COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

The Electronic Application of Duke Energy Kentucky, Inc. for a Certificate of Public Convenience and Necessity to Convert its Wet Flue Gas Desulfurization System from a Quicklime Reagent Process to a Limestone Reagent Handling System at its East Bend Generating Station and for Approval to Amend its Environmental Compliance Plan for Recovery by Environmental Surcharge Mechanism	)	Case No. 2024-00152

APPLICATION OF DUKE ENERGY KENTUCKY, INC.

Now comes Duke Energy Kentucky, Inc. (Duke Energy Kentucky or the Company), by and through counsel, pursuant to KRS 278.020(1), KRS 278.183, and 807 KAR 5:001 Sections 14 and 15, and hereby respectfully requests the Kentucky Public Service Commission (Commission) to issue an Order approving: (1) a Certificate of Public Convenience and Necessity (CPCN) for the construction and conversion of its existing Wet Flue Gas Desulfurization (WFGD) from a quicklime handling process to a limestone handling process to continue to meet existing environmental regulations (Limestone Conversion Project); (2) amendment of the Company's Environmental Compliance Plan (ECP) to include the Limestone Conversion Project construction and operation, and reagents; (3) recovery of the Limestone Conversion Project costs through the Company' Environmental Surcharge Mechanism (ESM); and (4) any other necessary relief and approvals. In support of this Application, Duke Energy Kentucky states as follows:

Introduction

1. Duke Energy Kentucky is a Kentucky corporation with its principal office and

principal place of business at 139 East Fourth Street, Cincinnati, Ohio 45202. The Company's local office in Kentucky is Duke Energy Erlanger Operations Center, 1262 Cox Road, Erlanger, Kentucky 41018. The Company further states that its electronic mail address for purposes of this matter is KYfilings@duke-energy.com.

2. Duke Energy Kentucky is a utility engaged in the gas and electric business. Duke Energy Kentucky purchases, sells, stores and transports natural gas in the Boone, Bracken, Campbell, Gallatin, Grant, Kenton, and Pendleton Counties. Duke Energy Kentucky also generates electricity, which it distributes and sells, in the Boone, Campbell, Grant, Kenton, and Pendleton Counties.

3. Pursuant to 807 KAR 5:001, Section 14(2), Duke Energy Kentucky states that it was originally incorporated in the Commonwealth of Kentucky on March 20, 1901, and attests that it is currently in good standing in said Commonwealth. A copy of a certificate of good standing is included as Exhibit 1 to this Application.

4. Pursuant to KRS 278.380, Duke Energy Kentucky waives any right to service of Commission orders by mail for purposes of this proceeding only. Copies of all orders, pleadings, and other communications related to this proceeding should be directed to:

Rocco O. D'Ascenzo
Deputy General Counsel
Duke Energy Kentucky, Inc.
139 East Fourth Street
Cincinnati, OH 45202
rocco.d'ascenzo@duke-energy.com

Larisa Vaysman
Associate General Counsel
Duke Energy Kentucky, Inc.
139 East Fourth Street
Cincinnati, OH 45202
Larisa.vaysman@duke-energy.com

and

Sarah E. Lawler
Vice President, Rates and Regulatory Strategy Ohio/Kentucky
Duke Energy Kentucky, Inc.
139 East Fourth Street
Cincinnati, OH 45202
sarah.lawler@duke-energy.com

Background

5. On or about December 5, 2003, in Case No. 2003-00252, the Commission approved Duke Energy Kentucky's acquisition of three generating stations from Duke Energy Ohio; East Bend Unit 2 (East Bend), Miami Fort Unit 6 and Woodsdale. Effective January 1, 2006, Duke Energy Kentucky completed the acquisition of these three generating stations. Effective December 31, 2014, Duke Energy Kentucky became the sole owner of East Bend, having completed the purchase of The Dayton Power and Light Company's 31 percent interest in the station as authorized by the Commission in Case No. 2014-00201.[1]

6. East Bend is a 600 megawatt (MW) (net summer rating) coal-fired steam unit located along the Ohio River in Boone County, Kentucky, which was commissioned in 1981. East Bend is the Company's only baseload and coal-fired generator, providing the majority of the capacity to serve the Company's Northern Kentucky load.

7. There are several environmental programs promulgated by the United States Environmental Protection Agency (U.S. EPA) under the Clean Air Act (CAA) as well as the Commonwealth of Kentucky, that impact all of the Company's generating stations, and

[1] *In the Matter of the Application of Duke Energy Kentucky, Inc., for (1) A Certificate of Public Convenience and Necessity Authorizing the Acquisition of the Dayton Power & Light Company's 31% Interest in the East Bend Generating Station; (2) Approval of Duke Energy Kentucky, Inc.'s Assumption of Certain Liabilities in Connection with the Acquisition; (3) Deferral of Costs Incurred as Part of the Acquisition; and (4) All Other Necessary Waivers, Approvals, and Relief,* Case No. 2014-00201 *(*Ky.P.S.C. Dec. 4, 2014).

particularly East Bend. The U.S. EPA regulations are the primary drivers of Duke Energy Kentucky's environmental compliance strategies for its plants. These CAA regulations are as follows: the Mercury and Air Toxics Standard (MATS Rule) and the Cross State Air Pollution Rule (CSAPR) including the U.S. EPA's September 2016 final CSAPR Update Rule. The regulations that most directly impact the Company's ash handling strategy as it pertains to East Bend are the CAA and the CCR Final Rule and ELG Final Rule

8. The major pollution control features at East Bend include a high-efficiency hot side electrostatic precipitator, a selective catalytic reduction control (SCR) system designed to reduce nitrogen oxide (NO_x) emissions by 85 percent, and a WFGD system designed to remove sulfur dioxide (SO_2) emissions to an average of 97 percent. The WFGD currently utilizes a magnesium enhanced lime (MEL) technology to control the station's SO_2 emissions. This MEL technology is unique to the 1980's vintage WFGD and is the only one of its kind within the Duke Energy fleet of coal-fired generation.

9. The MEL technology relies on pebble quicklime containing a small fraction of dolomite as the reagent. Dolomite is comprised of about 50% magnesium oxide which, when added to the absorber with the lime reagent, dissolves and promotes elevated concentrations of sulfite. Sulfite is an effective source of liquid-phase alkalinity, which facilitates high SO_2 removal efficiency for boilers firing high sulfur coal. The primary benefit of scrubbing with MEL is that the required absorber recycle slurry pumping capacity is lower than limestone-based FGD systems – typically in the range of 40 to 50 gallons per 1,000 cubic feet of treated flue gas – and results in smaller pumps with lower power requirements

10. Despite some process advantages, MEL scrubbing has several disadvantages including the production of calcium sulfite ($CaSO_3$) solids that are typically difficult to dewater.

As a result, significant quantities of fly ash and lime must be added to the filtered solids to produce a stable product, called poz-o-tec, that is suitable for disposal in an onsite landfill. Another disadvantage of the MEL scrubbing process is the reliance on an expensive lime reagent – quicklime, and stabilization additives which in recent years, has detrimentally impacted East Bend's competitiveness in the power generation markets.

11. At the time of its construction, and in years past, the cost of the quicklime was reasonable and was a popular choice for SO_2 removal in the Ohio River Valley. In the early 1980s, when the system at East Bend was designed, the cost of lime was modest; delivered prices were about $40 per ton. Since then, the price for delivered quicklime has risen dramatically to well over $100 per ton. The approximate cost at East Bend in 2022 was $133 per ton. However, with many Midwest power plants retiring or converting to lower cost reagents such as limestone, the availability of supply, number of suppliers, and quality of MEL has been adversely impacted creating exponential increasing costs and risks to the future availability of supply. A request for proposal (RFP) issued in mid-2023 produced a lime cost per ton that is more than double that paid in 2022. East Bend has experienced a 247 percent increase in the mag-lime reagent cost over the last 10 years and a 125 percent increase in in the last two years. Due to the energy intensity to produce the MEL reagent product, the Company expects the reagent to continually escalate at a rate double that of limestone.

12. Duke Energy Kentucky has recently been made aware of additional limitations to MEL supply leading to material cost increases and a risk in availability of supply alternatives creating future availability concerns.

13. If Duke Energy Kentucky is unable to procure the reagents necessary to operate its WFGD, the Company will not be able to comply with the aforementioned environmental

regulations or continue operating East Bend in compliance and would likely be forced to retire the plant prematurely. The reagent supply scarcity and associated price risks for Duke Energy Kentucky must be addressed to continue providing cost-effective, safe and reliable service to our Kentucky customers.

14. The increase in current lime-based reagent costs negatively impacts the dispatch costs for East Bend. As the cost for the existing lime process continues to escalate, the value of the unit in the wholesale market continues to diminish and its capacity factor decreases. This results in Duke Energy Kentucky purchasing more economy power from the market and not generating itself.

15. To address the rising cost of the quicklime reagent, and the risk of an inability to operate the unit absent a viable reagent replacement, Duke Energy Kentucky's fuel sourcing organization has explored several alternatives, including 1) the Lime Stone Conversion project; 2) conducting requests for proposals (RFP) to explore alternative sources for the existing MEL product with the correct chemical composition to operate the WFGD system; and 3) system renovations for onsite mixing of magnesium hydroxide with hi-calcium quicklime to create a replacement mag-lime product that possesses similar chemical composition to operate the existing WFGD system.

16. An RFP alternative is not a viable solution going forward as in its most recent solicitation, the Company did not receive competitive offers, which resulted in significant cost increases.

17. The onsite mixing of chemicals with high-calcium quicklime was a more expensive alternative as it would require the Company to purchase significant amounts of magnesium hydroxide to meet the correct chemical content specifications to operate the WFGD increasing the

Company's reagent costs and further eroding the unit's economics in the competitive markets. Moreover, this strategy did not alleviate the scarcity risk with obtaining a lime-based reagent product. Because this solution does not sufficiently mitigate the risk of a lack of certainty of reagent supplies it was not a reasonable and viable solution.

18. The conversion of the WFGD to a limestone inhibited oxidation process (LSIO) is the most economic and most reasonable solution. The LSIO chemistry will improve the dewatering properties of the calcium sulfite solids by creating larger, more regular, and symmetric crystals and provide a lower cost alternative for reagents going forward. This proposed Limestone Conversion Project process should result in lower reagent costs than the current mag-lime-based process, which in turn should provide downward pressure on East Bend's total dispatch cost in the wholesale energy markets and should result in an increased capacity factor.

19. The Limestone Conversion Project scope includes modifications to existing equipment and is based on a turnkey delivery, including engineering, procurement, and construction. The conversion of the East Bend WFGD system to LSIO operation involves several process, equipment, and system changes including:

a. Minor modifications to reagent receiving, conveying, and storage systems;
b. Installation of new reagent feeders and conveying equipment;
c. Installation of new limestone pre-crushers and grinding mills;
d. Refurbishment and resheaving of absorber recycle pumps
e. Installation of new absorber recycle slurry piping, cross-tie piping, spray headers, and spray nozzles;
f. Operation of all absorber recycle slurry pumps to enhance SO_2 removal performance;
g. Modification of the absorber trays to enhance SO_2 removal performance;
h. Installation of a buffer additive storage and feed system to enhance SO_2 removal performance;
i. Replacement of existing emulsified sulfur storage tank and fees system to improve system reliability and inhibit sulfite oxidation

j. Upgrade of mist eliminator wash water supply system;

k. Replacement of waste slurry storage tank, thickener underflow sludge tank and lime slurry tank agitators; and

l. Installation of a filtrate purge system to control process chloride levels.

Modeling shows that conversion to a LSIO- limestone reagent process is economic in most future scenarios and produces a reduced variable operational cost and lower dispatch cost reducing the Company's reliance upon market purchases for power. Although the Limestone Conversion Project will likely result in a higher overall reagent expenditure due to the anticipated increased economic dispatch of the plant necessitating a greater need and consumption of the limestone reagent, the cost per ton of reagent is anticipated to be significantly lower due to the Limestone Conversion Project. The current class 4 estimated capital cost for the project is approximately $125.8 million. As explained in accompanying testimony, the conversion would reduce total variable operating and maintenance and produce estimated benefits to customers in terms of fuel cost savings and additional off system sales revenues as compared to continuing the existing processes. This increased economics of East Bend is a benefit to customers as it will likely reduce the need for replacement power from the market.

Request for Certificate of Public Convenience and Necessity

20. Duke Energy Kentucky requests Commission authorization through a CPCN to construct the Limestone Conversion Project.

21. In accordance with KRS 278.020, No utility may construct or acquire any facility to be used in providing utility service to the public until it has obtained a CPCN from the Kentucky Public Service Commission.[2] To obtain a CPCN, the utility must demonstrate a need for such facilities and an absence of wasteful duplication.[3] "Need" requires:

[2] KRS 278.020(1)(a).
[3] *Kentucky Utilities Co. v. Pub. Serv. Comm 'n*, 252 S.W.2d 885 (Ky. 1952).

> [A] showing of a substantial inadequacy of existing service, involving a consumer market sufficiently large to make it economically feasible for the new system or facility to be constructed or operated. [T]he inadequacy must be due either to a substantial deficiency of service facilities, beyond what could be supplied by normal improvements in the ordinary course of business; or to indifference, poor management or disregard of the rights of consumers, persisting over such a period of time as to establish an inability or unwillingness to render adequate service.[4]

"Wasteful duplication" is defined as "an excess of capacity over need" and "an excessive investment in relation to productivity or efficiency, and an unnecessary multiplicity of physical properties."[5] To demonstrate that a proposed facility does not result in wasteful duplication, Duke Energy Kentucky must demonstrate that a thorough review of all reasonable alternatives has been performed. Although cost is a factor, selection of a proposal that ultimately costs more than an alternative does not necessarily result in wasteful duplication.[6] All relevant factors must be balanced.[7]

[4] *Id*. at 890.
[5] *Id.*
[6] *See Kentucky Utilities Co. v. Pub. Serv. Comm'n*, 390 S.W.2d 168, 175 (Ky. 1965). *See also Case No. 2005-00089, Application of East Kentucky Power Cooperative, Inc. for a Certificate of Public Convenience and Necessity for the Construction of a 138 kV Electric Transmission Line in Rowan County, Kentucky* (Ky. PSC Aug. 19, 2005), final Order
[7] *Case No. 2005-00142, Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for a Certificate of Public Convenience and Necessity for the Construction of Transmission Facilities in Jefferson, Bullitt, Meade, and Hardin Counties, Kentucky* (Ky. PSC Sept. 8, 2005).

22. In accordance with 807 KAR 5:001 Section 12(2)(a)-(i), Duke Energy Kentucky is filing the following financial information in Exhibit 2, which is incorporated herein and made a part of this Application filed in this proceeding:

Exhibit 2 Page	**Description**	**807 KAR 5:001 Section Reference**
	Financial Exhibit	12(2)
1	Amount and kinds of stock authorized	12(2)(a)
1	Amount and kinds of stock issued and outstanding	12(2)(b)
1	Terms of preference or preferred stock	12(2)(c)
1	Brief description of each mortgage on property of Duke Energy Kentucky	12(2)(d)
1-2	Amount of bonds authorized and issued and related information	12(2)(e)
2	Notes outstanding and related information	12(2)(f)
2-3	Other indebtedness and related information	12(2)(g)
3	Dividend information	12(2)(h)
3-5	Detailed Income Statement and Balance Sheet	12(2)(i)

23. Additionally, requirements for Applications requesting a CPCN related to a new construction or extension are set forth in 807 KAR 5:001 § 14 and 15(2) *et seq.*, and include the following requirements:

Section 14:

(1) Each application shall state the full name, mailing address, and electronic mail address of the applicant, and shall contain fully the facts on which the application is based, with a request for the order, authorization, permission, or certificate desired and a reference to the particular law requiring or providing for the information.

(2) If a corporation, the applicant shall identify in the application the state in which it is incorporated and the date of its incorporation, attest that it is currently in good standing in the state in which it is incorporated, and, if it is not a Kentucky corporation, state if it is authorized to transact business in Kentucky.[8]

[8] 807 KAR 1:005 § 14; Sub sections 2 and 4 are inapplicable as Duke Energy Kentucky is a Kentucky Corporation.

Section 15(2):

(a) The facts relied upon to show that the proposed construction or extension is or will be required by public convenience or necessity;
(b) Copies of franchises or permits, if any, from the proper public authority for the proposed construction or extension, if not previously filed with the commission;
(c) A full description of the proposed location, route, or routes of the proposed construction or extension, including a description of the manner of the construction and the names of all public utilities, corporations, or persons with whom the proposed construction or extension is likely to compete;
(d) One (1) copy in portable document format on electronic storage medium and two (2) copies in paper medium of:
    1. Maps to suitable scale showing the location or route of the proposed construction or extension, as well as the location to scale of like facilities owned by others located anywhere within the map area with adequate identification as to the ownership of the other facilities; and
    2. Plans and specifications and drawings of the proposed plant, equipment, and facilities;
(e) The manner in detail in which the applicant proposes to finance the proposed construction or extension; and
(f) An estimated annual cost of operation after the proposed facilities are placed into service.

24. Section 14- Name, Address, electronic mail address of Applicant, facts upon which the Application is based, and reference to the particular law: See paragraphs 1 through 23 above, which are incorporated by reference as if fully restated herein.

25. Section 15(2)(a)- Statement of Need: The facts relied upon to demonstrate the Limestone Conversion Project is required by public convenience and necessity are set forth within this Application and in the Testimony submitted in support thereof. In summary, the existing reagent process needed to operate the Company's East Bend WFGD is insufficient to continue its operation due to unreasonable and uncontrollable increases in reagent prices, a lack of competitive RFP responses, scarcity of supply and an overall risk of an inability to comply and continue operating the station if a suitable replacement is not timely implemented. Duke Energy Kentucky has explored several alternative strategies and has determined that the Limestone Conversion

Project is the least-cost and most reasonable solution to continue complying with Federal environmental regulations, including the CAA.

26. Section 15(2)(b)- Copies of Franchises and Permits: The Company has previously filed with the Commission the applicable franchises from the proper public authorities. In addition, because much of the existing equipment will be used as part of the Limestone Conversion, only minor air source permit modifications will be necessary to construct the Limestone Conversion Project. A copy of the minor air source permit application, submitted on July 17, 2012 is attached as Exhibit 3.

27. Section 15(2)(c)- Description of the Proposed Location, Manner of Construction, and Competing Utilities, Companies, or Persons: Exhibit 4 contains maps of the East Bend facility and depicts the approximate location of the Limestone Conversion construction. Exhibit 3 further contains a description of how the construction will occur. Additionally, the direct testimony accompanying this Application further describes the manner of construction. This project will be constructed on the existing East Bend site, which is owned by Duke Energy Kentucky and will be used by the Company to continue to meet environmental regulations impacting the operation of the East Bend station. Consequently, there are no other utilities, persons or corporations competing with the proposed facilities to be constructed.

28. Section 15(2)(d)- Maps and Specifications: Exhibit 3 includes overhead maps of the site showing the location of the East Landfill and closure construction. Exhibit 4 includes the design plans, specifications, and drawings of the East Landfill closure.

29. Section 15(2)(e)- Manner of Proposed Financing: the Company states that the total, fully loaded projected costs for Limestone Conversion Project is $125.8million, including contingency and escalation. Duke Energy Kentucky seeks to recover these costs through its ESM

as part of its ECP. Duke Energy Kentucky expects to finance the costs of construction with a combination of new debt and equity and through ongoing operations. The mix of debt and equity used to finance the project will be determined so as to allow Duke Energy Kentucky to maintain its investment-grade credit rating.

30. Section 15(2)(f)- Ongoing Cost of Operation: The estimated incremental ongoing costs of operation, will be minimal (<$10,000 per year, excluding the reagent commodity.

Request for Recovery by Environmental Surcharge and to Amend Duke Energy Kentucky's Environmental Compliance Plan.

31. Duke Energy Kentucky is seeking Commission authorization to amend its Environmental Compliance Plan, (ECP) to include the construction, operation and maintenance of the Limestone Conversion Project as well as the associated reagents. This conversion will enable Duke Energy Kentucky to continue operation of East Bend in compliance with applicable environmental regulations, including but not limited to, the U.S. EPA CAA, MATS, and CSAPR, as well as other environmental regulations. .

32. Duke Kentucky's ESM and ECP are governed by KRS 278.183 which provides in relevant part:

> (1) . . . [A] utility shall be entitled to the current recovery of its costs of complying with the Federal Clean Air Act as amended and those federal, state, or local environmental requirements which apply to coal combustion wastes and by-products from facilities utilized for production of energy from coal in accordance with the utility's compliance plan . . .
>
> (2) Recovery of costs pursuant to subsection (1) of this section that are not already included in existing rates shall be by environmental surcharge to existing rates imposed as a positive or negative adjustment to customer bills in the

second month following the month in which costs are incurred. Each utility, before initially imposing an environmental surcharge pursuant to this subsection, shall thirty (30) days in advance file a notice of intent to file said plan and subsequently submit to the commission a plan, including any application required by KRS 278.020(1), for complying with the applicable environmental requirements set forth in subsection (1) of this section. The plan shall include the utility's testimony concerning a reasonable return on compliance-related capital expenditures and a tariff addition containing the terms and conditions of a proposed surcharge as applied to individual rate classes. Within six (6) months of submittal, the commission shall conduct a hearing upon the request of a party, and shall, regardless of whether or not a hearing is requested:

(a) Consider and approve the plan and rate surcharge if the commission finds the plan and rate surcharge reasonable and cost-effective for compliance with the applicable environmental requirements set forth in subsection (1) of this section;

(b) Establish a reasonable return on compliance-related capital expenditures; and

(c) Approve the application of the surcharge.

Duke Energy Kentucky submits that the CPCN is necessary to comply with existing environmental regulations affecting its coal-fired generation. The Company is entitled to amend its ECP and ESM because: 1) the need for this Limestone Conversion Project CPCN arises from the need to continue complying with environmental regulations applicable to coal combustion generating facilities and the current method is experiencing and will continue to experience significant price increases and there is a serious risk that the existing reagent process will no longer

be able to function due to resource scarcity; 2) the costs of construction and operation of this Limestone Conversion Project CPCN are not already included in existing rates; and 3) the ECP and ESM are reasonable and cost-effective as it results in a lower cost for customers and avoids the risk of not having access to necessary reagents and premature plant closure.

33. This Application and supporting testimony and exhibits are available for public inspection at Duke Energy Kentucky's local Kentucky office located at Duke Energy Erlanger Operations Center, 1262 Cox Road, Erlanger, Kentucky 41018. The Company is giving notice to the public of the proposal to recover the Limestone Conversion Project through its existing environmental surcharge by newspaper publication. The Company is also posting this Application on its website at www.duke-energy.com. An initial Certificate of Notice and Publication is filed with this Application as Exhibit 5. A Certification of Completed Notice and Publication will be filed with the Commission upon completion of same pursuant to 807 KAR 5:001, Section 17(3)(b).

34. Pursuant to KRS 278.183(1), Duke Energy Kentucky is "entitled to the current recovery of its costs of complying with the Federal Clean Air Act as amended and those federal, state, or local environmental requirements which apply to coal combustion wastes and byproducts from facilities utilized for production of energy from coal in accordance with the utility's compliance plan."

35. A detailed summary of the facts and compliance requirements supporting this Application is set forth in the direct testimony and exhibits of the Company's witnesses:

36. The testimony of John A. Verderame, Vice President of Fuels and Systems Optimization, who discusses the need and justification of the Limestone Conversion Project, alternatives considered, and why the Limestone Conversion Project is the least cost and most reasonable solution;

37. The testimony of Chad M. Donner, Project Manager, describes the engineering and construction aspects of the Limestone Conversion Project and the estimated costs;

38. The testimony of J. Michael Geers, P.E., Manager Environmental Services, discusses the environmental regulations that necessitate the Limestone Conversion Project; and

39. The testimony of Sarah E. Lawler, Vice President, Rates and Regulatory Strategy for Ohio/ Kentucky provides an overview of the estimated impact of the Limestone Conversion on Rider ESM, the recovery of the cost of construction and ongoing operation and maintenance, the requested ROE as authorized by the Commission in the Company's most recent electric base rate case proceeding and the estimated monthly bill impact for residential and non-residential customers.

40. Duke Energy Kentucky proposed Environmental Surcharge Mechanism tariff sheet, K.Y.P.S.C. No. 19, Sheet No. 76 is attached as Exhibit 6 to this Application, and reflects changes the issue and effective dates and to include the Limestone Conversion Project and the new limestone reagent. In accordance with KRS 278.183(2), the ESM tariff has an issue date of July 25, 2024, and is proposed to be effective on August 25, 2024, to begin recovery of construction activities following Commission approval of the requested CPCN. The Company projects that bills issued following Commission approval will reflect the revised environmental surcharge.

WHEREFORE, Duke Energy Kentucky respectfully requests the Kentucky Public Service Commission to enter an order: 1) granting Duke Energy Kentucky a Certificate of Public Convenience and Necessity to construct, operate and maintain its Limestone Conversion Project; 2) approving the amendment to Duke Energy Kentucky's ECP to include the construction and operation of the Limestone Conversion Project and associated reagents; 3) approving the proposed ESM tariff for recovery of the costs of for bills rendered following Commission approval; 4)

recovery of the overall ROE requested herein; and 5) granting such other relief as Duke Energy Kentucky may be entitled under the law.

Respectfully submitted,

DUKE ENERGY KENTUCKY, INC.

/s/ Rocco O. D'Ascenzo

Rocco O. D'Ascenzo (92796)
Deputy General Counsel
Duke Energy Business Services LLC
139 East Fourth Street, 1303-Main
Cincinnati, Ohio 45201-0960
Phone: (513) 287-4320
Fax: (513) 287-4385
E-mail: rocco.d'ascenzo@duke-energy.com

CERTIFICATE OF SERVICE

This is to certify that the foregoing electronic filing is a true and accurate copy of the document being filed in paper medium; that the electronic filing was transmitted to the Commission on July 25 2024; and that there are currently no parties that the Commission has excused from participation by electronic means in this proceeding.

John G. Horne, II
The Office of the Attorney General
Utility Intervention and Rate Division
700 Capital Avenue, Ste 118
Frankfort, Kentucky 40601

/s/Rocco D'Ascenzo
Rocco D'Ascenzo

Commonwealth of Kentucky
Michael G. Adams, Secretary of State

Michael G. Adams
Secretary of State
P. O. Box 718
Frankfort, KY 40602-0718
(502) 564-3490
http://www.sos.ky.gov

Certificate of Existence

Authentication number: 316232
Visit https://web.sos.ky.gov/ftshow/certvalidate.aspx to authenticate this certificate.

I, Michael G. Adams, Secretary of State of the Commonwealth of Kentucky, do hereby certify that according to the records in the Office of the Secretary of State,

DUKE ENERGY KENTUCKY, INC.

DUKE ENERGY KENTUCKY, INC. is a corporation duly incorporated and existing under KRS Chapter 14A and KRS Chapter 271B, whose date of incorporation is March 20, 1901 and whose period of duration is perpetual.

I further certify that all fees and penalties owed to the Secretary of State have been paid; that Articles of Dissolution have not been filed; and that the most recent annual report required by KRS 14A.6-010 has been delivered to the Secretary of State.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my Official Seal at Frankfort, Kentucky, this 25th day of July, 2024, in the 233rd year of the Commonwealth.

COMMONWEALTH OF KENTUCKY
OFFICE OF SECRETARY OF STATE

Michael G. Adams
Secretary of State
Commonwealth of Kentucky
316232/0052929

FINANCIAL EXHIBIT

(1) Section 12(2)(a) Amount and kinds of stock authorized.

1,000,000 shares of Capital Stock $15 par value amounting to $15,000,000 par value.

(2) Section 12(2)(b) Amount and kinds of stock issued and outstanding.

585,333 shares of Capital Stock $15 par value amounting to $8,779,995 total par value. Total Capital Stock and Additional Paid-in Capital as of May 31, 2024:

Capital Stock and Additional Paid-in Capital
As of May 31, 2024
($ per 1,000)

Capital Stock	$8,780
Premiums thereon	18,839
Total Capital Contributions from Parent (since 2006)	334,311
Contribution from Parent Company for Purchase of Generation Assets	140,061
Total Capital Stock and Additional Paid-in-Capital	$501,991

(3) Section 12(2)(c) Terms of preference or preferred stock, cumulative or participating, or on dividends or assets or otherwise.

There is no preferred stock authorized, issued or outstanding.

(4) Section 12(2)(d) Brief description of each mortgage on property of applicant, giving date of execution, name of mortgagor, name or mortgagee, or trustee, amount of indebtedness authorized to be secured, and the amount of indebtedness actually secured, together with any sinking fund provision.

Duke Energy Kentucky does not have any liabilities secured by a mortgage.

(5) Section 12(2)(e) Amount of bonds authorized, and amount issued, giving the name of the public utility which issued the same, describing each class separately, and giving the date of issue, face value, rate of interest, date of maturity and how secured, together with the amount of interest paid thereon during the last fiscal year.

The Company has thirteen outstanding issues of unsecured senior debentures issued under an Indenture dated December 1, 2004, between itself and Deutsche Bank Trust Company Americas, as Trustee, as supplemented by eight Supplemental Indentures. The Indenture

allows the Company to issue debt securities in an unlimited amount from time to time. The Debentures issued and outstanding under the Indenture are the following:

Supplemental Indenture	Date of Issue	Principal Amount Authorized and Issued	Principal Amount Outstanding	Rate of Interest	Date of Maturity	Interest Paid Year 2023
1st Supplemental	3/7/2006	65,000,000	65,000,000	6.20%	3/10/2036	4,030,000
3rd Supplemental	1/5/2016	45,000,000	45,000,000	3.42%	1/15/2026	1,539,000
3rd Supplemental	1/5/2016	50,000,000	50,000,000	4.45%	1/15/2046	2,225,000
4th Supplemental	9/7/2017	30,000,000	30,000,000	3.35%	9/15/2029	1,005,000
4th Supplemental	9/7/2017	30,000,000	30,000,000	4.11%	9/15/2047	1,233,000
4th Supplemental	9/7/2017	30,000,000	30,000,000	4.26%	9/15/2057	1,278,000
5th Supplemental	10/3/2018	40,000,000	40,000,000	4.18%	10/15/2028	1,672,000
5th Supplemental	12/12/2018	35,000,000	35,000,000	4.62%	12/15/2048	1,617,000
6th Supplemental	7/17/2019	40,000,000	40,000,000	4.32%	7/15/2049	1,728,000
7th Supplemental	9/15/2019	95,000,000	95,000,000	3.23%	10/1/2025	3,068,500
7th Supplemental	9/15/2019	75,000,000	75,000,000	3.56%	10/1/2029	2,670,000
8th Supplemental	9/15/2020	35,000,000	35,000,000	2.65%	9/15/2030	927,500
8th Supplemental	9/15/2020	35,000,000	35,000,000	3.66%	9/15/2050	1,281,000
			605,000,000			24,274,000

(6) Section 12(2)(f) Each note outstanding, giving date of issue, amount, date of maturity, rate of interest, in whose favor, together with amount of interest paid thereon during the last fiscal year.

Duke Energy Kentucky does not have any outstanding notes as of 5/31/2024.

(7) Section 12(2)(g) Other indebtedness, giving same by classes and describing security, if any, with a brief statement of the devolution or assumption of any portion of such indebtedness upon or by person or corporation if the original liability has been transferred, together with amount of interest paid thereon during the last fiscal year.

The Company has two series of Pollution Control Revenue Refunding Bonds issued under a Trust Indenture dated as of August 1, 2006 and a Trust Indenture dated as of December 1, 2008, between the County of Boone, Kentucky and Deutsche Bank National Trust Company as Trustee. The Company's obligation to make payments equal to debt service on the Bonds is evidenced by a Loan Agreement dated as of August 1, 2006 and December 1, 2008 between the County of Boone, Kentucky and Duke Energy Kentucky. The Bonds issued under the Indentures are below. On Nov 1, 2021, the Company bought in the Series 2008A bond, and remarketed the bond in June 2022.

Indenture	Date of Issue	Principal Amount Authorized and Issued	Principal Amount Outstanding	Rate of Interest	Date of Maturity	Interest Paid Year 2023
Series 2010	11/24/2010	26,720,000	26,720,000	3.86% (1)	8/1/2027	1,031,392
Series 2008A	12/01/2011	50,000,000	50,000,000	3.70% (2)	8/1/2027	1,850,000
			76,720,000			2,881,392

(1) The bonds were issued at a variable-rate and were swapped to a fixed rate of 3.86% for the life of the debt.

(2) Bonds were remarketed in June 2022 under a fixed-to-maturity interest rate mode (3.70% coupon).

The Company has no outstanding financing leases as of May 31, 2024.

The Company also has $54,712,000 of money pool borrowings outstanding as of May 31, 2024, $25,000,000 of which is classified as Long-Term Debt payable to affiliated companies. This obligation, which is short-term by nature, is classified as long-term due to Duke Energy Kentucky's intent and ability to utilize such borrowings as long-term financing.

(8) Section 12(2)(h) Rate and amount of dividends paid during the last five (5) previous fiscal years, and the amount of capital stock on which dividends were paid each year.

DIVIDENDS PER SHARE

Year Ending	Per Share	Total	No. of Shares	Par Value of Stock
31-Dec-19	0	0	585,333	8,779,995
31-Dec-20	0	0	585,333	8,779,995
31-Dec-21	0	0	585,333	8,779,995
31-Dec-22	0	0	585,333	8,779,995
31-Dec-23	0	0	585,333	8,779,995

(9) Section 12(2)(i) Detailed Income Statement and Balance Sheet.

See the attached pages for a detailed Income Statement for the five months ended May 31, 2024 and a detailed Balance Sheet as of May 31, 2024.

DUKE ENERGY KENTUCKY, INC.
CONDENSED STATEMENTS OF OPERATIONS
(Unaudited)
(In thousands)

	Five Months Ended May 31 2024
Operating Revenues	
Electric	197,850
Gas	71,385
Total operating revenues	**269,235**
Operating Expenses	
Fuel used in electric generation and purchased power	60,296
Natural gas purchased	27,125
Operation, maintenance and other	65,728
Depreciation and amortization	45,888
Property and other taxes	9,542
Goodwill and other impairment charges	-
Total operating expenses	**208,579**
Gains on Sales of Other Assets and Other, net	**96**
Operating Income	**60,752**
Other Income and Expenses, net	**3,365**
Interest Expense	**12,152**
Income Before Income Taxes	**51,965**
Income Tax Expense	**9,945**
Income From Continuing Operations	**42,020**
Income From Discontinued Operations, net of tax	**-**
Net Income	**42,020**

DUKE ENERGY KENTUCKY, INC.
Condensed Balance Sheets
(Unaudited)

(in thousands, except share amounts)	May 31, 2024
ASSETS	
Current Assets	
Cash and Cash Equivalents	2,317
Receivables (net of allowance for doubtful accounts)	67,051
Receivables from affiliated companies	90
Notes Receivables from affiliated companies	-
Inventory	70,175
Regulatory Assets	13,888
Other	9,303
Total Current Assets	162,824
Property, Plant and Equipment	
Cost	3,464,273
Less Accumulated Depreciation and Amortization	(1,164,515)
Generation Facilities To Be Retired	-
Net Property Plant and Equipment	2,299,758
Other Noncurrent Assets	
Regulatory Assets	107,742
Operating Lease Right-of-Use assets	5,660
Other	21,972
Total Other Noncurrent Assets	135,374
Total Assets	**2,597,956**
LIABILITIES AND COMMON STOCKHOLDERS' EQUITY	
Current Liabilities	
Accounts Payable	28,306
Accounts payable to affiliated companies	36,012
Notes payable to affiliated companies	30,268
Taxes Accrued	20,810
Interest Accrued	7,353
Current Maturities of Long-Term Debt	-
Asset Retirement Obligations	6,762
Regulatory Liabilities	13,152
Other	16,072
Total Current Liabilities	158,735
Long-Term Debt	**679,701**
Notes payable to affiliated companies	**25,000**
Other Noncurrent Liabilities	
Deferred Income Taxes	304,722
Asset Retirement Obligations	80,163
Regulatory Liabilities	104,727
Operating Lease Liabilities	5,812
Accrued Pension and Other Post-Retirement Benefit Costs	27,467
Other	23,548
Total Other Noncurrent Liabilities	546,439
Commitments and Contingencies	**-**
Equity	
Common Stock, $15.00 par value, 1,000,000 shares authorized and 585,333 shares outstanding	8,780
Additional Paid in Capital	493,211
Retained Earnings	686,090
Total Duke Energy Corporation Stockholders' Equity	1,188,081
Noncontrolling Interests	-
Total Liabilities and Equity	**2,597,956**

Duke Energy Kentucky, Inc.
139 E. 4th Street
Cincinnati, OH 45202

July 11, 2024

Commonwealth of Kentucky
Energy and Environment Cabinet
Department for Environmental Protection
Division for Air Quality
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

RE: Duke Energy East Bend Station
Agency Interest No: 176
Title V Operating Permit: V-12-023
Minor Permit Revision

Duke Energy Kentucky LLC, East Bend Station is proposing to convert the wet flue gas desulfurization (FGD) system from lime to limestone. The existing FGD process relies upon magnesium enhanced lime (MEL) to control SO_2 emissions. Recent issues with lime supply, quality, and price escalation pose additional risks to the East Bend Station from a reliability, compliance, and economic perspective. As a result, Duke Energy is proposing to convert the FGD system from lime to limestone, which will lower the operating cost and enhance unit reliability and compliance. The FGD process modifications will be designed to maintain an SO_2 removal efficiency of at least 98% for the design fuel.

The proposed project will require some minor changes to the existing reagent handling system, removal of some existing process equipment and the addition several new transfer points, a limestone pre-crusher, vertimill and a new wet scrubber.

Minor Changes to Existing Equipment
The existing unloading system, receiving hopper and main reagent storage silo will be repurposed for limestone. The existing unloading system will be equipped wear plates to accommodate limestone. Conveyors 1 and 3A will be equipped with restrictor plates on the tail end of conveyor to ensure the maximum hourly throughput capacity remains the same. Duke Energy is not proposing any changes to the hourly throughput or control devices associated with emitting units 14-01 thru 14-07 and 14-13 thru 14-16.

New Equipment
The proposed project will require installation of the following new equipment.
1) Two weigh belt feeders (WBFs) at the existing day bin discharge points.
2) One belt conveyor to transport limestone from the WBFs to the new reagent preparation system.
3) Pre-crusher to reduce the limestone to < ¼ inch.
4) Vertimill to grind the limestone down to achieve the final slurry.
5) One 29,000-gallon FGD buffer additive tank and feed pumps.
6) Modifications to the existing FGD scrubber to increase the liquid to gas ratio and improve the spray coverage.
7) Wet scrubber to control emissions from new emitting units associated with limestone handling.

A process flow diagram is included in **Attachment A**.

Duke Energy Kentucky, Inc.
139 E. 4th Street
Cincinnati, OH 45202

Removal of Existing Permitted Equipment
Existing emitting units 14-8 thru 14-12 will be removed to accommodate the conversion of the FGD to limestone. Duke Energy will submit a separate request the remove of this equipment once the limestone conversion project is completed. Emitting units 14-17 thru 14-23 are no longer in service and can be removed from the permit.

Emissions Quantification
The particulate emissions from the following new limestone handling equipment will be controlled by a new wet scrubber.

- transfer of limestone from the day silo to the weigh belt feeders, identified as 14-26,
- transfer of limestone from the WBF to the conveyor 4A, identified as 14-27,
- transfer of limestone from conveyor 4A to the pre-crusher, identified as 14-28 and
- pre-crusher, identified as 14-29.

The wet scrubber will be designed to achieve compliance with the applicable PM emission standard from NSPS subpart OOO. The new vertimill is a wet process and will is not a source of particulate emissions. The potential to emit (PTE) for the new emitting units 14-26 thru14-29 is included in **Attachment B Table 1.**

As a result of the project the PTE from the existing equipment will be revised to reflect the emission factors for limestone handling, which result in a lower particulate emission. The PTE calculations for the existing equipment identified as 14-01 thru 14-07 and 14-13 thru14-16 are included in **Attachment B Table 2**.

Regulatory Review
The following subsections discuss the applicability of regulatory requirements for the conversion of the FGD to limestone.

Prevention of Significant Deterioration [401 KAR 51:017 and 40 CFR Part 52.21]
The Prevention of Significant Deterioration (PSD) rule is applicable to the construction of new major sources and major modification at existing major sources for pollutants which are in attainment or unclassifiable for the National Ambient Air Quality Standards (NAAQS). East Bend is located in Campbell County Kentucky which is designated as attainment or unclassifiable for all criteria pollutants. Consequently, the proposed project was reviewed for applicability to the PSD rule. Since the project involves both new and existing equipment the project was evaluated for PSD applicability using a Hybrid Test.

For the new equipment the increase in emissions was based on the uncontrolled potential to emit (PTE). The PTE for the new equipment identified as 14-26 thru 14-29 was calculated using emissions factors from AP-42 section 11.19.2 for Crushed Stone Processing and Pulverized Mineral Processing assuming maximum operating capacity and continuous hours of operation.

For the existing coal fired boiler, identified as Unit 2, the emissions increase associated with the proposed project was determined using the past actual to future projected analysis. The past actual emissions, in tons per year, are the emissions the unit emitted during any consecutive 24-month period on a pollutant-by-pollutant basis within the 60-month baseline period. The baseline period starts on October 1, 2019, and ends on March 31, 2025.The future projected emissions in tons per year, are the projected actual emissions at which the unit emitted the pollutant during any consecutive 12-month period selected within

Duke Energy Kentucky, Inc.
139 E. 4th Street
Cincinnati, OH 45202

the 60-month period immediately following the start of normal operation. The future projected emissions begin on January 1, 2027, and end on December 31, 2031.

The PSD regulation is applicable to projects which result in emissions increase which exceeds the PSD significance threshold, excluding demand growth. Demand growth is that portion of the unit's projected actual emissions that is unrelated to the particular project and due solely to the projected increase in utilization of the unit to meet customer demand.

Pollutants	SO2 (tons)	NOx (tons)	CO2e (tons)	VOC (Tons)	PM (tons)	PM2.5 (tons)	PM10 (tons)	PB (tons)	H2SO4 (tons)	CO (tons)
Baseline	1,832.42	1,893.63	3,259,191.59	47.27	171.48	362.03	425.38	0.03	126.77	338.83
Future W - Limestone	1,801.07	1,746.54	3,649,814.70	53.09	43.36	366.53	383.01	0.03	131.00	380.60
Future W/O -Quicklime	1,061.22	991.56	2,150,547.71	31.32	25.58	216.21	225.93	0.02	77.27	224.51
Demand Growth (DG)	0	0	0	0	0	0	0	0	0	0
New Equipment[1]	-	-	-	-	2.21	0.40	0.87	-	-	-
Emissions Increase (EI)	-	-	390,623	6	-	4.90	-	-	4.22	42
EI - DG	-	-	390,623	6	-	4.90	-	-	4.22	42
Significant Emissions Threshold	40	40	75,000	40	25	10	15	0.6	7	100
PSD Applies	No	No	No	No	No	No	No	No	No	No
Reasonable Possibility Reporting	No	No	No	No	No	No	No	No	**Yes**	No

[1] Emission increase from new equipment is based on the uncontrolled potential to emit.

The PSD regulation is not applicable to this project since the emissions increase is below the PSD significant emissions rate for all NSR regulated pollutants, except for carbon dioxide equivalence (CO_{2e}). CO_{2e} is a measure of the total greenhouse gas emitted and was calculated using the equations in 40 CFR Part 98. CO_{2e} is only subject to the PSD rule when the project is subject to PSD for another NSR regulated pollutant and the emission increase in CO_{2e} exceeds the significant emissions threshold. Since the project does not trigger PSD for any other pollutant, PSD is not applicable to CO_{2e}.

The reasonable possibilities recordkeeping and reporting requirements applies to projects which have an emission increase excluding demand growth which exceeds 50% of the significance emissions threshold, on a pollutant by pollutant basis. Since H_2SO_4 exceeds the 50% of the significant emission threshold excluding demand growth, the proposed project triggers the reasonable possibilities reporting requirements for H_2SO_4. Pursuant to 40 CFR Part 52.21(r)(6)(v) and 401 KAR 51:017(16)(5), East Bend Generating Station will report the annual emissions of H_2SO_4 for a period of 5 years following the resumption of normal operation after the change.

NSPS for Electric Utility Steam Generating Units 40 CFR Part 60 Subpart Da
The proposed project will not result in an increase in the maximum hourly emissions rate from Unit 2 for any pollutant regulated under subpart Da. Consequently, NSPS subpart Da is not being triggered because of this project.

NSPS for Nonmetallic Mineral Processing Plants, 40 CFR Part 60 Subpart OOO
The new conveyor/weight feeders, pre-crusher, and vertimill will be subject to NSPS subpart OOO, since this equipment is affected equipment pursuant to 60.670(a)(1) and is being constructed after effective date

Duke Energy Kentucky, Inc.
139 E. 4th Street
Cincinnati, OH 45202

of 8/3/1983. The exiting affected equipment being repurposed for limestone are not subject to NSPS Subpart OOO, since conversion to limestone will not result in an increase in the maximum hourly emission rate and this equipment was installed prior to 8/3/1983.

The following requirement under Subpart OOO are applicable.

- Pursuant to 40 CFR Part 60.672(a) the PM emissions from the wet scrubber, identified as C14-10, used to control emissions from 14-26 thru 14-30 will be subject to the PM emissions limit of 0.014 gr/dscf.

- Compliance shall be demonstrated based on an initial stack test to be conducted within 60 days of reaching maximum operating capacity but not longer than 180 days after initial startup using the procedures specified in 60.675(b).

- Pursuant to 40 CFR Part 60.674(a), the Permittee shall install, calibrate, maintain, and operate a continuous monitor the following monitoring devices on the wet scrubber identified as C14-10.
  - A device for the continuous measurement of the pressure loss of the gas stream through the wet scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±250 pascals ±1 inch water gauge pressure and must be calibrated on an annual basis in accordance with the manufacturer's specification.
  - A device for the continuous measurement of the scrubbing liquid flow rate to the wet scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±5 percent of design scrubbing liquid flow rate and must be calibrated on an annual basis in accordance with manufacturer's instructions.

- Pursuant to 40 CFR Part 60.676(c) during the initial performance test of a wet scrubber, and daily thereafter, the Permittee shall record the measurements of both the change in pressure of the gas stream across the wet scrubber and the scrubbing liquid flow rate.

- Pursuant to 40 CFR 60.676(d) and (e), after the initial performance test of the wet scrubber, the Permittee shall submit semiannual reports to the Administrator of occurrences when the measurements of the wet scrubber pressure loss and liquid flow rate decrease by more than 30 percent from the average determined during the most recent performance test. The reports shall be postmarked within 30 days following end of the second and fourth calendar quarters.

- Pursuant to 40 CFR 60.676(i), notification of the actual date of initial startup of each affected facility shall be submitted to the Administrator. The notification shall be postmarked within 15 days after such date and shall include a description of each affected facility, equipment manufacturer, and serial number of the equipment, if available.

Requested Changes to the Title V Permit

401 KAR 52:020, Section 14(3)(d), specifies that a modified version of the existing Title V permit with new text to reflect the proposed modification should be included with a minor revision application. This requirement is satisfied through the inclusion of the suggested permit in **Attachment C**.

Duke Energy Kentucky, Inc.
139 E. 4th Street
Cincinnati, OH 45202

Qualifications for Treatment as a Minor Permit Revision
This permit application seeks to revise the current Title V permit to reflect the installation as described in this application letter and its attachments. 401 KAR 52:020, Section 14 provides procedures for existing Title V sources to obtain minor permit revisions for modifications that meet certain criteria. An analysis of these criteria for this permit action is provided as follows:

- The proposed permit revision does not violate any applicable requirements contained within the existing Title V permit.
- The proposed permit revision does not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit.
- The proposed permit revision does not require or change a case-by-case determination of an emission limit, a source-specific determination for temporary sources, or a visibility or increment analysis. No PSD avoidance limits are necessary for this project.
- The proposed permit revision does not seek to establish or change a permit term or condition for which there is no corresponding underlying applicable requirement, and which the source has assumed to avoid an otherwise applicable requirement.

This permit action is not a modification under Title I of the Clean Air Act as this term is defined at 401 KAR 52:001 Section 1(52). Section 14(4) of 401 KAR 52:020 allows an applicant to proceed with the proposed modifications upon filing of an administratively complete minor revision application.

The application Forms DEP7007AI, 7007L, 7007N, 7007V and 7007GG are included in **Attachment D**.

Please contact Patrick Coughlin at 317-838-2108 if you should have any questions regarding this minor permit revision application.

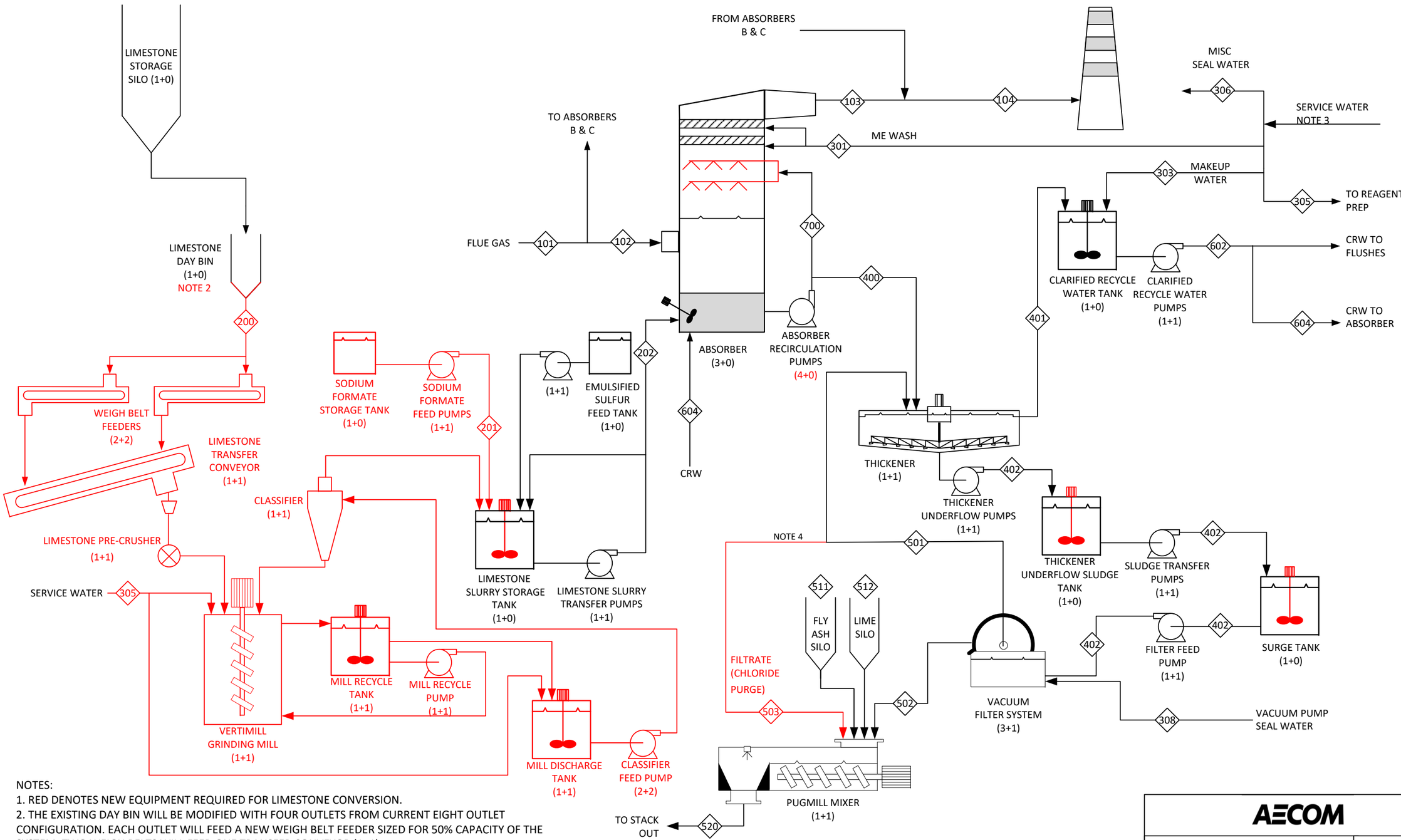
I certify that, based on information and belief formed after reasonable inquiry, the statements and information contained in the following documents are true, accurate, and complete.

Sincerely,

Brett Riggins
GM III – Regulated Stations

Enclosures

Attachment A
Process Flow Diagram



NOTES:
1. RED DENOTES NEW EQUIPMENT REQUIRED FOR LIMESTONE CONVERSION.
2. THE EXISTING DAY BIN WILL BE MODIFIED WITH FOUR OUTLETS FROM CURRENT EIGHT OUTLET CONFIGURATION. EACH OUTLET WILL FEED A NEW WEIGH BELT FEEDER SIZED FOR 50% CAPACITY OF THE SYSTEM. TWO WEIGH BELTS WILL FEED ONE TRANSFER CONVEYOR (1+1).
3. NEW SERVICE WATER PUMP (1+1) WILL BE PROVIDED AS PART OF THE CONVERSION PROJECT.
4. CHLORIDE PURGE WILL BE DRAWN FROM DISCHARGE PIPING OF FILTRATE PUMP UPSTREAM OF FILTRATE. STORAGE TANK. FILTRATE TANKS AND PUMPS NOT SHOWN FOR CLARITY.

AECOM

CLIENT / PROJECT NAME Duke Energy - East Bend Station WFGD Limestone Conversion Process Flow Diagram		PROJECT NO. 60680586
DRAWING NUMBER PFD - 101	DRAWING REVISION 0	DATE June 08, 2022

Attachment B
Emissions Quantification

Attachement B
Emissions Quantification

Table 1- Potential to Emit for existing units being re-purposed to handel Limestone.

