REPORT

Annual Inspection

Coal Creek Station - Southeast Section 16 CCR Landfill

Submitted to:

Great River Energy
2875 Third Street SW
Underwood, North Daklota 58576

Submitted by:

Golder Associates Inc.
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19115185

January 2020

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1.0 INTRODUCTION

As part of 40 CFR Part 257 of the Subtitle D solid waste provisions under the Resource Conservation and Recovery Act (RCRA), utilities are required to complete annual inspections for surface impoundments and landfills containing Coal Combustion Residuals (CCR). This report has been prepared by Golder Associates Inc. (Golder) for Great River Energy (GRE) to satisfy the annual inspection requirements for CCR landfills under 40 CFR Part 257.84.

Coal Creek Station (CCS) is located in McLean County, approximately 10 miles northwest of Washburn, North Dakota. There are four facilities located at CCS that fall under the CCR rule requirements (Figure 1):

- Drains Pond System CCR Surface Impoundment (Drains Pond System)
- Upstream Raise 91 CCR Surface Impoundment (Upstream Raise 91)
- Upstream Raise 92 CCR Surface Impoundment (Upstream Raise 92)
- Southeast Section 16 CCR Landfill (Southeast 16)

Upstream Raise 91 and Upstream Raise 92 both operate as impoundments and will be closed with CCR in-place. The Drains Pond System is currently being used to dewater bottom ash and as a process water impoundment to return conveyance water back to the plant. The Southeast 16 landfill operates as a landfill and is used as a storage/disposal facility for CCRs that do not contain free liquid. This report presents a review of available facility information and findings of the inspection of Southeast 16 at CCS performed September 24, 2019.

2.0 REVIEW OF EXISTING INFORMATION

2.1 Geological Conditions

Southeast 16 is generally constructed over a glacial till layer consisting of sandy and silty-clay soils. Glacial till varies in thickness from 20 feet to several hundred feet in the area of CCS. Silty-sand and sand lenses are present throughout the glacial till formation, which is underlain by poorly consolidated siltstone/sandstone bedrock (Barr Engineering 1982; CPA and UPA 1989).

2.2 Site History and Liner Systems

Southeast 16 (Figure 2) is located in Section 16, Township 145N, Range 82W and covers approximately 71 acres. The facility is used as a storage/disposal facility for CCRs including fly ash, bottom ash, economizer ash, and flue gas desulfurization (FGD) material as required. Moisture conditioned CCRs are hauled to Southeast 16 using haul trucks. The material is placed using a dozer and compacted by routing the haul traffic across placed CCR. In addition, Southeast 16 receives non-CCR materials associated with plant processes and a small construction and demolition (C&D) disposal area receives C&D material from CCS. Contact water at Southeast 16 is routed to the north side of the facility to a contact water collection area and sump. As required, contact water is pumped from the sump to Upstream Raise 92, Upstream Raise 91, or the Drains Pond System. Southeast 16 is adjacent to hay fields and wetland areas to the north and east, Upstream Raise 92 to the west, and is approximately 100 feet north of rail lines.

Southeast 16 was originally part of the East Ash Pond. In 1989, the facility was reclassified as a solid waste disposal area and any CCRs disposed at Southeast 16 were excavated and placed in the Southwest Section 16 Landfill that is now below Upstream Raise 92. After being cleaned out, Southeast 16 was re-graded with berms along the east, south, and west sides. The footprint was re-lined in 1994 with a composite liner consisting of 2 feet

of compacted clay, a 60-mil geomembrane liner, a non-woven geotextile cushion, and fly ash protective cover. In 2001, an embankment berm was constructed along the north side with a composite liner consisting of a geosynthetic clay liner (GCL) and a 60-mil geomembrane liner. In 2015 the contact water collection area along the north side of the facility was expanded by approximately 4.5 acres. The contact water collection area expansion liner consists of a GCL and 60-mil geomembrane overlain with fly ash and bottom ash protective cover.

Selected construction drawings from the 1994, 2001, and 2015 work and current permit drawings are included in Appendix A.

2.3 Site Geometry

The design top of embankment surrounding Southeast 16 has an approximate elevation of 1904 feet above mean sea level (amsl) along the south and east sides, and between 1887 and 1892 feet amsl along the north side. The original berm along the west side was at elevation 1901 feet amsl, but CCR storage/disposal along this side extends over this berm onto Upstream Raise 92 slopes. The upstream slopes of the embankment surrounding Southeast 16 were designed with 3:1 slopes to bottom of landfill elevations between 1887 feet amsl and 1876 feet amsl. The downstream slopes from the soil embankment have 3:1 slopes. The surrounding topography has elevations varying from approximately 1882 feet amsl to 1876 feet amsl. The crest is a gravel surfaced roadway supporting light passenger vehicles. All heavy haul equipment accesses the site from the north and west sides along internal roads constructed on placed CCR material.

2.4 Changes in Geometry

No significant changes to geometry were noted other than the continued placement of CCR materials, non-CCR materials, and C&D debris to the design grades. Based on site documentation of the materials disposed of over the previous year, estimated disposal through the fall of 2019 included approximately 55,000 cubic yards (CY) of CCR and non-CCR material primarily deposited along the south and east sides to bring outside grades up to an approximate elevation of 1943 feet amsl.

2.5 Storage Capacity and Volumes

Based on annual placement estimates and survey placement estimates, the amount of CCR and non-CCR material contained in the facility at the end of 2019 is estimated to be approximately 3,980,000 CY.

2.6 Permits

Southeast 16 is currently permitted with the North Dakota Department of Environmental Quality (NDDEQ) under Permit Number 0033. Previous permit modification documents describe additional historical information about the design of the facility (CPA 1997, CPA and UPA 1989, GRE 2003, GRE 2012, GRE 2015).

2.7 Summary of 2019 Weekly Inspections

Routine weekly inspections of Southeast 16 were performed as a part of the final CCR Rule. Based on a review of the available inspection forms, the following items were noted:

- Generally good site maintenance.
- No signs of significant seepage, settlement, or cracking of the berm downstream slopes.

2.8 Summary of Previous Inspections

The most recent annual professional engineer inspection of Southeast 16 was performed by Golder in September of 2018 (Golder 2019) and a summary of the observations of that inspection are as follows:

- Generally good vegetation and site maintenance.
- Exposed geomembrane liner along the north berm upstream slope.
- Minor erosion of downstream CCR slopes.
- Areas of poorly vegetated berm downstream slopes on the north side of the facility constructed with bottom ash.
- Isolated areas of poorly vegetated final cover placed on CCR downstream slopes.
- Contact water control features (sump, pump, and piping) were in good condition.
- Isolated and minor woody vegetation was growing near the toe of slopes.

3.0 2019 ANNUAL INSPECTION

On September 24, 2019, Craig Schuettpelz and Paul Schlicht of Golder performed an inspection of Southeast 16 per United States Environmental Protection Agency (USEPA) Regulation 40 CFR Part 257.84(b) requirements. The inspection consisted of visual observations while walking around the facility traversing up and down the perimeter berm and CCR placement areas. An annual inspection checklist used during the inspection is presented in Appendix B. Photographs were taken and are presented in Appendix C. The following presents a summary of the observations made during the 2019 annual inspection.

3.1 Hydraulic Structures

Contact water is collected in the contact water collection area located in the northeast corner of Southeast 16. As contact water accumulates, it can be pumped from the area to Upstream Raise 92, Upstream Raise 91, or the Drains Pond System through a high-density polyethylene (HDPE) pipe (above and below grade). The contact water collection area, pump, and pipe observed, appeared to be in good condition with no noticeable damage, significant corrosion, or significant erosion. The corrugated metal culvert conveying contact water collected on top of the facility to the north contact water collection area (under the C&D access road) appears to be slightly deformed. Golder recommends adding cover material over the culvert to limit further deformation due to heavy equipment traffic.

3.2 Perimeter Berm

3.2.1 Berm Upstream Slope

The majority of berm upstream slopes have been covered with CCR, with only the berm upstream slope along the north side being visible. The slopes appeared to match the design slopes of 3:1 with no observed cracks, sloughs, settlement, or seepage. The geomembrane liner along much of the north berm upstream slope and a minor area on the floor of the contact water collection area is exposed. Minor damage was identified on the upstream slope of the north berm. Although not covered with CCR and above the contact water level, it is recommended that the geomembrane be repaired and covered with CCR to act as protective cover. The berm upstream slopes of Southeast 16 appear to be in fair condition.

3.2.2 Berm Crest

The berm crest around the east and south sides of Southeast 16 is surfaced with gravel and used for light vehicle traffic. The berm crest along the north side is narrow and rarely used for light vehicle traffic. Heavy haul traffic bringing CCR to the site use an internal road constructed over previously placed CCR. The road on the berm crest of Southeast 16 appears to be in good condition, with no noticeable cracking or settlement, and appears to be well maintained. When wet, the road surface can become rutted and slippery. During the inspection, minor rutting was noted on the south and east crests along with ponded water from recent precipitation events. Ruts that develop on the road surface should be repaired as soon as practical to maintain access.

