ≥ 50%
Grab Tensile Strength	D 4632	N	1100	700
Trapezoid Tear Strength	D 4533	N	400	250
CBR Puncture Strength	D 6241	N	2250	1400
Permittivity	D 4491	sec-1	0.02	0.02
Apparent Opening Size	D 4751	mm	0.60	0.60
Ultraviolet Stability ⁽²⁾	D 4355	% Ret. @ 500 hrs	50	50

Table 2(c) – Geotextile Properties Class 3 (Low Survivability)

Property ⁽¹⁾	ASTM Test Method	Unit	Elongation n < 50%	Elongation n ≥ 50%
Grab Tensile Strength	D 4632	N	800	500
Trapezoid Tear Strength	D 4533	N	300	180
CBR Puncture Strength	D 6241	N	1700	1000
Permittivity	D 4491	sec-1	0.02	0.02
Apparent Opening Size	D 4751	mm	0.60	0.60
Ultraviolet Stability ⁽²⁾	D 4355	% Ret. @ 500 hrs	50	50

Notes:

- (1) All values are minimum average roll values (MARV) except AOS which is a maximum average roll value (MaxARV) and UV stability which is a minimum average value.
- (2) Evaluation to be on 50 mm strip tensile specimens after 500 hours exposure.

Table 3 - Required Degree of Survivability as a Function of Subgrade Conditions, Construction Equipment and Lift Thickness
(Class 1, 2 and 3 Properties are Given in Table 1 and 2; Class 1 + Properties are Higher than Class 1 but Not Defined at this Time)

	Low ground- pressure equipment ≤ 25 kPa (3.6 psi)	Medium ground-pressure equipment > 25 to ≤ 50 kPa (>3.6 to ≤ 7.3 psi)	High ground- pressure equipment > 50 kPa (> 7.3 psi)
Subgrade has been cleared of all obstacles except grass, weeds, leaves, and fine wood debris. Surface is smooth and level so that any shallow depressions and humps do not exceed 450 mm (18 in.) in depth or height. All larger depressions are filled. Alternatively, a smooth working table may be placed.	Low (Class 3)	Moderate (Class 2)	High (Class 1)
Subgrade has been cleared of obstacles larger than small to moderate-sized tree limbs and rocks. Tree trunks and stumps should be removed or covered with a partial working table. Depressions and humps should not exceed 450 mm (18 in.) in depth or height. Larger depressions should be filled.	Moderate (Class 2)	High (Class 1)	Very High (Class 1+)
Minimal site preparation is required. Trees may be felled, delimbed, and left in place. Stumps should be cut to project not more than ± 150 mm (6 in.) above subgrade. Fabric may be draped directly over the tree trunks, stumps, large depressions and humps, holes, stream channels, and large boulders. Items should be removed only if placing the fabric and cover material over them will distort the finished road surface.	High (Class 1)	Very high (Class 1+)	Not recommended

*Recommendations are for 150 to 300 mm (6 to 12 in.) initial lift thickness. For other initial lift thicknesses:

- 300 to 450 mm (12 to 18 in.): reduce survivability requirement one level;
- 450 to 600 mm (18 to 24 in.): reduce survivability requirement two levels;
- > 600 mm (24 in.): reduce survivability requirement three levels

Note 1: While separation occurs in every geotextile application, this pavement-related specification focuses on subgrade soils being “firm” as indicated by CBR values higher than 3.0 (soaked) or 8.0 (unsoaked).

Source: Modified after Christopher, Holtz, and DiMaggio

ATTACHMENT 5B

PROPOSED MINE STABILIZATION PLAN

MINE VOID STABILIZATION PLAN

1.0 INTRODUCTION

The following is a Mine Void Stabilization Plan (Plan) for the proposed Peoria City/County Landfill 3 (Landfill No. 3) in Brimfield, Illinois. Within the Landfill No. 3 waste footprint, the Herrin coal seam was encountered at elevations ranging from approximately 593 feet to 597 feet above mean sea level (AMSL). The excavation grades of Landfill No. 3, as currently designed, have elevations ranging from approximately 574 feet to 594 feet AMSL, with side-slopes to elevations of 620 feet AMSL on the east side to 650 feet AMSL on the west side. As such, the available information indicates that, even if the Herrin coal seam or potential voids within the coal seam are encountered, the excavation of the landfill will likely remove the coal seam and any potential abandoned mine workings across the floor of the landfill. However, there is the potential for the coal seam or voids within the coal seam to be present at or below the planned excavation grades of the landfill in the northern portion of the waste footprint or underneath the side slopes.

The construction quality assurance (CQA) plan includes procedures for addressing areas of unsuitable soils or voids, if encountered, during landfill development including over excavation and placement of compacted soil fill. If evidence of areas of voids are encountered that cannot be addressed through over excavation and the placement of compacted soil fill, additional measures will be required. Evidence may include observations of areas of subsidence, features of former mine workings, and/or shafts/voids.

