2023 Landfill CCR Inspection Report

Entergy Arkansas, LLC Independence Plant
Class 3N Landfill

Permit No. 0200-S3N-R2
AFIN: 32-00042

January 2024
Promus Project No. 230267

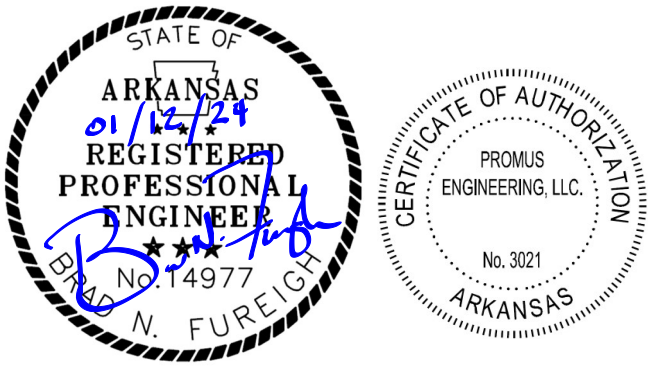
Prepared for:
Entergy Arkansas, LLC
P.O. Box 551
Little Rock, Arkansas 72203

Prepared by:

PROMUS ENGINEERING

PROFESSIONAL ENGINEER'S CERTIFICATION

This report on the annual engineering inspection of the Entergy Arkansas, LLC Independence Plant Class 3N Landfill and supporting documentation was prepared under the direction and supervision of a qualified, State of Arkansas-registered Professional Engineer. Mr. Brad Fureigh, PE, of Promus Engineering, LLC. (Promus), was responsible for the overall preparation of this report. The report has been prepared to fulfill the requirements of §257.84(b). Based on the inspection of the landfill facility and review of available landfill documents, the design, construction, operation, and maintenance of the landfill is consistent with recognized and generally accepted good engineering standards.



Brad N. Fureigh, PE AR Registered Professional Engineer No.: 14977	January 12, 2024 Date

TABLE OF CONTENTS

TABLES

APPENDICES

2023 Landfill CCR Inspection Report

Entergy Arkansas, LLC Independence Plant Class 3N Landfill
Newark, Arkansas

1.0 INTRODUCTION

1.1. Purpose of Report

The purpose of this report is to document the annual inspection of the Entergy Arkansas, LLC Independence Plant Landfill facility in accordance with 40 CFR §257, *Subpart D - Disposal of Coal Combustion Residuals from Electric Utilities* (the CCR Rule). In particular, the report has been prepared to comply with §257.84(b), which requires an inspection to be conducted by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the landfill is consistent with recognized and generally accepted good engineering standards.

The report includes:

- Information on the current layout of the landfill,
- Waste volume estimates for the amount of waste contained in the landfill and remaining disposal capacity, and
- An assessment of the landfill including structural integrity and overall operations with respect to the CCR Rule and the facility permit requirements.

1.2. Independence Power Plant Information

The plant is located on approximately 1,850 acres about 2-½ miles southeast of Newark in Independence County, Arkansas as shown on Figure 1 (all figures are included in Appendix A). The site is characterized by minimal topographic relief and is situated within the White River floodplain.

The plant has been in operation since 1983 and has historically generated electricity through the combustion of Powder River Basin (PRB) (Wyoming) sub-bituminous coal. The ash, a coal combustion by-product (or residue) (CCR), is generally segregated into two categories, “fly” and “bottom” ash.

Approximately 80% of the ash produced is classified as fly ash that is derived from the boiler exhaust gas and collected in electrostatic precipitators. The fly ash is composed of very fine particles similar to glass and has the consistency of a powder. Collected fly ash is blown to silos for short-term storage. A subcategory of the fly ash is known as economizer ash. This material is the coarsest fraction of the fly ash that drops out before the electrostatic precipitators and represents approximately 2% of the fly ash production.

The bottom ash is composed of angular, glassy particles with a porous surface texture and has the consistency of coarse sand. The bottom ash is sluiced to a remote submerged flight conveyor

for removal of bottom ash from the bottom ash transport water, which is recycled. The bottom ash is deposited into the bottom ash bunker from which it is removed and bottom ash is transported from the bottom ash bunker for disposal in the landfill.

