Comments

on

Proposed Part 70 Air Operating Permit
Proposed Prevention of Significant Deterioration Permit
Environmental Assessment

for

South Louisiana Methanol Plant
St. James, Louisiana

Agency Interest No. 188074
Permit No. 2560-00292-V3, Activity No. PER20190002
Permit No. PSD-LA-780(M-2), Activity No. PER20190003

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Prepared for

RISE St. James and Louisiana Bucket Brigade

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Introduction

These comments are prepared on behalf of RISE St. James and Louisiana Bucket Brigade. I reviewed the draft permit package for proposed major modifications to the Part 70 Operating Permit (or "Title V Permit") and Prevention of Significant Deterioration ("PSD") Permit for the South Louisiana Methanol, LP ("SLM" or "Applicant") St. James Methanol Plant ("Methanol Complex") published by the Louisiana Department of Environmental Quality ("LDEQ") for public review on October 16, 2020.[1] In addition to a substantial increase in methanol production and modifications to previously permitted sources, the proposed permit modifications include construction and operation of an onsite dedicated methanol storage and export facility.

My review of the draft permit package and supporting documents for the facility available on LDEQ's Electronic Document Management System ("EDMS")[2] indicates that the documents submitted by the Applicant to LDEQ in support of the proposed modifications are substantively deficient and inadequate to support the draft permits. The draft permits for the Methanol Complex modifications are substantially flawed and fail to meet the requirements of the federal Clean Air Act and Louisiana Administrative Code Title 33. Further, the analysis presented in included the Environmental Assessment Statement ("2019 EAS") fails to satisfy the public trustee requirements set forth in Article IX, Section 1, of the Louisiana Constitution.

My comments are organized in two main sections addressing the deficiencies of the draft permits in Comment I and those of the 2019 EAS in Comment II.

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[1] LDEQ, Public Notices, South Louisiana Methanol, LP-St. James Methanol Plant, AI: 188074, Activity: PER20190002; PER20190003, Permit Number: 2560-00292-V3;PSD-LA-780(M-2), Subject: Public Hearing and Request for Public Comment on Proposed Part 70 Air Operating & Prevention of Significant Deterioration (PSD) Permit Major Modifications & the Associated Environmental Assessment Statement (EAS); available at: https://www.deq.louisiana.gov/public-notices?keyword=south&startDate=&endDate=; draft permit package (EDMS No. 12385833); available at: https://edms.deq.louisiana.gov/app/doc/view.aspx?doc=12385833&ob=yes&child=yes.

[2] EDMS available at: https://edms.deq.louisiana.gov/app/doc/querydef.aspx.

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I. DRAFT PERMITS

As discussed in the comments below, the draft permit package is incomplete and unsatisfactory as a public review document. The draft permits as proposed are substantially deficient, lack adequate support, and fail to comply with all applicable rules and regulations.

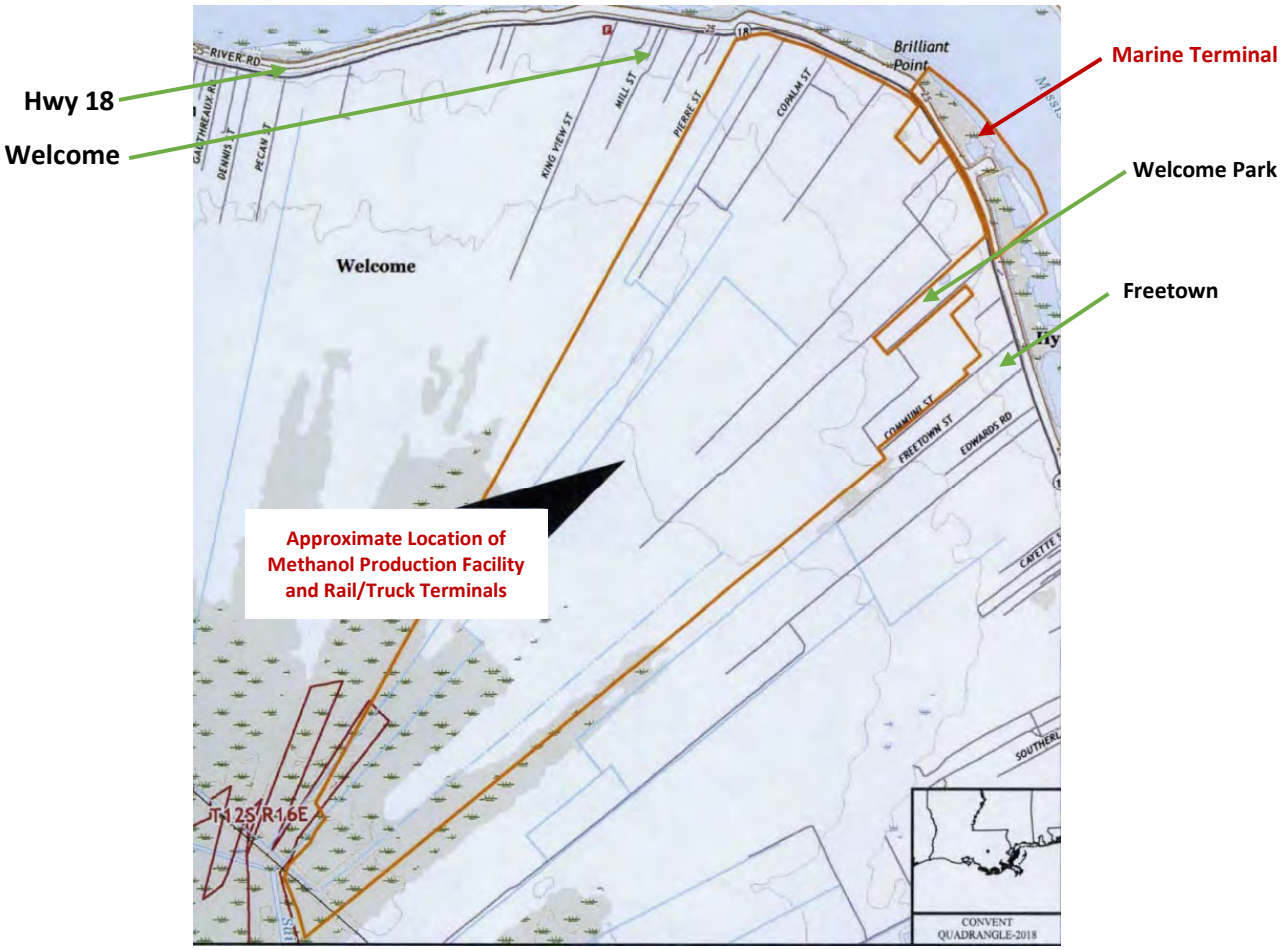
I.A Facility Site Location

The Methanol Complex, which would produce methanol from natural gas feedstock, would be located on a 1,273-acre,[3] wedge-shaped site in St. James Parish, Louisiana, between Highway 3127 to the southwest and Highway 18 (River Road) along the Mississippi River to the northeast. Most of the site is currently farmed and wraps around existing residences within the Freetown and Welcome areas of St. James along Highway 18.[4] The site perimeter encircles the only recreational facility and community center in St. James (District 5) called Welcome Park, as shown in Figure 1 (site perimeter in orange).

[3] *See* U.S. Army Corps of Engineers, Public Notice for South Louisiana Methanol LP (MVN-2014-00702-CM), October 22, 2019; available at: https://www.mvn.usace.army.mil/Missions/Regulatory/Public-Notices/Article/1668669/mvn-2014-00702-cm/.

[4] EDMS No. 11856641 (Application, Appx. A, Figure 1: Site Location Map).

Figure 1: Methanol Complex site location map



Excerpted from: Application, Appx. A, Figure 1, annotated

I.B Permit History and Proposed Modifications

The Methanol Complex was originally permitted with Part 70 Operating Permit No. 2560-00292-V0[5] and PSD Permit No. PSD-LA-780[6], both issued by LDEQ in December 2013. In June 2017, LDEQ issued Part 70 Operating Permit No. 2560-00292-V1[7] and PSD Permit No. PSD-LA-780(M1)[8] for a major modification, specifically, for adding an Econamine unit for recovery of carbon dioxide ("CO_2") from the methanol production process (replacing third-party pipeline-delivered CO_2); adding electricity production via excess process-generated steam; and increasing methanol

[5] EDMS No. 9145850.

