Clifty Creek Generating Station

Initial Certification Statement to Discharge Bottom Ash Transport Water

Indiana-Kentucky Electric Corporation

Clifty Creek Generating Station

Project No. 128991

Revision 0
October 15, 2021

Clifty Creek Generating Station

Initial Certification Statement to Discharge Bottom Ash Transport Water

Prepared for

Indiana-Kentucky Electric Corporation
Clifty Creek Generating Station

Project No. 128991
Jefferson, Indiana

Revision 0
October 15, 2021

Prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

INDEX AND CERTIFICATION

Indiana-Kentucky Electric Corporation
Clifty Creek Generating Station

Initial Certification Statement to Discharge Bottom Ash Transport Water

Report Index

Certification

I hereby certify, as a Professional Engineer in the State of Indiana, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by Indiana-Kentucky Electric Corporation or others without specific verification or adaptation by the Engineer. I hereby certify that this initial certification was prepared for the Indiana-Kentucky Electric Corporation Clifty Creek Generating Station in accordance with standard engineering practices and based on my knowledge, information, and belief, the content of this Certification when developed in August 2021 is true and meets the requirements of 40 CFR § 423.19(c). I hereby certify that I am familiar with the ELG regulation requirements and Indiana-Kentucky Electric Corporation's Clifty Creek Generating Station.

Zachary Bahr

Zachary Bahr, P.E.
(Indiana License No. PE11400643)

Date: 10/15/2021

Owner’s Certification of Compliance - 40 CFR 122.22

Pursuant to 40 CFR 122.22, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

On behalf of Indiana-Kentucky Electric Corporation:

J. Michael Brown

J. Michael Brown
(Printed Name)

Director, Environmental, Safety & Health
(Title)

October 28, 2021
(Date)

TABLE OF CONTENTS

Page No.

LIST OF TABLES

Page No.

LIST OF ABBREVIATIONS

Abbreviation	**Term/Phrase/Name**
BAT	Best Available Technology Economically Achievable
BATW	Bottom Ash Transport Water
BMcD	Burns & McDonnell
BSHS	Boiler Slag Handling System
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
Clifty Creek	Clifty Creek Generating Station
ELG Rule	Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category
EPA	U.S. Environmental Protection Agency
FGD	Flue Gas Desulfurization
gpm	gallons per minute
HDPE	High density polyethylene
IKEC	Indiana-Kentucky Electric Corporation
LSI	Langelier Scaling Index
L-SI	Larson-Skold Index
LVWTS	Low Volume Wastewater Treatment System
PRB	Powder River Basin
PSI	Puckorius Scaling Index
RSI	Ryznar Scaling Index
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

1.0 EXECUTIVE SUMMARY

On November 3, 2015, the U.S. Environmental Protection Agency (EPA) issued the federal Steam Electric Power Generating Effluent Limit Guidelines and Standards (ELG); see 80 FR 67838. The 2015 rule addressed discharges from flue gas desulfurization (FGD) wastewater, fly ash transport water, bottom ash transport water (BATW), flue gas mercury control wastewater, gasification wastewater, combustion residual leachate, and non-chemical metal cleaning wastes.

The 2015 rule was reconsidered by EPA, with updates finalized on October 13, 2020 (see 85 FR 64650) that became effective on December 14, 2020. The final rule revised the limitations and standards for two of the waste streams addressed in the 2015 rule: BATW and FGD wastewater. For BATW, the final rule determined the Best Available Technology Economically Achievable (BAT) is a high recycle rate system with a site-specific volumetric purge (defined in the final rule as bottom ash purge water). The purge rate cannot exceed a 30-day rolling average of ten percent of the BATW system's primary active wetted volume, with the purge volume and associated effluent limitations established by the permitting authority. EPA recognizes that some plants need to improve their equipment, process controls, and/or operations to consistently meet the limitations included in this final rule; however, this is consistent with the Clean Water Act, which requires that BAT discharge limitations and standards reflect the best available technology economically achievable.

This document serves as the initial certification statement required by 40 CFR § 423.19(c). On behalf of Indiana-Kentucky Electric Corporation (IKEC), this initial certification seeks to discharge BATW pursuant to 40 Code of Federal Regulations (CFR) § 423.13(k)(2)(i) at the Clifty Creek Generating Station (Clifty Creek), located in Jefferson County, Indiana. As required by the ELG Rule, this plan includes the following:

A. A statement that the professional engineer is a licensed professional engineer (refer to Index & Certification page).
B. A statement that the professional engineer is familiar with the regulation requirements (refer to Index & Certification page).
C. A statement that the professional engineer is familiar with the facility (refer to Index and Certification page).
D. The primary active wetted bottom ash system volume in 40 CFR § 423.11(aa) (refer to Table 2-1).
E. Material assumptions, information, and calculations used by the certifying professional engineer to determine the primary active wetted bottom ash system volume (refer to Appendix A).

F. A list of all potential discharges under 40 CFR § 423.13(k)(2)(i)(A)(1) through (4), the expected volume of each discharge, and the expected frequency of each discharge (refer to Table 2-2).
G. Material assumptions, information, and calculations used by the certifying professional engineer to determine the expected volume and frequency of each discharge, including a narrative discussion of why such water cannot be managed within the system and must be discharged (refer to Table 2-2).
H. A list of all wastewater treatment systems at the facility currently, or otherwise required by a date certain under this section (refer to Table 2-5).
I. A narrative discussion of each treatment system including the system type, design capacity, and current or expected operation (refer to Table 2-5).

Clifty Creek is a six unit, 1,302-megawatt coal-fired facility that burns Illinois basin coal. Clifty Creek's existing once-thru bottom ash sluicing system is being replaced with a new BATW high recycle system, which will utilize wet sluicing to transport bottom ash to a remote settling and surge tank system to dewater the bottom ash. The system cannot be operated as a closed loop without significant corrosion that will result in damage to plant equipment that, in turn, will result in maintenance challenges that impact operational efficiency and reliability. As a result, an engineering determination has been made that the system should be operated as a high recycle rate system with pH/alkalinity adjustment and the allowable purge to alleviate these concerns.

IKEC will be directing over half of the excess water collected in the BATW system to the wet scrubber system; however, the scrubber system is an essential air pollution control system necessary for the plant to meet its obligations under the facilities Title V Operating permit. Specifically, the scrubber must be operated to meet not-to-exceed SO_2 emission limit in the facility permit to maintain compliance with the 2010 SO_2 National Ambient Air Quality Standard. In addition, the facility must meet not-to-exceed Mercury emission limits and other emission limits needed to demonstrate compliance with USEPA's Mercury and Air Toxics Standards Rule. As a result, the ash transport water reused in the scrubber needs to be managed in a holistic manner to ensure that the volume and chemistry of the ash transport water does not compromise the effectiveness of the scrubber to meet its primary/intended purpose as an air pollution control system. For example, constituents like aluminum and fluoride in the bottom ash water can cause fouling of the lime / limestone used in the FGD system which in turn can impact SO_2 removal rates and scrubber efficiency.