Historically, approximately 60 to 70% of the two types of ash have been marketed regionally to construction-related industries. The remaining amount of ash has been placed in the onsite Landfill for disposal.

1.3. Permit History

In October 1982, Arkansas Power & Light Company (AP&L) was granted a permit (#200-S) from the Arkansas Department of Pollution Control and Ecology, now the Arkansas Department of Energy & Environment Division of Environmental Quality (DEQ), to construct and operate a solid waste disposal facility at the plant. Entergy Arkansas, Inc. (now known as Entergy Arkansas, LLC) became AP&L's successor in interest in April 1996. The permit was modified in 2002 to update the landfill to comply with Arkansas Pollution Control and Ecology Commission (APC&EC) Rule No. 22 (Solid Waste Management Code) design and operational standards for Class 4 (inert waste) Landfills. The current facility permit (0200-S3N-R2) was issued in December 2014 and includes design and operational modifications to the landfill facility to comply with Rule No. 22 requirements for Class 3N (Industrial) Landfills.

2.0 LANDFILL LAYOUT

2.1. Existing Conditions of Landfill

The permitted landfill area consists of approximately 335 acres and is located in the northeastern portion of the plant site as shown on Figure 1. The Landfill was designed to be developed in three phases, of which only Phases 1 and 2 are currently permitted. The current layout of the Landfill includes a total of 22 disposal cells and has a permitted waste capacity of approximately 13,000,000 cubic yards (cy). Waste Cells 1 through 15 have been constructed and Waste Cells 12, 13, 14, and 15 comprise the active disposal area of the Landfill having received CCR materials after October 19, 2015.

Construction of the disposal cells has followed the numerical sequence of the cell numbers with all design, construction, operation and maintenance in compliance with the requirements of APC&EC Rule 22. Waste Cells 1 through 11 were constructed, operated and closed prior to the effective date of the CCR Rule and are not covered by the requirements of the Rule. Waste Cells 12 through 15 are existing landfill CCR units and are operated in accordance with requirements of the CCR Rule.

Table 2.1 presents a summary of the existing CCR Unit disposal cells that have been constructed at the Independence Landfill.

Table 2.1: Construction Summary of Independence Plant Class 3N Landfill

Cell Number	Year Built	Bottom Liner System	Year Closed	Final Cover System	Status
12	Pre-1996	Original Permit	N/A	N/A	Open and Active Disposal Area
13	Pre-1996	Original Permit	N/A	N/A	Open and Active Disposal Area
14	2000; 2006	Original Permit; 2002 Permit	N/A	N/A	Open and Active Disposal Area
15	2011	Current Permit	N/A	N/A	Open and Active Disposal Area

2.2. Changes Made to Landfill Configuration During Reporting Period

During the reporting period, no changes were made to the landfill configuration. Waste Cells 12 through 15 are open and are actively receiving waste. No cells were opened, and no cells were closed during the reporting period.

The landfill manager who works for the contracted landfill management company, Charah Solutions, Inc. (Charah), reported improvements during the year that included fine grading slopes and the top deck to repair erosion rills and gullies.

3.0 WASTE VOLUME CALCULATIONS

The landfill facility has been surveyed annually since 1996. Each year's survey is compared to the previous year to compute the amount of CCR disposed. The current survey is also compared to the permitted top of waste elevations to determine remaining capacity, or airspace. Additionally, the current survey is compared to an estimated "operational" top of waste to determine the remaining operational capacity. The operational top of waste is the maximum disposal elevation that can be achieved within the open cells while maintaining the required 4:1 exterior and 3:1 interior slopes along with a top width sufficient for disposal activities. If additional operational capacity is needed, construction of an adjacent disposal cell will be required.

Disposal rates for the facility are calculated using the average of the disposal rates from the five most recent years. Disposal rates depend upon CCR production at the plant and sales of the ash. These can vary significantly year to year based on the current economic climate, weather, and how much the plant is operational.

During the reporting period, there were four waste cells (Waste Cells 12 through 15) open at the site. These areas are shown on Figure 2. Final permitted contours are illustrated on Figure 3.

