# 2018 Landfill CCR Inspection Report

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

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

**January 2019**
**Project No. 35177248A**

**Prepared for:**
**Entergy Independence Plant**
**555 Point Ferry Rd.**
**Newark, AR 72562**

**Prepared by:**
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# PROFESSIONAL ENGINEER'S CERTIFICATION

This report on the annual engineering inspection of the Entergy 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. David McCormick, PE, of Terracon Consultants, Inc. (Terracon), 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.


1-17-2019

David C. McCormick, P.E. — Date
Arkansas Professional Engineer No. 9199


Expires 12.31.19

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# 1.0 INTRODUCTION

## 1.1 Purpose of Report

The purpose of this report is to document the annual inspection of the Entergy 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 principally to dewatering hoppers for removal of water and for storage.

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 Environmental Quality (ADEQ) to construct and operate a solid waste disposal facility at the Plant. Entergy Arkansas, Inc. (now knows 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 (APCEC) Regulation 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 Regulation 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 2**. The Landfill is designed to be developed through three phases, which only Phases 1 and 2 are currently permitted for development. 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 currently 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 APCEC Regulation 22. 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. 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. Cells 12 through 15 are open and are actively receiving waste. No new cells were opened, and no existing cells were closed.

The landfill manager that works for the contracted landfill management company, Boral CM Services (Boral) reported improvements made during the year to the leachate collection system and repairs to slopes exhibiting 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 ADEQ 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 upon 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**.

Digital terrain modeling techniques were used to determine volumes of ash disposed during the current reporting period. Surface models were originally created for the Landfill's surface from aerial photography taken in June 1996 and for the originally permitted proposed final surfaces. The surface models were updated in 1997 through 2015 based on field and/or aerial survey data. For this report, the active areas were surveyed on December 12, 2018. The surface generated from the current survey was compared to the November 28, 2017, survey surface model 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) | ADEQ Permitted Waste Capacity (cy) | 2018 Volume Placed (cy) | Total Volume Placed (cy) | Operational Remaining Disposal Capacity (cy) | Operational Remaining Life (years) |
|---|---|---|---|---|---|---|---|
| Cell 12 | Active | 5.7 | 434,800 | 6,100 | 297,600 | 82,300 | 0.72 |
| Cell 13 | Active | 5.7 | 372,300 | 3,200 | 298,400 | 73,900 | 0.65 |
| Cell 14 | Active | 15.0 | 807,400 | 10,500 | 659,400 | 131,700 | 1.15 |
| Cell 15 | Active | 18.2 | 1,258,100 | 162,500 | 634,500 | 516,400 | 4.52 |
| **Totals** | | **44.6** | **2,872,600** | **182,300** | **1,889,900** | **740,000** | **7.04** |

Based upon the digital terrain model, the net volume of material filled in Waste Cells 12 through 15 during the reporting period was calculated to be approximately 182,300 cubic yards (cy). The quantity of ash placed this reporting period is significantly higher than the previous year and the 5 year average due to the facility cleaning out their Recycle Ponds. Final permitted contours are shown in **FIGURE 3**. Based upon a 5-year historical annual average disposal rate of approximately 114,200 cy of material, there are about 7.04 years of capacity left in Waste Cells 12 through 15. This time frame is affected by the market for ash material and may be shorter or longer depending on market conditions. Also, the time may be affected by additional cleaning of the recycle ponds.

## 4.0 ASSESSMENT OF LANDFILL FACILITY

This section of the report provides a summary of the inspection of the Entergy Independence Plant Class 3N Landfill facility that was conducted on December 12, 2018. The assessment included an interview with the landfill operating company Boral CM Services (Boral) personnel and Entergy personnel, review of weekly inspections 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 side-slopes of the landfill are generally at the required 4:1 external and 3:1 interior slope requirements. 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 done in a safe manner and the overall maintenance of the facility is in good condition.

### 4.2 Landfill Cover System

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

### 4.3 Leachate Collection System

As required by APCEC Regulation 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. 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. Improvements to the leachate collection sump were completed in October 2018. Overall, the leachate collection system appeared to be in good working order (See Photo 1).