[6] EDMS No. 9145852.

[7] EDMS Nos. 10693678 and 10693710.

[8] EDMS Nos. 10693676 and 10693710.

production from 5,150 metric tons per day[9] ("MTPD") to 5,275 MTPD. In July 2018, LDEQ issued an administrative amendment to the Part 70 Operating Permit (No. 2560-00292-V1 AA[10]) correcting emissions of volatile organic compounds ("VOC") from the Econamine unit. In March 2019 LDEQ issued a renewal for the Part 70 Operating Permit (No. 2560-00292-V2[11]). Permits No. 2560-00292-V2 and PSD-LA-780(M1) are the current permits for the facility prior the proposed permit action.

In September 2019, SLM submitted an application for another major modification to Methanol Complex's Part 70 and PSD permits to construct and operate an onsite dedicated methanol storage and export facility instead of utilizing a third party for storage and terminal services. (The September 2019 application and subsequently submitted supporting documents are herein referred to as "Application.") In addition, the Applicant requests a substantial increase in methanol production as well as a considerable number of modifications to previously permitted sources at the methanol production facility (herein also referred to as "methanol production train"). The proposed modifications at the Methanol Complex are summarized below based on information from the draft permit package, the Application, and the facility's current permits:

Methanol Production Facility

- Increase methanol production capacity from 5,275 MTPD to 6,000 MTPD (by 14%[12]); according to the Applicant, this increase is achieved through design optimization and recovery of reactants in waste/fuel streams while lowering emissions;[13]
- Establish an emissions cap (GRP0003/RA CAP) for the Reformer Vent (EQT0001/RV-13) and Econamine Absorber Vent (EQT0011/ECABS-14) for operational flexibility;
- Delete the Econamine Cooling Tower (EQT00l 8/ECT-14);
- Delete the Crude Methanol Tank (EQT0017/OSMT1-13) for storage of off-spec methanol and associated Crude Methanol Tank Scrubber Vent (EQT0020/SVI-14);
- Increase the storage capacity of the Methanol Product Surge Tank (EQT0019/MPST-14) from 41,000 gallons to 1.33 million gallons permitting an increase of the annual

[9] 1 metric ton = 1.1 U.S. ton.

[10] EDMS No. 11224838.

[11] EDMS No. 11552176.

[12] (6,000 MTPD) / (5,275 MTPD) = **1.14**.

[13] Draft permit package, pdf 407, EAS, p. 16 ("The proposed modifications to the methanol production process will result in a more efficient process with lower emissions.")

throughput from 246,000 gallons per year (based on the prior permit limit of maximum six (6) turnovers/year)[14] to 714 million gallons per year;

- Decrease the storage capacity of Methanol Product Tank A (EQT0014/MT-13) and Methanol Product Tank B (EQT0015/MT2-13) from 54,400 barrels to 31,670 barrels and add Methanol Product Tank A Scrubber (EQT0041/MTAS) and Methanol Product Tank B Scrubber (EQT0042/MTBS) as control devices;
- Route Methanol Product Surge Tank (EQT0019/MPST-14) to either Methanol Product Tank A Scrubber (EQT0041/MTAS) or Methanol Product Tank B Scrubber (EQT0042/MTBS);
- Increase the horsepower ("hp") of the Diesel Fired Emergency Generator Engine (EQT0012/DEG1-13) from 1,474 hp to 2,146 hp;
- Increase the horsepower of the Diesel Fire Pump Engine (EQT0013, DFP1-13) from 650 hp to 700 hp; and
- Updates to stack parameters and locations for previously permitted sources.

Methanol Storage and Loading Facility

- Add an onsite methanol storage and terminal facility consisting of
  - Five methanol storage tanks (13.23 million gallons each) with dedicated wet scrubbers (98% control);
  - rail, truck, and marine loading with scrubbers; and four 700-hp emergency fire pump engines;
- Establish emission caps for the following groups at the new methanol export terminal:
  1. Methanol Terminal Tanks cap (GRP0001/TKCAP) for VOC emissions from:
     - Terminal Methanol Product Tank 1 (EQT0022/MT-1)
     - Terminal Methanol Product Tank 2 (EQT0023/MT-2)
     - Terminal Methanol Product Tank 3 (EQT0024/MT-3)
     - Terminal Methanol Product Tank 4 (EQT0025/MT-4)
     - Terminal Methanol Product Tank 5 (EQT0026/MT-5)
     - Terminal Methanol Tank Scrubber No. 1 (EQT0027/TSV-1)
     - Terminal Methanol Tank Scrubber No. 2 (EQT0028/TSV-2)
     - Terminal Methanol Tank Scrubber No. 3 (EQT0029/TSV-3)
     - Terminal Methanol Tank Scrubber No. 4 (EQT0030/TSV-4)
     - Terminal Methanol Tank Scrubber No. 5 (EQT0031/TSV-5)
     - Tank Landing Operations (EQT0032/TLO-1)
     - Tank Cleaning Operations (EQT0033/TCO); and
  2. Methanol Terminal Loading Scrubber cap (GRP0002/TLS-1) for VOC emissions from:
     - Marine Loading Scrubber (EQT0034/MALS)
     - Rail Loading Scrubber (EQT0035/RALS) and
     - Truck Loading Scrubber (EQT0036/TRLS).

[14] (41,000 gal) × (6/year) = **246,000 gal/year**.

I.C The Draft Permit Package Is Incomplete and Impenetrable

The draft permit package posted on LDEQ's website for public review consists of the following documents and will be cited herein by pdf page number:

PER20190002 Part 70 Operating Permit, Permit No. 2560-00292-V3

- Public Notice for Part 70 Operating Permit, pdf 1-2
- Draft authorization letter to Applicant for Part 70 Operating Permit, pdf 3
- Air Permit Briefing Sheet, Part 70 Operating Permit, pdf 4-24
- Inventories, pdf 25-29
- Emission Rates for TAP/HAP [Toxic Air Pollutants/Hazardous Air Pollutants] & Other Pollutants, pdf 34-37
- Specific Requirements, pdf 38-85
- General Information, pdf 86-87

PER20190003 PSD Permit PSD-LA-780(M-2)

- Draft authorization letter to Applicant for PSD Permit, pdf 88-89
- Briefing Sheet, pdf 89-96
- Preliminary Determination Summary, pdf 97-167

Statement of Basis for Proposed Part 70 Operating & Prevention of Significant Deterioration (PSD) Permit Nos. 2560-00292-VJ, PSD-LA-780(M-2), pdf 168-195

Miscellaneous Correspondence

- July 23, 2020 SLM emails and attachments re: LDEQ queries including final Emission Inventory Questionnaires dated July 2020, pdf 196-269 (missing Reformer Vent Scenario 2)
- May 13, 2020, SLM response to 40 CFR 68 Applicability and Public Hearing Request, pdf 270-281
- April 16, 2020 SLM response to LDEQ questions, pdf 282-287
- March 19, 2020 SLM re: draft PSD Permit review, pdf 288-366
- March 6, 2020 SLM response to LDEQ questions, pdf 367-391
- October 16, 2019, SLM submittal of Environmental Assessment Statement, pdf 392-420
- September 6, 2019, SLM submittal of Air Quality Modeling Protocol, pdf 421-444

The draft Part 70 Operating Permit, p. 1, identifies the following information submitted by the Applicant in support of the proposed permit modifications:

> A permit application and Emission Inventory Questionnaire were submitted by South Louisiana Methanol, LP on September 6, 2019, requesting a major modification to the Part 70 operating permit and the PSD permit. Additional information dated October 16, 2019, March 6, 2020, March 19, 2020, April 16, 2020, May 13, 2020, and July 23, 2020, was also received. Technical comments from South Louisiana Methanol, LP were received on May 6, 2020, on the proposed permits.