Digital terrain modeling techniques were used to determine volumes of ash disposed during the current reporting period. For this report, the active areas were surveyed on January 10, 2024. The surface generated from the current survey was compared to the surface model generated from the December 15, 2022 survey, utilizing AutoCAD Civil 3D software, to estimate volume changes that have occurred over the reporting period. Table 3.1 summarizes volume changes for the current reporting period and estimated remaining capacity by waste cell.

Table 3.1: Summary of Waste Volume Calculations

Cell Number	Status	Area (ac)	DEQ Permitted Waste Capacity (cy)	2023 Net Volume Placed (cy)	Total Volume Placed (cy)	Operational Remaining Disposal Capacity (cy)	Operational Remaining Life (years)
Cell 12	Active	5.7	434,800	(5,850)	412,350	22,450	0.4
Cell 13	Active	5.7	372,300	(2,250)	353,150	19,150	0.3
Cell 14	Active	15.0	807,400	(5,000)	727,600	79,800	1.3
Cell 15	Active	18.2	1,258,100	30,450	875,000	383,100	6.3
Totals		**44.6**	**2,872,600**	**17,350**	**2,368,100**	**504,500**	**8.4**

Note: [1] The operational remaining disposal capacity was calculated by comparing the January 10, 2024 survey to the operational top of waste grading, which includes an interim slope on the east side of Cell 12 and 14, and the south side of Cell 15. The operational waste grade surface was created by lowering the permitted final cover surface by 2.5' (clay cap or geomembrane cap option) combined with the interim south slope.

Based upon the most recent digital terrain model, the net volume of material placed in Waste Cells 12 through 15 during the reporting period was calculated to be approximately 17,350 cubic yards. The 5-year average disposal rate, including this reporting period, is approximately 60,394 cubic yards per year, in-place. At this rate, the calculated available airspace of 504,500 cubic yards, provides approximately 8.4 years of remaining operational capacity. The remaining landfill capacity is affected by the market for ash material and may be shorter or longer depending on market conditions.

4.0 ASSESSMENT OF LANDFILL FACILITY

This section of the report provides a summary of the inspection of the Entergy Arkansas, LLC Independence Plant Class 3N Landfill facility that was conducted on January 9, 2024. Charah was the landfill's operations contractor during 2023. The assessment included an interview with site personnel, review of inspection reports of the facility, review of documents pertaining to the operation and compliance of the landfill, and an on-site inspection of the landfill facility. Photographs of the site inspection are included in Appendix B.

4.1. General Operations

In general, the final and interim slopes of the active waste cells appeared to be stable. The sideslopes of the landfill are generally at the required 4:1 external and 3:1 interior slope. No tension cracks, seeps, or other features that indicate a potential slope failure were observed during the site inspection. In addition, no active seeps were noted.

The general operations of the landfill facility are being performed in a safe manner and the overall maintenance of the facility is in good condition.

4.2. Landfill Cover System

None of the active Waste Cells, 12 through 15, are partially closed or have interim cover.

4.3. Leachate Collection System

As required by APC&EC Rule 22, Cell 15 is constructed with a leachate collection system. The system consists of a six-inch diameter high-density polyethylene (HDPE) perforated pipe installed in the center of Waste Cell 15. The pipe drains to a washed gravel-filled sump located on the toe of the eastern slope of the cell. The sump was working during the visit and the levels were less than 12-inches over the liner system. From the sump, leachate is pumped via a dual-contained HDPE pipeline (4" diameter/8" diameter) to the discharge point at the plant's Surge Pond south of the landfill in accordance with the facility's current National Pollutant Discharge Elimination System (NPDES) Permit. Overall, the leachate collection system appeared to be in good working order.

4.4. Stormwater Control System

No issues were found with the Stormwater control system during the inspection. In accordance with the facility's Operation Plan required by the current Class 3N solid waste permit, Charah conducts periodic inspections of the condition of the system and makes appropriate repairs as needed. Charah conducted the appropriate inspections and any necessary repairs during the reporting period.

Temporary berms are used down gradient of the active area to help minimize the potential for sediment transport from the area. Perimeter ditches and drainage conveyances are used to direct stormwater around the landfill area. Culverts are installed at the southwest corner of the Landfill to allow drainage beneath the perimeter access road.

