



ANNUAL REPORT

ANNUAL INSPECTION REPORT

GREAT RIVER ENERGY – COAL CREEK STATION

Southeast Section 16 CCR Landfill



Submitted to: Great River Energy
Coal Creek Station
2875 Third Street SW
Underwood, North Dakota 58576

Submitted by: Golder Associates Inc.
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1772255



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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 21, 2017.

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 Coal Creek Station. 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. There is also a small construction and demolition (C&D) disposal area located within Southeast 16 that 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 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 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. Berm upstream slopes of the surrounding

embankments were designed with 3:1 slopes to bottom of landfill elevations between 1887 feet amsl and 1876 feet amsl. The berm 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 CCRs and C&D debris to the design grades. CCR disposal through November 2017 included approximately 15,000 cubic yards of material primarily deposited along the south and east sides to bring outside grades up to an approximate elevation of 1935 feet amsl.

2.5 Storage Capacity and Volumes

Based on annual placement estimates and survey placement estimates, the amount of CCR contained in the facility at the end of 2017 is estimated to be approximately 3,865,000 cubic yards.

2.6 Permits

Southeast 16 is currently permitted with the North Dakota Department of Health (NDDH) 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 2017 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.
- Minor erosion of a fly ash CCR downstream slope on the north side of the facility was noted.

2.8 Summary of Previous Inspections

The most recent annual professional engineer inspection of Southeast 16 was performed by Golder in October of 2016 (Golder 2017) and a summary of the observations of that inspection are as follows:

- Generally good vegetation and site maintenance.
- Minor erosion of downstream CCR slopes that is repaired by GRE.
- 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 2017 ANNUAL INSPECTION

On September 21, 2017, Craig Schuettepelz and Ryan Shedivy 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 2017 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.

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. Although exposed, no damage to the geomembrane liner was noted. It is recommended that the geomembrane be 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 noticed on the south and east crests due to recent rain 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. The north berm downstream slope west of the contact water collection area was constructed of bottom ash and only minimal vegetation exists on these slopes. Golder recommends that soil be placed on these slopes to allow for growth of

vegetation. 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 wetland 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.

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 some vegetation beginning to grow in 2017 (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 has 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 east slope 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 2017.

4.0 SUMMARY AND CONCLUSIONS

An annual inspection was performed for Southeast 16 at Coal Creek Station on September 21, 2017. 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 will perform the 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.

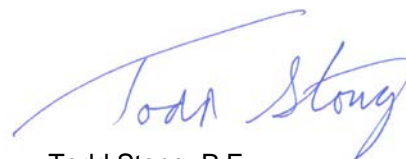
GOLDER ASSOCIATES INC.



Craig Schuettpelez, P.E.
Senior Project Engineer



Ryan Shedivy, P.E.
Project Engineer



Todd Stong, P.E.
Associate/Senior Consultant

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.

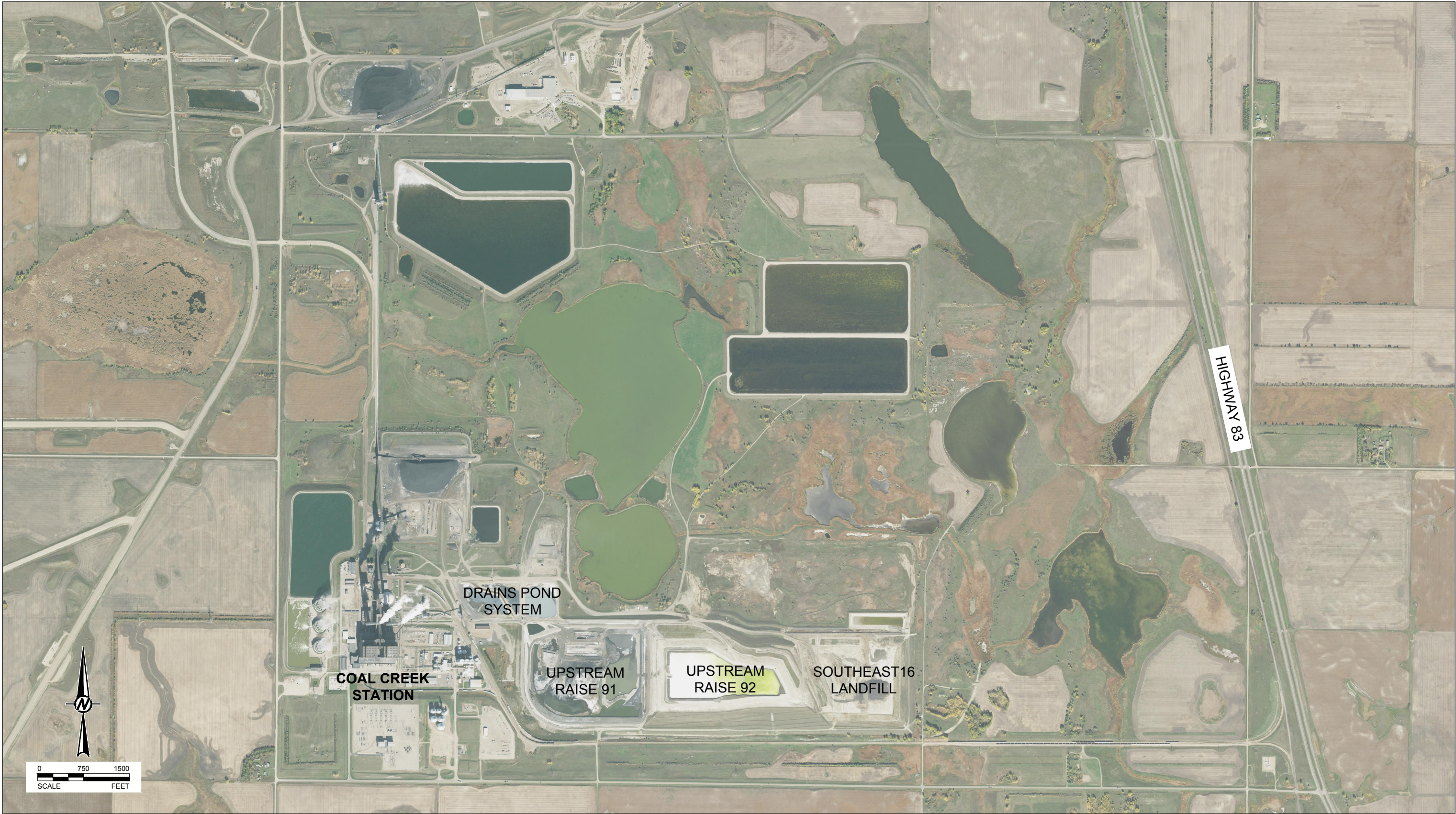
Golder Associates, Inc. Golder 2017. Annual Inspection Report – Great River Energy – Coal Creek Station – Southeast Section 16 Landfill. January 2017.

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



REFERENCES

- 1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AERIAL IMAGERY PROGRAM, PUBLISHED 2017.

CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT



YYYY-MM-DD	2017-12-12
DESIGNED	RFS
PREPARED	KAC
REVIEWED	CCS
APPROVED	TJS

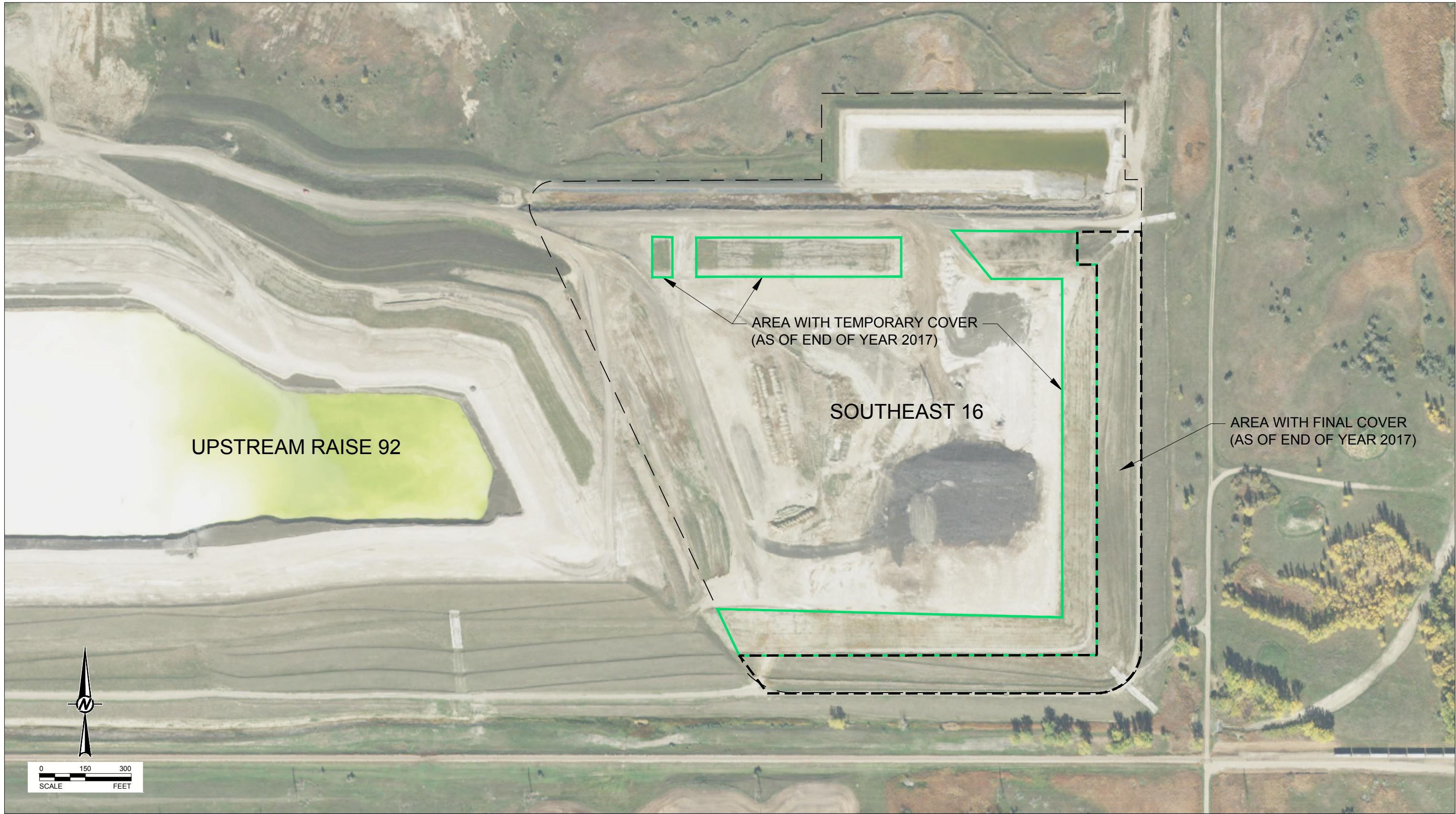
PROJECT
2017 ANNUAL INSPECTION REPORT

TITLE
COAL CREEK STATION SITE OVERVIEW

PROJECT NO.
1772255

REV.
A

FIGURE
1



REFERENCES

1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AERIAL IMAGERY PROGRAM, PUBLISHED IN 2017.

CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT



YYYY-MM-DD	2017-12-13
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PREPARED	KAC
REVIEWED	CCS
APPROVED	TJS

PROJECT
2017 ANNUAL INSPECTION REPORT

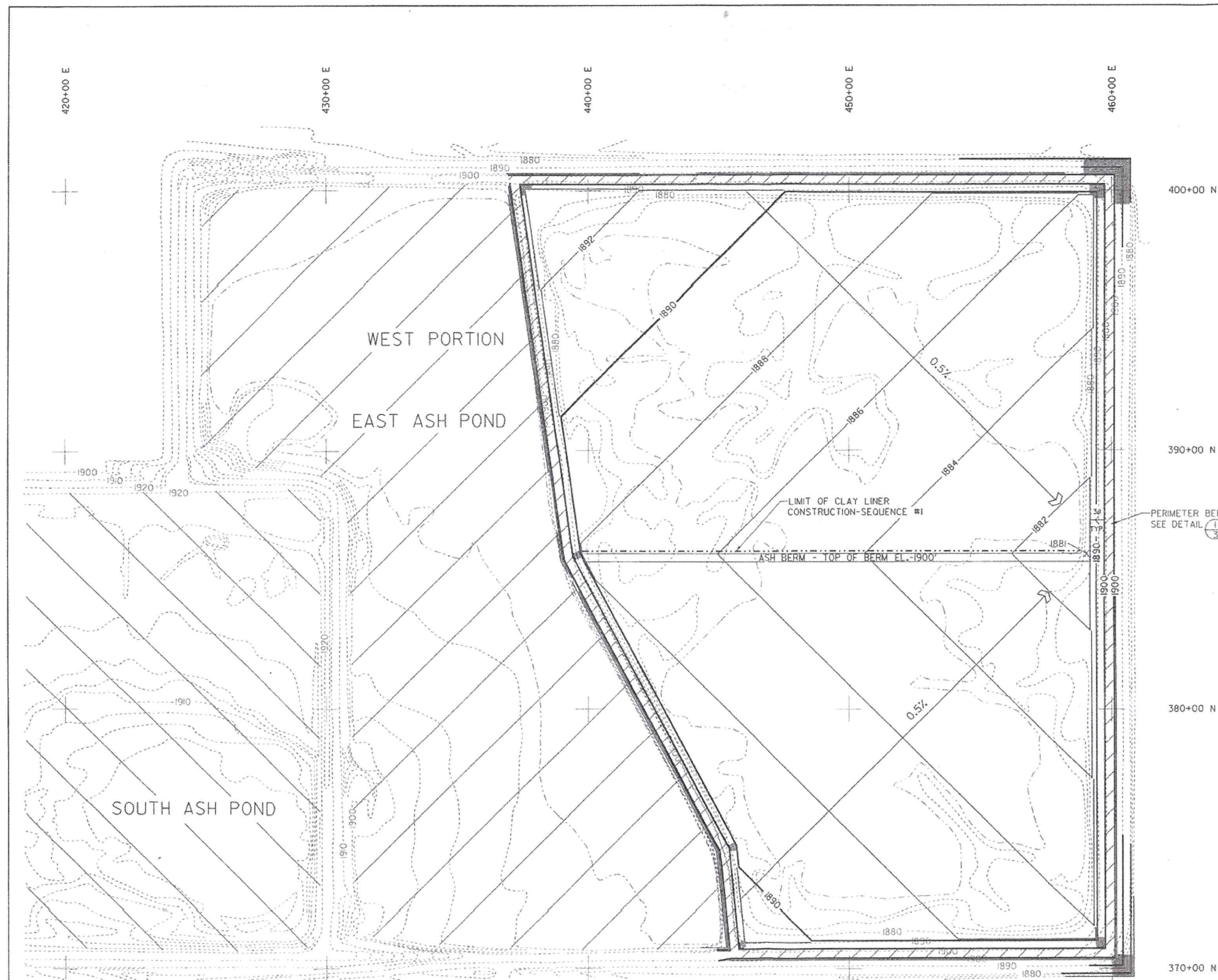
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SITE OVERVIEW**