3.2.3 Berm Downstream Slope

The berm downstream slopes on the south and east side had good vegetation. Some small animal burrows were identified along the berm downstream slope. The north berm downstream slope west of the contact water collection area was constructed of bottom ash. Fair vegetation is established on the bottom ash; however, Golder recommends that soil be placed on these slopes to improve vegetative success. Golder did not observe indications of seepage, sloughing, cracking, or excessive settlement on the berm downstream slopes. The berm downstream slopes appeared to be in fair condition.

3.2.4 Toe

The environment at the toe of the berm slope varies surrounding Southeast 16. A poorly draining area exists at the toe along the north side and surface water drainages exist along the toe on the south and east sides. Golder did not observe indications of sloughing, cracking, significant erosion, excessive settlement, or vegetation that seemed to be thriving abnormally along the toe. No signs of seepage were noted. The toe appeared to be in good condition. There were a few small trees and bushes near the toe along the east and south sides. Although these trees and bushes were not on the berm downstream slopes, Golder recommends that they be removed to keep all woody vegetation clearly off the berm downstream slopes and toe.

3.3 CCR Placement

3.3.1 CCR Downstream Slope (no Cover)

Uncovered CCR downstream slopes appeared to be in fair condition with no noticeable cracks, settlement, sloughing, seepage, or other signs of structural distress. The uncovered CCR downstream slopes appeared to match the design slopes with only minor erosion noted, particularly of fly ash along the north CCR downstream slope. Fly ash erosion on the south downstream CCR slope has collected in the contact water ditch. Golder recommends that the contact water ditch be cleaned out to allow contact water to flow freely within the ditch.

3.3.2 CCR Downstream Slope (with Cover)

Portions of CCR downstream slopes on the north, east and south sides of Southeast 16 have temporary cover installed as of late 2016. These areas had fair to poor vegetation (a combination of grassy vegetation and weeds) and minor erosion on the soil surface below. However, these CCR downstream slopes with temporary cover appeared to be in generally good condition to aid in controlling erosion of the outer fly ash “shell” and limit wind-blown fugitive dust.

The east and south CCR downstream slopes of Southeast 16 have final cover to an elevation of 1925 feet amsl with terrace channels and downchute drainage channels along the side slopes. This final cover was installed in 2015 and had fair to poor native grass vegetative growth. Golder recommends that topsoil be replaced in portions of this covered area and that it be re-seeded.

Golder did not observe indications of seepage, sloughing, cracking, settlement, or other signs of structural distress on the covered CCR downstream slopes. The covered CCR downstream slopes appeared to be in fair condition.

3.4 Signs of Structural Weakness or Other Observations that Could Affect Stability

No signs of structural weakness or other observations that could affect the stability of Southeast 16 were observed during the site inspection in September 2019.

4.0 SUMMARY AND CONCLUSIONS

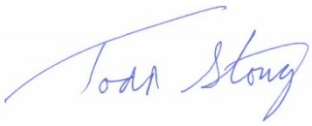
An annual inspection was performed for Southeast 16 at Coal Creek Station on September 24, 2019. The inspection met the requirements for CCR landfills under 40 CFR Part 257.84. Golder observed good vegetation and site maintenance and did not identify significant deficiencies such as seepage, excessive erosion or settlement, or cracking during visual observations of Southeast 16.

In addition to annual inspections by the Professional Engineer, trained and qualified site personnel perform required weekly facility inspections to look for signs of potential structural weaknesses.

Minor maintenance items that may need to be continually addressed include repairing large animal burrows as they appear, monitoring erosion along CCR slopes, repairing rutted perimeter roads to maintain access, re-seeding poorly vegetated CCR downstream slopes where final cover has been placed, removing woody vegetation growing on the berm downstream slopes and toes, and placing CCR over exposed geomembrane liner.

Golder Associates Inc.

Craig Schuettpelz, PE
Senior Engineer



Todd Stong, PE
Associate and Senior Consultant

CCS/TJS/

5.0 REFERENCES

Barr Engineering. 1982. Coal Creek Station Hydrogeologic Study, June 3, 1982.

Cooperative Power Association. CPA 1997. Application to Renew Permit SU-033 and Combine with Permit SU-118. Eden Prairie, Minnesota, July 30, 1997.

Cooperative Power and United Power Association. CPA and UPA 1989. *Application to Renew Permit to Operate a Special Use Disposal Site, Coal Creek Station, Permit Number SU-033*. Prepared for the North Dakota State Department of Health and Consolidated Laboratories.

Golder Associates, Inc. Golder 2019. Annual Inspection Report – Great River Energy – Coal Creek Station – Southeast Section 16 CCR Landfill. January 2019.

Great River Energy – Coal Creek Station. GRE 2003. Permit Modification Document, Permit No. SP-033. Original Permit Modification submitted September 30, 2003. Revised Permit Modification submitted to NDDH on July 8, 2004.

Great River Energy – Coal Creek Station. GRE 2012. Permit Modification Document, Permit No. SP-033. Original Permit Modification dated December 12, 2012.

Great River Energy – Coal Creek Station. GRE 2015. Permit Modification Document, Permit No. SP-033. Original Permit Modification dated February, 2015.

Figures

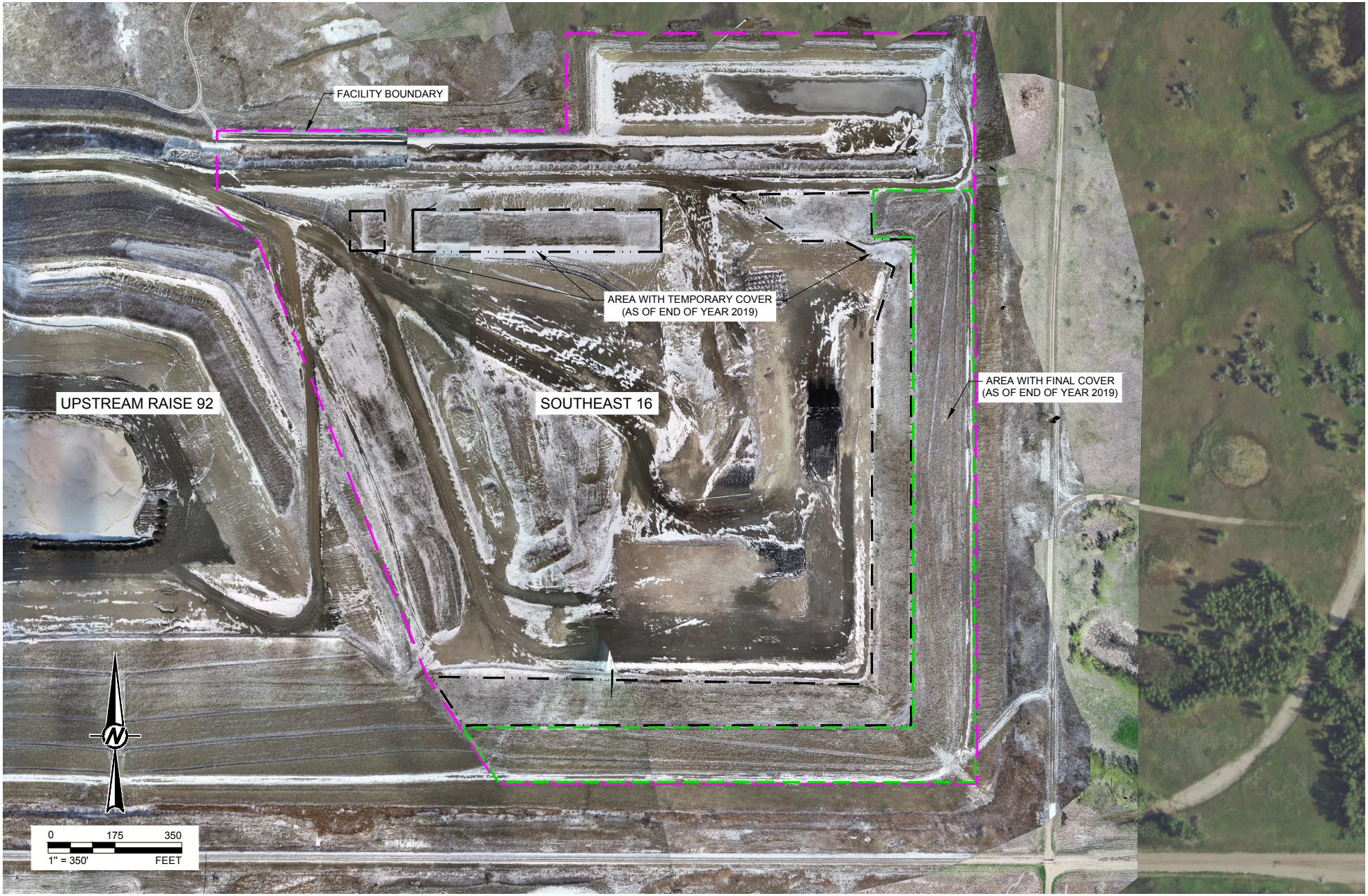
GOLDER

NOTE(S)

1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURE AERIAL IMAGERY PROGRAM, TAKEN IN 2018.