Emission Unit ID	Description	Control Description	Stack ID	Control Device ID	Control Efficeincy PM	Control Efficeincy PM10/PM2.5	Potential to Emit Lime Operation								Potential to Emit Limestone Operation								Change In Potential to Emit from Lime to Limestone		
							PM lbs/ton	PM10 [(a)] lbs/ton	PM2.5[(b)] lbs/ton	Emission Factor	Thurput ton/hr	PM tons/yr	PM10 tons/yr	PM2.5 tons/yr	PM lbs/ton	PM10 lbs/ton	PM2.5 lbs/ton	Emission Factor SCC#	Thurput ton/hr	PM tons/yr	PM10 tons/yr	PM2.5 tons/yr	PM tons/yr	PM10 tons/yr	PM2.5 tons/yr
ID: 14-01	Clamshell Unloader Digging from a Barge	Partial Enclosure	S14-01	Fugitive	90	81	2.2	1.1	1.1	3-05-016-15	600	578.16	549.25	549.25	0.003	0.0011	0.00007	3-05-020-06	600	0.788	0.734	0.035	-577.37	-548.52	-549.22
ID: 14-02	Clamshell Unloader to Receiving Hopper	Partial Encl & Baghouse	S14-02	C14-04	75	74.6	2.2	1.1	1.1	3-05-016-15	600	1445.40	734.26	734.26	0.003	0.0011	0.00007	3-05-020-06	600	1.971	0.043	0.047	-1443.43	-734.26	-734.26
ID: 14-03	Receiving Hopper to Belt Feeder	Baghouse	S14-02	C14-04	99	98.5	2.2	1.1	1.1	3-05-016-15	600	57.82	43.36	43.36	0.003	0.0011	0.00007	3-05-020-06	600	0.079	0.043	0.003	-57.74	-43.36	-43.36
ID: 14-04	Belt Feeder to Conveyor "1"	Baghouse	S14-02	C14-04	99	98.5	2.2	1.1	1.1	3-05-016-15	600	57.82	43.36	43.36	0.003	0.0011	0.00007	3-05-020-06	600	0.079	0.043	0.003	-57.74	-43.36	-43.36
ID: 14-05	Conveyor "1" to Unit 2 Main Silo	Baghouse	S14-03	C14-05	99	98.5	2.2	1.1	1.1	3-05-016-15	600	57.82	43.36	43.36	0.003	0.0011	0.00007	3-05-020-06	600	0.079	0.043	0.003	-57.74	-43.36	-43.36
ID: 14-06	Unit 2 Main Silo to Conveyor "3-A"	Baghouse	S14-04	C14-06	99	98.5	2.2	1.1	1.1	3-05-016-15	120	11.56	8.67	8.67	0.003	0.0011	0.00007	3-05-020-06	120	0.016	0.009	0.001	-11.55	-8.67	-8.67
ID: 14-07	Conveyor "3-A" to Day Bin (previously transferred to vibrating screen)	Baghouse	S14-05	C14-07	99	98.5	2.2	1.1	1.1	3-05-016-15	120	11.56	8.67	8.67	0.003	0.0011	0.00007	3-05-020-06	120	0.016	NA	0.001	-11.55	-8.67	-8.67
ID: 14-13	Dump Truck to Dumper House Hopper	Baghouse	S14-06	C14-08	99	98.5	2.2	1.1	1.1	3-05-016-15	25	2.41	1.81	1.81	0.003	0.0011	0.00007	3-05-020-06	25	0.003	0.002	0.000	-2.41	-1.80	-1.81
ID: 14-14	Hopper to Belt Feeder	Baghouse	S14-06	C14-08	99	98.5	2.2	1.1	1.1	3-05-016-15	25	2.41	1.81	1.81	0.003	0.0011	0.00007	3-05-020-06	25	0.003	0.002	0.000	-2.41	-1.80	-1.81
ID: 14-15	Belt Feeder to Conveyor "3"	Baghouse	S14-06	C14-08	99	98.5	2.2	1.1	1.1	3-05-016-15	25	2.41	1.81	1.81	0.003	0.0011	0.00007	3-05-020-06	25	0.003	0.002	0.000	-2.41	-1.80	-1.81
ID: 14-16	Conveyor "3" to Conveyor "3-A"	Baghouse	S14-04	C14-06	99	98.5	2.2	1.1	1.1	3-05-016-15	25	2.41	1.81	1.81	0.003	0.0011	0.00007	3-05-020-06	25	0.003	0.002	0.000	-2.41	-1.80	-1.81

Attachement B
Emissions Quantification

Table 2 - Potential to Emit for new emission units for the conversion to Limestone.

Emission Unit ID	Description	Control Description	Stack ID	Control Device ID	Control Efficeincy PM[(1)]	Control Efficeincy PM10/PM2.5[(1)]	Emission Factors				Thurput ton/hr	Uncontrolled PTE			Controlled PTE		
							PM lbs/ton	PM10 lbs/ton	PM2.5 lbs/ton	Emission Factor SCC#		PM tons/yr	PM10 tons/yr	PM2.5 tons/yr	PM tons/yr	PM10 tons/yr	PM2.5 tons/yr
ID: 14-26	Transfer from day bin to wiegh belt feeders	Scrubber	S14-10	C14-10	90	90	0.003	0.0011	0.00007	3-05-020-06	35	0.460	0.169	0.011	0.0460	0.0169	0.0011
ID: 14-27	Transfer from wiegh belt feeders to belt conveyor 4A	Scrubber	S14-10	C14-10	90	90	0.003	0.0011	0.00007	3-05-020-06	35	0.460	0.169	0.011	0.0460	0.0169	0.0011
ID: 14-28	Transfer from conveyor 4A to pre-crusher	Scrubber	S14-10	C14-10	90	90	0.003	0.0011	0.00007	3-05-020-06	35	0.460	0.169	0.011	0.0460	0.0169	0.0011
ID: 14-29	Limestone pre-crusher	Scrubber	S14-10	C14-10	90	90	0.0054	0.0024	0.0024	3-05-030-03	35	0.828	0.368	0.368	0.0828	0.0368	0.0368
										Total Emissions Increase, tons/yr		**2.21**	**0.87**	**0.40**	**0.22**	**0.09**	**0.04**

[(1)] Scrubber will be designed to achieve compliance with the NSPS Subpart OOO PM standard of 0.014 gr/dscf and was conservatively estimated to achieve 90% control efficiency for PM/PM10/PM2.5.

Attachment C
Suggested Permit Conditions

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

Emissions unit: 14 (01-~~25~~29) - Lime Handling Operations (Fugitive Emissions)

Description:

Equipment includes:

Emission Unit:	Description:	Process Rate (tons/hour):	Control Method:
14-01	~~Lime~~ Barge Loader	600	Short Drop Heights
14-02	~~Lime~~ Barge Unloader Hopper	600	Part Encl & Baghouse
14-03	~~Lime~~ Hopper to belt Feeder	600	Total Encl & Baghouse
14-04	Belt Feeder to Conveyer 1	600	Total Encl & Baghouse
14-05	Conveyer 1 to Main Lime Silo	600	Total Encl & Baghouse
14-06	Main ~~Lime~~ Silo to Conveyer 3-A	120	Total Encl & Baghouse
14-07	Prior to conversion of FGD to limestone, conveyer 3-A to vibrating screen, after conversion of FGD to limestone conveyer 3-A to Day bin.	120	Total Encl & Baghouse
14-08	Vibrating Screen	120	Total Encl & Baghouse
14-09	Vibrating Screen to day Bin	120	Total Encl & Baghouse
14-10	Day bin to screw Conveyer	32	Total Encl & Baghouse
14-11	Screw Conveyer to vert-Mill	32	Total Encl & Baghouse
14-12	Lime Crushers (4)	32	Total Encl & Baghouse
14-13	Dump Crush Lime to Dumper House Hopper	25	Part Encl & Baghouse
14-14	Dumper House Hopper to belt Feed	25	Total Encl & Baghouse
14-15	Belt Feed to Conveyer 3	25	Total Encl & Baghouse
14-16	Conveyer 3 to Conveyer 3-A	25	Total Encl & Baghouse
~~14-17~~	~~Main Lime Silo to truck Loading~~	~~25~~	~~Total Enclosed~~
~~14-18~~	~~FGD Sludge Fix Plant Truck Dump~~	~~25~~	~~Part Encl & Baghouse~~
~~14-19~~	~~Sludge Fix Plant to Lime crusher~~	~~25~~	~~Total Encl & Baghouse~~
~~14-20~~	~~Lime Crusher (4)~~	~~25~~	~~Total Encl & Baghouse~~
~~14-21~~	~~Lime Crusher to Belt Feeder~~	~~25~~	~~Total Encl & Baghouse~~
~~14-22~~	~~Belt Feeder to Sludge Fix Plant Lime Conveyer~~	~~25~~	~~Total Encl & Baghouse~~
~~14-23~~	~~Sludge Fix Plant Lime Conveyer to Lime Silo~~	~~25~~	~~Total Encl & Baghouse~~
14-24	FGD Plant Lime Tanker Unload	75	Total Encl & Baghouse
14-25	FGD Plant Lime Silo	75	Total Encl & Baghouse
14-26	Day Bin to Weigh Feeders	35	Total Encl & Scrubber
14-27	Weigh Feeder to Conveyer 4	35	Total Encl & Scrubber
14-28	Conveyer 4 to Pre-crusher	35	Total Encl & Scrubber
14-29	Limestone Pre-crusher	35	Total Encl & Scrubber

Construction commenced: 1976

Applicable Regulations:

401 KAR 63:010, Fugitive emissions

401 KAR 60:005, New Source Performance Standards for Nonmetallic Mineral Processing Plant

401 KAR 51:017, Prevention of significant deterioration of air quality

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

1. Operating Limitations:

a) Reasonable precautions shall be taken to prevent particulate matter from becoming airborne. Such reasonable precautions shall include, when applicable, but not be limited to the following **[401 KAR 63:010, Section 3]**:

1. Application and maintenance of asphalt, application of water, or suitable chemicals on roads, material stockpiles, and other surfaces which can create airborne dusts;

2. Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials, or the use of water sprays or other measures to suppress the dust emissions during handling.

3. The maintenance of paved roadways in a clean condition;

4. The prompt removal of earth or other material from a paved street which earth or other material has been transported thereto by trucking or other earth moving equipment or erosion by water.

b) No person shall cause or permit the discharge of visible fugitive dust emissions beyond the lot line of the property on which the emissions originate **[401 KAR 63:010, Section 3]**.

c) No one shall allow earth or other material being transported by truck or earth moving equipment to be deposited onto a paved street or roadway **[401 KAR 63:010, Section 4]**.

d) Upon completion of the conversion of the FGD from lime to limestone, emission units 14-08 thru 14-12 will be decommissioned and emission unit 14-07 will transfer limestone from conveyor 3-A directly to the Day bin.

2. Emission Limitations:

Upon completion of the conversion of the FGD from lime to limestone the following emission limit shall apply.

a) The scrubber identified as C14-10 used to control particulate emissions from the emitting units 14-26 and 14-29 is subject to the PM emissions limit of 0.014 gr/dscf. [40 CFR Part 60.672(a)]

3. Testing Requirements:

Upon completion of the conversion of the FGD from lime to limestone stack tests for particulate matter on scrubber C14-10 shall be conducted within 60 days of reaching maximum operating capacity but not longer than 180 days after initial startup. [40 CFR 60.672(a) and 40 CFR 60.675(b)].

4. Specific Monitoring Requirements:

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

The Permittee shall install, calibrate, maintain, and operate the following monitoring devices on the wet scrubber identified as C14-10. [40 CFR Part 60.674(a)]

a) a device for the continuous measurement of the pressure loss of the gas stream through the scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±250 pascals ±1 inch water gauge pressure and must be calibrated on an annual basis in accordance with the manufacturer's specification.

b) A device for the continuous measurement of the scrubbing liquid flow rate to the wet scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±5 percent of design scrubbing liquid flow rate and must be calibrated on an annual basis in accordance with manufacturer's instructions.

5. Specific Record Keeping Requirements:

a) During the initial performance test of a wet scrubber, and daily thereafter, the Permittee shall record the measurements of both the change in pressure of the gas stream across the scrubber and the scrubbing liquid flow rate. [40 CFR 60.676(c)]

b) Records of the lime and limestone received and processed (tonnages) shall be maintained on a weekly basis for emission inventory purposes **[401 KAR 52:020, Section 10]**.

6. Specific Reporting Requirements:

a) After the initial performance test of the scrubber, the Permittee shall submit semiannual reports to the Administrator of occurrences when the measurements of the scrubber pressure loss and liquid flow rate decrease by more than 30 percent from the average determined during the most recent performance test. The reports shall be postmarked within 30 days following end of the second and fourth calendar quarters. [40 CFR 60.676(d) and (e)]

b) A notification of the actual date of initial startup of each affected facility shall be submitted to the Administrator. The notification shall be postmarked within 15 days after such date and shall include a description of each affected facility, equipment manufacturer, and serial number of the equipment, if available. [40 CFR 60.676(i)]

Refer to **Section F, Monitoring, Recordkeeping and Reporting Requirements**.

SECTION B - EMISSION POINTS, EMISSION UNITS, APPLICABLE REGULATIONS, AND OPERATING CONDITIONS (CONTINUED)

7. Specific Control Equipment Operating Conditions:

1. Watering shall be used to maintain compliance with applicable requirements, in accordance with standard operating practices **[401 KAR 63:010]**.

2. Records regarding the maintenance and use of the control measures in Subsection 7(a) shall be maintained **[401 KAR 52:020, Section 10]**.

3. Refer to **Section E, Source Control Equipment Requirements**.

Attachment D
Permit Application Forms

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601
(502) 564-3999

DEP7007AI

Administrative Information

___ Section AI.1: Source Information
___ Section AI.2: Applicant Information
___ Section AI.3: Owner Information
___ Section AI.4: Type of Application
___ Section AI.5: Other Required Information
___ Section AI.6: Signature Block
___ Section AI.7: Notes, Comments, and Explanations

Additional Documentation

___ Additional Documentation attached

Source Name: Duke Energy Kentucky LLC, East Bend Station

KY EIS (AFS) #: 21- 015-00029

Permit #: V-12-023

Agency Interest (AI) ID: 176

Date: 11-Jul-24

Section AI.1: Source Information

Physical Location Address:	**Street:**	6293 Beaver Road				
	City:	Union	**County:**	Boone	**Zip Code:**	40191
Mailing Address:	**Street or P.O. Box:**	6293 Beaver Road				
	City:	Union	**State:**	Kentucky	**Zip Code:**	40191

Standard Coordinates for Source Physical Location

Longitude: 38.904 (decimal degrees) **Latitude:** -84.851 (decimal degrees)

Primary (NAICS) Category: Electric Power Generation **Primary NAICS #:** 22111

AI

Classification (SIC) Category: Electric Power Generation **Primary SIC #:** 4931

Briefly discuss the type of business conducted at this site: Electric Generating Utility

Description of Area Surrounding Source: ☑ Rural Area ☐ Industrial Park ☐ Residential Area ☐ Urban Area ☐ Industrial Area ☐ Commercial Area

Is any part of the source located on federal land? ☐ Yes ☐ No

Number of Employees: 160 approx

Approximate distance to nearest residence or commercial property: *2200 feet (estimated)*

Property Area: **1777 acers**

Is this source portable? ☐ Yes ☑ No

What other environmental permits or registrations does this source currently hold or need to obtain in Kentucky?

NPDES/KPDES:	☑ Currently Hold	☐ Need	☐ N/A
Solid Waste:	☑ Currently Hold	☐ Need	☐ N/A
RCRA:	☐ Currently Hold	☐ Need	☑ N/A
UST:	☐ Currently Hold	☐ Need	☑ N/A

Type of Regulated Waste Activity:

☐ Mixed Waste Generator ☐ Generator ☐ Recycler ☑ Other: _____

☐ U.S. Importer of Hazardous Waste ☐ Transporter ☐ Treatment/Storage/Disposal Facility ☐ N/A

Section AI.2: Applicant Information

Applicant Name: Duke Energy Kentucky Inc., East Bend Station

Title: (if individual)

Mailing Address: **Street or P.O. Box:** 6293 Beaver Road
City: Union **State:** Kentucky **Zip Code:** 40191

Email: (if individual)

Phone:

Technical Contact

Name: Patrick Coughlin

Title: Environmental Specialist

Mailing Address: **Street or P.O. Box:** 1000 East Main St.
City: Plainfield **State:** Indiana **Zip Code:** 46168

Email: patrick.coughlin@duke-energy.com

Phone: 317-838-2108

Air Permit Contact for Source

Name: Patrick Coughlin

Title: Environmental Specialist

Mailing Address: **Street or P.O. Box:** 1000 East Main St.
City: Plainfield **State:** Indiana **Zip Code:** 46168

Email: patrick.coughlin@duke-energy.com

Phone: 317-838-2108

Section AI.3: Owner Information

☑ **Owner same as applicant**

Name: _____

Title: _____

Mailing Address: **Street or P.O. Box:** _____

City: _____ **State:** _____ **Zip Code:** _____

Email: _____

Phone: _____

List names of owners and officers of the company who have an interest in the company of 5% or more.

Name	Position

11/2018 DEP7007AI

Section AI.4: Type of Application

Current Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ General Permit ☐ Registration ☐ None

Requested Action: *(check all that apply)*

☐ Name Change	☐ Initial Registration	☐ Significant Revision	☐ Administrative Permit Amendment
☐ Renewal Permit	☐ Revised Registration	☑ Minor Revision	☐ Initial Source-wide OperatingPermit
☐ 502(b)(10)Change	☐ Extension Request	☐ Addition of New Facility	☐ Portable Plant Relocation Notice
☐ Revision	☐ Off Permit Change	☐ Landfill Alternate Compliance Submittal	☑ Modification of Existing Facilities
☐ Ownership Change	☐ Closure		

Requested Status: ☑ Title V ☐ Conditional Major ☐ State-Origin ☐ PSD ☐ NSR ☐ Other: _____

Is the source requesting a limitation of potential emissions? ☐ Yes ☑ No

Pollutant:	Requested Limit:	Pollutant:	Requested Limit:
☐ Particulate Matter		☐ Single HAP	
☐ Volatile Organic Compounds (VOC)		☐ Combined HAPs	
☐ Carbon Monoxide		☐ Air Toxics (40 CFR 68, Subpart F)	
☐ Nitrogen Oxides		☐ Carbon Dioxide	
☐ Sulfur Dioxide		☐ Greenhouse Gases (GHG)	
☐ Lead		☐ Other	

For New Construction:

Proposed Start Date of Construction: *(MM/YYYY)* 03/2025 **Proposed Operation Start-Up Date:** *(MM/YYYY)* 01/2027

For Modifications:

Proposed Start Date of Modification: *(MM/YYYY)* 03/2025 **Proposed Operation Start-Up Date:** *(MM/YYYY)* 01/2027

Applicant is seeking coverage under a permit shield. ☐ Yes ☑ No **Identify any non-applicable requirements for which permit shield is sought on a separate attachment to the application.**

Section AI.5 Other Required Information

Indicate the documents attached as part of this application:

- ☐ DEP7007A Indirect Heat Exchangers and Turbines
- ☐ DEP7007B Manufacturing or Processing Operations
- ☐ DEP7007C Incinerators and Waste Burners
- ☐ DEP7007F Episode Standby Plan
- ☐ DEP7007J Volatile Liquid Storage
- ☐ DEP7007K Surface Coating or Printing Operations
- ☑ DEP7007L Mineral Processes
- ☐ DEP7007M Metal Cleaning Degreasers
- ☑ DEP7007N Source Emissions Profile
- ☐ DEP7007P Perchloroethylene Dry Cleaning Systems
- ☐ DEP7007R Emission Offset Credit
- ☐ DEP7007S Service Stations
- ☐ DEP7007T Metal Plating and Surface Treatment Operations
- ☑ DEP7007V Applicable Requirements and Compliance Activities
- ☐ DEP7007Y Good Engineering Practice and Stack Height Determination
- ☐ DEP7007AA Compliance Schedule for Non-complying Emission Units
- ☐ DEP7007BB Certified Progress Report
- ☐ DEP7007CC Compliance Certification
- ☐ DEP7007DD Insignificant Activities
- ☐ DEP7007EE Internal Combustion Engines
- ☐ DEP7007FF Secondary Aluminum Processing
- ☑ DEP7007GG Control Equipment
- ☐ DEP7007HH Haul Roads
- ☐ Confidentiality Claim
- ☐ Ownership Change Form
- ☐ Secretary of State Certificate
- ☑ Flowcharts or diagrams depicting process
- ☐ Digital Line Graphs (DLG) files of buldings, roads, etc.
- ☐ Site Map
- ☐ Map or drawing depicting location of facility
- ☐ Safety Data Sheet (SDS)
- ☐ Emergency Response Plan
- ☐ Other: _____

Section AI.6: Signature Block

I, the undersigned, hereby certify under penalty of law, that I am a responsible official*, and that I have personally examined, and am familiar with, the information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the information is on knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false or incomplete information, including the possibility of fine or imprisonment.

Brett Riggins — **Authorized Signature**

7/15/2024 — **Date**

Brett Riggins — **Type or Printed Name of Signatory**

GM III- Reg Stations — **Title of Signatory**

*Responsible official as defined by 401 KAR 52:001.

Section AI.7: Notes, Comments, and Explanations

11/2018

DEP7007N

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007N

Source Emissions Profile

__ Section N.1: Emission Summary
__ Section N.2: Stack Information
__ Section N.3: Fugitive Information
__ Section N.4: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: Dueke Energy Kentucky LLC., East Bend Generating Station

KY EIS (AFS) #: 21- 015-00029

Permit #: V-12-23 R1

Agency Interest (AI) ID: 176

Date: 8-Jul-24

N.1: Emission Summary

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity (SCC Units/hour)	Pollutant	Uncontrolled Emission Factor (lb/SCC Units)	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency (%)	Control Efficiency (%)	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential (lb/hr)	Controlled Potential (lb/hr)	Uncontrolled Potential (tons/yr)	Controlled Potential (tons/yr)
14	Transfer from day bin to weigh belt feeders	26	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM	0.003	AP-42 Section 11.19.2	100%	90%	0.105	0.01050	0.460	0.0460
14	Transfer from day bin to weigh belt feeders	26	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM10	0.0011	AP-42 Section 11.19.2	100%	90%	0.039	0.00385	0.169	0.0169
14	Transfer from day bin to weigh belt feeders	26	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM2.5	0.00007	AP-42 Section 11.19.2	100%	90%	0.002	0.00025	0.011	0.0011
14	Transfer from wiegh belt feeders to belt conveyor 4A	27	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM	0.003	AP-42 Section 11.19.2	100%	90%	0.105	0.01050	0.460	0.0460
14	Transfer from wiegh belt feeders to belt conveyor 4A	27	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM10	0.0011	AP-42 Section 11.19.2	100%	90%	0.039	0.00385	0.169	0.0169
14	Transfer from wiegh belt feeders to belt conveyor 4A	27	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM2.5	0.00007	AP-42 Section 11.19.2	100%	90%	0.002	0.00025	0.011	0.0011
14	Transfer from conveyor 4A to pre-crusher	28	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM	0.003	AP-42 Section 11.19.2	100%	90%	0.105	0.01050	0.460	0.0460
14	Transfer from conveyor 4A to pre-crusher	28	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM10	0.0011	AP-42 Section 11.19.2	100%	90%	0.039	0.00385	0.169	0.0169
14	Transfer from conveyor 4A to pre-crusher	28	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM2.5	0.00007	AP-42 Section 11.19.2	100%	90%	0.002	0.00025	0.011	0.0011

Emission Unit #	Emission Unit Name	Process ID	Process Name	Control Device Name	Control Device ID	Stack ID	Maximum Design Capacity *(SCC Units/hour)*	Pollutant	Uncontrolled Emission Factor *(lb/SCC Units)*	Emission Factor Source (e.g. AP-42, Stack Test, Mass Balance)	Capture Efficiency *(%)*	Control Efficiency *(%)*	Hourly Emissions		Annual Emissions	
													Uncontrolled Potential *(lb/hr)*	Controlled Potential *(lb/hr)*	Uncontrolled Potential *(tons/yr)*	Controlled Potential *(tons/yr)*
14	Limestone precrusher	29	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM	0.0054	AP-42 Section 11.19.2	100%	90%	0.189	0.01890	0.828	0.0828
14	Limestone precrusher	29	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM10	0.0024	AP-42 Section 11.19.2	100%	90%	0.084	0.00840	0.368	0.0368
14	Limestone precrusher	29	Limestone Handling	Wet Scrubber	C14-10	S14-10	35	PM2.5	0.0024	AP-42 Section 11.19.2	100%	90%	0.084	0.00840	0.368	0.0368

Section N.2: Stack Information

UTM Zone:

Stack ID	Identify all Emission Units (with Process ID) and Control Devices that Feed to Stack	Stack Physical Data			Stack UTM Coordinates		Stack Gas Stream Data		
		Equivalent Diameter *(ft)*	Height *(ft)*	Base Elevation *(ft)*	Northing *(m)*	Easting *(m)*	Flowrate *(acfm)*	Temperature *(° F)*	Exit Velocity *(ft/sec)*
S14-10	14-26. 14-27, 14-28 and 14-29	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Section N.3: Fugitive Information

UTM Zone:

Emission Unit #	Emission Unit Name	Process ID	Area Physical Data		Area UTM Coordinates		Area Release Data	
			Length of the X Side *(ft)*	Length of the Y Side *(ft)*	Northing *(m)*	Easting *(m)*	Release Temperature *(°F)*	Release Height *(ft)*

Section N.4: Notes, Comments, and Explanations

11/2018

DEP7007GG

Division for Air Quality

300 Sower Boulevard

Frankfort, KY 40601

(502) 564-3999

DEP7007GG

Control Equipment

Additional Documentation

___ Complete Sections GG.1 through GG.12, as applicable

___ Attach manufacturer's specifications for each control device

___ Complete DEP7007AI

Source Name: Duke Energy Kentucky LLC., East Bend Generating Station

KY EIS (AFS) #: 21- 015-00029

Permit #: V-12-023

Agency Interest (AI) ID: 176

Date: 8-Jul-24

Section GG.1: General Information - Control Equipment

Control Device ID #	Control Device Name	Cost	Manufacturer	Model Name/ Serial #	Date Installed	Inlet Gas Stream Data For All Control Devices					Inlet Gas Stream Data For Condensers, Adsorbers, Afterburners, Incinerators, Oxidizers Only			Equipment Operational Data For All Control Devices		
						Temperature (°F)	Flowrate (scfm @ 68 °F)	Average Particle Diameter (μm)	Particle Density (lb/ft^3) or Specific Gravity	Gas Density (lb/ft^3)	Gas Moisture Content (%)	Gas Composition	Fan Type	Pressure Drop Range ($in. H_2O$)	Pollutants Collected/ Controlled	Pollutant Removal (%)
C14-10	TBD	TBD	TBD	TBD	TBD	ambient	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	90%

Section GG.11: Other Control Equipment

Control Device ID #	Identify all Emission Units and Control Devices that Feed to Control Equipment	**Type of Control Equipment** (provide description and a diagram with dimensions)
C14-10	14-26, 14-27, 14-28 and 14-29	Wet Scrubber

Section GG.12: Notes, Comments, and Explanations

Scrubber will be designed to achieve compliance with the NSPS Subpart OOO PM standard of 0.014 gr/dscf and was conservatively estimated to achieve 90% control efficiency for PM/PM10/PM2.5.

11/2018 DEP7007L

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007L

Mineral Processes

__ Section L.1: Source Operating Information
__ Section L.2: Concrete Operations
__ Section L.3: Asphalt Operations
__ Section L.4: Coal Operations
__ Section L.5: Aggregate Processing Operations
__ Section L.6: Feed, Corn, and Flour Operations
__ Section L.7: Grain Elevators
__ Section L.8: Fertilizer Operations
__ Section L.9: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI, DEP7007N, DEP7007V, and DEP7007GG.

___ Attach flow diagram

Source Name: Duke Energy Kentucky LLC. East Bend Generating Station

KY EIS (AFS) #: 21- **015-00029**

Permit #: **V-12-023 R1**

Agency Interest (AI) ID: **176**

Date: **8-Jul-2024**

Section L.1: Source Operating Information

Type of Plant: ☐ Concrete ☐ Asphalt ☐ Coal ☐ Fertilizer ☐ Feed Corn Flour ☐ Grain Elevators ☑ Aggregate Processing

Operating Schedule: 24 Hours/Day: 7 Days/Week: 52 Weeks/Year:

Percent Annual Throughput:
Dec.-Feb.: 25 % Mar.-May: 25 % Jun.-Aug.: 25 % Sep.-Nov.: 25 %

Maximum Rated Source Capacity: ____35____ tons/hour _306,600___ tons/year

Combustion Equipment:

Is there a generator located on site? ☑ Yes ☐ No

Is it possible for the generator to remain at one site longer than twelve months? ☑ Yes ☐ No

Is there a hot water heater located on site? ☑ Yes ☐ No

Is there a dryer located on site? ☐ Yes ☑ No

Is there a hot oil heater (asphalt heater) located on site? ☐ Yes ☑ No

Describe briefly the disposal of particulates collected in the baghouse and/or other waste generated at the site: **The existing lime handling equipment will repurposed to handle limestone 14-1 thru 14-7, 14-13 thru 14-16, 14-24 and 14-25. New limestone process/handling equipment identified as units 14-26 thru 14-30 will be installed.**

Is there additional information attached to support the data required in this form? ☑ Yes ☐ No

Brief description of additional information included: flow diagram, draft language, emissions calculations

Total number of additional pages, including drawings, maps, and diagrams: 39 pages

11/2018

DEP7007L

Section L.5: Aggregate Processing Operations

New Source Performance Standard Applicability

Are any emission units for the operation subject to: ☑ NSPS, Subpart OOO ☐ None ☐ Other: _____

Complete the Table:

Emission Unit #	Affected Facility	Maximum Rated Capacity		Control Method or Equipment	Control Efficiency *(% removal)*	SCC Code	Pollutant	Emission Factor *(lb/SCC unit)*	Source of Emission Factor	Proposed/Actual Date of Construction Commencement *(MM/YYYY)*	Installation Date of Each Unit	Is the Unit Subject to NSPS? *(Yes or No)*
		(tons/hr)	*(tons/yr)*									
14-26	Transfer Limestone from day bin to weigh belt feeders	35	306600	Scrubber	90	30502006	PM	lb/ton	AP-42	25-Mar	NA	Yes
14-27	Tansfer of Limestone from weigh belt feeder to conveyor 4A	35	306600	Scrubber	90	30502006	PM	lb/ton	AP-42	25-Mar	NA	Yes
14-28	Transfer of Limestone from conveyor 4A to pre-crusher	35	306600	Scrubber	90	30502006	PM	lb/ton	AP-42	25-Mar	NA	Yes
14-29	Pre-crusher	35	306600	Scrubber	90	305003003	PM	lb/ton	AP-42	25-Mar	NA	Yes

Division for Air Quality

300 Sower Boulevard
Frankfort, KY 40601
(502) 564-3999

DEP7007V

Applicable Requirements and Compliance Activities

___ Section V.1: Emission and Operating Limitation(s)
___ Section V.2: Monitoring Requirements
___ Section V.3: Recordkeeping Requirements
___ Section V.4: Reporting Requirements
___ Section V.5: Testing Requirements
___ Section V.6: Notes, Comments, and Explanations

Additional Documentation

___ Complete DEP7007AI

Source Name: **Duke Energy Kentucky LLC. East Bend Generating Station**
KY EIS (AFS) #: **21-** **015-00029**
Permit #: **V-12-023 R1**
Agency Interest (AI) ID: **176**
Date: **8-Jul-24**

Section V.1: Emission and Operating Limitation(s)

Emission Unit #	Emission Unit Description	Applicable Regulation or Requirement	Pollutant	Emission Limit (if applicable)	Voluntary Emission Limit or Exemption (if applicable)	Operating Requirement or Limitation (if applicable)	Method of Determining Compliance with the Emission and Operating Requirement(s)
14-26 thru 14-29	New Limestone Handling	60.672(a), 60.674(a)	PM	0.014 gr/dscf			Method 5

Section V.2: Monitoring Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Monitored	Description of Monitoring
14-26,14-27, 14-28 and 14-29	Limestone Handling and pre-crusher	PM	60.674(a)(1)	Monitor pressure across the scrubber	Continuous measurement of the pressure loss of the gas stream through the scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±250 pascals ±1 inch water gauge pressure and must be calibrated on an annual basis in accordance with the manufacturer's specification.
14-26,14-27, 14-28 and 14-29	Limestone Handling and pre-crusher	PM	60.674(a)(2)	Monitor scrubber liquid flow rate	Continuous measurement of the scrubbing liquid flow rate to the wet scrubber. The monitoring device must be certified by the manufacturer to be accurate within ±5 percent of design scrubbing liquid flow rate and must be calibrated on an annual basis in accordance with manufacturer's instructions.

Section V.3: Recordkeeping Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Recorded	Description of Recordkeeping
14-26, 14-27, 14-28 and 14-29	Limestone Handling and pre-crusher	PM	60.676(b)	Daily pressure change across the scrubber and scrubber liquid flow rate.	

Section V.4: Reporting Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Reported	Description of Reporting
14-26,14-27, 14-28 and 14-29	Limestone Handling Pre-crusher	NA	60.676(i)	Date of initial startup	Notification of actual startup The notification shall be postmarked within 15 days after such date and shall include a description of each affected facility, equipment manufacturer, and serial number of the equipment, if available.
14-26,14-27, 14-28 and 14-29	Limestone Handling Pre-crusher	PM	60.676(d)(e)	Change in pressure across the scrubber and scrubber liquid flow rate	Submit semiannual reports to the Administrator of occurrences when the measurements of the scrubber pressure loss and liquid flow rate decrease by more than 30 percent from the average determined during the most recent performance test. .
Unit 2	Coal Fired Boiler	H_2SO_4	401 KAR 51:017(16)(5) 40 CFR Part 52.21(r)(6)(v)	Annual emissions of H^2SO^4	Report annual emissions of H_2SO_4 wiithin 60 days after the end of the calendar year for a period of 5 years following resumpsion of normal operation after the change.

Section V.5: Testing Requirements

Emission Unit #	Emission Unit Description	Pollutant	Applicable Regulation or Requirement	Parameter Tested	Description of Testing
14-26, 14-27, 14-28 and 14-29	Limestone Handling and Pre-crusher	PM	60.674(c)	PM	

11/2018 DEP7007V

Section V.6: Notes, Comments, and Explanations

Duke Energy East Bend Station

Wet FGD Conversion to a Limestone Inhibited-Oxidation Process
Preliminary Engineering Report

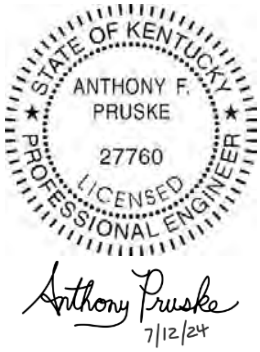
Duke Energy

Project number: 60724995

July 12, 2024

Quality information

Prepared by	Checked by	Verified by	Approved by
Anthony Pruske, PE Project Engineer	Scott Bryan Project Engineer	Julie Harkin Project Manager	Sterling Gray Business Development Director



Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	March 25, 2024	Issued for Permitting	Yes	Gray	Business Development Director
1	April 22, 2024	Issued for Permitting	Yes	Gray	Business Development Director
2	April 29, 2024	Issued for Permitting	Yes	Gray	Business Development Director
3	July 12, 2024	Issued for Permitting	Yes	Gray	Business Development Director

Distribution List

# Hard Copies	PDF Required	Association / Company Name
0	Yes	Troy Wilhelm / Duke Energy
0	Yes	Chad Donner / Duke Energy

Prepared for:

Duke Energy

Prepared by:

Anthony Pruske
Project Engineer
T: 512-924-7268 (c)
E: anthony.pruske@aecom.com

AECOM
13640 Briarwick Dr.
Suite 200
Austin, TX 78729
aecom.com

Table of Contents

Figures

Tables

1. Introduction and Project Basis

1.1 Project Basis

Duke Energy's East Bend Station currently operates a wet flue gas desulfurization (FGD) process that relies upon magnesium-enhanced lime (MEL) to control SO_2 emissions. However, the expenses associated with lime reagent, stabilization additives and disposal of the waste sludge produced by the process result in very high FGD operating costs which adversely affect the competitiveness of the East Bend Station in today's power markets. Furthermore, recent issues with lime supply, quality, and price escalation pose additional risks to the East Bend Station from a reliability, compliance, and economic perspective.

As a result, Duke Energy approached AECOM to assess the technical feasibility of converting the FGD system to use lower-cost limestone reagent in an inhibited oxidation process (LSIO) while still meeting all environmental and reliability requirements, and whether the required capital investment is economically justified.

1.2 Project Background

AECOM completed a Phase 1 Engineering Study (the Study) in 2022 which evaluated the technical and economic feasibility of converting the East Bend FGD system to a LSIO process. The Study identified the required scope items to convert the East Bend FGD system from MEL operation to LSIO operation, which are detailed in Section 3.

The Study report included the design basis, scope, and assumptions for a complete conversion of the existing FGD system to LSIO operation. The following preliminary documents formed the basis for the project scope:

- Process design basis, PRISM modeling, material balances, and process flow diagrams (PFDs),
- P&IDs,
- General arrangements, equipment layouts, and Power Distribution Center (PDC) arrangement,
- Equipment list, load list, one-line diagrams, and net IO summary,
- Contract and procurement approach,
- EPC schedule, and
- Class 3 cost estimate.

1.3 Objectives

The objectives of the Study were to determine the technical requirements, capital investment, and operating cost savings associated with converting the East Bend wet FGD process to LSIO operation. The Study established the following preliminary information:

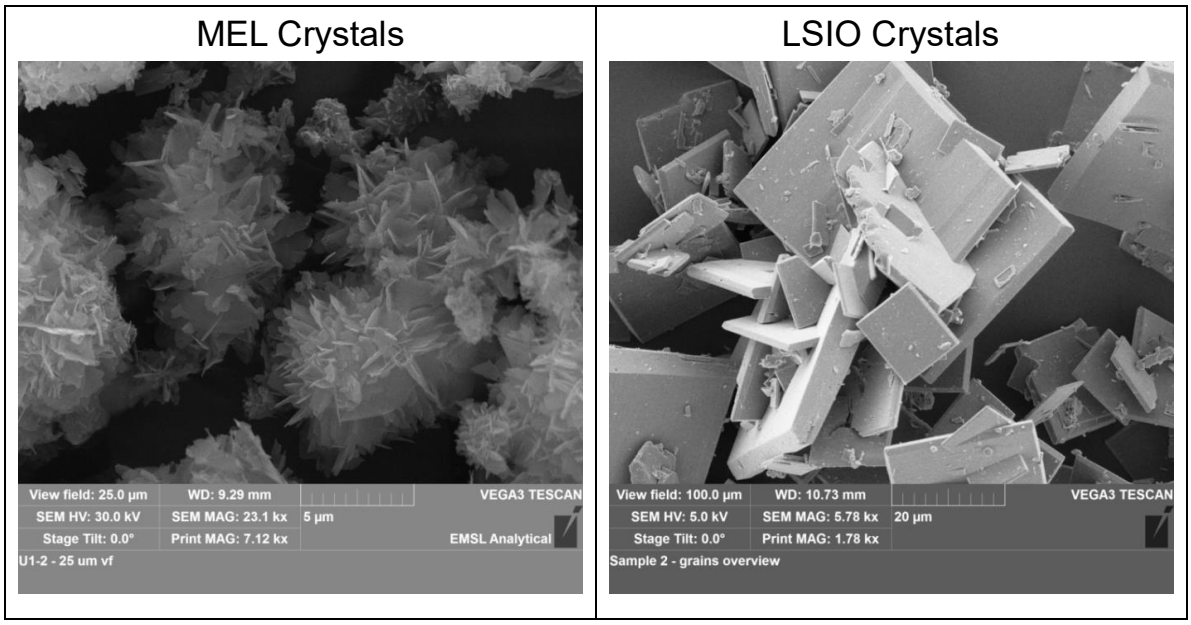
- Design basis for the FGD conversion from MEL to LSIO,
- Process modifications to existing systems,
- Major equipment and infrastructure for new systems,
- System and equipment arrangements and configurations,
- Project schedule,
- Cost estimate, and
- Contract and procurement approach.

2. Technology Overview

The Wet FGD system at East Bend uses MEL scrubbing technology, which relies on pebble quicklime containing a small fraction of dolomite as the reagent. Dolomite is comprised of about 50% magnesium oxide which, when added to the absorber with the lime reagent, dissolves and promotes elevated concentrations of sulfite. Sulfite is an effective source of liquid-phase alkalinity, which facilitates high SO_2 removal efficiency for boilers firing high sulfur coal. The primary benefit of scrubbing with MEL is that the required absorber recycle slurry pumping capacity is lower than limestone-based FGD systems – typically in the range of 40 to 50 gallons per 1,000 cubic feet of treated flue gas – and results in smaller pumps with lower power requirements.

A key disadvantage of the MEL technology is the production of calcium sulfite ($CaSO_3$) solids that are typically difficult to dewater. As a result, significant quantities of fly ash and lime must be added to the filtered solids to produce a stable product suitable for disposal in a landfill. Conversion to LSIO chemistry will improve the dewatering properties of the calcium sulfite solids by creating larger, more regular, and symmetric crystals. A comparison of calcium sulfite crystals produced by MEL and LSIO scrubbing is provided in Figure 2-1.

Figure 2-1: Comparison of Crystal Shapes from MEL and LSIO FGD Systems



The FGD waste solid crystals in the left image were collected from an MEL FGD system of similar design and vintage to East Bend; oxidation was approximately 11%. The irregular shape of the crystals causes them to trap water between the solids such that dewatering is not easily achieved. The FGD waste solid crystals in the right image were collected from another utility that converted from MEL to LSIO operation. Due to the sulfite oxidation inhibiting properties of thiosulfate and sodium formate, oxidation in that unit was approximately 5%. The flatter, cubic, and larger LSIO crystals enable more efficient water removal from between the solid crystals in the slurry. As a result of the LSIO conversion at East Bend, a significant improvement in dewatering characteristics of the FGD solids is expected, resulting in much drier filter cake, less water landfilled, and reduced fixation lime requirements.

Another disadvantage of note with MEL scrubber technology is the loss of liquid-phase alkalinity due to oxidation of sulfite to sulfate during periods of low load operation or if an FGD absorber is out of service. Liquid-phase alkalinity must be re-established when load increases or the system is returned to service before the FGD process can achieve required efficiency. The degradation in performance has become a greater concern as more coal-fired units operate at lower capacity factors in the current market while emission limits and compliance requirements become more stringent.

The following process modifications are needed to convert an existing MEL scrubber to LSIO operation:

- **Reagent Unloading.** Due to differences in their molecular weight, more limestone by mass is required than MEL to scrub the same quantity of SO_2. Further, the bulk density of limestone is roughly double the bulk density of lime. As a result, the existing reagent unloading and material handlings systems, designed for MEL, often require modification to accommodate new operating conditions and higher density material.
- **Reagent Preparation.** The reagent preparation system for a MEL scrubber consists of a lime slaking device. Generally, slakers cannot be repurposed to grind limestone to the required fineness due to overall mechanical configuration issues or capacity issues. New grinding mills are often required to produce the necessary quantity and quality of reagent slurry sufficient for the FGD process. New equipment enclosures or enclosure additions are also often required to house the new grinding systems.
- **Liquid-phase Alkalinity.** Liquid-phase alkalinity provides the main driving force for SO_2 removal in MEL scrubber systems. Limestone scrubbers rely predominately on solid-phase alkalinity with dissolution of limestone in the absorber replenishing alkalinity to facilitate SO_2 scrubbing. Due to this fundamental difference, MEL scrubbers require less interaction between the scrubber liquor and flue gas to achieve the required removal efficiency and are designed to operate at lower liquid-to-gas (L/G) ratios. To compensate for this difference while minimizing the capital investment associated with increasing the L/G, a performance additive such as sodium formate (NaFo) is used to provide equivalent alkalinity following an LSIO conversion. However, since performance additives will not degrade in the slurry as the reaction tank sits idle during outages and can also be added directly to the scrubbers following an outage in which the absorber reaction tanks are drained, the FGD system is able to maintain consistent SO_2 removal performance under all operating scenarios.
- **Mist Eliminator Wash System.** The mist eliminator (ME) wash systems for MEL scrubbers were typically designed as general flush systems to remove slurry carryover from the front surfaces of the ME stages to prevent accumulation of calcium sulfite. However, the slurry carryover in LSIO FGD slurry also contain residual limestone solids that react with SO_2 remaining in the flue gas passing through the ME. As such, the ME wash system for a limestone based FGD system should be more robust in design with respect to wash intensity (gpm/ft2) and wash pressure to provide effective removal of the FGD slurry from the ME surfaces.

3. Project Scope and Design Information

AECOM developed a preliminary design and layout for the conversion of the East Bend FGD process to LSIO operation. This section provides a general overview of the design basis and preliminary design for the system. Preliminary drawings are included in the appendices of this report.

3.1 Design Basis

The FGD process modifications are designed to maintain an SO_2 removal efficiency of at least 98% for the design fuel (5.66 lb SO_2 / MMBtu). Table 3-1 provides key design basis inputs.

Table 3-1: Preliminary Design Basis

Parameter	Unit	Value
Site Elevation	Ft above MSL	515
Number of Generating Units	-	1
Unit Load, Net	MW	600
Unit Heat Rate, Net	Btu/kWh	10,760
Unit Heat Input	MMBtu/hr	6,456
Annual Capacity Factor	%	69
Coal Heating Value	Btu/lb	11,778
Coal Ash Content	wt%	9.02
Fly Ash Portion of Total Ash	% by weight	80
Coal Sulfur Content	%-wet	3.20
SO_2 Removal Requirement (Design)	%	98
Lime Reagent CaO Purity	%	90.3
Limestone $CaCO_3$ Purity	%	92
Limestone size (received)	-	1"x0
Limestone size (product)	-	90% passing 325 mesh

3.2 Scope Overview

The LSIO conversion project scope includes modifications to existing equipment and is based on the turnkey delivery, including engineering, procurement, and construction. The conversion of the East Bend FGD system to LSIO operation involves several process, equipment, and system changes including:

- Minor modifications to reagent receiving, conveying, and storage systems.
- Installation of new reagent feeders and conveying equipment.
- Installation of new limestone pre-crushers and grinding mills.
- Refurbishment and resheaving of absorber recycle pumps.
- Installation of new absorber recycle slurry piping, cross-tie piping, spray headers, and spray nozzles.
- Operation of all absorber recycle slurry pumps to enhance SO_2 removal performance.
- Modification of the absorber trays to enhance SO_2 removal performance.
- Installation of a buffer additive storage and feed system to enhance SO_2 removal performance.
- Replacement of existing emulsified sulfur storage tank and feed system to improve system reliability and inhibit sulfite oxidation.

- Upgrade of mist eliminator wash water supply system.
- Replacement of waste slurry storage tank, thickener underflow sludge tank, and lime slurry tank agitators.
- Installation of a filtrate purge system to control process chloride levels.

3.3 System Descriptions and Scope

3.3.1 Material Handling System

The material handling system includes infrastructure and equipment required for the receiving, unloading, conveying, processing, and storage of the limestone reagent (currently magnesium-enhanced lime). Limestone will be received by barge at the barge unloading area where it is offloaded and then conveyed to the storage silo area. From here, the limestone will be conveyed to the day bin area where it will be temporarily stored for distribution to the reagent prep system by way of a new belt conveyor system.

1. Limestone Flowability Studies will be performed on the Unloading Hopper, Storage Silo, modified Day Bin, and the pre-crusher outlet chute. The primary objective of the studies is to confirm the assumption that no geometry modifications are required on the Unloading Hopper or the Storage Silo, guide the detail design on the Day Bin outlet modifications, and provide design parameters for the pre-crusher outlet chute.
2. Barge Unloading Area – The existing barge unloader and unloading hopper will be repurposed for limestone service. The following modifications are planned at the barge unloading area:
    a. Install a new, smaller, barge unloading clamshell bucket to account for the higher density of limestone and stay within the system design parameters.
    b. Modify existing 30-day storage silo inlet chute to extend below maximum fill level for level control.
3. Storage Silo Area – The existing lime storage silo will be repurposed for limestone service. The following modifications will be performed at the storage silo:
    a. Install a profile plate on the tail end of Conveyor 3A to limit the conveyor's limestone tonnage throughput to match the existing lime throughput on the conveyor.
    b. The high-level alarm(s) setpoint will be lowered so that the weight capacity of the existing silo is not exceeded due to the higher density of the limestone (relative to lime) stored in the silo. The existing level transmitter and cabling will be reused.
    c. Demolish existing metal detector and install a new manual magnetic separator at the head end of LH1.
4. Day Bin Area – The following modifications will be made to convert the existing lime day bin to limestone service:
    a. A new feed chute on the discharge of Conveyor 3A will be installed down to the day bin. The chute will be equipped with AR liners.
    b. Bin Outlet Modifications – The eight existing day bin outlets will be modified to four discharge points. Outlet slopes will be equipped with AR liners. Design of the modifications to the bottom of the bin to accommodate the new discharge points will take into consideration the need to reduce the allowable storage volume of the bin to prevent exceeding the weight capacity of the equipment.
    c. Four new weigh belt feeders (WBFs) will be installed at the day bin discharge points. Each WBF will be equipped with a slide gate to isolate the WBF from the day bin material. Each limestone material handling train (two trains total) will be equipped with two 100% WBFs, one operating and one spare.
    d. Supplemental steel and platform modifications will be designed and provided for new WBF installations.
    e. The high-level alarm(s) setpoints will be lowered so that the weight capacity of the existing day bin is not exceeded due to the higher density limestone being stored in the day bin. The existing level transmitter and cabling will be reused.
5. Limestone Conveying System – A new belt conveyor system will be installed to transport limestone from the WBFs to the new reagent preparation system. The conveying system includes:

a. Two 24” wide belt conveyors (one per train) that collect material from the discharge of the WBFs and feed it into the limestone preparation system. The conveyors will be equipped with a walkway on both sides and have ladder access to the WBF deck. The conveying systems will be equipped with manual screw take-ups on the tail pulleys and a tramp metal detection system that is interlocked with the transfer conveyors to prevent damage to the pre-crushing and grinding systems.

b. New AR lined chutes will be installed between the WBFs and the transfer conveyors. New AR lined chutes will be installed at the discharge of the transfer conveyor and feed into the reagent preparation system.

c. Limestone transfer points (WBF discharge, transfer conveyor discharge) and the pre-crusher will have connections to a new dust collection system.

d. Supplemental steel will be designed and installed to support the limestone conveying and tensioning system.

e. Foundations will be installed for some conveyor support structures that cannot be supported from building steel.

6. Instrumentation and Controls – New control devices for the material handling system that will be installed include:

   a. Conveyor belt control devices will include pullcord switches the full length of the transfer conveyor, belt misalignment switches, and zero speed switches. The weigh belt feeders will include scales, VFDs, other devices to control limestone feed rate and devices to protect the weigh belt feeders.

   b. New chutes will be equipped with plugged chute switches.

   c. The new dust collector system will include level switches and automated valves for cleaning the new dust collection system.

7. Cabling and Raceways – New cables and raceways will be installed to energize and control new equipment.

   a. Power cabling will be installed from a new 480V lineup in the new limestone grinding building to new conveying system equipment.

   b. New instrument and control cabling will be installed from material handling equipment to a new RIO cabinet in the new Power Distribution Center (PDC).

   c. New cable trays will be installed for power, instrument, and control cabling. Metal conduit and flex conduit will be used for final drops to equipment and other end users.

   d. Supplemental steel for raceway supports will be designed and installed.

   e. Foundations for raceway support steel will be installed at grade.

8. Demolition – The existing metal detector at the top of the 30-day lime silo will be removed. The day bin vibrating screen (and associated chute work), day bin bottoms, lime screw feeders, and the day bin outlet gates will be removed to accommodate the new limestone conversion equipment. Penetrations will be made on the existing reagent preparation building for transfer conveyor access. Other equipment no longer used and not interfering with the new equipment will be abandoned in place.

3.3.2 Reagent Prep System

The reagent prep system includes unit operations for crushing and grinding limestone received from the material handling system. The limestone received will first pass through a pre-crusher system where the product will be crushed before it is sent to the limestone grinding system. From the pre-crushing system, the pre-crushed product will be sent to Vertimills for final slurry product sizing. Final slurry product will be stored in the existing lime transfer storage tank.

1. Limestone Pre-crushing System – Two 100% pre-crushing systems will be installed to size the limestone down to an acceptable top size for the grinding systems (<1/4”). The pre-crushing system is summarized below:

   a. A pre-crusher will be installed between each limestone transfer conveyor (two pre-crushers total) and each grinding system.

b. A new discharge chute will be installed on the outlet of the pre-crusher. Each chute will feed into its respective grinding system and will be lined with AR material.

2. Limestone Grinding System – Two 100% limestone grinding trains will be installed to achieve the final slurry product sizing of 90% passing 325 mesh. The grinding system consists of the following equipment.

   a. Two 100% vertical mill systems (VTMs) rated for 35 TPH will be installed. Each VTM will be equipped with a 1000 HP motor, a separation tank and a recycle pump. The lower portions of the VTMs are lined with magnetic tiles and the upper portion is lined with abrasion resistant material. The VTM bearings will be automatically lubricated with a grease pump and accessories. The VTM gearbox will be lubricated via a forced lubrication skid which includes duplex oil filters, temperature control, and sample valves. The mills are equipped with a door jacking system to assist with clearing the door jamb. A single portable hydraulic pump will be provided. A single common screw transporter will be provided to facilitate major maintenance activities. The screw transporter includes a hydraulic jacking system to raise/lower the screw in/out of the mill body. Two screw stands will be provided to facilitate maintenance activities. A single, 2-ton electric ball charge hoist will be provided for adding grinding media to both mills. The initial ball charge will be provided. Vendor support including field installation, process commissioning, and operator training.

   b. Each grinding system will include a classification system to perform the final slurry product sizing. Each classification system will include a hydrocyclone feed tank, feed tank agitator, hydrocyclone cluster, outlet distribution box (for feed tank level control), and two feed pumps. A single, 1-ton electric hoist will be installed for servicing the hydrocyclone clusters. 200’ of’ 8” diameter AR FRP piping is included in the design to transfer slurry from both classifier feed tanks to the classifiers. The hydrocyclone underflow will be routed via gravity drain using 6” AR FRP piping to the Vertimill for further processing. An allowance of 400’ of piping is included in the design for both underflow and overflow systems.

   c. Each hydrocyclone overflow will be routed via gravity drain to the existing lime transfer storage tank or returned to the hydrocyclone feed tank via the outlet distribution box using 6” AR FRP piping.

   d. The pre-crushing and VTM equipment along with ancillary components will be installed in a steel enclosure with structural steel framing and aluminum-zinc coated steel panels for roofing and siding southeast of the existing slaker building. A 35-ton bridge crane will be provided for servicing the VTMs. The enclosure will be equipped with man-doors to provide sufficient ingress/egress for plant staff, two roll-up doors, lighting, convenience power, insulation, and heating/ventilation equipment. The vertical mill hydrocyclones and launders will be installed on an elevated concrete deck and a building sump will be provided with two sump pumps and an agitator. Two tempered eye wash stations will be provided. Fire detection hardware will interface with an existing fire detection monitoring panel.

   e. New utility and process piping for the grinding systems will be provided and installed. Service water will be utilized for grinding water and flush water. Approximately 240’ of 6” piping and 130’ of 4” is included in the design for service water. Service water and service air piping will be carbon steel. One-hundred and fifty feet of copper piping will be used for the eye wash stations. Slurry piping will be equipped for automated flushing slurry from the piping prior to system shutdowns. Slurry isolation valves will be knife gate valves and flush water valves will be butterfly valves. Utility valves will be ball valves or gate valves. Water piping located outdoors will be heat traced and insulated. Pipe supports for process and utility piping will be provided and installed.

   f. Supplemental steel for pipe supports will be designed and installed. An allowance of 17 tons for supplemental steel is included in the design.

   g. Foundations for the mills, tanks, pumps, and enclosure will be designed and installed. Final site grading will be performed. A Geotechnical investigation will be performed.

   h. A new 20 HP agitator will be installed in the existing reagent slurry tank. It is assumed the existing agitator power cables are at least #10 conductors and adequate for the new service. The existing agitator starter will be reused.

   i. The lining system of the reagent slurry tank will be replaced with a flake glass lining.