This Plan includes protocols to determine the extent and condition of voids due to potential former mine workings that may be encountered during landfill construction and measures to mitigate potential subsidence in areas where it would potentially impact the liner system. These measures consist of a grouting program to stabilize potentially mined areas that could strain the liner system and/or leachate collection system beyond acceptable limits if left unmitigated.

2.0 MINE VOID STABILIZATION AREA AND METHODS

2.1 STABILIZATION AREA

Based on the subsurface investigations performed to date, no mine voids have been positively identified within the Landfill No. 3 waste footprint. A stabilization area would be determined based on future observations and/or investigations.

2.2 MINE VOID STABILIZATION METHOD

The mine void stabilization technique involves the systematic filling of the mine voids using flowable grout placed via boreholes drilled from ground surface or directly into a void when encountered during excavation. There is considerable precedent for use of this technique in stabilizing the ground surface preparatory to the construction of landfills. Consequently, the processes of performing the stabilization, monitoring and documenting the stabilization, and evaluating the success of the stabilization are well understood.

3.0 MINE VOID STABILIZATION PHASES AND SEQUENCE

The mine void stabilization program will be conducted in a systematic phased manner when and if former mine workings are encountered that cannot be remediated by over excavation. The sequence of the major steps is:

1. Mine Void Investigation, if needed to supplement existing information;
2. Grout Hole Layout and Drilling, if needed;
3. Grout Production;
4. Grout Placement;
5. Verification; and
6. Final Report and Certification.

Details of the various steps, listed above that constitute the mine stabilization plan follow.

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4.0 MINE VOID INVESTIGATION PROCEDURES

Additional subsurface investigations may be performed at the discretion of the CQA officer at any time, in order to better define mine void limits and conditions if encountered. Additional investigations, if any, can be used to adjust the basic grouting plan to suit area-specific mine conditions and layout. The additional investigations may consist of additional excavation, installation of bore holes, and/or the use of geophysical instruments to determine the nature and extent of any former mine workings that may be encountered. Specific investigation procedures to be used will be determined by the CQA officer, design engineer, and PCCL personnel.

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5.0 MINE VOID GROUT HOLE DRILLING

If extensive mine workings are encountered that cannot be remediated by over-excavation, grout holes may be necessary to fill the voids with cement grout. The CQA consultant will log every boring to document the qualitative subsurface condition (e.g., intact coal, gob filled, open voids) at each location.

Grout holes will be located on a specific spacing and pattern, throughout the area to be grouted. Each borehole shall be drilled through soil and rock overburden to the base of the coal seam (intact coal or mine floor), and each borehole shall be drilled approximately 2 feet lower than the coal seam base to confirm intact rock was present beneath the mine workings.

All holes will be monitored and logged by a CQA technician familiar with mine stabilization construction. The technician will indicate overburden conditions and whether intact bedrock, coal, voids, or fractured material was encountered at and above the mine workings elevations. The depths at which the coal, void, or fractured material were encountered, and the thickness of these zones will be recorded and summarized on boring logs. These logs will be provided to the CQA officer, and the CQA officer shall use the logs to update the stabilization grid to reflect actual subsurface conditions encountered and adjust the borehole spacing and/or orientation if warranted. Where necessary, boreholes drilled through unconsolidated overburden or highly fractured rock shall be cased from the ground surface into rock to prevent caving or obstruction of the borehole. If an obstruction is encountered during drilling that cannot be drilled through or cased, the Contractor shall pull out of the borehole, and the borehole shall be grouted to the surface. The CQA technician shall inform the CQA officer of the blockage, and the CQA officer shall locate another borehole in proximity to the blocked borehole.

6.0 GROUT MIXES AND PRODUCTION

6.1 GROUT MIXES

The grout mixture will be selected to suit the site conditions, the availability of grouting materials, the grout mixing plant type and location, and required minimum compressive strength.

6.2 GROUT PRODUCTION

The grout mixes may be prepared and delivered to the stabilization area in either of two ways:

1. At a local offsite batch plant and delivered to the job site in ready-mix trucks; or
2. Mixed on-site and delivered to the project area by ready-mix trucks and/or concrete pump and hosing or piping.

The method of grout production will be selected based on economics, and to suit the area to be grouted, considering the quantities of grout needed and the most efficient method of mixing, transportation, and placement.

6.3 MINIMUM GROUT COMPRESSIVE STRENGTH

Grout compressive strength shall be tested in accordance with ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. The average unconfined compressive strength for the grout mixtures shall equal or exceed 250 pounds per square inch (psi) at 7 days and 500 psi at 28 days. Prior to initiation of grouting, the selected batch plant and mix design shall be tested. Representative cylinder samples from the test batch of the grout mix shall be tested to confirm the mix meets the minimum compressive strength. The compressive strengths of the grout samples will be tested at 7, 14, and 28 days or until the minimum strength is met or exceeded. The results of the compression testing will be recorded and summarized in the certification report documenting the grouting program.