### 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, Boral conducts periodic inspections of the condition of the system and makes appropriate repairs as needed.

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 at the time of the inspection. The disposal access road to the active cells is paved, and it was in excellent condition at the time of the inspection. The perimeter access road has an all-weather surface coarse and was in good condition.

## 4.6 Fugitive Dust Control

In accordance with the facility's CCR Fugitive Dust Control Plan, Boral 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 and economizer ash are in a moist condition when transported to the landfill. The landfill access roads have enforced posted speed limit of 25 mph. Within the landfill boundary, a 5 mph speed limit is enforced. During the inspection, minimal fugitive dust was observed.

**APPENDIX A**
Figures


| | |
|---|---|
| Project Mngr: | TLB |
| Drawn By: | KHJ |
| Checked By: | DCM |
| Approved By: | DCM |

| | |
|---|---|
| Project No. | 026-001-35177248A |
| Scale: | AS SHOWN |
| File No. | 001 |
| Date: | 12/19/2018 |

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SITE MAP

2018 LANDFILL INSPECTION REPORT

ENTERGY INDEPENDENCE PLANT

CLASS 3N LANDFILL

NEWARK ARKANSAS

FIG. No. 1

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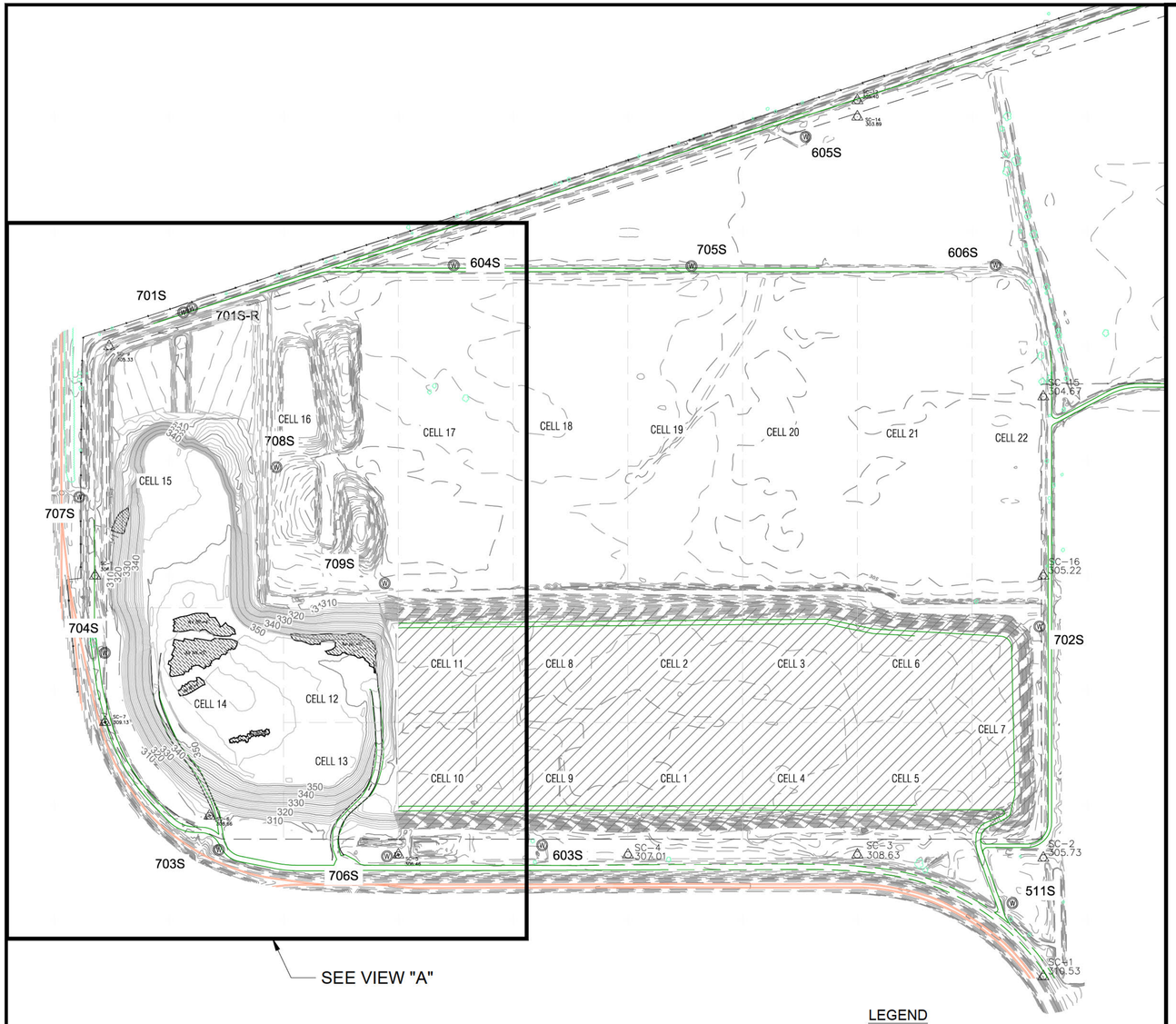