GREAT RIVER ENERGY - COAL CREEK STATION
2019 ANNUAL CCR FACILITY INSPECTION REPORT
SITE OVERVIEW

FIGURE 1



GOLDER

REFERENCE(S)

1. AERIAL IMAGE COMPILED FROM GREAT RIVER ENERGY PHOTOGRAPHS TAKEN BETWEEN 2018 AND 2019.

GREAT RIVER ENERGY - COAL CREEK STATION
2019 ANNUAL CCR FACILITY INSPECTION REPORT
SOUTHEAST 16 - SITE OVERVIEW

FIGURE 2

APPENDIX A

Selected Construction Drawings and Permit Drawings

N

LEGEND

- 1900 — EXISTING GROUND CONTOUR
- EXISTING EDGE OF WATER
- 1900 — PROPOSED BASE GRADE CONTOUR
- 3:1 — PROPOSED SLOPE RATIO
- 4% — PROPOSED SLOPE
- 1876 — PROPOSED SPOT ELEVATION
- TOP OF BERM

NOTES:

1. SITE LOCATION: SECTION 16, T45N, R82W, MC LEAN COUNTY, NORTH DAKOTA.
2. TOPOGRAPHIC MAP PREPARED FROM AERIAL SURVEY BY KBM, INC., GRAND FORKS, NORTH DAKOTA. DATE OF PHOTOGRAPHY - SEPTEMBER 30, 1987.
3. ELEVATIONS BASED ON MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS TWO FEET.
4. HORIZONTAL DATUM BASED ON NORTH DAKOTA STATE PLANE COORDINATE SYSTEM AS FOLLOWS:

   SITE GRID N = N STATE PLANE COORD MINUS 150,000
   SITE GRID E = E STATE PLANE COORD MINUS 1,830,000

5. THIS DRAWING SHOWS CONTOURS DEPICTING THE BASE GRADES (TOP OF CLAY LINER).

WEST PORTION OF E.A.P

OWNER TO PLACE AN INTERIM COVER OF A MINIMUM OF 6" OF COMPACTED SELECT MATERIAL OVER EXISTING RESIDUE. OWNER TO PERIODICALLY COLLECT SURFACE WATER RUNOFF, AS REQUIRED, FOR DISPOSAL IN AN ACCEPTABLE MANNER.

SECTION MANAGER		
PROJECT COORD.		
DESIGN COORD.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
ENGINEERING REVIEW		
SECTION MANAGER		
HYDRO.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
HYDROGEOLOGIC REVIEW		
PROJECT REVIEW		
6		
5		
4		
3		
2		
1		
NO.	BY:	DATE
DESCRIPTION		
REVISIONS		

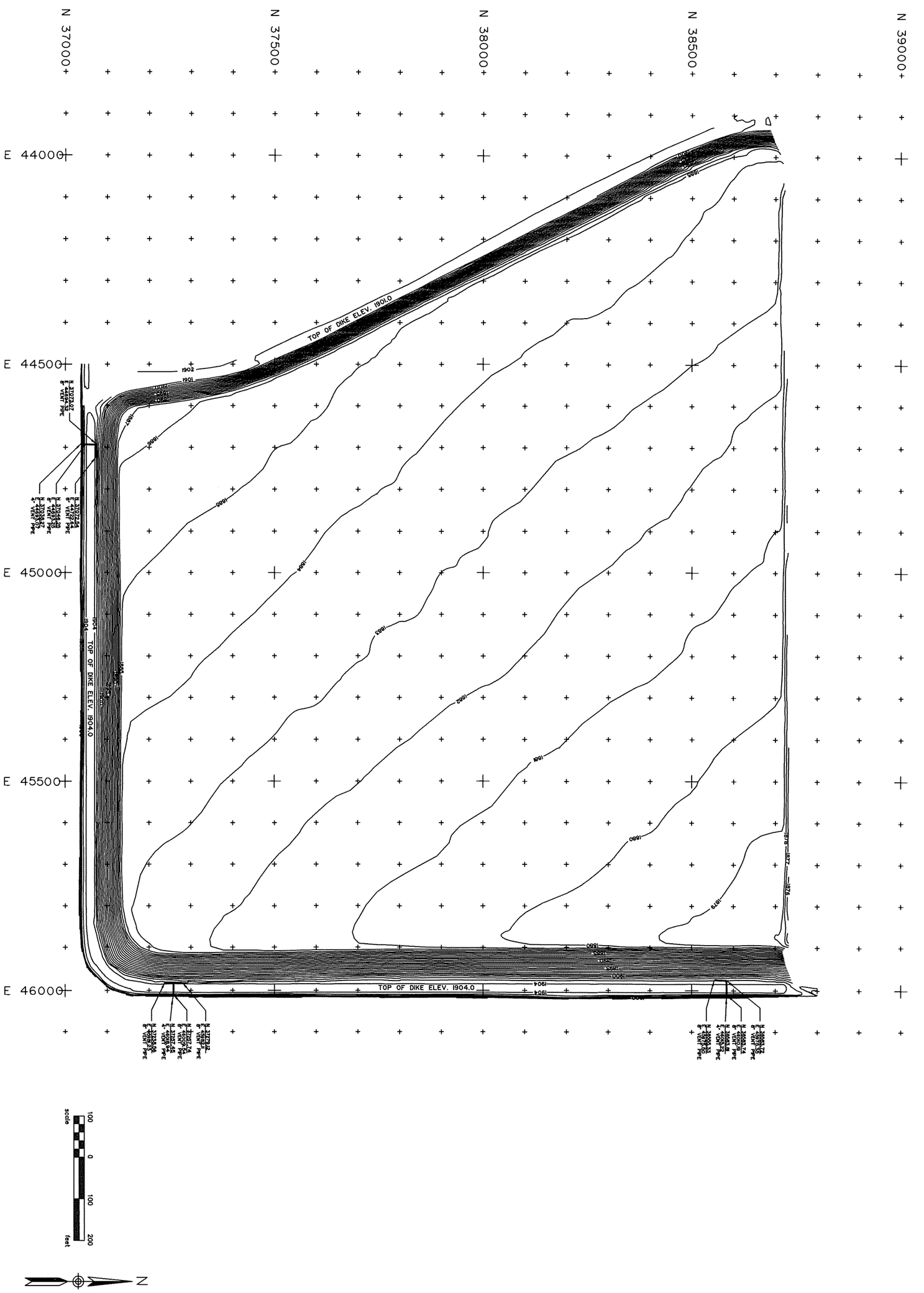
PLAN OF OPERATION FOR THE
COAL CREEK STATION
EAST ASH POND DISPOSAL AREA
MC LEAN COUNTY, NORTH DAKOTA

BASE GRADES

Foth & Van Dyke
Geoscience and Environmental Management Division
P.O. Box 1802
Green Bay, WI 54307-1802
(414) 497-2500

DRAWN BY	MRS
DATE	DECEMBER, 1988
BOOK NO	
JOB NO.	87C61
FILE NO	
SURVEYED BY	
SCALE	1" = 200'

DRAWING NO.
A-4



SHEET NO. 4

interstate engineering, inc.

Engineering – Surveying – Planning

COOPERATIVE POWER ASSOCIATION
UNDERWOOD, NORTH DAKOTA

SECTION 16 FINAL CONTOURS
WITH GAS VENT PIPING
SECTION 16, T145N, R82W.