IKEC will seek to maximize water reuse in the scrubber system; however, IKEC expects periods of operation that will limit reuse of this water and the allowable purge will be required to maintain consistent operation of the BATW system. For these reasons, **IKEC is requesting to purge up to ten percent of the total system volume (up to 317,800 gallons per day) related to system water chemistry and water balance as allowed under 40 CFR § 423.13(k)(2)(i).**

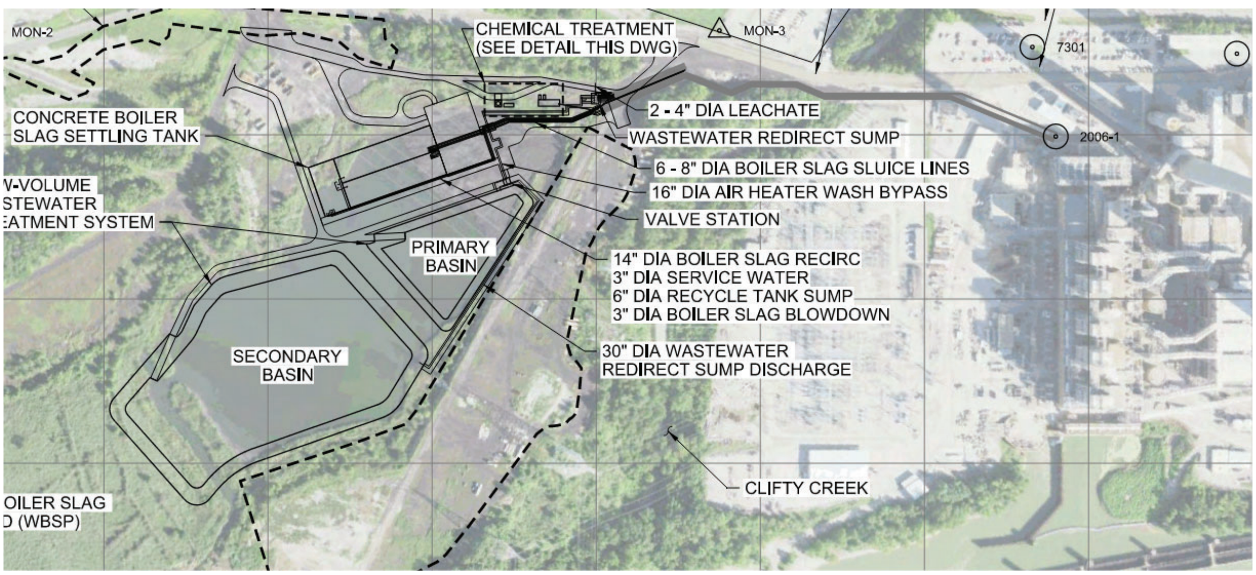
2.0 HIGH RECYCLE SYSTEM DESCRIPTION

As required by 40 CFR § 423.19(c)(3)(D) through (I), the following is a description of the boiler slag handling system (BSHS) at Clifty Creek, including the assumptions, information, and calculations used by the certifying professional engineer to determine the primary active wetted bottom ash system volume and the expected volume and frequency of each discharge. This section also includes a description of the wastewater treatment systems at Clifty Creek.

2.1 Bottom Ash System Description

After combustion, ash/boiler slag that accumulates in the bottom of the boiler is captured in slag hoppers located directly beneath the boiler. Boiler slag is then crushed into small pieces by the boiler hopper ash clinker grinders and pumped by ash disposal pumps to a system of remote settling and surge tanks. A site plan showing major components of the bottom ash system can be found below in Figure 2-1.

Figure 2-1: Clifty Creek Generating Station Plan Drawing



Boiler slag is then removed from the system and transported via truck to the CCR landfill for disposal or sold for beneficial reuse. Transport water from the dewatering process overflows from the settling tank to the surge tank and is then pumped back to the sluice pumps for re-use in the sluice system. Major equipment for Clifty Creek's BSHS consists of twelve boiler hoppers (two hoppers per unit), two settling tanks (one in operation while the other is emptied of its collected bottom ash), and one surge/recycle tank. The sluice supply piping and the water return piping has been included in the system volume calculation as well, while the miscellaneous interconnecting piping throughout the system and most of the inactive settling tank (except the portion that always retains water) have been excluded.

A summary of pertinent system data is provided in Table 2-1: . A site water balance diagram can be found in Appendix A.

Table 2-1: Clifty Creek's Primary Active Wetted Volume Summary

Description	Qty	Unit	Length (LF)	Size (in)	Component Volume (Cu. ft)	Total Component Volume (Gal)	Cumulative System Volume (Gal)
Equipment							
Boiler Slag Hopper	12	Each	See Appendix A		2,039	182,977	182,977
Settling Tank (Active)	1	Each	See Appendix A		203,752	1,524,068	1,707,044
Settling Tank (Inactive Heel)	1	Each	See Appendix A		38,096	284,959	1,992,003
Recycle/Surge Tank	1	Each	See Appendix A		147,110	1,100,383	3,092,386
Piping							
Basalt-Lined Sluice Piping	1	Each	18,682	8	6,319	47,266	3,139,652
Carbon Steel Recirculation Piping	1	Each	179	3	9	69	3,139,721
Carbon Steel Recirculation Piping	1	Each	2,511	4	222	1,660	3,141,381
Carbon Steel Recirculation Piping	1	Each	1,242	6	249	1,864	3,143,245
HDPE Recirculation Piping	1	Each	1,207	6	188	1,409	3,144,654
Carbon Steel Recirculation Piping	1	Each	183	8	64	477	3,145,131
Basalt-Lined Recirculation Piping	1	Each	6,486	8	2,194	16,410	3,161,541
Carbon Steel Recirculation Piping	1	Each	82	10	45	334	3,161,875
Carbon Steel Recirculation Piping	1	Each	2,274	14	2,178	16,288	3,178,163
					Total Nominal Volume		**3,178,000**
					10% gallons/day		317,800
					10% gallons/hour		13,242
					10% gallons/min		221

2.2 List of All Potential Discharges under 40 CFR § 423.13(k)(2)(i)(A)(1) – (4)

Table 2-2 summarizes the discharges from the bottom ash system at Clifty Creek:

Table 2-2: Clifty Creek's Purge Discharges

Discharge Stream	Flow/Volume	Description	Frequency
(A)(1) Stormwater	>240,000 gal	Precipitation-related inflows generated from storm events exceeding a 10-year storm event of 24-hour or longer duration (e.g., 30-day storm event) and cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment.	Following significant storm events. The system was designed to manage a 10-year/24-hour storm event equivalent to 4.5" of rainfall, or 240,000 gallons. Anything surpassing this amount will be purged from the system to maintain water balance.
(A)(2) Process Waste Streams	456 gpm	Regular inflows from waste streams other than bottom ash transport water that exceed the ability of the bottom ash system to accept recycled water.	Additional hopper quench water is introduced to the BSHS during normal sluice operation and comingled within the BATW. An average 235 gpm of this excess water will be forwarded to the FGD system as allowed by scrubber operations; however, the additional 221 gpm purge rate will provide the discharge needed to maintain the high recycle rate system water balance and reduce the potential for chemistry and water balance impacts to the scrubber.
(A)(3) Water Chemistry Purge	221	To maintain system water chemistry where installed equipment at the facility is unable to manage pH, corrosive substances, substances or conditions causing scaling, or fine particulates to below levels which impact system operation or maintenance.	Water within the BSHS has corrosive tendencies based on acidic conditions. The requested purge for discharge stream (A)(3) will improve water chemistry, but pH and alkalinity adjustment will likely be needed to prevent corrosion since additional purge is not allowed under the final rule.
(A)(4) Maintenance Flows	N/A	To conduct maintenance not otherwise included in (A) (1), (2), or (3) of this table and not exempted from the definition of transport water in § 423.11(p), and when water volumes cannot be managed by installed spares, redundancies, maintenance tanks, and other secondary bottom ash system equipment.	During air heater wash events, the wastewater will be discharged to the future LVWTS (Low Volume Waste Treatment System) and not comingled with the bottom ash system. The LVWTS will be a new lined treatment basin.

2.2.1 High Recycle Rate Bottom Ash Chemistry Considerations

After the conversion to a high recycle rate system, it is expected that the future BSHS water quality will cycle up to an equilibrium concentration, where the additional mass of constituents introduced per sluice is equal to the mass exiting the BSHS through the reuse in the FGD system and the purge flows. Since the existing system is not currently operating as a closed-loop configuration, it is difficult to reliably predict the corrosiveness or scaling potential in the high recycle rate configuration. We anticipate that once operating in a high recycle rate configuration, there will be an increase in total dissolved solids (TDS), total suspended solids (TSS), conductivity, aluminum, calcium, iron, silica, sodium, sulfates, and other constituents from the bottom ash.

In an open-loop bottom ash sluicing system, ash is sluiced to a bottom ash pond where the ash settles out to be dewatered and capped or dredged and removed at a future date. Overflow from the bottom ash pond is typically discharged and fresh makeup water is used for subsequent sluice cycles. As ash is removed from a bottom ash system, water adheres to the ash particles via surface tension, and then drains through the ash pile. Excess water is captured in drains and returned to the system, but a substantial portion of the water that has adhered to the ash evaporates or remains entrained within the ash, rather than being returned to the system. This portion of water lost from the bottom ash system is referred to as dragout. Some water is also lost from the system due to evaporation.

Several scaling indices can be used to model the scaling and corrosive properties of the water. These are the Puckorius Scaling Index (PSI), The Ryznar Scaling Index (RSI), the Langelier Scaling Index (LSI), and the Larson-Skold Index (L-SI). The PSI, RSI, and LSI all use alkalinity, hardness, temperature, and pH to estimate calcium scale and corrosivity, comparing the pH of the system to the equilibrium pH and the pH of saturation. The L-SI looks at the concentrations of carbonate, bicarbonate, sulfate, and chloride to estimate the tendency for sulfate and chloride to interfere with scale formation and to support corrosion due to sulfate and chloride chemistry. The target ranges for these indices are shown in Table 2-3.

Table 2-3: Key to Scaling Indexes

	PSI	RSI	LSI	L-SI
Extreme Corrosion	>9.0	>9.0	<-2	>4.0
Moderate Corrosion	>7.5 - 9.0	>7.5 - 9.0	-2.0 - -0.5	1.2 - 4.0
Slight Corrosion	>7.0 - 7.5	>7.0 - 7.5	>-0.5 - 0.0	0.8 - <1.2
In range	>6.0 - 7.0	>6.0 - 7.0	>0.0 - 0.5	<0.8
Slight Scaling	5.0 - 6.0	5.0 - 6.0	>0.5 - 2.0	
Heavy Scaling	<5.0	<5.0	>2.0	

Burns & McDonnell prepared a model of the bottom ash system to predict future conditions under a variety of operating scenarios. We used typical system criteria from other design projects like hydraulic residence time, cycles of concentration, evaporation rate, and bottom ash moisture content to develop this model.

The model was then used to calculate the scaling and corrosion indices and show the potential for scale formation or corrosion. It should be noted that this model was based on limited sample data from the existing open-loop configuration and that it is difficult to simulate the expected chemistry after the system conversion. Table 2-4 below provides a summary of these results for the potential operating scenarios.

Table 2-4: Estimated Scaling Indexes

Index	10% Purge - High Recycle Rate	Optimize Indexes* - High Recycle Rate
Makeup, gpm	456	456
Flow to FGD, gpm	235	235
Purge Flow, gpm	221	221
Dragout and/or Evaporation, gpm	15	15
Purge %	10.0%	10.0%
Puckorius SI	**8.98**	**6.96**
Ryznar SI	**8.45**	**6.19**
Langelier SI	**(0.28)**	**1.40**
Larson-Skold I	**1.01**	**0.27**

* pH and alkalinity control are included

The 10% Purge column predicts the values assuming a 10% bottom ash purge in a high recycle rate bottom ash system with the indices showing that the bottom ash sluice water is slightly to moderately corrosive even with a 10% purge rate and additional excess water routed to the FGD system. The Optimize Indexes column predicts the values again with a 10% bottom ash purge in a high recycle rate bottom ash system but with the addition of pH and alkalinity control. The indices show that pH and alkalinity control may be needed in addition to a 10% bottom ash purge to bring the indices to within the target ranges to minimize corrosion.