3. FGD Additive System – A new FGD additive system will be installed to enhance the liquid phase alkalinity of limestone slurry. The features of the additive system include:

a. A new double wall 29,000-gallon shop fabricated FRP tank will be provided for storing FGD system additive. The tank will be located indoors in the existing slaker building. The tank will include a heating system and insulation installed to maintain a product temperature of 100 deg F.

b. A new pump skid equipped with two 100% capacity 1.2 gpm positive displacement chemical pumps will be installed indoors in the adjacent slaker building. The additive pumps will pump the FGD additive to the existing lime/limestone slurry storage tank. The pumps will be heat traced and equipped with removable blanket insulation.

c. New 304 SS tubing from the additive storage tank up to the existing limestone slurry storage tank will be installed. Approximately 100' of new 3/8" SS tubing will be designed and installed. The piping system will include manual valves, check valves, heat tracing, insulation, and pipe supports.

d. Foundations for the new additive tanks, pumps, pipe supports, and raceways will be designed and installed.

e. A truck unloading system will be installed to fill the additive tank. It is assumed the tank will be close enough to the unloading station so that the tank truck pumps can be used for filling the new additive tank. The unloading station will be equipped with an eyewash station and containment system. The containment will be equipped with manual drain valve and HDPE piping to drain storm water into the existing reagent preparation building trench system.

f. Area lighting and convenience power at the FGD Additive system is included. Local panels for distributing power, lighting, and heat tracing will be installed.

g. Supplemental steel for pipe and raceway supports will be provided. An allowance of 5 tons of supplemental steel is included in the design.

4. Instrumentation and Controls – New instrumentation, control devices, and automated valves will be installed for the new reagent preparation systems.

   a. Instrumentation to monitor, control, and protect the pre-crushing and grinding process equipment will be provided.

   b. New instrumentation will be provided to monitor the additive tank levels and temperatures. The additive feed pumps will include remote start capabilities.

   c. A new remote I/O (RIO) cabinet will be installed in the PDC. The new RIO cabinet will interface with the existing DCS via a fiber optic link. An allowance for 500' of fiber optic cable for interfacing with the existing DCS is included in the design.

5. Power Supply – The power supply to the reagent preparation area will be fed from spare compartments in the existing 4160V lineups (24SR-1 and 24SR-2) to support the new power supply system, the following scope will be performed.

   a. Electrical studies (load flow, short circuit analysis, relay coordination, and arc flash) will be performed to support detail design and engineering activities. New arc flash labeling will be provided where personnel protection levels are higher than existing labeling.

   b. Two spare 4160V compartments will be utilized to energize each reagent handling and preparation system. Two compartments will be utilized from 24SR-1 and two spare compartments will be utilized from 24SR-2. One of the compartments on each existing lineup will be utilized to power a 1000HP VTM motor and the other compartment will feed a 4160V x 480V transformer that will supply the remaining power distribution requirements in the reagent handling and preparation areas. Each 4160V compartment (four compartments total) will have new 4160 breakers and SEL relays installed (feeder protection or motor protection as required).

   c. The 480V and under power distribution system will be installed in a prefabricated Power Distribution Center (PDC) to be located adjacent the new VTM enclosure. The primary lineup will include outdoor 4160V x 480V liquid filled step down transformers and an open transition tie breaker between each train's 480V equipment. Transformers will be installed per NEC code and applicable regulations (e.g., fire detection/protection). The low voltage power distribution system will include LV MCCs, load centers, and lighting panels. The PDC will be equipped with HVAC, lighting, convenience outlets, and two doors.

d. New foundations for the transformers will be installed. The PDC will sit on elevated piers to allow for bottom entry and exit of cabling.

6. Cabling and Raceways – New cables and raceways will be installed to energize, monitor, and control new equipment that will be installed. Connections to the existing plant ground grid are included.

   a. Medium voltage power cabling will be installed overhead from the FGD electrical room to the new PDC. The VTM motor cables will be routed overhead in the new VTM enclosure. Low voltage (LV) duct banks will be installed from the transformers to the PDC and from the PDC to the VTM enclosure. Low voltage power cabling will be installed from the PDC to the new reagent handling equipment, the new reagent preparation area users, and the FGD Additive system. A new ground grid will tie into the existing grid.

   b. New instrument and control cabling will be installed from reagent preparation area equipment to a new RIO cabinet in the PDC.

   c. New cable trays will be installed for power, instrument, and control cabling. Metal conduit and flex conduit will be used for final drops to equipment and other end users.

   d. Supplemental steel for raceway supports will be designed and installed.

   e. Foundations for raceway support steel will be installed at grade.

7. Demolition – The existing reagent preparation building will be cleaned of lime dust accumulations. The Lime slurry tank agitator and two tank baffles will be removed.

3.3.3 FGD Area

The recycle slurry system receives the limestone slurry product from the reagent prep system where it is sprayed into the absorbers for SO_2 removal. Recycle slurry pumps recycle the limestone slurry in a closed loop spray tower. Absorber trays installed in the cross-section of the towers create pressure drop (dP) for enhanced SO2 removal as the limestone slurry collected on these trays passes through the perforations in the tray.

The mist eliminator system installed above the recycle slurry spray nozzles is designed to remove carryover (moisture) from the exiting flue gas. The mist eliminator system includes an integrated wash header system designed to clean the surfaces of the mist eliminators with wash water.

1. Recycle Slurry System – To achieve the desired SO_2 removal objectives, the following modifications will be made to increase the system L/G ratio and overall absorber slurry spray coverage.

   a. Absorber recycle pump refurbishments (overhaul) to restore pumps to like-new conditions. Modifications (e.g., resheaving) to recycle pumps to optimize flow and pressure on the lower spray headers. Automated flush controls will be added for the recycle pumps.

   b. Two new 316L spray headers will be installed on each module (six headers total). The main inlet trunk diameter will be 30” and each header will be equipped with 128 silicon carbide slurry nozzles. A new 30” 316L penetration spool will be provided for each header.

   c. A new 316L internal support truss will be designed and installed to support the lower recycle header trunk. The existing truss will be used to support the upper recycle header trunk. New 316L box beam supports will be designed and installed for the upper and lower header branches.

   d. The existing 20” external recycle piping will be replaced with 30” FRP piping and a new cross-tie (manifold) to allow four pumps to feed both spray elevations. New pipe supports are included.

   e. Supplemental steel for the new external recycle piping supports will be designed and installed.

   f. New 316L absorber tray dP taps will be installed on each absorber (six taps total) so that the tray dP can be manually measured during system startup. The taps will be 2” diameter and will include a manual ball valve.

   g. 316L strips of 11-gauge sheet metal will be welded onto the existing tray to reduce the open area of tray surface. The strips will be installed as evenly/symmetrically as possible across the tray surface to promote even gas/liquid distribution.

h. Replace existing emulsified sulfur system as the existing has reached the end of its serviceable life.

2. Mist Eliminator (ME) System – The ME system will be modified to improve the wash intensity on the MEs by increasing the wash water pressure from 20-30 psi to 40-50 psi.

   a. The two existing service water pumps will be replaced to achieve desired wash conditions at the ME wash nozzles. The new pump duty point will be approximately 2000 gpm at 250' TDH. The new pump motor horsepower is estimated to be 250 HP. Two additional Lakos filters and six filter pods will be added to improve reliability and availability of the service water filtration system. Associated piping and isolation, flush, and drain valves are included. The additional filters will be installed in the location of the existing ME wash water blend station (adjacent to the two existing Lakos Filters). The new arrangement will have three operating filters and one spare filter.

   b. The existing 5" ME wash piping sections will be replaced with approximately 210' of 6" 316L SS piping. New pipe supports are included.

   c. Supplemental steel for the new ME wash pipe supports will be designed and installed. An allowance of 5 tons of supplemental steel is included in the design.

   d. The two existing service water pump foundations will be modified to accommodate the new service water pumps. Foundations for the new Lakos filters and associated pipe supports will be installed.

   e. New ME wash nozzles will be installed on the upper "C" module wash header after the existing nozzle extensions are removed. 248 nozzles will be installed. The nozzles will be replaced in kind.

   f. The existing ME wash logic and sequencing will be modified.

   g. Upgrade and replacement of portions of existing Lakos filter blowdown piping due to excessive erosion.

   h. Three new on/off isolation valves will be installed for each wash zone header for improved operational and maintenance flexibility.

   i. A new Gravity Filter Bank for the ME system is included. The new filters will be used to support filtering stability to the ME wash station, preserve FGD chemistry and density.

3. Slurry Bleed and Level Control – The control logic for the absorber density and level controls will be modified so that reaction tank density will be controlled by batch operation (on/off) with the existing bleed valves. New automated flush valves, piping, and restriction orifices will be installed. In addition, controls will be modified such that reaction tank liquid level will be maintained by addition of CRW makeup water (see section 3.3.4.3 for more CRW makeup water details).

4. Instrumentation and Controls – The following instrumentation, devices, and services will be provided for the FGD area.

   a. The absorber recycle density meters on each module (three meters total) will be removed prior to demolition of external recycle piping. After the new 30" recycle piping is installed, the existing density meters will be reinstalled near the original location using new mounting hardware. Existing instrument cabling will be reused. If additional cabling is necessary to access density meter terminations, a junction box and new instrument cabling will be installed (no cable splices).

   b. New 6" magnetic flow meters (three flow meters total) and 6" ME wash valves (twelve valves total) will be installed in each absorber's new 6" mist eliminator wash piping near their original location. Existing instrument cabling will be reused. If additional cabling is necessary to access flow meter and valve terminations, a junction box and new instrument cabling will be installed (no cable splices).

   c. New recirculation valves will be installed on each service water pump (two recirculation valves total). It is assumed the existing pipe support system is adequate for the valve addition.

   d. A new pressure transmitter will be installed in the common service water pump discharge piping for recirculation valve control.

   e. One portable ship loose differential pressure gauge will be provided for each module (three gauges total). The gauges will be utilized for monitoring absorber tray dP during startup post limestone conversion.

5. Cabling and Raceways – New cables and raceways will be installed to energize, monitor, and control new equipment that will be installed. Connections to the existing plant ground system are included.
    a. New cabling will be installed for the service water pump recirculation valves and the pressure transmitter.
    b. Cabling for the service water pump recirculation (automated valves and pressure transmitter) will be ran in new conduit.
6. Power supply – Existing service water pump cabling will be reused based on the one-line drawing (SLD20D27) stating the existing infrastructure is designed for 250 HP. If additional cabling is necessary to access pump motor terminations, a junction box and new power and control cabling will be installed (no cable splices).
7. Demolition – The existing 316L recycle headers, penetration nozzles, and internal box beams will be removed from the absorbers. Portions of the external FRP recycle piping (20" diameter sections) will be removed along with associated pipe supports and supplemental steel. The 5" ME wash piping, flow meters, and automated valves will be removed to accommodate the new 6" ME wash piping. The 248 ME wash riser extensions on the "C" module upper wash header will be removed. The existing service water pumps and recirculation restriction orifices will be removed. The existing ME wash water blending station valves and piping will be demolished and the CRW and service water piping reworked to make room for the two new Lakos filters and Zero Gravity filter pods.

3.3.4 Dewatering Area

Solids accumulated in the absorber tower sumps are pumped to the dewatering area for removal from the FGD system by means of two-step dewatering. Primary dewatering is achieved by means of a thickener which receives the slurry blowdown from the FGD area. Solids accumulated in the center well of the thickener (thickener underflow) are pumped to the secondary dewatering area and the thickener overflow is collected in the CRW tank.

Secondary dewatering is achieved by means of drum filters. Thickener underflow is first received and stored in the existing WSP surge tank, then pumped to drum filters for dewatering. The filter cake is stabilized in existing pugmills where the filter cake is blended with fly ash, lime, and water from a chloride purge stream. Final blended cake is disposed of consistent with current operations.

1. Primary Dewatering – The primary dewatering will be modified as below for the conversion to limestone reagent.
    a. The existing FGD Sludge Tank (thickener underflow tank) mixer will be replaced with a new agitator. The agitator oil pump will be a shaft driven style oil pump to allow for agitator lubrication when the agitator is required to operate on essential power.
    b. The existing mixer support structure will be reinforced with additional supplemental steel and two baffles will be installed in the tank.
    c. The thickener underflow pump controls will be modified to facilitate consistent, automatic control of the underflow slurry density at the desired operational setpoint.
    d. The lining system of the FGD Sludge Tank will be replaced with a flake glass lining.
    e. Automated flush control valves will be added for flushing the thickener underflow pumps and piping.
2. Secondary Dewatering – The secondary dewatering system will be modified as below for reagent conversion project.
    a. The existing WSP Surge Tank mixer will be replaced with a new agitator.
    b. The existing mixer support structure will be reinforced with additional supplemental steel and two baffles will be installed in the tank.
    c. New 316L chloride purge piping will be installed on the discharge of each filtrate pump (four pumps total). The piping will be manifolded together and routed to a new chloride purge spray bar at the pug mill for blending with waste disposal product material. Each purge line will be equipped with an automated valve and a downstream block valve. Approximately 140' of 2.5" and 60' of 1.5" piping will be installed.

3. Instrumentation and Controls

    a. The following devices will be installed as part of the chloride purge addition: A new automated valve will be installed in the discharge piping of each of the four existing filtrate pumps (four valves total). A flow meter will be installed to control a modulating valve on the chloride purge header to the pug mill.

    b. Eight new automated valves and associated piping will be installed as part of the absorber density using CRW.

4. Power Supply, Cabling and Raceways – New motor starters, cables, and raceways will be installed to energize, monitor, and control new equipment that will be installed.

    a. Space in existing dewatering area MCCs (thickener and WSP) will be configured for Size 4 MCC buckets to power the new dewatering area agitators. The WSP MCC will not require any loads to be relocated to accommodate a size 4 bucket. The thickener area MCC will require relocating some loads to accommodate a size 4 bucket. New size 4 starters will be provided. New power and control cabling will be installed from the new motor starters to new agitators.

    b. New instrument and control cables will be installed for the new chloride purge devices and the CRW density control.

    c. New raceways will be installed for power, instrument, and control cabling. Metal conduit and flex conduit will be used for final drops to end users.

    d. Supplemental steel will be designed and installed for the new cable trays.

5. Demolition – The Sludge Tank Mixer and the WSP Surge Tank Mixers will be removed to accommodate the new agitators.

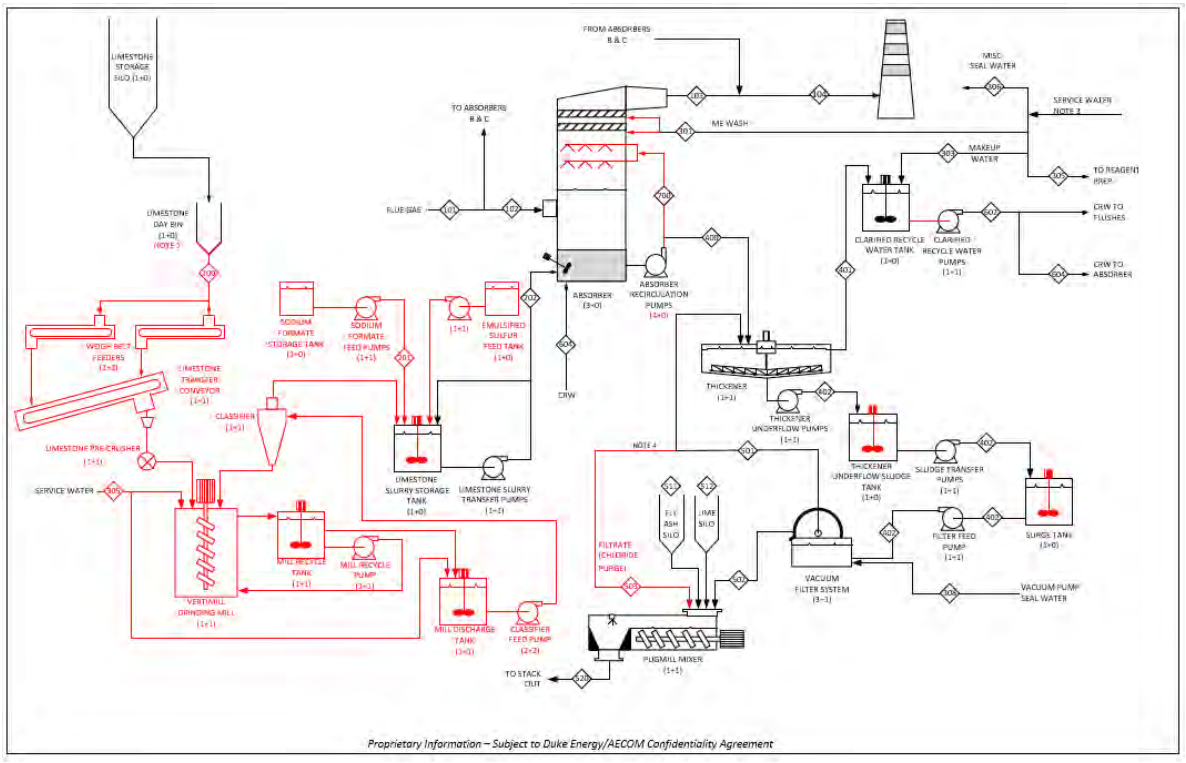
3.3.5 Balance of Plant (BOP)

1. A laser scan will be performed of selected project areas to optimize pipe routing and equipment arrangements.
2. A geotechnical investigation will be performed in the area of the new vertical milling system to identify the foundation design requirements for this area.
3. An English Language Control Description (ELCD) for the DCS supplier (Emerson – Ovation) to make programming changes to existing systems and programming for new systems.

4. System Operations

The concept AECOM developed for LSIO operation reuses some existing equipment and infrastructure where possible to minimize the capital cost associated with a process retrofit. A process flow diagram (PFD) of the proposed configuration is provided in Figure 4-1. The process lines and equipment in red represent new scope and construction items. All other process lines and equipment in black reflect existing equipment or piping that will be reused or repurposed. The PFD with associated material balance for limestone operation is provided as Appendix B.

Figure 4-1: Limestone Inhibited Oxidation (LSIO) Process Flow Diagram

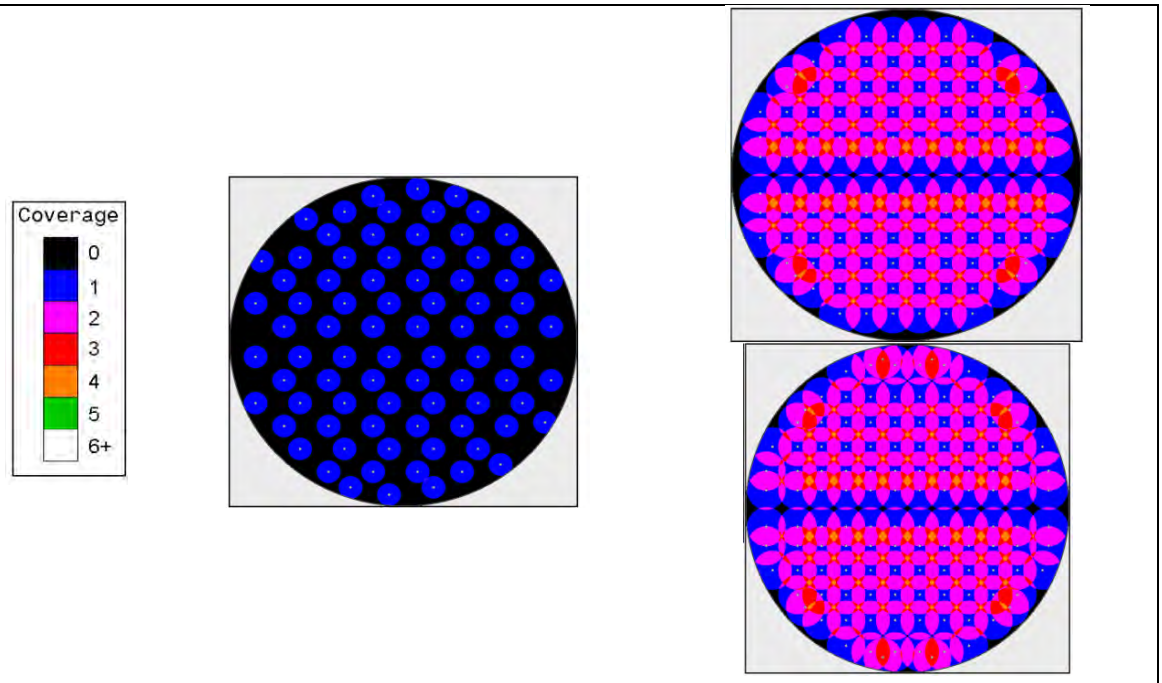


4.1 LSIO Operation

LSIO operation will require an increase in L/G to achieve the desired SO_2 removal efficiency of 98% without requiring excessively high sodium formate usage. All four of the existing slurry pumps will operate at an approximate flow of 12,500 gpm each (50,000 gpm total per absorber) to achieve an L/G of 64 gal/kacf. Modifications to pump speed via new belts and sheaves and modifications to the existing recycle piping to reduce system friction losses will be required to allow the existing pumps to achieve these flows.

New spray headers designed with improved spray coverage will be installed to distribute the slurry over the absorber cross section at each of the two existing spray levels. Comparison of the existing spray coverage to the proposed new spray coverage is illustrated in Figure 4-2. The images represent spray coverage at 18-inches below the nozzles. A schematic of the new spray header design is provided in Appendix A. Tray strips will also be added to the existing tray to achieve a pressure drop across the tray of approximately 3.0 IWG at design conditions. Improvements to spray coverage and an increase in tray pressure drop will both provide mass transfer benefits that appropriately balance capital investments with operational expenditures.

Figure 4-2: Current Versus Proposed Absorber Recycle Spray Pattern



Existing Spray Coverage
82 Single Hollow Cone nozzles
90-degree spray angle

Proposed Spray Coverage
128 Single Hollow Cone nozzles
120-degree spray angle

Calcium sulfite solids will continue to be produced with LSIO operation. These solids will be purged from the individual reaction tanks based on density feedback control to target 15% suspended solids in the reaction tanks rather than the current control scheme that uses tank level as the control variable. To maintain slurry velocity in the existing bleed piping, the bleed will operate on a batch rather than continuous basis at roughly the same flow rate. The existing bleed valves will open when a high density set point has been reached in the reaction tank and will remain open until a low density setpoint has been achieved. The bleed piping will be flushed with clarified recirculating water (CRW) after the bleed valve has closed. At full load operation, the bleed will operate for approximately 20 minutes of every hour. The existing density meters will be used to control the batch bleed process. Tank level will be used to control the addition of CRW as makeup to the reaction tank.

The solids purged from the reaction tank will be transported in the existing bleed piping to the thickeners for primary dewatering. Consistent with current operations, overflow from the thickener will be collected in the CRW tank along with FGD system makeup water. The thickener will be operated such that the underflow slurry contains nominally 30% suspended solids. The underflow will be collected in the existing thickener underflow (TUF) sludge tanks for subsequent transfer via the waste slurry processing (WSP) sludge tank to the drum filters. The improved dewatering properties of the sodium sulfite solids associated with the LSIO conversion (as described in Section 2.0) will result in improved performance for the drum filters. Based on LSIO conversions at other facilities, AECOM predicts the drum filter cake to contain nominally 65% solids. The existing filtrate pumps that transfer filtrate to the filtrate storage tank appear to have marginal capacity for the increased filtrate production associated with the reduced cake moisture. AECOM will perform an assessment during detailed design, but at this time assumes the filtrate pumps have adequate capacity for the new duty. As such, the only modifications necessary for the secondary dewatering system are replacement agitators in the TUF and WSP Sludge Tanks to keep the more readily dewatered calcium sulfite solids in suspension. Operation with 2 or 3 drums in service will continue, dependent upon cleaning and maintenance schedules.

Stabilization operations will continue with use of the existing pugmill to combine filter cake from the drum filters with fly ash and lime. A chloride purge stream will be added to the pugmill to control chlorides within FGD system metallurgical limits. A slipstream of drum filter filtrate will be diverted to the pugmill and distributed via spray bar to promote mixing with the filter cake, lime, and fly ash. AECOM estimates a chloride purge flow of approximately 75 gpm will be required to maintain FGD system chloride concentration below 7,000 ppm. The blended cake will be collected and disposed consistent with current operations.

4.2 Reagent Prep and Storage

The existing barge unloading system will undergo minor modification to be repurposed for limestone unloading. The existing lime conveyance equipment and storage silos will also undergo modifications to be repurposed for limestone handling and storage.

The existing vertical ball mill slaking system will be demolished. New feeders and transfer conveyors will transport limestone rock to a new grinding building constructed to the southeast of the existing slaker building. A new pre-crusher will reduce the size of the incoming limestone to 80% passing 5 mesh (4.25mm); the resulting product will gravity feed new vertical ball mills (VTMs). The VTMs are designed to reduce the size of the pre-crushed limestone to 90% passing 325 mesh. The limestone slurry from the VTMs will be discharged to the existing lime slurry storage tank. The lime slurry storage tank will be outfitted with a new agitator to keep the limestone slurry in suspension while stored in the tank. The remainder of the reagent storage and delivery system will be reused as is.

4.3 Chemical Additive and Storage

An FGD buffer additive will be required to meet the desired SO_2 removal efficiency upon converting to use of limestone reagent. For LSIO operation, sodium formate is the most cost-effective performance additive. Approximately 1,000 ppm of sodium formate will be required at design fuel conditions when targeting 98% SO_2 removal with three absorber towers in service.

Addition of sodium formate will require the addition of one new sodium formate tank and two additive feed pumps. The storage tank will be installed outdoors adjacent to the existing slaker building while the feed pumps will be installed within the existing slaker building. The tank is sized with a nominal capacity of 29,000 gallons equivalent to 14 days of use at full load operation. An alternative location for the storage tank inside the existing slaker building is under evaluation by Duke Energy and AECOM. The existing emulsified sulfur storage and delivery system will be replaced as it has reached end of service.

4.4 Mist Eliminator Wash System

The ME wash system will be upgraded to improve the quality of the wash with respect to wash intensity, wash pressure and wash duration. The existing ME wash headers will be reused as is. The design of the headers provides greater than 150% wash coverage across the ME surfaces, which is adequate for LSIO operation. However, the existing service water pump can only provide about 20-30 psig of wash pressure at the mist eliminator elevation. Typically, ME wash is delivered at 40-50 psig to ensure adequate force is applied with the wash water to dislodge solids that accumulate. Operation of the existing East Bend ME wash headers at around 50 psig will provide approximately 1,000 gpm of flow per header and increase wash intensity (gpm/ft2) to nearly 1.5 gpm/ft2 which is consistent the Electric Power Research Institute (EPRI) recommendations.

A new service water pump will be provided to generate at least 40-50 psig and approximately 1,000 gpm at the ME elevation for improved wash pressure and intensity. Piping of larger diameter will be retrofit to the ME wash supply to minimize friction loses with the increased flow. The ME wash sequence will also be modified to achieve a 60 second wash for each ME zone once per hour at full load conditions. These control system modifications are necessary to maintain the FGD system water balance. ME wash system reliability will also be improved with the addition of two new Lakos filters installed in parallel with the existing Lakos filters to create a 3+1 arrangement (4 x 33% capacity) filtration system.

5. Contract and Procurement Execution Approach

The project contracting and procurement execution approach assumes one entity providing execution of the scope of work under and EPC contract. The procurement and subcontracting WBS is provided in Table 5-1.

Table 5-1: Procurement and Subcontracting WBS

WBS Area	Package Number	Description
Common	81.112	Site Laser Scan
Common	81.110	Site Survey
Common	81.115	Geotechnical Investigation
Common	81.010	General Construction
Material Handling	63.000	Flowability Study
Material Handling	72.252	Conveyor System
Limestone Prep	71.114	Cranes and Hoists
Limestone Prep	72.250.1	Vertimill
Limestone Prep	72.250.2	Pre-Crusher
Limestone Prep	72.272	Dust Collector
Limestone Prep	73.300	Power Distribution Center (PDC)
FGD	81.008	Absorber Recycle Pump Refurbishment
FGD	72.229	Mist Eliminator Wash Filters (Lakos and Pods)
FGD	72.214	Recycle Piping, FRP (External)
FGD	72.200	Mist Eliminator Wash Nozzles
FGD	72.202	Recycle Spray Nozzles
FGD	72.212	Alloy Material, Recycle Spray Headers (Internal)
FGD	72.216	Recycle Pipe Supports (External)
Dewatering	72.246	Agitators

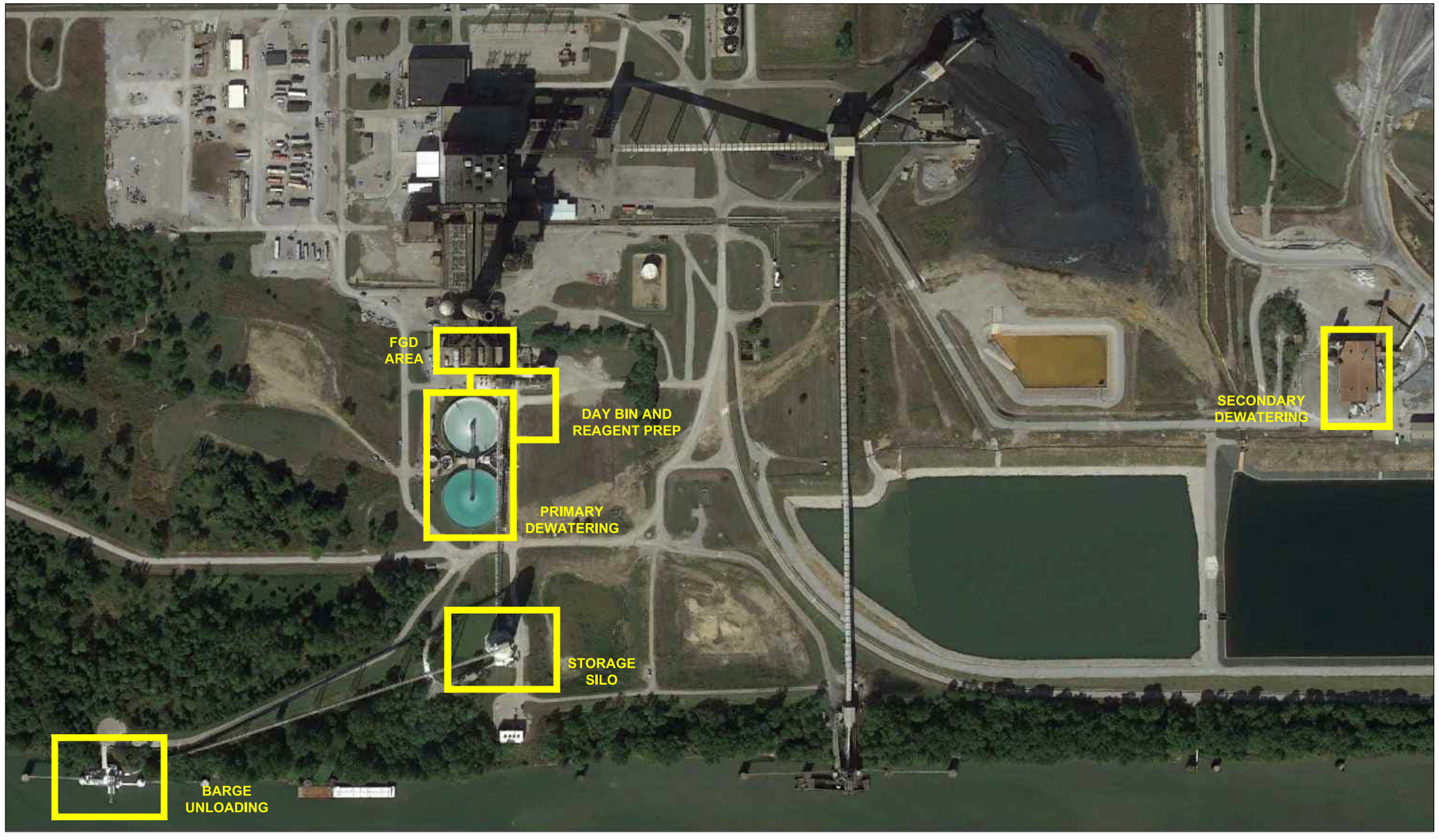
The division of responsibilities for the EPC works is outlined in Table 5-2 to establish various stakeholders' roles and responsibilities throughout the project.

Table 5-2: LSIO Conversion Project Division of Responsibility

Item	Description	Engineering and Design Services	Equipment and Material Supply	Installation and Erection
1	Site Laser Scan	SUB	N/A	N/A
2	Site Survey	SUB	N/A	N/A
3	Geotechnical Investigation	SUB	N/A	N/A
4	General Construction (GC)	AECOM	AECOM	AECOM
5	Flowability Study	SUB	N/A	N/A
6	Conveyor System	CS	AECOM	GC
7	Vertimill	VTM	AECOM	GC
8	Pre-Crusher	PC	AECOM	GC
9	Power Distribution Center	PDC	AECOM	GC
10	Recycle Piping	AECOM / PIPE	AECOM	GC

Item	Description	Engineering and Design Services	Equipment and Material Supply	Installation and Erection
11	Recycle Pumps (Refurbishment)	PUMP	PUMP	Duke
12	Recycle Pumps (New Sheaves)	AECOM	GC	GC
13	Recycle Spray Nozzles	NZL	AECOM	GC
14	Recycle Pipe Supports	PIPE	AECOM	GC
15	Agitators	AGIT	AECOM	GC
17	Balance of Plant	AECOM	GC	GC
18	Site Road Improvements	DUKE	DUKE	DUKE
19	Demolition	AECOM	GC	GC
20	Commissioning	AECOM	N/A	N/A
21	Startup	AECOM	N/A	N/A
22	Performance Testing	AECOM	N/A	N/A

Appendix A - General Arrangement Drawings



Project Management Initials: Designer: Checked: Approved: ARCH D 24" x 36"

Last saved by: RYANRASMUSSEN(2024-03-21) Last Plotted: 2024-03-21
Filename: C:\USERS\RYAN.RASMUSSEN\ONEDRIVE - AECOM\21_EXTRACT\DUKE 60724995\SITE GA\60724995-M-SK-200.DWG

Printed on ___% Post-Consumer Recycled Content Paper

AECOM

PROJECT

East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT

Duke Energy
525 South Tryon
Charlotte, NC 28202

http://www.duke-energy.com

CONSULTANT

AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED
PROFESSIONAL ENGINEER

Anthony Pruske
4/29/24

ISSUE/REVISION

IR	DATE	DESCRIPTION
A	2024-03-22	Issue for Permit Application

KEY PLAN

PROJECT NUMBER

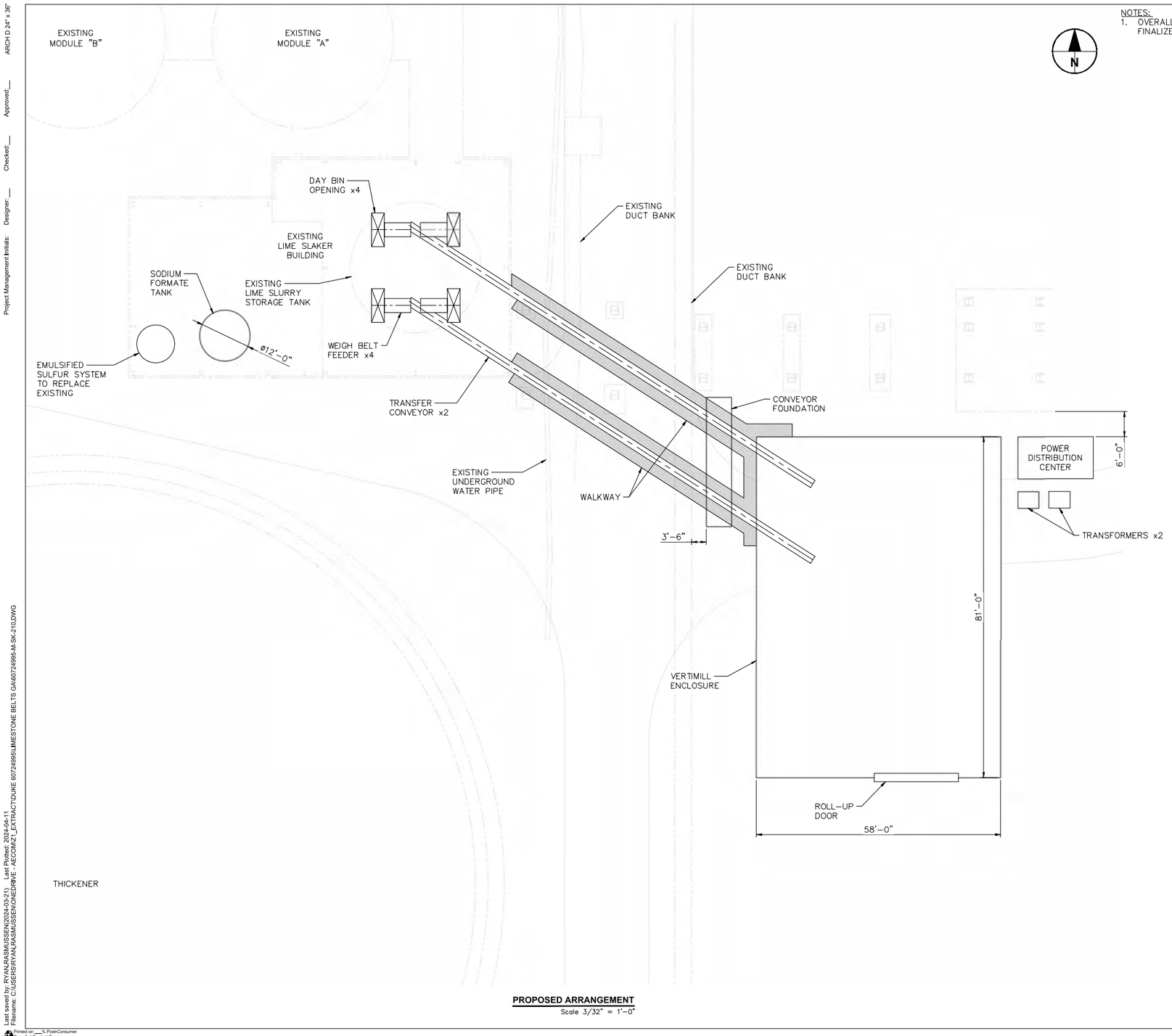
60724995

SHEET TITLE

GENERAL ARRANGEMENT
SITE PLAN

SHEET NUMBER

60724995-M-SK-200



PROPOSED ARRANGEMENT
Scale 3/32" = 1'-0"

AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202
http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

ISSUE/REVISION

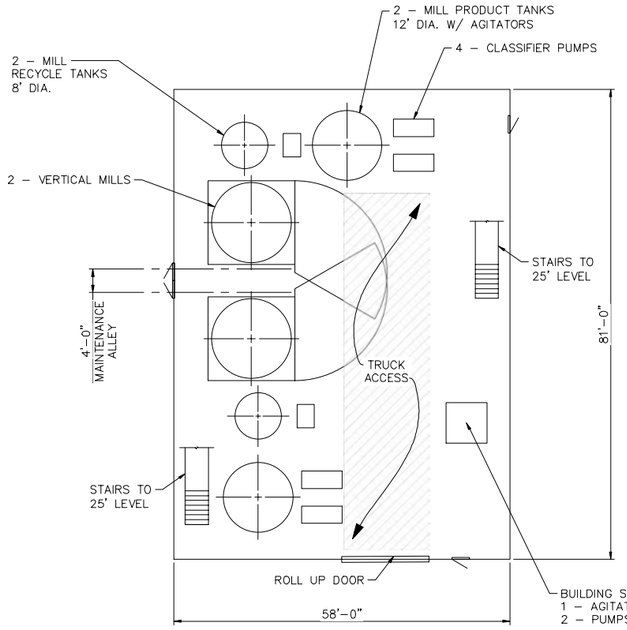
B	2024-04-12	Issue for Permit Application
A	2024-03-22	Issue for Permit Application
I/R	DATE	DESCRIPTION

KEY PLAN

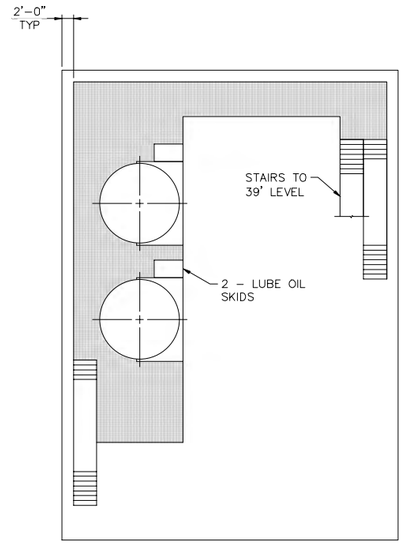
PROJECT NUMBER
60724995

SHEET TITLE
General Arrangement
Limestone Preparation

SHEET NUMBER
60724995-M-SK-210

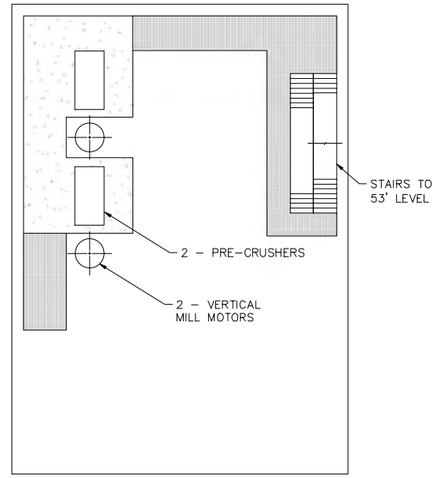


PLAN VIEW AT EL 0'-0"
Scale: 3/32" = 1'–0"

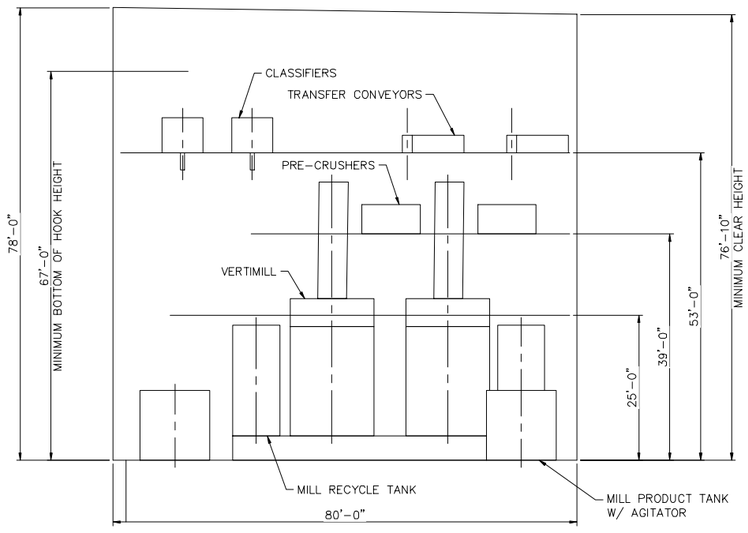


PLATFORM PLAN AT EL 25'-0"
Scale: 3/32" = 1'–0"

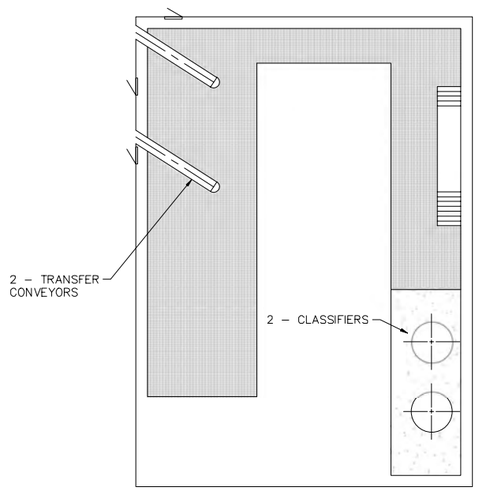
NOTES:
1. REQUIRED HOISTING EQUIPMENT:
   ONE 35 TON BRIDGE CRANE
   2 TON MONORAILS AS REQUIRED
2. PLATFORMING SHOWN FOR INFORMATION ONLY. FINAL PLATFORMING AND COLUMN LAYOUT TO BE FINALIZED IN DETAILED DESIGN.
3. OVERALL ENCLOSURE DIMENSIONS TO BE FINALIZED IN DETAILED DESIGN.



PLATFORM PLAN AT EL 39'-0"
Scale: 3/32" = 1'–0"



SECTION LOOKING WEST
Scale: 3/32" = 1'–0"



PLATFORM PLAN AT EL 53'-0"
Scale: 3/32" = 1'–0"

AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202

http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED
PROFESSIONAL ENGINEER

Anthony Pruske
4/29/24

ISSUE/REVISION

I/R	DATE	DESCRIPTION
A	2024-03-22	Issue for Permit Application

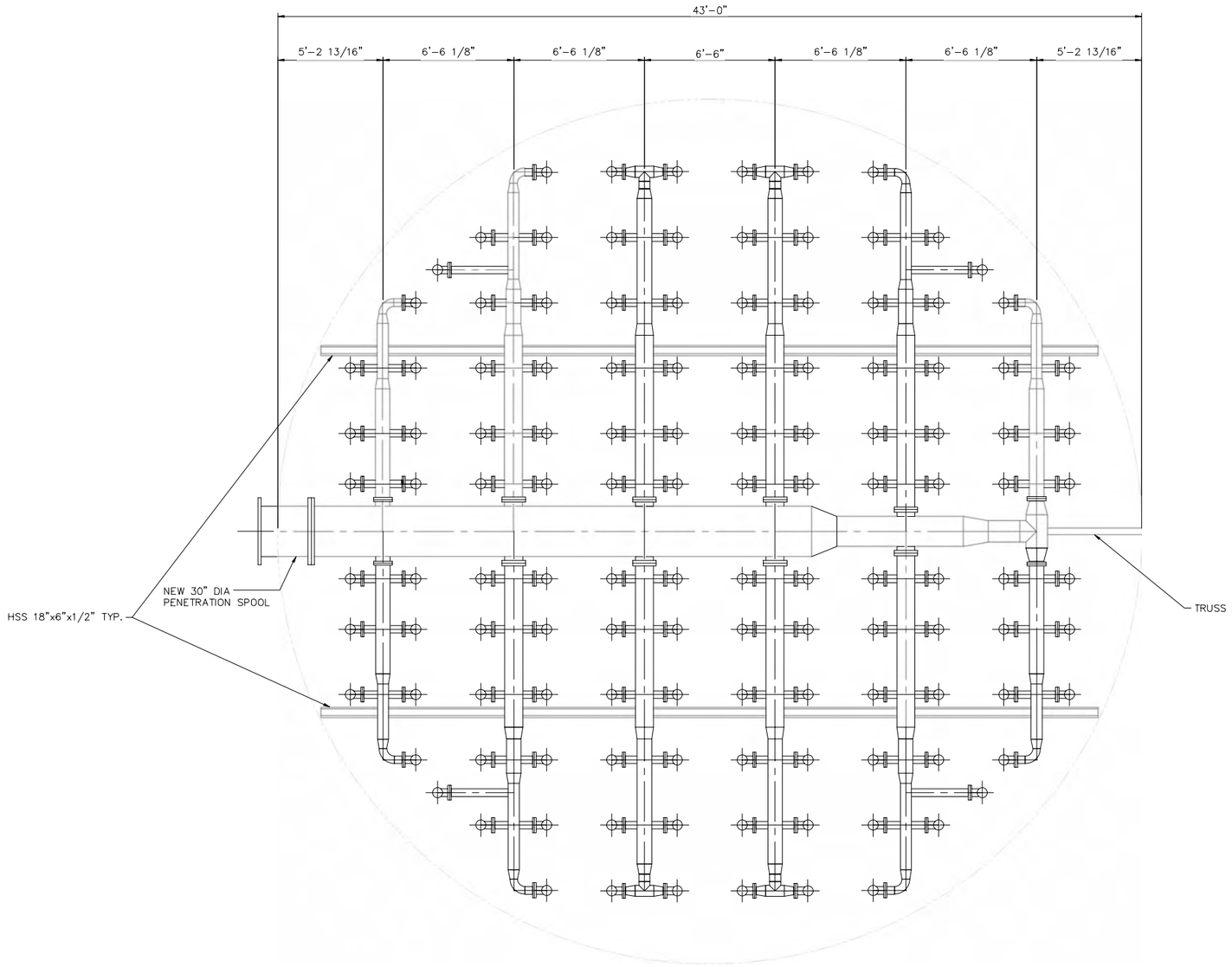
KEY PLAN

PROJECT NUMBER
60724995

SHEET TITLE
GENERAL ARRANGEMENT
VERTIMILL ENCLOSURE

SHEET NUMBER
60724995-M-SK-215

NOTES:
1. PIPING MATERIAL SPECIFICATION PN01SD1B02
2. QTY 1 SHOWN; 6 REQUIRED



ABSORBER INTERNAL SPRAY HEADER PLAN VIEW
Scale 3/8"=1'-0"

AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202

http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER

Anthony Pruske
4/29/24

ISSUE/REVISION

I/R	DATE	DESCRIPTION
A	2024-03-22	Issue for Permit Application

KEY PLAN

PROJECT NUMBER
60724995

SHEET TITLE
Spray Header Piping Arrangement

SHEET NUMBER
60724995-M-SK-225

NOTES:
1. NEW PIPING SHOWN IN RED.
2. EXISTING PUG MILL 2-1 WILL BE REPLACED IN-KIND.

AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202
http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

ISSUE/REVISION

I/R	DATE	DESCRIPTION
B	2024-04-09	Issue for Permit Application
A	2024-03-22	Issue for Permit Application

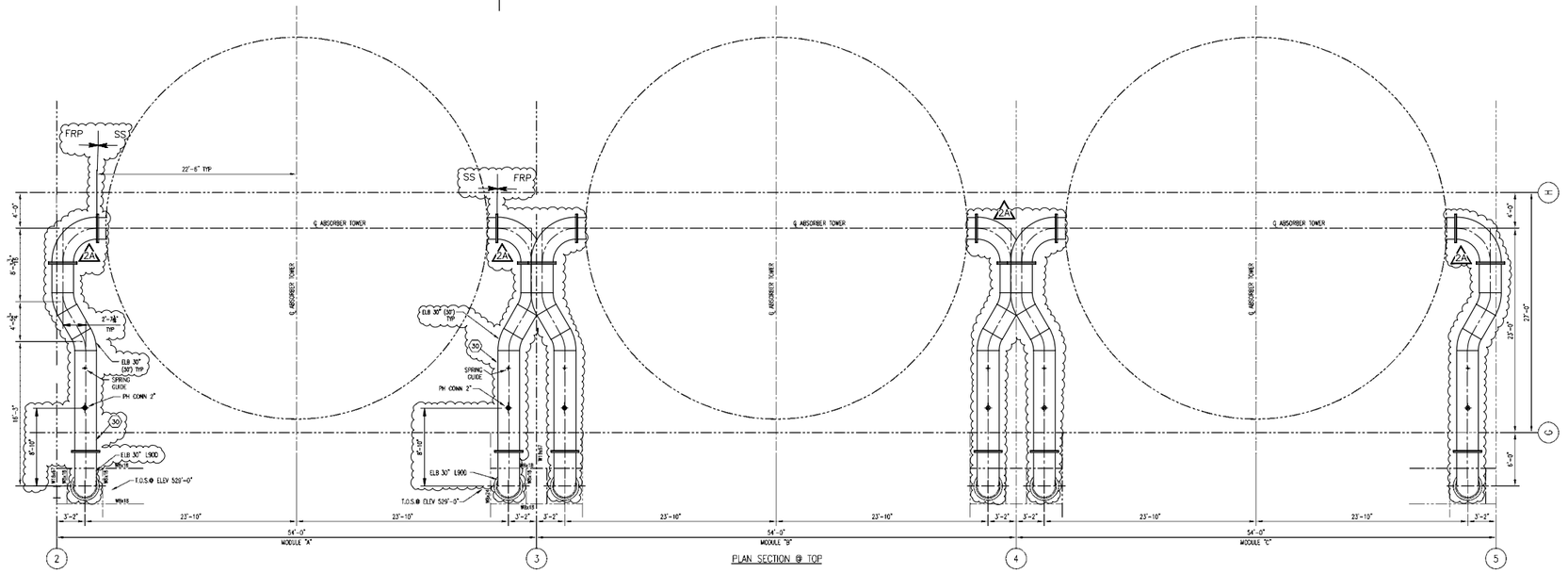
KEY PLAN

PROJECT NUMBER
60724995

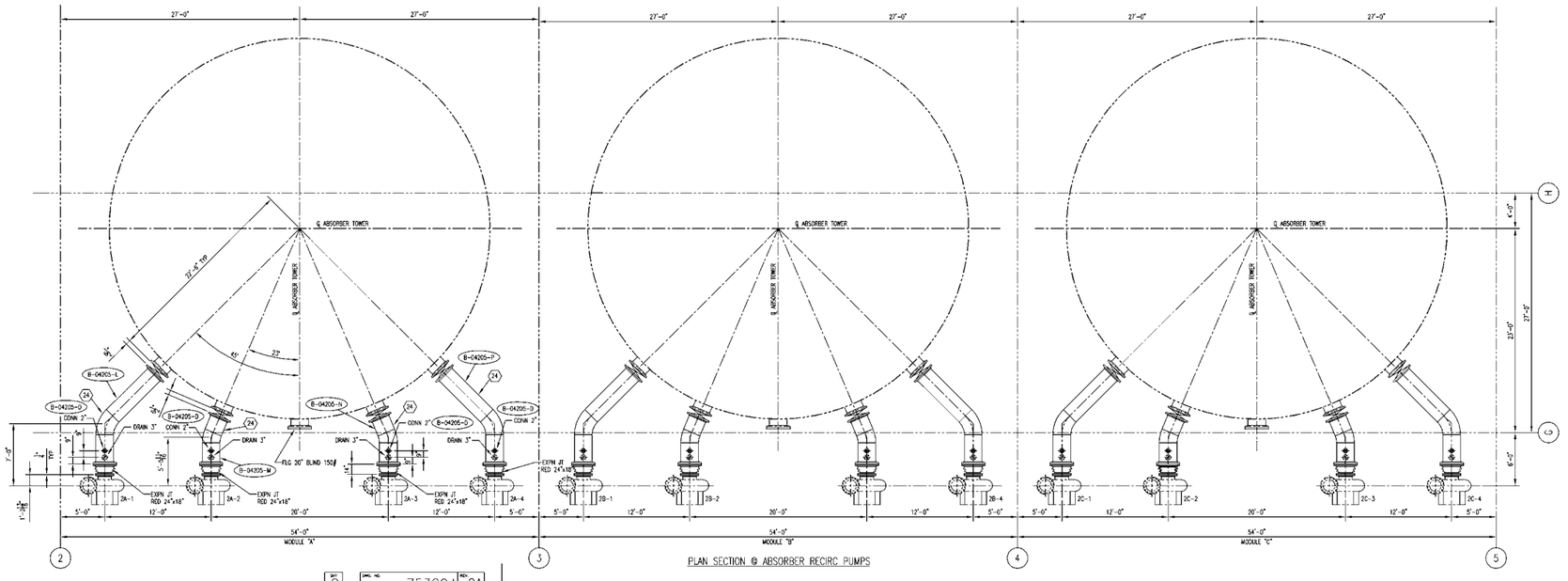
SHEET TITLE
GENERAL ARRANGEMENT
SECONDARY DEWATERING

SHEET NUMBER
60724995-M-SK-230

REVISIONS			
REV	DESCRIPTION	DATE	APPROVAL
1	ADDED SPOOL MK NO's PER VENDER PRINTS.	2/1/05	PDS-FL
2A	PROPOSED PIPING CHANGES SHOWN FOR PERMIT APPLICATION.		