Drawn By D.JONASSON | Project No. B94-23(01)

Checked By L.H.K | Date 10/01/94

Revision No.	Date	By	Description

LOCATION PLAN

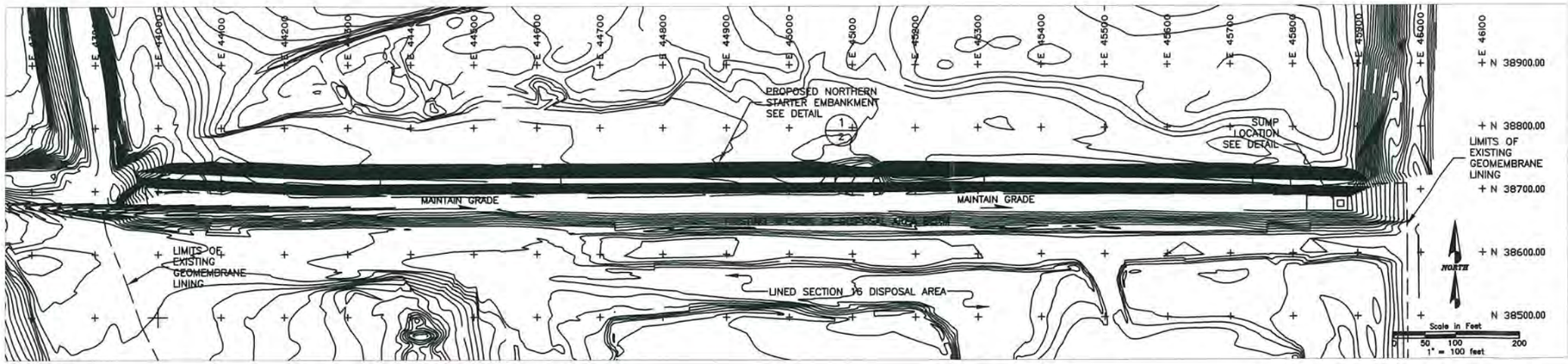
NOTES

1. TOPOGRAPHY AND AERIAL PHOTOGRAPH PROVIDED BY GREAT RIVER ENERGY (GRE) 9/2000.
2. GRE SHALL PROVIDE SOIL MATERIALS, GEOSYNTHETIC CLAY LINER (GCL), AND GEOMEMBRANE LINER.
3. EARTHWORKS CONTRACTOR RESPONSIBLE FOR BERM CONSTRUCTION, INCLUDING SOIL EXCAVATION, TRANSPORTATION, STOCKPILING AND PLACEMENT TO THE LINES AND GRADES ON THESE DRAWINGS; AND DEPLOYMENT OF GCL AND GEOMEMBRANE LINER; AND GCL SEAMING.
4. LINER SEAMING CONTRACTOR RESPONSIBLE FOR SEAMING GEOMEMBRANE PANELS.
5. GCL REQUIRED FOR CONSTRUCTION SHALL CONSIST OF A LAYER OF SODIUM BENTONITE BETWEEN WOVEN OR NON-WOVEN NEEDLE-PUNCHED GEOTEXTILES.
6. GEOMEMBRANE LINER REQUIRED FOR CONSTRUCTION SHALL BE 60-MIL SMOOTH HIGH-DENSITY POLYETHYLENE (HDPE).
7. SOIL MATERIALS USED FOR BERM CONSTRUCTION SHALL BE CLEAN, GRANULAR BOTTOM ASH FREE OF ORGANIC MATERIALS.
8. THE EXISTING LINER IN THE AREA SHOWN ON THE DRAWINGS SHALL BE CUT IF REQUIRED AND ROLLED AWAY FROM CONSTRUCTION ACTIVITIES TO PROTECT IT FROM DAMAGE.
9. NATURAL GROUND WITHIN THE LIMITS OF BERM CONSTRUCTION SHALL BE STRIPPED OF TOPSOIL, AND SCARIFIED IN PREPARATION FOR PLACEMENT OF SOIL CONSTRUCTION MATERIALS.
10. SOIL MATERIALS SHALL BE PLACED IN MAXIMUM 12-INCH THICK HORIZONTAL LIFTS AND COMPACTED USING METHODS APPROVED BY THE OWNERS REPRESENTIVE.
11. PORTIONS OF THE BERM TO BE COVERED BY GCL AND GEOMEMBRANE LINER SHALL BE SMOOTH-DRUM ROLLED TO PROVIDE A FLAT SURFACE.
12. OVERSIZED SOIL MATERIALS LOCATED WITHIN PORTIONS OF THE BERM THAT WILL BE COVERED WITH GCL AND GEOMEMBRANE SHALL BE REMOVED AS DETERMINED BY THE OWNERS REPRESENTIVE.
13. GEOSYNTHETICS SHALL BE DEPLOYED FROM EAST TO WEST TO PROVIDE OVERLAP IN THE DOWNSTREAM DIRECTION.
14. GCL SHALL BE DEPLOYED USING MANUFACTURER-RECOMMENDED METHODS, AVOIDING UNNECESSARY FOLDS OR IRREGULARITIES.
15. GCL PANEL OVERLAP SHALL BE ACCORDING TO THE MANFUCTURES RECOMMENDATIONS.
16. GEOMEMBRANE LINER SHALL BE DEPLOYED USING MANUFACTURER-RECOMMENDED METHODS, AVOIDING UNNECESSARY FOLDS OR IRREGULARITIES.
17. GEOMEMBRANE OVERLAP SHALL BE ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS AND COORDINATED WITH THE SEAMING CONTRACTOR.
18. GEOMEMBRANE SHALL BE TEMPORARILY ANCHORED USING SANDBAGS FILLED WITH BOTTOM ASH.
19. THE EXISTING GEOMEMBRANE SHALL BE RE-DEPLOYED AND EDGE CLEANED (TOP AND BOTTOM) AND DRIED IN PREPARATION FOR SEAMING TO THE NEW LINER, AS DIRECTED BY THE OWNER.
20. THE GEOMEMBRANE LINER PANELS SHALL BE SEAMED USING FUSION OR EXTRUSION WELDING PROCESSES.
21. GEOMEMBRANE LINER CQA SHALL CONSIST OF DESTRUCTIVE AND NON-DESTRUCTIVE TESTING.
22. FUSION SEAMS SHALL BE TESTED USING AIR CHANNEL TESTS WITH A PRESSURE OF 30 PSI FOR 5 MINUTES. PASSING TESTS SHALL CONSTITUTE A PRESSURE DROP OF LESS THAN 3 PSI WITHIN 5 MINUTES.
23. EXTRUSION WELDS SHALL BE TESTED USING A VACUUM BOX AND AN APPLIED PRESSURE OF 5 PSI FOR 10 SECONDS.
24. DESTRUCTIVE TESTING SHALL BE CONDUCTED FOR SHEAR AND PEEL.
25. LINER CQA SHALL BE OBSERVED AND DOCUMENTED BY THE OWNER'S REPRESENTATIVE.

ESTIMATED MATERIAL QUANTITIES

MATERIAL	UNIT	QUANTITY
BOTTOM ASH*	YD^3	15,000
60mil SMOOTH GEOMEMBRANE LINER	FT^2	50,000
GEOSYNTHETIC CLAY LINER (GCL)	YD^2	6,400

* DENOTES IN-PLACE VOLUME



SECTION 16 NORTHERN STARTER EMBANKMENT PLAN

LEGEND

- EXISTING GROUND CONTOURS
- PROPOSED BERM CONTOURS
- EXISTING LIMITS OF SECTION 16 GEOMEMBRANE LINER

IF THE ABOVE BAR DOES NOT SCALE 1 INCH THE DRAWING SCALE IS ALTERED

CLIENT DATE

ENGINEER'S STAMP

NO.	REVISION DESCRIPTION (THIS DRAWING IS NOT APPROVED UNLESS LAST REVISION IS HAND WRITTEN)	DATE	BY	CHKD	AP'VD
3	ISSUED FOR CONSTRUCTION				
2	ISSUED WITH DESIGN REPORT	10/23/00			
1	ISSUED FOR CLIENT REVIEW	10/10/00			

PRINT ISSUE RECORD

CLIENT/PROJECT: GREAT RIVER ENERGY
COAL CREEK STATION

TITLE: SECTION 16 ASH DISPOSAL FACILITY
NORTHERN STARTER EMBANKMENT PLAN

Denver, Colorado

Golder Associates

DRAWN	DBS	DATE	OCT. 2000
CHECKED	GE	SCALE	AS SHOWN
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APPROVED	RRJ	DWG. NO.	C002
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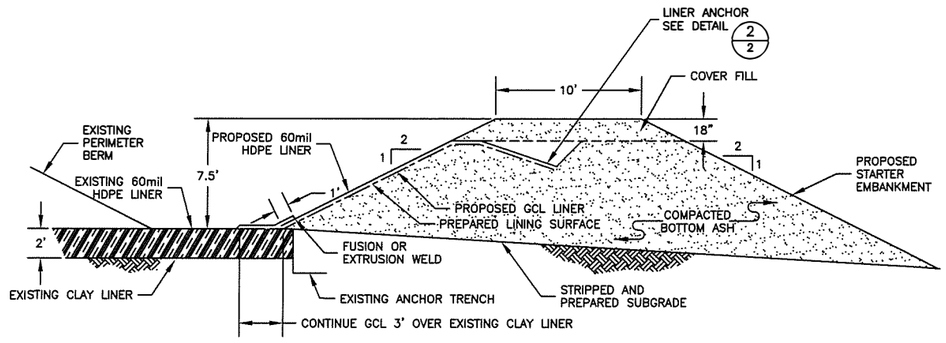