As summarized above, the draft permit package contains some of the cited additional information submitted by SLM between October 16, 2019 and July 23, 2020 at pdf pages 196-444 but it fails to provide the Applicant's September 6, 2019 permit application and fails to identify and provide the Air Quality Modeling Report, which was submitted by the Applicant on November 1, 2019.[15] Without these documents, the draft permits cannot be properly reviewed and its conclusions cannot be substantiated. (For example, the Application contains emission calculations for individual emissions units supporting emission rates and permitted emissions, which are critical to a thorough review of the draft permits.) Instead, these documents can only be obtained by reviewing the administrative record for the Methanol Complex online via the agency's Electronic Document Management System, which is beyond what can be expected from the general public. Thus, the draft permit package presented for public review is incomplete and not adequately supported.

I note that the 444-page draft permit package posted on LDEQ's website is a poorly scanned document (as are most documents on EDMS) without bookmarks, table of contents, text recognition, or any other means for the public to navigate this unwieldy document. As a result, many pages, especially those with very small text, are exceedingly difficult, if not impossible, to read (*see*, for example, the final Emissions Inventory Questionnaires at pdf 216-269, which are barely legible). Further, as a result of the content having been scanned as images without text recognition, the file size of the downloaded document is 172 Megabytes, which can cause many, especially older and/or underpowered, computers and laptops to freeze. In this day and age, when documents are produced and submitted electronically, scanning documents instead of compiling searchable electronic files seems an unacceptable impediment to public review.

I further note that the permits could be substantially improved by providing a summary table with the change in emission rates for each individual emission unit before and after the proposed modification rather than only providing a summary table for the entire facility.[16] Even for an experienced reviewer, it is exceedingly difficult to trace changes in emissions from the various permit emission units because it requires painstaking comparison of information found in the Application (which is not provided with the draft permit package), in the proposed permits, and in prior permits and applications (which are only available in the administrative record on EDMS).

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[15] EDMS No. 11943041; available at: https://edms.deq.louisiana.gov/app/doc/view.aspx?doc=11943041&ob=yes&child=yes.

[16] *See* draft permit package, pdf 9.

I.D The Proposed Modifications Are Not Adequately Supported

The permit record does not provide an adequate description of either the proposed modifications at the methanol production train or the three proposed new methanol export terminals, (rail, truck, and marine).

I.D.1 Methanol Production Train

For the methanol production train, the Application merely lists the proposed modifications (*see* Comment I.B above) without providing any discussion of the process design optimization that results in a 14% increase in methanol production. Of particular concern in this context is the dramatic increase in storage capacity of the Methanol Product Surge Tank (EQT0019/MPST-14) from 41,000 gallons to 1.33 million and the increase in annual throughput from 246,000 gallons per year (based on the prior permit limit of maximum 6 turnovers/year)[17] to 714 million gallons per year (equals 537 annual turnovers[18] and a throughput increase by a factor of 2,902[19]).

Further, typically, applications for major industrial sources are accompanied by engineering drawings, process flow diagrams, heat and materials balance sheets, piping and instrumentation diagrams, vendor guarantees, stack tests, studies, etc., which allow for verification of the permitted units, the assumptions used to support emission limits established in the permits, and the air quality modeling. Without such adequate documentation the emission factors in the permits are unsupported and the public cannot meaningfully comment on their appropriateness. Here, this information is either entirely absent in the record or substantially inadequate. For example, the Application fails to provide vendor guarantees, studies, or stack tests for several assumptions made in the emissions calculations, simply stating that they were provided by SLM or vendors.[20] This is not acceptable.

Further, the Application fails to provide a detailed plot plan derived from engineering drawings for the redesigned methanol production train identifying the individual emission units on site (*e.g.*, reformer stack, boiler stack, flare, cooling tower, methanol

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[17] (41,000 gal) × (6/year) = **246,000 gal/year**.

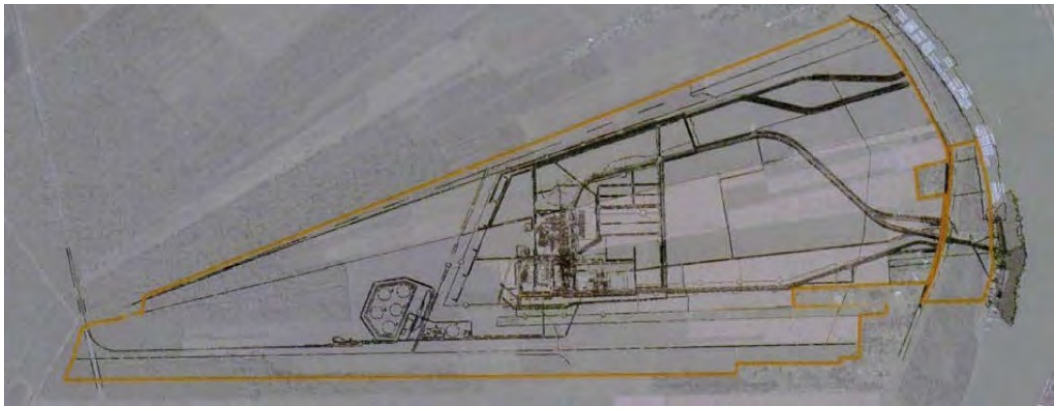
[18] (714 MM gal/year) / (1.3 MM gal) = **536.8/year**.

[19] (714,000,000 gal/year) / (246,000 gal/year) = **2,902.4**.

[20] For example, Draft permit package, pdf 199 through 202 ("Ammonia emission rate of 10 ppmv provided by SLM"), pdf 199 and 200, ("Ratio of vent stream treated by Econamine Unit provided by vendor"), pdf 201 and 202 ("… stack gas average and max concentrations of 0.88 and 2 ppmv for EFG+Solvent (MEA) and 1.2 and 5 ppm for acetaldehyde as provided by vendor" and "CO_2 treatment rate of 1,737 tons/day as provided by vendor").

tanks, etc.). The Application contains only an illegible site map without labels, shown in the excerpt in Figure 2.

Figure 2: Methanol Complex site map provided with Application



Excerpted from: Application, Appx. A, Figure 2

Because the proposed modifications include changes in locations for previously permitted sources, the plot plans submitted in support of previous permits are not longer valid. (*See* also Comment II.A.)

Also, the process flow diagrams ("PFDs") provided by the Applicant (found in Appendix A to the Application) are substantially inadequate. The Louisiana *Guidance for Air Permitting Actions*,[21] pp. 156-157, requires that an Applicant submit detailed process flow diagrams:

> A Process Flow Diagram (PFD) is required in order to show how the process(es) within a given facility or unit work(s). Each piece of equipment should be clearly and plainly labeled on this PFD, as well as any insignificant activities. Sources must be labeled with the source identification numbers provided in the application. It should be plain to see exactly what flows into each piece of equipment, what pieces of equipment supply this flow, and where this flow goes after exiting each piece of equipment. If a source to be permitted is not represented in this PFD, then the PFD does not contain sufficient detail. It is important to ensure that the PFD supplied with the application is current and is consistent with the application.

The Application, Appendix A, contains three process flow diagrams in Figure 3 (facility process flow), Figure 4 (topping column overheads process flow), and Figure 5 (terminal process flow). These PFDs, again only available as largely illegible scanned

[21] LDEQ, Louisiana Guidance for Air Permitting Actions, May 2017; available at: https://www.deq.louisiana.gov/assets/docs/Air/Air_Permit_Applications/LouisianaGuidanceforAirPermittingActions.pdf.

documents (on blue background), are inadequate to support the draft permits as they do not show the source identification numbers for each piece of equipment or insignificant activities and process flow rates are not quantified.

I.D.2 Truck, Rail, and Marine Terminals

For the new terminal facilities, the permit record fails to even provide a description or plot plan other than identifying the scrubbers that would reduce VOC emissions from methanol loading at these terminals and the emergency fire pumps. The reviewer is left to wonder about the most basic information, including:

- The number of loading arms at each terminal and their maximum hourly and annual throughput;
- The maximum number of trucks, trains, railcars, and ships or barges loaded and leaving the site on a daily, monthly, and annual basis;
- Whether the rail facility would have switching locomotives on site and how many railcars could be stored on site;
- Whether trains accessing the site would be unit trains or manifest trains;
- Whether loading would be conducted under inert or non-inert conditions; and
- Whether methanol would be loaded into dedicated or non-dedicated transport vessels.

While some limited information can be found buried deep in the appendices of the Application (which was not made part of the draft permit package for public review), for example, the number of railcars and trucks that could be loaded at the same time; most information is missing from the permit record.