PLAN SECTION @ TOP



PLAN SECTION @ ABSORBER RECIRC PUMPS

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

THE CINCINNATI GAS & ELECTRIC COMPANY
EAST BEND STATION UNIT 2

DRN	MET
CHK'D	MJF
APP'D	PDS-FL
DATE	11/11/04
CONTRACT NO.	596-4088
DRAG. CONTRACT NO.	586-0010
— DO NOT SCALE — USE DIMENSIONS ONLY	

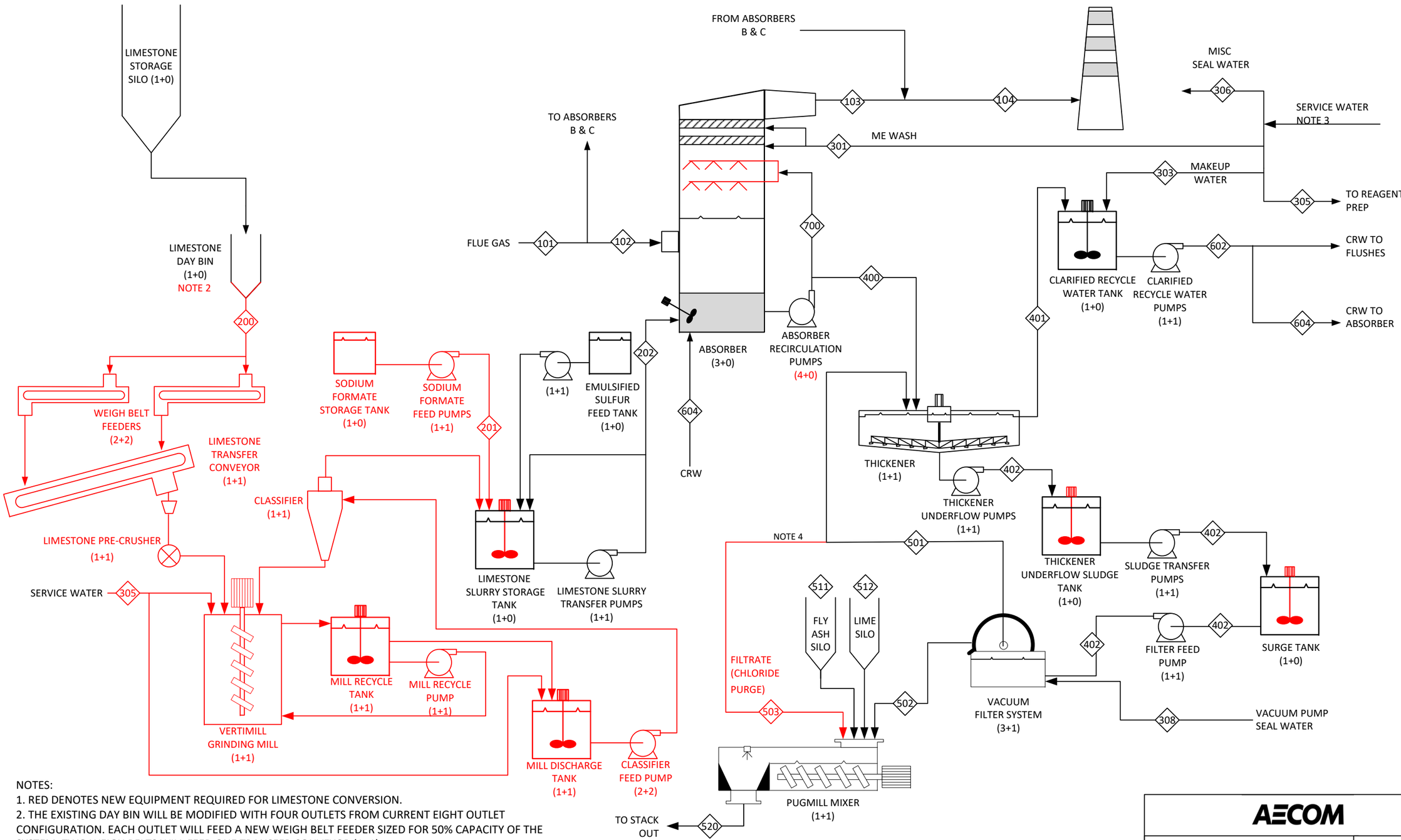
The Babcock & Wilcox Company
a McDermott company

GENERAL ARRANGEMENT
SCRUBBER MODULE
FRP PIPING
SECTIONS

SCALE	ICC-SECT	DWG. NO.	REV.
1/4" = 1'-0"	792	75320J	2A

SHT 2 | DWG. NO. 75320J | REV. 2A

Appendix B - PFD and Material Balance



NOTES:
1. RED DENOTES NEW EQUIPMENT REQUIRED FOR LIMESTONE CONVERSION.
2. THE EXISTING DAY BIN WILL BE MODIFIED WITH FOUR OUTLETS FROM CURRENT EIGHT OUTLET CONFIGURATION. EACH OUTLET WILL FEED A NEW WEIGH BELT FEEDER SIZED FOR 50% CAPACITY OF THE SYSTEM. TWO WEIGH BELTS WILL FEED ONE TRANSFER CONVEYOR (1+1).
3. NEW SERVICE WATER PUMP (1+1) WILL BE PROVIDED AS PART OF THE CONVERSION PROJECT.
4. CHLORIDE PURGE WILL BE DRAWN FROM DISCHARGE PIPING OF FILTRATE PUMP UPSTREAM OF FILTRATE. STORAGE TANK. FILTRATE TANKS AND PUMPS NOT SHOWN FOR CLARITY.

AECOM

CLIENT / PROJECT NAME Duke Energy - East Bend Station WFGD Limestone Conversion Process Flow Diagram		PROJECT NO. 60680586
DRAWING NUMBER PFD - 101	DRAWING REVISION 0	DATE June 08, 2022

AECOM

Duke East Bend Unit 2

Mass Balance - Limestone, Full Load, 600MW

5.67 lb SO2/MMBtu Inlet, 0.113 lb SO2/MMBtu Stack Outlet

Refer to PFD drawing #101

	Stream No.	101	102	103	104							
	Description	Booster Fan Outlet	Inlet Flue Gas per Abs.	Outlet Flue Gas per Abs.	Total Gas Out							
Flow, acfm		2,749,086	916,362	745,253	2,244,767							
Flow, lb/hr		8,327,832	2,775,944	2,915,141	8,745,424							
H2O, lb/hr		372,535	124,178	275,896	827,689							
SO2, lb/hr		36,579	12,193	244	732							
SO2, ppmd		2,179	2,179	44	44							
HCl, lb/hr		506	169	0	0							
HCl, ppmd		53	53	0	0							
Ash, lb/hr		394	131	26	79							
O2, lb/hr		685,120	228,373	228,075	684,225							
O2, % dry		8.2	8.2	8.2	8.2							
Temperature, F		330	330	126	126							
Pressure, IWCG (psig)		8	8	5	3							

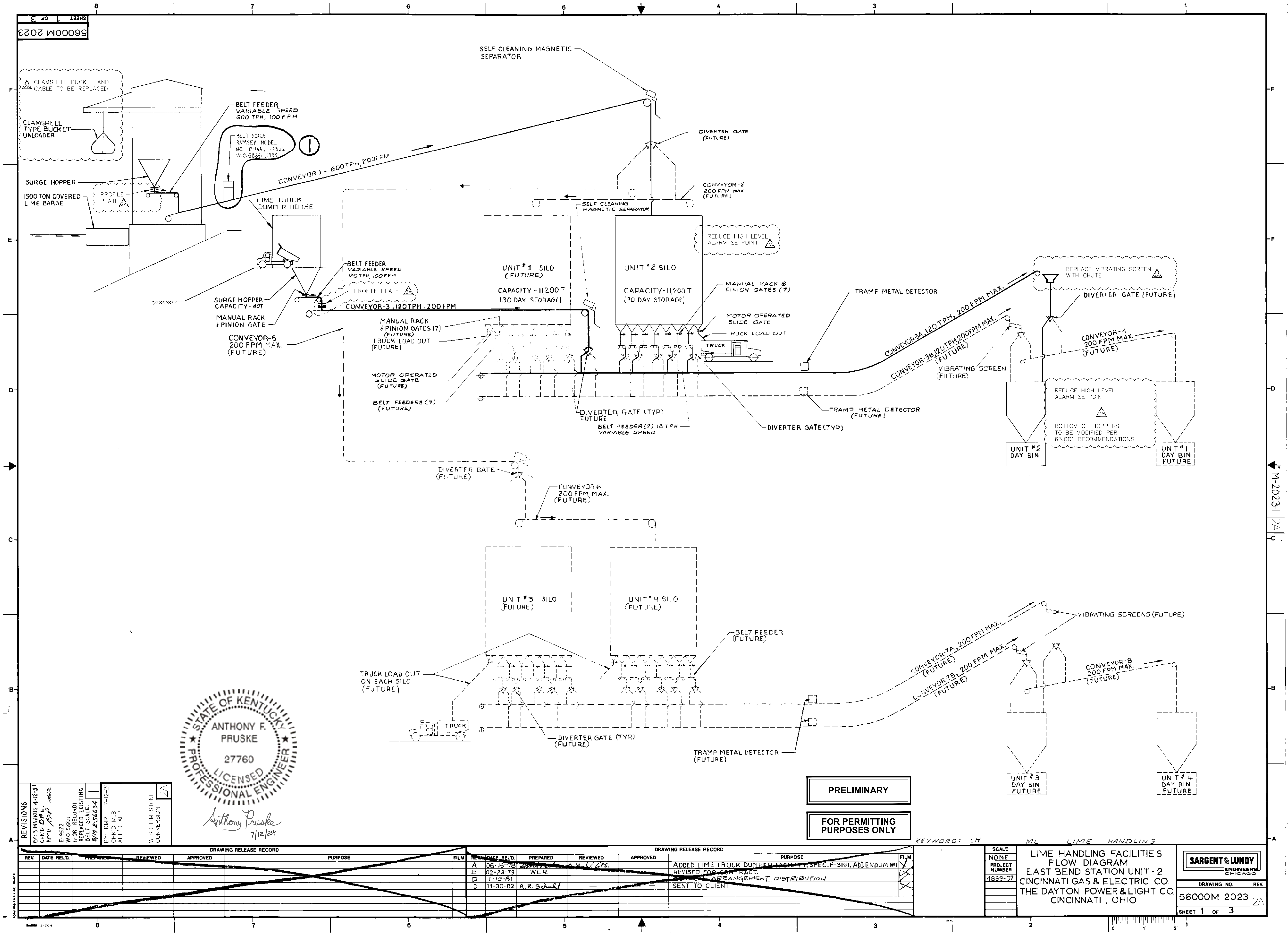
	Stream No.	200	201	202	301	303	305	306	308	400	401	402
	Description	Dry Reagent	Concentrated Additive	Reagent Feed	ME Wash	FGD Makeup Water	Make-up Water To Reagent Prep	Misc Seal Water	Vacuum Pump Seal Water	Absorber Bleed Stream	Primary OF to CRW Tank	Primary Dewatering UF
Flow, gpm		--	1.1	356	214	493	301	20	50	1,024	829	452
Flow, lb/hr		69,396	719	218,552	107,190	246,661	150,678	10,006	25,014	552,566	414,562	271,600
Total SS, lb/hr		67,384	0	65,436	5	25	6	0	1	82,885	1,538	81,480
Total SS, %		97.10%	0.00%	29.94%	0.00%	0.01%	0.00%	0.00%	0.00%	15.00%	0.37%	30.00%
pH		--	0.00	7.48	8.10	7.80	8.10	8.10	8.10	5.80	5.80	5.80
Specific gravity		--	1.26	1.23	1.00	1.00	1.00	1.00	1.00	1.09	1.01	1.22
H2O, lb/hr		2,012	431	153,116	107,185	246,636	150,672	10,005	25,013	469,681	413,023	190,120
CaCO3, lb/hr		59,031	0	59,037	5	0	6	0	1	2,383	44	2,342
CaSO4-2H2O, lb/hr		0	0	0	0	0	0	0	0	0	0	0
CaSO3-1/2H2O, lb/hr		0	0	0	0	0	0	0	0	73,636	1,367	72,388
Fly Ash, lb/hr		0	0	0	0	0	0	0	0	321	6	316
Inerts, lb/hr		6,399	0	6,399	0	25	0	0	0	6,545	121	6,434
Cl, lb/hr		0	0	4	3	3	4	0	1	3,273	2,770	1,325
Cl, mg/L		0 ppm	0	27	27	14	27	27	27	6,938	6,728	6,938
Mg, lb/hr		291	0	293	1	22	2	0	0	2,063	1,746	835
Mg, mg/L		4325 ppm	0	1,921	12	90	12	12	12	4,373	4,241	4,373
Sodium Formate, lb/hr		0	288	288	0	0	0	0	0	472	399	191
Sodium Formate, mg/L		0 ppm	500,530	1,884	0	0	0	0	0	1,000	970	1,000

	Stream No.	501	502	503	511	512	520	602	604	700		
	Description	Total Filtrate Water	Secondary Dewatering Product	Filtrate Purge	Fly Ash to Blending	Lime to Blending	Blended Product	CRW Pump Discharge	CRW to Absorber	Recycle Slurry Flow		
Flow, gpm		341	--	75	--	--	--	1,325	1,325	46,000		
Flow, lb/hr		171,523	125,092	37,927	39,039	4,372	206,430	661,223	661,223	24,825,225		
Total SS, lb/hr		172	81,310	38	39,039	4,372	124,759	1,563	1,563	3,723,784		
Total SS, %		0.10%	65.00%	0.10%	100.00%	100.00%	60.44%	0.24%	0.24%	15.00%		
pH		6.07	--	6.07	--	--	--	6.55	6.55	5.80		
Specific gravity		1	--	1.01	--	--	--	1.01	1.01	1.09		
H2O, lb/hr		171,351	43,782	37,889	0	0	81,671	659,660	659,660	21,101,441		
CaCO3, lb/hr		5	2,338	1	0	4,372	6,712	44	44	107,042		
CaSO4-2H2O, lb/hr		0	0	0	0	0	0	0	0	0		
CaSO3-1/2H2O, lb/hr		152	72,236	34	0	0	72,269	1,367	1,367	3,308,259		
Fly Ash, lb/hr		1	315	0	39,039	0	39,354	6	6	14,441		
Inerts, lb/hr		14	6,420	3	0	0	6,423	146	146	294,042		
Cl, lb/hr		1,056	270	233	--	--	503	2,774	2,774	145,959		
Cl, mg/L		6,180	2156 (ppm)	6,180	--	--	2438 (ppm)	4,218	4,218	6,938		
Mg, lb/hr		665	170	147	--	--	317	1,768	1,768	92,005		
Mg, mg/L		3,895	3,895	3,895	--	--	3,895	2,689	2,689	4,373		
Sodium Formate, lb/hr		152	39	34	--	--	72	399	399	21,037		
Sodium Formate, mg/L		890	890	890	--	--	890	607	607	1,000		

Notes:

1. Flows in material balance represent average, steady-state flows at noted conditions.

Appendix C - P&IDs


SELF CLEANING MAGNETIC SEPARATOR
CLAMSHELL BUCKET AND CABLE TO BE REPLACED
CLAMSHELL TYPE BUCKET UNLOADER
BELT FEEDER VARIABLE SPEED 600 TPH, 100 FPM
BELT SCALE RAMSEY MODEL NO. 10-14A, E-9522 W.O.58831, 1980
CONVEYOR 1 - 600TPH, 200FPM
SURGE HOPPER
1500 TON COVERED LIME BARGE
PROFILE PLATE
LIME TRUCK DUMPER HOUSE
DIVERTER GATE (FUTURE)
CONVEYOR-2 200 FPM MAX (FUTURE)
SELF CLEANING MAGNETIC SEPARATOR
REDUCE HIGH LEVEL ALARM SETPOINT
UNIT #1 SILO (FUTURE) CAPACITY - 11,200 T (30 DAY STORAGE)
UNIT #2 SILO CAPACITY - 11,260 T (30 DAY STORAGE)
BELT FEEDER VARIABLE SPEED 120TPH, 100FPM
SURGE HOPPER CAPACITY - 40T
MANUAL RACK & PINION GATE
CONVEYOR-3, 120TPH, 200FPM
CONVEYOR-5 200 FPM MAX. (FUTURE)
MANUAL RACK & PINION GATES (7) (FUTURE)
TRUCK LOAD OUT (FUTURE)
MOTOR OPERATED SLIDE GATE (FUTURE)
BELT FEEDERS (7) (FUTURE)
MANUAL RACK & PINION GATES (7)
MOTOR OPERATED SLIDE GATE
TRUCK LOAD OUT
TRUCK
DIVERTER GATE (TYP) FUTURE
BELT FEEDER (7) 18 TPH VARIABLE SPEED
DIVERTER GATE (TYP)
TRAMP METAL DETECTOR
TRAMP METAL DETECTOR (FUTURE)
REPLACE VIBRATING SCREEN WITH CHUTE
DIVERTER GATE (FUTURE)
CONVEYOR-3A 120 TPH, 200 FPM MAX.
CONVEYOR-3B 120TPH, 200FPM MAX. (FUTURE)
CONVEYOR-4 200 FPM MAX. (FUTURE)
VIBRATING SCREEN (FUTURE)
REDUCE HIGH LEVEL ALARM SETPOINT
BOTTOM OF HOPPERS TO BE MODIFIED PER 63,001 RECOMMENDATIONS
UNIT #2 DAY BIN
UNIT #1 DAY BIN FUTURE
DIVERTER GATE (FUTURE)
CONVEYOR 6 200 FPM MAX. (FUTURE)
UNIT #3 SILO (FUTURE)
UNIT #4 SILO (FUTURE)
BELT FEEDER (FUTURE)
TRUCK LOAD OUT ON EACH SILO (FUTURE)
TRUCK
DIVERTER GATE (TYP) (FUTURE)
TRAMP METAL DETECTOR (FUTURE)
VIBRATING SCREENS (FUTURE)
CONVEYOR-7A, 200 FPM MAX. (FUTURE)
CONVEYOR-7B, 200 FPM MAX. (FUTURE)
CONVEYOR-8 200 FPM MAX. (FUTURE)
UNIT #3 DAY BIN FUTURE
UNIT #4 DAY BIN FUTURE
STATE OF KENTUCKY ANTHONY F. PRUSKE 27760 LICENSED PROFESSIONAL ENGINEER
7/12/24
PRELIMINARY
FOR PERMITTING PURPOSES ONLY
REVISIONS
E-9522 W.O. 58831 (FOR RECORD) REPLACED EXISTING BELT SCALE
BY: RMR CHK'D: MJB APP'D: AFP 7-12-24
WFGD LIMESTONE CONVERSION
2A
DRAWING RELEASE RECORD
REV. DATE REL'D. PREPARED REVIEWED APPROVED PURPOSE FILM
A 06-15-78 ADDED LIME TRUCK DUMPER FACILITY, SPEC. F-3191, ADDENDUM No1
B 02-23-79 W.L.R. REVISED FOR CONTRACT.
D 1-15-81 ARRANGEMENT DISTRIBUTION
0 11-30-82 SENT TO CLIENT
KEYWORD: LH ML LIME HANDLING
SCALE NONE
PROJECT NUMBER 4869-07
LIME HANDLING FACILITIES FLOW DIAGRAM
EAST BEND STATION UNIT - 2
CINCINNATI GAS & ELECTRIC CO.
THE DAYTON POWER & LIGHT CO.
CINCINNATI, OHIO
SARGENT & LUNDY ENGINEERS CHICAGO
DRAWING NO. 56000M 2023 REV. 2A
SHEET 1 OF 3
M-2023-1

LIMESTONE DAY BIN
CAPACITY: 11,200 T

LIMESTONE WEIGH BELT FEEDER 1/2
CAPACITY: 35 TPH

NOTES:
1. DETAILS NOTED ON THIS SHEET TYPICAL FOR TWO HOPPER OUTLETS OF THE DAY BIN. THE HOPPER DAY BIN CONTINUES ON TO AN ADDITIONAL TWO OUTLETS, NOT SHOWN.
2. VENDOR TO MODIFY DISCHARGE CONES OF EXISTING DAY BIN TO CONVERT EIGHT EXISTING DISCHARGE CONES TO FOUR DISCHARGE CONES. EXACT DETAILS TO FOLLOW IN DETAILED ENGINEERING.
3. SLIDE GATE VALVE AT DISCHARGE OF EACH BIN

LIMESTONE
D2 | 56000M 2023 SHT 1
FROM CONVEYOR 3A

(EXISTING LIME DAY BIN)
LIMESTONE DAY BIN

NOTE 2
NOTE 2
NOTE 1

(EXISTING LIME DAY BIN HOPPER 2D1)
(EXISTING LIME DAY BIN HOPPER 2C1)
(EXISTING LIME DAY BIN HOPPER 2B1)
(EXISTING LIME DAY BIN HOPPER 2A1)

LIMESTONE DAY BIN, HOPPER 1
NOTE 3
LIMESTONE DAY BIN, HOPPER 2
NOTE 3

8" – EXHAUST DUCT

LIMESTONE DUST
002 | 60724995-DI-SK-115
TO LIME SLAKER BLDG DUST COLLECTION SYSTEM

ENABLEFAULT RUN: JYR ALM ZSR SI SY ###
SETPOINT
SPEED INDICATION
PULL CORD SWITCH: HS ###
WEIGHT INDICATOR: WI ###
WE ###
MISALIGN SWITCH: ZSHH ###
WEIGH BELT FEEDER MOTOR
VFD
SPEED SWITCH: SSL ###
MISALIGN SWITCH: ZSHH ###
PULL CORD SWITCH: HS ###
PULL CORD SWITCH: LSH ###

LIMESTONE WEIGH BELT FEEDER 1
LIMESTONE WEIGH BELT FEEDER 2

DRAG CHAIN CONVEYOR MOTOR

MCC
S/S RUN PWR AVAIL
JYR ZSR AUT JYA ###

LIMESTONE
003 | 60724995-DI-SK-111
TO TRANSFER CONVEYOR 1

LIMESTONE
001 | 60724995-DI-SK-111
TO TRANSFER CONVEYOR 1

AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202
http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
7/12/24

ISSUE/REVISION

0B	2024-07-12	Issue for Permit Applicatiion
0A	2024-03-22	Issue for Permit Application
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER
60724995

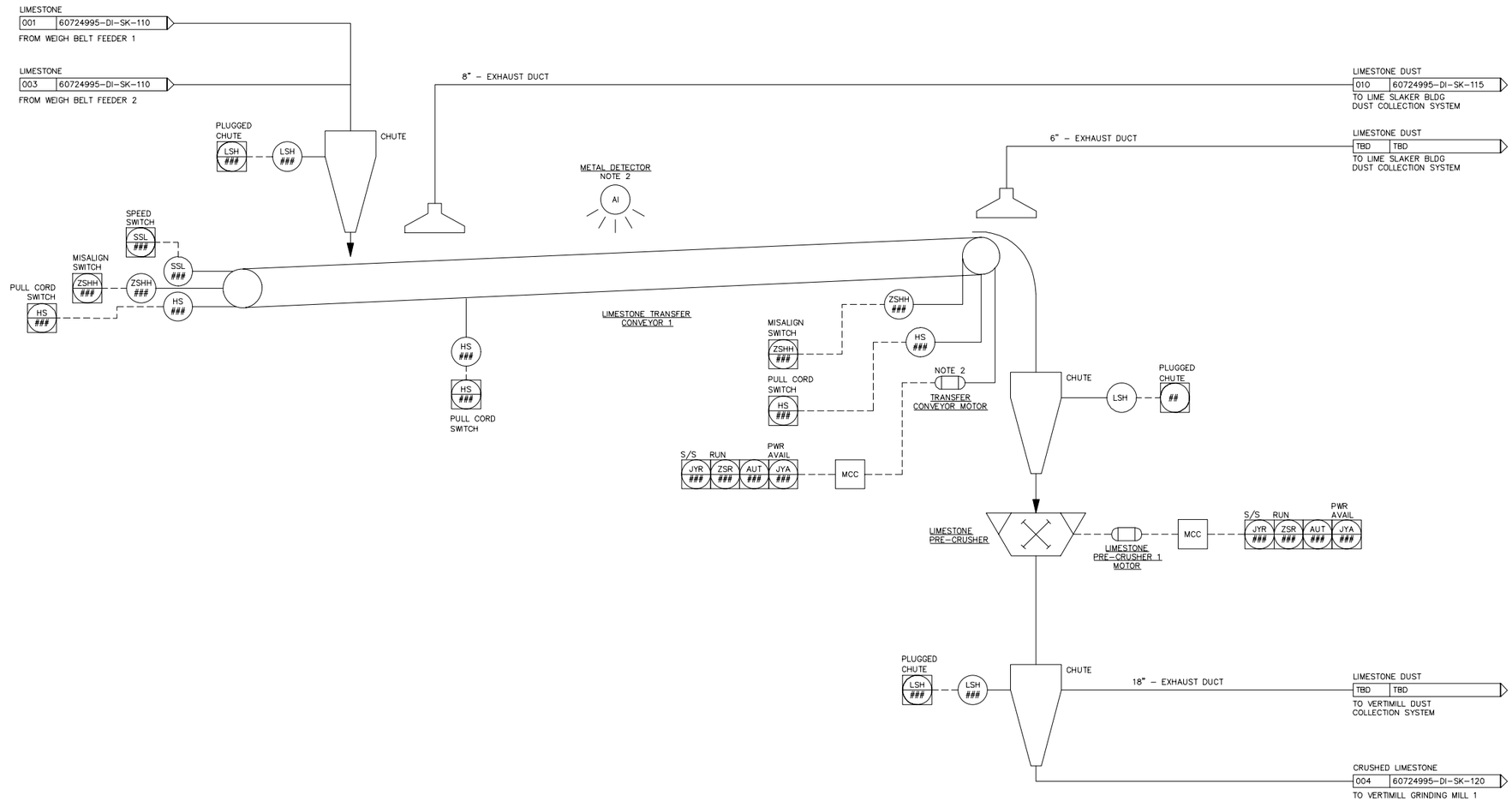
SHEET TITLE
WFGD LIMESTONE CONVERSION P&ID
MATERIAL HANDLING

SHEET NUMBER
60724995-DI-SK-110

LIMESTONE TRANSFER CONVEYOR
CAPACITY: 35 TPH

LIMESTONE PRE-CRUSHER
CAPACITY: 35 TPH

NOTES:
1. DETAILS NOTED ON THIS SHEET TYPICAL FOR TWO PROVIDED SYSTEMS.
2. TRAMP METAL DETECTOR WILL BE INTERLOCKED WITH TRANSFER CONVEYOR MOTOR.



AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202
http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

ISSUE/REVISION

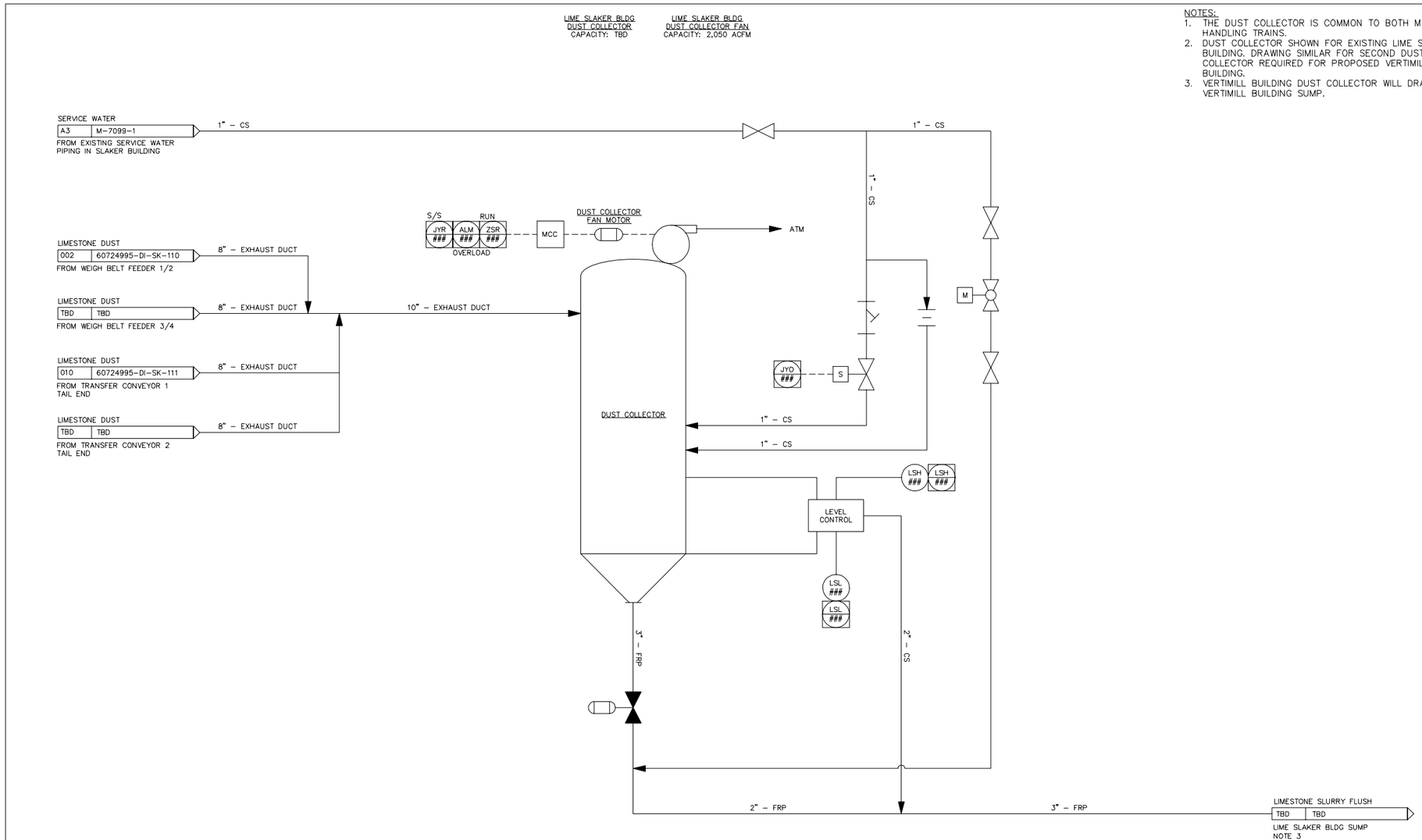
I/R	DATE	DESCRIPTION
0A	2024-03-22	Issue for Permit Application

KEY PLAN

PROJECT NUMBER
60724995

SHEET TITLE
WFGD LIMESTONE CONVERSION
P&ID
MATERIAL HANDLING

SHEET NUMBER
60724995-DI-SK-111



NOTES:
1. THE DUST COLLECTOR IS COMMON TO BOTH MATERIAL HANDLING TRAINS.
2. DUST COLLECTOR SHOWN FOR EXISTING LIME SLAKER BUILDING. DRAWING SIMILAR FOR SECOND DUST COLLECTOR REQUIRED FOR PROPOSED VERTIMILL BUILDING.
3. VERTIMILL BUILDING DUST COLLECTOR WILL DRAIN TO VERTIMILL BUILDING SUMP.

AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study
EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202
http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
7/12/24

ISSUE/REVISION

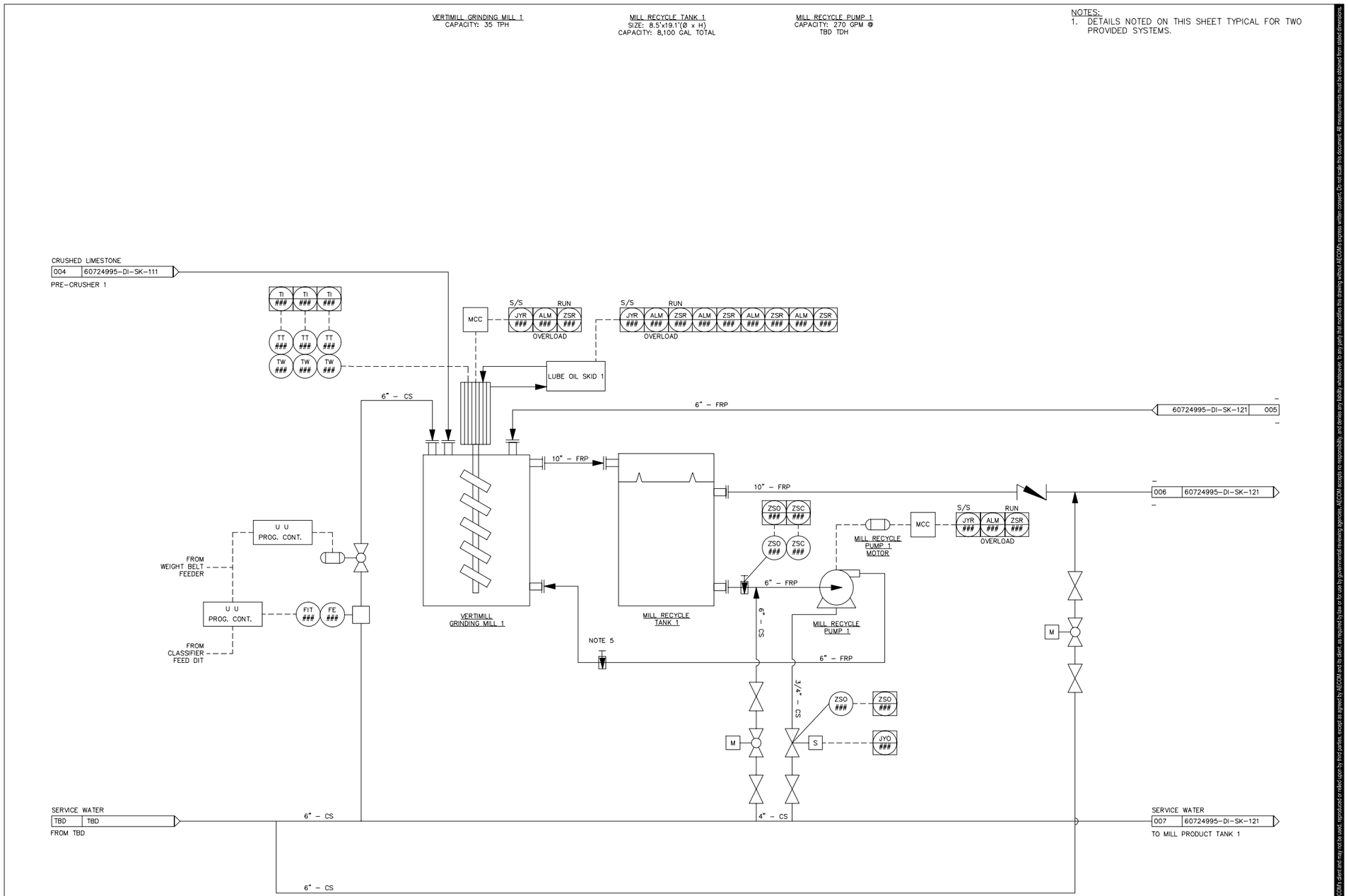
0B	2024-07-12	Issue for Permit Application
0A	2024-03-22	Issue for Permit Application
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER
60724995

SHEET TITLE
WFGD LIMESTONE CONVERSION
P&ID
DUST COLLECTION

SHEET NUMBER
60724995-DI-SK-115



AECOM

PROJECT

East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT

Duke Energy

525 South Tryon
Charlotte, NC 28202

http://www.duke-energy.com

CONSULTANT

AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
7/12/24

ISSUE/REVISION

0C	2024-07-12	Issue for Permit Application
0B	2024-04-12	Issue for Permit Application
0A	2024-03-22	Issue for Permit Application
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

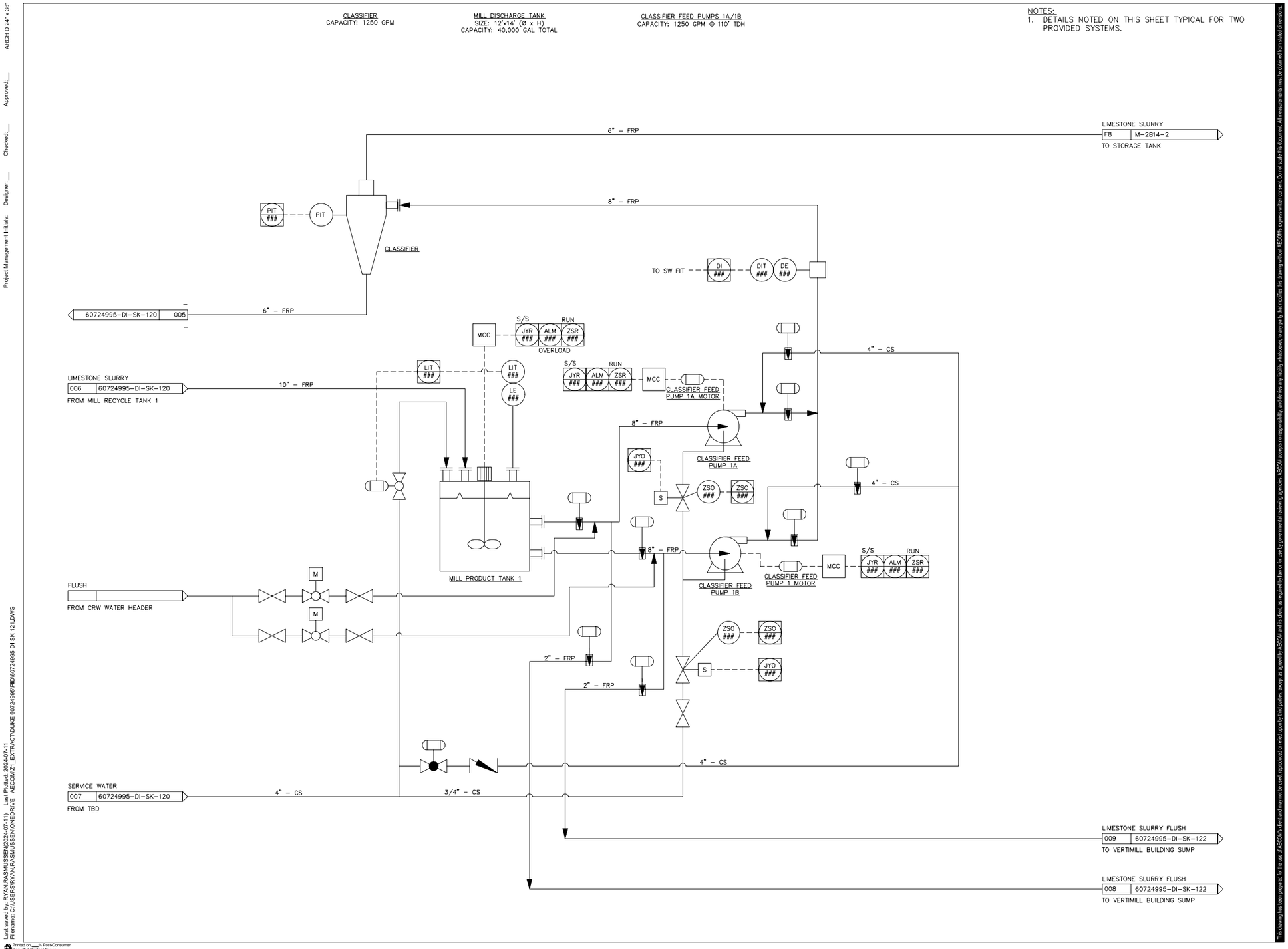
60724995

SHEET TITLE

WFGD LIMESTONE CONVERSION
P&ID
REAGENT PREP

SHEET NUMBER

60724995-DI-SK-120



Project Management Initials: Designer:___ Checked:___ Approved:___ ARCH D 24" x 36"

Last saved by: RYANRASMUSSEN (2024-07-11) Last Plotted: 2024-07-11
Filename: C:\USERS\RYAN.RASMUSSEN\ONEDRIVE - AECOM\Z1_EXTRACT\DUKE 60724995\PID\60724995-DI-SK-121.DWG

Printed on ___% Post-Consumer Recycled Content Paper

AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202

http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
7/12/24

ISSUE/REVISION

I/R	DATE	DESCRIPTION
0B	2024-07-12	Issue for Permit Application
0A	2024-03-22	Issue for Permit Application

KEY PLAN

PROJECT NUMBER
60724995

SHEET TITLE
WFGD LIMESTONE CONVERSION
P&ID
REAGENT PREP

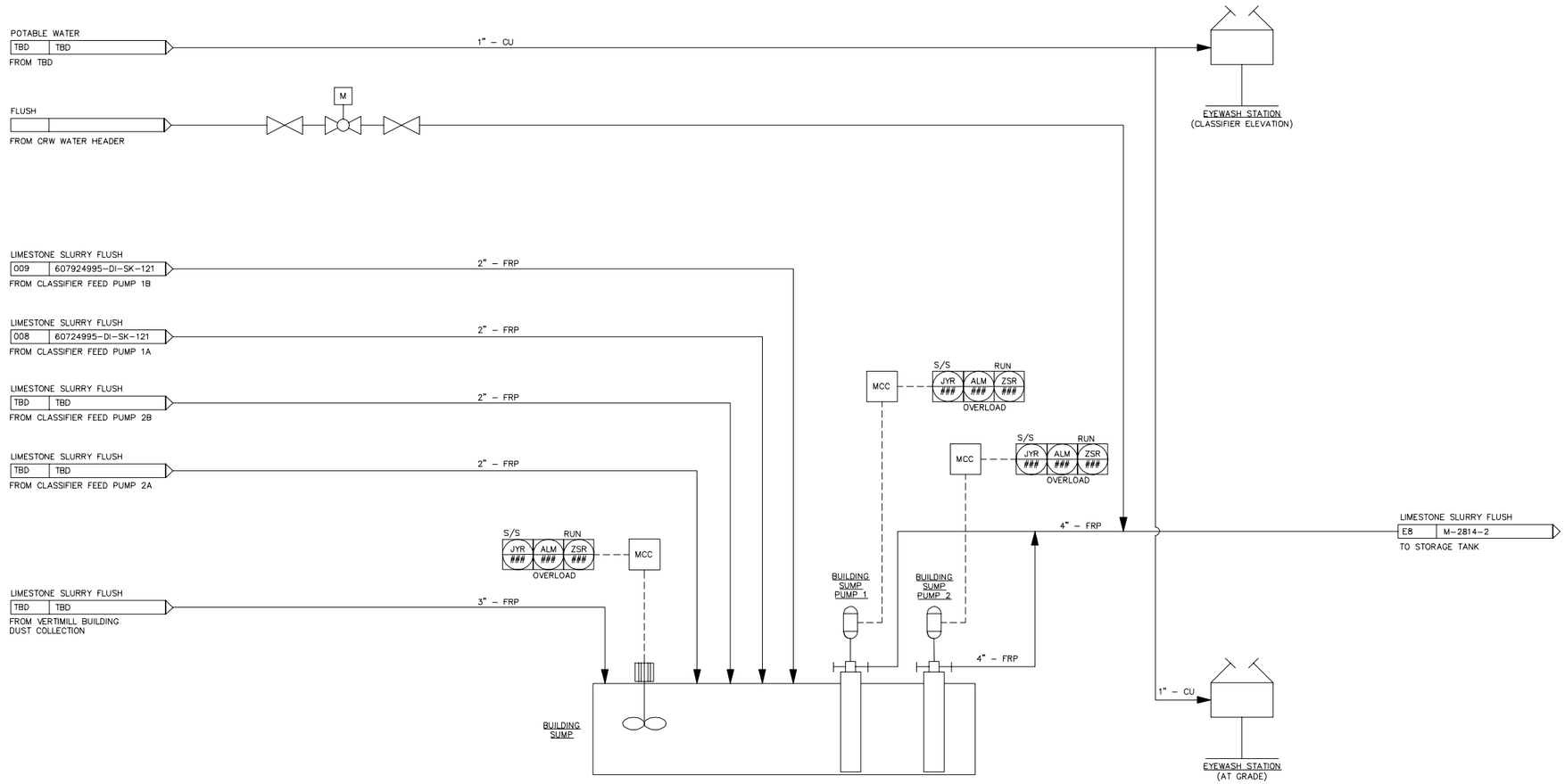
SHEET NUMBER
60724995-DI-SK-121

AGITATOR
HP: TBD

BUILDING SUMP PUMPS 1/2
CAPACITY: 200 GPM
@ 38' TDH

BUILDING SUMP
SIZE: 7' X x 7' W x 8' H

NOTES:
1. EYEWASH STATIONS TO INCLUDE FLOW SWITCHES.



AECOM

PROJECT
East Bend WFGD
Limestone Conversion
Phase 1 Engineering Study

EAST BEND STATION
RT 338, 6293 Beaver Rd
Union, KY 41091-0142

CLIENT
Duke Energy
525 South Tryon
Charlotte, NC 28202

http://www.duke-energy.com

CONSULTANT
AECOM Process Technologies
13640 Briarwick Drive, Suite 200
Austin, Tx 78729
512.454.4797 tel
www.aecom.com

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REGISTRATION

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED
PROFESSIONAL ENGINEER

Anthony Pruske
7/12/24

ISSUE/REVISION

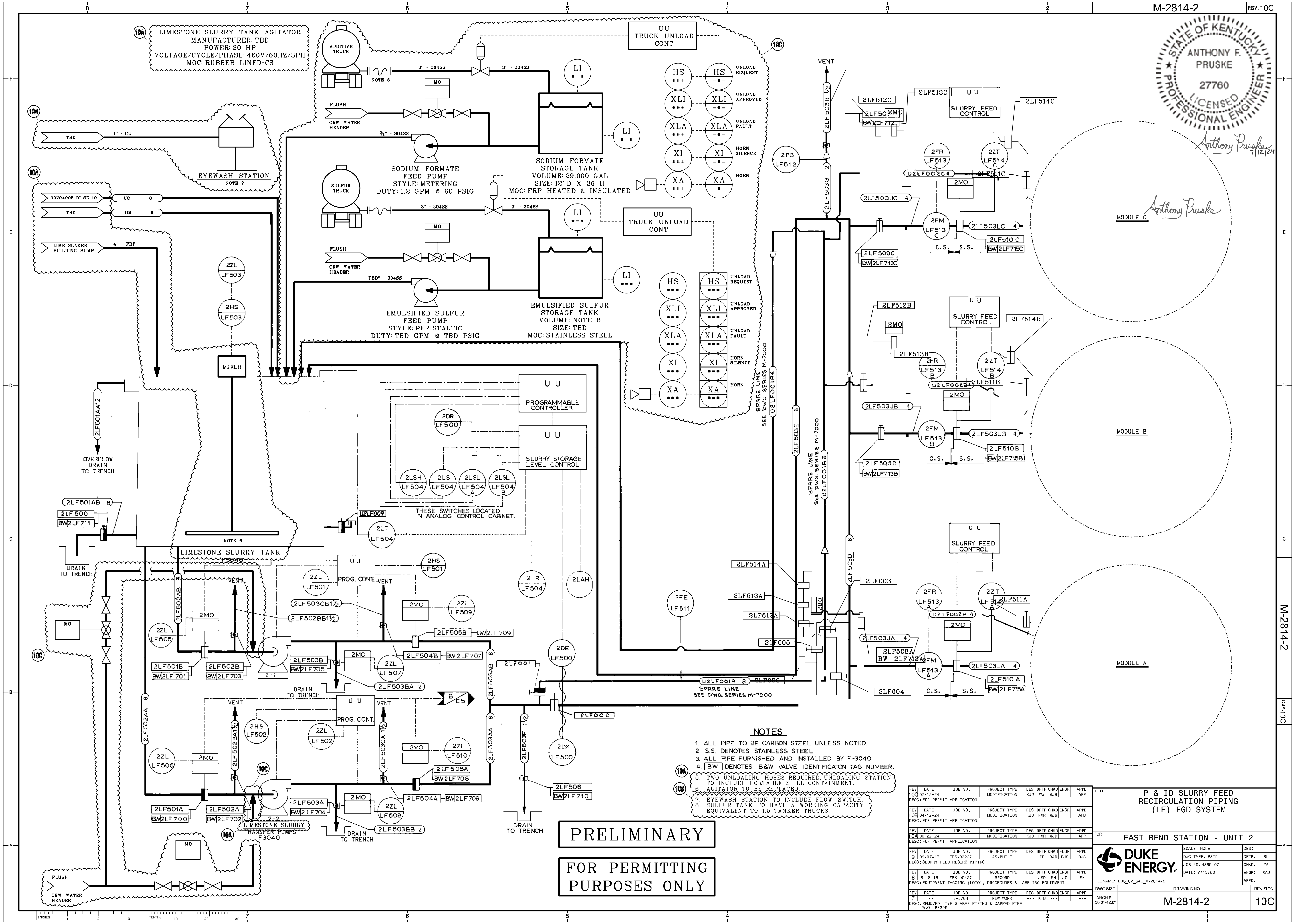
0C	2024-07-12	Issue for Permit Application
0B	2024-04-12	Issue for Permit Application
0A	2024-03-22	Issue for Permit Application
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER
60724995

SHEET TITLE
WFGD LIMESTONE CONVERSION
P&ID
REAGENT PREP

SHEET NUMBER
60724995-DI-SK-122


M-2814-2
REV. 10C
LIMESTONE SLURRY TANK AGITATOR
MANUFACTURER: TBD
POWER: 20 HP
VOLTAGE/CYCLE/PHASE: 460V/60HZ/3PH
MOC: RUBBER LINED-CS
ADDITIVE TRUCK
SULFUR TRUCK
UU TRUCK UNLOAD CONT
SODIUM FORMATE FEED PUMP
STYLE: METERING
DUTY: 1.2 GPM @ 60 PSIG
SODIUM FORMATE STORAGE TANK
VOLUME: 29,000 GAL
SIZE: 12' D X 36' H
MOC: FRP HEATED & INSULATED
EMULSIFIED SULFUR FEED PUMP
STYLE: PERISTALTIC
DUTY: TBD GPM @ TBD PSIG
EMULSIFIED SULFUR STORAGE TANK
VOLUME: NOTE 8
SIZE: TBD
MOC: STAINLESS STEEL
EYEWASH STATION
LIME SLAKER BUILDING SUMP
CRW WATER HEADER
FLUSH
MIXER
LIMESTONE SLURRY TANK
OVERFLOW DRAIN TO TRENCH
DRAIN TO TRENCH
PROGRAMMABLE CONTROLLER
SLURRY STORAGE LEVEL CONTROL
THESE SWITCHES LOCATED IN ANALOG CONTROL CABINET.
LIMESTONE SLURRY TRANSFER PUMPS F3040
SPARE LINE SEE DWG SERIES M-7000
SLURRY FEED CONTROL
MODULE A
MODULE B
MODULE C
VENT
NOTES
1. ALL PIPE TO BE CARBON STEEL UNLESS NOTED.
2. S.S. DENOTES STAINLESS STEEL.
3. ALL PIPE FURNISHED AND INSTALLED BY F-3040
4. BW DENOTES B&W VALVE IDENTIFICATON TAG NUMBER.
5. TWO UNLOADING HOSES REQUIRED. UNLOADING STATION TO INCLUDE PORTABLE SPILL CONTAINMENT.
6. AGITATOR TO BE REPLACED.
7. EYEWASH STATION TO INCLUDE FLOW SWITCH.
8. SULFUR TANK TO HAVE A WORKING CAPACITY EQUIVALENT TO 1.5 TANKER TRUCKS.
PRELIMINARY
FOR PERMITTING PURPOSES ONLY
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
P & ID SLURRY FEED RECIRCULATION PIPING (LF) FGD SYSTEM
EAST BEND STATION - UNIT 2
DUKE ENERGY
M-2814-2
10C

M-2815-1

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

MARKUPS ON THIS SHEET TYPICAL ALL 3 ABSORBERS

CLARIFIED RECYCLE M2811-5 B2

DRAIN TO FLOOR TRENCH

SPENT SLURRY TO THICKENERS M2810-1 E3

FGD SERVICE WATER M-2803-1

UU LEVEL CONTROL

UU PROG. CONT.