2.3 Wastewater Treatment Systems at Clifty Creek

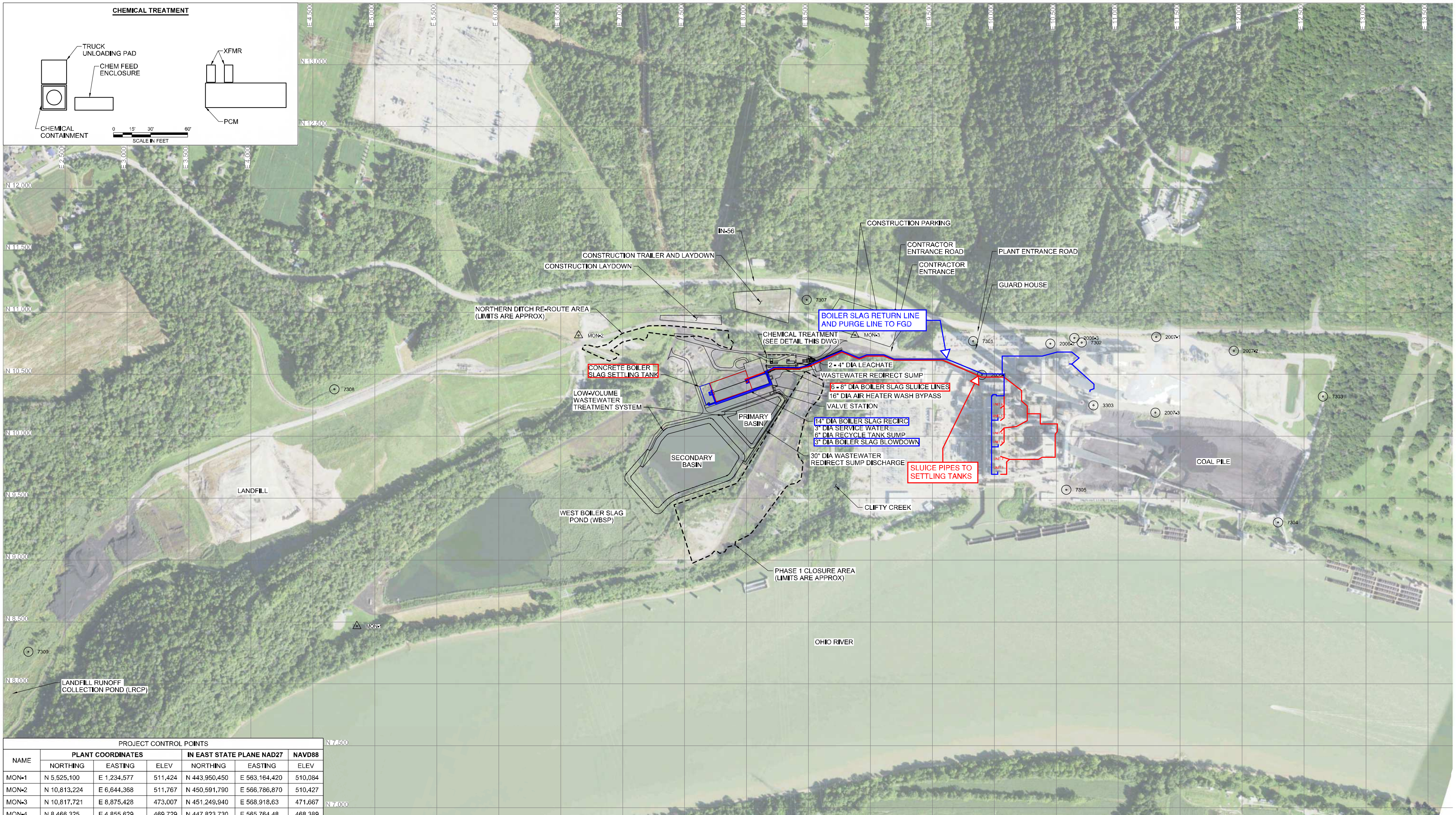
Table 2-5 summarizes the water treatment systems at Clifty Creek.

Table 2-5: Clifty Creek's Wastewater Treatment Systems

System Type	Design Capacity	Current Operation	Expected Operation
FGD Wastewater Treatment System	244 gpm	Physical/chemical treatment pH adjustment, coagulant, organosulfide, clarification, and solids handling. Discharged via NPDES Outfall to West Boiler Slag Pond	The current FGD wastewater treatment system will discharge treated effluent to the new low volume wastewater treatment system (LVWTS). A secondary treatment system is being piloted for additional constituent removal to comply with the final ELG rule.
Low Volume Wastewater	8,929 gpm	Settling in West Boiler Slag Pond	All low volume wastewater streams will be re-routed to the LVWTS. Some streams will be treated with coagulant before final settling within the new lined settling pond.
Coal Pile Runoff	1,790 gpm (10-year storm)	Settling in West Boiler Slag Pond	Coal pile runoff discharge re-routed to the LVWTS for settling via the Coal Yard Sump.

The Clifty Creek facility operates a wet FGD scrubber, equipped with a physical/chemical wastewater treatment system that will discharge through the new LVWTS. Sanitary wastewater is discharged to the local sanitary sewer, eliminating the need for a sanitary wastewater treatment system. Low volume wastewaters, which include coal pile runoff, boiler blowdown, boiler hopper quench water, bottom ash purge wastewaters, metal cleaning wastewaters, contact storm water runoff, and other miscellaneous power plant low volume wastewaters, will be managed through the LVWTS. The addition of coagulant may be needed for some specific low volume waste streams to promote settling within the LVWTS prior to discharging the wastewaters through a NPDES-permitted outfall. The water balance for Clifty Creek is included in Appendix A. No other wastewater treatment systems are currently in use at the facility.

APPENDIX A – BOTTOM ASH EQUIPMENT SYSTEM VOLUMES AND WATER BALANCE



PROJECT CONTROL POINTS						
NAME	PLANT COORDINATES			IN EAST STATE PLANE NAD27		NAVD88
	NORTHING	EASTING	ELEV	NORTHING	EASTING	ELEV
MON-1	N 5,525,100	E 1,234,577	511,424	N 443,950,450	E 563,164,420	510,084
MON-2	N 10,813,224	E 6,644,368	511,767	N 450,591,790	E 566,786,870	510,427
MON-3	N 10,817,721	E 8,875,428	473,007	N 451,249,940	E 568,918,63	471,667
MON-4	N 8,466,325	E 4,855,629	469,729	N 447,823,730	E 565,764,48	468,389

TRUE NORTH
PLANT NORTH
17°02'09,1"
NORTH
0 300' 600'
SCALE IN FEET

FOR BID - NOT FOR CONSTRUCTION

RANDELL L. SEDLACEK REGISTERED NO. PE11400562 STATE OF INDIANA PROFESSIONAL ENGINEER

This document has been digitally sealed and signed. July 26, 2021.

no.	date	by	ckd	description
0	07/26/21	AMM	RLS	INITIAL ISSUE

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
Burns & McDonnell Engineering Co, Inc,

designed A, MYERS
detailed A, MYERS

OVEC IKEC
Ohio Valley Electric Corporation / Indiana-Kentucky Electric Corporation