PROJECT NO.
1772255

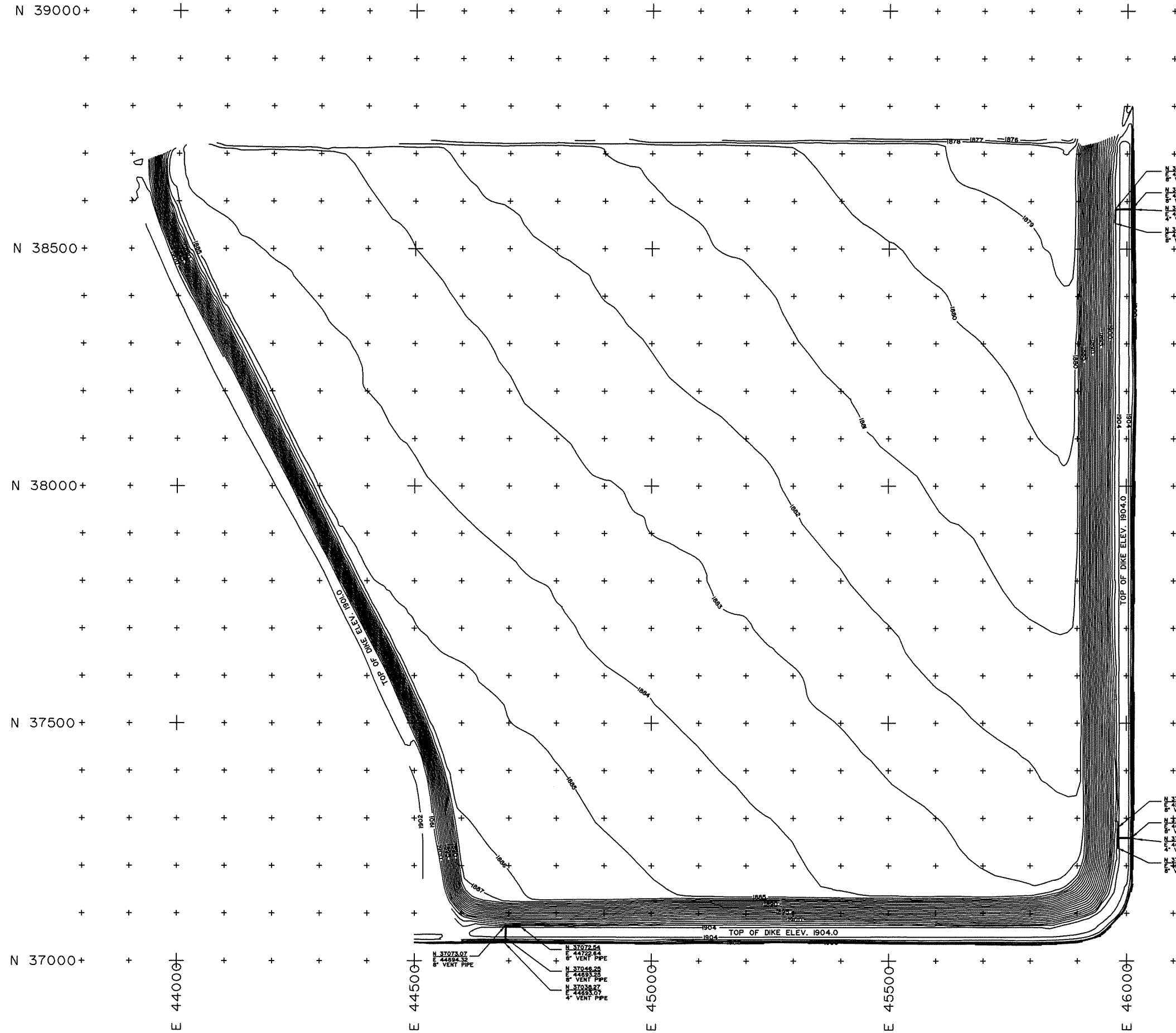
REV.
A

FIGURE
2

APPENDIX A
SELECTED CONSTRUCTION DRAWINGS AND
PERMIT DRAWINGS



SECTION MANAGER		
PROJECT ENGINEER		
DESIGN COORD.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
ENGINEERING REVIEW		
SECTION MANAGER		
HYDRO.		
TECHNICAL COORD.		
RELEASES	BY:	DATE
HYDROGEOLOGIC REVIEW		
PROJECT REVIEW		
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 1902 Green Bay, WI 54307-9002 (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		



N 38563.72
E 45973.35
6" VENT PIPE
N 38563.74
E 46000.0
6" VENT PIPE
N 38563.81
E 46000.0
6" VENT PIPE
N 38563.83
E 45978.40
6" VENT PIPE

N 37279.12
E 45982.1
6" VENT PIPE
N 37287.74
E 46000.0
6" VENT PIPE
N 37287.85
E 46000.0
6" VENT PIPE
N 37288.06
E 45982.1
6" VENT PIPE

N 37073.07
E 44804.32
6" VENT PIPE
N 37072.54
E 44722.64
6" VENT PIPE
N 37044.26
E 44693.26
6" VENT PIPE
N 37038.47
E 44693.07
4" VENT PIPE

interstate engineering, inc.

Engineering – Surveying – Planning

4

SHEET NO.

COOPERATIVE POWER ASSOCIATION
UNDERWOOD, NORTH DAKOTA
SECTION 16 FINAL CONTOURS
WITH GAS VENT PIPING
SECTION 16, T145N, R82W.
Drawn By D.JONASSON
Checked By L.H.K.