All stormwater runoff from the permitted landfill area is ultimately discharged to the plant's Surge Pond. Water from the Surge Pond is pumped to sedimentation basins that are part of the plant's wastewater treatment system. After treatment in the sedimentation basins, the water is either used as cooling water in the plant or discharged to the White River. Discharges to the

White River are permitted under NPDES Permit No. AR0037451. Runoff from the Landfill is a listed source for this NPDES permit.

4.5. Facility Roads

The facility roads were well maintained, and in excellent condition at the time of the inspection. The disposal access road located on the west side of the Landfill is paved to roughly Cell 13 and then transitions to an all-weather surface course. The perimeter road with all-weather surface course continues on the north side, the east side, and the south side of the Landfill.

4.6. Fugitive Dust Control

In accordance with the facility's CCR Fugitive Dust Control Plan, Charah routinely sprays the working face and haul roads using water trucks to control dust from the fly ash. Fly ash is deposited in the landfill by belly-dumping from the bottom of the tanker trucks in order to minimize the material drop distance. Bottom ash, in a moist condition, is hauled to the landfill using dump trucks. Economizer ash is loaded to covered dump truck prior to transfer to the landfill. A windsock is used to visually gauge wind direction and intensity. Water is applied, when necessary, for dust suppression on roads and the landfill using a water truck. The landfill access roads have enforced posted speed limit of 25 mph. Within the landfill boundary, a 5 mph speed limit is enforced.

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APPENDIX A
FIGURES

NOTES:

ORTHO IMAGERY OBTAINED FROM GOOGLE EARTH, DATED NOVEMBER 15, 2020.

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SITE LOCATION MAP

2023 LANDFILL CCR
INSPECTION REPORT
INDEPENDENCE PLANT
NEWARK, ARKANSAS

PROJECT NO.:
230267

1

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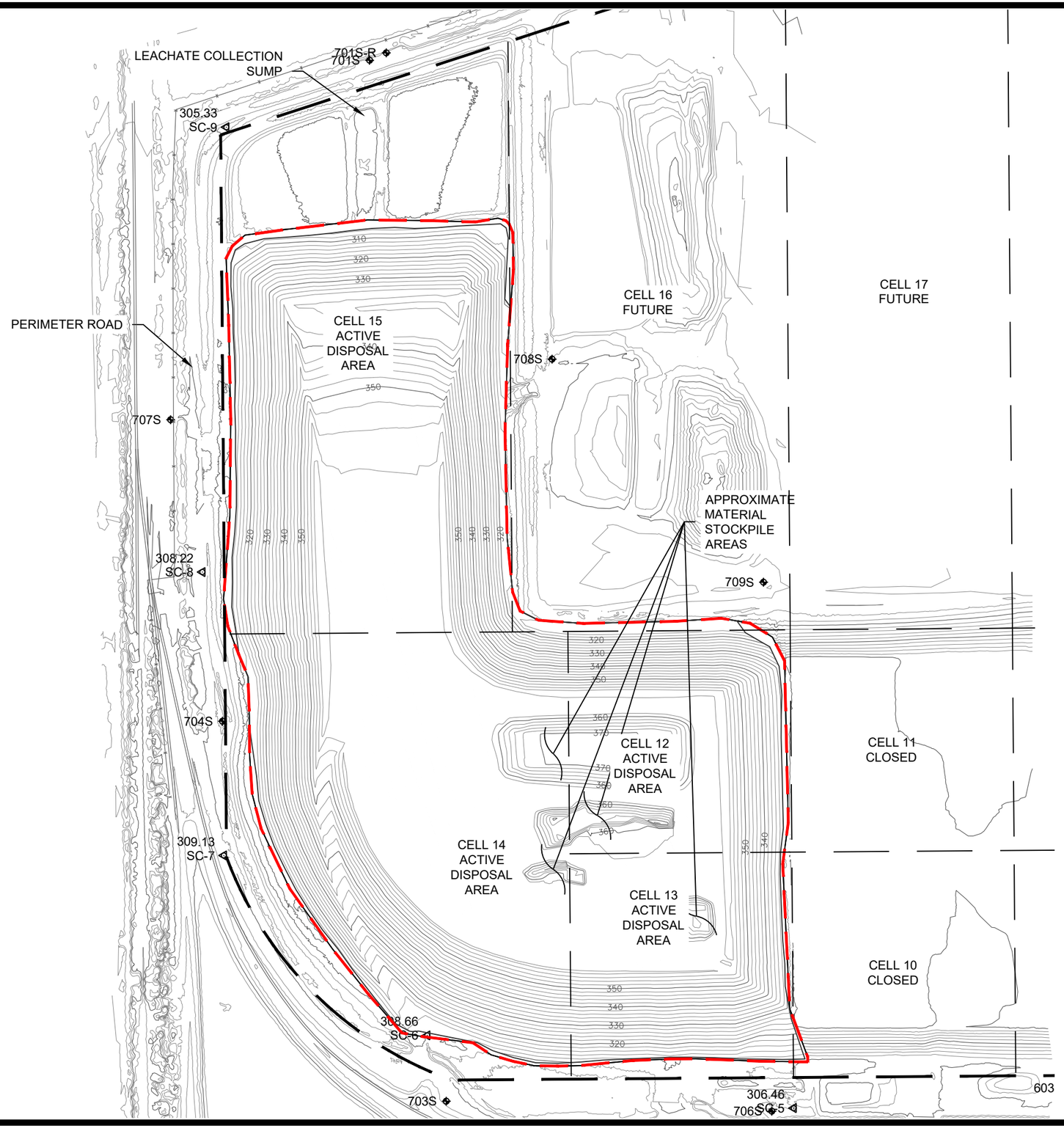