UU PH CONTROL

UU DENSITY CONTROL

RECIRCULATION TANK
266,166 GALLONS

FOR MOISTURE SEPARATOR WASH SEE DRWG. M-2812

ABSORBER RECIRCULATION PUMPS
UPPER AND LOWER 12,500 G.P.M. @ 68 FT. H_2O

MANUAL BALL VALVE

DRAIN TO FLOOR MANUAL BALL VALVE 1"

CRW M2811-5 C-2 FLUSH

M2811-5 B-1

NORTH THICKENER TUNNEL TRENCH

SPENT SLURRY TO MAINTENANCE TANK

NOTES

1. S.S. DENOTES STAINLESS STEEL CONSTRUCTION.
2. ⊂⊃ DENOTES REDUCING EXPANSION JOINT.
3. BW DENOTES B&W VALVE IDENTIFICATION NUMBER.
4. DENSITY MEASUREMENT TO BE USED FOR CONTROL OF BLEED VALVE.
5. DENSITY METERS TO BE REUSED.
6. RESHEAVING OF PUMPS TO BE DETERMINED IN DETAILED DESIGN.
7. LEVEL MEASUREMENT TO BE USED FOR CONTROL OF MAKEUP WATER VALVE.
8. 24" TEE AND 24X30 REDUCER TO BE REPLACED WITH 24X24X30 TEE AND SPOOL PIECE FOR FIELD FIT-UP.
9. SPRAY HEADERS TO BE REPLACED.
10. CROSS-TIE BETWEEN UPPER AND LOWER HEADERS TO BE ADDED TO FACILITATE OPERATION WITH ONE ABSORBER RECIRCULATION PUMP OUT OF SERVICE.
11. REPLACE WITH 6" ISR WARREN 3800 AND UPSIZE PIPING.

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
7/12/24

REVISION 6C
DES: WW DPTR:
CHKD: ENGR: MJB APPD: AFP
W.C. NO: PM:
DESCRIPTION: ISSUED FOR PERMIT APPLICATION
ISSUE TYPE: PERMIT DATE ISSUED: 7-12-24

REVISIONS				
REV	DATE	APPD	W.C.	DESCRIPTION
3	6-14-93		58023	REV'D 2WB505A
4	8-11-03		C8021291	REV'D BY CINERGY E&C
5	10-25-19		88689	AS-BUILT
6A	1-29-24	AFP		ISSUED FOR PERMIT APP.
6B	4-12-24	AFP		ISSUED FOR PERMIT APP.
6C	7-12-24	SRB		ISSUED FOR PERMIT APP.

TITLE
P & ID
ABSORBER &
RECIRCULATION PIPING-MODULE A
F.G.D. SYSTEM

FOR EAST BEND STATION - UNIT 2 STA. NO. 20

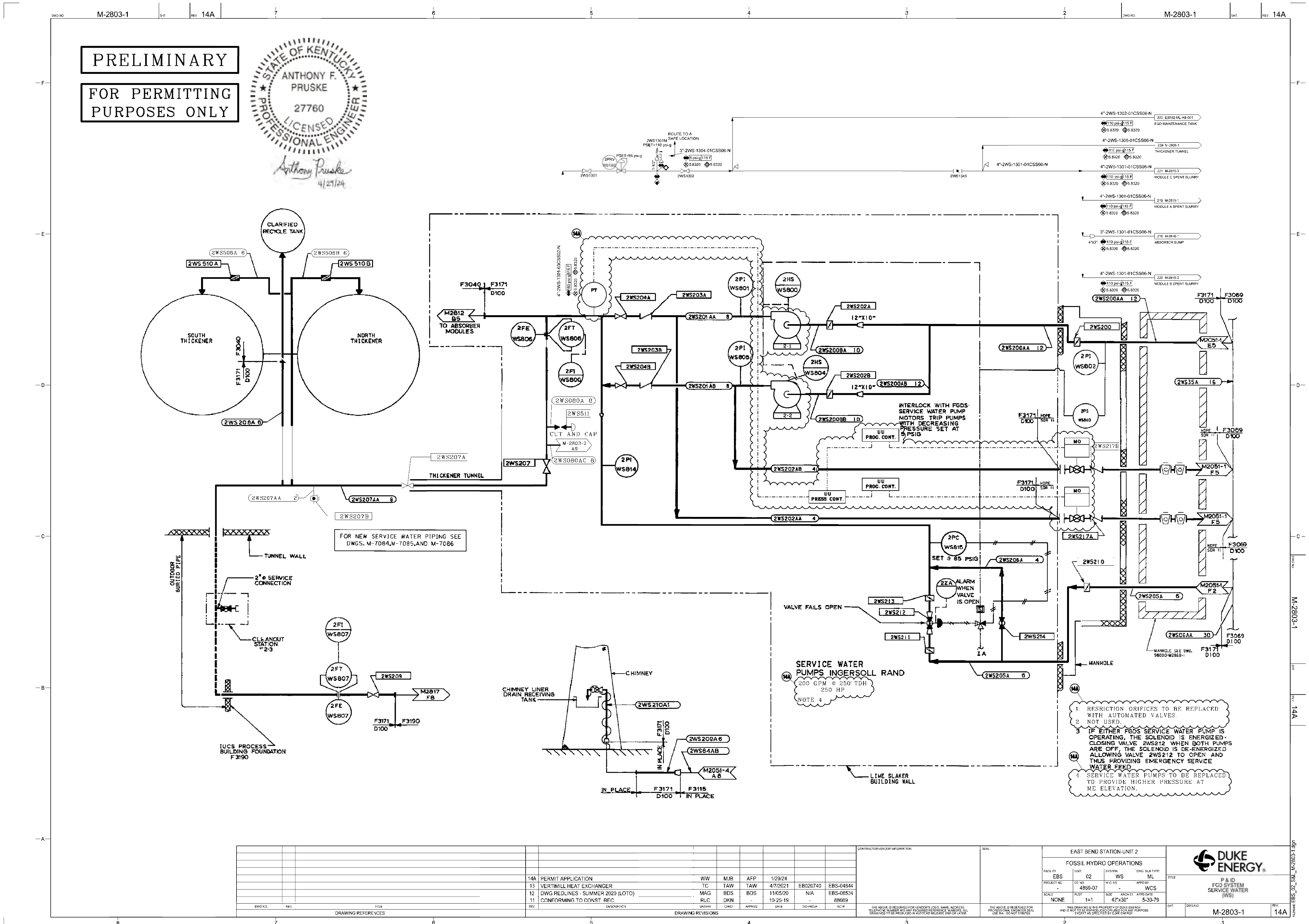
SCALE NONE DWG TYPE M.L.
DES DPTR S.L.
CHKD C.J.A. ENGR R.A.J.
APPD. PJ.V. NO.
W.C. NO. DATE 7-15-80
W.O. NO. JOB NO.

JOB NO.	JOB NO.	JOB NO.	DWG SIZE
			E

CINERGY.
CINCINNATI GAS & ELECTRIC COMPANY

DRAWING NO.
M-2815-1

CAD FILE N:\M\2815\1.dgn


M-2803-1
14A
PRELIMINARY
FOR PERMITTING PURPOSES ONLY
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
4/29/24
CLARIFIED RECYCLE TANK
SOUTH THICKENER
NORTH THICKENER
2WS510A
2WS510B
2WS208A 6
THICKENER TUNNEL
2WS207
2WS207A
2WS207AA 8
2WS207B
FOR NEW SERVICE WATER PIPING SEE DWGS. M-7084, M-7085, AND M-7086
TUNNEL WALL
OUTDOOR BURIED PIPE
2" ø SERVICE CONNECTION
CLEANOUT STATION #2-3
IUCS PROCESS BUILDING FOUNDATION F3190
2WS209
M2817 F8
F3171 D100
F3190
M2812 B5 TO ABSORBER MODULES
F3040
F3171 D100
2WS204A
2WS203A
2WS204B
2WS203B
2WS201AA 8
2WS201AB 8
2WS202A
2WS202B
12"X10"
2WS200BA 10
2WS200AB 12
2WS200BB 10
2WS200AA 12
2WS200
2WS202AB 4
2WS202AA 4
CUT AND CAP
M-2803-2 A9
2WS080A 6
2WS080AC 6
2WS511
INTERLOCK WITH FGDS SERVICE WATER PUMP MOTORS TRIP PUMPS WITH DECREASING PRESSURE SET AT 5 PSIG
UU PROC. CONT.
UU PRESS CONT.
2WS217B
2WS217A
2WS210
SET @ 85 PSIG
2WS206A 4
ALARM WHEN VALVE IS OPEN
VALVE FAILS OPEN
2WS213
2WS212
2WS211
2WS214
2WS205A 6
M2051-4 E5
M2051-1 F5
M2051-1 F2
2WS35A 16
2WS06AA 30
F3069 D100
MANHOLE
MANHOLE SEE DWG. 56000-M2869-1
SERVICE WATER PUMPS INGERSOLL RAND
200 GPM @ 250' TDH
250 HP
NOTE 4
CHIMNEY
CHIMNEY LINER DRAIN RECEIVING TANK
2WS210A1
2WS209A6
2WS64AB
M2051-4 A8
IN PLACE
F3171 D100
F3115 IN PLACE
LIME SLAKER BUILDING WALL
ROUTE TO A SAFE LOCATION
4"-2WS-1301-01CSS06-N
1. RESRICTION ORIFICES TO BE REPLACED WITH AUTOMATED VALVES.
2. NOT USED.
3 IF EITHER FGDS SERVICE WATER PUMP IS OPERATING, THE SOLENOID IS ENERGIZED-CLOSING VALVE 2WS212 WHEN BOTH PUMPS ARE OFF, THE SOLENOID IS DE-ENERGIZED ALLOWING VALVE 2WS212 TO OPEN AND THUS PROVIDING EMERGENCY SERVICE WATER FEED
4. SERVICE WATER PUMPS TO BE REPLACED TO PROVIDE HIGHER PRESSURE AT ME ELEVATION.
DRAWING REFERENCES
14A PERMIT APPLICATION WW MJB AFP 1/29/24
13 VERTIMILL HEAT EXCHANGER TC TAW TAW 4/7/2021 EB020740 EBS-04844
12 DWG REDLINES - SUMMER 2020 (LOTO) MAG BDS BDS 11/05/20 N/A EBS-06534
11 CONFORMING TO CONST. REC. RLC DKN - 10-25-19 - 88669
REV. DESCRIPTION DRAWN CHKD APPRVD DATE WO-PROJ# ACT#
DRAWING REVISIONS
CONTRACTOR/VENDOR INFORMATION
SEAL
EAST BEND STATION-UNIT 2
FOSSIL HYDRO OPERATIONS
FACILITY EBS UNIT: 02 SYSTEM: WS DWG SUB TYPE: ML
PROJECT NO: - CC NO: 4869-07 W.O. NO - APPD BY WCS
SCALE NONE PLOT 1=1 SIZE ARCH-E1 42"x30" APPD DATE: 5-30-79
THIS DRAWING IS THE PROPERTY OF DUKE ENERGY AND IS NOT TO BE REPRODUCED OR USED FOR ANY PURPOSE EXCEPT AS SPECIFIED BY DUKE ENERGY
DUKE ENERGY
TITLE P & ID FGD SYSTEM SERVICE WATER (WS)
DWG NO: M-2803-1 REV: 14A
FILENAME EBS_02_S&L_M-2803-1.dgn

M-2812 REV 6B

MODULE A

MODULE B

MODULE C

MOISTURE SEPARATOR WASH OVERSPRAY HEADERS

MOISTURE SEPARATOR WASH UNDERSPRAY HEADERS

NOTE 6.7

NOTE 7

PROG. CONT.

SLAKER BUILDING

ABSORBER BUILDING

BLIND FLANGE

DRAIN TO TRENCH

M-2811-5 A2 CLARIFIED RECYCLE WATER

M-2812-2 8B

M-2812-2 5S

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
7/12/24

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

NOTES:
1. ALL PIPE TO BE RUBBER LINED CARBON STEEL, UNLESS NOTED
2. S.S DENNOTEDS STAINLESS STEEL CONSTRUCTION.
3. ALL PIPE FURNISHED AND INSTALLED BY F3040.
4. HAYWARD MANUFACTRING COMPANY MODEL 50 DUPLEX STRAINER.
5. BW DENOTES B&W VALVE I.D. TAG NUMBER.
6. VALVES AND FLOW METERS LOCATED IN 5" DIAMETER PIPING INDICATED FOR REPLACEMENT WILL ALSO BE REPLACED WITH 6" DIAMETER COMPONENTS.
7. ALL ME REPLACEMENT PIPING WILL BE NON-LINED 316SS

REV	DATE	JOB NO.	PROJECT TYPE	DES	DFTR	CHKD	ENGR	APPD
6B	7/12/24	60724995	PERMIT APPLICATION	--	WR		MJB	AFP
DESC:								
6A	1/29/24	60724995	PERMIT APPLICATION	--	WR		MJB	AFP
DESC:								
5	3/24/20	EBS01297	NEW WORK	--	JDP	BES	W/BDS	BDS
DESC: ME TRAY REPLACEMENT - ACT CC EBS-02966								

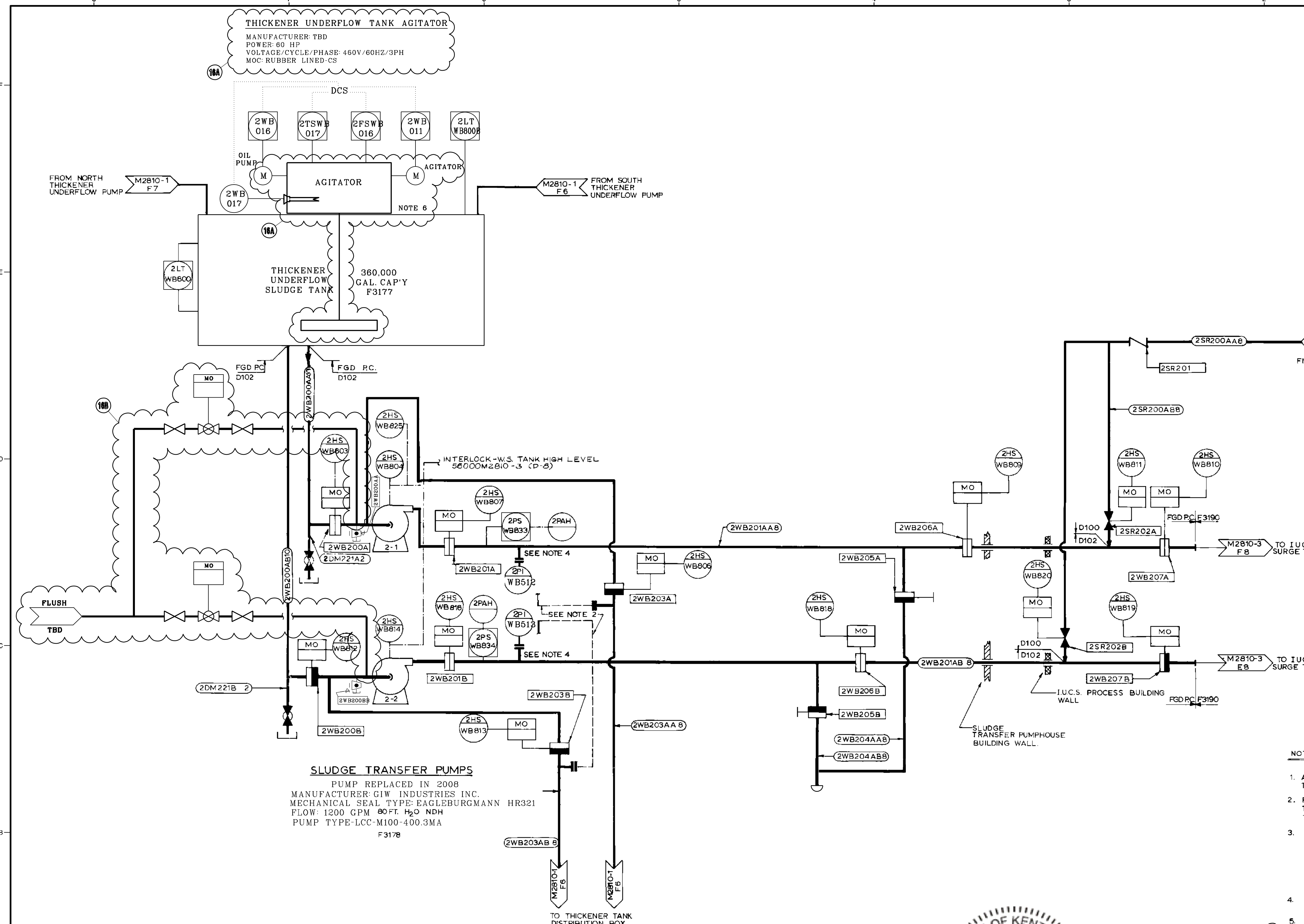
TITLE
P&ID
WASH SERVICE WATER (SX)
FGD SYSTEM
FOR
EAST BEND STATION-UNIT 2

Duke Energy

SCALE: NONE DES: SL
DWG TYPE: M DFTR: SL
JOB NO: 4866-07 CHKD:
DATE: 7-15-80 ENGR: EZA
FILENAME: EBS_02_s&l_m-2812.dgn APPD: EZA

DWG SIZE: ARCH E1 30.0"x42.0"
DRAWING NO.: M-2812
REVISION: 6B

M-2810-2 REV. 16B


THICKENER UNDERFLOW TANK AGITATOR
MANUFACTURER: TBD
POWER: 60 HP
VOLTAGE/CYCLE/PHASE: 460V/60HZ/3PH
MOC: RUBBER LINED-CS
DCS
AGITATOR
OIL PUMP
NOTE 6
FROM NORTH THICKENER UNDERFLOW PUMP
M2810-1 F7
M2810-1 F6
FROM SOUTH THICKENER UNDERFLOW PUMP
THICKENER UNDERFLOW SLUDGE TANK
360,000 GAL. CAP'Y F3177
FGD P.C. D102
FLUSH
TBD
INTERLOCK-W.S. TANK HIGH LEVEL 56000M2810-3 (D-8)
SEE NOTE 4
SEE NOTE 2
2WB201AA8
2WB201AB 8
2WB203AA 8
2WB203AB 8
2SR200AA8
2SR200AB8
M2811-4 C-5
FROM IUCS FILTRATE RETURN
M2810-3 F8
TO IUCS SURGE TANK
M2810-3 E8
TO IUCS SURGE TANK
I.U.C.S. PROCESS BUILDING WALL
SLUDGE TRANSFER PUMPHOUSE BUILDING WALL
TO THICKENER TANK DISTRIBUTION BOX
SLUDGE TRANSFER PUMPS
PUMP REPLACED IN 2008
MANUFACTURER: GIW INDUSTRIES INC.
MECHANICAL SEAL TYPE: EAGLEBURGMANN HR321
FLOW: 1200 GPM 80FT. H2O NDH
PUMP TYPE-LCC-M100-400.3MA
F3178

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

REFERENCES

M-2804-1 GLAND WATER
M-2848 FGD SYSTTEM SLUDGE TRANSFER PUMP
M-2810-2 FGD SYSTEM SLUDGE THICKNER
02-HR321/100-G1-E31 EAGLBURGNM

GIW INDUSTRIES INC.

13527LOC FGD SLUDGE TRANSFER PUMPS
13527DT FGD SLUDGE TRANSFER PUMPS
13527IP FGD SLUDGE TRANSFER PUMPS

NOTES:

1. ALL PIPING AND VALVES PER S&L DESIGN TABLE D102 UNLESS OTHERWISE NOTED.
2. REMOVE BLIND FLANGE AND INSTALL SPOOL PIECE TO ALLOW SLUDGE TRANSFER FROM SURGE TANK TO THICKENERS.
3. MO — DENOTES MOTOR OPERATED SLIDING GATE VALVE
4. REMOVE BLIND FLANGE AND INSTALL SPOOL PIECE TO ALLOW CROSS FLOW OF SLUDGE TO SPARE PIPE.
5. VALVES 2WB207A AND 2WB207B WILL DELAY CLOSING 1 MIN AT INITIATION OF PURGE CYCLE.
6. AGITATOR TO BE REPLACED.

STATE OF KENTUCKY — ANTHONY F. PRUSKE — 27760 — LICENSED PROFESSIONAL ENGINEER

Anthony Pruske 7/12/24

REV	DATE	JOB NO.	PROJECT TYPE	DES	DFTR	CHKD	ENGR	APPD
16B	07/12/24	60724995	PERMIT APP.	---	WW		MJB	AFP
16A	01/29/24	60724995	PERMIT APP.	---	WW		MJB	AFP
15	02/05/20	0506000	RECORD		JWO	BDS	BDS	BDS
14	10/25/19	88669	AS BUILT			RLC	DKH	

DESC (15): CC# EBS-09355-SUMMER 2019 REDLINES
DESC (14): CONFORMING TO CONSTRUCTION RECORDS

P&ID
SLUDGE (WB)
THICKENER UNDERFLOW FGD SYSTEM

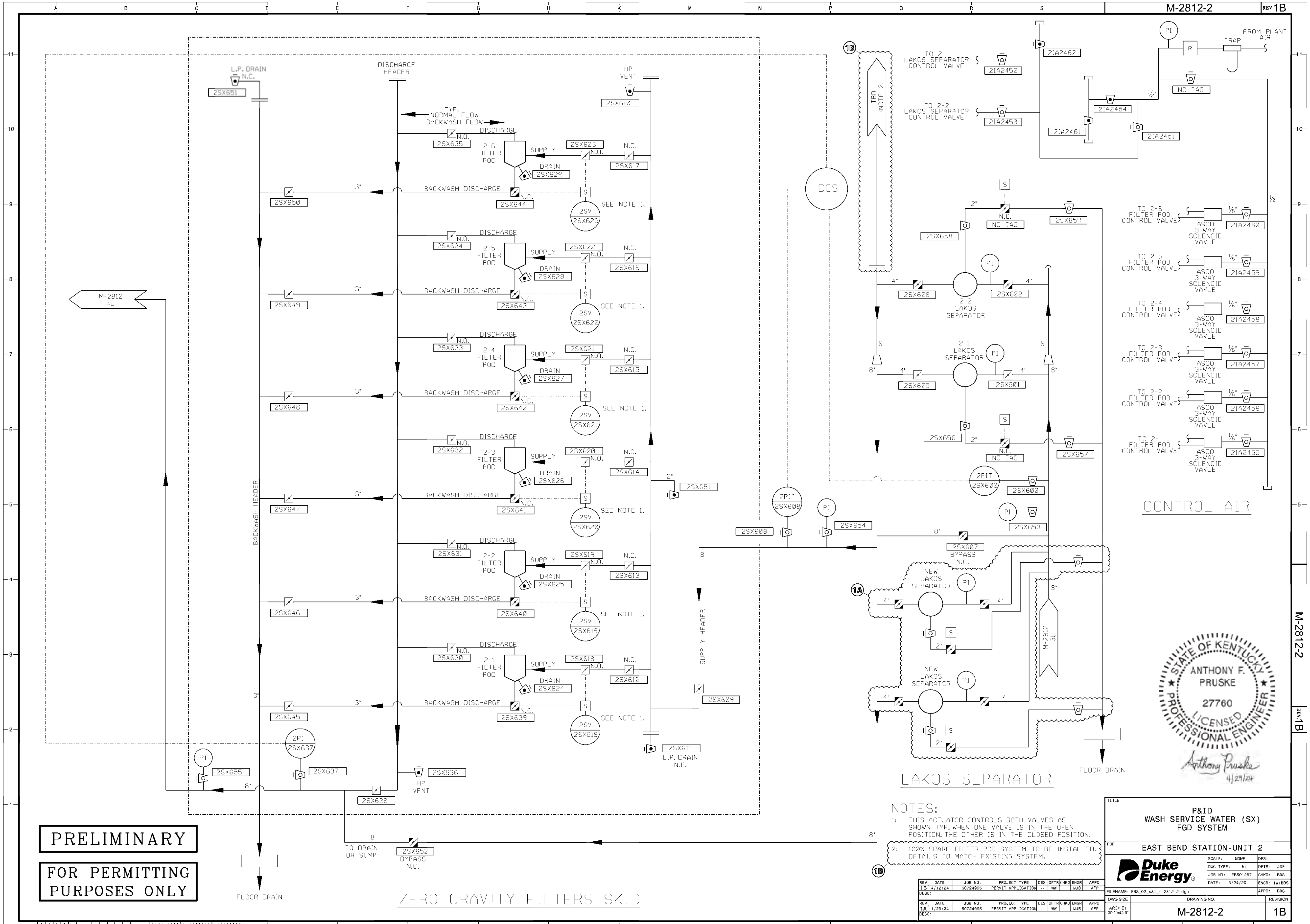
EAST BEND STATION - UNIT 2

DUKE ENERGY

SCALE: NONE · DWG TYPE: ML · JOB NO: 4886-07 · DATE: 5-31-79 · DES: --- · DFTR: SL · CHKD: RAJ · ENGR: WCS · APPD: WCS

FILENAME: EBS_02_S&L_M-2810-2.dgn

DWG SIZE: ARCH E1 30.0"x42.0" · DRAWING NO. M-2810-2 · REVISION 16B

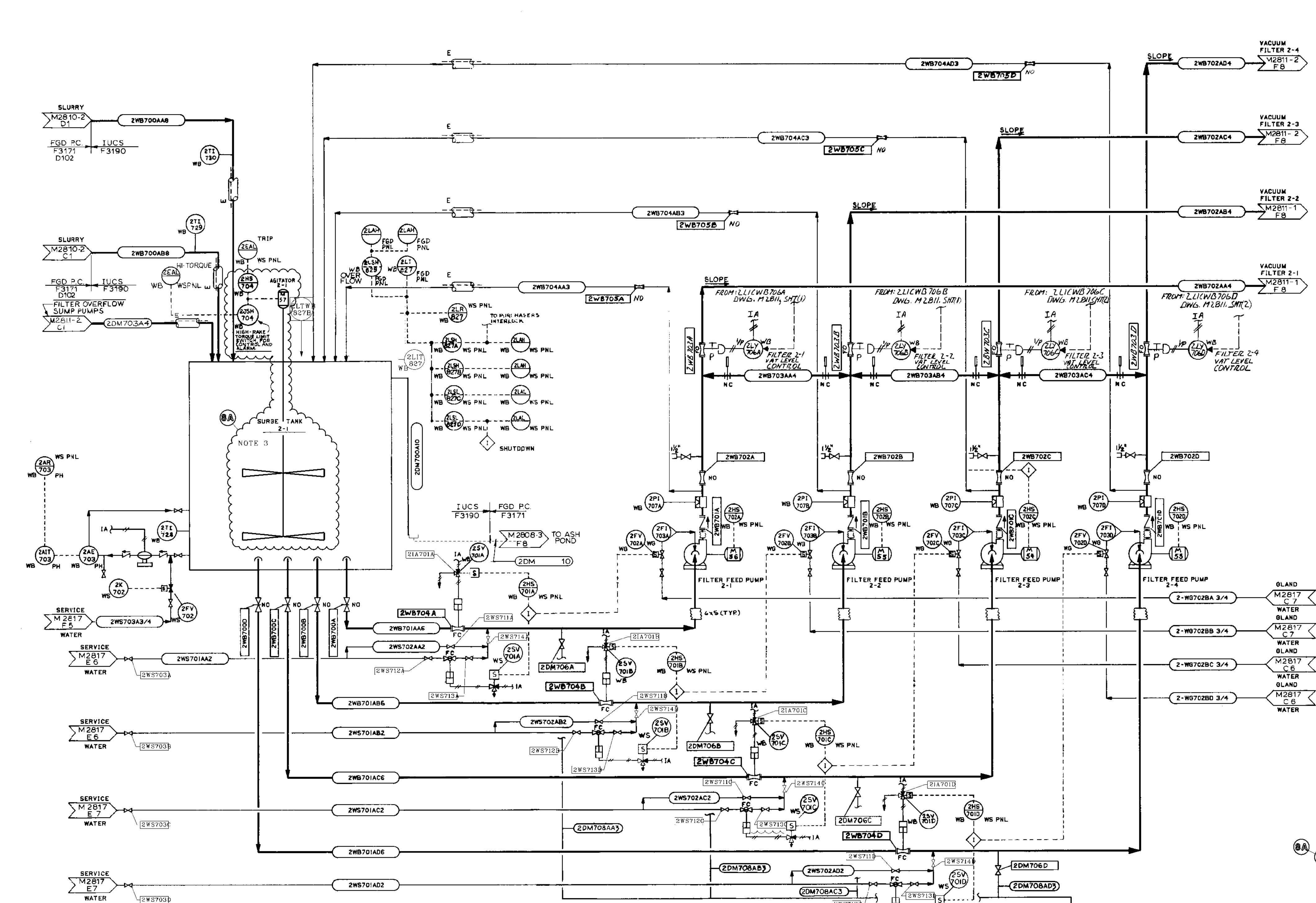

M-2812-2
REV 1B
ZERO GRAVITY FILTERS SKID
L.P. DRAIN N.C.
DISCHARGE HEADER
HP VENT
TYP. NORMAL FLOW
BACKWASH FLOW
2-6 FILTER POD
2-5 FILTER POD
2-4 FILTER POD
2-3 FILTER POD
2-2 FILTER POD
2-1 FILTER POD
DISCHARGE
SUPPLY
DRAIN
BACKWASH DISCHARGE
SEE NOTE 1.
BACKWASH HEADER
SUPPLY HEADER
M-2812 4L
TO DRAIN OR SUMP
BYPASS N.C.
FLOOR DRAIN
DCS
TBD (NOTE 2)
2-2 LAKOS SEPARATOR
2-1 LAKOS SEPARATOR
NEW LAKOS SEPARATOR
NEW LAKOS SEPARATOR
M-2812 3U
LAKOS SEPARATOR
TO 2-1 LAKOS SEPARATOR CONTROL VALVE
TO 2-2 LAKOS SEPARATOR CONTROL VALVE
FROM PLANT AIR
TRAP
TO 2-6 FILTER POD CONTROL VALVE
TO 2-5 FILTER POD CONTROL VALVE
TO 2-4 FILTER POD CONTROL VALVE
TO 2-3 FILTER POD CONTROL VALVE
TO 2-2 FILTER POD CONTROL VALVE
TO 2-1 FILTER POD CONTROL VALVE
ASCO 3-WAY SOLENOID VAVLE
CONTROL AIR
NOTES:
1: THIS ACTUATOR CONTROLS BOTH VALVES AS SHOWN TYP. WHEN ONE VALVE IS IN THE OPEN POSITION, THE OTHER IS IN THE CLOSED POSITION.
2: 100% SPARE FILTER POD SYSTEM TO BE INSTALLED. DETAILS TO MATCH EXISTING SYSTEM.
PRELIMINARY
FOR PERMITTING PURPOSES ONLY
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
4/29/24
TITLE
P&ID
WASH SERVICE WATER (SX)
FGD SYSTEM
FOR
EAST BEND STATION-UNIT 2
SCALE: NONE
DES: --
DWG TYPE: ML
DFTR: JDP
JOB NO: EBS01297
CHKD: BDS
DATE: 3/24/20
ENGR: TW/BDS
APPD: BDS
FILENAME: EBS_02_s&l_m-2812-2.dgn
REV 1B, DATE 4/12/24, JOB NO. 60724995, PROJECT TYPE PERMIT APPLICATION, DES --, DFTR WW, ENGR MJB, APPD AFP
REV 1A, DATE 1/29/24, JOB NO. 60724995, PROJECT TYPE PERMIT APPLICATION, DES --, DFTR WW, ENGR MJB, APPD AFP
DWG SIZE ARCH E1 30.0"x42.0"
DRAWING NO. M-2812-2
REVISION 1B

M-2810-3 8A

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske 4/29/24



SURGE TANK AGITATOR

MANUFACTURER: TBD
POWER: 50 HP
VOLTAGE/CYCLE/PHASE: 460V/60HZ/3PH
MOC: RUBBER LINED-CS

SURGE TANK
2-1(T-211)

MANUFACTURER	:ENVIRO-FAB
SIZE	:40'.DIA. X 40'. HIGH (COVERED)
CAPACITY	:320,000 GALLONS
MATERIAL	:CARBON STEEL

FILTER FEED PUMP
2-1,2-2,2-3,2-4,(P-211A,B,C,& D)

MANUFACTURER	:DENVER
TYPE	:CENTRIFUGAL (HORZ)
SIZE	: 5"X 4 "X 14"
CAPACITY	:350 GPM
HEAD	:80' TDH
MATERIAL	:CI(RUBBER LINED)
SPEED	:1150 RPM
HORSEPOWER	:50

NOTES

1. IUCS EQUIPMENT NUMBERS ARE IN PARENTHESES.
2. ALL ABOVE GROUND OUTSIDE LINES TO BE TRACED AND INSULATED.
3. AGITATOR TO BE REPLACED. (8A)

REFERENCE DRAWINGS

DWG. NO.	TITLE

REDRAWN FROM IUCS DRAWING 2213-F-203

DRAWING REFERENCES

DWG NO.	REV.	TITLE

DRAWING REVISIONS

REV	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE	WO-PROJ#	ACT#
8A	PERMIT APPLICATION	WW	MJB	AFP	01/29/24		
7	DWG REDLINES - SUMMER 2020 (LOTO)	MAG	BDS	BDS	11/05/20	N/A	EBS-06534
6	CONFORMING TO CONST. REC.	JMD	DG	DG	08/08/19	-	EBS-05443

CONTRACTOR/VENDOR INFORMATION

THE ABOVE IS RESERVED FOR VENDOR'S LOGO, NAME, ADDRESS, TELEPHONE NUMBER AND ANY REQUIRED REFERENCE NUMBERS. ALL DRAWINGS TO BE PRODUCED IN AUTOCAD RELEASE 2000 OR LATER.

SEAL

THE ABOVE IS RESERVED FOR PROFESSIONAL ENGINEER SEAL. USE INK - DO NOT EMBOSS

EAST BEND STATION-UNIT 2

FOSSIL HYDRO OPERATIONS

FACILITY	UNIT	SYSTEM	DWG SUB TYPE
EBS	02	TBD	ML
PROJECT NO: -	CC NO: -	W.O. NO -	APPD BY CS
SCALE NONE	PLOT 1=1	SIZE ARCH-E1 42"x30"	APPD DATE: 12-14-79

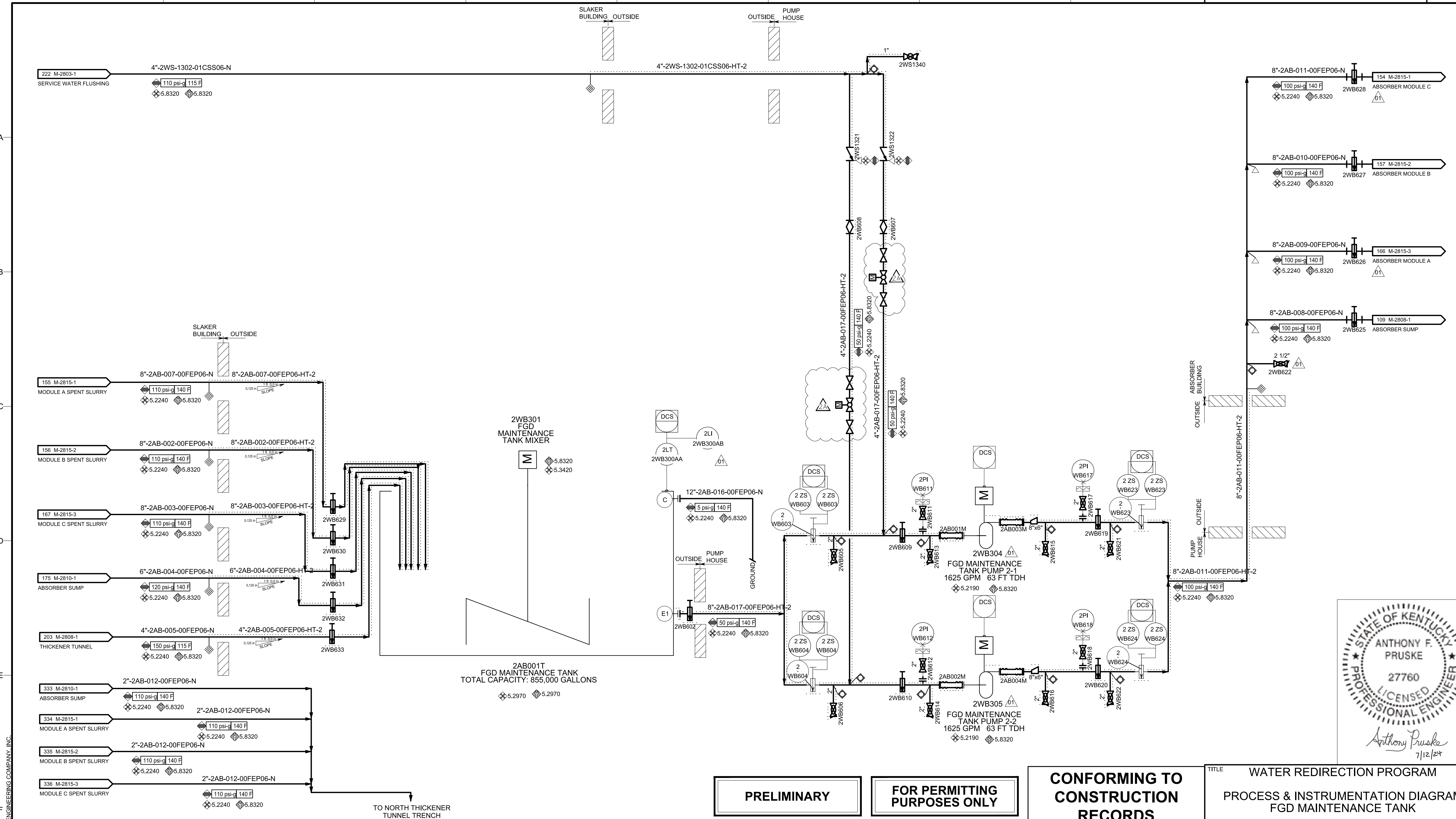
THIS DRAWING IS THE PROPERTY OF DUKE ENERGY AND IS NOT TO BE REPRODUCED OR USED FOR ANY PURPOSE EXCEPT AS SPECIFIED BY DUKE ENERGY

DUKE ENERGY.

TITLE: PROCESS & INSTRUMENT DIAGRAM SLURRY SURGE & FEED TANK

SHT | DWG NO: M-2810-3 | REV: 8A

FILENAME: EBS_02_S&L_M-2810-3.dgn



PRELIMINARY

FOR PERMITTING PURPOSES ONLY

CONFORMING TO CONSTRUCTION RECORDS

no.	date	by	ckd	description
02A	7/12/24	RMR	MJB	WFGD LIMESTONE CONVERSION
01	10/25/19	RLC	DKH	CONFORMING TO CONSTRUCTION RECORDS
00	01/31/19	RLC	ACR	CONFORMING TO CONSTRUCTION RECORDS

BURNS McDONNELL
9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400
FIRM LICENSE NO. 43

TITLE
WATER REDIRECTION PROGRAM
PROCESS & INSTRUMENTATION DIAGRAM
FGD MAINTENANCE TANK

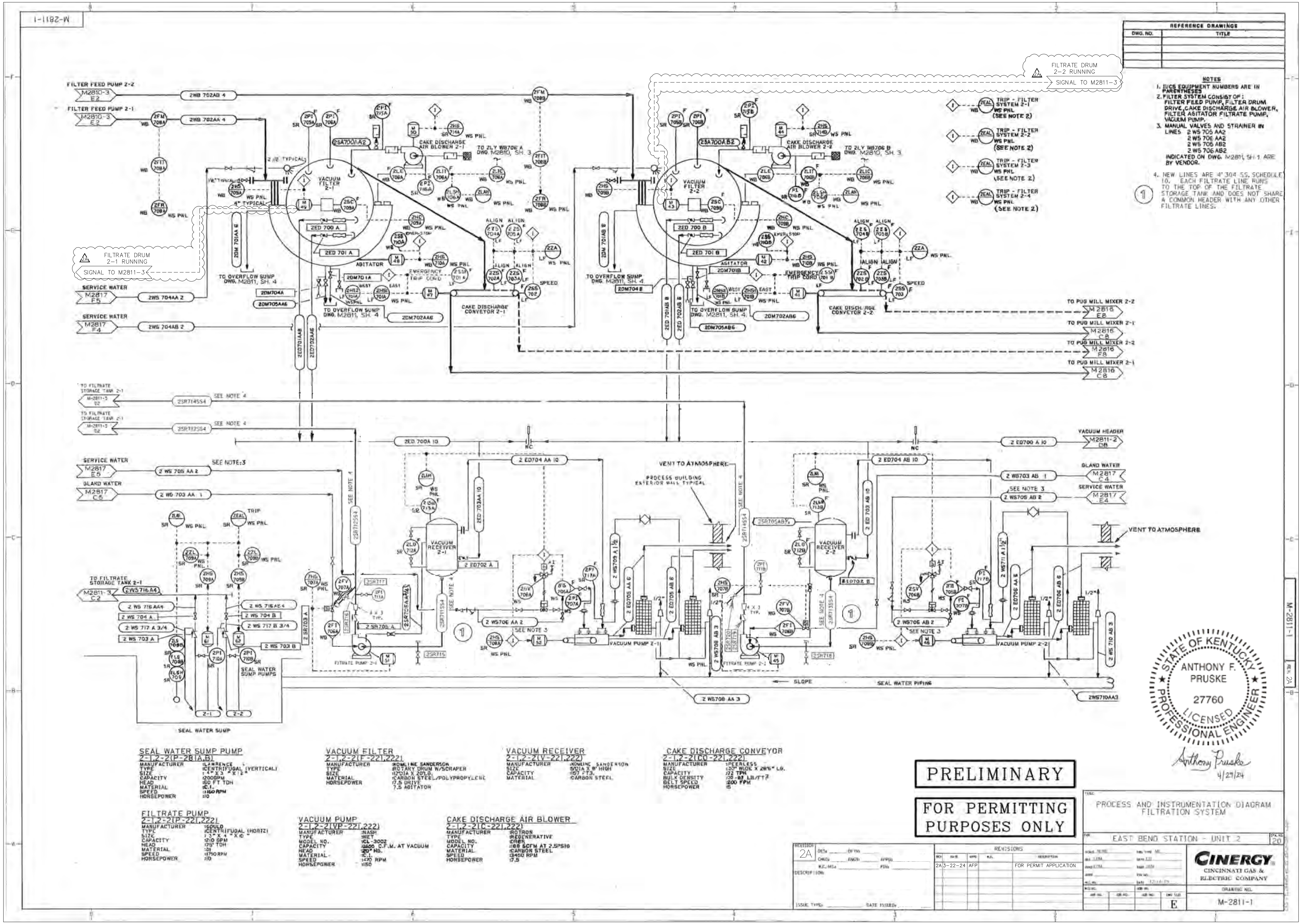
FOR
EAST BEND STATION UNIT 2

DUKE ENERGY
BOONE COUNTY, KY

SCALE: NTS		CON:	5,8320
DWG TYPE: PD		DFTR:	TDE
JOB NO: 88669		CHKD:	ACR
DATE: 08/30/17		ENGR:	AES
FILENAME: EBS02-ML-AB-001.dwg		APPD:	ACR

DWG SIZE	DRAWING NO.	REVISION
ANSI D 22.0"X34.0"	EBS02-ML-AB-001	02A

C:\USERS\RYAN.RASMUSSEN\ONEDRIVE - AECOM\Z1_EXTRACT\DUKE 60724995\PID\EBS02-ML-AB-001.DWG 7/12/2024 2:11 PM RENECHANDLER


M-2811-1
REFERENCE DRAWINGS
DWG. NO.
TITLE
FILTRATE DRUM 2-2 RUNNING
SIGNAL TO M2811-3
FILTRATE DRUM 2-1 RUNNING
SIGNAL TO M2811-3
NOTES
1. IUCS EQUIPMENT NUMBERS ARE IN PARENTHESES
2. FILTER SYSTEM CONSIST OF: FILTER FEED PUMP, FILTER DRUM DRIVE, CAKE DISCHARGE AIR BLOWER, FILTER AGITATOR FILTRATE PUMP, VACUUM PUMP.
3. MANUAL VALVES AND STRAINER IN LINES 2 WS 705 AA2 2 WS 706 AA2 2 WS 705 AB2 2 WS 706 AB2 INDICATED ON DWG. M2811, SH 1 ARE BY VENDOR.
4. NEW LINES ARE 4" 304 SS, SCHEDULE 10. EACH FILTRATE LINE RUNS TO THE TOP OF THE FILTRATE STORAGE TANK AND DOES NOT SHARE A COMMON HEADER WITH ANY OTHER FILTRATE LINES.
FILTER FEED PUMP 2-2
FILTER FEED PUMP 2-1
VACUUM FILTER 2-1
VACUUM FILTER 2-2
CAKE DISCHARGE AIR BLOWER 2-1
CAKE DISCHARGE AIR BLOWER 2-2
CAKE DISCHARGE CONVEYOR 2-1
CAKE DISCHARGE CONVEYOR 2-2
TO OVERFLOW SUMP DWG. M2811, SH. 4
SERVICE WATER
TO PUG MILL MIXER 2-2
TO PUG MILL MIXER 2-1
TO FILTRATE STORAGE TANK 2-1
VACUUM HEADER
GLAND WATER
VENT TO ATMOSPHERE
PROCESS BUILDING EXTERIOR WALL TYPICAL
VACUUM RECEIVER 2-1
VACUUM RECEIVER 2-2
VACUUM PUMP 2-1
VACUUM PUMP 2-2
FILTRATE PUMP 2-1
FILTRATE PUMP 2-2
SEAL WATER SUMP PUMPS
SEAL WATER SUMP
SEAL WATER PIPING
SLOPE
SEAL WATER SUMP PUMP
2-1,2-2(P-28(A,B)
MANUFACTURER :LAWRENCE
TYPE :CENTRIFUGAL (VERTICAL)
SIZE : 4" X 3 " X 12 "
CAPACITY :200GPM
HEAD :60 FT TDH
MATERIAL :C.I.
SPEED :1160 RPM
HORSEPOWER :10
VACUUM FILTER
2-1,2-2(F-221,222)
MANUFACTURER :KOMLINE SANDERSON
TYPE :ROTARY DRUM W/SCRAPER
SIZE :12'DIA X 20'LG.
MATERIAL :CARBON STEEL/POLYPROPYLENE
HORSEPOWER :7.5 DRIVE 7.5 AGITATOR
VACUUM RECEIVER
2-1,2-2(V-221,222)
MANUFACTURER :KOMLINE SANDERSON
SIZE :5'DIA X 8' HIGH
CAPACITY :157 FT3.
MATERIAL :CARBON STEEL
CAKE DISCHARGE CONVEYOR
2-1,2-2(CO-221,222)
MANUFACTURER :PEERLESS
SIZE :30" WIDE X 28'6" LG.
CAPACITY :72 TPH
BULK DENSITY :70-87 LB/FT3
BELT SPEED :200 FPM
HORSEPOWER :5
FILTRATE PUMP
2-1,2-2(P-221,222)
MANUFACTURER :GOULD
TYPE :CENTRIFUGAL (HORIZ)
SIZE : 3" X 4 " X 10 "
CAPACITY :210 GPM
HEAD :75' TDH
MATERIAL :DI
SPEED :1750 RPM
HORSEPOWER :10
VACUUM PUMP
2-1,2-2(VP-221,222)
MANUFACTURER :NASH
TYPE :WET
MODEL NO. :CL-3002
CAPACITY :2650 C.F.M. AT VACUUM
HEAD :20" HG.
MATERIAL :C.I.
SPEED :470 RPM
HORSEPOWER :150
CAKE DISCHARGE AIR BLOWER
2-1,2-2(C-221,222)
MANUFACTURER :ROTRON
TYPE :REGENERATIVE
MODEL NO. :DR6R
CAPACITY :188 SCFM AT 2.5PSIG
MATERIAL :CARBON STEEL
SPEED :3450 RPM
HORSEPOWER :7.5
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
4/29/24
PRELIMINARY
FOR PERMITTING PURPOSES ONLY
PROCESS AND INSTRUMENTATION DIAGRAM FILTRATION SYSTEM
EAST BEND STATION - UNIT 2
20
REVISION 2A
DESCRIPTION:
ISSUE TYPE: DATE ISSUED:
REVISIONS
2A 3-22-24 AFP FOR PERMIT APPLICATION
CINERGY
CINCINNATI GAS & ELECTRIC COMPANY
DRAWING NO.
E
M-2811-1

DWG NO M-2811-3 SHT REV 5A

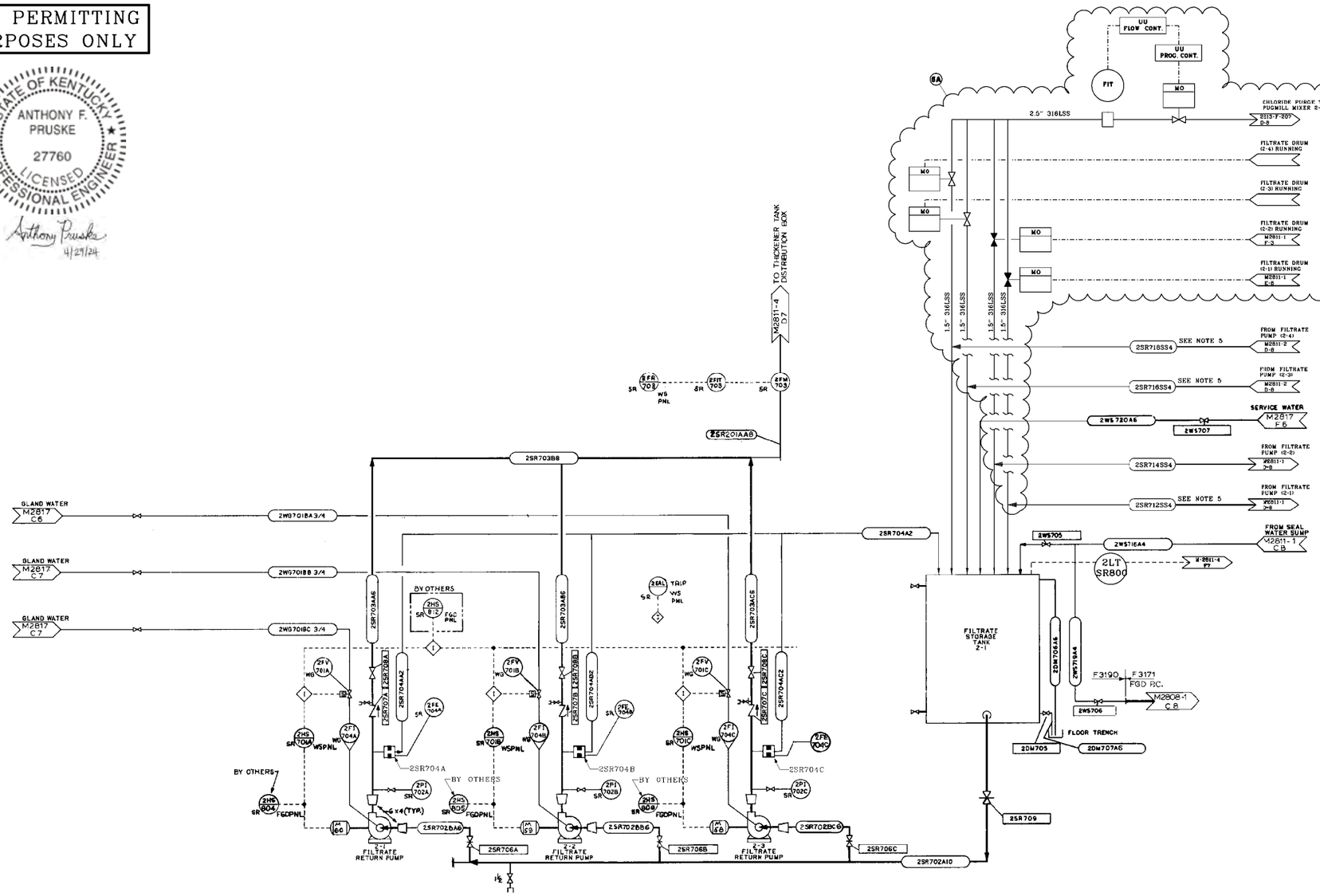
PRELIMINARY

FOR PERMITTING PURPOSES ONLY

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

REFERENCE DRAWINGS	
DWG. NO.	TITLE

NOTES
1. IUCS EQUIPMENT NUMBERS ARE IN PARENTHESES.
2. ALL ABOVE GROUND OUTSIDE LINES TO BE TRACED AND INSULATED
3. INSTRUMENTS ON F&D PNL ARE BY OTHERS
4. ALL CHECK VALVES ARE SUPPLIED WITH DRAIN PLUGS.



REV.	DESCRIPTION	DRAWN	CHKD	APPROVD	DATE	WO/MOD#	ACT#
5A	PERMIT APPLICATION	WW	MJB	AFP	01/29/24		
4	DWG REDLINES - SUMMER 2020 (LOTO)	MAG	BDS	BDS	11/05/20	N/A	EBS-06524
3	WSP FILTRATE STORAGE	FDM	CPA	CPA	R-14-15	-	-

DRAWING REVISIONS

DWG NO.	REV.	TITLE

DRAWING REFERENCES

CONTRACTOR/VENDOR INFORMATION

THIS ABOVE IS RESERVED FOR VENDORS LOGO, NAME, ADDRESS, TELEPHONE NUMBER AND ANY REQUIRED REFERENCE NUMBERS. ALL DRAWINGS TO BE PRODUCED IN ACCTCAD RELEASE 2000 OR LATER.