Revision No. Date By Description

Project No. B94-23(01)
Date 10/01/94



LOCATION PLAN

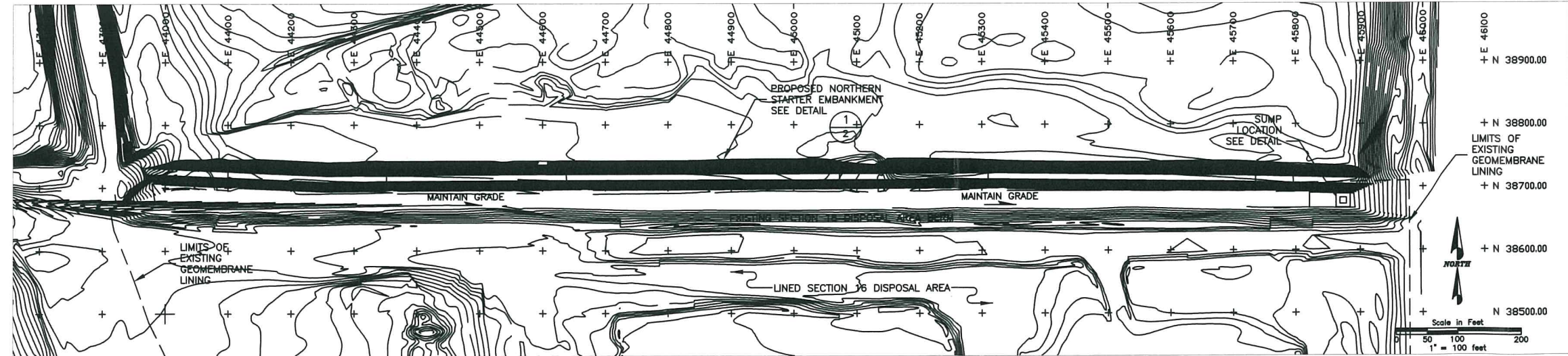
PROPOSED STARTER EMBANKMENT

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 REPRESENTATIVE.
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 REPRESENTATIVE.
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 MANUFACTURES 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

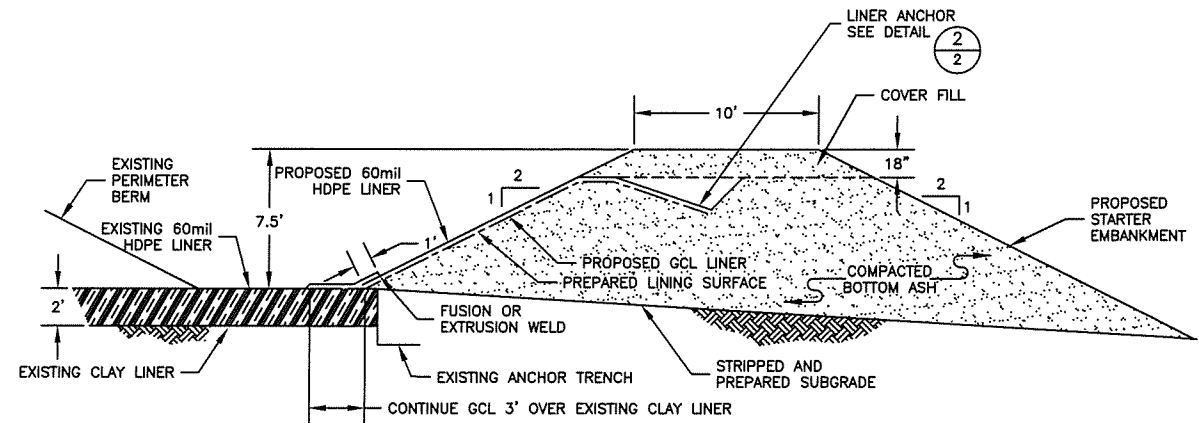
DRAFT

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

ENGINEER'S STAMP

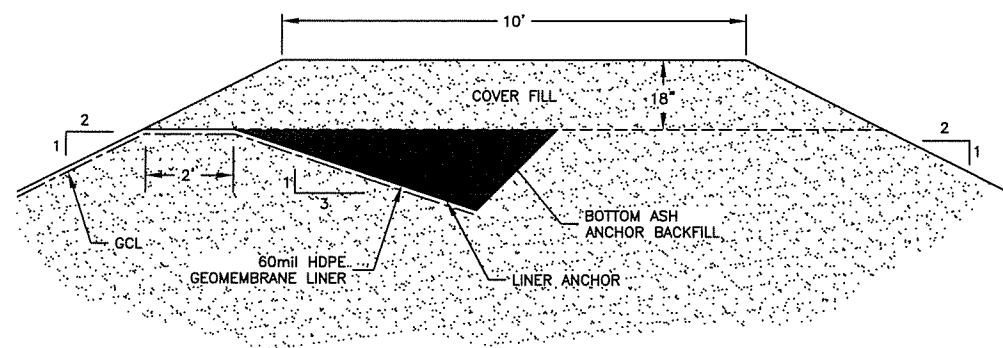
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1	ISSUED FOR CONSTRUCTION					1							
2	ISSUED WITH DESIGN REPORT	10/23/00				2							
3	ISSUED FOR CLIENT REVIEW	10/10/00				3							

CLIENT/PROJECT			
GREAT RIVER ENERGY COAL CREEK STATION			
TITLE			
SECTION 16 ASH DISPOSAL FACILITY NORTHERN STARTER EMBANKMENT PLAN			
Denver, Colorado			
DRAWN		DBS	DATE OCT. 2000
CHECKED		GE	SCALE AS SHOWN
REVIEWED		RRJ	JOB NO. 003-2178
APPROVED		RRJ	DWG. NO. C002
FILE NO. 2178C002		DRAYING	1