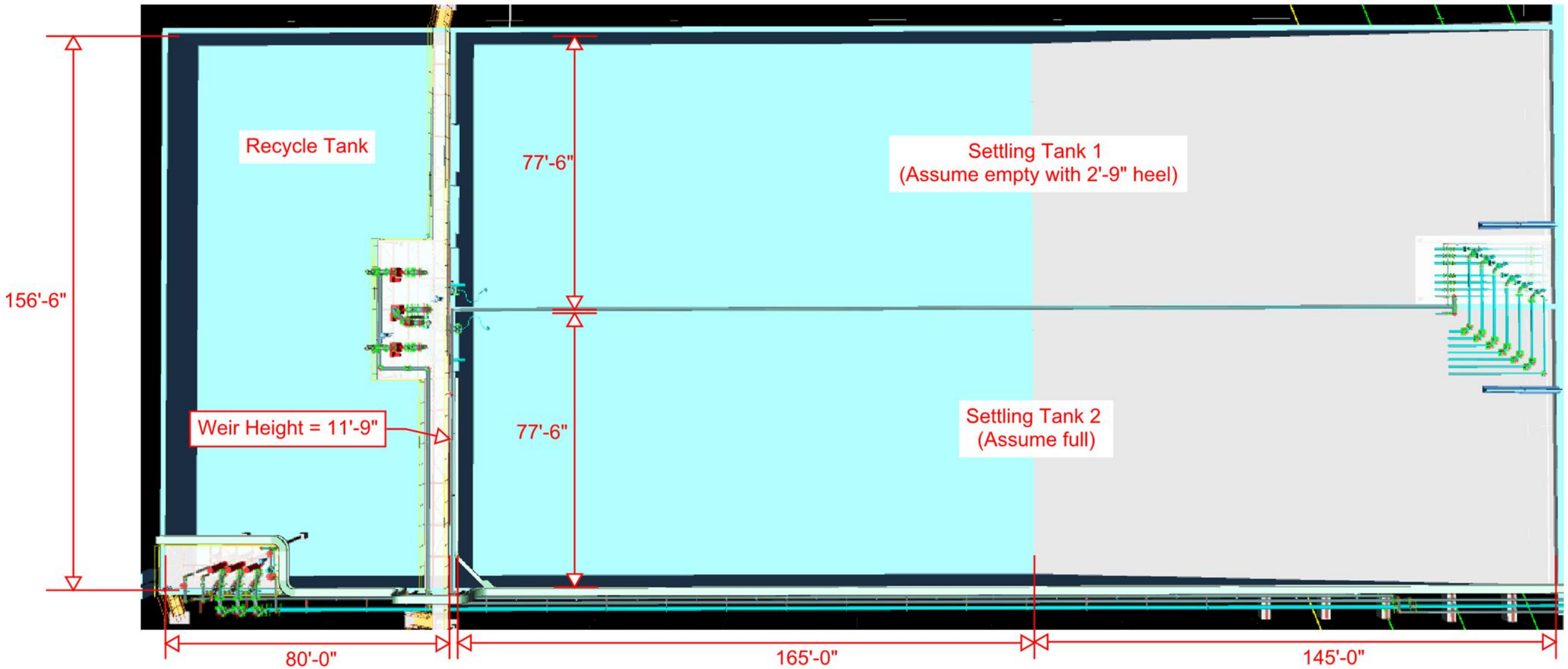
CLIFTY CREEK GENERATING STATION
CCR / ELG PROJECT
JEFFERSON COUNTY, INDIANA

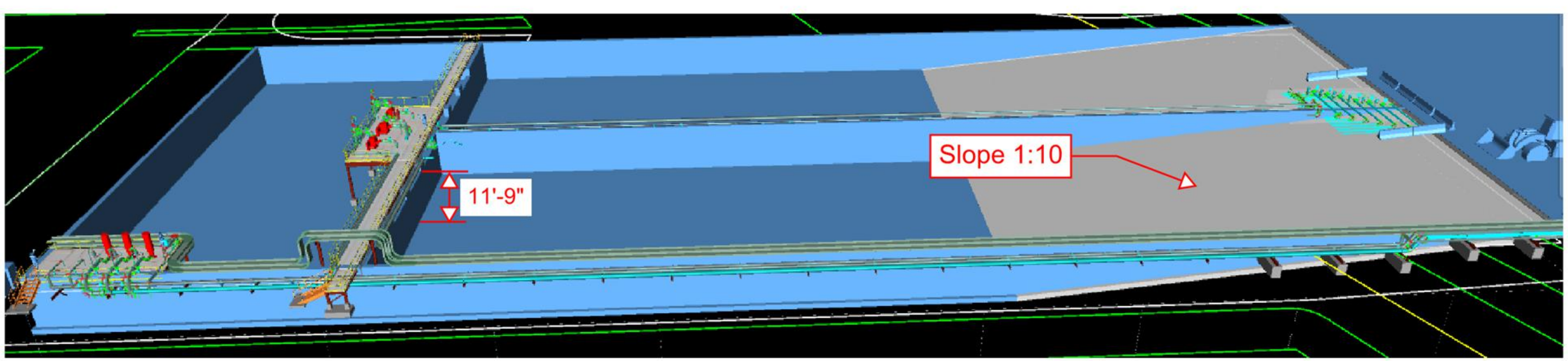
SITE PLAN
project 128991
contract 8220
drawing CS002 — rev. 0
sheet of sheets
file 128991,8220-CS002,dgn

7/26/2021

Z:\Clients\ENR\OVEC\128991_CliftyAshConv\2_Design\Civil\Dwgs\8220 - Foundations\128991.8220-CS002.dgn

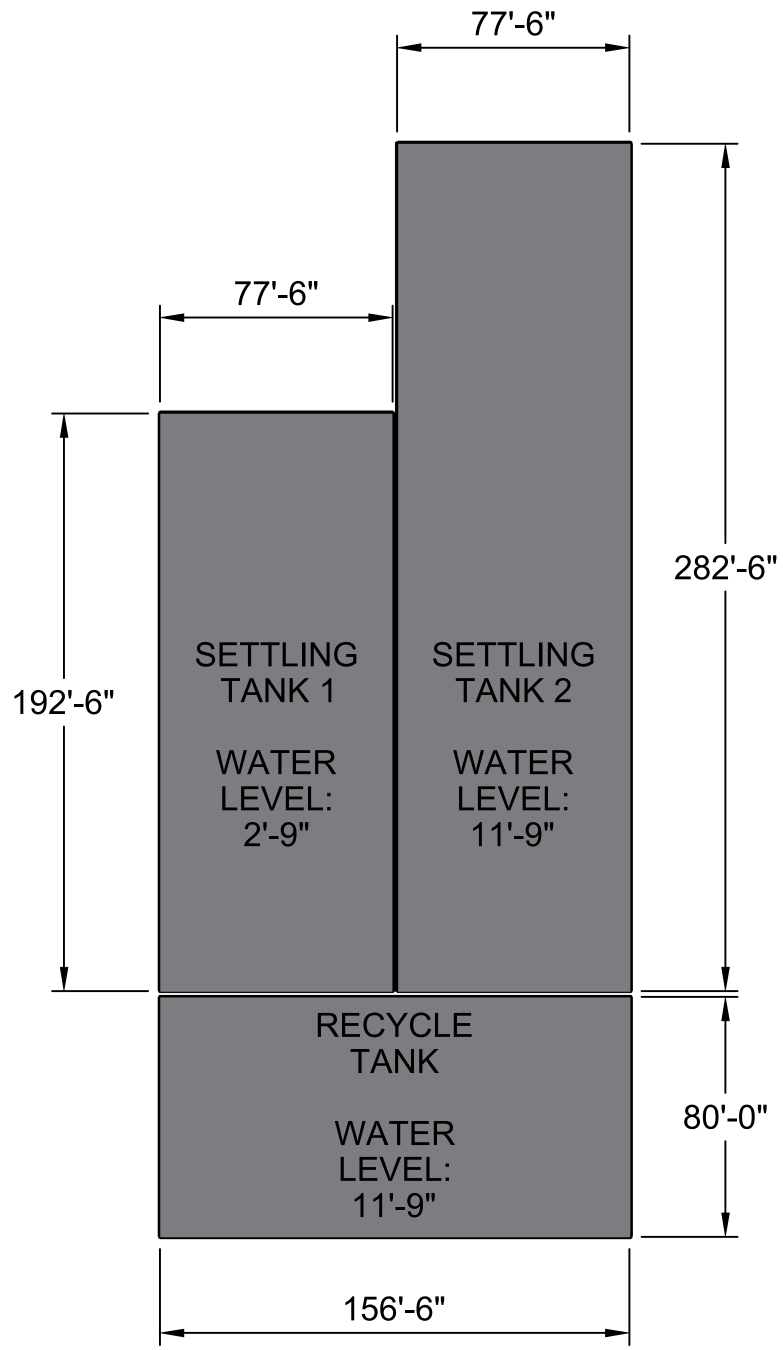
Clifty Creek
Settling & Recycle Tank Dimensions

