



Consulting
Engineers and
Scientists

Regulation Compliance Report Closure Plan

Caledonia Ash Landfill
Caledonia, Wisconsin

Submitted to:

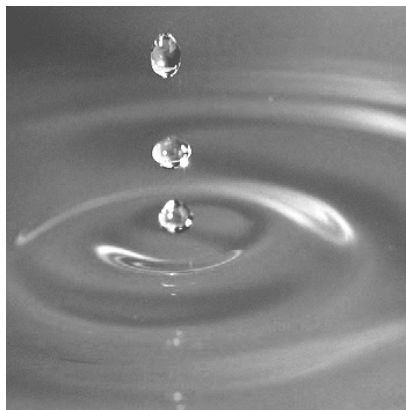
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October 2016, Revision 0

Project 1610530



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Drawings

Drawing C-1: Top of Ash Open Area, Regulatory Compliance Report – Closure Plan, We Energies Caledonia Ash Landfill

Drawing PM-11: Final Waste Grades, We Energies Caledonia Ash Landfill, Plan of Operation Modification, dated April 17, 2009

Drawing PM-12: Top of Final Cover, We Energies Caledonia Ash Landfill, Plan of Operation Modification, dated April 17, 2009

Drawing PM-15: Construction Details, We Energies Caledonia Ash Landfill, Plan of Operation Modification, dated April 17, 2009

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1. Introduction

We Energies owns and operates a solid waste disposal facility on the Oak Creek Site in the NE 1/4 of Section 1, Township 4 North, Range 22 East, in the Village of Caledonia, Racine County, Wisconsin. The We Energies Caledonia Ash Landfill is regulated as an industrial waste landfill by the Wisconsin Department of Natural Resources (WDNR) under the provisions of Chapter 289 Wisconsin State Statutes, and all applicable requirements of Chapters NR 500 of the Wisconsin Administrative Code. The design, construction, operation, closure, and post-closure care requirements are specified in the WDNR conditionally approved Plan of Operations, License No. 03232, FID No. 252108450. As currently constructed, the landfill has 27.2 acres open, 34.9 acres of base liner system (Cells 1, 2, 3, 4, 6, 8, and 10) is constructed, and 7.7 acres of perimeter slopes (Cells 1, 2, 3, 4, and 6) have received final cover.

In addition to the state regulations, the Caledonia Ash Landfill is also required to comply with 40 CFR Part 257 Subpart D – *Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments* and is defined as a CCR unit. Cells 1, 2, 3, 4, 6, 8 and 10 were constructed prior to October 14, 2015, and are defined as an existing CCR landfill in accordance with § 257.53. Future landfill cells are permitted by the WDNR in the conditionally approved Plan of Operation and defined as lateral expansions under § 257.53 when constructed.

This report fulfills the requirements for a written Closure Plan of the Caledonia Ash Landfill in accordance with § 257.102 - *Criteria for Conducting the Closure or Retrofit of CCR Units*. In accordance with § 257.102(b)(1), this report describes the engineering design of the landfill, phased development, a description of the final cover system and how the final cover will be constructed, and how the final cover system will meet the applicable performance standards contained in § 257.102(d). In addition, it also includes an estimate of the maximum inventory of CCR, an estimate of the maximum open area that would require closure at one time, and a generalized schedule based on the anticipated landfill filling rates and disposal volumes.

This closure plan includes the following sections:

- Section 1 Introduction
- Section 2 Closure Narrative
- Section 3 Final Cover System
- Section 4 Schedule for Closure
- Section 5 Conclusion and Certification

2. Closure Narrative

This section provides the closure narrative as required by § 257.102(b)(i). Closure of the Caledonia Ash Landfill will be accomplished by leaving the CCR in place and installing a final cover meeting the requirements of § 257.102(d)(3) over the CCR. The final cover system is described in Section 3. The areal limits of Caledonia Ash Landfill are shown on drawing C-1 in Appendix A. Closure activities for the landfill will commence when CCR disposed in the cell reach final waste grades shown on drawing PM-11 in Appendix A. It may be necessary to laterally expand the landfill with the construction of Cell 12 before final waste grades are completed in Cells 8 and 10. At that time this closure plan will be updated to comply with the federal rules.