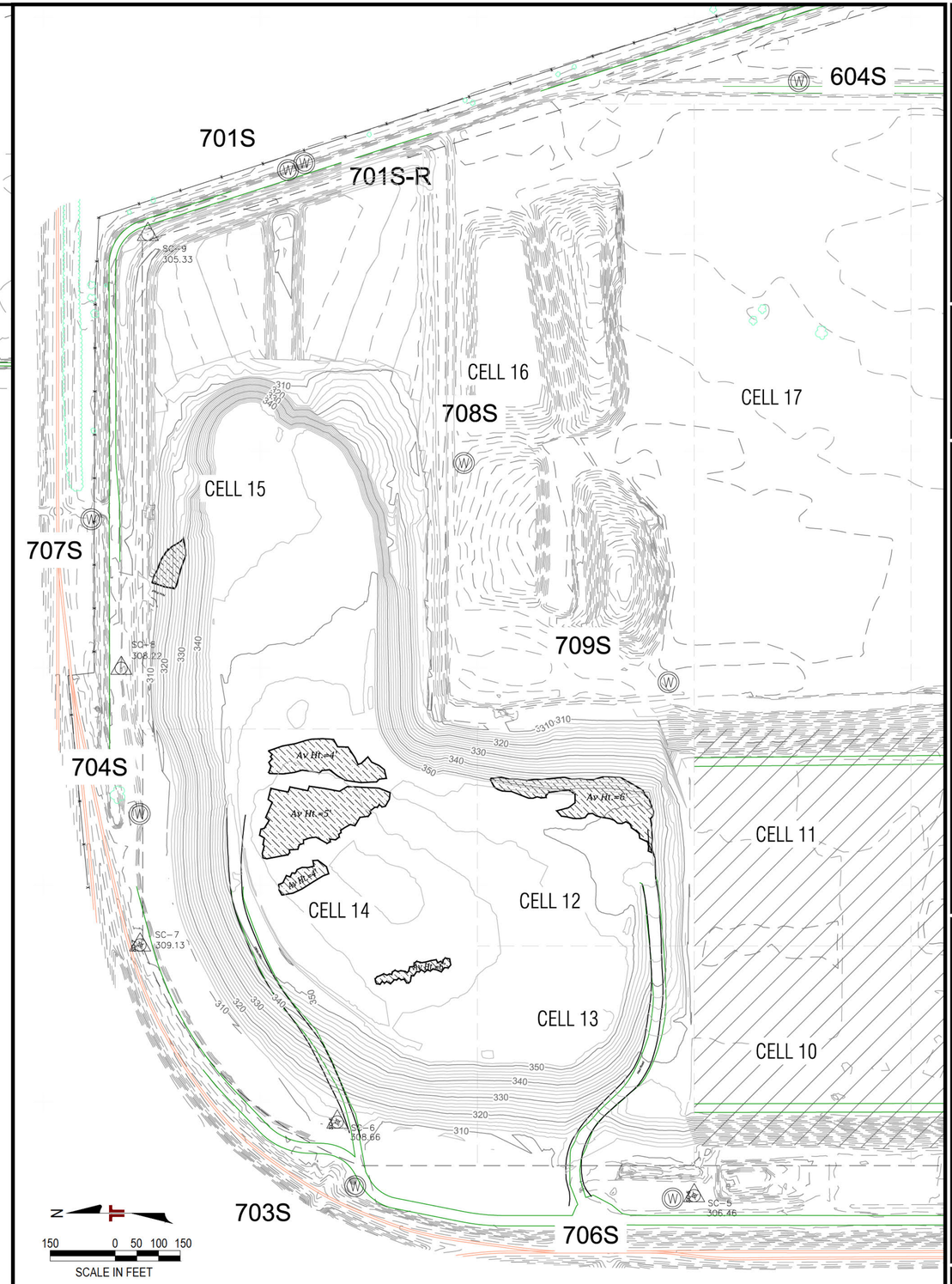


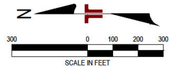


LEGEND

- INDEX CONTOUR
- INTERMEDIATE CONTOUR
- TREES
- EXISTING ROAD (UNPAVED)
- EXISTING ROAD (PAVED)
- EXISTING RAILROAD
- CELL BOUNDARY
- LANDFILL PERMIT BOUNDARY
- 330 PROPOSED TOP OF FINAL COVER
- PLANT GRID TICK
- SC-# ELEV. SURVEY CONTROL BENCHMARK
- CLOSED WASTE DISPOSAL AREA
- MONITORING WELL LOCATION (511S)
- WASTE/ASH PILES (AVG HEIGHT)

NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN AERIAL SURVEY BY AMI ENGINEERING, INC. (MAY 2003) AND A FIELD SURVEY BY HARMON SURVEYING (DECEMBER 2018).
2. SURVEY CONTROL POINTS WERE ESTABLISHED IN AUGUST 1997 BY DESIGN, DRAFTING, SURVEYING, AND MAPPING, LLC.

| REV. | DATE | BY | DESCRIPTION |
|---|---|---|---|
| | | | |

EXISTING CONDITIONS

2018 LANDFILL INSPECTION REPORT

ENTERGY INDEPENDENCE PLANT

CLASS 3N LANDFILL

NEWARK ARKANSAS

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FIGURE 2

| | |
|---|---|
| DESIGNED BY: | TLB |
| DRAWN BY: | KHJ |
| APPVD. BY: | DCM |
| SCALE: | SEE SCALEBAR |
| DATE: | 1-08-2019 |
| JOB NO. | 026-001-35177248A |
| ACAD NO. | 002 |
| SHEET NO.: | 2 OF 3 |