SEAL

THIS ABOVE IS RESERVED FOR PROFESSIONAL ENGINEER SEAL USE R/A - DO NOT ERASE

EAST BEND STATION-UNIT 2
FOSSIL HYDRO OPERATIONS

FACILITY	UNIT	SYSTEM	DWG SUB TYPE
EBS	02	TBD	ML
PROJECT NO.	CC NO.	W.O. NO.	APPD BY
-	-	-	-
SCALE	PLOT	SIZE - ARCH-D / APPD DATE	
NONE	1=1	42"x30"	12/14/79

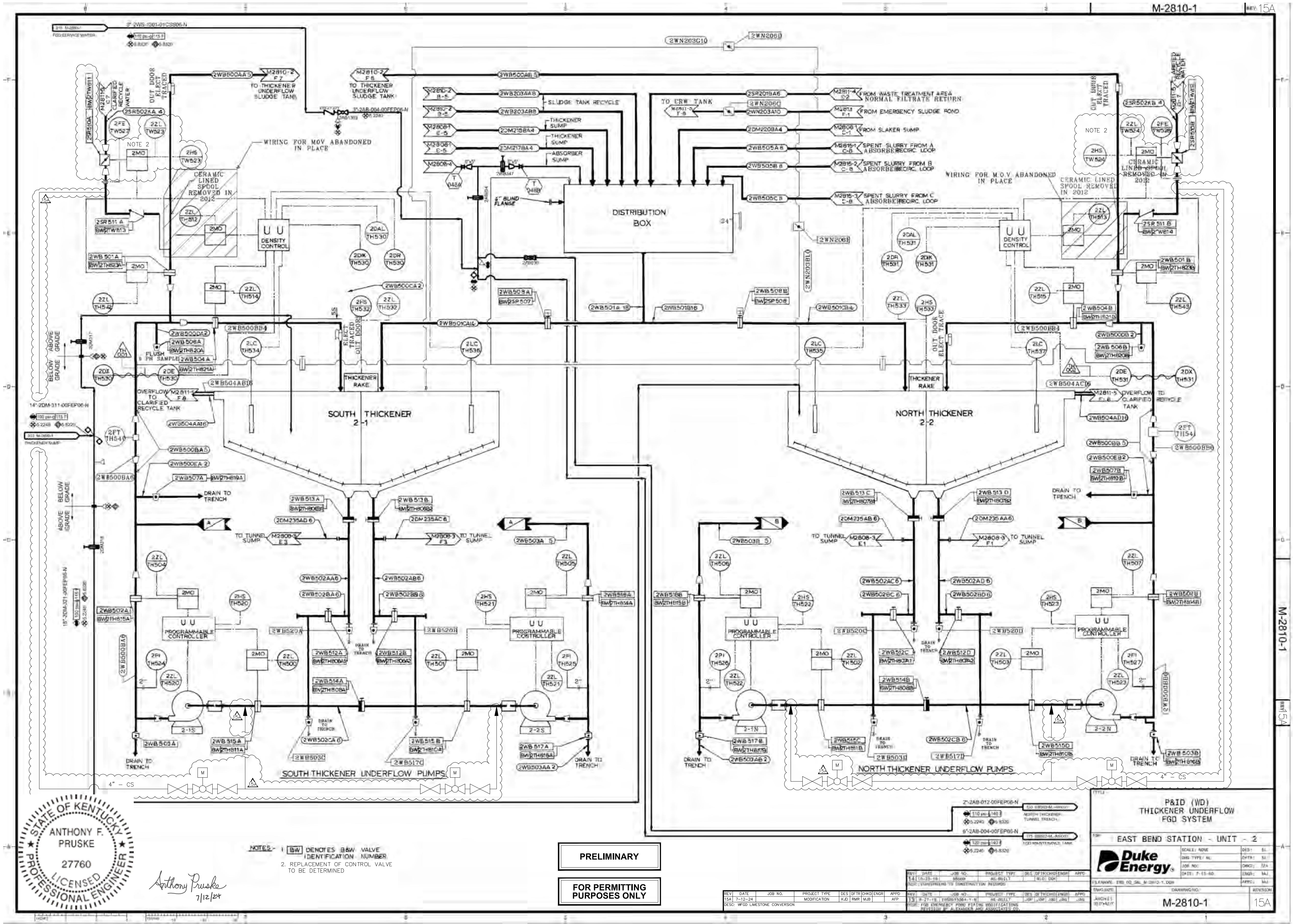
DUKE ENERGY

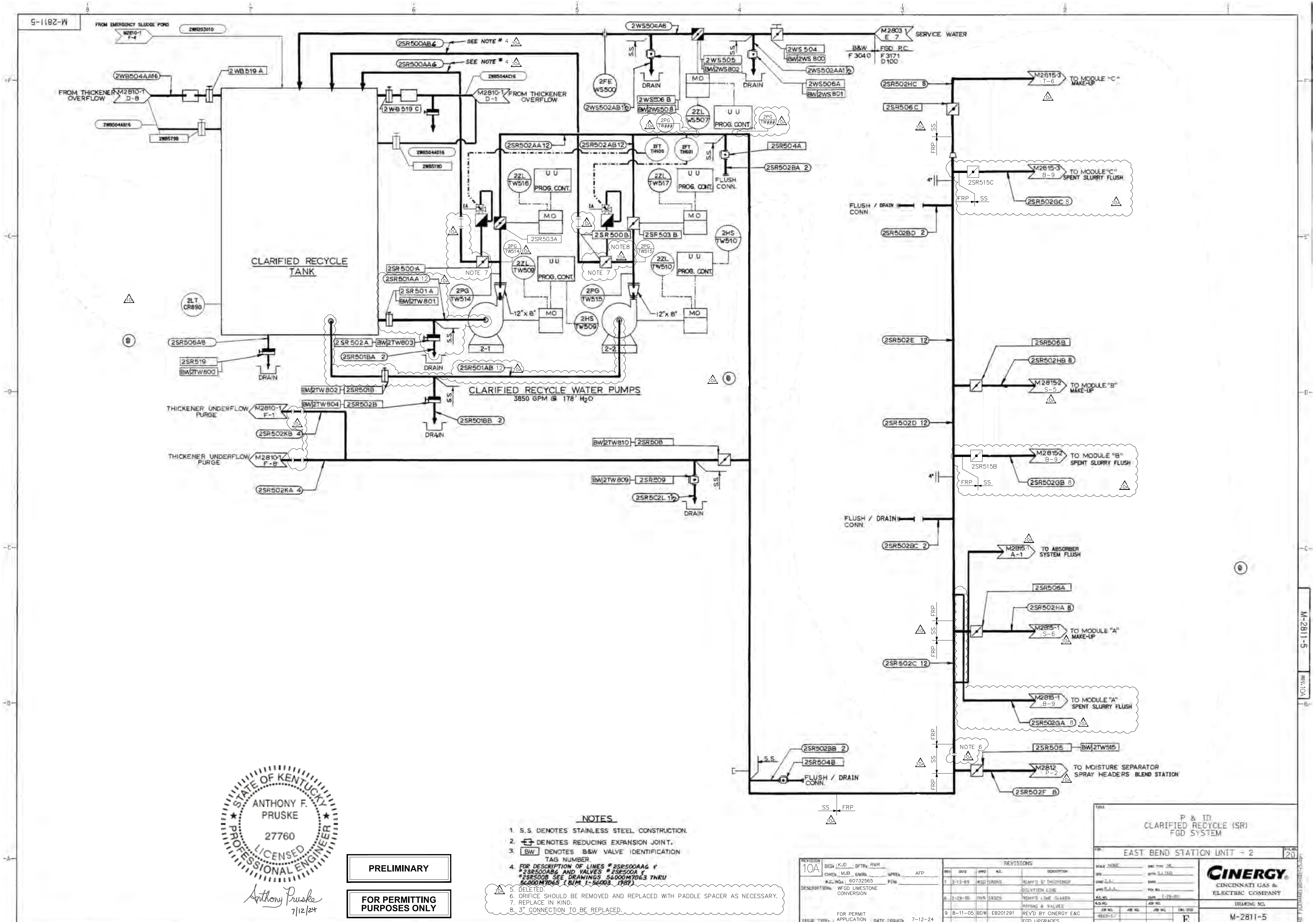
TITLE: PROCESS & INSTRUMENTATION DIAGRAM RECLAIM WATER SYSTEM

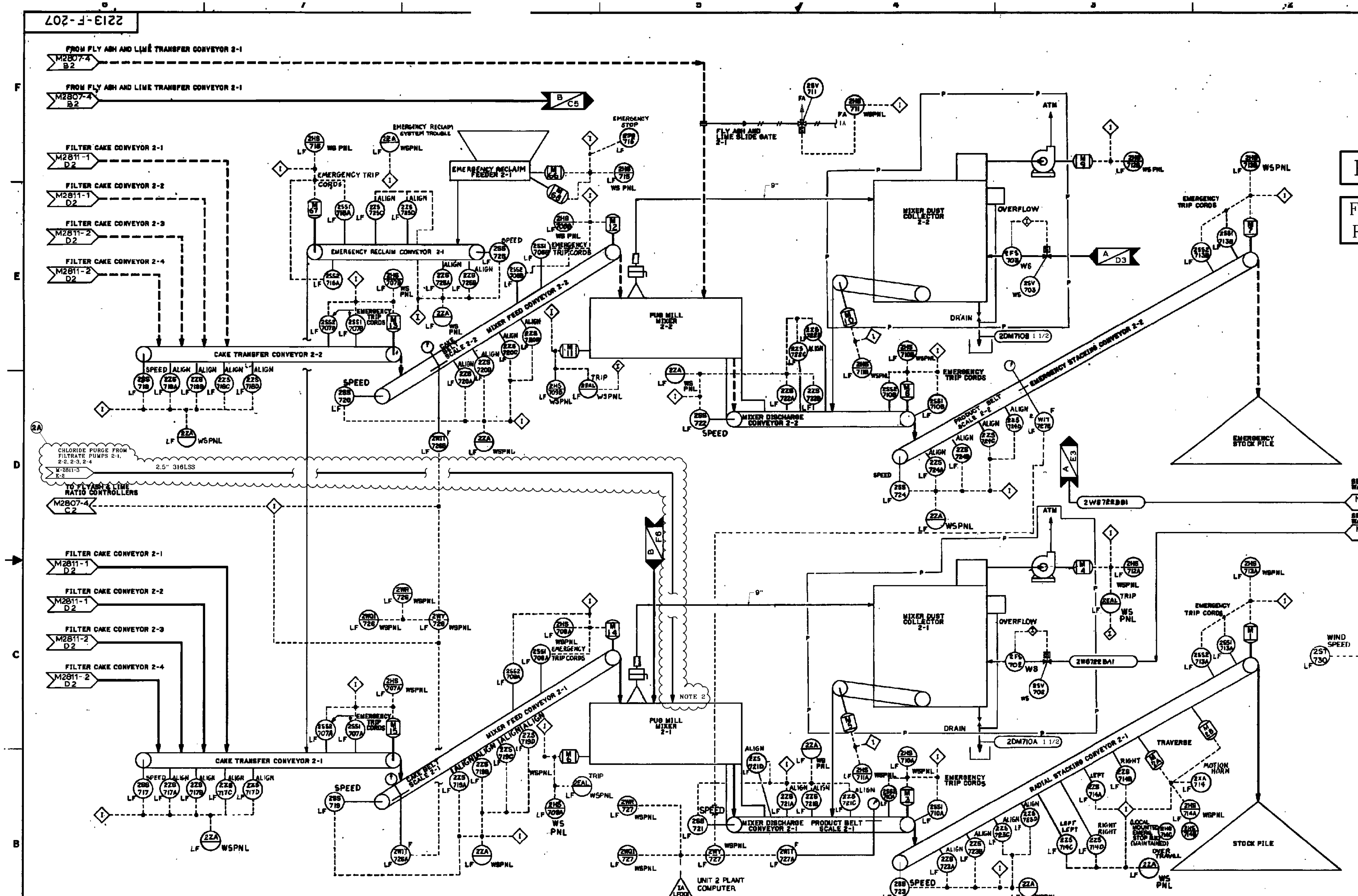
SHT DWG NO M-2811-3 REV 5A

M-2811-3 SHT 5A

FILENAME EBS_02_SM_M2811-3.dgn


M-2810-1
DISTRIBUTION BOX
SOUTH THICKENER 2-1
NORTH THICKENER 2-2
THICKENER RAKE
DENSITY CONTROL
PROGRAMMABLE CONTROLLER
SOUTH THICKENER UNDERFLOW PUMPS
NORTH THICKENER UNDERFLOW PUMPS
WIRING FOR MOV ABANDONED IN PLACE
CERAMIC LINED SPOOL REMOVED IN 2012
TO THICKENER UNDERFLOW SLUDGE TANK
SLUDGE TANK RECYCLE
THICKENER SUMP
ABSORBER SUMP
TO CRW TANK
FROM WASTE TREATMENT AREA NORMAL FILTRATE RETURN
FROM EMERGENCY SLUDGE POND
FROM SLAKER SUMP
SPENT SLURRY FROM A ABSORBER RECIRC. LOOP
SPENT SLURRY FROM B ABSORBER RECIRC. LOOP
SPENT SLURRY FROM C ABSORBER RECIRC. LOOP
OVERFLOW TO CLARIFIED RECYCLE TANK
DRAIN TO TRENCH
TO TUNNEL SUMP
NOTES - 1. BW DENOTES B&W VALVE IDENTIFICATION NUMBER
2. REPLACEMENT OF CONTROL VALVE TO BE DETERMINED
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske 7/12/24
PRELIMINARY
FOR PERMITTING PURPOSES ONLY
P&ID (WD) THICKENER UNDERFLOW FGD SYSTEM
EAST BEND STATION - UNIT - 2
Duke Energy
M-2810-1
15A


CLARIFIED RECYCLE TANK
CLARIFIED RECYCLE WATER PUMPS
3850 GPM @ 178' H_2O
FROM EMERGENCY SLUDGE POND
FROM THICKENER OVERFLOW
THICKENER UNDERFLOW PURGE
SERVICE WATER
TO MODULE "C" MAKE-UP
TO MODULE "C" SPENT SLURRY FLUSH
TO MODULE "B" MAKE-UP
TO MODULE "B" SPENT SLURRY FLUSH
TO ABSORBER SYSTEM FLUSH
TO MODULE "A" MAKE-UP
TO MODULE "A" SPENT SLURRY FLUSH
TO MOISTURE SEPARATOR SPRAY HEADERS BLEND STATION
FLUSH / DRAIN CONN.
DRAIN
SEE NOTE # 4
NOTES
1. S.S. DENOTES STAINLESS STEEL CONSTRUCTION.
2. DENOTES REDUCING EXPANSION JOINT.
3. BW DENOTES B&W VALVE IDENTIFICATION TAG NUMBER.
4. FOR DESCRIPTION OF LINES # 2SR500AA6 & # 2SR500AB6 AND VALVES # 2SR500A & # 2SR500B SEE DRAWINGS 56000M7063 THRU 56000M7065 (B/M 1-56003 1989)
5. DELETED.
6. ORIFICE SHOULD BE REMOVED AND REPLACED WITH PADDLE SPACER AS NECESSARY.
7. REPLACE IN KIND.
8. 3" CONNECTION TO BE REPLACED.
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
7/12/24
PRELIMINARY
FOR PERMITTING PURPOSES ONLY
REVISION 10A
DESCRIPTION: WFGD LIMESTONE CONVERSION
ISSUE TYPE: FOR PERMIT APPLICATION
DATE ISSUED: 7-12-24
REVISIONS
9. 8-11-05 BDW EB201291 REV'D BY CINERGY E&C FGD UPGRADES
P & ID
CLARIFIED RECYCLE (SR)
FGD SYSTEM
EAST BEND STATION UNIT - 2
CINERGY
CINCINNATI GAS & ELECTRIC COMPANY
DRAWING NO.
M-2811-5



NOTES
1. IUCS EQUIPMENT NUMBERS ARE IN PARENTHESIS.
2. CHLORIDE PURGE WILL BE DISTRIBUTED WITHIN THE PUGMILL VIA AN ASSEMBLY OF SPRAY NOZZLES OR A SPRAY BAR APPARATUS.

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

CAKE TRANSFER CONV.
2-1,2-2 (CO-226,227)
MANUFACTURER : PEERLESS
SIZE : 36 IN WIDE X 98 FT LONG
CAPACITY : 220 TONS PER HOUR
BULK DEN : 70-85 LB/FT3
BELT SPEED : 250 FT PER MIN.
HORSEPOWER : 15

MIXER FEED CONV.
2-1,2-2(CO-228,229)
MANUFACTURER : PEERLESS
SIZE : 42 IN WIDE X 38 FT LONG
CAPACITY : 220 TONS PER HOUR
BULK DEN : 75-80 LB/FT3
BELT SPEED : 275 FT PER MIN.
HORSEPOWER : 10

EMERGENCY RECLAIM FEEDER
2-1,(FD-281)
MANUFACTURER : J.C. STEELE
MODEL NO. : 55C
TYPE : COUNTER ROTATING
SIZE : 4'X12'
CAPACITY : 80 TONS PER HOUR
MATERIAL : HOPPER-CARBON STEEL (LINED) FEEDER-STEEL/ALLOY CI
HORSEPOWER : 20 MAIN DRIVE 1½ CROSS FEEDER DRIVE

PUG MILL MIXER
2-1,2-2(M-241,242)
MANUFACTURER : EAGLE
TYPE : PUG MILL
LENGTH : 15'10"
SCREW DIAMETER : 44"
CAPACITY : 250 TPH
SPEED : 49 RPM
HORSEPOWER : 150

EMERGENCY RECLAIM CONV.
2-1 (CO-281)
MANUFACTURER : PEERLESS
SIZE : 30 IN WIDE X 82 FT LONG
CAPACITY : 80 TONS PER HOUR
BULK DEN : 75-80 LB/FT3
BELT SPEED : 200 FT PER MIN.
HORSEPOWER : 5

PRODUCT BELT SCALE
2-1,2-2(WS-233,234)
MANUFACTURER : AUTO WEIGH
CAPACITY : 0-300 TPH
MATERIAL : CARBON STEEL
DESIGN RATE : 250 TPH

CAKE BELT SCALE
2-1,2-2(WS-228,229)
MANUFACTURER : AUTO WEIGH
CAPACITY : 0-300 TPH
MATERIAL : CARBON STEEL
DESIGN RATE : 220 TPH

FLY ASH & LIME SLIDE GATE
2-1(SG-262)
MANUFACTURER : PROCESS EQUIP BUILDERS
TYPE : AIR OPERATED
SIZE : 21" x 21"
MATERIAL : CARBON STEEL

MIXER DUST COLLECTOR
2-1,2-2(DC-241,242)
MANUFACTURER : AMERICAN AIR FILTER
TYPE : HYDROSTATIC
CAPACITY : 2000 A CFM AT 12"WG
MATERIAL : CARBON STEEL
HORSEPOWER : 7.5 BLOWER 1/2 SCRAPER

MIXER DISCHARGE CONV.
2-2(CO-234)
MANUFACTURER : PEERLESS
SIZE : 36 IN WIDE X 67 FT 6 IN LG
CAPACITY : 250 TONS PER HOUR
BULK DEN : 80-85 LB/FT3
BELT SPEED : 200 FT PER MIN.
HORSEPOWER : 7.5

MIXER DISCHARGE CONV
2-1(CO-233)
MANUFACTURER : PEERLESS
SIZE : 36 IN WIDE X 105 FT 4 IN LG
CAPACITY : 250 TONS PER HOUR
BULK DEN : 80-85 LB/FT3
BELT SPEED : 200 FT PER MIN.
HORSEPOWER : 10

EMERGENCY STACKING CONV. (FIXED)
2-2(CO-236)
MANUFACTURER : PEERLESS
SIZE : 42 IN WIDE X 160 FT LONG
CAPACITY : 250 TONS PER HOUR
BULK DEN : 80-85 LB/FT3
BELT SPEED : 250 FT PER MIN.
HORSEPOWER : 15 BELT DRIVE

RADIAL STACKING CONV.
2-1(CO-235)
MANUFACTURER : PEERLESS
SIZE : 42 IN WIDE X 140 FT LONG
CAPACITY : 250 TONS PER HOUR
BULK DEN : 80-85 LB/FT3
BELT SPEED : 250 FT PER MIN.
HORSEPOWER : 30 BELT DRIVE
HORSEPOWER : (2) 5 H.P. EACH (TRAVERSE)

REV.	DATE	DESCRIPTION
2A	01-29 2024	ISSUED FOR PERMIT APP.
1		AS-BUILT
0		SENT TO CLIENT
		GENERAL DISTRIBUTION
0	1980	GENERAL DISTRIBUTION
	1980	GENERAL DISTRIBUTION
0		ISSUE FOR CONSTRUCTION
D		GENERAL REVISIONS
C		FOR SARGENT & LUNDY APPROVAL
B		FOR SARGENT & LUNDY REVIEW
A		FOR SARGENT & LUNDY REVIEW

EAST BEND STATION - UNIT 2
THE CINCINNATI GAS & ELECTRIC CO
THE DAYTON POWER & LIGHT CO

IU CONVERSION SYSTEMS, INC.
HORSHAM, PA.

TITLE:
PROCESS & INSTRUMENT DIAGRAM
MIXING & STACKING SYSTEM

DWN. BY: COMPUDRAFT
CHK'D. BY: E.R.M. 12-15-79
ENGINEER: 12-11-79
DWG. NO. 2213-F-207
56000M2816
REV. NO. 2A

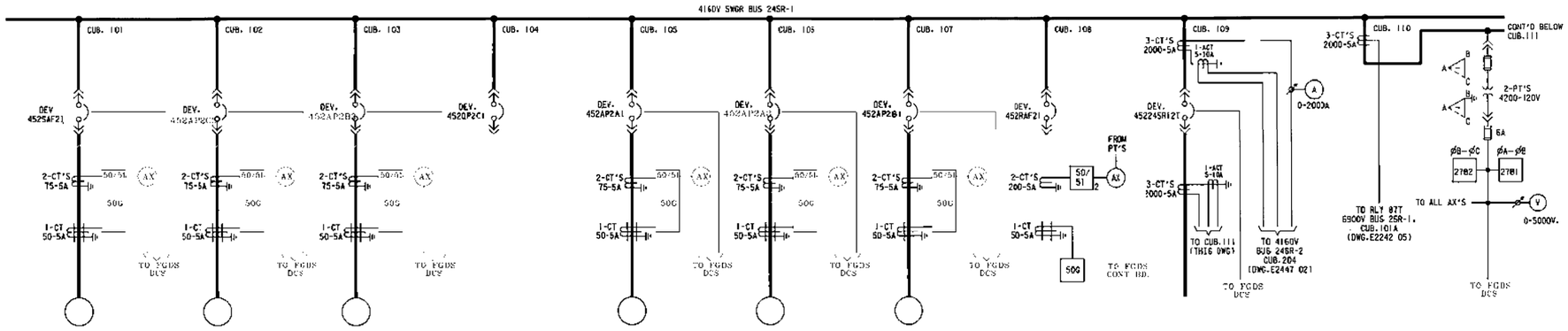
Appendix D - Electrical Load List

Duke East Bend
Reagent Conversion Study
Preliminary Load List

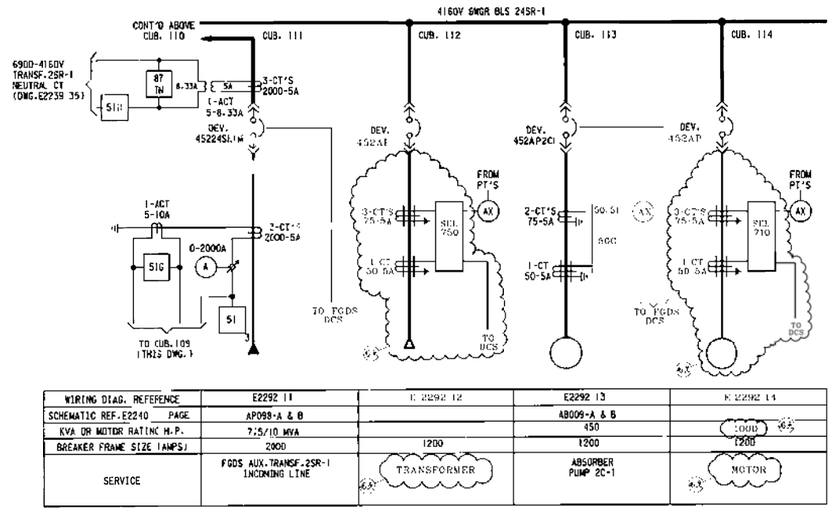
REV NO.	REVISION	DATE					
A	Review	6/17/2022	**DOC:**	**ELECTRICAL LOAD LIST**	**CONNECTED HP**		**3725.50**
B	Preliminary	7/18/2022	**CLIENT:**	Duke Energy	**CONNECTED KVA**		**3554.40**
			PROJECT:	East Bend Limestone Conversion	**CONNECTED KW**		**3198.96**
			JOB NUMBER:	**60680586**	**OPERATING KVA**		**1553.43**
					VOLT		**480**
					OPERATING AMPS		**1868**

ITEM	INSTALLED AREA	SYSTEM	DESCRIPTION	TYPE (Motor, Feeder or Actuator)	CONT. LOAD AMPS	1 or 3 PH	Voltage	CONN. HP	FULL LOAD AMPS	EFF	PF	STATIC KVA	CONN. KVA	CONN. KW	DEMAND FACTOR	OPERATING KVA	VFD (Y or N)	STARTER SIZE	BREAKER SIZE	CONTROL STATION (HOA, ETC)	DCS (Y or N)	FED FROM	COMMENTS
1	Reagent	Reagent Prep	Vertimill A Drive Motor			3	4160	1000	121.1	0.95	0.9		871.5	784.3	0.8	697.2	N				Y	24-SR1	Existing breaker
2	Reagent	Reagent Prep	Vertimill B Drive Motor			3	4160	1000	121.1	0.95	0.9		871.5	784.3	0.0	0.0	N				Y	24-SR2	Existing breaker
3	Reagent	Reagent Prep	4160V x 480V TFMR1			3	4160		0.0	0.95	0.9				0.8		N				Y	24-SR1	Existing breaker - Feeds LS-MCC1
4	Reagent	Reagent Prep	4160V x 480V TFMR2			3	4160		0.0	0.95	0.9				0.8		N				Y	24-SR2	Existing breaker - Feeds LS-MCC2
5	Reagent	Reagent Prep	A Mill Recycle Pump	FVNR		3	480	25	34.0	0.95	0.9		28.2	25.4	0.8	22.6	N	2	50		Y	LS-MCC1	
6	Reagent	Reagent Prep	B Mill Recycle Pump	FVNR		3	480	25	34.0	0.95	0.9		28.2	25.4	0.8	22.6	N	2	50		Y	LS-MCC2	
7	Reagent	Reagent Prep	A Mill Product Tank Agitator	FVNR		3	480	15	21.0	0.95	0.9		17.4	15.7	0.8	14.0	N	2	40		Y	LS-MCC1	
8	Reagent	Reagent Prep	B Mill Product Tank Agitator	FVNR		3	480	15	21.0	0.95	0.9		17.4	15.7	0.8	14.0	N	2	40		Y	LS-MCC2	
9	Reagent	Reagent Prep	A1 Classifier Feed Pump	FVNR		3	480	50	65.0	0.95	0.9		54.0	48.6	0.8	43.2	N	3	150		Y	LS-MCC1	
10	Reagent	Reagent Prep	A2 Classifier Feed Pump	FVNR		3	480	50	65.0	0.95	0.9		54.0	48.6	0.0	0.0	N	3	150		Y	LS-MCC1	
11	Reagent	Reagent Prep	B1 Classifier Feed Pump	FVNR		3	480	50	65.0	0.95	0.9		54.0	48.6	0.0	0.0	N	3	150		Y	LS-MCC2	
12	Reagent	Reagent Prep	B2 Classifier Feed Pump	FVNR		3	480	50	65.0	0.95	0.9		54.0	48.6	0.0	0.0	N	3	150		Y	LS-MCC2	
13	Reagent	Reagent Prep	VTM-1 Lube System	FDR		3	480	3	4.8	0.95	0.9		4.0	3.6	1.0	4.0	N		15		Y	LS-MCC1	
14	Reagent	Reagent Prep	VTM-2 Lube System	FDR		3	480	3	4.8	0.95	0.9		4.0	3.6	0.0	0.0	N		15		Y	LS-MCC1	
15	Reagent	Reagent Prep	Pre-Crusher 1	FVNR		3	480	200	240.0	0.95	0.9		199.3	179.4	0.8	159.4	N	5	350		Y	LS-MCC1	
16	Reagent	Reagent Prep	Pre-Crusher 2	FVNR		3	480	200	240.0	0.95	0.9		199.3	179.4	0.0	0.0	N	5	350		Y	LS-MCC2	
17	Reagent	FGD Additive	FGD Additive Tank Heater	FDR		3	480	10	14.0	0.95	0.9		11.6	10.5	1.0	11.6	N		30		Y	LS-MCC1	7kW heater
18	Reagent	FGD Additive	FGD Additive Feed Pump 1	FDR		3	480	1	2.1	0.95	0.9		1.7	1.6	0.8	1.4	N		15		Y	LS-MCC1	Skid control panel
19	Reagent	FGD Additive	FGD Additive Feed Pump 2	FDR		3	480	1	2.1	0.95	0.9		1.7	1.6	0.0	0.0	N		15		Y	LS-MCC1	Skid control panel
20	Reagent	Reagent Prep	Reagent Prep Lighting TFMR	FDR		3	480	100	124.0	0.95	0.9		103.0	92.7	0.7	72.1	N		200		N	LS-MCC1	
21	Reagent	Reagent Prep	Reagent Prep Convenience Power	FDR		3	480	100	124.0	0.95	0.9		103.0	92.7	0.5	51.5	N		200		N	LS-MCC2	
22	Reagent	Reagent Prep	Bridge Crane	FDR		3	480	20	27.0	0.95	0.9		22.4	20.2	0.5	11.2	N		50		N	LS-MCC2	
23	Reagent	Reagent Prep	Hydroclone Hoist	FDR		3	480	7.5	11.0	0.95	0.9		9.1	8.2	0.5	4.6	N		20		N	LS-MCC2	
24	Reagent	Reagent Prep	Ball Charge Hoist	FDR		3	480	7.5	11.0	0.95	0.9		9.1	8.2	0.7	6.4	N		20		N	LS-MCC1	
25	Reagent	Reagent Prep	Misc VTM Auxilaries 1	FDR		3	480	10	14.0	0.95	0.9		11.6	10.5	1.0	11.6	N		30		N	LS-MCC1	
26	Reagent	Reagent Prep	Misc VTM Auxilaries 2	FDR		3	480	10	14.0	0.95	0.9		11.6	10.5	0.3	2.9	N		30		N	LS-MCC2	
27	Reagent	Matl. Handling	Day Bin MOV1	ACT		3	480	3	4.8	0.95	0.9		4.0	3.6	1.0	4.0	N		15		Y	LS-MCC1	
28	Reagent	Matl. Handling	Day Bin MOV2	ACT		3	480	3	4.8	0.95	0.9		4.0	3.6	0.0	0.0	N		15		Y	LS-MCC1	
29	Reagent	Matl. Handling	Day Bin MOV3	ACT		3	480	3	4.8	0.95	0.9		4.0	3.6	0.0	0.0	N		15		Y	LS-MCC2	
30	Reagent	Matl. Handling	Day Bin MOV4	ACT		3	480	3	4.8	0.95	0.9		4.0	3.6	0.0	0.0	N		15		Y	LS-MCC2	
31	Reagent	Matl. Handling	Weigh Belt Feeder 1	FDR		3	480	1.5	3.0	0.95	0.9		2.5	2.2	0.8	2.0	N		15		Y	LS-MCC1	
32	Reagent	Matl. Handling	Weigh Belt Feeder 2	FDR		3	480	1.5	3.0	0.95	0.9		2.5	2.2	0.0	0.0	N		15		Y	LS-MCC1	
33	Reagent	Matl. Handling	Weigh Belt Feeder 3	FDR		3	480	1.5	3.0	0.95	0.9		2.5	2.2	0.0	0.0	N		15		Y	LS-MCC2	
34	Reagent	Matl. Handling	Weigh Belt Feeder 4	FDR		3	480	1.5	3.0	0.95	0.9		2.5	2.2	0.0	0.0	N		15		Y	LS-MCC2	
35	Reagent	Matl. Handling	Transfer Conveyor 1	FVNR		3	480	15	21.0	0.95	0.9		17.4	15.7	0.8	14.0	N	2	40		Y	LS-MCC1	
36	Reagent	Matl. Handling	Transfer Conveyor 2	FVNR		3	480	15	21.0	0.95	0.9		17.4	15.7	0.0	0.0	N	2	40		Y	LS-MCC2	
37	Reagent	FGD Additive	Heat Tracing	FDR		1	208			0.95	0.9				0.8		N				N		Use existing spares
38	Reagent	Reagent Prep	Limestone Slurry Tank Agitator	FVNR		3	480	20	27.0	0.95	0.9		22.4	20.2	0.8	17.9	N	2	50		Y	2SR2-3 (B2)	Replacing 10HP agitator
39	Dewater	Thickener	TUF Sludge Tank Agitator	FVNR		3	480	75	96.0	0.95	0.9		79.7	71.7	0.8	63.8	N	4	200		Y	Existing MCC	Replacing 15HP agitator
40	Dewater	Filter Feed	WSP Surge Tank Agitator	FVNR		3	480	60	77.0	0.95	0.9		63.9	57.5	0.8	51.2	N	4	200		Y	Existing MCC	Replacing 10HP agitator
24	Reagent	Reagent Prep	Limestone Slurry Tank Agitator - GB Heater	FDR		3	480	5	7.6	0.95	0.9		6.3	5.7	0.7	4.4	N		15		Y	Existing MCC	Reuse existing cabling and breaker
25	Dewater	Thickener	Sludge Tank Agitator - GB Heater	FDR		3	480	5	7.6	0.95	0.9		6.3	5.7	0.7	4.4	N		15		Y	Existing MCC	Reuse existing cabling and breaker
26	Dewater	Filter Feed	WSP Surge Tank Agitator - GB Heater	FDR		3	480	5	7.6	0.95	0.9		6.3	5.7	0.7	4.4	N		15		Y	Existing MCC	Reuse existing cabling and breaker
27	Reagent	Reagent Prep	Limestone Slurry Tank Agitator - Lube Pump	FVNR		3	480	1.5	3.0	0.95	0.9		2.5	2.2	0.8	2.0	N	0	15		Y	Existing MCC	Reuse existing cabling and starter
28	Dewater	Thickener	Sludge Tank Agitator - Lube Pump	FVNR		3	480	1.5	3.0	0.95	0.9		2.5	2.2	0.8	2.0	N	0	15		Y	Existing MCC	Reuse existing cabling and starter
29	Dewater	Filter Feed	WSP Surge Tank Agitator - Lube Pump	FVNR		3	480	1.5	3.0	0.95	0.9		2.5	2.2	0.8	2.0	N	0	15		Y	Existing MCC	Reuse existing cabling and starter
30	Reagent	Reagent Prep	PDC Auxilaries	FDR		3	480	25	34.0	0.95	0.9		28.2	25.4	0.7	19.8	N		50		N		Lighting, HVAC, etc...
31	Reagent	ME Wash	Service Water Pump 2-1	FVNR		3	480	250	302.0	0.95	0.9		250.8	225.7	0.8	200.6	N	6	400		Y	2SR1-4B	Upgrade existing 200 HP pump
32	Reagent	ME Wash	Service Water Pump 2-1	FVNR		3	480	250	302.0	0.95	0.9		250.8	225.7	0.0	0.0	N	6	400		Y	2SR2-3C	Upgrade existing 200 HP pump
33	Reagent	Reagent Prep	Sump Pump A	FVNR		3	480	10	14.0	0.95	0.9		11.6	10.5	0.5	5.8	N	1	30		Y	LS-MCC1	
34	Reagent	Reagent Prep	Sump Pump B	FVNR		3	480	10	14.0	0.95	0.9		11.6	10.5	0.0	0.0	N	1	30		Y	LS-MCC2	
35	Reagent	Reagent Prep	Sump Agitator	FVNR		3	480	5	7.6	0.95	0.9		6.3	5.7	0.8	5.0	N	1	15		Y	LS-MCC1	
			TOTALS					**3725.50**					**3554.40**	**3198.96**		**1553.43**							

Appendix E - One Line Diagrams



WIRING DIAG. REFERENCE	E2292 01	E-2292-2	E-2292-3	E-2292-4	E2292 05	E-2292-6	E2292 07	E2292 08	E2292 09	E2292 10
SCHEMATIC REF.E2240 PAGE	BA10E-A & B	AB01I-A&B	AB007-A&B		AB001-A & B	AB003-A&B	AB005-A & B	CR002-A & B	AP100-A & B	
KVA OR MOTOR RATING H.P.	350	450	450		450	450	450	1000		
BREAKER FRAME SIZE (AMPS)	1230	1200	1200	1200	1200	1200	1200	1200	2000	
SERVICE	SEAL AIR FAN 2-1	ABSORBER PUMP 2C-1	ABSORBER PUMP 2H-1	SPARE	ABSORBER PUMP 2A-1	ABSORBER PUMP 2A-1	ABSORBER PUMP 2B-1	SPARE	4160V SWGR 24SR-1 TIE TO SWGR 24SR-2	CT'S & PT'S COMPARTMENT



WIRING DIAG. REFERENCE	E2292 11	E-2292-12	E2292 13	E-2292-14
SCHEMATIC REF.E2240 PAGE	AP098-A & B		AB009-A & B	
KVA OR MOTOR RATING H.P.	7.5/10 MVA		450	1000
BREAKER FRAME SIZE (AMPS)	2000	1200	1200	1200
SERVICE	FGDS AUX.TRANSF.2SR-1 INCOMING LINE	TRANSFORMER	ABSORBER PUMP 2C-1	MOTOR

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

STATE OF KENTUCKY
JOHN J. ELMER
31405
LICENSED PROFESSIONAL ENGINEER
5/3/24

NOTE:
TWO SPARE 4160V COMPARTMENTS WILL BE UTILIZED TO ENERGIZE EACH REAGENT HANDLING AND PREPARATION SYSTEM TWO COMPARTMENTS WILL BE UTILIZED FROM 24SR-1 AND TWO SPARE COMPARTMENTS WILL BE UTILIZED FROM 24SR-2. ONE OF THE COMPARTMENTS ON EACH EXISTING LINEUP WILL BE UTILIZED TO POWER A 1000HP VTM MOTOR AND THE OTHER COMPARTMENT WILL FEED A 4160V X 480V TRANSFORMER THAT WILL SUPPLY THE REMAINING POWER DISTRIBUTION REQUIREMENTS IN THE REAGENT HANDLING AND PREPARATION AREAS. IT IS ASSUMED THAT THE SPARE COMPARTMENTS ARE EQUIPPED WITH A 4160V BREAKER AND CONTROL WIRING. EACH 4160V COMPARTMENT (FOUR COMPARTMENTS TOTAL) WILL HAVE NEW SEL RELAYS INSTALLED (FEEDER PROTECTION OR MOTOR PROTECTION AS REQUIRED).

20 B1

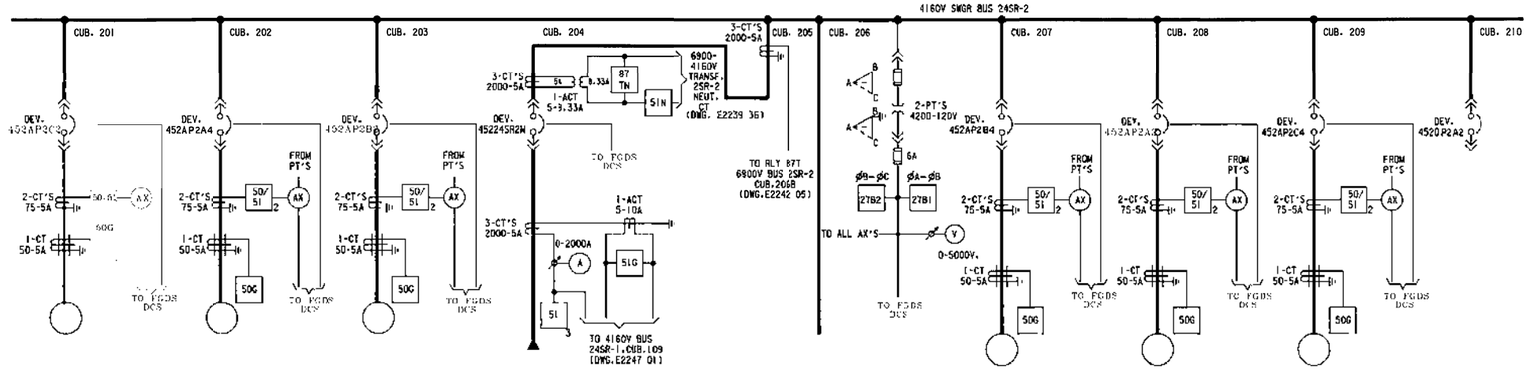
KEY DIAGRAM:E 2247 1

REV	DATE	JOB NO.	PROJECT TYPE	DES	DFTR	CHKD	ENGR	APPD	DESCRIPTION
2	12-21-12	EB201348AB-E	AS-BUILT	MSA	GUV	DLM	DRC	DRC	FGD CONTROLS REPLACEMENT
									REVISED BY A&A
3	9-10-13	EBS01343AB-E	AS-BUILT	DLM	DLM	DLM	DRC	DRC	REPLACE ABS PUMP BREAKER PH1
4A	3-1-24	60724995	PERMIT APP.		WW		DA		PERMIT APPLICATION

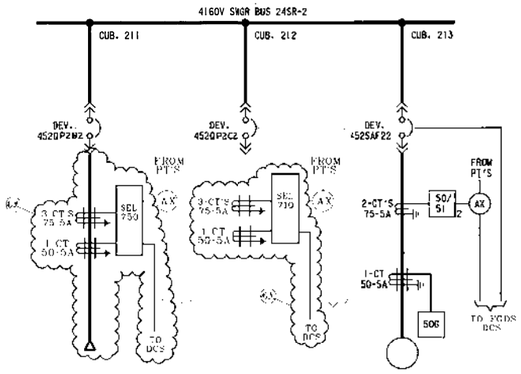
DUKE ENERGY

FILENAME: ebs_02_cge_sld20b1.dgn

SCALE: NONE	DES:	TITLE	SINGLE LINE DIAGRAM
DWG TYPE: WL	DFTR:		4160V AUX 24SR-1 SWITCHGEAR
JOB NO:	CHKD:	FOR	EAST BEND STATION - UNIT 2
DATE:	ENGR:	DWG SIZE: ANSI B 11"x17"	DRAWING NO.: SLD20B1
	APPD:		REVISION: 4A



WIRING DIAG. REFERENCE	E-2293-1	E2293 02	E-2293-3	E2293 04	E2293 05	E2293 06	E2293 07	E-2293-8	E2293 09	E-2293-10
SCHEMATIC REF.E2240 PAGE	AB010-A&B	AB004-A & B	AB000-A&B	AP099-A & B			AB008-A & B	AB002-A&B	AB012-A & B	
KVA OR MOTOR RATING H.P.	450	450	450	7.5/10KVA			450	450	450	
BREAKER FRAME SIZE (AMPS)	1200	1200	1200	2000			1200	1200	1200	1200
SERVICE	ABSORBER PUMP 2C-2	ABSORBER PUMP 2A-4	ABSORBER PUMP 2B-2	FGDS AUX.TRANSF.25R-2 INCOMING LINE	AUX. COMPARTMENT	4160V.SWGR.24SR-1 TIE TO SWGR.24SR-2 & PT COMPT.	ABSORBER PUMP 2B-4	ABSORBER PUMP 2A-2	ABSORBER PUMP 2C-4	SPARE



WIRING DIAG. REFERENCE	E-2293-11	E-2293-12	E2293 13
SCHEMATIC REF.E2240 PAGE			BA106-A & B
KVA OR MOTOR RATING H.P.		1000	350
BREAKER FRAME SIZE (AMPS)	1200	1200	1200
SERVICE	TRANSFORMER	MOTOR	SEAL AIR FAN 2-2

STATE OF KENTUCKY
JOHN J. ELMER
31405
LICENSED PROFESSIONAL ENGINEER
5/3/24

PRELIMINARY

FOR PERMITTING PURPOSES ONLY

NOTE
TWO SPARE 4160V COMPARTMENTS WILL BE UTILIZED TO ENERGIZE EACH REAGENT HANDLING AND PREPARATION SYSTEM TAG COMPARTMENTS WILL BE UTILIZED FROM 24SR-1 AND TWO SPARE COMPARTMENTS WILL BE UTILIZED FROM 24SR-2 ONE OF THE COMPARTMENTS IN EACH EXISTING LINEUP WILL BE UTILIZED TO POWER A 1000HP VTM MOTOR AND THE OTHER COMPARTMENT WILL FEED A 4160V X 480V TRANSFORMER THAT WILL SUPPLY THE REMAINING POWER DISTRIBUTION REQUIREMENTS IN THE REAGENT HANDLING AND PREPARATION AREAS. IT IS ASSUMED THAT THE SPARE COMPARTMENTS ARE EQUIPPED WITH A 4160V BREAKER AND CONTROL WIRING. EACH 4160V COMPARTMENT (FOUR COMPARTMENTS TOTAL) WILL HAVE NEW SEL RELAYS INSTALLED (FEEDER PROTECTION OR ZOTOB PROTECTION AS REQUIRED)

20 B2

KEY DIAGRAM: E-2247-2

REV	DATE	JOB NO.	PROJECT TYPE	DES	DFTR	CHKD	ENGR	APPD	DESCRIPTION
2	12-21-12	EB201348AB-E	AS-BUILT	MSA	GUV	DLM	DRC	DRC	FGD CONTROLS REPLACEMENT
									REVISED BY A&A
3	9-10-13	EBS01343AB-E	AS-BUILT	DLM	DLM	DLM	DRC	DRC	REPLACE ABS PUMP BREAKER PH1
4A	3-1-24	60724995	PERMIT APP.		WW		DA		PERMIT APPLICATION

DUKE ENERGY

FILENAME: ebs_02_cge_sld20b2.dgn

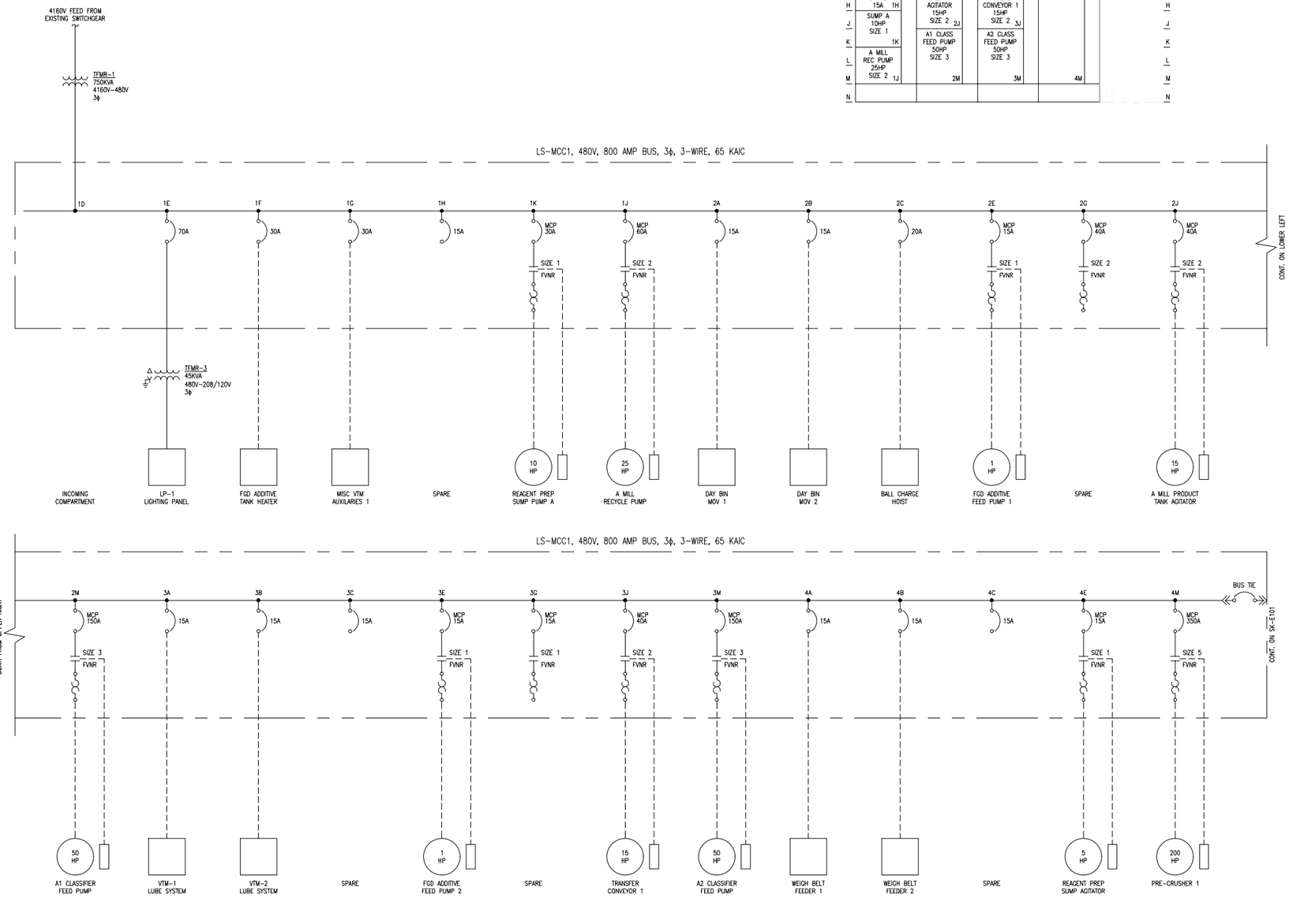
SCALE: NONE	DES:	TITLE	SINGLE LINE DIAGRAM 4160V AUX 24SR-2 SWITCHGEAR
DWG TYPE: WL	DFTR:		
JOB NO:	CHKD:	FOR	EAST BEND STATION - UNIT 2
DATE:	ENGR:	DWG SIZE	DRAWING NO. / REVISION
	APPD:	ANSI B 11"x17"	SLD20B2 / 4A

Project Management Initials: Designer: PB Checked: SRB Approved: SRB ARCH D 24" x 36"

NOTES:
1. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH PROJECT STANDARDS AND THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE.