§ 257.102(b)(1)(iv) requires an estimate of the maximum inventory of CCR ever on the site over the active life of the CCR unit. The design capacity of the Caledonia Ash Landfill as currently constructed (Cells 1, 2, 3, 4, 6, 8, and 10) is 3,021,000 cubic yards.

§ 257.102(b)(1)(v) requires an estimate of the largest area of the CCR unit ever requiring final cover, at any time during the active life of the CCR unit. The area of the landfill that has been constructed (Cells 1, 2, 3, 4, 6, 8, and 10) is approximately 34.9 acres and the area of the landfill that has received final cover prior to October 14, 2015, are 7.7 acres. So, the largest area of Caledonia Ash Landfill requiring final cover is approximately 27.2 acres.

§ 257.102(d)(1)(i). The final cover system described in Section 3 is a composite final cover system which will envelop the CCR, minimizing post-closure infiltration and the potential release of CCR, leachate, or contaminated run-off from the closed unit. Fugitive dust from exposed CCR before and during final cover construction will be managed in accordance with the Fugitive Dust Control Plan. Surface water that has come into contact with CCR before and during final cover construction will be managed as leachate in accordance with the Run-on and Run-off Control Plan.

§ 257.102(d)(1)(iii). Slope stability of the CCR and final cover is enhanced in the manner in which the CCR is conditioned, placed, and compacted; how the facility is operated to promote storm and contact water management; and how the leachate collection system is designed and monitored to ensure leachate is being removed from the waste and not allowed to build-up within the landfill. The permitted final cover slopes will be at a 4% minimum slope at the top of the landfill to promote surface water drainage and prevent ponding due to the settlement of the final cover system. The perimeter side slopes of the landfill will be at a maximum slope of 25% to provide long-term stable slopes that promote stormwater drainage, can be protected from excessive erosion, and safely maintained.

§ 257.102(d)(1)(iv). The final cover system described in Section 3 will minimize infiltration, which in turn minimizes the demand on the leachate collection system. The final cover will be vegetated with grass to promote evapotranspiration and prevent erosion. The final cover system vegetation will be maintained by fertilizing as necessary to develop a well-established vegetative cover and periodic mowing to stimulate root growth and prevent the establishment

of woody vegetation. Final slopes will be between 4% and 25% to facilitate mowing. Slopes greater than 10% will be covered with erosion matting after seeding to minimize erosion during the establishment of vegetative cover.

§ 257.102(d)(1)(v). The final cover system described in Section 3 uses readily available equipment and materials and can easily be completed in a single construction season.

3. Final Cover System

This section is included to fulfill the requirements of § 257.102(b)(1)(iii).

Filling to final contours will result in a final slope no greater than 25% sloping downward from the center of the fill area to the perimeter of the site. The top portion of the landfill will be graded to no less than 4% sloping downward from the center to ensure positive drainage to the perimeter of the site. Drainage features, such as the perimeter ditches, terraces, and runoff channels will be constructed, as necessary, to accommodate surface runoff from phased closure.

The final cover system has been designed to minimize leachate generation by limiting percolation through the final cover barrier layer, promoting subsurface drainage to limit head on the barrier layer, and establishing vigorous plant growth to maximize evapotranspiration. The final cover system has also been designed for stability and to reduce maintenance.

The 7.7 acres of the final cover shown in Appendix A, Drawing C-1 was installed over portions of Cells 1, 2, 3, 4 and 6 and was installed prior to the Plan of Operations Modification issued by WDNR on May 19, 2010. This 7.7 acres of final cover consists from top to bottom a 6-inch-thick topsoil layer, 24-inch-thick rooting zone layer, 24-inches of compacted clay with a hydraulic conductivity no greater than 1.0E-07 cm/s, and a 6-inch-thick grading layer of bottom ash or clay.