7.0 GROUT PLACEMENT

Grout will be placed into the boreholes using a concrete pump truck, or similar method approved by the CQA officer. The grout mixture will be delivered to the concrete pump truck in ready-mix trucks or mixed on-site. The grout will be placed by gravity means directly into each barrier or production grout hole using a small hopper with a funnel end if necessary to direct the material into the grout holes, or through a crane boom with tremie pipe, or other acceptable method. Even though the grout will be placed by gravity means, the pressure exerted on the grout column will be substantial, due to a typical grout density of approximately 140 pounds per cubic foot.

Each borehole will be grouted to the ground surface, which will be considered evidence of “grout refusal.” Where a large “grout take” is encountered (typically 25 cubic yards or more), the hole will be grouted in stages. Additional grout holes, placed between the initial production grout holes, may be installed at the discretion of the CQA officer in areas of large grout takes to achieve the appropriate degree of filling.

8.0 MINE STABILIZATION VERIFICATION

To verify the adequacy of the mine stabilization program the following procedures will be followed.

8.1 QUALITATIVE COMPARISON OF VOID SPACE TO GROUT TAKE

During drilling of the grout placement holes, records of drilling observations will be maintained by the driller and the CQA technician. These records will provide a thorough description of the subsurface and mine conditions that exist across the phase area being stabilized. These conditions will be used to qualitatively estimate the void space and therefore the quantity of grout required to adequately treat an area. These qualitative estimates can then be compared to the actual grout volumes used to assess the adequacy of the grouting program.

The CQA officer will review the subsurface conditions (e.g., intact coal, gob filled or fractured roof rock with little to no air return, gob filled or fractured roof rock with air return, and open voids as noted by tool drops) encountered at each location. The CQA officer will compare the borehole data to subsequent grout volume takes to qualitatively confirm that the following conditions generally exist:

- Boreholes with voids have larger grout take volumes relative to boreholes with fractured roof rock and gob filled conditions (without air returns);
- Boreholes with fractured roof rock and gob filled conditions (without air returns) have larger grout take volumes relative to boreholes with fractured roof rock and gob filled conditions (with air returns); and
- Boreholes with fractured roof rock and gob filled conditions (with air returns) have larger grout take volumes relative to boreholes drilled into intact coal.

8.2 GROUT VERIFICATION PRODUCTION HOLES

While grouting proceeds, records of the volume of grout used to fill production boreholes will be used to guide the grouting program and determine areas that may require additional production grouting treatment. In areas of high grout take, additional grout production holes may be installed and grouted. These holes will provide additional verification of the adequacy of grouting in areas of high grout take or low grout take where mine voids or fractured conditions were noted.

The CQA officer will review the data and qualitatively verify that observed grout take volumes match the conditions observed in the boreholes.

8.3 VERIFICATION COREHOLE LOCATION AND DRILLING

To determine the adequacy of the grouting program, verification coring may be performed at selected locations within the grouted area. The verification coreholes will generally be located throughout the project area footprint to provide general grout coverage verification. Verification coreholes will target areas of high grout take to confirm the adequacy of filling in these areas. The exact location of the verification coreholes will be determined by the CQA officer, to meet the general criteria of one per acre, to verify grout coverage throughout the general project area, and to verify areas that had large grout take volumes have been completely filled. Corehole locations will not be based on random coordinate generation, as the intent is to confirm that areas with high grout take volumes have in fact been filled and stabilized.

The CQA officer will use the cores to visually verify the degree of filling of the mine voids, and/or the voids within the collapsed mine roof materials and fractures in the overburden above the mine level. The results of these core borings and accompanying photographs will be included in the final certification report. Based on the verification coreholes, additional grout holes may be installed in areas where grout filling is not adequate.

8.4 GROUT STRENGTH

Representative samples of the grout will be taken daily during the grouting program and tested, to confirm that the grout meets an average unconfined compressive strength of 250 psi at 7 days and 500 psi at 28 days. Grout cylinders will be prepared for every 50 yards of grout delivered to the work area, or at a minimum one set for every day grouting is conducted, and cured for future testing purposes. The cylinders will be referenced to the boreholes filled with grout from which the cylinders were obtained. The compressive strengths of the grout samples will be tested at 7, 14, and 28 days, or until the average unconfined compressive strength is met or exceeded. If failing results (i.e., average 28-day compressive strength < 500 psi) are obtained, the CQA officer shall determine if additional drilling and grouting must occur in areas that were previously grouted with the substandard grout. The results of the compression testing will be recorded and summarized in a report documenting the grouting program.