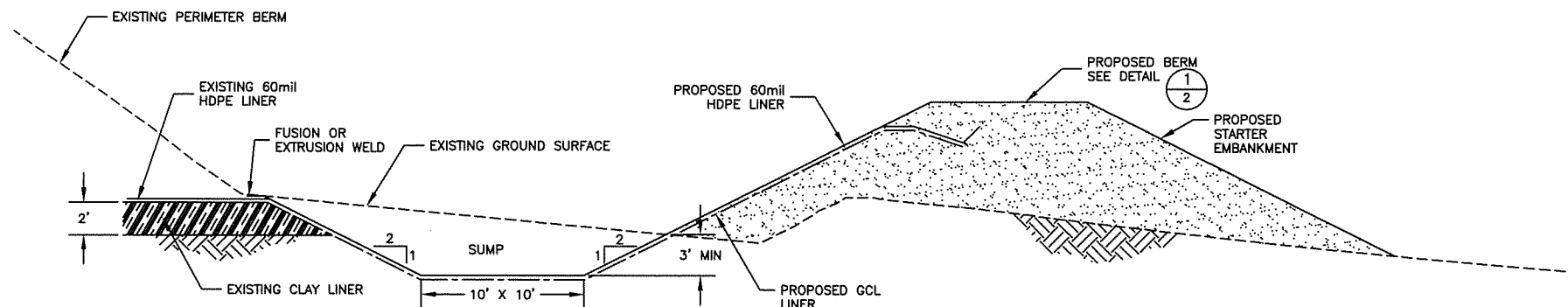
1 PROPOSED STARTER EMBANKMENT

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1" = 10 feet



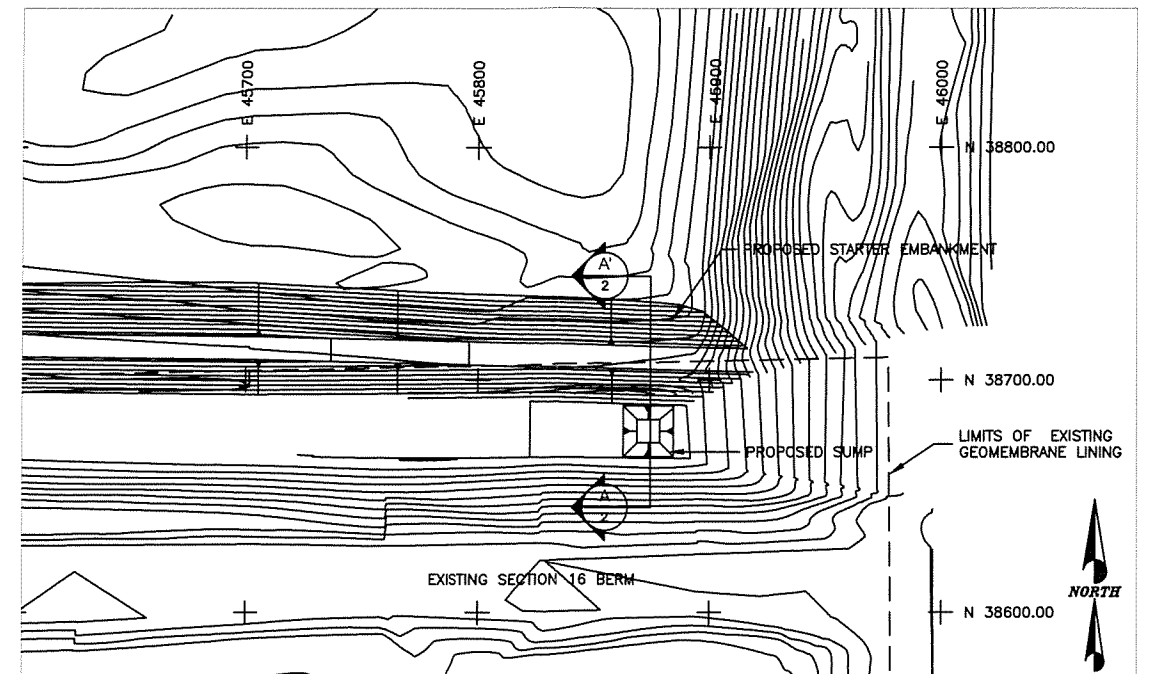
2 LINER ANCHOR DETAIL

N.T.S.



A SECTION A-A'

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



SUMP PLAN

Scale in Feet
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1" = 40 feet

DRAFT

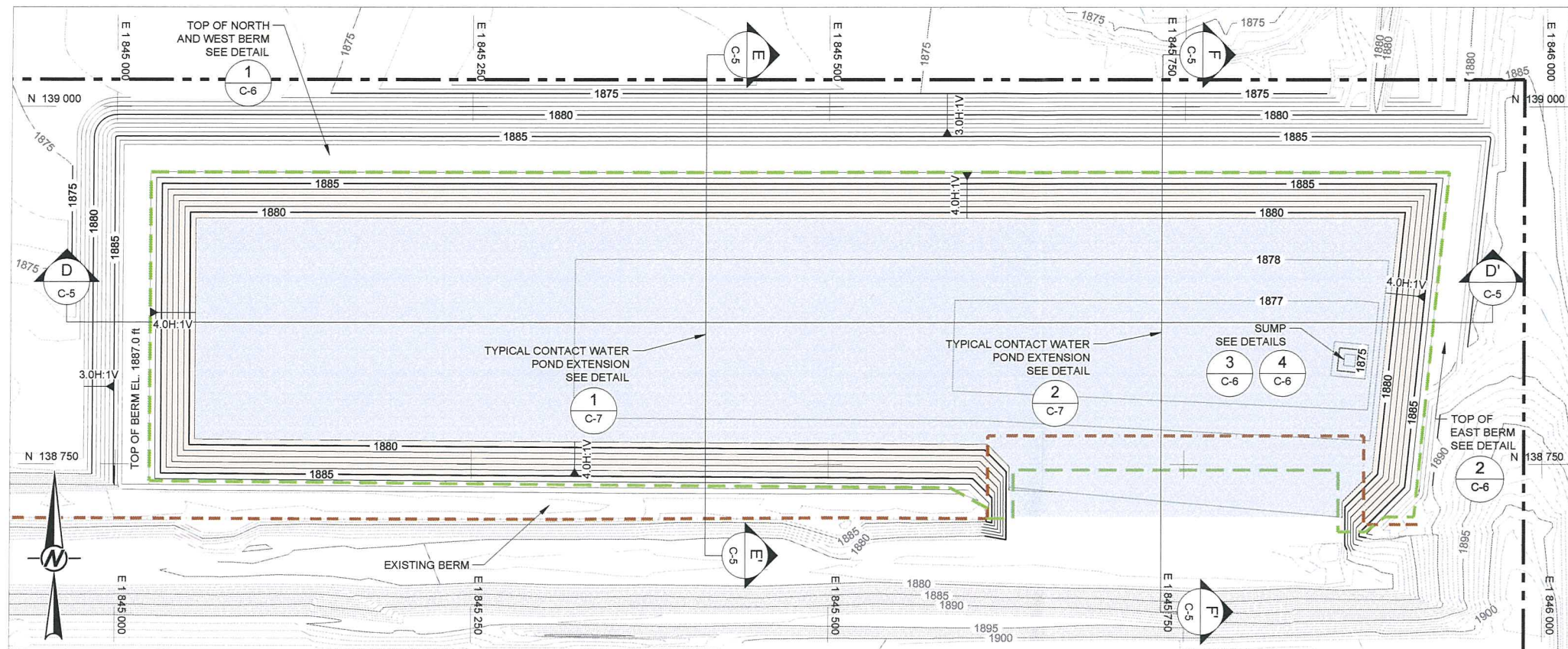
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CLIENT DATE

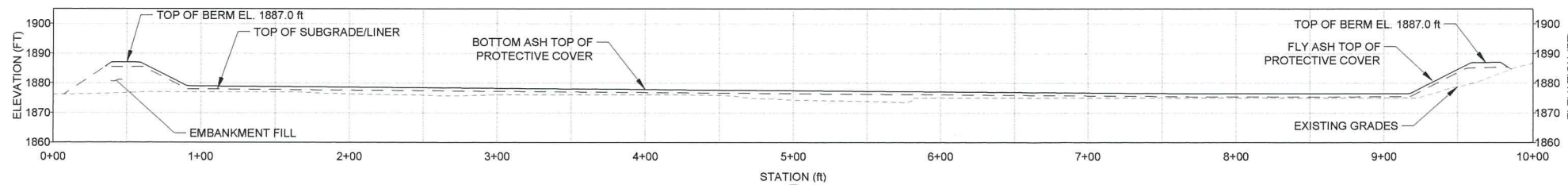
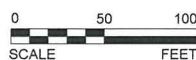
ENGINEER'S STAMP

NO.	REVISION DESCRIPTION	DATE	BY	CHKD	AP'D	NO.	REVISION DESCRIPTION	DATE	BY	CHKD	AP'D	DATE	PRINT	ISSUE RECORD
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3	ISSUED FOR CLIENT REVIEW	10/10/00				3								