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SCALE IN FEET

LEGEND

- WASTE BOUNDARY
- 100 EXISTING CONTOURS
- 308.66 SC-6 PERMAMENT SITE BENCHMARK
- -1000 SITE SPECIFIC GRID MARKER
- 709S GROUNDWATER MONITORING WELL
- LIMIT OF JANUARY 10, 2024 SURVEY

NOTES:

EXISTING CONTOURS SHOWN ON THIS DRAWING, WITHIN THE LIMIT OF SURVEY, REPRESENT TOPOGRAPHIC SURVEY DATA COLLECTED BY ARKANSAS SURVEYING AND CONSULTING, INC. ON JANUARY 10, 2024. EXISTING CONTOURS SHOWN ON THIS DRAWING, BEYOND LIMITS OF JANUARY 2024 SURVEY, REPRESENT PREVIOUS YEARS SURVEYS PROVIDED BY THE CLIENT AND ARE FOR VISUAL PURPOSES ONLY.

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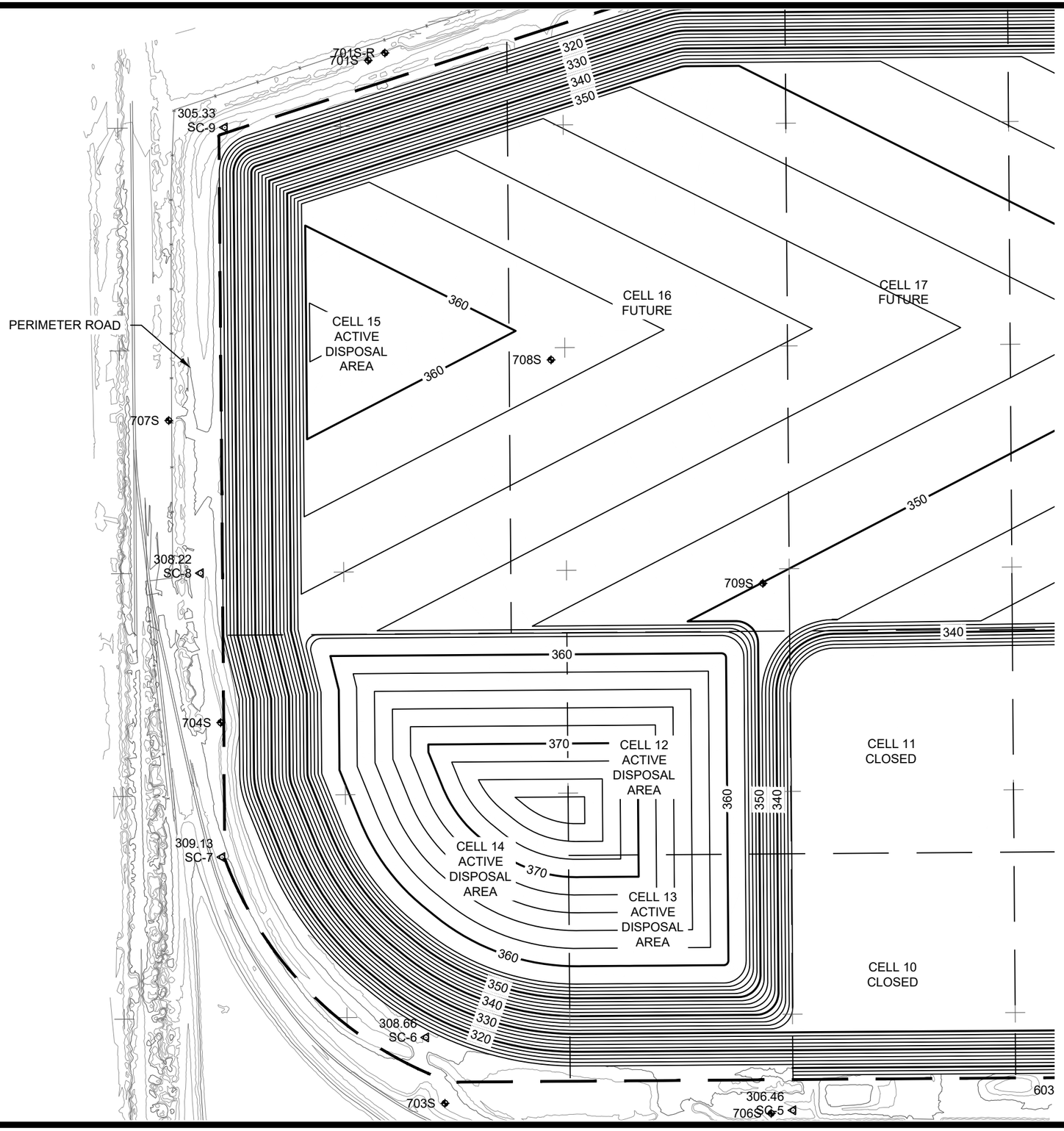
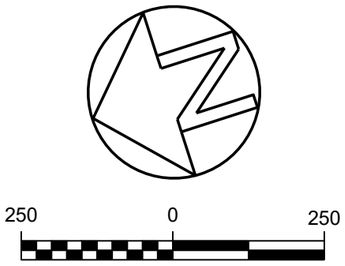
JANUARY 10, 2024 SURVEY

2023 LANDFILL CCR
INSPECTION REPORT
INDEPENDENCE PLANT
NEWARK, ARKANSAS

PROJECT NO.: 230267

2





LEGEND

- WASTE BOUNDARY
- 100 — EXISTING CONTOURS
- 100 — PERMITTED FINAL COVER CONTOURS
- 308.66 SC-6 — PERMAMENT SITE BENCHMARK
- -1000 — SITE SPECIFIC GRID MARKER
- 709S — GROUNDWATER MONITORING WELL

NOTES:

PROPOSED GRADING SHOWN ON THIS DRAWING REPRESENTS PERMITTED FINAL COVER GRADES DESIGNED BY FTN. EXISTING FEATURES AND BOUNDARIES PROVIDED BY CLIENT.

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PERMITTED FINAL COVER

2023 LANDFILL CCR
INSPECTION REPORT
INDEPENDENCE PLANT
NEWARK, ARKANSAS

PROJECT NO.:
230267

3

APPENDIX B

PHOTOS OF ANNUAL ENGINEERING INSPECTION

Photo No. 1
Looking south at material stockpiled on the top deck in Cells 12, 13, and 14.

Photo No. 2
Looking southwest at active fill area in Cell 15.

Photo No. 3
Looking east at the top deck of the active working area in Cells 14 and 15.

Photo No. 4
Looking south at the north slope of Cell 15.

Photo No. 5
Looking northwest at the Cell 15 leachate collection riser headwall and pump control system.

Photo No. 6
Looking northwest at the east slope of Cell 15.

Photo No. 7
Looking east at the west slope of previously closed landfill cells.

Photo No. 8
Looking south at top deck of previously closed areas, including Cell 1 through Cell 11.

Photo No. 9
Looking north at the east slope of Cells 12 and 14.