1/2 PROPOSED STARTER EMBANKMENT

Scale in Feet
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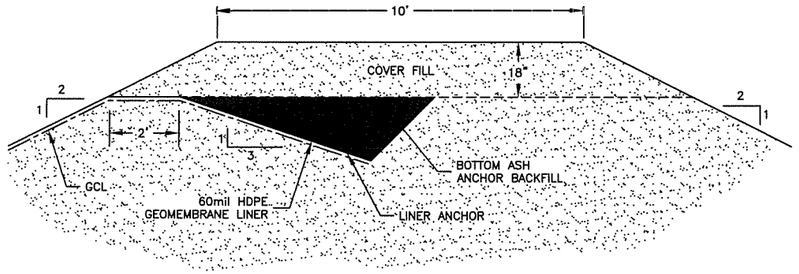
1" = 10 feet



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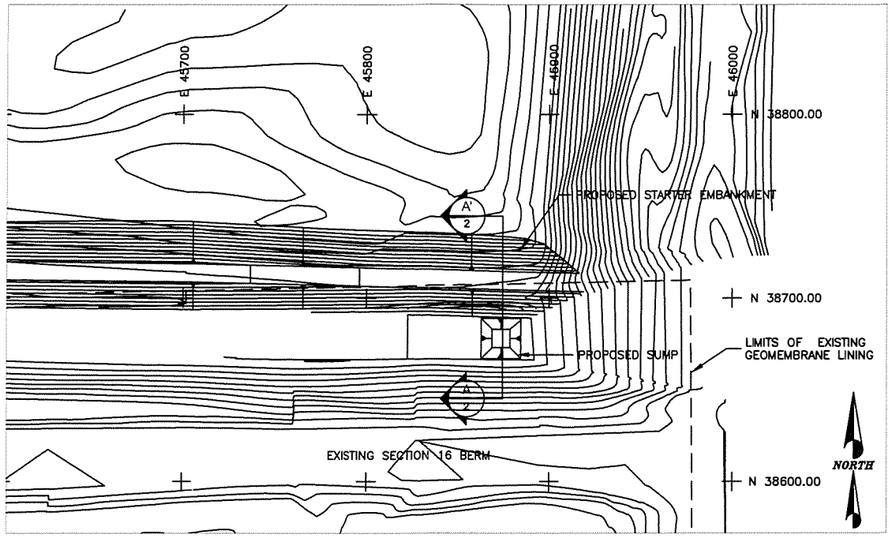

SUMP PLAN

Scale in Feet
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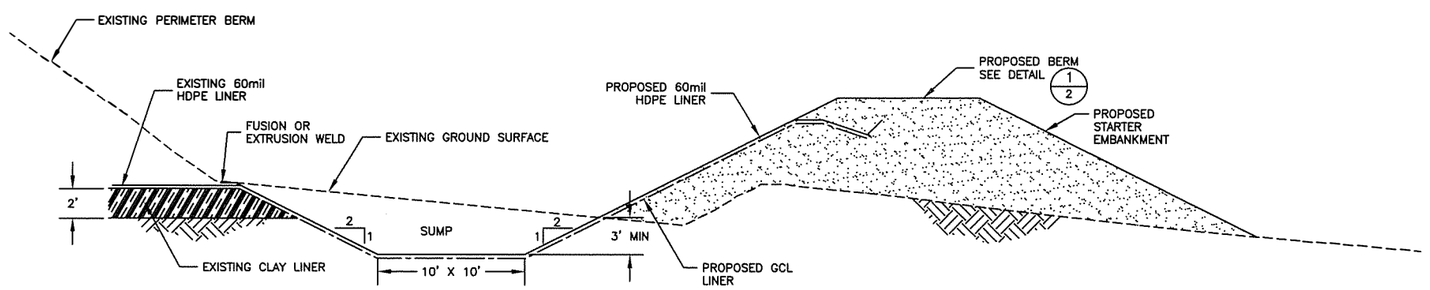
1" = 40 feet



A/2 SECTION A–A'

Scale in Feet
0 2.5 5 10
1" = 5 feet

IF THE ABOVE BAR DOES NOT SCALE 1 INCH THE DRAWING SCALE IS ALTERED

CLIENT DATE

ENGINEER'S STAMP

NO.	REVISION DESCRIPTION (THIS DRAWING IS NOT APPROVED UNLESS LAST REVISION IS HAND WRITTEN)	DATE	BY	CHKD	AP'VD
6	ISSUED FOR CONSTRUCTION				
5	ISSUED WITH DESIGN REPORT	10/23/00			
4	ISSUED FOR CLIENT REVIEW	10/10/00			
3					
2					
1					

NO.	REVISION DESCRIPTION (THIS DRAWING IS NOT APPROVED UNLESS LAST REVISION IS HAND WRITTEN)	DATE	BY	CHKD	AP'VD
6					
5					
4					
3					
2					
1					

PRINT ISSUE RECORD

CLIENT/PROJECT
GREAT RIVER ENERGY
COAL CREEK STATION

TITLE
SECTION 16 ASH DISPOSAL FACILITY
NORTHERN STARTER EMBANKMENT - DETAILS

Golder Associates
Denver, Colorado

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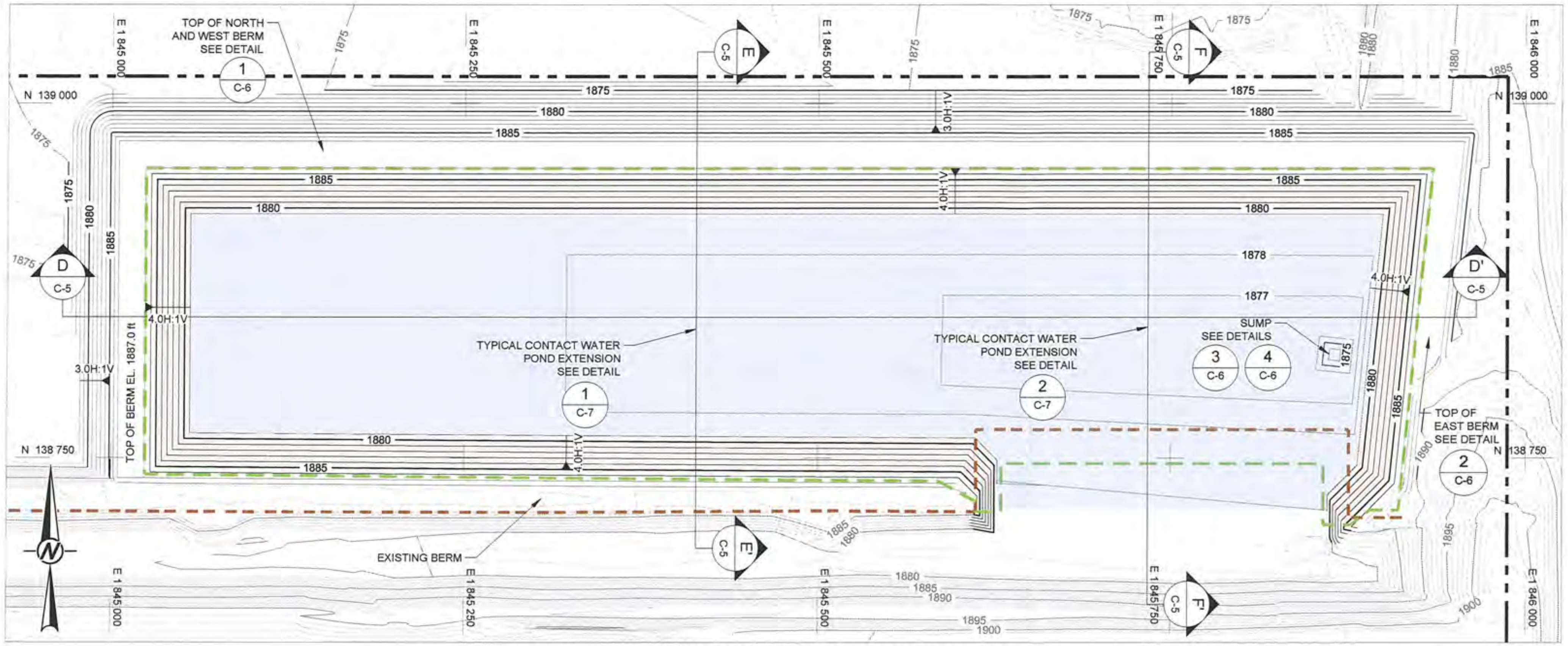
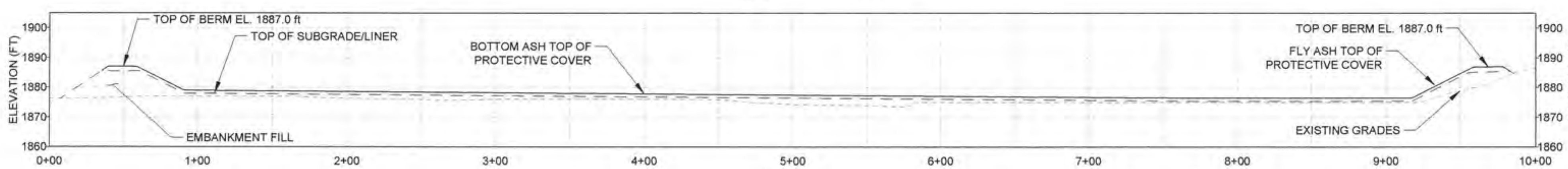