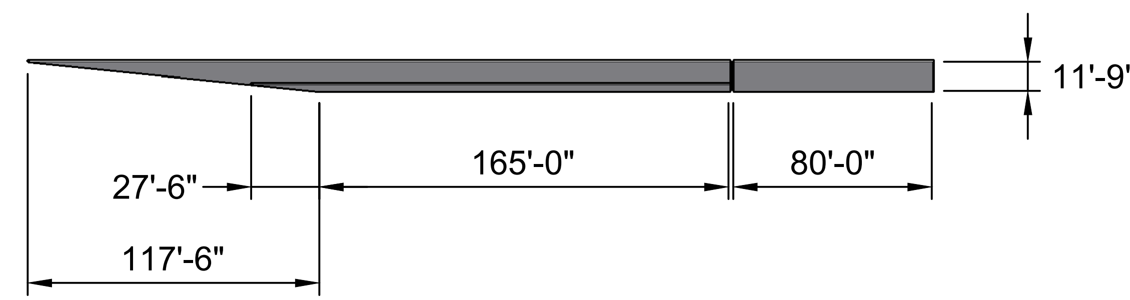


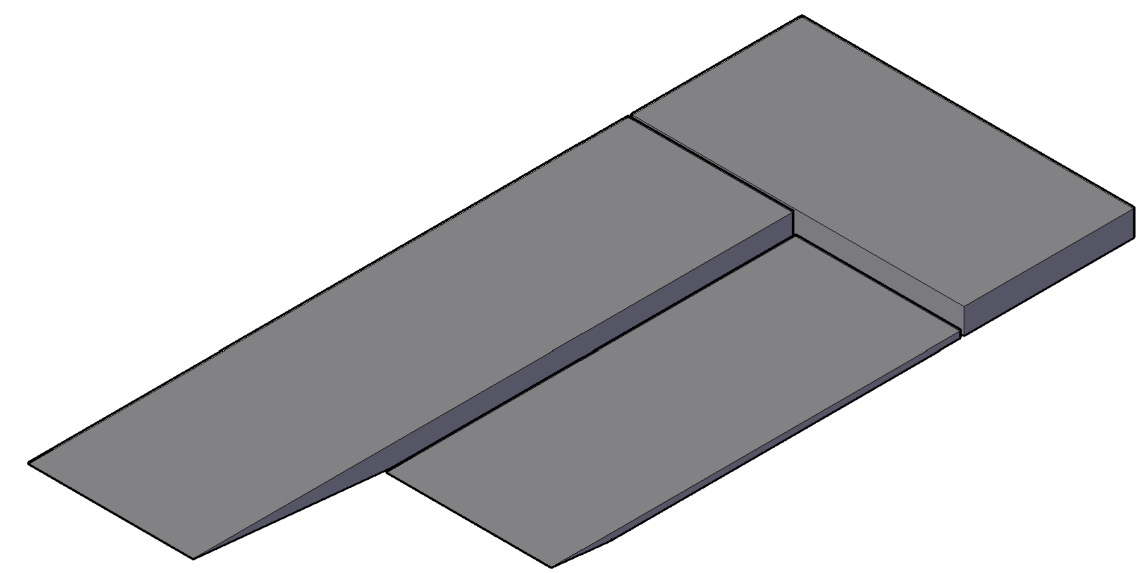


VOLUMES:

SETTLING TANK 1	38,096.10 FT^3
SETTLING TANK 2	203,752.34 FT^3
RECYCLE TANK	147,110.00 FT^3







BURNS McDONNELL

date 05/05/21

designed K. MATTHEWS

CLIFTY CREEK

SETTLING AND RECYCLE
TANK VOLUME

project 128991

contract -

SKM0001

2028-56

APPROVED
IN GENERAL
CLIFTY CREEK PLANT
UNITS 1 TO 6 INCL.
AMERICAN GAS & ELECTRIC SERVICE CORP.
PER [signature] DATE SEP 17 1954

DESIGN APPROVED.........

NOTICE

THIS DRAWING IS THE PROPERTY OF THE ALLEN-SHERMAN-HOFF CO., WYNNEWOOD, PENNA., AND IS LENT SUBJECT TO THE CONDITION THAT IT SHALL NOT BE REPRODUCED, COPIED, LENT OR OTHERWISE DISPOSED OF, DIRECTLY OR INDIRECTLY. IT SHALL NOT BE USED TO FURNISH ANY INFORMATION FOR THE MAKING OF DRAWINGS, PRINTS OR APPARATUS, OR PARTS THEREOF EXCEPT WHERE OTHERWISE SPECIFICALLY PROVIDED FOR BY CONTRACT AGREEMENT WITH THE A-S-H CO. THE EQUIPMENT AND DESIGNS SHOWN ON THIS DRAWING ARE COVERED EITHER BY ISSUED PATENTS, OR PENDING APPLICATIONS, IN U. S. AND FOREIGN COUNTRIES AND ARE THE EXCLUSIVE PROPERTY OF THE ALLEN-SHERMAN-HOFF CO.

REFERENCE DWGS.