I.E The Draft Permits Fail to Follow All Applicable Regulations

As discussed in the following comments, the Draft Permits fail to follow all applicable regulations and improperly exempt emissions units and activities from permitting,

I.E.1 The Draft Part 70 Operating Permit Improperly Exempts Emissions Units and Activities from Permitting pursuant to LAC 33:111.501.B.5 (Insignificant Activities)

The draft Part 70 Operating Permit, Section X, lists ten emissions units and activities as exempt from the requirement to obtain a permit pursuant to LAC 33:111.501.B.5 (Insignificant Activities).

Comparison with the facility's current Part 70 Operating Permit (No. 2560-00292-V2), which was issued in March 2019, shows that seven of the ten listed Insignificant Activities are new or modified storage tanks. Table 2 compares Insignificant Activities in the proposed Part 70 Operating Permit (No. 2560-00292-V3) with those listed in previously issued permits, specifically, the Part 70 Operating Permit renewal issued in March 2019 (Permit No. 2560-00292-V2); the Part 70 Operating Permit issued in December 2018 for an administrative amendment (Permit No. 2560-00292-V1AA); and the initial Part 70 Operating Permit issued in December 2013 (Permit No. 2560-00292-V0). Changes compared to the 2019 permit are indicated in **red/bold for new emission units** and **blue/bold for modified emission units**.

Table 2 Part 70 Operation Permit, Section X, Insignificant Activities

		Part 70 Operating Permit 2560-00292-			
		V3	**V2**	**V1AA**	**V0**
Unit ID	**Unit Description**	**2020**	**2019**	**2018**	**2013**
Activities		(turnovers/year)			
13-TLO	Tank Landings (at Methanol Plant)	4	4	4	4
Storage Tanks		(gallons)			
14-DST1	Diesel Storage Tank	2,000	2,000	10,000	10,000
14-DST3	Diesel Storage Tank	660	660	660	660
TDST	**Diesel Storage Tank**	2,500	-	-	-
14-SST1	**Solvent (MEA) Storage Tank**	5,771	6,300	6,300	-
14-SRT1	**Solvent (MEA) Recovery Tank**	5,438	4,400	4,400	-
14-RBT1	**Reclaimer Bottoms Tank (MEA)**	1,556	1,915	1,915	-
14-ST	**Solvent (MEA) Holding Tank**	102,816	112,700	112,700	-
13-AST1	**Reformer Aqueous Ammonia Tank**	25,400	15,000	15,000	10,000
19-AST1	**Auxiliary Boiler Aqueous Ammonia Tank**	6,800	-	-	-

As shown, the draft permit lists a new 2,500-gallon diesel storage tank (TDST) for storing fuel for the emergency engines at the new terminal and a new 6,800-gallon aqueous ammonia storage tank (19-AST1) for storing reactant for the selective catalytic reduction ("SCR") system on the Methanol Complex's two auxiliary boilers. For the existing aqueous ammonia storage tank storing reactant for the SCR on the reformer (13-AST1), the draft permit specifies a major storage capacity (volume) increase from 15,000 gallons to 25,400 gallons. In addition, the draft permit specifies minor changes to the storage capacity of four previously permitted storage tanks storing the mono-ethanolamine ("MEA") solvent used in the methanol production process (14-SST1, 14-SRT1, 14-RBT1, 14-ST).

I note that while the storage capacities of the five previously permitted tanks have changed, their respective annual throughputs have not, presumably an erroneous carryover from the prior permit that must be corrected in revised permits.

a) Failure to Provide Adequate Documentation

LDEQ's *Louisiana Guidance for Air Permitting Actions* requires that applicants submit the following in support of a designation of emission units or activities as insignificant activities pursuant to LAC 33:111.501.B.5:[22]

> An applicant must provide calculations or other supporting documentation to demonstrate that the emissions unit or activity qualifies as an insignificant activity. Specifically, the demonstration should concentrate on such items as:
>
> - proving that no federal applicable requirement applies;
> - for tanks, documenting the volume of the tank and the true vapor pressure (at storage conditions) of organic liquids is less than the limits specified;
> - for external combustion devices, documenting the fuel type and maximum heat input; and
> - except for activities deemed insignificant under A.5 or A.7, documenting that the aggregate emissions from all similar types of sources qualifying as insignificant do not exceed 5 tons per year (tpy) or exceed any Minimum Emission Rate (MER) listed in Table 51.1 of LAC 33:III.5112.

Neither the draft permit package nor the Application contain calculations or other supporting documentation to demonstrate that the new or modified tanks qualify as for the proposed exemption.

b) Aqueous Ammonia Storage Tanks: Exemptions Based on LAC 33:111.501.B.5.D

The draft Part 70 Operating Permit lists both aqueous ammonia storage tanks (13-AST1 and 19-AST1) as exempt from permitting pursuant to LAC 33:111.501.B.5.D. This paragraph reads as follows:

[22] Louisiana Guidance for Air Permitting Actions; *op. cit.* (pp. 19-20: ("40 CFR 70.5(c) states that LDEQ may approve a list of insignificant activities which need not be included in permits. The regulation provides for the submittal of certain types of information so that the permitting authority can verify that the activities qualify for the "exempt" status. For these actions, estimates of the emissions of the sources or activities will need to be submitted.") and p. 155: "Detailed emissions calculations must be provided to support the emissions estimates as stated for all permitted sources, including General Condition XVII Activities (GCXVII) and Insignificant Activities that appear in LAC 33:III.501.B.5.A and D.")).

D. Exemptions Based on Emissions Levels

The owner or operator of any source may apply for an exemption from the permitting requirements of this Chapter for any emissions unit provided each of the following criteria are met. Activities or emissions units exempt as insignificant based on these criteria shall be included in the permit at the next renewal or permit modification, as appropriate.

a. The emissions unit emits and has the potential to emit no more than 5 tons per year of any criteria or toxic air pollutant.
b. The emissions unit emits and has the potential to emit less than the minimum emission rate listed in LAC 33:III.5112, Table 51.1, for each Louisiana toxic air pollutant.
c. The emissions unit emits and has the potential to emit less than the de minimis rate established pursuant to section 112(g) of the federal Clean Air Act for each hazardous air pollutant.
d. No new federally enforceable limitations or permit conditions are necessary to ensure compliance with any applicable requirement.

Ammonia is one of the toxic air pollutants ("TAPs") listed in LAC 33.III.5112, Table 5.1 Class III (Acute and Chronic Toxins), with a minimum emission rate ("MER") of 1,200 pounds per year ("lb/year"). The application submitted in support of the 2017 Part 70 Operating Permit (No. 2560-00292-V1) estimated ammonia emissions from the 15,000-gallon aqueous ammonia storage tank storing reactant for the reformer SCR (13-AST1) at 3,111.2 lb/year (1.6 tons/year[23]).[24] These emissions by far exceed the MER for ammonia (by a factor more than 2.5[25]), making this tank ineligible for an exemption from permitting requirements. The requested increase in the storage capacity of 13-AST1 to 25,400 gallons will further increase ammonia emissions. Ammonia emissions from the new aqueous ammonia storage tank storing reactant for the SCR on the auxiliary boilers (19-AST-1), which at 6,800 gallons storage capacity is a little less than half the size of the previously permitted 15,000-gallon 13-AST1, will also exceed the MER. Thus, neither of the two storage tanks for aqueous ammonia qualifies for an exemption from permitting requirements under LAC 33:111.501.B.5.D .

I note that the Applicant requested that both aqueous ammonia storage tanks be exempted from permitting requirements pursuant to LAC 33:111.501.B.5.A.10. The proposed Part 70 Operating Permit changed the exemption for the aqueous ammonia storage tank for the reformer (13-AST1) to LAC 33:111.501.B.5.D without providing any discussion. LAC 33:111.501.B.5.A.10 reads as follows:

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[23] (3,112.2 lb/year) / (2,000 lb/ton) = **1.56 tons/year**.

[24] *See* EDMS No. 10053134, pdf 293 (SLM, Addendum to Part 70 Title V Air Permit Major Modification and Prevention of Significant Deterioration (PSD) Expedited Permit Application, January 14, 2016, Appx. B, Point Source Description: Aqueous Ammonia Storage Tank (19%), 15,000 gal).