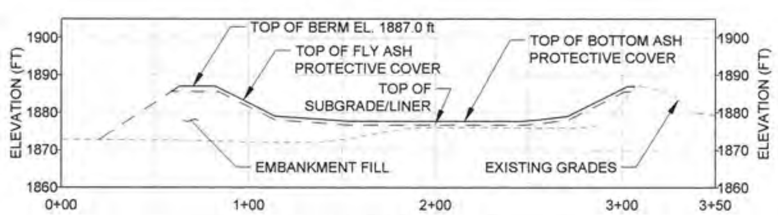
1 C-5 PLAN VIEW - TOP OF PROTECTIVE COVER

0 50 100 SCALE FEET



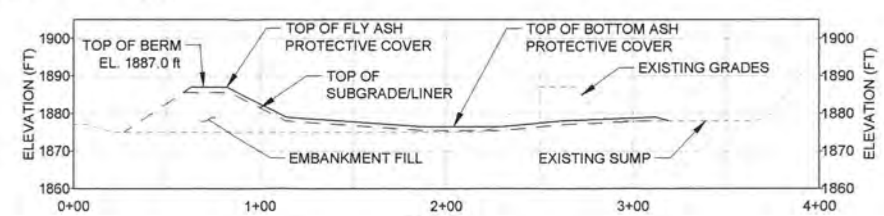
2X VERT. EXAGGERATION D C-5 SECTION D - D'

0 50 100 SCALE FEET



2X VERT. EXAGGERATION E C-5 SECTION E - E'

0 50 100 SCALE FEET



2X VERT. EXAGGERATION F C-5 SECTION F - F'

0 50 100 SCALE FEET

LEGEND

- EXISTING GROUND TOPOGRAPHY (SEE REFERENCE 2)
- TOP OF PROTECTIVE COVER OR EMBANKMENT (NOTE 2)
- FLY ASH PROTECTIVE COVER (NOTE 5)
- BOTTOM ASH PROTECTIVE COVER (NOTE 5)
- PERMITTED LIMIT OF CCR FACILITY (NOTE 1)
- APPROXIMATE EXISTING LINER BOUNDARY
- APPROXIMATE NEW LINER BOUNDARY

NOTES

1. THE PERMIT BOUNDARY IS APPROXIMATE.
2. PROPOSED GRADES REPRESENT THE TOP OF PROTECTIVE COVER AND EMBANKMENT.
3. FOUR MONITORING WELLS ARE LOCATED IN A LINE ORIENTED EAST-WEST APPROXIMATELY 200 FEET NORTH OF THE NORTH BOUNDARY OF THE WORK AREA AND A PIEZOMETER IS LOCATED APPROXIMATELY 40 FEET WEST OF THE WORK AREA. EXERCISE CAUTION WHEN WORKING AROUND OR NEAR THE MONITORING WELLS AND PIEZOMETER. CONTRACTOR IS RESPONSIBLE FOR PROTECTING THESE WELLS/PIEZOMETERS DURING CONSTRUCTION ACTIVITIES.
4. A MINIMUM OF 12 INCHES OF PROTECTIVE COVER SHALL BE PLACED OVER THE NEW AND EXISTING GEOMEMBRANE, AS DIRECTED BY OWNER'S REPRESENTATIVE.
5. BOTTOM ASH SHALL BE USED ON THE FLOOR AS PROTECTIVE COVER AND FLY ASH SHALL BE USED ON THE INTERIOR SLOPES AS PROTECTIVE COVER.

REFERENCE(S)

1. SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
2. EXISTING GROUND TOPOGRAPHY WAS PROVIDED BY GREAT RIVER ENERGY. THE SURVEYS WERE PERFORMED BETWEEN 1996 AND 2011.
3. COORDINATES ARE BASED ON THE PLANT GRID SYSTEM.
4. THE CONTOUR INTERVAL IS ONE FOOT.
5. ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-06-24	ISSUED FOR CONSTRUCTION	AMS	AMS	RFS	TJS
A	2015-06-02	ISSUED FOR BID	AMS	AMS	RFS	TJS

SEAL: REGISTERED PROFESSIONAL ENGINEER TODD J. STONG PE-6144 NORTH DAKOTA

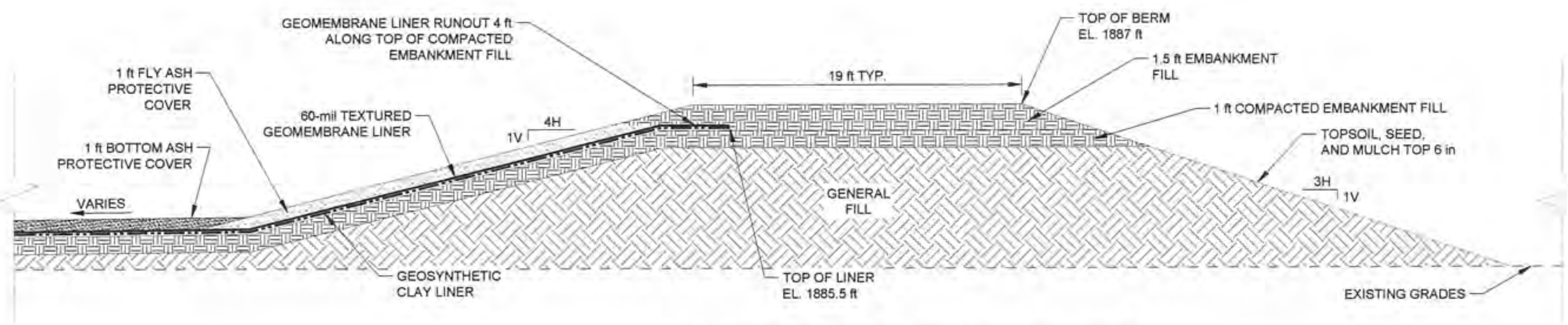
CLIENT: GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT: GOLDER ASSOCIATES, INC.
44 UNION BLVD, SUITE 300
LAKEWOOD, COLORADO
USA
[+1] (303) 980-0540
www.golder.com

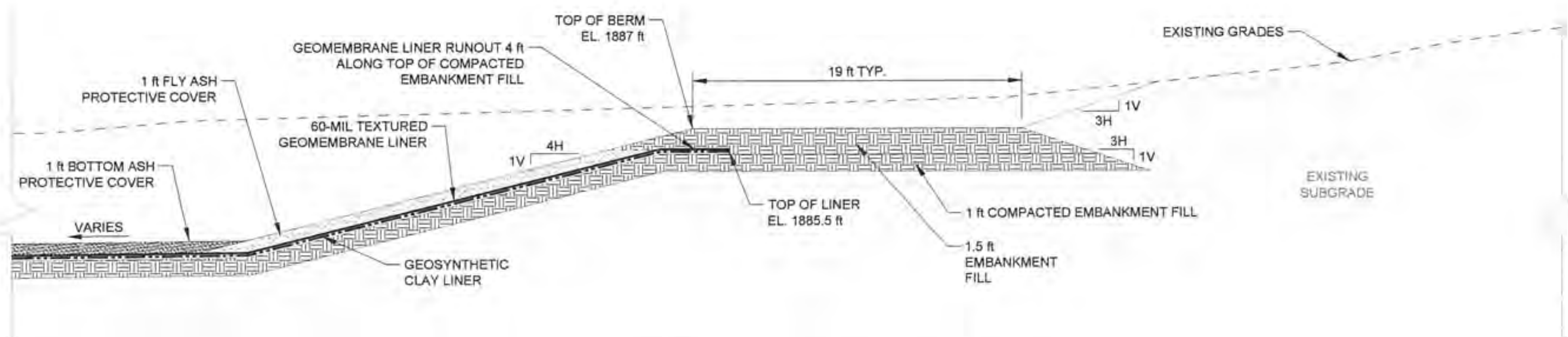
PROJECT: 2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK C
SOUTHEAST SECTION 16 CONTACT WATER POND