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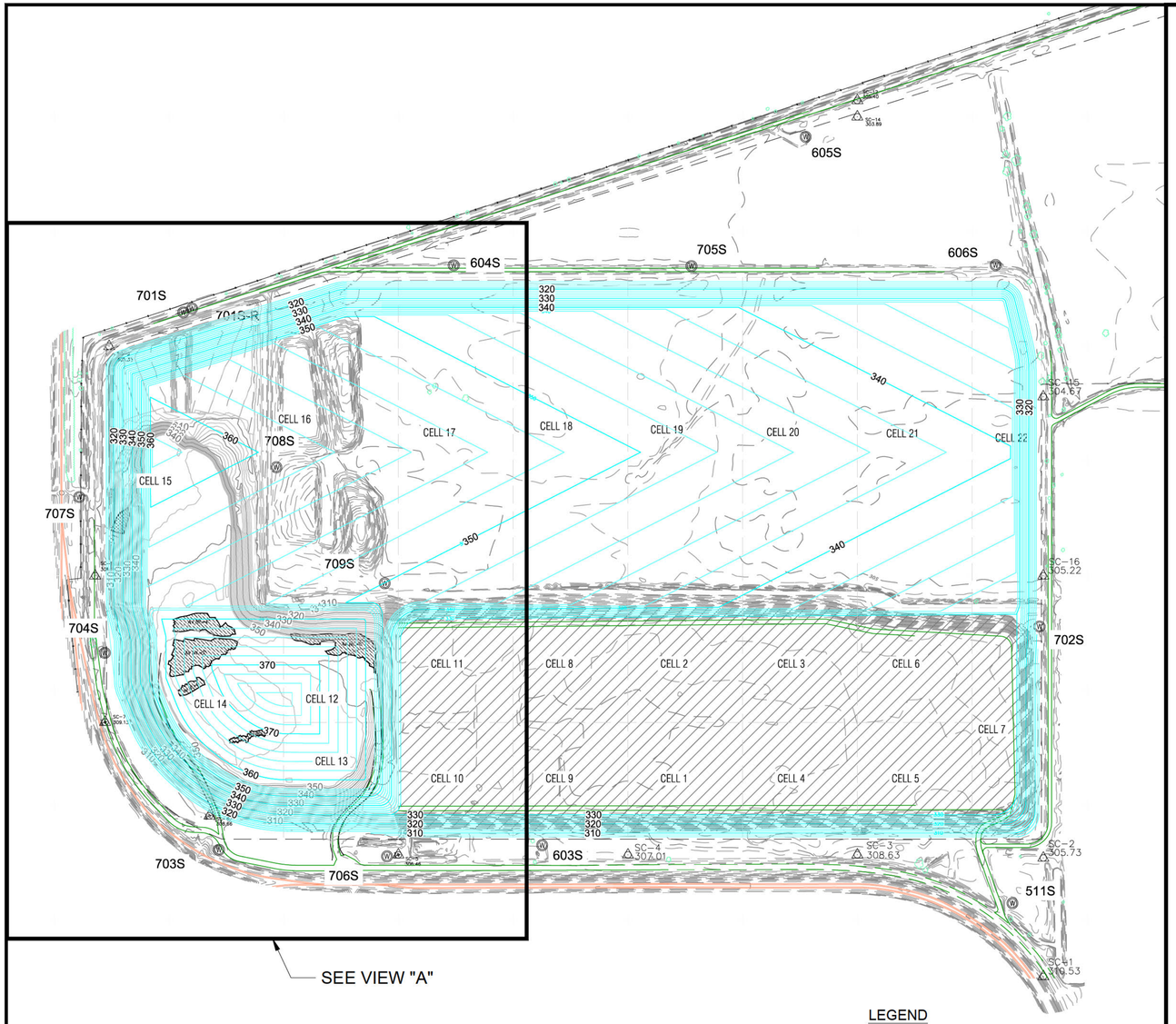