[25] (3,111.2 lb/year) / (1,200 lb/year) = **2.59**.

> 10. storage tanks containing, exclusively, soaps, detergents, surfactants, waxes, glycerin, vegetable oils, greases, animal fats, sweetener, molasses, corn syrup, aqueous salt solutions, or aqueous caustic solutions, provided an organic solvent has not been mixed with such materials, the tanks are not subject to 40 CFR 60, subpart Kb or other federal regulation, and the aggregate emissions from all such tanks listed as insignificant do not exceed 5 tons per year of criteria or toxic air pollutants, do not exceed any minimum emission rate listed in LAC 33:III.5112, Table 51.1, and do not exceed any hazardous air pollutant de minimis rate established in accordance with section 112(g) of the federal Clean Air Act;

Clearly, an exemption of the aqueous ammonia storage tanks under LAC 33:111.501.B.5.A.10 is not applicable because it contains the same requirement that ammonia emissions not exceed the MER for this pollutant listed in LAC 33.III.5112, Table 5.1. (I note that prior permits improperly exempted 13-AST1 under LAC 33:111.501.B.5.A.10).

In sum, the draft 70 Operating Permit must be revised to contain permits for the facility's two aqueous ammonia storage tanks. Further, ammonia emissions from these tanks must be included in a revised ambient air quality dispersion modeling for determining compliance with the Louisiana ambient air standard for this toxic air pollutant.[26]

c) Methanol Storage Tank Landings at Methanol Production Train: Exemptions Based on LAC 33:111.501.B.5.D

The draft Part 70 Operating Permit lists tank landings for methanol storage tanks at the methanol production train (13-TLO) as exempt from permitting requirements pursuant to LAC 33:111.501.B.5.D. These tanks include the Methanol Product Tank A (EQT0014/MT-13), Methanol Product Tank B (EQT0015/MT2-13), and the Methanol Product Surge Tank (EQT0019/MPST-14). This exemption is not applicable.

Specifically, LAC33:111.501.B.5 makes clear that any activity for which a federal applicable requirement applies cannot be exempt from permitting requirements:

[26] LAC 33:III.5112, Table 51.2 Louisiana Toxic Air Pollutant Ambient Air Standards.

> 5. Insignificant Activities List. Those activities listed in the following table are approved by the permitting authority as insignificant on the basis of size, emission or production rate, or type of pollutant. By such listing, the permitting authority exempts certain sources or types of sources from the requirement to obtain a permit under this Chapter unless it is determined by the permitting authority on a site-specific basis that any such exemption is not appropriate. The listing of any activity or emission unit as insignificant does not authorize the maintenance of a nuisance or a danger to public health or safety. Any activity for which a federal applicable requirement applies is not insignificant, even if the activity meets the criteria below. For the purpose of permitting requirements under LAC 33:III.507, no exemption listed in the following table shall become effective until approved by the administrator in accordance with 40 CFR 70. For purposes of the insignificant activities listed in this Paragraph, *aggregate emissions* shall mean the total emissions from a particular insignificant activity or group of similar insignificant activities (e.g., A.1, A.2, etc.) within a permit per year.

Methanol storage tanks are subject to the National Emission Standards for Hazardous Air Pollutants ("NESHAP") in 40 CFR 63 Subpart G (Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater). This applicability extends to tank landings, a fact LDEQ recognizes for methanol storage tank landings at the new terminal (TLO-1).[27] Thus, methanol storage tank landings at the methanol production train cannot be exempt from permitting requirements. (I note that LDEQ initially removed tank landings at the methanol production train from the Insignificant Activities list but upon request by the Applicant[28] simply reinstated their listing as exempt from permitting in the draft Part 70 Operating Permit without questioning.)

Tank landings from methanol tanks at the methanol production train (13-TLO) must be permitted and included in the facility's permitted emissions. The emission calculations submitted in support of the facility's current permits (Permits No. 2560-00292-V2 and

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[27] Draft permit package, pdf 19 (XI. Table 1. Applicable Louisiana and Federal Air Quality Requirements).

[28] *See* draft permit package, pdf 206:

> 3. X. Insignificant Activities.
> d. Reinstate 13-TLO Tank Landings. 13-TLO is for landing of tanks at the methanol plant (EQT0014, EQT0015, and EQT0019) and should be considered different to the Terminal Storage Tanks. TLO-1 is for landing of tanks at the Terminal (EQT0022, EQT0023, EQT0024, EQT0025, and EQT0026).

PSD-LA-780(M1) estimated tank landing operations for methanol tanks at the methanol production train (13-TLO) at 2.389 pounds per hour ("lb/hr") and 0.46 tons/year.[29]

Further, the draft Part 70 Operating Permit lists "Tank Cleaning Operations" with annual emissions of 0.35 tons/year of VOC as a General Condition XVIII Activity.[30] Review of the underlying emission calculations from the facility's existing Part 70 Operating Permit shows that these tank cleaning operations are associated with the cleaning of methanol tanks at the methanol production train.[31] LDEQ may not piecemeal emissions from the methanol storage tanks at the methanol production train into various permitted and unpermitted activities. Regular operations, landing, and cleaning are all an integral part of operating these methanol tanks pursuant to 40 CFR 63 Subpart G and, whether these activities are given a separate name/identification number in the permit or not, they all must be included in the permitted emissions for the facility.

Emission estimates for both tank landings and tank cleanings of the methanol tanks at the methanol production train must be revised based on the proposed tank parameters for the methanol tanks at the methanol production train and included in permitted emissions. Short-term methanol emission rates during tank landings and cleaning at the methanol plant must be included in the ambient air quality modeling to determine compliance with Louisiana's 8-hour ambient air standard for this toxic air pollutant.

I.E.2 40 CFR 68 and LAC33:III.59, Chemical Accident Prevention Provisions

40 CFR 68 and LAC 33:III.59, Chemical Accident Prevention Provisions, require that a Risk Management Plan ("RMP") be developed if a facility will store a listed substance in excess of a specified threshold quantity. Aqueous ammonia (CAS 7664-41-7) with a concentration of 20% or greater in water is a listed substance pursuant to 40 CFR 68.130 with a threshold quantity of 20,000 pounds ("lb").

Neither the Application nor the draft permit package specify the concentration of the aqueous ammonia that would be used as a reagent for the facility's SCRs on the reformer and auxiliary boilers and stored in the two aqueous ammonia storage tanks (13-AST1 and 19-AST1). The list of Insignificant Activities merely refers to "Aqueous Ammonia Tank."

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[29] EDMS No. 11417474 (2019 Part 70 Operating Permit Renewal, Permit No. 2560 00292 V2), pdf 276.

[30] Draft permit package, pdf 13.

[31] EDMS No. 11417474 (2019 Part 70 Operating Permit Renewal, Permit No. 2560 00292 V2), pdf 296-297.

SCR applications using aqueous ammonia (as opposed to anhydrous ammonia or urea) generally transport and store the reagent at a concentration of 29.4% ammonia in water, although some applications use a 19% solution. The annual operating costs associated with a 19% aqueous ammonia solution are estimated at 13% higher than for a 29% ammonia solution, primarily because of the cost for transportation.[32]

In prior applications SLM assumed a 19% aqueous ammonia solution for 13-AST1 to calculate emissions.[33] However, as discussed above, Applicant provided no information whatsoever for the modified and the new tank storing aqueous ammonia, including the concentration of the reactant that would be stored in them. Considering the cost-savings of using 29.4% aqueous ammonia, continued use of the previously specified concentration cannot simply be assumed. Instead, concentration must be written into the permits. Further, unless 19% aqueous ammonia will be stored in these tanks, the Applicant must prepare and maintain a Risk Management Plan (RMP) for ammonia.

I.E.3 40 CFR 63 National Emission Standards for Hazardous Air Pollutants

The draft PSD SOB, Section VIII.1 Federal Regulations, p. 9, summarizes the applicability of 40 CFR 63 – National Emission Standards For Hazardous Air Pollutants For Source Categories, which specify Maximum Achievable Control Technology ("MACT"), as follows:

> 40 CFR 63 – Maximum Achievable Control Technology (MACT)
>
> The following subparts are applicable at SJMP: A, F, G, H, ZZZZ, and DDDDD. Applicable emission standards, monitoring, test methods and procedures, recordkeeping, and reporting requirements are summarized in the "Specific Requirements" section of the proposed permit.