TITLE: TOP OF PROTECTIVE COVER

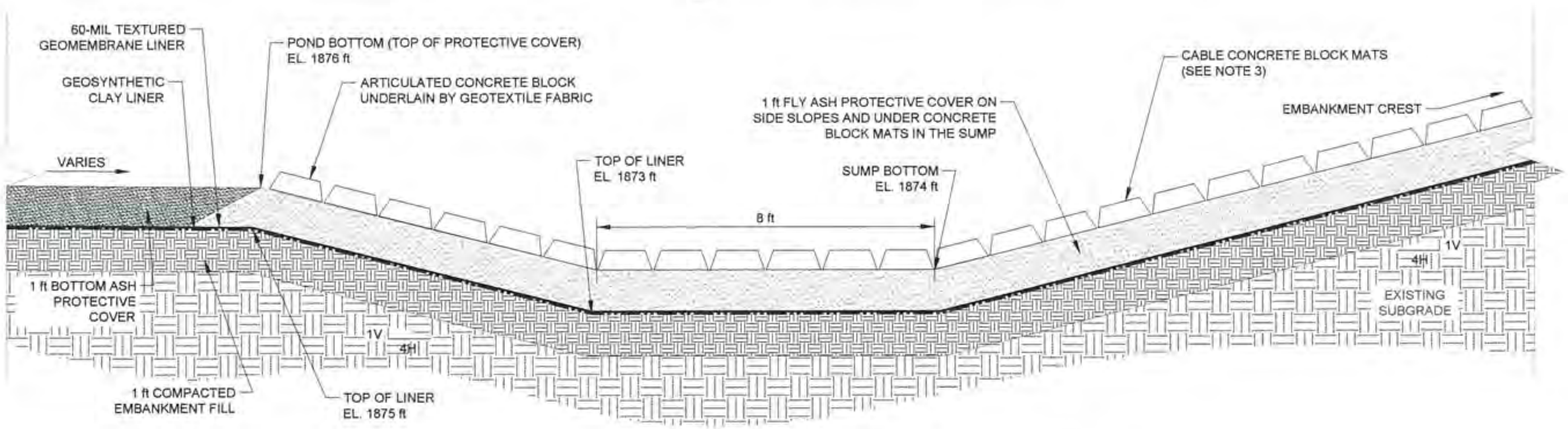
PROJECT No	Rev.	C-5 of C-7	DRAWING
1523661	0		C-5



N.T.S. 1 C-6 TYPICAL BERM DETAIL (NORTH AND WEST BERMS)



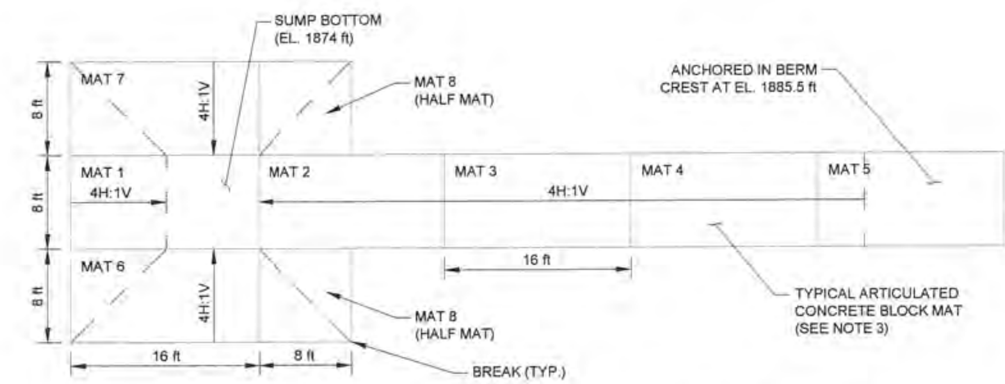
N.T.S. 2 C-6 TYPICAL BERM DETAIL (EAST BERM)



N.T.S. 3 C-6 POND SUMP DETAIL (PROFILE VIEW)

NOTES

1. PRIOR TO PLACEMENT OF GENERAL FILL OR EMBANKMENT FILL, UNSUITABLE MATERIAL TO BE REMOVED AND PLACED NORTH OF THE WORK AREA. AREAS AT GRADE SHALL BE SUBCUT TO ALLOW FOR 1-FOOT OF EMBANKMENT PLACEMENT.
2. A MINIMUM OF 12 INCHES OF PROTECTIVE COVER SHALL BE PLACED OVER THE NEW AND EXISTING GEOMEMBRANE, AS DIRECTED BY OWNER'S REPRESENTATIVE.
3. CLOSED CELL CABLE CONCRETE BLOCK MATS SHALL BE PROVIDED IN 8-FOOT BY 16-FOOT SECTIONS (OR APPROVED ALTERNATIVE) TO BE PLACED IN THE POND SUMP BOTTOM AND SLOPES AND UP THE UPSTREAM SLOPE EAST OF THE SUMP TO THE BERM CREST. MATS SHALL BE UNDERLAIN BY GEOTEXTILE FABRIC, 12 INCHES OF PROTECTIVE COVER, AND THE LINER SYSTEM.



N.T.S. 4 C-6 POND SUMP ACB PLACEMENT DETAIL (PLAN VIEW)

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-06-24	ISSUED FOR CONSTRUCTION	AMS	AMS	RFS	TJS
A	2015-06-02	ISSUED FOR BID	AMS	AMS	RFS	TJS

SEAL
REGISTERED PROFESSIONAL ENGINEER TODD J. STONG PE-6144 NORTH DAKOTA 6/21/2015

CLIENT
GREAT RIVER ENERGY
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT
Golder Associates
GOLDER ASSOCIATES, INC.
44 UNION BLVD, SUITE 300
LAKEWOOD, COLORADO
USA
[+1] (303) 980-0540
www.golder.com

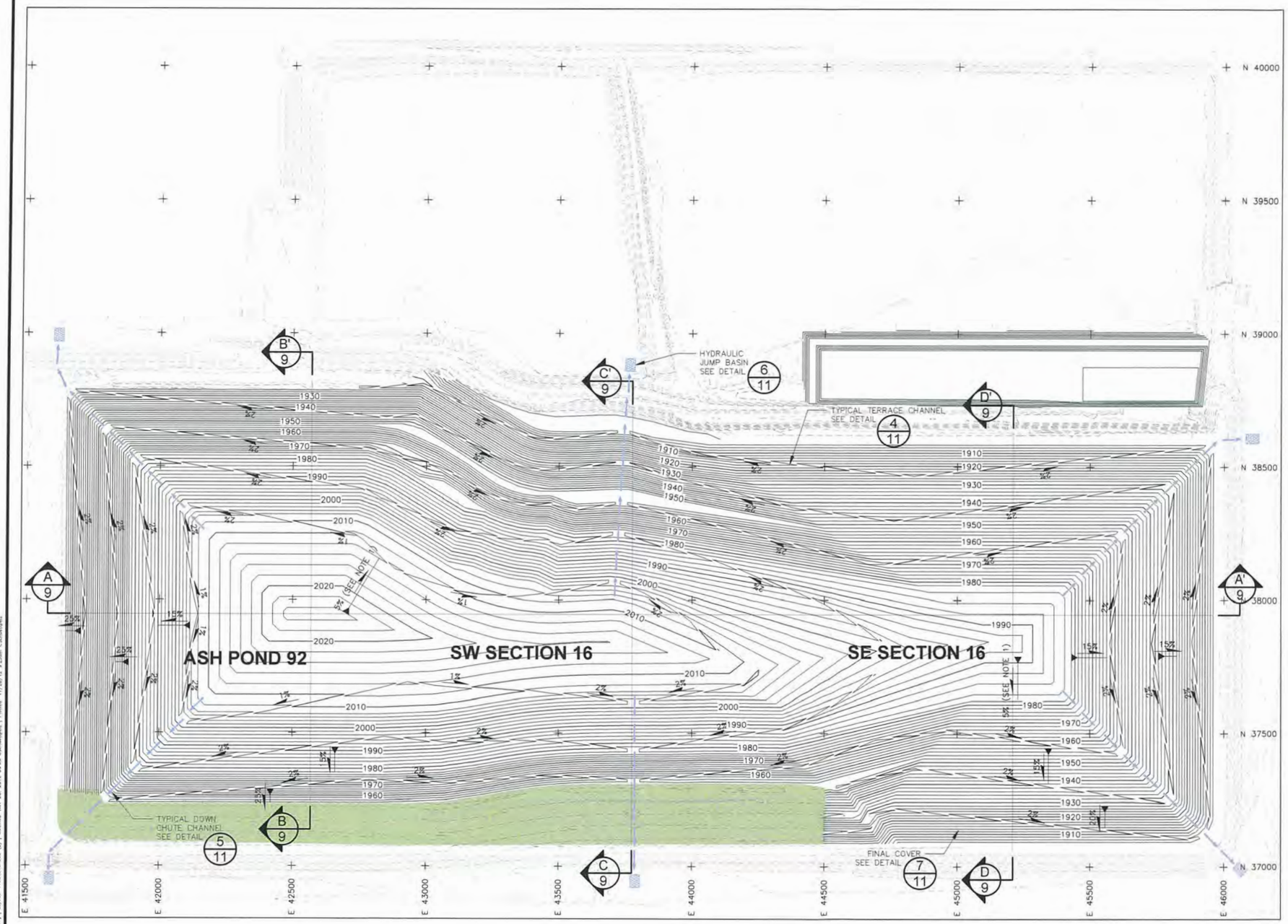
PROJECT
2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK C
SOUTHEAST SECTION 16 CONTACT WATER POND

TITLE
DETAILS 1 OF 2

PROJECT No. 1523661 | Rev. 0 | C-6 of C-7 | DRAWING C-6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: \\Denver\golder gds\acad\15\1523661 - GRE\PRODUCTION_C - SOUTHEAST SECTION 16 CONTACT WATER POND | File Name: 1523661C006.dwg



LEGEND

- EXISTING GROUND TOPOGRAPHY
- 1980 PROPOSED TOP OF COVER TOPOGRAPHY
- FINAL COVER PLACED
- DOWNCHUTE/OUTLET CHANNEL

NOTES

1. TOP OF COVER GRADES OF THE CROWN OF THE FACILITY ARE SHOWN AT 5%, BUT MAY BE CONSTRUCTED BETWEEN 3% AND 5%.
2. SEE THE SURFACE WATER ENGINEERING WORKSHEET FOR FURTHER DETAILS CONCERNING THE SURFACE WATER CONTROL PLAN.