00-LV-MCC-101

	1	2	3	4	5
A	INCOMING COMPARTMENT	DAY BIN MOV 1 15A 2A	VTM-1 15A 3A	WEIGH BF-1 15A 4A	
B		DAY BIN MOV 2 15A 2B	VTM-2 15A 3B	WEIGH BF-2 15A 4B	
C		BALL HOIST 20A 2C	SPARE 15A 3C	SPARE 30A 4C	FUTURE
D	1D	FGD ADD FEED PUMP 1 1HP SIZE 1 2E	FGD ADD FEED PUMP 2 1HP SIZE 1 3E	SUMP AGITATOR 5HP SIZE 1 4E	
E	LP-1 70A 1E	SPARE 15HP SIZE 2 2G	SPARE 1HP SIZE 1 3G	REAGENT PRE-CRUSHER 1 200HP SIZE 5	
F	FGD TNK HTR 30A 1F	A MILL TANK AGITATOR 15HP SIZE 2 2J	TRANSFER CONVEYOR 1 15HP SIZE 2 3J		
G	VTM AUX 1 30A 1G	A1 CLASS FEED PUMP 50HP SIZE 3 2M	A2 CLASS FEED PUMP 50HP SIZE 3 3M	4M	
H	SPARE 15A 1H				
J	SUMP A 10HP SIZE 1 1K				
K	A MILL REC PUMP 25HP SIZE 2 1J				
L					
M					
N					



Last saved by: DEBBIE.WHITE(2018-07-12) Last Plotted: 2011-05-25
Filename: L:\PTO\RESOURCES\DRAFTING\00-AECOM_STD\TITLE BORDER BLOCKS\2018_ACM_ARCHDTITLEBLOCK.DWG

Printed on ___% Post-Consumer Recycled Content Paper

AECOM

PROJECT
Duke Energy
East Bend
Limestone Conversion
East Bend

CLIENT
Duke Energy

CONSULTANT
AECOM Process Technologies
13640 Briarwick Dr
Suiet 200, Building A
Austin, Tx 78729
512,454,4797 tel 512,419,6004 fax
www,aecom,com

PRELIMINARY

ISSUE FOR INFORMATION

REGISTRATION
STATE OF KENTUCKY
JOHN J. ELMER
31405
LICENSED PROFESSIONAL ENGINEER
5/3/24

ISSUE/REVISION

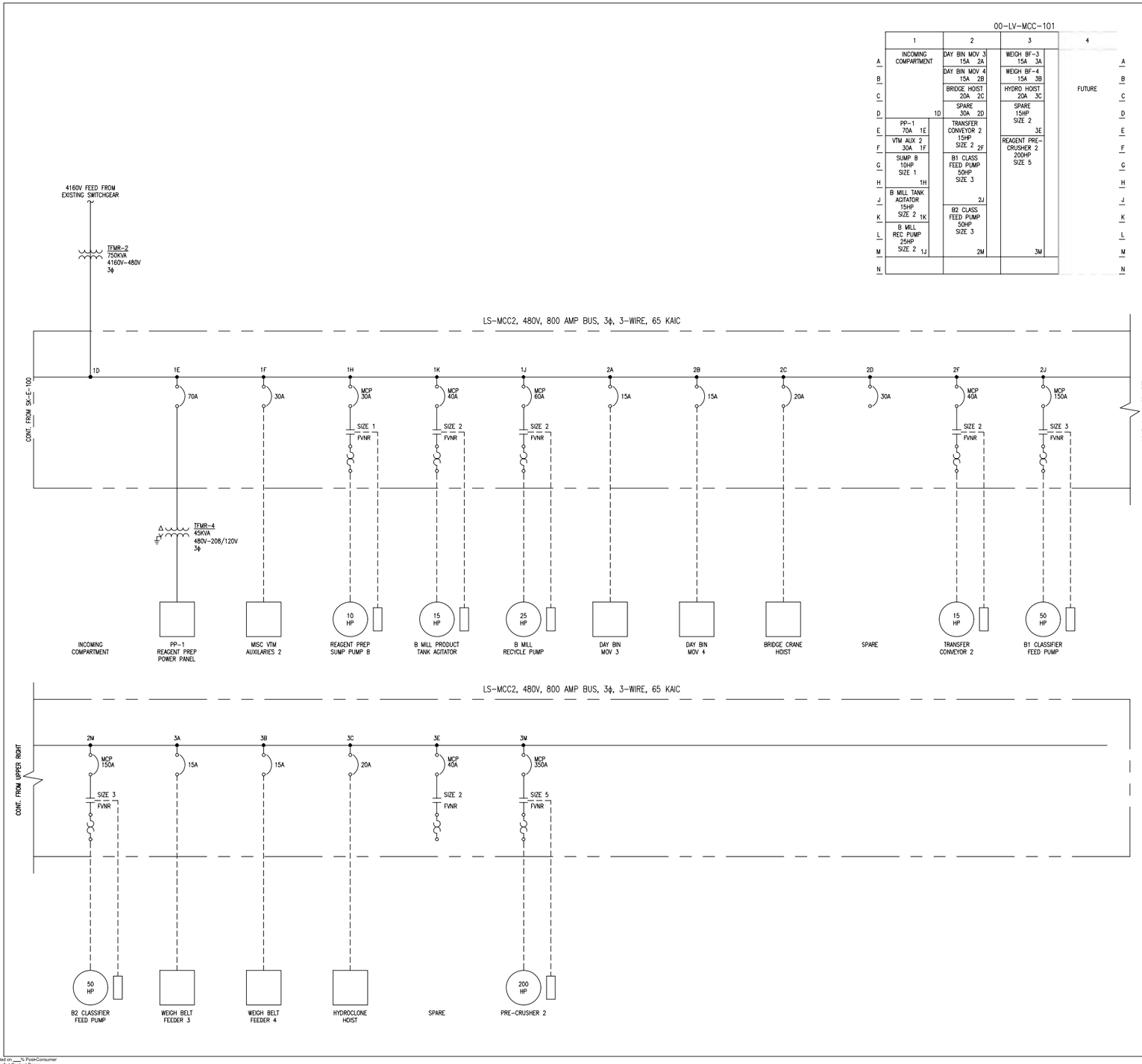
I/R	DATE	DESCRIPTION
A	2022-08-02	Issue for Information

KEY PLAN

PROJECT NUMBER
60680586

SHEET TITLE
Electrical Building
LS-MCC1
One-Line Diagram

SHEET NUMBER
SK-E-100



AECOM

PROJECT
Duke Energy
East Bend
Limestone Conversion
East Bend

CLIENT
Duke Energy

CONSULTANT
AECOM Process Technologies
9400 Amberglen Boulevard
Austin, Tx 78729
512.454.4797 tel 512.419.6004 fax
www.aecom.com

PRELIMINARY

ISSUE FOR INFORMATION

REGISTRATION
STATE OF KENTUCKY
JOHN J. ELMER
31405
LICENSED PROFESSIONAL ENGINEER
5/3/24

ISSUE/REVISION

I/R	DATE	DESCRIPTION
A	2022-08-02	Issue for Information

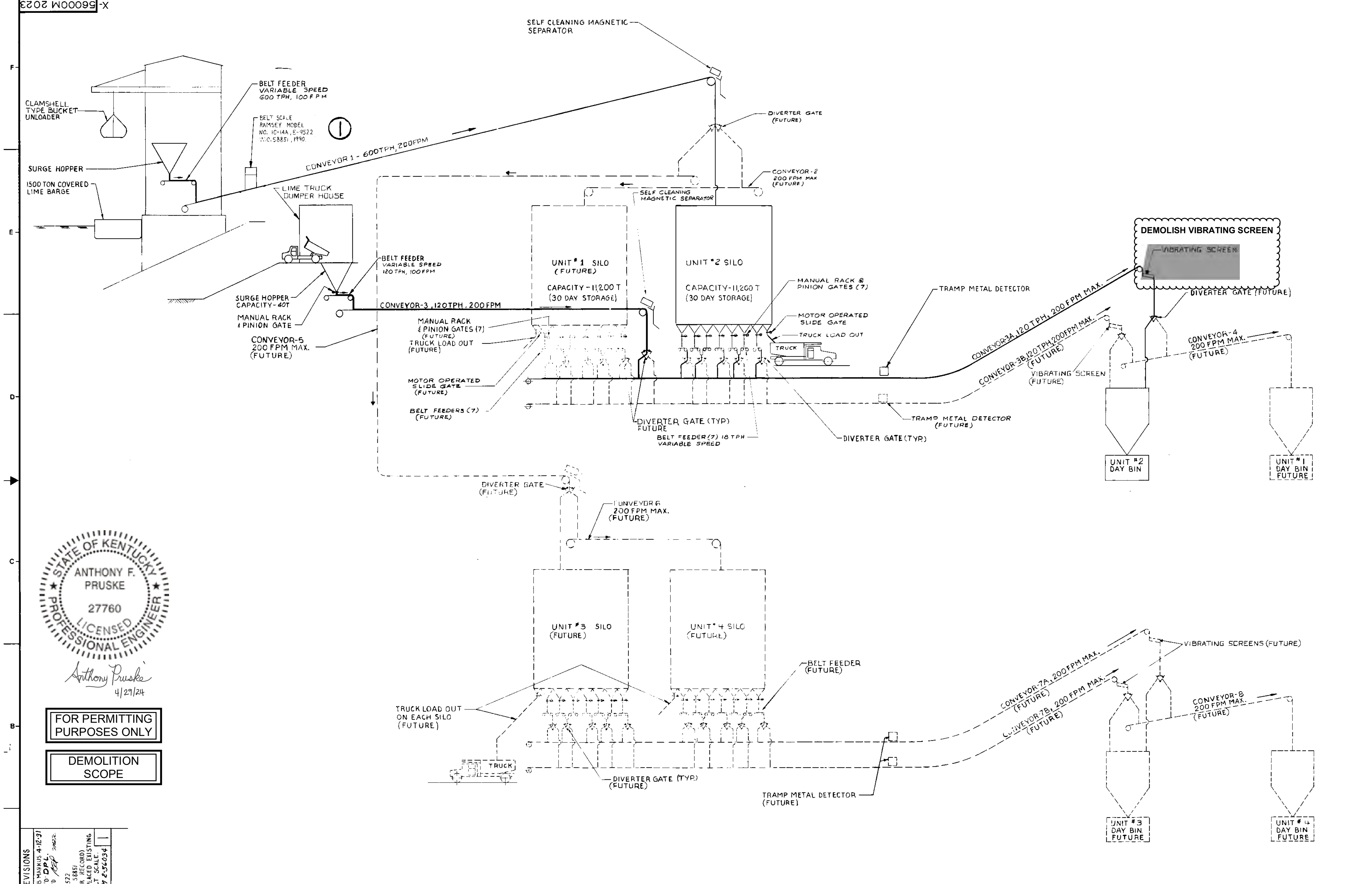
KEY PLAN

PROJECT NUMBER
60680586

SHEET TITLE
Electrical Building
LS-MCC2
One-Line Diagram

SHEET NUMBER
SK-E-101

Appendix F - Demolition Drawings


X-56000M 2023
SELF CLEANING MAGNETIC SEPARATOR
CLAMSHELL TYPE BUCKET UNLOADER
BELT FEEDER VARIABLE SPEED 600 TPH, 100 FPM
SURGE HOPPER
1500 TON COVERED LIME BARGE
CONVEYOR 1 - 600TPH, 200FPM
LIME TRUCK DUMPER HOUSE
DIVERTER GATE (FUTURE)
CONVEYOR-2 200 FPM MAX (FUTURE)
SELF CLEANING MAGNETIC SEPARATOR
UNIT #1 SILO (FUTURE)
CAPACITY-11,200 T (30 DAY STORAGE)
UNIT #2 SILO
CAPACITY-11,200 T (30 DAY STORAGE)
DEMOLISH VIBRATING SCREEN
VIBRATING SCREEN
BELT FEEDER VARIABLE SPEED 120 TPH, 100 FPM
SURGE HOPPER CAPACITY-40T
MANUAL RACK & PINION GATE
CONVEYOR-3, 120TPH, 200FPM
CONVEYOR-5 200 FPM MAX. (FUTURE)
MANUAL RACK & PINION GATES (7) (FUTURE)
TRUCK LOAD OUT (FUTURE)
MOTOR OPERATED SLIDE GATE (FUTURE)
BELT FEEDERS (7) (FUTURE)
MANUAL RACK & PINION GATES (7)
MOTOR OPERATED SLIDE GATE
TRUCK LOAD OUT
TRUCK
TRAMP METAL DETECTOR
CONVEYOR 3A, 120 TPH, 200 FPM MAX.
CONVEYOR-3B, 120 TPH, 200 FPM MAX. (FUTURE)
DIVERTER GATE (FUTURE)
CONVEYOR-4 200 FPM MAX. (FUTURE)
VIBRATING SCREEN (FUTURE)
DIVERTER GATE (TYP) FUTURE
BELT FEEDER (7) 18 TPH VARIABLE SPEED
DIVERTER GATE (TYP)
TRAMP METAL DETECTOR (FUTURE)
UNIT #2 DAY BIN
UNIT #1 DAY BIN FUTURE
DIVERTER GATE (FUTURE)
CONVEYOR 6 200 FPM MAX. (FUTURE)
UNIT #3 SILO (FUTURE)
UNIT #4 SILO (FUTURE)
VIBRATING SCREENS (FUTURE)
BELT FEEDER (FUTURE)
TRUCK LOAD OUT ON EACH SILO (FUTURE)
CONVEYOR-7A, 200 FPM MAX. (FUTURE)
CONVEYOR-7B, 200 FPM MAX. (FUTURE)
CONVEYOR-8 200 FPM MAX. (FUTURE)
TRUCK
DIVERTER GATE (TYP) (FUTURE)
TRAMP METAL DETECTOR (FUTURE)
UNIT #3 DAY BIN FUTURE
UNIT #4 DAY BIN FUTURE
X-M-2023-1

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske 4/29/24

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

KEYWORD: LH ML LIME HANDLING

REV.	DATE REL'D.	PREPARED	REVIEWED	APPROVED	PURPOSE
A	06-15-78				ADDED LIME TRUCK DUMPER FACILITY, SPEC. F-3191, ADDENDUM No 1
B	02-23-79	WLR			REVISED FOR CONTRACT.
C	1-15-81				GENERAL ARRANGEMENT DISTRIBUTION
D	11-30-82	A.R. Schaul			SENT TO CLIENT

SCALE: NONE
PROJECT NUMBER: 4869-07

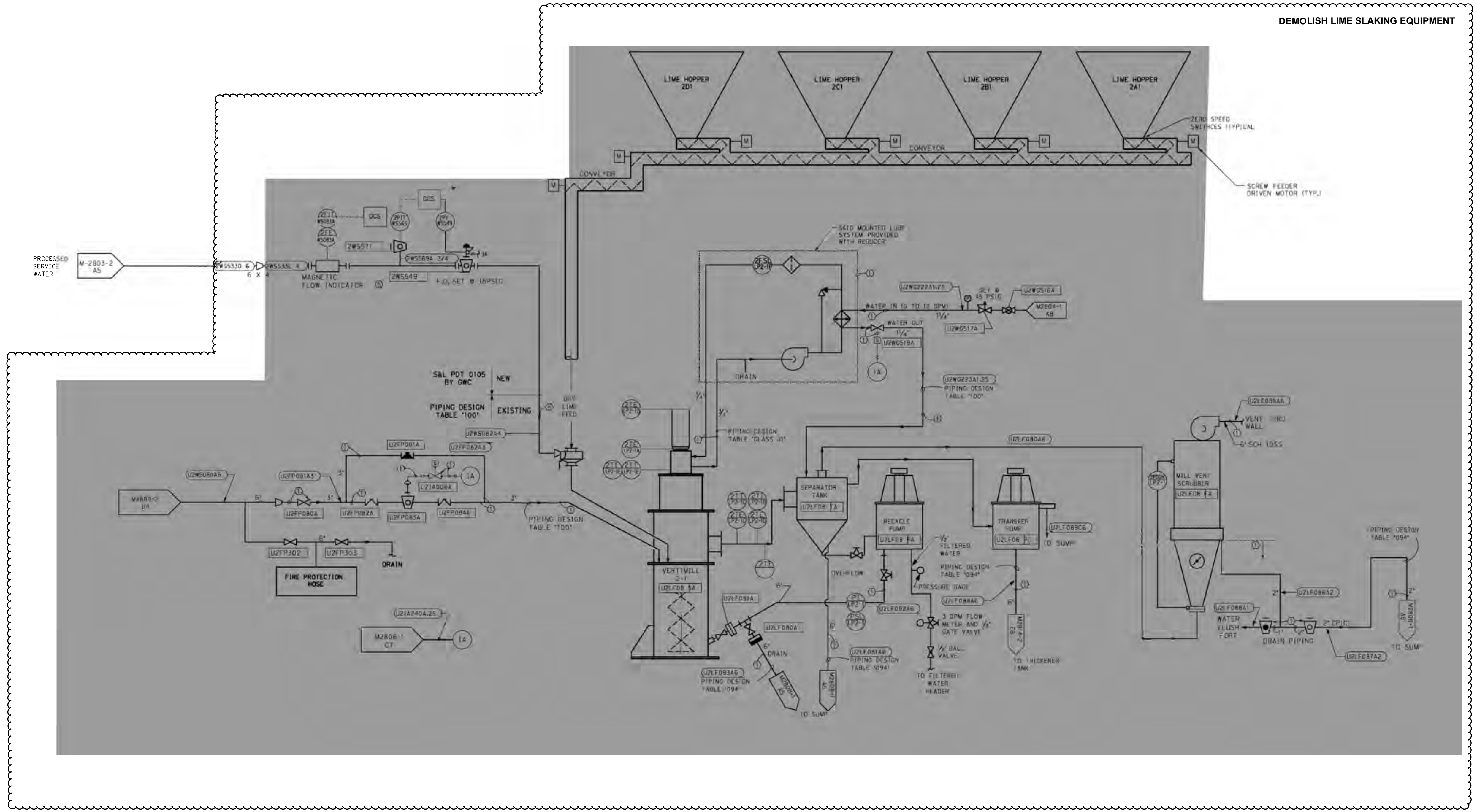
LIME HANDLING FACILITIES
FLOW DIAGRAM
EAST BEND STATION UNIT - 2
CINCINNATI GAS & ELECTRIC CO.
THE DAYTON POWER & LIGHT CO.
CINCINNATI, OHIO

SARGENT & LUNDY ENGINEERS CHICAGO

DRAWING NO. X-56000M 2023 REV. A
SHEET 1 OF 3

X-M-7099-1

DEMOLISH LIME SLAKING EQUIPMENT



X-M-7099-1 REV. A

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

STATE OF KENTUCKY ANTHONY F. PRUSKE 27760 LICENSED PROFESSIONAL ENGINEER

Anthony Pruske 4/29/24

NOTES

1. REFERENCE CG&E DWG. M-2152 SHEET 2 FOR SYMBOLOGY.
2. ALL WORK SHOWN IF FURNISHED BY PURCHASER AND INSTALLED BY INSTALLATION CONTRACTOR UNLESS NOTED OTHERWISE.
3. ①FURNISHED AND INSTA_LED BY INSTALLATION CONTRACTOR.
   ②EXISTING EQUIPMENT
4. ALL REDUCERS FURNISHED AND INSTALLED BY INSTALLATION CONTRACTOR.
5. INPLACE, DISCONNECT/RECONNECT
6. DEMOLTION INDICATED TYPICAL FOR TWO SYSTEMS

REFERENCES

M-2803	SERVICE WATER (P & ID)
M-2806-1	INSTRJMENT AIR (P & ID)
M 2808 1	DRAINS & VENTS FGD SYS (P & ID)
M-2809-2	FIRE PROTECTION (P & ID)
M 2810 1	THICKENER UNDERFLOW FGD SYS (P & ID)
M-2811-5	CLARIFIED RECYCLE (P & ID)
M-2812	WASH SERVICE WATER (P & ID)
M-28 4-1	LIME SLURRY FEED SYSTEM (P & ID)
M-2814-2	SLURRY FEED RECIRC. PTPING (P & TD)
M 7057	GR_T REMOVAL SYSTEM (P & ID)
M-7096	VERTIMILL LIME SLAKER (PLAN)
M-7097	VERTIMILL LIME SLAKER (LOWER PLAN)
M-7100	VERTIMILL LIME SLAKER (SECT)
M-7099-2	VERTIMILL LIME S_AKER (P & ID)

FILENAME: EBS 02 S&L M-7099-1.dgn

REVISION A DES: -- DFTR: CHKD: ENGR: APPD: W.C. NO.: --- PIN:
DESCRIPTION:
ISSUE TYPE: DATE ISSUED:

REVISIONS

REV	DATE	APPD	W.C.	DESCRIPTION
1	06/25/01	GB	EBS98PE	VERTIMILL ADDITIONS AND SLAKER REMOVAL
2	12/10/04	GC	EB251	REPLACED SEP. TANK RELOCATED REC. PUMPS
3	4/7/2021	TAW	F3020740	REPLACED FLOW CONTROL VALVE STATION

TITLE: P&ID VERTIMILL LIME SLAKER PART 1

FOR: EAST BEND STATION - UNIT 2 STA. NO. 20

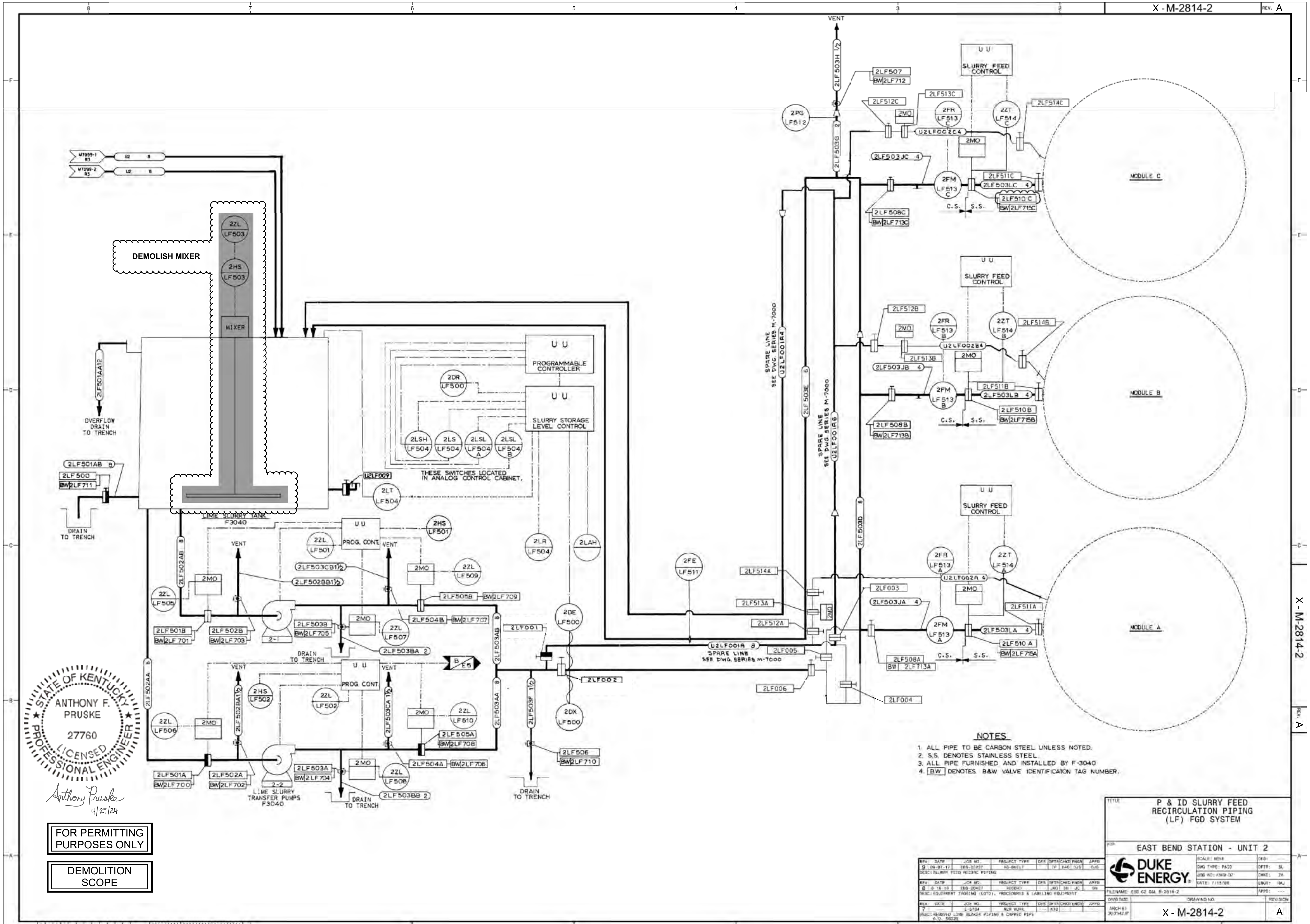
SCALE NONE DWG TYPE M
DES DFTR CBIII
CHKD DPL ENGR DLR
APPD PIN NO.
W.C. NO. 58329 DATE 2-28-95
W.O. NO. JOB NO.
E-5784 DWG SIZE E

CINERGY® CINCINNATI GAS & ELECTRIC COMPANY

DRAWING NO. X-M-7099-1

CAD FILENAME: ebs_02_s&l_m-7099-1

Level 46=entire bdr&tags; Level 47=rev blk; Level=48=CG&E; Level 49=PSI


DEMOLISH MIXER
MIXER
LIME SLURRY TANK F3040
PROGRAMMABLE CONTROLLER
SLURRY STORAGE LEVEL CONTROL
THESE SWITCHES LOCATED IN ANALOG CONTROL CABINET.
OVERFLOW DRAIN TO TRENCH
DRAIN TO TRENCH
LIME SLURRY TRANSFER PUMPS F3040
SPARE LINE SEE DWG SERIES M-7000
SLURRY FEED CONTROL
MODULE C
MODULE B
MODULE A
VENT
NOTES
1. ALL PIPE TO BE CARBON STEEL UNLESS NOTED.
2. S.S. DENOTES STAINLESS STEEL.
3. ALL PIPE FURNISHED AND INSTALLED BY F-3040
4. BW DENOTES B&W VALVE IDENTIFICATON TAG NUMBER.
STATE OF KENTUCKY ANTHONY F. PRUSKE 27760 LICENSED PROFESSIONAL ENGINEER
4/29/24
FOR PERMITTING PURPOSES ONLY
DEMOLITION SCOPE
P & ID SLURRY FEED RECIRCULATION PIPING (LF) FGD SYSTEM
EAST BEND STATION - UNIT 2
DUKE ENERGY
X-M-2814-2
A

X-M-2815-1

DEMOLISH 20" PIPING AND SPRAY HEADERS

DEMOLISH CABLE

DEMOLISH CABLE

DEMOLISH 20" PIPING AND SPRAY HEADERS

CLARIFIED RECYCLE

SPENT SLURRY TO THICKENERS

DRAIN TO FLOOR TRENCH

FOR MOISTURE SEPARATOR WASH SEE DRWG. M-2812

CLARIFIED RECYCLE MAKEUP

RECIRCULATION TANK
266,166 GALLONS

ABSORBER RECIRCULATION PUMPS
LOWER 13,000 G.P.M. @ 55.5 FT. H. O
UPPER 13,000 G.P.M. @ 72.5 FT. H. O

MANUAL BALL VALVE

DRAIN TO FLOOR MANUAL BALL VALVE 1"

DRAIN TO FLOOR TRENCH

NOTES

1. S.S. DENOTES STAINLESS STEEL CONSTRUCTION.
2. ⊲⊳ DENOTES REDUCING EXPANSION JOINT
3. BW DENOTES B&W VALVE IDENTIFICATION NUMBER
4. DEMOLITION INDICATED TYPICAL FOR TWO SYSTEMS

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

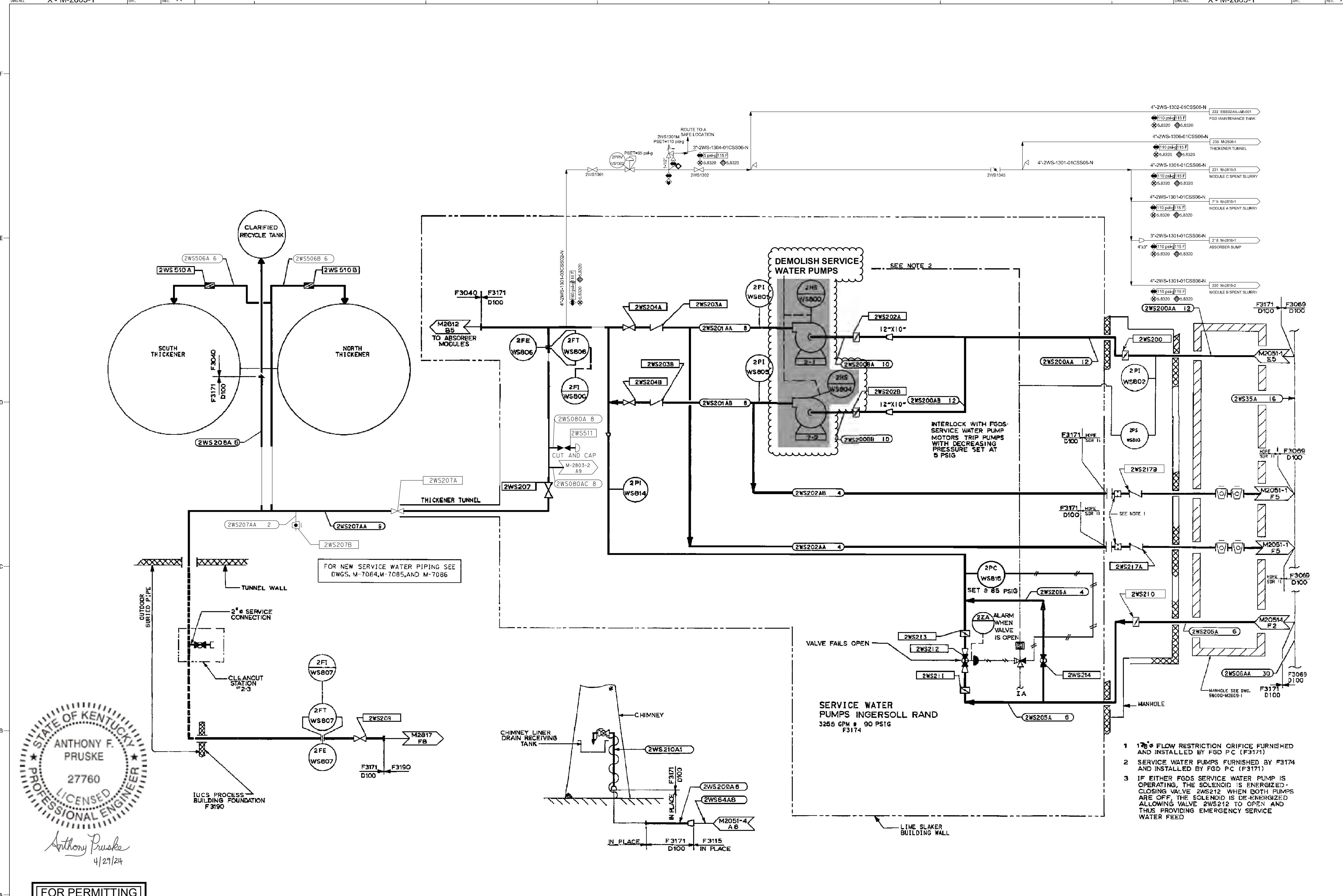
REVISIONS				
REV	DATE	APPD	W.C.	DESCRIPTION
3	6-14-93		58023	REV'D 2WB505A
4	9 11 05		EB201291	REV'D BY CINERGY E&C

TITLE: P & ID
ABSORBER & RECIRCULATION PIPING-MODULE A F.G.D. SYSTEM

FOR: EAST BEND STATION - UNIT 2

DRAWING NO. X-M-2815-1

CINERGY® CINCINNATI GAS & ELECTRIC COMPAN



1. 1½" FLOW RESTRICTION ORIFICE FURNISHED AND INSTALLED BY FGD PC (F3171)
2. SERVICE WATER PUMPS FURNISHED BY F3174 AND INSTALLED BY FGD PC (F3171)
3. IF EITHER FGDS SERVICE WATER PUMP IS OPERATING, THE SOLENOID IS ENERGIZED-CLOSING VALVE 2WS212 WHEN BOTH PUMPS ARE OFF, THE SOLENOID IS DE-ENERGIZED ALLOWING VALVE 2WS212 TO OPEN AND THUS PROVIDING EMERGENCY SERVICE WATER FEED

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

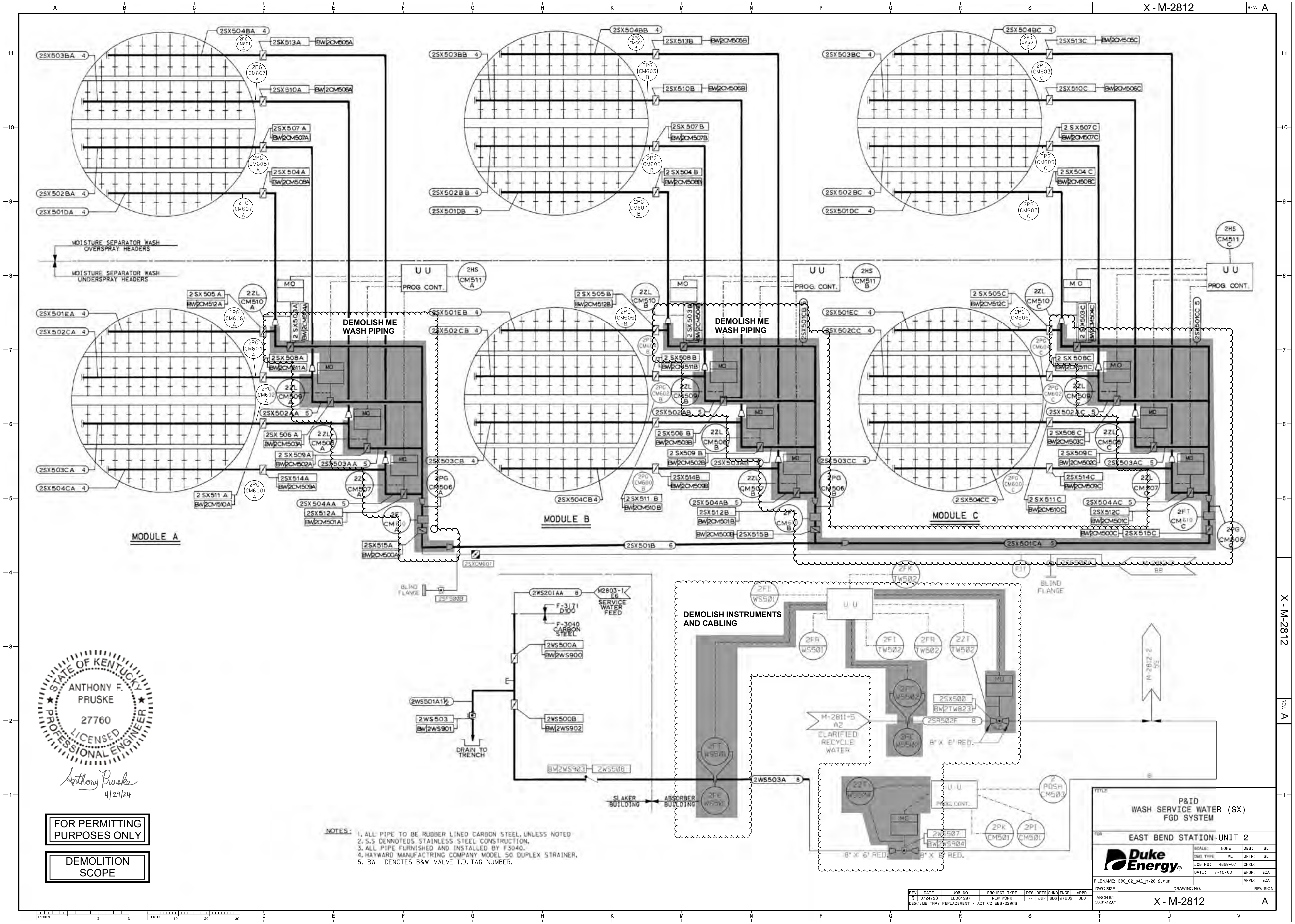
No.	Description	Drawn	Chkd	Apprvd	Date	WO/PO	ECR
13	VERTIMILL HEAT EXCHANGER	TC	TAW	TAW	4/7/2021	EB020740	EBS-04844
12	DWG REDLINES - SUMMER 2020 (LOTO)	MAG	BDS	BDS	11/05/20	N/A	EBS-06534
11	CONFORMING TO CONST. REC.	RLC	DKN	-	10-25-19	-	88869

EAST BEND STATION-UNIT 2
FOSSIL HYDRO OPERATIONS

DUKE ENERGY.

P & ID
FGD SYSTEM
SERVICE WATER
(WS)

X - M-2803-1 REV. A



NOTES:
1. ALL PIPE TO BE RUBBER LINED CARBON STEEL, UNLESS NOTED
2. S.S DENNOTEDS STAINLESS STEEL CONSTRUCTION.
3. ALL PIPE FURNISHED AND INSTALLED BY F3040.
4. HAYWARD MANUFACTRING COMPANY MODEL 50 DUPLEX STRAINER.
5. BW DENOTES B&W VALVE I.D. TAG NUMBER.

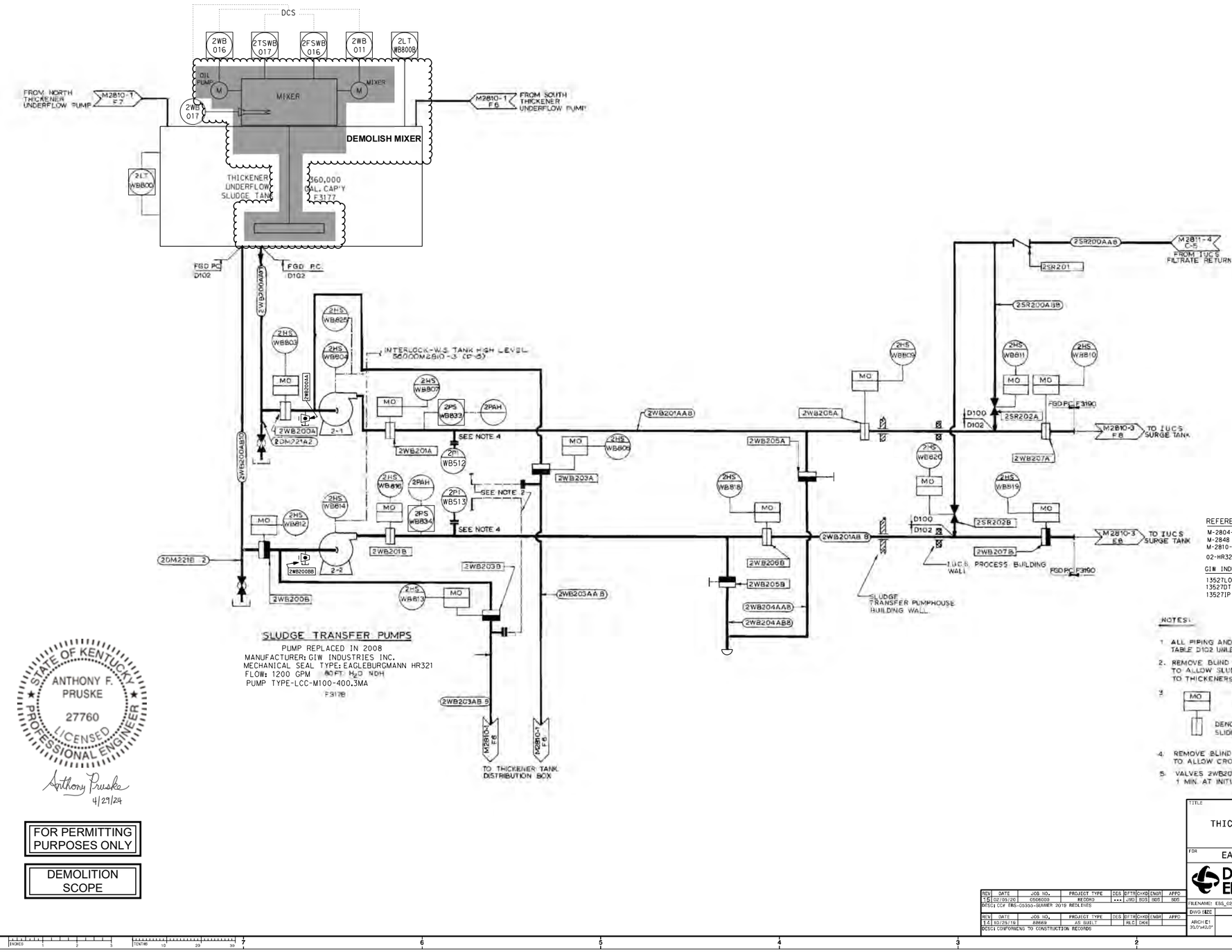
P&ID
WASH SERVICE WATER (SX)
FGD SYSTEM

EAST BEND STATION-UNIT 2

Duke Energy

DRAWING NO. X - M-2812
REVISION A

X- M-2810-2 REV. A



SLUDGE TRANSFER PUMPS

PUMP REPLACED IN 2008
MANUFACTURER: GIW INDUSTRIES INC.
MECHANICAL SEAL TYPE: EAGLEBURGMANN HR321
FLOW: 1200 GPM @ 80 FT. H_2O NDH
PUMP TYPE-LCC-M100-400.3MA
F3178

REFERENCES

M-2804-1 GLAND WATER
M-2848 FGD SYSTTEM SLUDGE TRANSFER PUMP HOUSE
M-2810-2 FGD SYSTEM SLUDGE THICKNER
02-HR321/100-GI-E31 EAGLBURGNM

GIW INDUSTRIES INC.

13527LOC FGD SLUDGE TRANSFER PUMPS
13527DT FGD SLUDGE TRANSFER PUMPS
13527IP FGD SLUDGE TRANSFER PUMPS

NOTES:

1. ALL PIPING AND VALVES PER S&L DESIGN TABLE D102 UNLESS OTHERWISE NOTED.
2. REMOVE BLIND FLANGE AND INSTALL SPOOL PIECE TO ALLOW SLUDGE TRANSFER FROM SURGE TANK TO THICKENERS.
3. MO — DENOTES MOTOR OPERATED SLIDING GATE VALVE
4. REMOVE BLIND FLANGE AND INSTALL SPOOL PIECE TO ALLOW CROSS FLOW OF SLUDGE TO SPARE PIPE
5. VALVES 2WB207A AND 2WB207B WILL DELAY CLOSING 1 MIN. AT INITIATION OF PURGE CYCLE

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

REV	DATE	JOB NO.	PROJECT TYPE	DES	DFTR	CHKD	ENGR	APPD
15	02/05/20	0506009	RECORD	---	JWD	BDS	BDS	BDS
DESC: COF EBS-0550-SUMMER 2019 REDLINES								
REV	DATE	JOB NO.	PROJECT TYPE	DES	DFTR	CHKD	ENGR	APPD
14	10/25/19	88669	AS BUILT		RLC	DKH		
DESC: CONFORMING TO CONSTRUCTION RECORDS								

TITLE
P&ID
SLUDGE (WB)
THICKENER UNDERFLOW FGD SYSTEM

FOR
EAST BEND STATION - UNIT 2

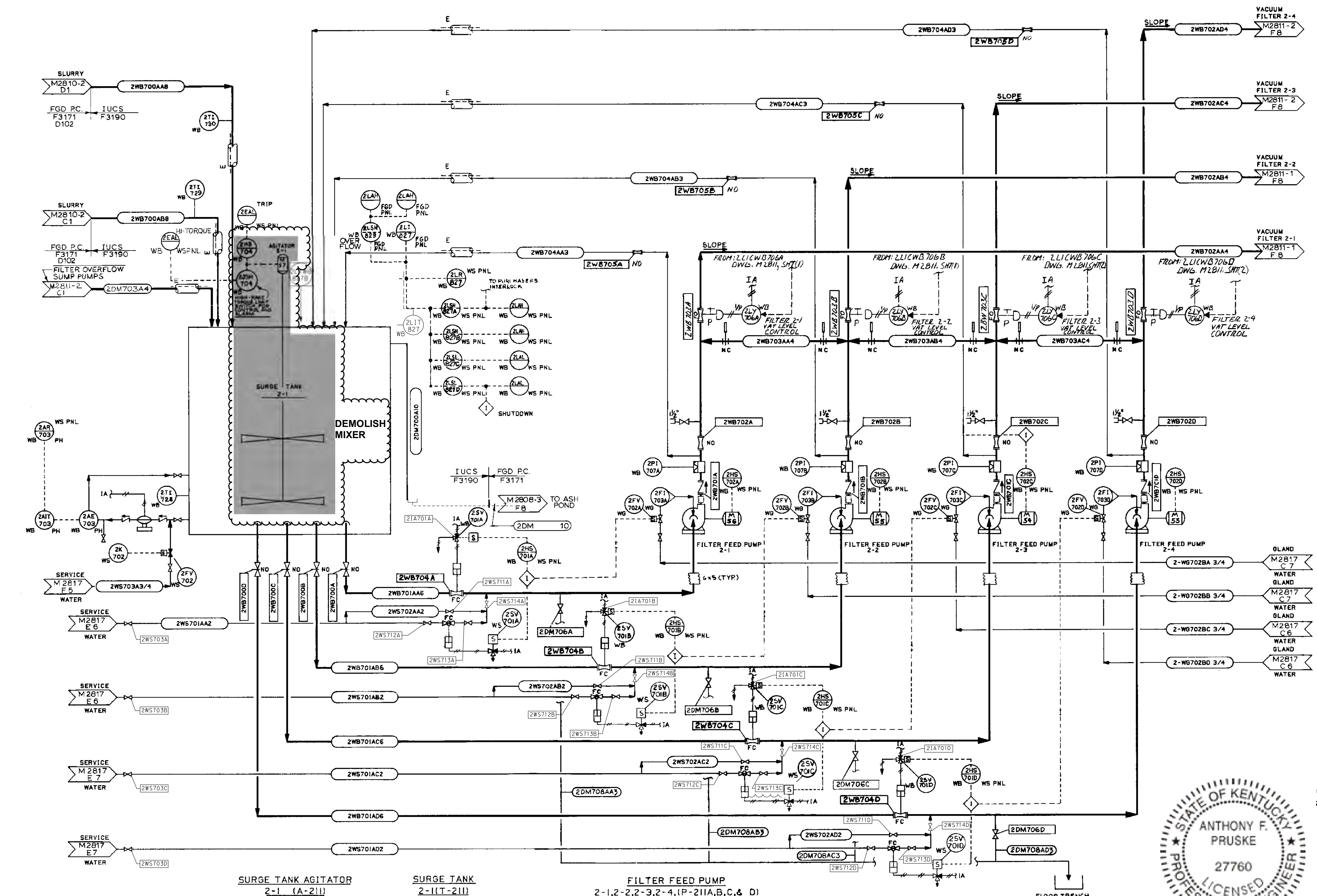
DUKE ENERGY®

SCALE: NONE	DES: ---
DWG TYPE: ML	DFTR: SL
JOB NO: 4889-07	CHKD: RAJ
DATE: 5-31-79	ENGR: WCS
FILENAME: EBS_02_S&L_M-2810-2.dgn	APPD: WCS

DWG SIZE	DRAWING NO.	REVISION
ARCH E1 30.0"x42.0"	X- M-2810-2	A

X- M-2810-2 REV. A

DWG NO. X - M-2810-3 REV. A



SURGE TANK AGITATOR
2-1 (A-211)

MANUFACTURER	:DENVER
TYPE	:PADDLE & RAKE
SHAFT DIAMETER	:10 3/4"-Ø
MATERIAL	:CARBON STEEL
SPEED	:300 FPM TIP SPEED
HORSEPOWER	:10

SURGE TANK
2-1(T-211)

MANUFACTURER	:ENVIRO-FAB
SIZE	:40'.DIA. X 40'. HIGH (COVERED)
CAPACITY	:320,000 GALLONS
MATERIAL	:CARBON STEEL

FILTER FEED PUMP
2-1,2-2,2-3,2-4,(P-211A,B,C,& D)

MANUFACTURER	:DENVER
TYPE	:CENTRIFUGAL (HORZ)
SIZE	:5"X4"X14"
CAPACITY	:350 GPM
HEAD	:80' TDH
MATERIAL	:CI(RUBBER LINED)
SPEED	:1150 RPM
HORSEPOWER	:50

NOTES

1. IUCS EQUIPMENT NUMBERS ARE IN PARENTHESES.
2. ALL ABOVE GROUND OUTSIDE LINES TO BE TRACED AND INSULATED.

STATE OF KENTUCKY – ANTHONY F. PRUSKE – 27760 – LICENSED PROFESSIONAL ENGINEER

Anthony Pruske
4/29/24

REFERENCE DRAWINGS

DWG. NO.	TITLE

REDRAWN FROM IUCS DRAWING 2213-F-203

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

REV.	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE	WO/PROJ#	ACT#
7	DWG REDLINES - SUMMER 2020 (LOTO)	MAG	BDS	BDS	11/05/20	N/A	EBS-08634
6	CONFORMING TO CONST. REC.	JMD	DG	DG	08/08/19	-	EBS-05443

DRAWING REFERENCES — DRAWING REVISIONS

EAST BEND STATION-UNIT 2
FOSSIL HYDRO OPERATIONS

FACILITY:	UNIT:	SYSTEM:	DWG. SUB TYPE:
EBS	02	TBD	ML
PROJECT NO: -	CC NO: -	W.O. NO: -	APPD BY: CS
SCALE: NONE	PLOT: 1=1	SIZE: ARCH-E1 42"x30"	APPD DATE: 12-14-79

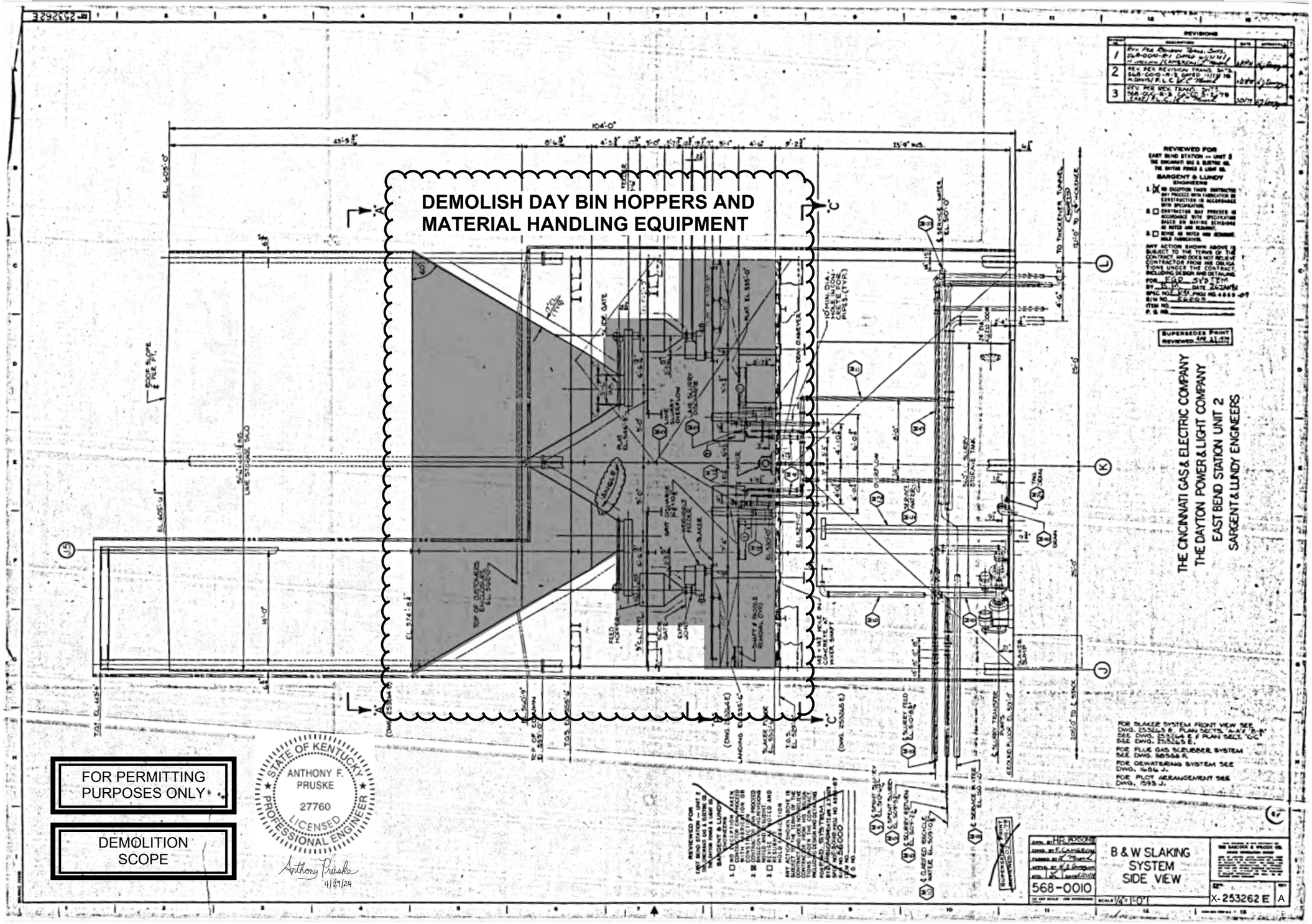
THE ABOVE IS RESERVED FOR PROFESSIONAL ENGINEER SEAL USE INK - DO NOT EMBOSS

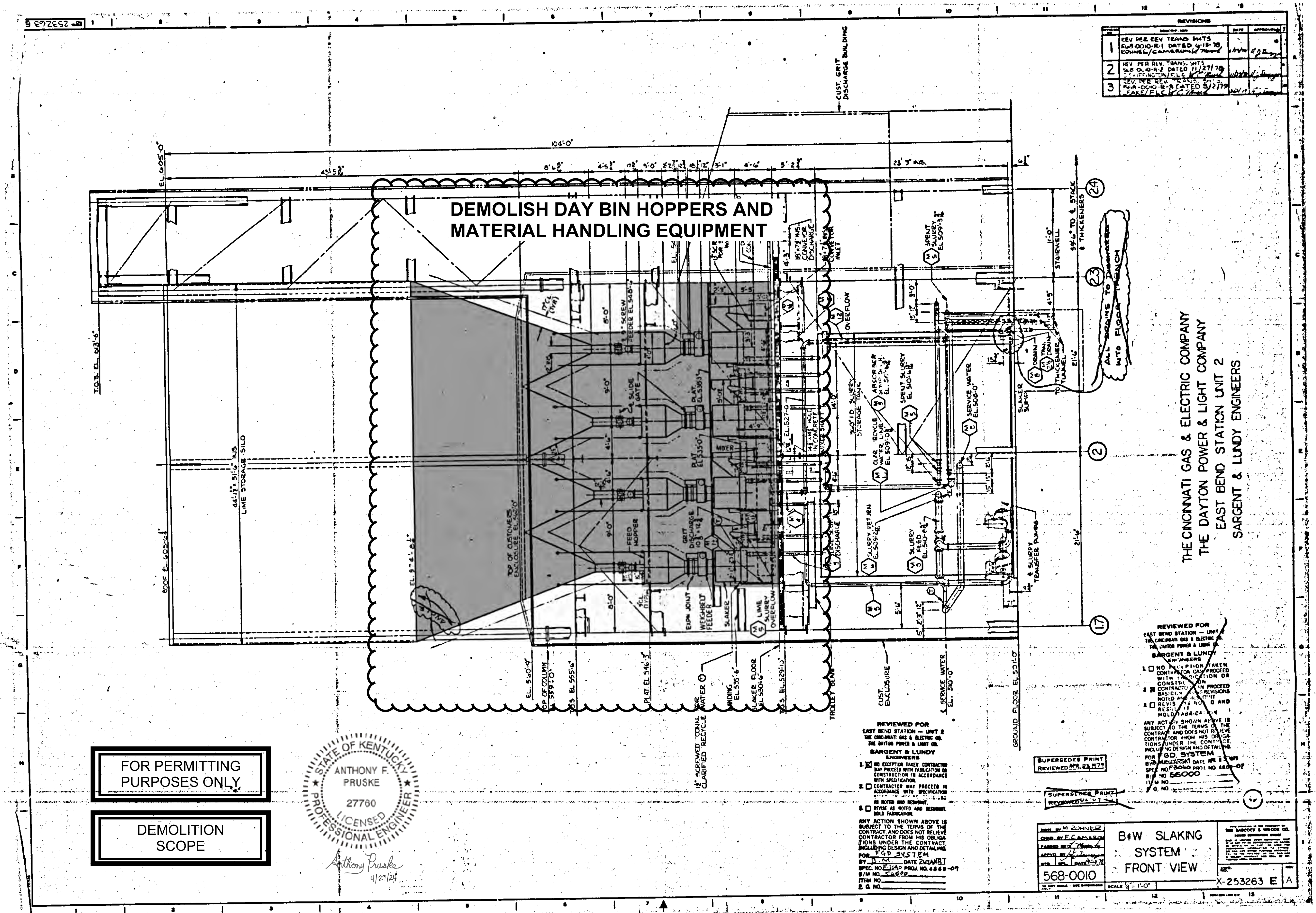
DUKE ENERGY

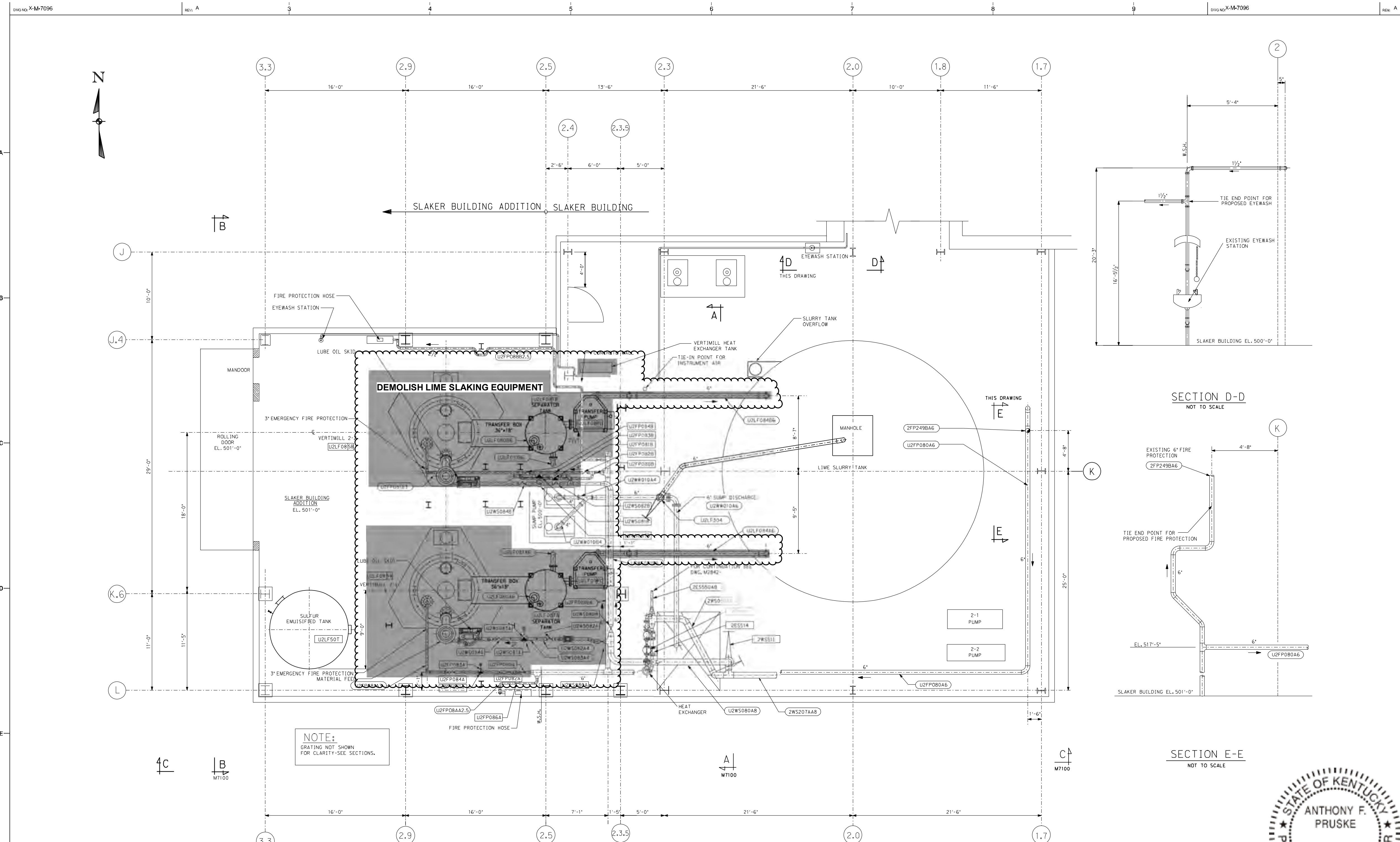
TITLE: PROCESS & INSTRUMENT DIAGRAM SLURRY SURGE & FEED TANK

DWG NO: X - M-2810-3 REV: A

FILENAME: EBS_02_S&L_M-2810-3.dgn


DEMOLISH DAY BIN HOPPERS AND MATERIAL HANDLING EQUIPMENT
FOR PERMITTING PURPOSES ONLY
DEMOLITION SCOPE
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24
REVISIONS
REVIEWED FOR
EAST BEND STATION — UNIT 2
THE CINCINNATI GAS & ELECTRIC CO.
THE DAYTON POWER & LIGHT CO.
SARGENT & LUNDY
ENGINEERS
SUPERSEDES PRINT REVIEWED 4/15/74
THE CINCINNATI GAS & ELECTRIC COMPANY
THE DAYTON POWER & LIGHT COMPANY
EAST BEND STATION UNIT 2
SARGENT & LUNDY ENGINEERS
B & W SLAKING SYSTEM SIDE VIEW
568-0010
X-253262 E
A


DEMOLISH DAY BIN HOPPERS AND
MATERIAL HANDLING EQUIPMENT
FOR PERMITTING
PURPOSES ONLY
DEMOLITION
SCOPE
STATE OF KENTUCKY
ANTHONY F.
PRUSKE
27760
LICENSED
PROFESSIONAL ENGINEER
4/29/24
THE CINCINNATI GAS & ELECTRIC COMPANY
THE DAYTON POWER & LIGHT COMPANY
EAST BEND STATION UNIT 2
SARGENT & LUNDY ENGINEERS
B&W SLAKING
SYSTEM
FRONT VIEW
568-0010
X-253263 E A



INTERMEDIATE FLOOR PLAN

EL. 510'-11"

REFERENCES:

M-7097 VERTIMILL LIME SLAKER (LOWER FLOOR PLAN)
M-7098 VERTIMILL LIME SLAKER (UPPER FLOOR PLAN)
M-7099-1 VERTIMILL LIME SLAKER (P&ID)
M-7099-2 VERTIMILL LIME SLAKER (P&ID)
M-7100 VERTIMILL LIME SLAKER (SECT)

NOTES:

1. ALL EQUIPMENT AND MATERIALS THAT ARE SHOWN DARK IS TO BE INSTALLED BY THE INSTALLATION CONTRACTOR
2. M-7097 SHOWS WHO FURNISHES EQUIPMENT

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

NOTES:

REV.	DESCRIPTION	DRAWN	CHKD	APPRVD	DATE	WO/PR#	ACT#
5	WATER REDIRECT PROJECT - NO CHANGES MADE	RJB	DJH		12-3-19	6330-WWT	EBS-02256

DRAWING REVISIONS

CONTRACTOR/VENDOR INFORMATION
THE ABOVE IS RESERVED FOR VENDOR'S LOGO, NAME, ADDRESS, TELEPHONE NUMBER AND ANY REQUIRED REFERENCE NUMBERS.