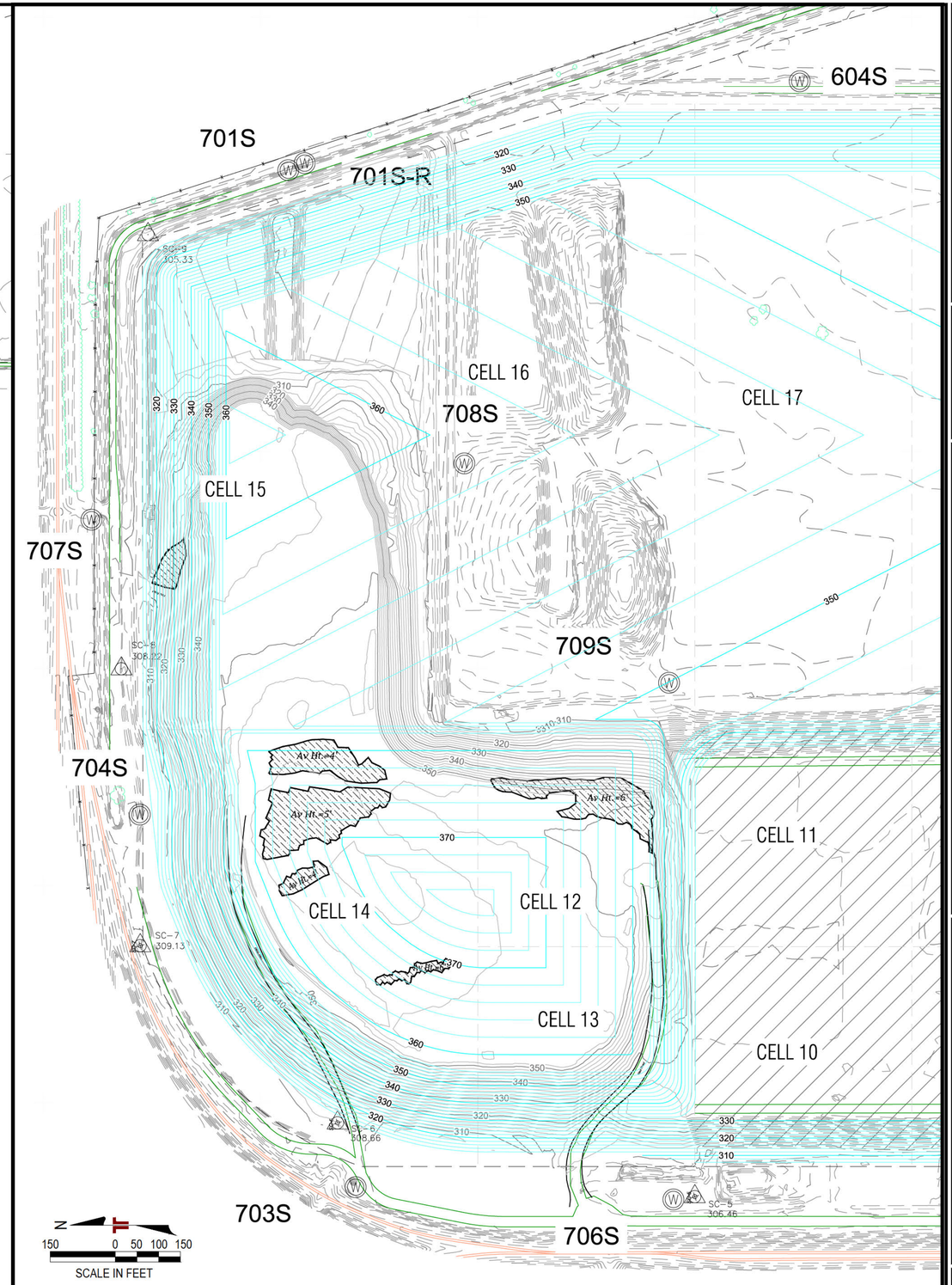


VIEW "A"

## LEGEND

- INDEX CONTOUR
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- EXISTING ROAD (UNPAVED)
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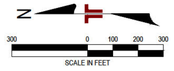


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| REV. | DATE | BY | DESCRIPTION |
|---|---|---|---|
| | | | |

FINAL PERMIT CONTOURS

2018 LANDFILL INSPECTION REPORT

ENTERGY INDEPENCE PLANT

CLASS 3N LANDFILL

NEWARK ARKANSAS


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FIGURE 3

| | |
|---|---|
| DESIGNED BY: | TLB |
| DRAWN BY: | KHJ |
| APPVD. BY: | DCM |
| SCALE: | SEE SCALEBAR |
| DATE: | 1-08-2019 |
| JOB NO. | 026-001-35177248A |
| ACAD NO. | 002 |
| SHEET NO.: | 3 OF 3 |

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**APPENDIX B**

Photos of Annual Engineering Inspection

1. Cell 15 sump area looking to the west.

2. Cell 15 leachate collection riser pipes and controls looking west. An additional riser pipe, pump and control panel was installed in 2018.

3. Southwest corner of previously constructed Phase I.

4. Cell 15 north dike looking southwest. This slope drains into the storm water runoff pond.

5. Northwest corner of Cell 14

6. Southeast corner of Phase I.

7. South side of Phase 1 looking east.

8. Southeast corner of Phase 1 looking north.