REFERENCES

1. SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
2. EXISTING GROUND TOPOGRAPHY PROVIDED BY GREAT RIVER ENERGY. PERFORMED BETWEEN 1996 AND 2011.
3. COORDINATES BASED ON PLANT GRID SYSTEM.
4. CONTOUR INTERVAL IS TWO FEET.
5. ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

200 0 200
SCALE FEET

DRAFT
FOR CLIENT REVIEW

ENGINEER'S STAMP

ORIGINAL DRAWING STAMPED BY TODD STONG, REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA (PE #6144), IS ON FILE AT GOLDER ASSOCIATES, LAKEWOOD, COLORADO, OFFICE.

NO.	REVISION DESCRIPTION	DATE	DESIGN	CADD	CHECK	REVIEW
B	ISSUED FOR PERMIT MODIFICATION	11/30/12	CCS	CCS	TJS	RRJ
A	ISSUED FOR CLIENT REVIEW	10/24/12	CCS	CCS	TJS	RRJ

PROJECT
GREAT RIVER ENERGY
COAL CREEK STATION
PERMIT NO. SP-033 PERMIT MODIFICATION

TITLE
FINAL COVER GRADES AND SURFACE WATER PLAN

Golder Associates

GREAT RIVER ENERGY

FILE No. 11381519A009
PROJECT No. 113-81519

8

APPENDIX B

Visual Observations Checklist

INSPECTION CHECKLIST

GOLDER

Facility Name: Southeast Section 16 Landfill
Owner and Address: Great River Energy – Coal Creek Station
Purpose of Facility: CCR Storage and Disposal
Legal: Section 16 **Township:** 145N **Range:** 82W
County: Mercer
Inspected By: Craig Schuettpelz, Paul Schlicht **Inspection Date:** September 24, 2019
Weather: Partly cloudy, 70°F, no precipitation

ITEM	Y	N	N/A	REMARKS
1. Contact Water Controls				
a. Water level in contact water control area	X			Depth: Maximum 3 ft.
b. Sump & pump in good condition	X			
c. Containment controls working	X			
d. Ponding water outside of control area		X		
e. Erosion protection in control area	X			Fly ash protective cover and ACB at pump suction, some erosion of bottom ash protective cover in the southeast corner of the contact water control area.
2. CCR Placement – Downstream Slope (no cover)				
a. Significant erosion	X			Erosion of fly ash on south downstream slope (sediment collected in contact water ditch) and minor erosion of fly ash on the north downstream slope.
b. Cracking/settlement		X		
c. Seepage		X		
3. CCR Placement – Downstream Slope (with cover)				
a. Erosion/liner exposed		X		
b. Rodent burrows		X		Small burrows.
c. Vegetation		X		Portions of final covered slopes require re-seeding and continued vegetation development.
d. Cracks/settlement/seepage/sloughing		X		
4. Perimeter Berm – Upstream slope				
a. Erosion (exposed liner)	X			Exposed liner on north berm, minor damage to geomembrane on upper portion of berm.
b. Vegetation		X		
c. Rodent burrows		X		
d. Seepage/sloughing/cracking/settlement		X		
5. Perimeter Berm - Crest				
a. Surfacing/Soil conditions	X			Gravel surfaced.
b. Comparable to design width	X			
c. Vegetation		X		
d. Rodent Burrows		X		
e. Exposed to heavy traffic		X		
f. Damage from vehicles/machinery	X			Minor rutting along south and east sides.
6. Perimeter Berm – Downstream Slope				
a. Erosion		X		
b. Vegetation	X			Grass.
c. Rodent burrows	X			Animal burrows on south side.
d. Seepage/sloughing/cracking/settlement		X		
7. Perimeter Berm – Toe				
a. Erosion		X		Grass, some woody vegetation near toe.
b. Vegetation	X			
c. Rodent burrows		X		
d. Seepage/sloughing/cracking/settlement		X		
e. Drainage conditions	X			

General Remarks: Generally good condition with limited maintenance required; such as protecting exposed liner, filling in animal burrows, repairing erosion of CCR slopes, maintaining gravel roads, and re-seeding areas where final cover vegetation is sparse.

Name of Engineer (Engineer Firm):
Craig Schuettpelz, PE (Golder Associates, Inc.)
Date: 9/24/19
Signature:

APPENDIX C

Photographs

Path: \\Denver\acad\GREAT RIVER ENERGY\COAL CREEK\99_PROJECTS\19115185\Annual Inspection\ | File Name: PhotoLog - SE16 Locations.dwg

LEGEND

1 PHOTOGRAPH ID AND LOCATION

NOTE(S)

1. FOREGROUND AERIAL IMAGES FROM GREAT RIVER ENERGY PHOTOGRAPHS TAKEN IN 2019.
2. BACKGROUND AERIAL IMAGE FROM THE UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURE AERIAL IMAGERY PROGRAM, TAKEN IN 2018.

GOLDER

GREAT RIVER ENERGY - COAL CREEK STATION
2019 ANNUAL CCR FACILITY INSPECTION REPORT
SOUTHEAST 16 - PHOTOGRAPH LOCATIONS

FIGURE 1

Southeast 16

Photograph 1 (East downstream slope)
East downstream slope, well-vegetated (PDS SE16 (1).JPG)

Photograph 2 (East berm crest access road)
Standing water in access road on the east berm crest (PDS SE16 (6).JPG)

Southeast 16

Photograph 3 (South berm crest access road)
Standing water in access road on the south berm crest (DSCF0506.JPG)

Photograph 4 (Southeast CCR downstream slope)
Articulated Concrete Block (ACB) downchute on southeast corner, well-vegetated (PDS SE16 (10).JPG)

Southeast 16

Photograph 5 (South CCR downstream slope (covered))
Sparse vegetation on final cover of downstream slope side of terrace berm (PDS SE16 (13).JPG)

Photograph 6 (Southeast corner of contact water collection area)
Contact water collection area (CWCA) and channel (DSCF0469.JPG)

Southeast 16

Photograph 7 (CWCA north downstream slope)
North berm downstream slope and toe, typical (DSCF0471.JPG)

Photograph 8 (CWCA north berm crest)
Contact water collection area crest (looking east) (DSCF0475.JPG)

Southeast 16

Photograph 9 (North CWCA channel)
Wrinkle in exposed geomembrane liner on upstream slope (DSCF0479.JPG)

Photograph 10 (North CWCA channel)
Exposed geomembrane on upstream slope of CWCA channel and damage from animals (DSCF0482.JPG)

Southeast 16

Photograph 11 (North CWCA channel)
Erosion of fly ash below culvert, Upstream Raise 92 area to CWCA channel (DSCF0485.JPG)

Photograph 12 (North CCR downstream slope)
Temporary cover on north fly ash slope (DSCF0488.JPG)

Southeast 16

Photograph 13 (C&D area)
Minor erosion on interior slopes to historic C&D access area of Southeast 16 (DSCF0495.JPG)

Photograph 14 (Northeast CCR downstream slope)
Erosion rill in temporary cover on northeast CCR downstream slope (DSCF0499.JPG)

Southeast 16

Photograph 15 (C&D area)
Access road and deposition of C&D material within C&D area (DSCF0501.JPG)

Photograph 16 (CCR placement)
CCR material containment on west, south, and east sides of Southeast 16 (DSCF0502.JPG)

Southeast 16

Photograph 17 (South CCR downstream slope (no cover))
Erosion of fly ash on the south CCR downstream slope (DSCF0504.JPG)

Photograph 18 (South CCR downstream slope (covered))
South downstream slope final cover, minor sparse vegetation (DSCF0505.JPG)

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