(Note: The "Specific Requirements" section is found in the proposed Part 70 Operating Permit section, not the draft PSD Permit section.) In addition, Subpart Y (National

[32] EPA, EPA Air Pollution Control Cost Manual, Section 4 – NOx Controls, Chapter 2 – Selective Catalytic Reduction, June 2019; available at: https://www.epa.gov/sites/production/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf. (pdf 15: "Relative to anhydrous ammonia, one reference estimated annual operating costs for 19% aqueous ammonia are 50% higher, costs for 29% aqueous ammonia are 33 percent higher, and costs for urea are 25% higher.") 1.33/1.50 = **1.28**.

[33] *See* EDMS No. 10053134, pdf 298 (SLM, Addendum to Part 70 Title V Air Permit Major Modification and Prevention of Significant Deterioration (PSD) Expedited Permit Application, January 14, 2016, Appx. B, Point Source Description: Aqueous Ammonia Storage Tank (19%), 15,000 gal).

Emission Standards for Marine Tank Vessel Loading Operations) is also applicable at the Methanol Complex.[34]

I.F The Draft Permits Fail to Require Best Available Control Technology for VOC Emissions from the Methanol Storage Tanks

The analyses of Best Available Control Technology ("BACT") for the methanol storage tanks presented in the draft permits are inadequate.

The Methanol Complex would use eight storage tanks to store methanol: two product methanol tanks (EQT0014/MT-13 and EQT0015/MT2-13) and one methanol product surge tank (EQT0019/MPST-14 located at the methanol production facility and five methanol product tanks for storing finished methanol prior to shipment (EQT0022/MT-1, EQT0023/MT-2, EQT0024/MT-3, EQT0025/MT-4, and EQT0026/MT-5) located near the truck and rail loading terminals. The VOC BACT analysis for these eight methanol storage tanks evaluates the following five control technologies:[35]

Pollutant	Control Technology
VOC	Internal Floating Roof Tank with Inert Gas Blanketing
	Internal Floating Roof Tank
	External Floating Roof
	Fixed Roof with Vapor Capture and Thermal Oxidizer
	Fixed Roof with Vapor Capture and Wet Scrubber

The BACT analysis eliminates external floating roofs as technically infeasible and ranks the remaining technically feasible control technologies as follows:

Step 3 Rank the remaining control technologies.

Pollutant	Rank	Control Technology	Control Efficiency
VOC	1	Internal Floating Roof Tank with Inert Gas Blanket	Comply with NESHAP Subpart G
	2	Internal Floating Roof Tank	Comply with NESHAP Subpart G
	3	Fixed Roof Tank with Wet Scrubber	98%
	4	Fixed Roof Tank with Thermal Oxidation	98%

The BACT analysis, acknowledging that the fixed roof tank options achieve "similar control" as the internal floating roof options, eliminates the fixed roof tanks because the

[34] *See* draft Part 70 Operating Permit, Section X, Table 1. Applicable Louisiana and Federal Air Quality Requirements for EQT00034 (MALS – Marine Loading Scrubber).

[35] *See* draft PSD Permit, pdf 139-142.

control devices require downtime for maintenance and come with added operational and maintenance costs and because thermal oxidization would result in negative impacts (combustion pollutants). Therefore, the BACT analysis determines the first option, *i.e.*, internal floating roof tanks with inert gas blanketing, based on compliance with NESHAP Subpart G (Synthetic Organic Chemical Manufacturing Industry ("SOCMI"): Process Vents, Storage Vessels Transfer Operations, and Wastewater), to be VOC BACT for all eight methanol storage tanks.[36]

This analysis is fundamentally flawed because it exaggerates the control efficiency of internal floating roof tanks (with or without inert gas blanketing) complying with NESHAP Subpart G and fails to analyze all available tank designs and add-on control technologies:

First, the BACT analysis relies on a control efficiency for internal floating roofs tanks of 99%, as shown in the following summary table: [37]

Control Alternatives		Availability/ Feasibility	Negative Impacts (a)	Control Efficiency	Emissions Reduction (TPY)	Capital Cost ($)	Annualized Cost ($)	Cost Effectiveness ($/ton)	Notes
MT-13 - Methanol Product Tank A (EQT0014) **MT2-13 - Methanol Product Tank B (EQT0015)** **MT-1 - Terminal Methanol Product Tank 1 (EQT0022)** **MT-2 - Terminal Methanol Product Tank 2 (EQT0023)** **MT-3 - Terminal Methanol Product Tank 3 (EQT0024)** **MT-4 - Terminal Methanol Product Tank 4 (EQT0025)** **MT-5 - Terminal Methanol Product Tank 5 (EQT0026)**									
VOC	Internal Floating Roof Tank with Inert Gas Blanketing	Yes/Yes	4	99%	-	-	-	-	Accepted
	Internal Floating Roof Tank	Yes/Yes	-	99%	-	-	-	-	Rejected
	External Floating Roof	Yes/No	2, 4	-	-	-	-	-	Rejected
	Fixed Roof with Vapor Capture & Thermal Oxidizer	Yes/No	2, 4	98%	-	-	-	-	Rejected
VOC (Cont.)	Fixed Roof with Vapor Capture & Wet Scrubber	Yes/Yes	-	95%	-	-	-	-	Rejected
	Compliance with NESHAP Subpart G	Yes/Yes	-	-	-	-	-	-	Accepted

(Note: in this summary table, the control efficiency of Fixed Roof with Vapor Capture & Wet Scrubber is indicated as 95% rather than the 98% quoted in the BACT Analysis.)

This assumed 99% control efficiency for internal floating roof tanks is discussed in the text of the BACT analysis, which claims without any support that internal floating roof tanks can reach VOC control efficiencies "as high as 99% percent over fixed roof tanks."[38] This is an unsupported and overly optimistic assumption, presumably based on the higher end of the potential control efficiency identified in AP-42 Chapter 7 of "60 to 99%" depending on the type of roof and seals installed (*see* discussion below) and

[36] *Ibid*.

[37] Draft Permit Package, pdf 164 (Table I: BACT Cost Summary).

[38] *Ibid*.

the type of organic liquid stored.[39] As such, it cannot be relied upon as a guaranteed control efficiency that results in an enforceable BACT emission limit. Importantly, compliance with NESHAP Subpart G does not guarantee a 99% control efficiency.

Second, the BACT analysis fails to analyze all available control options including the use of internal floating roof tanks (with or without inert gas blanketing) with add-on controls (*e.g.*, thermal oxidizer, wet scrubber). Here, the BACT analysis simply asserts, again without any support, that "vapors emitted from floating roof tanks cannot be captured, as this may cause a safety issue with toppling the floating roof."[40] This assertion appears to be a relic from the prior PSD permit, which the BACT analysis in the current Application no longer mentions.[41] Further, this assertion is contradicted within the draft permits themselves, which specify vapor capture for the internal floating roof methanol storage tanks and routing to wet scrubbers with a control efficiency of 98% control.[42] (The Methanol Product Surge Tank does not have a dedicated wet scrubber; instead emissions are routed to the methanol storage tanks at the methanol production facility.[43])

The Applicant recognizes that wet scrubbers are technically feasible but insists that the use of wet scrubbers is only required in nonattainment areas for ozone as Lowest Achievable Emissions Rate ("LAER"), not as BACT in attainment areas for ozone (St. James Parish):[44]

> Yes the application states the following:
> "To further mitigate emissions beyond BACT requirements, SLM has chosen to route methanol storage tank vents to scrubbers, which will have an additional 98 percent VOC control efficiency for tank vent streams."

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[39] EPA, AP-42, 7. Liquid Storage Tanks, June 2020, p. 7.1-9. ("Several methods are used to control emissions from fixed roof tanks. Emissions from fixed roof tanks can be controlled by installing an internal floating roof and seals to minimize evaporation of the product being stored. The control efficiency of this method ranges from 60 to 99 percent, depending on the type of roof and seals installed and on the type of organic liquid stored.")

[40] Draft permit package, pdf 140.

[41] *See* Application, pdf 44-45.