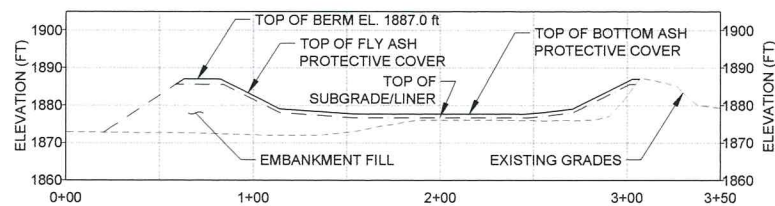
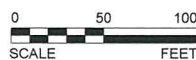
CLIENT/PROJECT				GREAT RIVER ENERGY COAL CREEK STATION			
TITLE				SECTION 16 ASH DISPOSAL FACILITY NORTHERN STARTER EMBANKMENT - DETAILS			
Denver, Colorado				DATE OCT. 2000			
Golder Associates				SCALE AS SHOWN			
				JOB NO. 003-2178			
				DWG. NO. C003			
				REVISION 2			



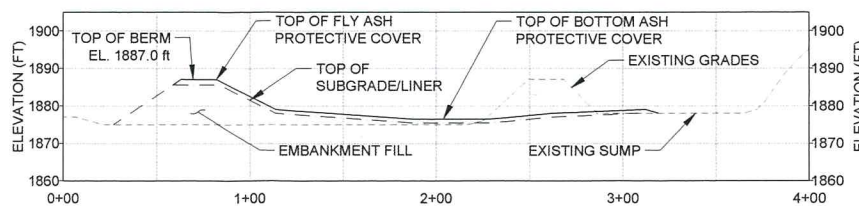
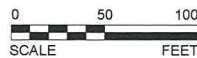
1 PLAN VIEW - TOP OF PROTECTIVE COVER



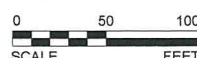
SECTION D - D'



SECTION E - E'



SECTION F - F'



- 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**
- THE PERMIT BOUNDARY IS APPROXIMATE.
 - PROPOSED GRADES REPRESENT THE TOP OF PROTECTIVE COVER AND EMBANKMENT.
 - 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.
 - A MINIMUM OF 12 INCHES OF PROTECTIVE COVER SHALL BE PLACED OVER THE NEW AND EXISTING GEOMEMBRANE, AS DIRECTED BY OWNER'S REPRESENTATIVE.
 - 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)**
- SITE LOCATION: SECTION 16, T145N, R82W, MCLEAN COUNTY, NORTH DAKOTA.
 - EXISTING GROUND TOPOGRAPHY WAS PROVIDED BY GREAT RIVER ENERGY. THE SURVEYS WERE PERFORMED BETWEEN 1996 AND 2011.
 - COORDINATES ARE BASED ON THE PLANT GRID SYSTEM.
 - THE CONTOUR INTERVAL IS ONE FOOT.
 - ALL PROPERTY SHOWN ON THIS MAP IS OWNED BY GREAT RIVER ENERGY.

DRAFT

SEAL

CLIENT



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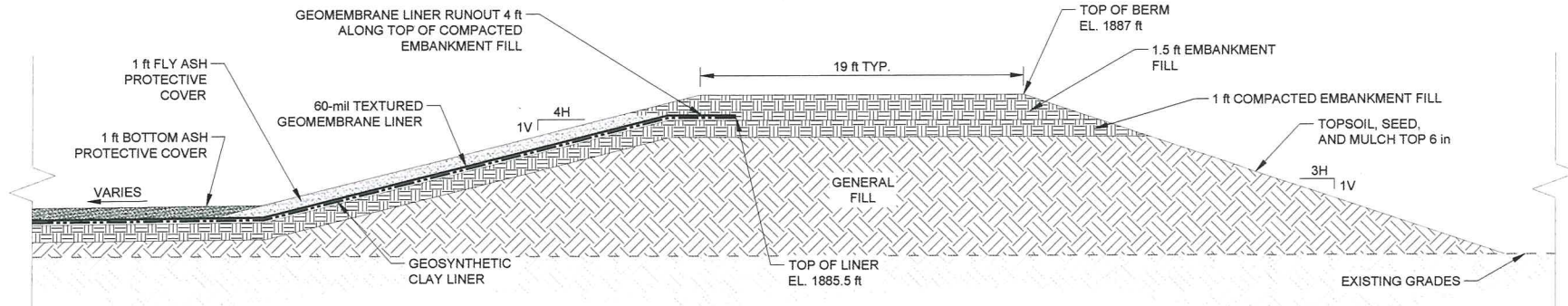
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

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

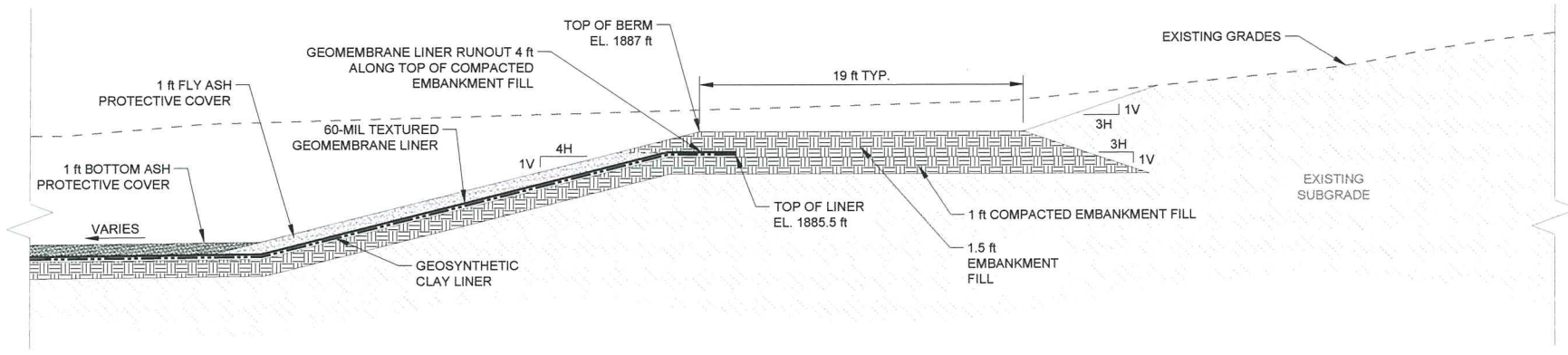
PROJECT
2015 COAL COMBUSTION RESIDUAL FACILITY CONSTRUCTION
SCOPE OF WORK C
SOUTHEAST SECTION 16 CONTACT WATER POND