SEAL
THE ABOVE IS RESERVED FOR PROFESSIONAL ENGINEER SEAL USE INK - DO NOT EMBOSS

EAST BEND STATION - UNIT 2
FOSSIL HYDRO OPERATIONS

FACILITY CODE: EBS	UNIT CODE: 02	SYSTEM CODE:
PROJECT NO: 4869	CC NO:	W.O. NO:
SIZE: ARCH-E1 42"x 30"	SCALE: 1/4" = 1'-0"	PLOT: 1=1

THIS DRAWING IS THE PROPERTY OF DUKE ENERGY. AND IS NOT TO BE REPRODUCED OR USED FOR ANY PURPOSE EXCEPT AS SPECIFIED BY DUKE ENERGY.

DUKE ENERGY®

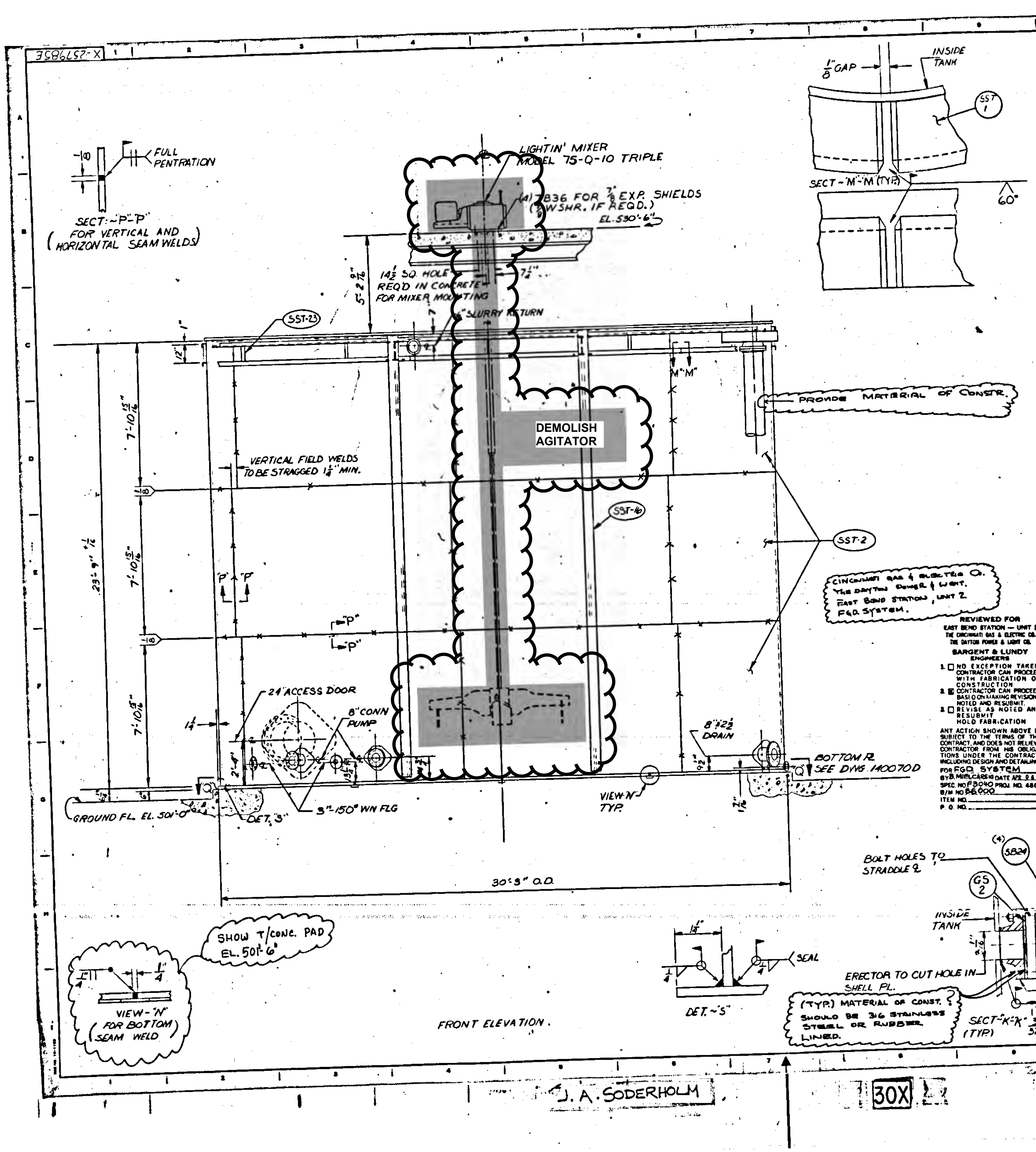
TITLE: VERTMILL LIME SLAKER UPPER FLOOR PLAN

SHT | DWG NO: X- M-7096 | REV A

FILENAME: EBS_02_S&L_M-7096.DGN

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE


X-257985E
LIGHTIN' MIXER
MODEL 75-Q-10 TRIPLE
(4) 1B36 FOR 7/8" EXP. SHIELDS (& WSHR. IF REQD.)
EL. 530'-6"
FULL PENETRATION
SECT.-"P"-"P"
(FOR VERTICAL AND HORIZONTAL SEAM WELDS)
14 1/2" SQ HOLE REQD IN CONCRETE FOR MIXER MOUNTING
SLURRY RETURN
DEMOLISH AGITATOR
VERTICAL FIELD WELDS TO BE STRAGGED 1 1/2" MIN.
PROVIDE MATERIAL OF CONSTR.
SST-2
SST-23
SST-46
24" ACCESS DOOR
8" CONN PUMP
8"x2 1/2" DRAIN
BOTTOM PL. SEE DWG 140070D
3"-150# WN FLG
VIEW "N" TYP.
DET. "3"
GROUND FL. EL. 501'-0"
30'-3" O.D.
23'-9 1/2"
7'-10 13/16"
7'-10 15/16"
7'-10 5/8"
1/8" GAP
INSIDE TANK
SECT-"M"-"M" (TYP)
60°
CINCINNATI GAS & ELECTRIC CO.
THE DAYTON POWER & LIGHT.
EAST BEND STATION, UNIT 2
FGD SYSTEM.
REVIEWED FOR
EAST BEND STATION — UNIT 2
THE CINCINNATI GAS & ELECTRIC CO.
THE DAYTON POWER & LIGHT CO.
SARGENT & LUNDY ENGINEERS
NO EXCEPTION TAKEN. CONTRACTOR CAN PROCEED WITH FABRICATION OR CONSTRUCTION
CONTRACTOR CAN PROCEED BASED ON MAKING REVISIONS NOTED AND RESUBMIT.
REVISE AS NOTED AND RESUBMIT HOLD FABRICATION
ANY ACTION SHOWN ABOVE IS SUBJECT TO THE TERMS OF THE CONTRACT, AND DOES NOT RELIEVE CONTRACTOR FROM HIS OBLIGATIONS UNDER THE CONTRACT, INCLUDING DESIGN AND DETAILING.
FGD SYSTEM
BOLT HOLES TO STRADDLE
INSIDE TANK
SEAL
ERECTOR TO CUT HOLE IN SHELL PL.
(TYP) MATERIAL OF CONST. SHOULD BE 316 STAINLESS STEEL OR RUBBER LINED.
SECT-"K"-"K" (TYP)
TANK WILL BE RUBBER LINED.
SHOW T/CONC. PAD EL. 501'-6"
VIEW-"N" FOR BOTTOM SEAM WELD
DET.-"5"
FRONT ELEVATION.
J. A. SODERHOLM
30X

REVISIONS

	DESCRIPTION	DATE	APPROVAL
1	CHGD FOUNDATION TO MAKE ... W/ INDOOR TANK INSTALLATION		FOX

*QTY GIVEN FOR ONE TANK

MK NO	QTY*	DESCRIPTION	MAT'L	DWG NO	SO PG
SST-1	12	STIFFNER RING	A36	148960 B	2124
SST-2	18	SHELL PANEL		176657C	
SST-3	2	BOTTOM PANEL		257986E	
SST-4	2				
SST-5	2				
SST-6	1				2125
SST-7	1			257987E	2126
SST-8	1	COVER PL			
SST-9	2				
SST-11	1				
SST-12	2				
SST-13	2				
SST-14	1				
SST-15	1	REMOVABLE COVER (56"X56")		176711C	
SST-16	4	WT4X5 X23'-7 1/2" LG	A36	PLAIN	2125
SST-17	2	S3X5.7X29'-4 5/16" LG			2127
SST-18	2	S3X5.7X27'-0 5/16" LG			
SST-19	2	S3X5.7X21'-7 1/8" LG			
SST-20	2	W10X49X 28'-1 1/4" LG		149149B	
SST-21	4	BAR 4"X 3/8"X 5"	M1020	PLAIN	
SST-22	12	BAR 1 1/2"X 3/8"X 4"	M1020		
SST-23	12	BAR 2"X 1/2"X 12"	M1020		
SST-58	2	REINFORCING PL 8" CONN	A36	171683 C	2128
RT-46	2	8" CONN	C.S.	176659C	
SST 50	1	24" CONN		176404C	
SST-51	1	REINFORCING PL 24" CONN	A36	171681C	
RT-52	1	COVER PL		171692C	
RT-56	1	SPRT			2129
RT-55	1	2 1/2" CONN	C.S.	176401 C	
3841	1	2 1/2" BLIND FLG FF CL150#		77842A	
SST-54	1	REINFORCING PL 8" CONN	A36	171687C	
RT-57	1	8" CONN	C.S.	176402 C	
RT-47	1	TANK OVERFLOW CONN.		176658C	2130
RT-60	2	OVERFLOW SPRTS	A36	171684C	
RT-61	2				
RT-62	1				
RT-63	1		M1020		
2339	2	3" WN FLG FF CL150#	C.S.	77890A	2131
VP 24x24	1	VENT PANEL		171719C	
SSB-1	8	BAFFLE PL		140063D	
GS-1	1	GSKT 32" ODX 1/8 X24 1/4 ID 50 DUROMETER	NPRN	—	
GS-2	2	7 1/2 OD X 1/8 X 3 1/16" ID.		—	
GS-3	1	19 OD X 1/8 X12" ID		—	
GS-4	1.	7 OD X 1/8 X 2 15/16 ID	-	—	
3346	2	3" BLIND FLG FF CL 150#	C.S.	77842 A	2131
5B24	12	BOLT HEX W/N	A307	—	2129
7029	12	STUD SW TFL 1/2 DIA X1 3/8 LG, WSHR, COUP	A108	64439A	2132
RT-48	1	6" LAP JOINT CONN	SA106B	176695 C	2132
1284	1	6" ELB. B/W L 90D	SA234WPB	77837A	
10836	20	BOLT HEX W/N & WASHER	A307	—	2129
7832	12	BOLT HEX W/N	A307	—	2131
—	4	7/8" EXP SHIELD	—	—	2132
7836	4	BOLT HEX W/O N - 7/8 WSHRS	A307	—	2132

30'-0" I D X 23'-9" HIGH

DRWN. BY	BARGERON
CHKD. BY	ML
PASSED BY	FOX
APPVD. BY	LEM/F
DATE	10-30-78

ARRG'T SLURRY STORAGE TANK (UNLINED) FRONT ELEVATION

568-0010-18

SCALE 1/2"=1'-0"

THE BABCOCK & WILCOX CO. POWER GENERATION GROUP

X-257985 E A

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

REVISIONS			
REV	DESCRIPTION	DATE	APPROVAL
1	ADDED SPOOL WK NO's PER VENDER PRINTS.	2/1/05	PDS-FL

DEMOLISH REDUCING BEND

DEMOLISH REDUCING BEND

DEMOLISH REDUCING BEND

DEMOLISH REDUCING BEND

DEMOLISH REDUCING BEND AND PIPING TYPICAL ALL ABSORBERS

DEMOLISH TEE AND REDUCER

DEMOLISH TEE AND REDUCER

DEMOLISH TEE AND REDUCER

DEMOLISH TEE AND REDUCER

DEMOLISH TEE AND REDUCER

ELEVATION VIEW

END VIEW

FLUSH WATER 2" CONN

DRAIN 3" CONN

pH HOT 2" CONN

INSPECTION PORT 16" CONN

PRESSURE TAP 2" CONN

SPENT SLURRY BLOWDOWN 10" CONN

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER

Anthony Pruske
4/29/24

THE CINCINNATI GAS & ELECTRIC COMPANY
EAST BEND STATION UNIT 2

DWN	MET
CHK'D	MJF
APP'D	PDS-FL
DATE	11/11/04
CONTRACT NO.	596-4088
OWNS' CONTRACT NO.	586-0010
	– DO NOT SCALE – USE DIMENSIONS ONLY

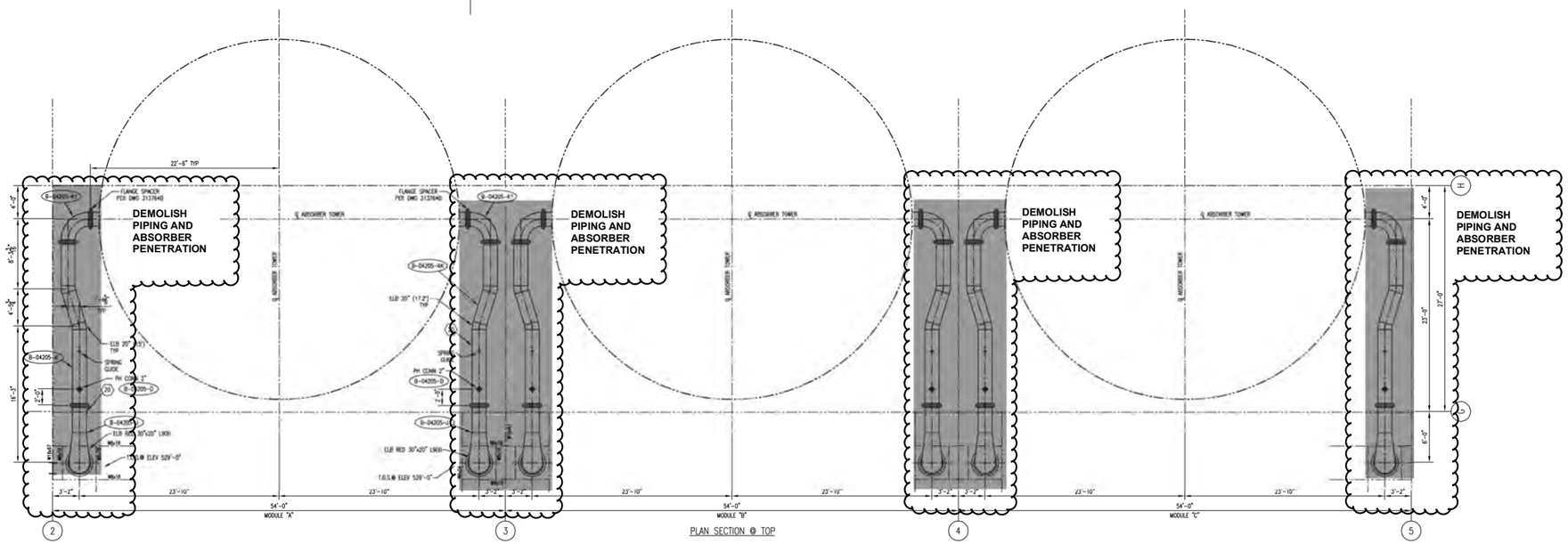
The Babcock & Wilcox Company
a McDermott company

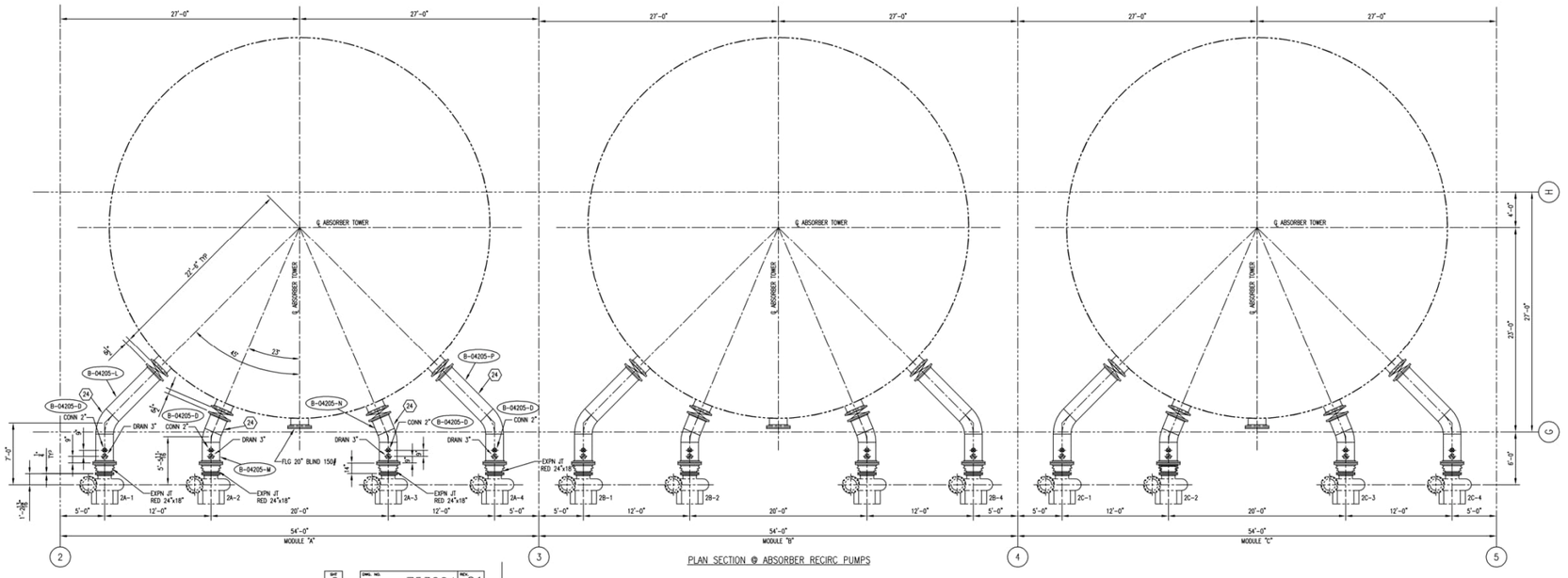
GENERAL ARRANGEMENT
SCRUBBER MODULE
FRP PIPING
SECTIONS

SCALE	CC–SECT	DWG. NO.	REV.
1/4" = 1'-0"	792	X-75319J	A

SEC 2 | DWG. NO. 75319J | REV. 01

REVISIONS			
REV	DESCRIPTION	DATE	APPROVAL
1	ADDED SPOOL WK NO's PER VENDER PRINTS.	2/1/05	PDS-FL





FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

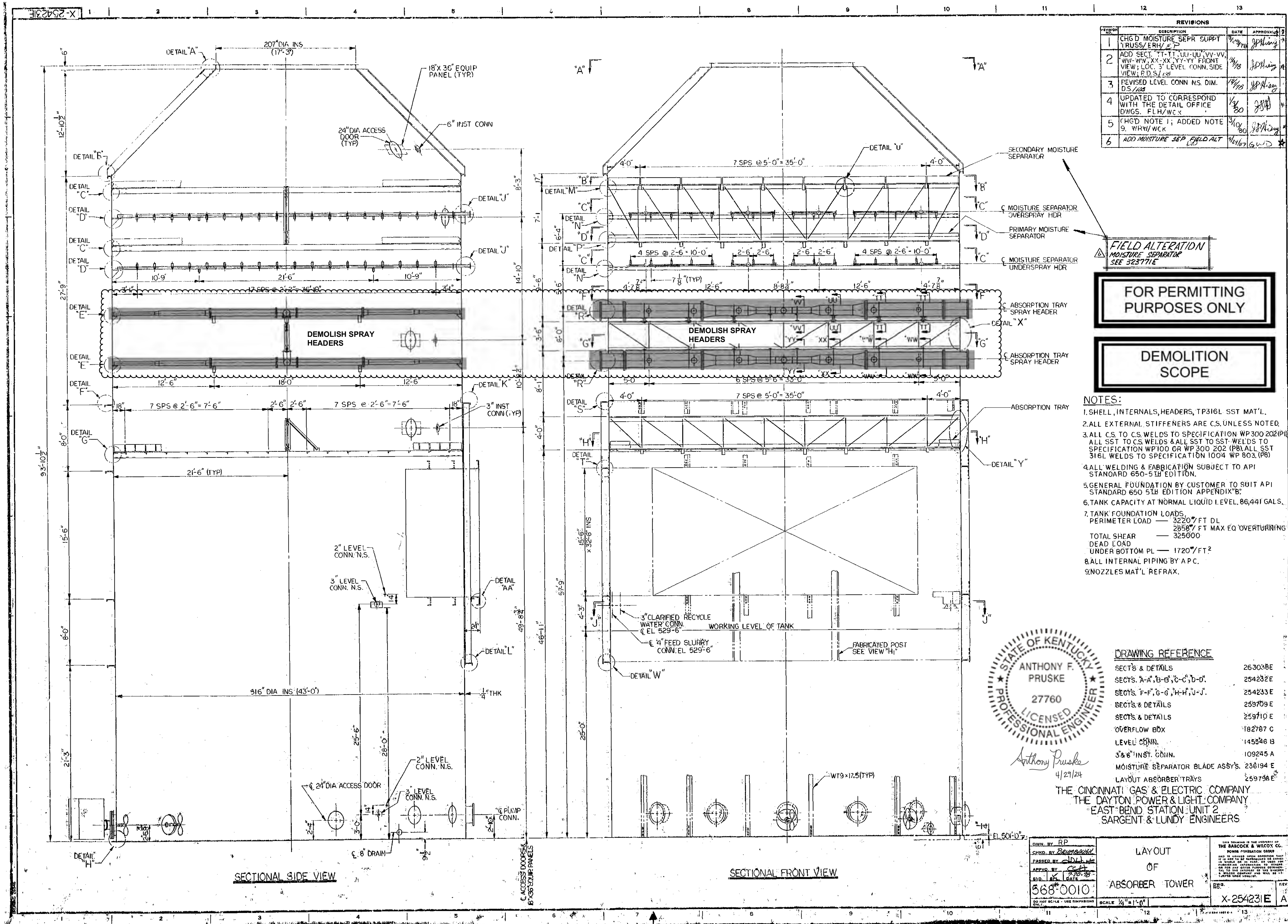
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER

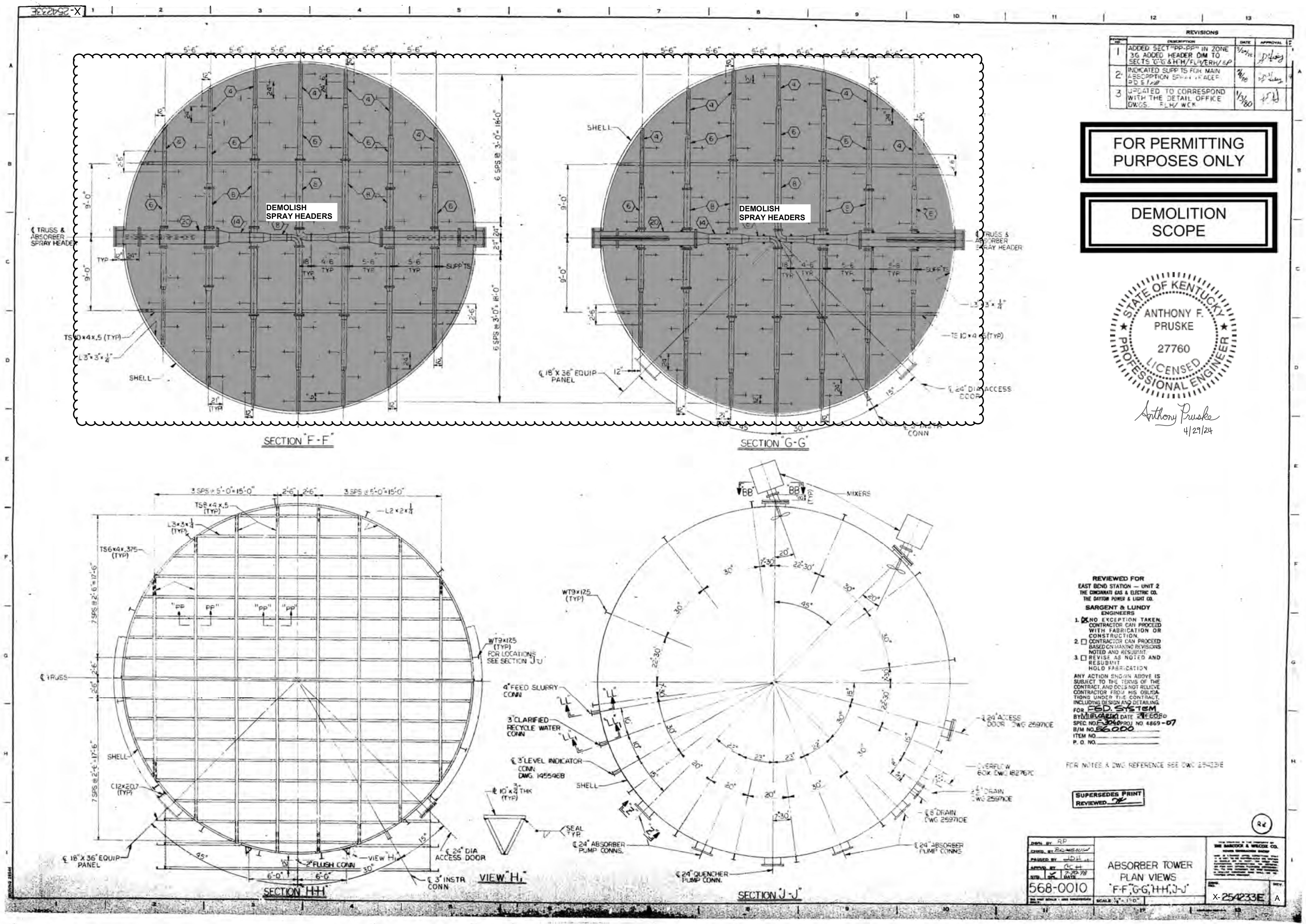
Anthony Pruske
4/29/24

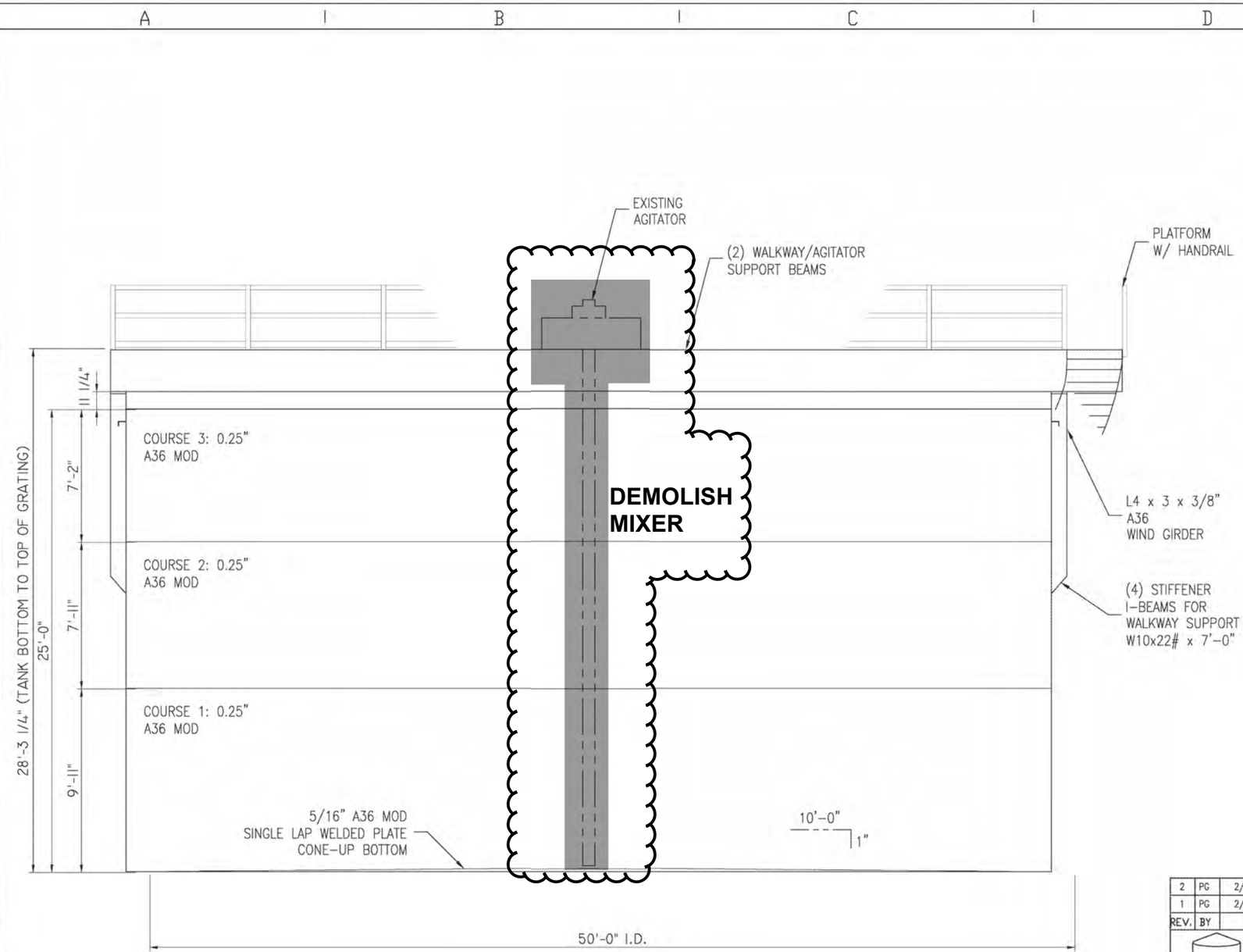
THE CINCINNATI GAS & ELECTRIC COMPANY
EAST BEND STATION UNIT 2

DWN	MET	The Babcock & Wilcox Company
CH'K'D	MJF	a McDermott company
APP'D	PDS-FL	
DATE	11/11/04	GENERAL ARRANGEMENT SCRUBBER MODULE FRP PIPING SECTIONS
CONTRACT NO.	596-4088	
DWG. CONTRACT NO.	586-0010	
SCALE	1/4" = 1'-0"	CC-SECT 792
DWG. NO.	X-75320J	REV. A
– DO NOT SCALE – USE DIMENSIONS ONLY		

SHT 2 | DWG. NO. 75320J | REV. 01


FOR PERMITTING PURPOSES ONLY
DEMOLITION SCOPE
DEMOLISH SPRAY HEADERS
DEMOLISH SPRAY HEADERS
REVISIONS
1 CHG'D MOISTURE SEPR SUPPT TRUSS/ERH/
2 ADD SECT. TT-TT, UU-UU, VV-VV, WV-WW, XX-XX, YY-YY FRONT VIEW; LOC. 3" LEVEL CONN. SIDE VIEW; R.D.S./
3 REVISED LEVEL CONN NS. DIM. D.S./
4 UPDATED TO CORRESPOND WITH THE DETAIL OFFICE DWGS. FLH/WCK
5 CHG'D NOTE 1; ADDED NOTE 9. WRH/WCK
6 ADD MOISTURE SEP FIELD ALT
FIELD ALTERATION
MOISTURE SEPARATOR SEE 323771E
SECONDARY MOISTURE SEPARATOR
MOISTURE SEPARATOR OVERSPRAY HDR
PRIMARY MOISTURE SEPARATOR
MOISTURE SEPARATOR UNDERSPRAY HDR
ABSORPTION TRAY SPRAY HEADER
ABSORPTION TRAY SPRAY HEADER
ABSORPTION TRAY
207" DIA INS (17'-3")
18"X 30" EQUIP PANEL (TYP)
24" DIA ACCESS DOOR (TYP)
6" INST CONN
3" INST CONN (TYP)
2" LEVEL CONN. N.S.
3" LEVEL CONN. N.S.
3" CLARIFIED RECYCLE WATER CONN. EL 529-6"
4" FEED SLURRY CONN. EL 529-6"
WORKING LEVEL OF TANK
FABRICATED POST SEE VIEW "H1"
516" DIA INS (43'-0")
1/4" THK
24" DIA ACCESS DOOR
PUMP CONN.
8" DRAIN
WT9 x 17.5 (TYP)
EL 501'-0"
SECTIONAL SIDE VIEW
SECTIONAL FRONT VIEW
NOTES:
1. SHELL, INTERNALS, HEADERS, TP316L SST MAT'L.
2. ALL EXTERNAL STIFFENERS ARE C.S. UNLESS NOTED.
3. ALL C.S. TO C.S. WELDS TO SPECIFICATION WP 300 202 (P1) ALL SST TO C.S. WELDS & ALL SST TO SST WELDS TO SPECIFICATION WP100 OR WP 300 202 (P8). ALL SST 316L WELDS TO SPECIFICATION 1004 WP 803 (P8)
4. ALL WELDING & FABRICATION SUBJECT TO API STANDARD 650-5TH EDITION.
5. GENERAL FOUNDATION BY CUSTOMER TO SUIT API STANDARD 650 5TH EDITION APPENDIX "B".
6. TANK CAPACITY AT NORMAL LIQUID LEVEL 86,441 GALS.
7. TANK FOUNDATION LOADS.
PERIMETER LOAD — 3220#/FT DL
2858#/FT MAX EQ OVERTURNING
TOTAL SHEAR — 325000
DEAD LOAD UNDER BOTTOM PL — 1720#/FT²
8. ALL INTERNAL PIPING BY A.P.C.
9. NOZZLES MAT'L REFRAX.
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
4/29/24
DRAWING REFERENCE
SECT'S & DETAILS 263038E
SECTS. A-A, B-B, C-C, D-D. 254232E
SECTS. F-F, G-G, H-H, J-J. 254233E
SECTS. & DETAILS 259709E
SECTS. & DETAILS 259710E
OVERFLOW BOX 182787C
LEVEL CONN. 145546B
3 & 6" INST. CONN. 109245A
MOISTURE SEPARATOR BLADE ASSY'S. 236194E
LAYOUT ABSORBER TRAYS 259738E
THE CINCINNATI GAS & ELECTRIC COMPANY
THE DAYTON POWER & LIGHT COMPANY
EAST BEND STATION UNIT 2
SARGENT & LUNDY ENGINEERS
LAYOUT OF ABSORBER TOWER
568-0010
SCALE 1/4" = 1'-0"
X-254231E A

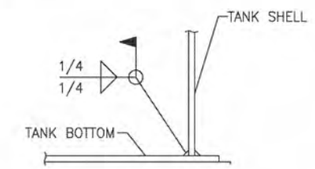

FOR PERMITTING PURPOSES ONLY
DEMOLITION SCOPE
DEMOLISH SPRAY HEADERS
DEMOLISH SPRAY HEADERS
REVISIONS
ADDED SECT "PP-PP" IN ZONE 3G ADDED HEADER DIM TO SECTS "G-G & H-H
INDICATED SUPP TS FOR MAIN ABSORPTION SPRAY HEADER
UPDATED TO CORRESPOND WITH THE DETAIL OFFICE DWGS.
STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24
SECTION "F-F"
SECTION "G-G"
SECTION "H-H"
VIEW "H1"
SECTION "J-J"
SHELL
TRUSS & ABSORBER SPRAY HEADER
MIXERS
4" FEED SLURRY CONN
3" CLARIFIED RECYCLE WATER CONN
3" LEVEL INDICATOR CONN
24" ABSORBER PUMP CONNS.
24" QUENCHER PUMP CONN.
REVIEWED FOR
EAST BEND STATION — UNIT 2
THE CINCINNATI GAS & ELECTRIC CO.
THE DAYTON POWER & LIGHT CO.
SARGENT & LUNDY ENGINEERS
NO EXCEPTION TAKEN. CONTRACTOR CAN PROCEED WITH FABRICATION OR CONSTRUCTION.
FOR NOTES & DWG REFERENCE SEE DWG 254231E
SUPERSEDES PRINT REVIEWED
ABSORBER TOWER PLAN VIEWS "F-F","G-G","H-H","J-J"
568-0010
X-254233E
30X



DESIGN NOTES:

CONTENTS: SLUDGE
DESIGN CODE: API-650 11TH EDITION ADD. 2
DESIGN SPECIFIC GRAVITY: 1.24
DESIGN METAL TEMPERATURE: 5°F
WIND LOAD: 90 MPH
I: 1.25
EXPOSURE: C
SEISMIC DESIGN:
SITE CLASS: D
I = 1.25
USE GROUP: II
Ss VALUE: 20%
S1 VALUE: 8%
CORROSION ALLOWANCE:
SHELL: 1/16"
BOTTOM: 1/16"
ROOF: N/A
STRUCTURE: 0
COLUMN: N/A
TOP ANGLE: 0

INTERNAL PRESSURE:	ATMOSPHERIC
EXTERNAL PRESSURE:	ATMOSPHERIC
UNIFORM ROOF LOAD:	N/A
SNOW LOAD:	N/A
ADDITIONAL ROOF LOAD:	N/A
SHELL WELD INSPECTION:	SPOT X-RAY PER API-650 SEC 8.1.2
JOINT EFFICIENCY:	1.0
TESTING:	HYDROSTATIC
SHELL MATERIAL:	A36 MOD
BOTTOM MATERIAL:	A36 MOD
ROOF:	A36 MOD
STRUCTURAL MATERIAL:	A36
COLUMN:	NONE
WIND GIRDER:	A36



DETAIL A

FOR PERMITTING PURPOSES ONLY

DEMOLITION SCOPE

STATE OF KENTUCKY
ANTHONY F. PRUSKE
27760
LICENSED PROFESSIONAL ENGINEER
Anthony Pruske
4/29/24

REV.	BY	DATE	DESCRIPTION
2	PG	2/22/2012	CORRECTED OVERALL HEIGHT DIMENSION
1	PG	2/20/2012	ADDED SUPPORT POST SIZE

GRAVER TANK TM
ENGINEERS - FABRICATORS - CONSTRUCTORS

DRAWING DESCRIPTION: 50'-0" DIA x 25'-0" HT TANK (NO ROOF) SLUDGE TANK
CUSTOMER: UNION CITY, KY
PROJECT: SLUDGE TANK REPLACEMENT TANK # 2
DRAWN: PG
CHECKED: CM
DATE: 1/12/2012
REVISION: A
JOB No.: X-65053
SHEET No.: 02

Anthony Pruske
Project Engineer
T: 512-924-7268 (c)
E: anthony.pruske@aecom.com

AECOM
13640 Briarwick Dr.
Suite 200
Austin, TX 78729
aecom.com

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In The Matter of:

The Electronic Application of Duke Energy Kentucky, Inc. for a Certificate of Public Convenience and Necessity to Convert its Wet Flue Gas Desulfurization System from a Quicklime Reagent Process to a Limestone Reagent Handling System at its East Bend Generating Station and for Approval to Amend its Environmental Compliance Plan for Recovery by Environmental Surcharge Mechanism	)	Case No. 2024-00152

CERTIFICATE OF NOTICE AND PUBLICATION

Pursuant to the Kentucky Public Service Commission's Regulation 807 KAR 5:001, Section 16(1)(b)(5), I hereby certify that I am Amy B. Spiller, President of Duke Energy Kentucky, Inc. (Duke Energy Kentucky or Company), a utility furnishing retail electric and gas service within the Commonwealth of Kentucky, which, on the 25th day of July 2024, will file an application with the Kentucky Public Service Commission requesting an order granting Duke Energy Kentucky a Certificate of Public Convenience and Necessity for the construction, and conversion of its existing Wet Flue Gas Desulfurization (WFGD) from a quicklime-based handling process to a limestone - based handling process in order to continue to meet existing environmental regulations (Limestone Conversion Project). The Limestone Conversion Project will be located at the Company's East Bend Generating Station. Additionally, the Company is requesting an order authorizing Duke Energy Kentucky to recover the environmental compliance costs of the construction, conversion and operation of the Limestone Conversion Project through amending its Environmental Compliance Plan and its environmental surcharge through its Rate Schedule ESM as required by KRS 278.183, and as applicable KRS 278.020(1). Duke Energy Kentucky is proposing changes to its Environmental Surcharge Mechanism tariff sheet, K.Y.P.S.C. No. 19, Sheet No. 76 and notice

to the public of the filing of the application is being given in all respects as required by 807 KAR 5:001, Section 17 and 807 KAR 5:001, Sections 8(2)(c) and 9(2), as follows:

On the 25th day of July 2024, the notice to the public was delivered for exhibition and public inspection at Duke Energy's Erlanger Ops Center, 1262 Cox Road, Erlanger, Kentucky 41018 and the same will be kept open to public inspection at said office in conformity with the requirements of 807 KAR 5:001, Section 17(1)(a) and 807 KAR 5:011, Section 8(1)(a).

I further certify that more than twenty (20) customers will be affected by said change by way of an increase in their rates or charges, and that on the 10th day of July 2024, there was delivered to the Kentucky Press Association, an agency that acts on behalf of newspapers of general circulation throughout the Commonwealth of Kentucky in which customers affected reside, a notice of the Company's Application, including proposed rates for publication therein once a week for three consecutive weeks beginning on July 19, 2024. A copy of said notice is attached hereto as Exhibit A, and a list of newspapers of general circulation throughout the Commonwealth of Kentucky in which customers affected reside, is being attached hereto as Exhibit B. A certificate of publication of said notice will be furnished to the Kentucky Public Service Commission upon completion of same pursuant to 807 KAR 5:001, Section 17(3)(b).

Also, beginning on July 25, 2024, Duke Energy Kentucky posted on its website a complete copy of the Company's application and a hyperlink to the location on the Kentucky Public Service Commission's website where the case documents and tariff filings are available.

Given under my hand this 25th day of July 2024.

Amy B. Spiller
President, Duke Energy Kentucky, Inc.
139 E. 4th Street
Cincinnati, Ohio 45202

Subscribed and sworn to before me, a Notary Public, in and before said County and State, this 25th day of July 2024.

Notary Public

My Commission expires: July 8, 2027

NOTARY PUBLIC STATE OF OHIO

EMILIE SUNDERMAN
Notary Public
State of Ohio
My Comm. Expires
July 8, 2027

CERTIFICATE OF SERVICE

This is to certify that the foregoing electronic filing is a true and accurate copy of the document being filed in paper medium; that the electronic filing was transmitted to the Commission on July 25th, 2024; and that there are currently no parties that the Commission has excused from participation by electronic means in this proceeding.

John G. Horne, II
The Office of the Attorney General
Utility Intervention and Rate Division
700 Capital Avenue, Ste 118
Frankfort, Kentucky 40601

/s/Rocco D'Ascenzo
Counsel for Duke Energy Kentucky, Inc.

Exhibit A

Notice of the Filing

NOTICE TO CUSTOMERS OF
DUKE ENERGY KENTUCKY, INC.

RECOVERY BY ENVIRONMENTAL SURCHARGE OF DUKE ENERGY KENTUCKY, INC.'S
AMENDMENT TO ITS 2021 AMENDED ENVIRONMENTAL COMPLIANCE PLAN

PLEASE TAKE NOTICE that Duke Energy Kentucky, Inc. ("Duke Energy Kentucky" or "Company") is filing with the Kentucky Public Service Commission ("Commission") on or about July 19, 2024 in Case No. 2024-00152, an Application pursuant to Kentucky Revised Statute 278.183 for approval of the construction of the Limestone Conversion Project (Project) located at its East Bend Generating Station ("East Bend") and an amendment of the Company's Environmental Compliance Plan to include the Project for the purpose of recovering the capital and operations and maintenance (O&M) costs associated with the Project through an increase in the environmental surcharge on customers' bills beginning March 1, 2025 under the Company's existing Rider ESM, also known as the environmental surcharge mechanism. The total capital cost of the Limestone Conversion Project in the Company's Amended Environmental Compliance Plan is estimated to be $125.8 million.

Federal and state environmental regulations require Duke Energy Kentucky to build and upgrade equipment and facilities that produce energy from coal to operate in an environmentally sound manner. Specifically, the Company is seeking Commission approval of a Certificate of Public Convenience and Necessity for the construction and operation of the Project. This construction project requires an amendment of Duke Energy Kentucky's Amended Environmental Compliance Plan that was approved by the Commission in 2022.

Additionally, Duke Energy Kentucky is seeking an order approving the recovery of the costs of the Project through its Environmental Surcharge tariff. The Project is required for the Company to continue to comply with the U.S. Environmental Protection Agency's federal Clean Air Act, and other environmental requirements that apply to Duke Energy Kentucky facilities used in the production of energy from coal. The total capital cost of the Project for which the Company is seeking recovery at this time is estimated to be $125.8 million. O&M costs related to the Project will be similar to O&M costs incurred today and are not distinguishable.

The impact on Duke Energy Kentucky's customers is estimated to be an increase of 1.0% for residential customers and 1.0% on average for non-residential customers in 2025, 2.8% for residential customers and 2.7% on average for non-residential customers in 2026, 2.1% for residential customers and 2.1% on average for non-residential customers in 2027, 1.8% for residential customers and 1.7% on average for non-residential customers in 2028, and 1.8% for residential customers and 1.8% on average for non-residential customers in 2029. For a Duke Energy Kentucky residential customer using 1000 kilowatt hours per month (kWh/mo.), the initial monthly increase is expected to be $1.32 during 2025, $3.63 in 2026, $2.72 in 2027, $2.25 in 2028, and $2.33 in 2029.

The rates contained in this notice are the rates proposed by Duke Energy Kentucky; however, the Kentucky Public Service Commission may order rates to be charged that differ from the proposed rates contained in this notice. Such action may result in rates for consumers other than the rates in this notice.

Any corporation, association, body politic or person with a substantial interest in the matter may, by written request within thirty (30) days after publication of this notice of the proposed rate changes, request leave to intervene; intervention may be granted beyond the thirty (30) day period for good cause shown. Such motion shall be submitted to the Kentucky Public Service Commission, P.O. Box 615, 211 Sower Boulevard, Frankfort, Kentucky 40602-0615, and shall set forth the grounds for the request including the status and interest of the party. If the Commission does not receive a written request for intervention within thirty (30) days of the initial publication the Commission may take final action on the application.

Intervenors may obtain copies of the application and other filings made by the Company by requesting same through email at DEKInquiries@duke-energy.com or by telephone at (513) 287-4366. A copy of the application and other filings made by the Company are available for public inspection through the Commission's website at http://psc.ky.gov, at the Commission's office at 211 Sower Boulevard, Frankfort, Kentucky, Monday through Friday, 8:00 a.m. to 4:30 p.m., and at the following Company office: Erlanger Ops Center, 1262 Cox Road, Erlanger, Kentucky 41018. Comments regarding the application may be submitted to the Public Service Commission through its website, or by mail at the following Commission address.

For further information contact:

PUBLIC SERVICE COMMISSION
COMMONWEALTH OF KENTUCKY
P.O. BOX 615
211 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40602-0615
(502) 564-3940

DUKE ENERGY KENTUCKY
1262 COX ROAD
ERLANGER, KENTUCKY 41018
(513) 287-4366

Exhibit B

Listing of Newspapers Publishing Notice

List of Newspapers in Duke Energy Kentucky Territory

Covington Kentucky Enquirer
Falmouth Outlook
Link NK
Warsaw Gallatin County News
Williamstown Grant County News

Duke Energy Kentucky, Inc.
1262 Cox Road
76
Erlanger, Kentucky 41018

KY. P.S.C. Electric No. 2
Fourth~~Third~~ Revised Sheet No. 76
Cancels and Supersedes
Third~~Second~~ Revised Sheet No. 76
Page 1 of 2

ENVIRONMENTAL SURCHARGE MECHANISM RIDER

APPLICABILITY

This rider is applicable to all retail sales in the Company's electric service area beginning with the billing month June 2018. Rate RTP program participants utilize the applicable portions of the Baseline Charge and Program Charge, as those terms are defined in Rate RTP, for this rider.

Standard electric rate schedules subject to this schedule are:
Residential: Rate Schedules RS and RS-TOU-CPP ~~(N)~~
Non-Residential: Rate Schedules DS, EH, SP, DP, DT, GSFL, TT, SL, TL, UOLS, NSU, SC, SE, and LED

RATE

The monthly billing amount under each of the schedules to which this rider is applicable, shall be increased or decreased by a percentage factor according to the following formula:

Environmental Surcharge Billing Factor = Jurisdictional E(m) / R(m)

DEFINITIONS

For all Plans:

E(m) = RORB + OE – EAS + Prior Period Adjustment + (Over)Under Recovery

RORB = (RB/12)*ROR

RB = the Environmental Compliance Rate Base, defined as electric plant in service for applicable environmental projects adjusted for accumulated depreciation, accumulated deferred taxes, accumulated investment tax credits, CWIP and emission allowance inventory.

ROR = the Rate of Return on the Environmental Compliance Rate Base, designated as the cost of debt and pretax cost of equity for environmental compliance plan projects approved by the Commission.

OE = the Operating Expenses, defined as the monthly depreciation expense, taxes other than income taxes, amortization expense, emission allowance expense and environmental reagent expense.

EAS = proceeds from Emission Allowance Sales.

Duke Energy Kentucky, Inc.
1262 Cox Road
Erlanger, Kentucky 41018

DEFINITIONS (Contd.)

Prior Period Adjustment is the amount resulting from the amortization of amounts determined by the Commission during six-month and two-year reviews.

(Over) or Under Recovery is a one-month "true-up" adjustment.

Plans are the environmental surcharge compliance plans submitted to and approved by the Kentucky Public Service Commission.

(1) Total E(m), (the environmental compliance plan revenue requirement), is multiplied by the Jurisdictional Allocation Factor. Jurisdictional E(m) is adjusted for any (Over)/Under collection or prior period adjustment to arrive at Adjusted Jurisdictional E(m). Adjusted Jurisdictional E(m) is allocated to Residential and Non-Residential on the basis of Revenue as a Percentage of Total Revenue for the 12 months ending with the Current Month.

(2) Residential R(m) is the average of total monthly residential revenue for the 12 months ending with the current expense month. Total revenue includes residential revenue, including all riders, but excluding environmental surcharge mechanism revenue.

(3) Non-Residential R(m) is the average of total monthly non-residential revenue for the 12 months ending with the current expense month. Total revenue includes non-residential revenue, including all riders, but excluding environmental surcharge mechanism revenue, base fuel revenue and FAC revenue.

(4) The current expense month (m) shall be the second month proceeding the month in which the Environmental Surcharge is billed.

SERVICE REGULATIONS, TERMS AND CONDITIONS

The supplying and billing for service and all conditions applying thereto, are subject to the jurisdiction of the Kentucky Public Service Commission, and to Company's Service Regulations currently in effect, as filed with the Public Service Commission of Kentucky.