The final cover system permitted by the WDNR on May 19, 2010, and to be installed subsequent to October 14, 2015, consists from top to bottom a 6-inch-thick topsoil layer, 24-inch-thick rooting zone layer, geocomposite drainage layer, 40-mil textured liner low-density polyethylene (LLDPE) geomembrane liner, 24-inch-thick compacted FGD filter cake/fly ash barrier layer and 6-inch-thick ash grading layer. The geocomposite drainage layer is incorporated into the final cover system cross-section to promote subsurface drainage and prevent the build-up of head pressure on the barrier layer and pore pressures in the final cover system soils.

The hydraulic conductivity of the final cover system is required by § 257.102(d)(3)(i)(A) to be less than or equal to the hydraulic conductivity of the bottom liner system or natural subsoils present or a hydraulic conductivity no greater than 1.0E-05 cm/s, whichever is less. The Caledonia Ash Landfill is divided into two phases. Phase I (Cells 1, 2, 3, 4, 6, and 8) was constructed with a 5-foot thick compacted clay liner with a maximum hydraulic conductivity of 1.0E-07 cm/s. Phase II (Cell 10) was constructed with a composite base liner system consisting of 4-foot-thick compacted clay layer and polyethylene geomembrane liner. The approved final cover system to be installed subsequent to October 14, 2015, is a composite final cover consisting of a 2-foot compacted barrier layer, polyethylene geomembrane, drainage layer, and vegetated soil layers. The 7.7 acres of final cover installed prior to October 14, 2015, matches the hydraulic conductivity of the base liner for Cells 1, 2, 3, 4 and 6 complying with the requirements of § 257.102(d)(3)(i)(A).

Construction equipment and methods normally used in developing landfills and performing earth-moving projects will be used. The following sub-sections discuss the construction of the individual components of the final cover system. Layout and details of the final cover system installed subsequent to October 14, 2015, are shown on the drawings included in Appendix A.

3.1 Compacted Barrier Layer

A minimum 2-foot-thick layer of compacted barrier layer constructed of soil or FGD filter cake and fly ash will be used in the final cover system installed subsequent to October 14, 2015, as the soil component of the composite barrier layer. The materials will be placed and compacted with a large vibratory smooth-drum roller, with a minimum operating weight of 15,000 pounds, and while in vibratory mode, can provide 30,000 pounds of compactive energy. The barrier layer will be placed and compacted in lifts not exceeding 6 inches. The prepared barrier layer shall provide a firm, smooth surface for deployment of the geomembrane. The barrier layer should be free of any angular particles protruding from the surface greater than 0.5 inches, sharp breaks in grade or excessive rutting greater than 0.2 feet. The completed barrier layer will have a maximum hydraulic conductivity of 5×10^{-5} cm/s. Based on the laboratory test results of the FGD filter cake and typical fly ash properties, the compaction and hydraulic conductivity specifications should be achievable using standard construction equipment and methods normally used in developing landfills and performing earth-moving projects.

3.2 Geomembrane

The geomembrane component of the final cover system installed subsequent to October 14, 2015, will be a 40-mil textured linear low-density polyethylene (LLDPE) geomembrane. The LLDPE geomembrane has been selected in order to provide flexibility of the final cover system to accommodate expected settling and subsidence in accordance with § 257.102(d)(3)(i)(D). Geomembrane panels will be positioned by suspending rolls of material with a front-end loader and unrolling the suspended material by hand or with the aid of an ATV, as the loader remains stationary. The geomembrane will be installed in a loose and relaxed condition. Panels will be overlapped approximately 4 inches and fusion-welded together. At seam intersections and other repair locations, a geomembrane patch extending a minimum of 12 inches beyond the intersection or repair will be extrusion-welded into place. All seams will be non-destructively tested by air or vacuum testing. The integrity of fusion welds will be air tested, and extrusion welds will be vacuum-tested.