ARRG'T SLAG HOPPER	2028-3J

NOTES

(F) INDICATES MATERIAL FURNISHED BY A-S-H CO.
(NF) " " " " OTHERS

NOTE

THE ALLEN-SHERMAN-HOFF COMPANY ACCEPTS NO RESPONSIBILITY FOR INTERFERENCES OR OBSTRUCTIONS NOT SHOWN ON THIS DRAWING.

MARK	REVISIONS	DATE	CHECKED
H			
G			
F			
E			
D			
C			
B			
A			

THE ALLEN-SHERMAN-HOFF CO.
WYNNEWOOD, PENNA.

DETAIL ARRG'T OF HOPPER REFRACTORY. OPENING

SCALE 3/8" = 1'-0"

DATE 9-13-54
DRAWN W.U.
TRACED
CHECKED H.P.L. 9-14-54
CONTRACT NO. CA-2028

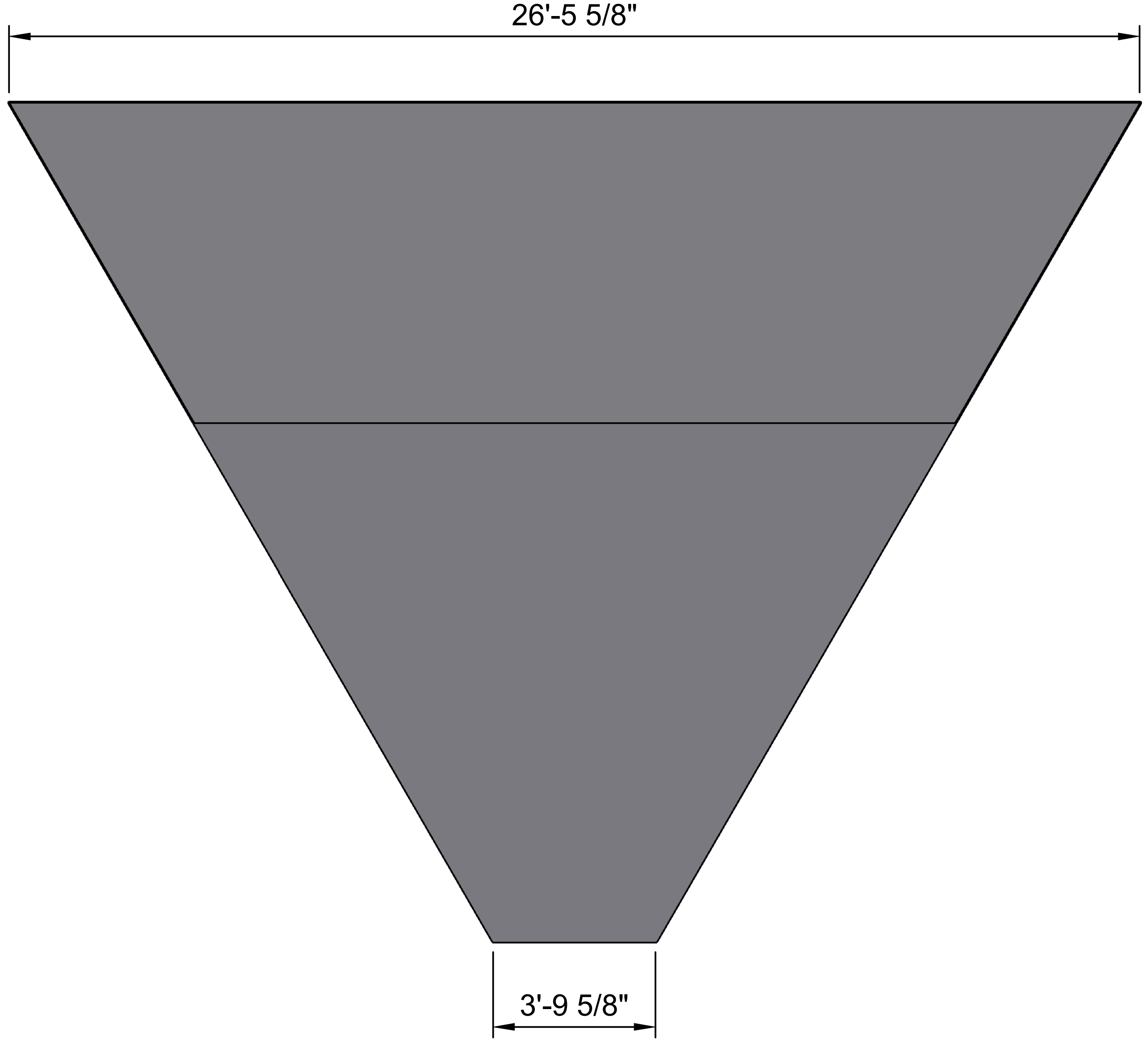
2028-56

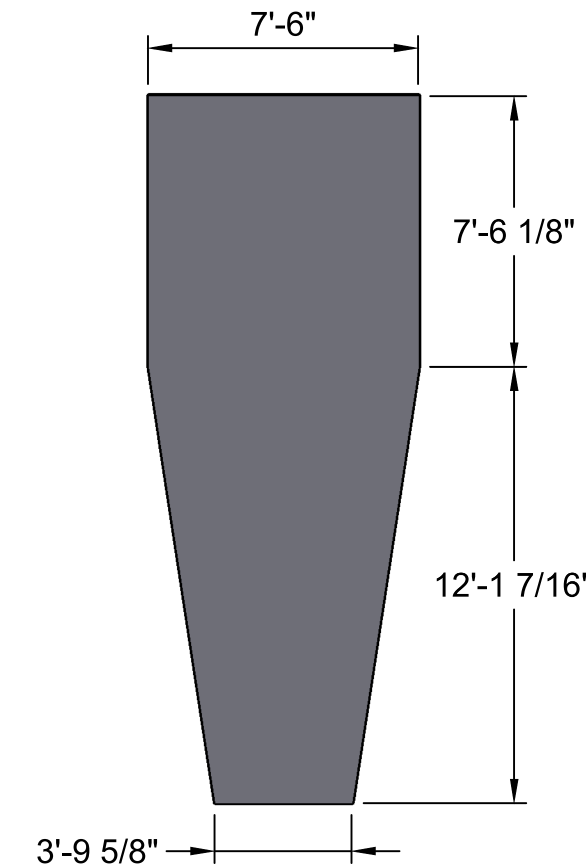
"Albanene" 1951. W. B. & S.