9.0 FINAL REPORT

The mine stabilization program for each phase of grouting will be documented and certified. Supporting documentation and test results for the mine stabilization program will subsequently be included as part of a comprehensive final certification report.

All activities associated with the mine stabilization project will be overseen, documented, and certified by an Illinois-licensed Professional Engineer. The CQA officer will coordinate with the Contractor to verify proper procedures are followed for all activities associated with the project, in accordance with this Plan. Additionally, the CQA officer will document the as-built locations, drilling and grouting field data, material quality control data and sampling, testing, and field activity logs. The mine stabilization program will be included as part of a comprehensive final certification report that will be submitted to the IEPA for review and approval. This certification report will include the following items specific to the grouting program:

9.1 MATERIAL VERIFICATION/APPROVAL

- Grout mix design;
- Variations in mix design to adjust to site conditions; and
- Grout quality control testing results.

9.2 MINE STABILIZATION PROCEDURES

- Grout hole installation program;
- Drilling logs (to include borehole depth, mine/overburden conditions, material classification, casing used, etc.);
- Grout component quantities;
- Methods of grout mixing;
- Grout placement procedures; and
- Field activity logs.

9.3 MINE STABILIZATION VERIFICATION

- Grout takes, utilizing summary tables and figures, as appropriate;
- Verification drilling and coring; and
- Core logging.

9.4 CERTIFICATION OF FACILITY CONSTRUCTION ACTIVITY

A construction certification signed and sealed by an Illinois licensed Professional Engineer, will be provided with the certification report that will contain the afore described information and a drawing that identifies the areas grouted, the locations of grout holes, and verification coreholes.

DRAFT



REQUEST FOR DISCUSSION

To: Peoria City/County Landfill Committee Members
From: David Bryant, Landfill General Manager
Peoria City/County Landfill, Inc. (PCCLI)

AGENDA DATE REQUESTED: June 5, 2024

ACTION REQUESTED: Subject to review and approval by Foth Infrastructure and Environment (Foth), authorize Chairman Morris to sign the application to the Illinois Environmental Protection Agency Bureau of Land (IEPA) to un-pause the Peoria City/County Landfill No. 3 landfill development permit.

BACKGROUND: In April 2023, Peoria City/County Landfill, Inc. (PCCLI) learned that an abandoned underground coal mine in the Springfield (No. 5) coal seam (Black Jewel Mine No. 2) might be present underneath the central portion of Landfill No. 3. The IEPA was notified of the potential presence of the underground mine, resulting in the permit being paused by the IEPA pending further investigation.

The subject application addresses comments by the IEPA received via email on March 8, 2024 (March 8, 2024 Email), and requests the development of Landfill No. 3 to be allowed to continue.

The March 8, 2024 Email states that PCCLI informed the IEPA in a letter, dated April 28, 2023, that the information used to obtain Permit No. 2013-026-LF (Permit) had changed. Specifically, the Illinois Department of Natural Resources (IDNR) noted the existence of a historical underground mine within the footprint of Landfill No. 3. This information changed the status of the Permit to be on hold until such time as PCCLI submits, and the IEPA approves, a significant modification to the permit demonstrating that the facility meets Section 22.36(a) of the Illinois Environmental Protection Act (415 ILCS 5/22.36).

The following information is included in the subject application:

- General Application for Permit (LPC-PA1), Notice of Application for Permit to Manage Waste (LPC-PA16), and 39(i) Certifications for Operating a Waste Management Facility. Chairman Morris' signature is required on the LPC-PA1 and 39(i) forms;
- A summary of the studies conducted since April 2023 to assess whether underground mines are or are not present beneath Landfill No. 3;
- Proposed activities to provide assurances that underground mines are not present beneath Landfill No. 3 or, if present, are remedied so that they do not threaten the integrity of Landfill No. 3;
- IEPA March 8, 2024 Email;
- Peer Review of Potential Mine Works, prepared by Civil & Environmental Consultants, Inc. (CEC), dated May 22, 2024 (CEC Peer Review Report);
- Black Jewel No. 2 Mine Investigation Report, prepared by the Illinois Department of Natural Resources (IDNR) – Abandoned Mine Land Reclamation Division (AMLRD), undated (IDNR-AMLRD Report). The IDNR-AMLRD Report is included as an appendix to the CEC Peer Review Report;
- Recommendations Report, prepared by CEC, dated May 22, 2024 (CEC Recommendations Report) and

- Mine Void Stabilization Plan to be included as part of the Construction Quality Assurance Plan for Landfill No. 3.

A draft of the application was provided to Foth for review on May 23, 2024. Foth provided GFL and CEC review comments during a videoconference held on May 30. Foth's comments have been incorporated into the attached permit application.

Following approval, PCCLI will promptly obtain the remaining application signatures and submit the application to the IEPA.