3.3 Drainage/Rooting Layer and Topsoil

A geocomposite drainage layer and a 24-inch-thick rooting zone layer meeting the requirements of § 257.102(d)(3)(i)(B) will be installed above the geomembrane final cover. The drainage layer will be installed to aid in the removal of subsurface storm water drainage; the rooting zone layer will be installed to support vegetative growth and both layers will provide protection of the geomembrane and compacted barrier layer. The geocomposite will be deployed such that the seams run perpendicular to the contour lines of the slope to the

extent possible. The geonet will be cable-tied every 3 feet along the edge of the panels and every 12 feet for end seams. The top geotextile will be sewn. The rooting layer will be placed over the geocomposite in a single lift using low ground pressure dozers. The material will be classified as SW, SP, SM, SC, ML, or CL and have a maximum particle size of 3 inches. The rooting layer will consist of on-site or off-site soils.

Meeting the requirements of § 257.102(d)(3)(i)(C), topsoil capable of sustaining vegetative growth will be placed and spread into a uniform loose lift thickness of 6 inches. Once placed, the topsoil will be fertilized, seeded, and mulched. On all slopes greater than 10%, a temporary straw mulch blanket will be used to limit erosion and protect the seed prior to the establishment of vegetation.

The 2-foot-thick rooting zone and the 6-inch-thick topsoil final cover layers installed prior to October 14, 2015, and meet the requirements of § 257.102(d)(3)(i)(B) and § 257.102(d)(3)(i)(C) respectively.

4. Schedule for Closure

This section is included to fulfill § 257.102(b)(1)(v). The Cells 1, 2, 3, 4, 6, 8, and 10 have been constructed. Portions of the perimeter slopes of Cells 1, 2, 3, 4 and 6 have received final cover prior to October 14, 2015, as shown in Appendix A, Drawing C-1. In accordance with the WDNR approved Plan of Operation, the landfill has a phased development plan, describing the construction, operation, and closure of each phase of the landfill. In general, the development plan requires active landfill cells which have reached final waste grades be closed as soon as practical to limit the maximum open area, leachate generation, and the potential operational problems. A schedule for completing all activities necessary to satisfy the closure criteria is dependent on the CCR generation rates, beneficial reuse programs, and disposal rate volumes. However, final closure of the landfill will begin no later than 30 days following the final waste receipt for the CCR unit in accordance with §257.102(e)(1).

Final cover construction at the Caledonia Ash Landfill will be completed in accordance with the WDNR approved Plan of Operation under License No. 03232. Therefore no additional state or local approvals are required for We Energies to begin construction of the next phase of the landfill or closure of an existing phase. The final cover system described in Section 3 uses standard and readily available equipment and materials and can easily be completed in a single construction season.

5. Conclusion and Certification

We Energies owns and operates a solid waste disposal facility on the Oak Creek Site in the NE 1/4 of Section 1, Township 4 North, Range 22 East, in the Village of Caledonia, Racine County, Wisconsin. Caledonia Ash Landfill is required to comply with 40 CFR Part 257 Subpart D – *Standards for Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments*. This plan fulfills the requirements for a written Closure Plan of the Caledonia Ash Landfill, in accordance with § 257.102 - *Criteria for Conducting the Closure or Retrofit of CCR Units*, describing the engineering design and construction of the final cover system, how the final cover system will meet the applicable performance standards contained in § 257.102(d), an estimate of the maximum inventory of CCR, an estimate of the maximum open area that would require closure at one time, and a generalized schedule based on the anticipated landfill filling rates and disposal volumes.

The Closure Plan was completed under the direction of John M. Trast, P.E. I am a licensed professional engineer in the State of Wisconsin in accordance with the requirements of ch. A-E 4, Wisconsin Administrative Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wisconsin Administrative Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR Part 257 Subpart D.