TITLE
TOP OF PROTECTIVE COVER

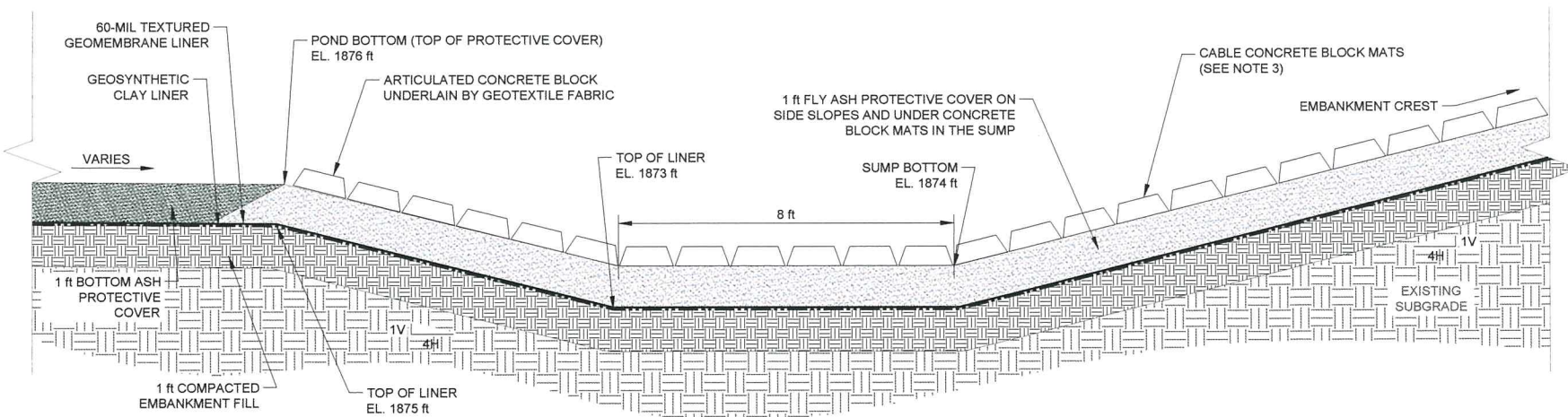
PROJECT No. 1523661
Rev. 0
C-5 of C-7
DRAWING C-5



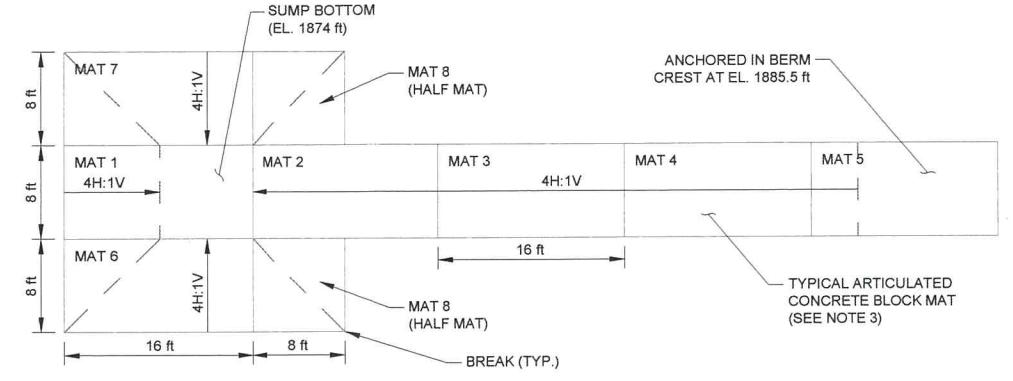
N.T.S. 1 TYPICAL BERM DETAIL (NORTH AND WEST BERMS)
C-6



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



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



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

- 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.

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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

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COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

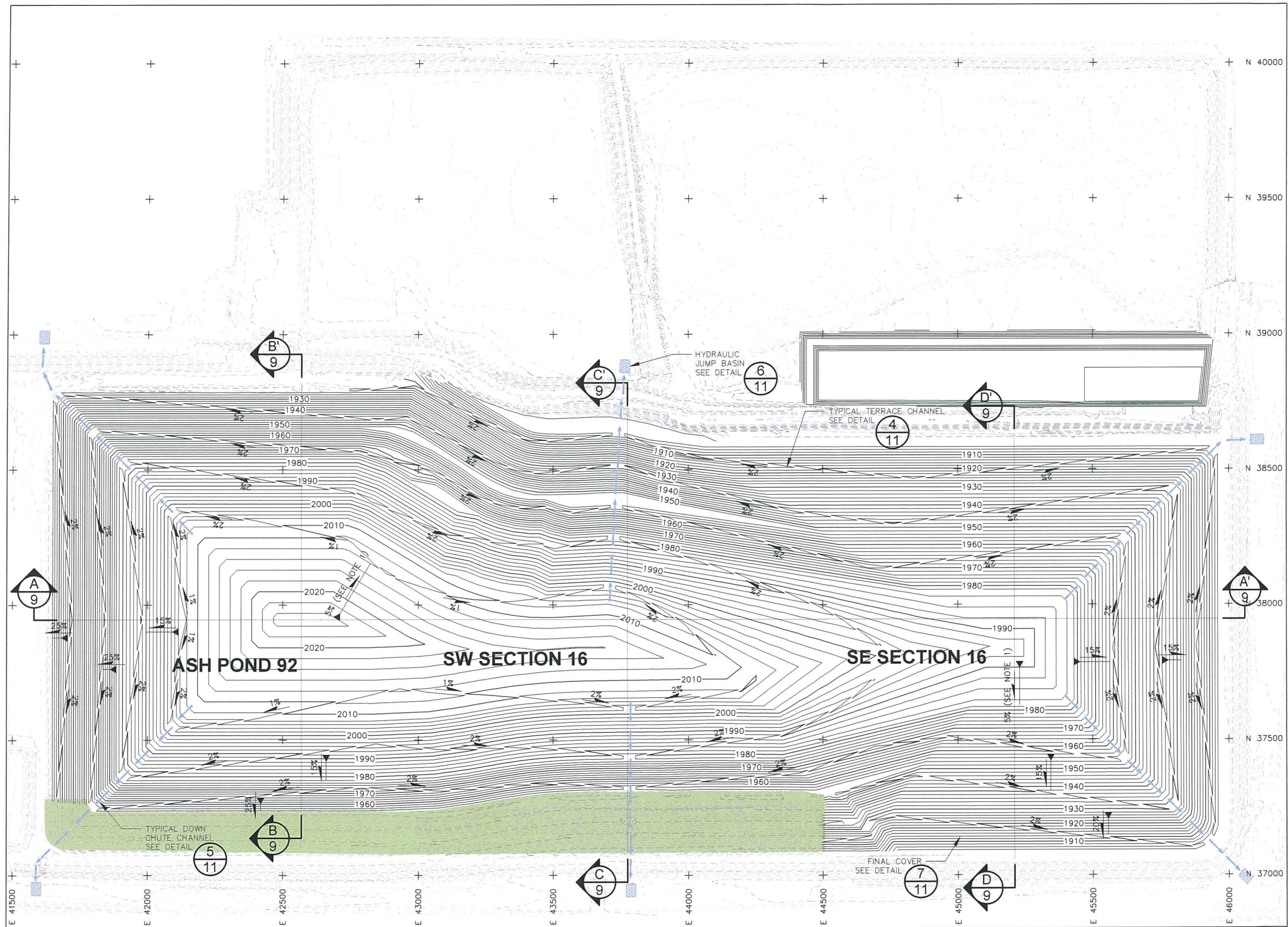
GOLDER ASSOCIATES, INC.
44 UNION BLVD, SUITE 300
LAKEWOOD, COLORADO
USA
[+1] (303) 980-0540
www.golder.com

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



LEGEND

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

NOTES



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

REFERENCES

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



DRAFT

PROJECT		GREAT RIVER ENERGY COAL CREEK STATION PERMIT NO. SP-033 PERMIT MODIFICATION	
TITLE		FINAL COVER GRADES AND SURFACE WATER PLAN	
		FILE No.	11381519A009
		PROJECT No.	113-81519
		8	