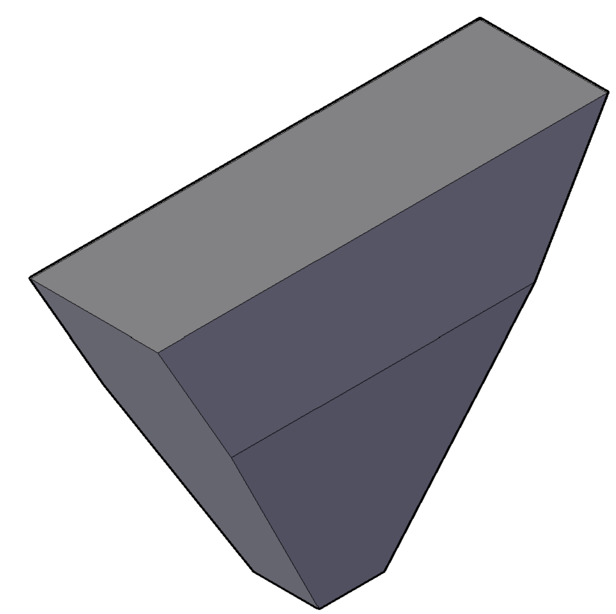
ccp_1-6_ash_2028-56_0

Brad Young-2/3/2017 09:22 AM

HOPPER:
VOLUME: 2,038.51 FT^3



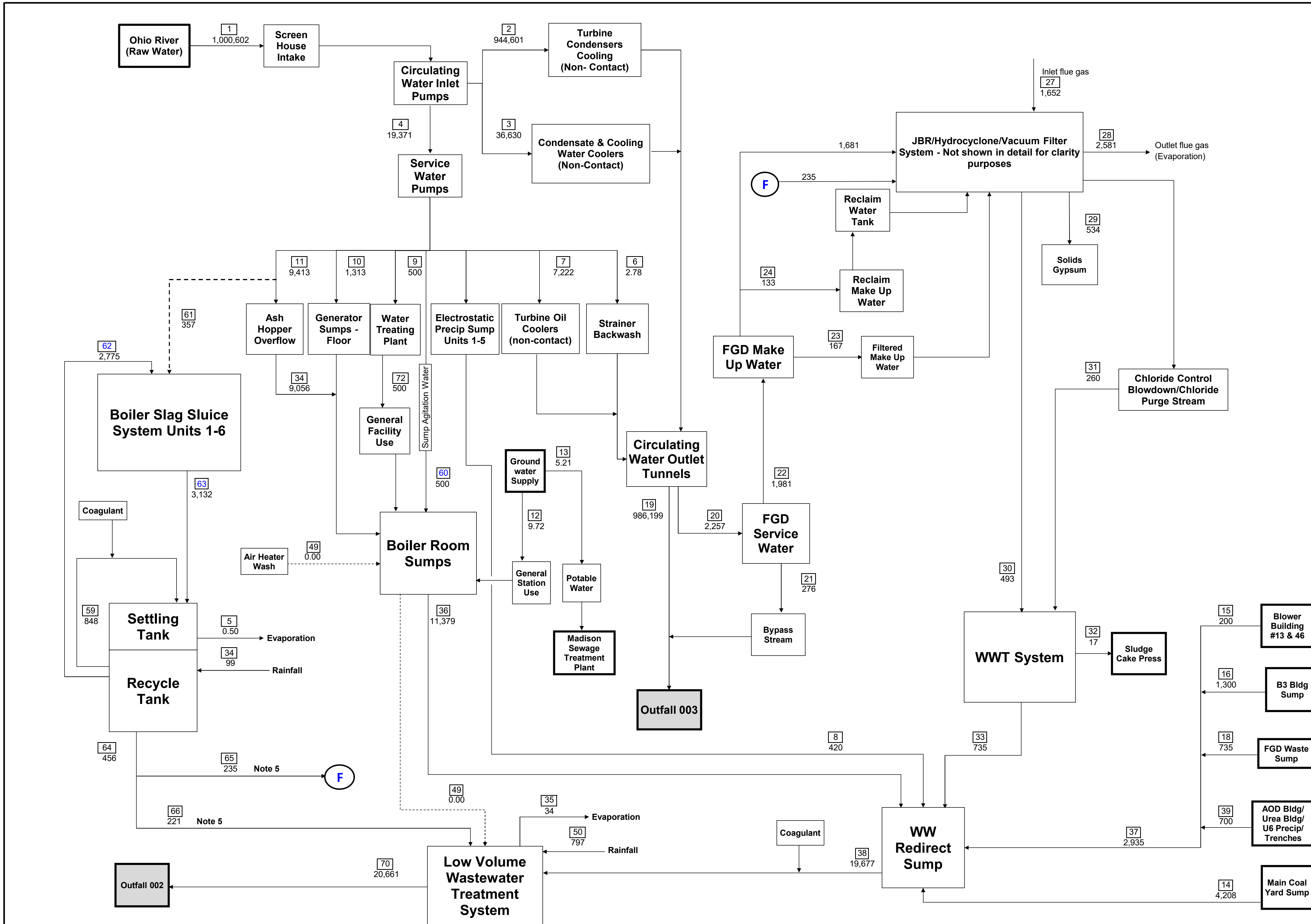




BURNS McDONNELL

date 05/07/21	**CLIFTY CREEK**	project 128991
designed K. MATTHEWS	HOPPER VOLUME	contract -
		SKM0002

Z:\CLIENTS\ENR\OVEC\128991_CLIFTYASHCONV\2_DESIGN\MECH\SYSTEM_DSGN\VOLUME SKETCHES\128991_SKM0002.DWG 5/10/2021 9:52 AM KJMATTHEWS



No.	Date	By	checked	Description
A	6/30/20	DXC	DRM	For Review
B	7/22/20	DXC	DRM	IFOR
C	8/17/20	DXC	BDH	IFOR - Added Yard Sum
D	9/11/20	DXC	BDH	Issued for Report
E	11/19/20	DXC	BDH	Revised Flows to FGD
F	12/7/20	DXC	BDH	BSHS to FGD Reclaim
G	5/7/21	DKE	BDH	Adjusted CYS flow

Notes:
1) Flows are shown in GPM.
2) Preliminary estimated blowdown rate to LVWTS will be maximum of 221 gpm (0.32 MGD)
3) Pond systems may not balance.
4) JBR max flows may not balance.
5) Blowdown flows are daily average or max values. Flow around settling/recycle basin may not balance.

Case Information

10	Case Number
2	Number of Units Sluicing Instantaneously
60	Duration of Sluice Event (min)
6	Number Sluice Event per Shift
Yes	Stormwater Included?

Case Description
Maximum Average Daily Flow

Legend
Continuous Flows
Intermittent Flows
Calculated Flow Stream Number
Metered Flow Stream Number

BURNS McDONNELL

date	detailed
12/7/2020	D. Chen
designed	checked
D. Chen	B. Hansen

OVEC IKEC
Ohio Valley Electric Corporation / Indiana-Kentucky Electric Corporation

WATER MASS BALANCE
Clifty Creek Power Plant
Madison, IN
Post Bottom Ash Reroute Conversion, and Fly Ash Conversion

Project	contract	
128991		
drawing		rev.
WMB - 10	---	G

sheet 1 of 1 sheets
file

CREATE AMAZING.

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
O 816-333-9400
F 816-333-3690
www.burnsmcd.com