10/14/2016

Appendix A

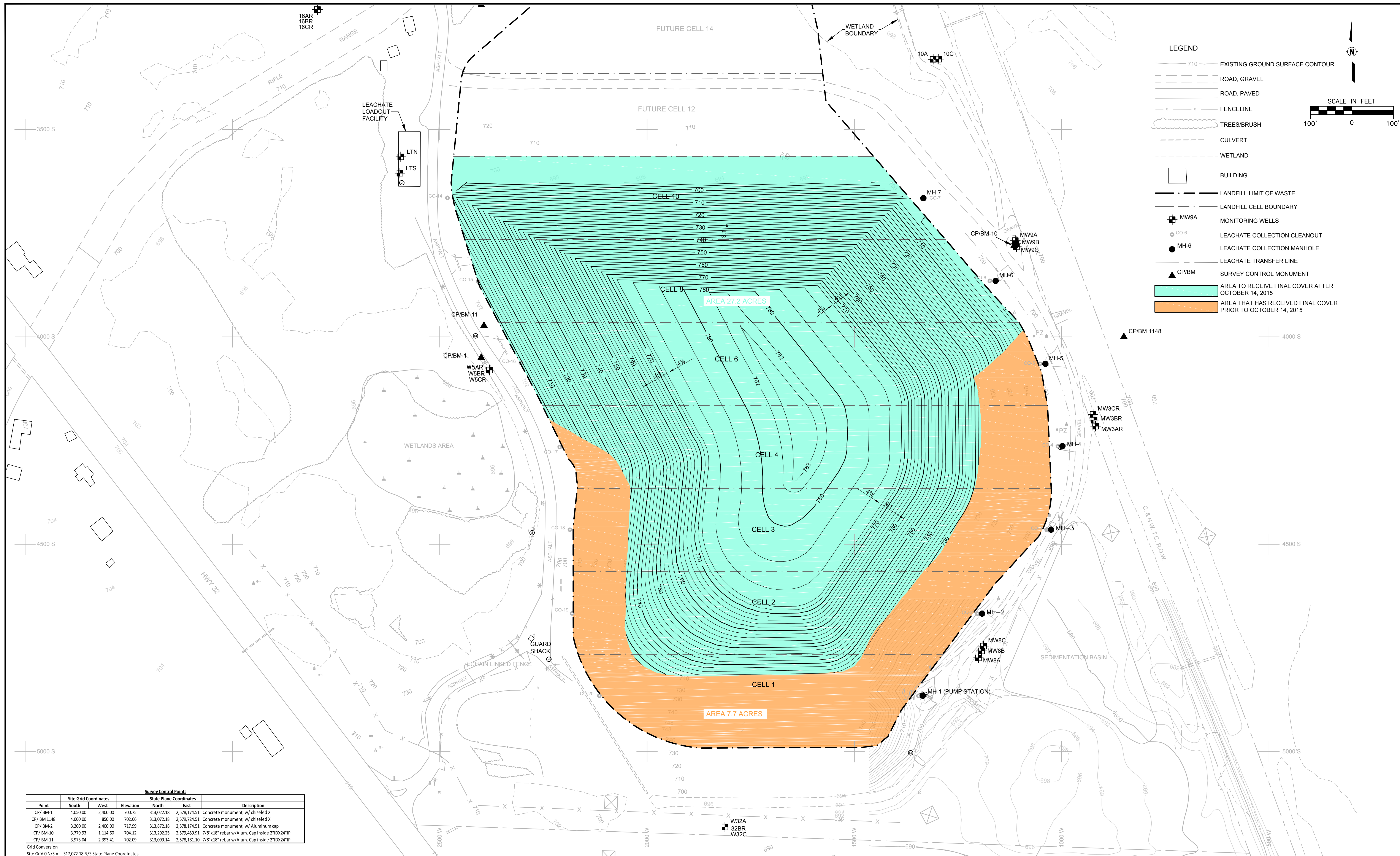
Drawings

Drawing C-1: Top of Ash Open Area, Regulatory Compliance Report – Closure Plan, We Energies Caledonia Ash Landfill, dated October 7, 2016