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

DRAFT
FOR CLIENT REVIEW

Drawing File: N:\1\113-81519\URC Permit Drawings\11381519A009.dwg | Layout: 11381519A008 (2) | Modified: Nov 28, 2012 09:05 C:\shuipz | Plotted: 11/20/12 9:25am C:\shuipz

APPENDIX B
VISUAL OBSERVATIONS CHECKLIST

LANDFILL INSPECTION CHECKLIST

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: McLean

Inspected By: Craig Schuettelpelz/Ryan Shedivy

Inspection Date: September 21, 2017

Weather: Mostly sunny, 60-70° F Wind: 6 mph E

ITEM	Y	N	N/A	REMARKS
1. General Conditions				
a. Alterations		X		
b. Grass cover	X			
c. Settlement/misalignment/cracks		X		
2. Contact Water Controls				
a. Water level in contact water control area	X			Depth: 1-2 ft
b. Sump & pump in good condition	X			
c. Containment controls working	X			
d. Ponding water outside of contact water control area		X		
e. Erosion protection in contact water control area	X			Fly ash protective cover and ACB at pump suction, some minor erosion of interior CCR slope on the south end of the contact water area
3. CCR slopes				
a. Significant Erosion		X		
b. Cracks/settlement		X		
c. Seepage		X		
4. Upstream slope				
a. Erosion – liner exposed	X			Exposed liner on north berm
b. Rodent burrows		X		
c. Vegetation		X		
d. Cracks/settlement		X		
5. Crest				
a. Soil condition	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. Downstream slope				
a. Erosion		X		
b. Vegetation	X			Final cover on the east slope requires re-seeding
c. Rodent burrows	X			Small burrows
d. Cracks/settlement/scarps		X		
e. Seepage		X		
7. Toe				
a. Vegetation	X			
b. Rodent burrows		X		
c. Settlement		X		
d. Drainage conditions	X			Standing water at the north toe
e. Seepage		X		

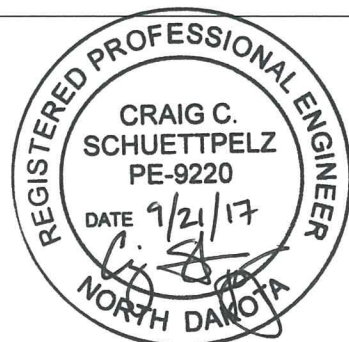
General Remarks: Good condition in general with limited maintenance required, such as filling in animal burrows, repairing interior erosion, and re-seeding areas where final cover vegetation is sparse.

Name of Engineer: Craig Schuettelpelz

Date: 9/21/17

Engineering Firm: Golder Associates Inc.

Signature: 



PROFESSIONAL ENGINEER SEAL

APPENDIX C
PHOTOGRAPHS

Path: \\Denver-golder\gas\projects\17\DOBS\1772255 GRE CCS\CCOR Rules\Annual Inspection\SE Section 16 | File Name: SE16_AnnualInspection_2017.dwg



- LEGEND**
- 1 PHOTOGRAPH LOCATION

- REFERENCES**
1. AERIAL IMAGE FROM UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AERIAL IMAGERY PROGRAM, PUBLISHED IN 2017.

CLIENT
GREAT RIVER ENERGY
COAL CREEK STATION
UNDERWOOD, NORTH DAKOTA

CONSULTANT



YYYY-MM-DD	2017-12-13
DESIGNED	RFS
PREPARED	KAC
REVIEWED	CCS
APPROVED	TJS

PROJECT
2017 ANNUAL INSPECTION REPORT

TITLE
**SOUTHEAST 16 LANDFILL
PHOTOGRAPH LOCATIONS**

PROJECT NO.
1772255

REV.
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FIGURE
1

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

Southeast 16 Landfill



Photograph 1 (East CCR downstream slope)
Boundary between CCR downstream slope with temporary cover (upslope) and CCR downstream slope with final cover (downslope) (DSCN1660.JPG)



Photograph 2 (East CCR downstream slope)
Contact water control channel (dry) (DSCN1673.JPG)

Southeast 16 Landfill



Photograph 3 (Interior)
Interior deposition area of Southeast 16 (DSCN1674.JPG)



Photograph 4 (East berm crest)
Rutting of berm crest perimeter access road (DSCN1678.JPG)

Southeast 16 Landfill



Photograph 5 (East berm downstream slope)
Small animal burrows (DSCN1683.JPG)



Photograph 6 (Northeast berm downstream slope)
Downchute channel below berm crest perimeter access road (DSCN1688.JPG)

Southeast 16 Landfill



Photograph 7 (Northeast toe)
Toe of slope at northeast corner (DSCN1689.JPG)



Photograph 8 (South berm crest)
Rutting of berm crest perimeter access road (DSCN1693.JPG)

Southeast 16 Landfill



Photograph 9 (North CCR slope)
Erosion of placed CCR materials (P1040150.JPG)



Photograph 10 (North CCR slope)
North interior CCR placement slope (P1040155.JPG)

Southeast 16 Landfill



Photograph 11 (North CCR slope)
North fly ash slope (P1040158.JPG)



Photograph 12 (North CCR slope)
Minor erosion of fly ash slope due to channelized water flow (P1040162.JPG)

Southeast 16 Landfill



Photograph 13 (North CCR slope)
Haul road within Southeast 16 footprint and contact water area (P1040163.JPG)



Photograph 14 (Northwest CCR slope)
Minor erosion of fly ash at interface between Upstream Raise 92 and Southeast 16 (P1040166.JPG)

Southeast 16 Landfill



**Photograph 15 (West CCR slope)
Southeast 16 interior (P1040167.JPG)**



**Photograph 16 (South downstream CCR slope with temporary cover)
Temporary cover (P1040170.JPG)**

Southeast 16 Landfill



**Photograph 17 (South berm crest)
Perimeter berm crest access road (P1040173.JPG)**



**Photograph 18 (Southwest CCR downstream slope)
Prior access ramp area (P1040174.JPG)**

Southeast 16 Landfill



Photograph 19 (South berm downstream slope)
Grass vegetated slope below berm crest perimeter access road (P1040175.JPG)



Photograph 20 (South toe)
Original toe drain and grass vegetated toe of slope (P1040176.JPG)

Southeast 16 Landfill



**Photograph 21 (South CCR downstream slope with temporary cover)
Contact water control channel (P1040180.JPG)**



**Photograph 22 (Southeast CCR downstream slope)
Articulated Concrete Block (ACB) downchute (P1040184.JPG)**

Southeast 16 Landfill



**Photograph 23 (Contact water collection area)
Pump pad and intake (P1040262.JPG)**



**Photograph 24 (Contact water collection area)
Top of geomembrane liner in contact water collection area (P1040263.JPG)**

Southeast 16 Landfill



Photograph 25 (Contact water collection area)
Fly ash protective cover in contact water collection area (P1040264.JPG)



Photograph 26 (Contact water collection area)
North berm downstream slope and toe (P1040273.JPG)

Southeast 16 Landfill



**Photograph 27 (Contact water collection area)
Northeast toe of slope (P1040276.JPG)**