[42] For example, draft permit package, pdf 50, Specific Requirements for CRG 0007 (Terminal MeOH Product Tank Scrubbers) and CRG 0008 (MeOH Product Tank Scrubbers), pdf 170, Statement of Basis (The methanol will be routed from storage tank vents to scrubbers, which will have an additional 98 percent VOC control efficiency for tank vent streams.)

[43] *See*, draft permit package, pdf 165, Table I: BACT.

[44] Draft Permit package, pdf 284.

> I have asked internally in Air Permits whether these scrubbers should be included. There may be another method to address this. SLM will have scrubbers on the tanks to further minimize emissions so they should be included in the permit (the emissions presented in the application include the scrubbers). However, we believe scrubbers are not BACT; they are LAER (which is not required in St. James Parish) so should not be referenced as BACT.

This claim is incorrect since the use of wet scrubbers has been determined as BACT in ozone attainment areas in Louisiana and elsewhere. For example, LDEQ permitted the IGP Methanol, LLC, Gulf Coast Methanol Complex (PSD-LA-820)[45] in Plaquemines Parish, an attainment area for ozone, determining the use of internal floating roof methanol storage tanks routed to a scrubber as BACT, as shown in the following excerpt from the facility's PSD permit:[46]

> **BACT analysis for VOC emissions from loading and tanks**
>
> The produced methanol will be temporarily stored and then loaded onto marine vessels. Methanol has very high affinity with water, so, wet scrubbers are the best control option. The Methanol Storage Tanks, Methanol Product Buffer Tanks, Equalization Tank, and Marine Vessel Loading are subject to control requirements of 40 CFR 63 Subpart G. IGP Methanol proposes to use wet scrubbers to control VOC emissions from the Methanol Product Buffer Tanks (98%), Equalization Tank (95%), and Marine Vessel Loading (98%). The Methanol Storage Tanks will be controlled by internal floating roofs (IFR) in combination with wet scrubbers. These proposed controls are determined as BACT for VOC emissions.

Further, the Southwest Clean Air Agency ("SWCAA") established BACT emissions limits for methanol storage tanks for a similar methanol production facility in Washington State in an ozone attainment area, Northwest Innovation Works Kalama, based on internal floating roof tanks vented to a wet scrubber with a minimum control efficiency of 99%.[47]

Third, several different internal floating roof ("IFR") tank designs exist with respect to a) how the internal floating roof is supported and b) the tank roof type:

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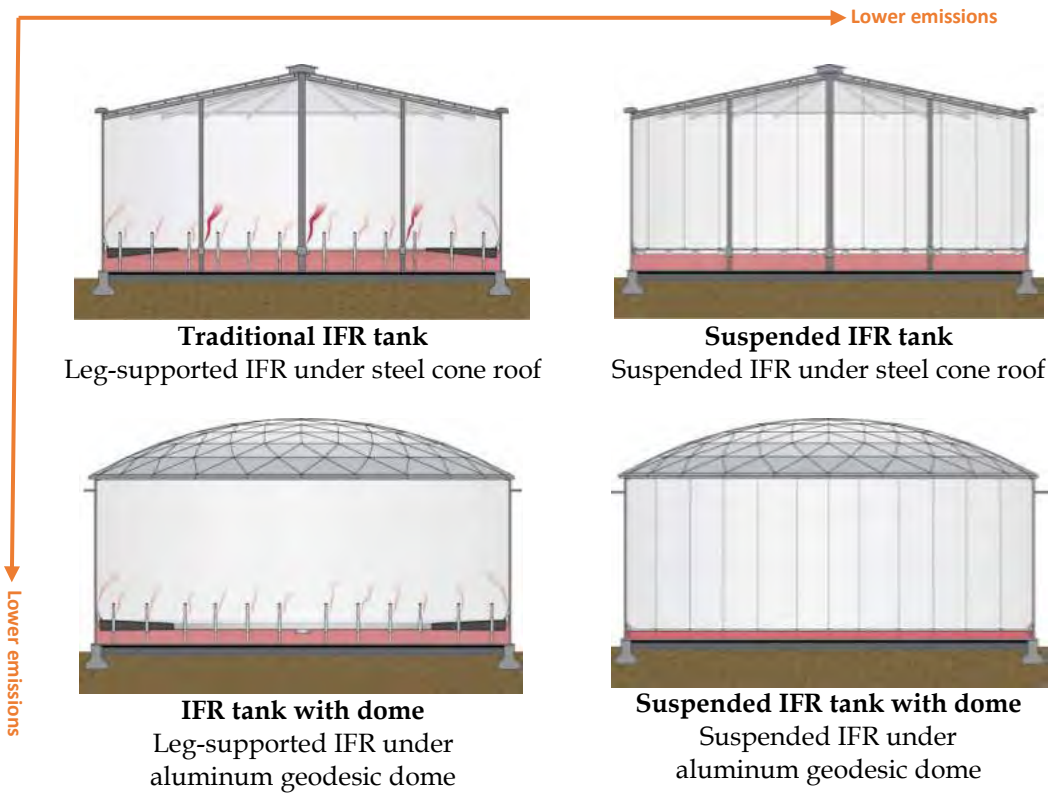
[45] EDMS No. 11217344.

[46] EDMS No. 11217344, pdf 12.

[47] SWCAA, Northwest Innovation Works Kalama, Final Air Discharge Permit ADP 16-3204, SWCAA ID 2455, June 7, 2017, pdf 7 and 16; available at: http://www.swcleanair.org/docs/permits/Final/16-3204ADP.pdf and Technical Support Document, pdf 25; available at: http://www.swcleanair.org/docs/permits/Final/16-3204TSD.pdf.

In general, IFR tanks with dome roofs have lower emissions than cone roofs and IFR tanks with suspended legs have lower emissions than those that are leg-supported, as illustrated in Figure 3.[48]

Figure 3: Emissions from IFR tanks depending on internal support and type of roof



From: Excerpted from: Eickhoff, HMT Inc., Reducing Storage Tank Emissions without Compromising Operational Performance, modified September 9, 2013; available at: https://www.nistm.org/PDF/Morning/Eickhoff.pdf

Here, the BACT analysis fails to address the different types of IFR tanks and the draft permits, without any discussion, simply specify leg-supported IFR tanks rather than evaluating the control efficiency of the types of IFR support (leg-supported vs. suspended) or the types of tank roofs.

LDEQ previously rejected the use of domed roofs:[49]

> LDEQ understands that geodesic domes are typically retrofitted on *external* floating roof (EFR) tanks to minimize the effect of wind on tank seals, as the majority of rim seal vapor losses from such tanks have been found to be wind-induced.[125] Indeed, it appears that the petroleum refinery examples cited by the commenter entailed dome installations on EFR tanks.

[48] Eickhoff, *op. cit.*

[49] EDMS 10693710, pdf 67.

However, irrespective of their use as retrofits on external floating roof storage tanks in the petroleum refinery industry, geodesic roofs are also used in new storage tank installations and can be used for methanol storage tanks.[50]

Fourth, a variety of internal floating roofs constructed from aluminum ("AIFR"), steel, or composite and type of construction exist, which also influence emission rates as summarized in the following table:

	Skin & Pontoon AIFR	Bolted Full Contact AIFR	Steel IFR	Welded Full Contact AIFR	Composite (GRP)
Emissions	Fair	Poor	Good	Best	Best
Capacity	Best	Best	Fair	Best	Best
Speed of Install	Best	Fair	Fair	Fair	Good
Durability	Fair [1]	Fair/Good [2]	Best	Good	Best
Corrosion Resistance	Poor to Good [3]	Poor to Good [3]	Poor to Good [3]	Poor to Good [3]	Best
Can be Suspended	Yes	Yes	No	Yes	Yes
Cost	$$ / $$$	$$ / $$$	$$$$	$$$$	$$$$$

[1] Skin & Pontoon IFRs come in a wide range of weights and qualities; heavy duty skin & pontoon IFRs with bi-directional structure and connections designed to handle high cycles, high flow rates, and dynamic loading can last longer than the tank without major maintenance required
[2] Bolted full-contact IFRs also come in a wide range of qualities and designs; consult manufacturers for more information
[3] Depends on product and whether steel roof is painted / coated

Here, the BACT analysis for the Methanol Complex's methanol storage tanks fails to evaluate these various IFR construction types and their respective impacts on emissions.