Drawing PM-11: Final Waste Grades, We Energies Caledonia Ash Landfill, Plan of Operation Modification, dated April 17, 2009

Drawing PM-12: Top of Final Cover, We Energies Caledonia Ash Landfill, Plan of Operation Modification, dated April 17, 2009

Drawing PM-15: Construction Details, We Energies Caledonia Ash Landfill, Plan of Operation Modification, dated April 17, 2009



LEGEND

- 710 — EXISTING GROUND SURFACE CONTOUR
- ROAD, GRAVEL
- ROAD, PAVED
- x - x - FENCELINE
- TREES/BRUSH
- CULVERT
- WETLAND
- BUILDING
- LANDFILL LIMIT OF WASTE
- LANDFILL CELL BOUNDARY
- ⊕ MW9A MONITORING WELLS
- CO-6 LEACHATE COLLECTION CLEANOUT
- MH-6 LEACHATE COLLECTION MANHOLE
- LEACHATE TRANSFER LINE
- ▲ CP/BM SURVEY CONTROL MONUMENT
- AREA TO RECEIVE FINAL COVER AFTER OCTOBER 14, 2015
- AREA THAT HAS RECEIVED FINAL COVER PRIOR TO OCTOBER 14, 2015

SCALE IN FEET
100' 0 100'

Survey Control Points

Point	Site Grid Coordinates			State Plane Coordinates		Description
	South	West	Elevation	North	East	
CP/BM-1	4,050.00	2,400.00	700.75	313,022.18	2,578,174.51	Concrete monument, w/ chiseled X
CP/BM 1148	4,000.00	850.00	702.66	313,072.18	2,579,724.51	Concrete monument, w/ chiseled X
CP/BM-2	3,200.00	2,400.00	717.99	313,872.18	2,578,174.51	Concrete monument, w/ Aluminum cap
CP/BM-10	3,779.93	1,114.60	704.12	313,292.25	2,579,459.91	7/8"x18" rebar w/Alum. Cap inside 2"10X24"IP
CP/BM-11	3,973.04	2,393.41	702.09	313,099.14	2,578,181.10	7/8"x18" rebar w/Alum. Cap inside 2"10X24"IP

Grid Conversion
 Site Grid N/S = 317,072.18 N/S State Plane Coordinates
 Site Grid E/W = 2,580,574.51 E/W State Plane Coordinates

- NOTES:**
- EXISTING CONTOURS FROM 1983 WPCO SURVEY AND RACINE COUNTY TOPOGRAPHIC MAP. CONTOURS IN LANDFILL AREA UPDATED FROM SURVEY ON 12/9/2015 BY EDGERTON.
 - HORIZONTAL GRID IS LOCAL GRID ESTABLISHED BY OTHERS. ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL.

Attention:

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NO.	DATE	ISSUE/REVISION	APP

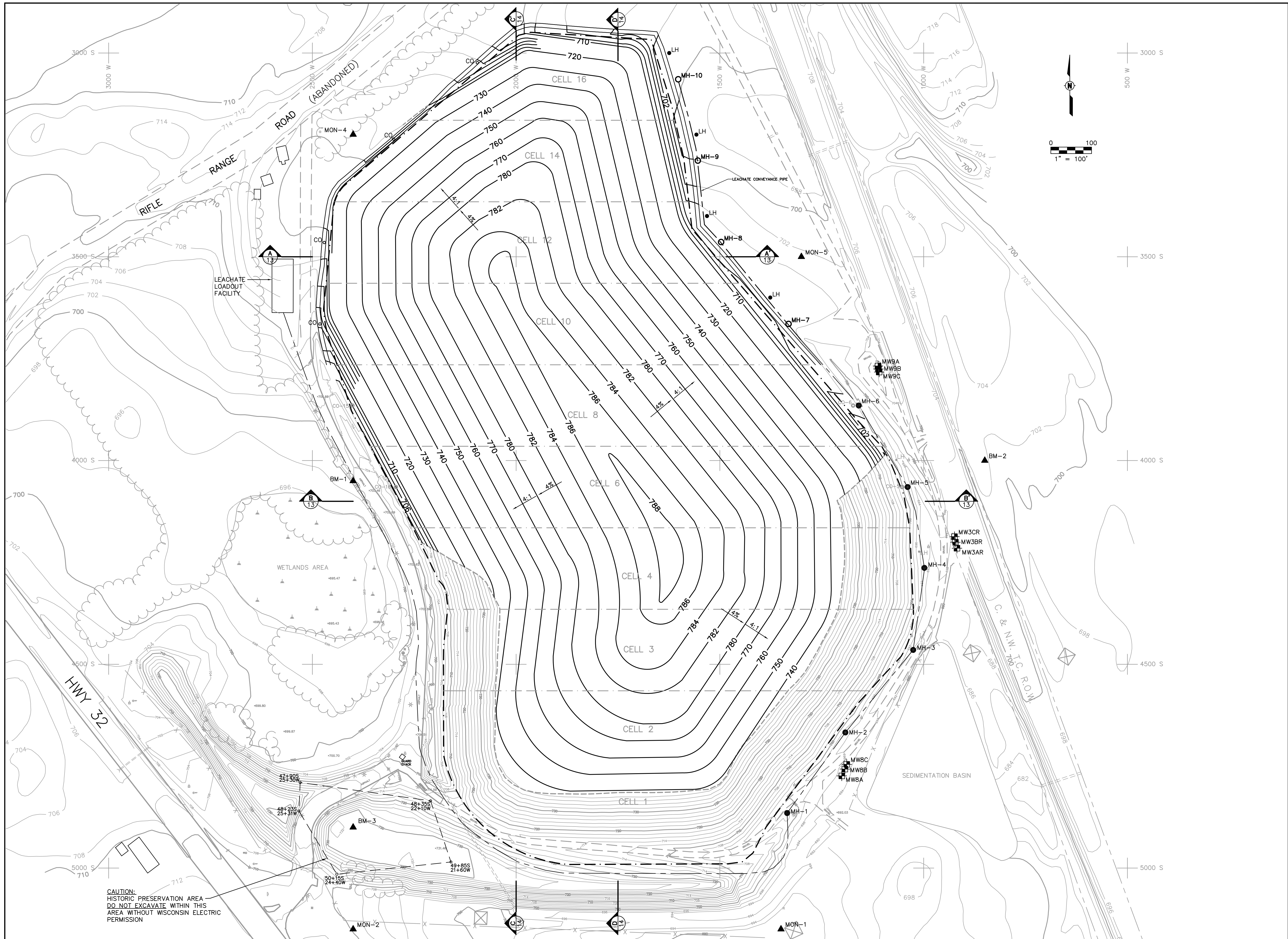
Designed: JXT
 Checked: JXT
 Drawn: JLC
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REGULATION COMPLIANCE REPORT CLOSURE PLAN	DWG. NO. C-1
CALEDONIA ASH LANDFILL TOP OF ASH - OPEN AREA	SHEET NO. 1

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PLAN OF OPERATION MODIFICATION
FINAL COVER GRADES

CALEDONIA ASH LANDFILL
WE ENERGIES
TOWN OF CALEDONIA
RACINE COUNTY, WISCONSIN

Issued

Rev	Date	Description

Designed: KJC 2/2009
Drawn: KJC 2/2009
Checked: JMT 2/2009
Approved: JMT 2/2009

PROJECT NUMBER
10532011

SHEET REFERENCE NUMBER

PM-12