In sum, the BACT analysis for the Methanol Complex's methanol storage tanks is substantially flawed and must be revised and establish emission limits based on a minimum 99% control efficiency.

[50] *See*, for example, Methanol.org, Methanol Safe Handling, Technical Bulletin, Materials Selection for Neat Methanol Service, October 2014 (*see* "Aluminum Alloy Floating Roof and Geodesic Dome AST Tank Covers"); available at: http://www.methanol.org/wp-content/uploads/2016/06/Materials-Selection-for-Neat-Methanol-Service_FINAL.pdf; and Ferry Sibarani, Dome Roof with Internal Floating Roof; available at: https://ferrysibarani.wordpress.com/2009/10/23/dome-roof-with-internal-floating-roof/ and Air Raising Process Dome Roof Tank; available at: https://ferrysibarani.wordpress.com/2009/10/29/air-raising-process-dome-roof-tank/.

I.G Emission Limits Are Not Enforceable

Many of the emission limits established in the draft permits are not practically enforceable because they lack specificity and adequate compliance monitoring, testing, recordkeeping, and reporting requirements. Below, I discuss enforceability issues for the methanol terminal loading scrubbers and ammonia slip emissions.

I.G.1 Methanol Terminal Loading Scrubbers

The draft permits establish maximum allowable hourly emission rates for VOC and methanol (a HAP) for the scrubbers serving the marine, rail, and truck loading terminals (MALS, RALS, and TRLS) at 19.26 lb/hr, 1.36 lb/hr, and 0.34 lb/hr, respectively.[51] These emission rates were determined as VOC BACT based on vapor capture, and wet scrubbing capable of achieving 99% control efficiency and compliance with NESHAP Subpart Y (Marine Tank Vessel Loading Operations) and G (SOCMI: Process Vents, Storage Vessels Transfer Operations, and Wastewater).[52] These emission rates are not enforceable. Specifically, the draft permits do not contain adequate monitoring and reporting provisions to demonstrate compliance with these hourly emission rates nor do they ensure that the scrubbers in fact achieve 99% control of VOC and methanol emissions.

a) Marine Terminal Loading Scrubber (EQR0034, MALS)

For the Marine Loading Scrubber, the draft Part 70 Operating Permit contains the following Specific Requirements:

- Nos. 242 through 285 for compliance with NESHAP Subpart Y (Marine Tank Vessel Loading Operations);
- Nos. 286 through 289 for compliance with LAC III.2108 (Marine Vapor Recovery) (these requirements are waived under permit shields requiring compliance with NESHAP Subpart Y);
- No. 290 for compliance with LAC III.507 (Part 70 Operating Permits Program); and
- No. 291 for compliance with LAC III.509 (Prevention of Significant Deterioration).

The draft PSD permit contains no additional Specific Conditions for the marine terminal loading scrubber.[53] The combined effect of these permit requirements in enforcing the

[51] Draft permit package, pdf 31 (Emission Rates for Criteria Pollutants and CO_2e) and pdf 36 (Emission Rates for TAP/HAP & Other Pollutants).

[52] Draft permit package, pdf 145-60 (BACT analysis) and pdf 158 (Specific Conditions, BACT Limit & Maximum Allowable Emissions Rates).

[53] *See* Draft permit package, pdf 153-154.

maximum allowable hourly emission rates for VOC and methanol (HAP) of 19.26 lb/hr from the marine loading scrubber is as follows:

For HAP emissions, the permit conditions for the marine terminal loading scrubber require monitoring, recordkeeping, and reporting of annual emissions to determine compliance with NESHAP Subpart Y (*see* Specific Requirement No. 242). There is no requirement for demonstrating compliance with the maximum allowable hourly methanol emission rates. Further, Specific Condition No. 244 [40 CFR 63.562(b)(3)] requires the reduction of HAP emissions from marine tank vessel loading operations by 98% rather than the scrubber control efficiency of 99% assumed in the calculation of maximum allowable hourly emission rates for methanol.[54] There are no additional permit conditions for VOC that would limit hourly methanol emissions, as discussed in the following.

For VOC emissions, the only additional permit conditions for the marine terminal loading scrubber are found in Specific Conditions 290 and 291:

290	[LAC 33:III.507.H.1.a]	Compliance demonstration method: VOC emissions shall be calculated monthly using Equation 1 of AP-42 Section 5.2, the volume of methanol loaded into barges and ships as recorded per 40 CFR 63.567(j) of Subpart Y, the saturation factor from Table 5.2-1 applicable to the specific type of loading performed, the average daily temperature of the methanol stored in the methanol product tanks during the calendar month in which the loading occurs, and the control efficiency of the scrubber determined in accordance with 40 CFR 63.563(b)(1) and 63.565(d) of Subpart Y.
291	[LAC 33:III.509]	Determined as BACT in PSD-LA-780(M-2): VOC: Use of vapor capture and scrubbing capable of achieving 99 percent recovery, good operating practices to reduce the amount of VOC generated from loading activities, and compliance with NESHAP Y - National Emission Standards for Marine Tank Vessel Loading Operations (40 CFR 63.540).

Neither of these conditions requires adequate compliance monitoring, recordkeeping, or reporting for demonstrating compliance with the maximum allowable hourly VOC emission rate (or the 99% scrubber control efficiency):

Specific Condition No. 290 merely lays out the compliance demonstration method for calculating monthly VOC emission rates, *i.e.*, the formula and assumptions to be used; it does not establish any recordkeeping or reporting requirements on an hourly basis (or monthly basis for that matter). Further, this permit condition requires that the control efficiency of the scrubber be determined pursuant to 40 CFR 63.563(b)(1) of NESHAP Subpart Y, which requires only an "initial performance test." An initial performance test is inadequate for purposes of demonstrating ongoing compliance with the permit's emission limits for the entire operating life of the control equipment.

At first glance, Specific Condition No. 291 appears to restate the VOC BACT requirements; however its vague phrasing merely requires the use of vapor capture and scrubbing "capable of achieving 99 percent recovery," which does not actually translate

[54] EDMS 11856641, pdf 192 (Application, Appx. B, Point Source Description: Methanol Terminal Loading Scrubber Cap).

to "achieving 99 percent recovery." Nowhere in the permit conditions is there a requirement for performance testing, demonstrating that the scrubber achieves 99% control efficiency, nor is this requirement incorporated any condition that would require 99% control be used for estimating VOC emissions from the marine terminal scrubber. (As discussed above, Specific Condition 290 merely incorporates the scrubber control efficiency determined in the initial performance test for purposes of compliance with NESHAP Subpart Y, which only requires a control efficiency of 98%.)

In sum, the permit conditions are inadequate to demonstrate compliance with the maximum allowed hourly emission rates for VOC and methanol at the marine terminal loading scrubber of 19.26 lb/hr based on a scrubber control efficiency of 99%.

b) Rail and Truck Loading Scrubbers (EQR0035, RALS and EQR0036 TRLS)

For the Rail and Truck Loading Scrubbers, the draft Part 70 Operating Permit contains the following Specific Requirements:

- Nos. 87 through 108 for compliance with NESHAP Subpart G (SOCMI Process Vents, Storage Vessels Transfer Operations, and Wastewater);
- Nos. 109 through 112 for compliance with LAC III.2107 (Volatile Organic Compounds—Loading) (these requirements are waived under permit shields requiring compliance with NESHAP Subpart G); and
- No. 113 for compliance with LAC III.509 (Prevention of Significant Deterioration).

The draft PSD permit contains no additional Specific Conditions for the rail and truck terminal loading scrubbers.[55] The combined effect of these permit requirements in enforcing the maximum allowable hourly emission rates for VOC and methanol (HAP) from the rail and truck terminal scrubbers of 1.36 lb/hr, and 0.34 lb/hr, respectively, is essentially the same as for the marine terminal above in that no hourly compliance is required and scrubber control efficiency is only required at 98% (*see* Specific Condition No. 88 (40 CFR 63.126(b)(1)) instead of 99% assumed for estimating emission rates. Moreover, the draft Part 70 Operating Permit contains no condition laying out the compliance demonstration method for calculating VOC emission rates for the rail and truck terminal scrubbers.

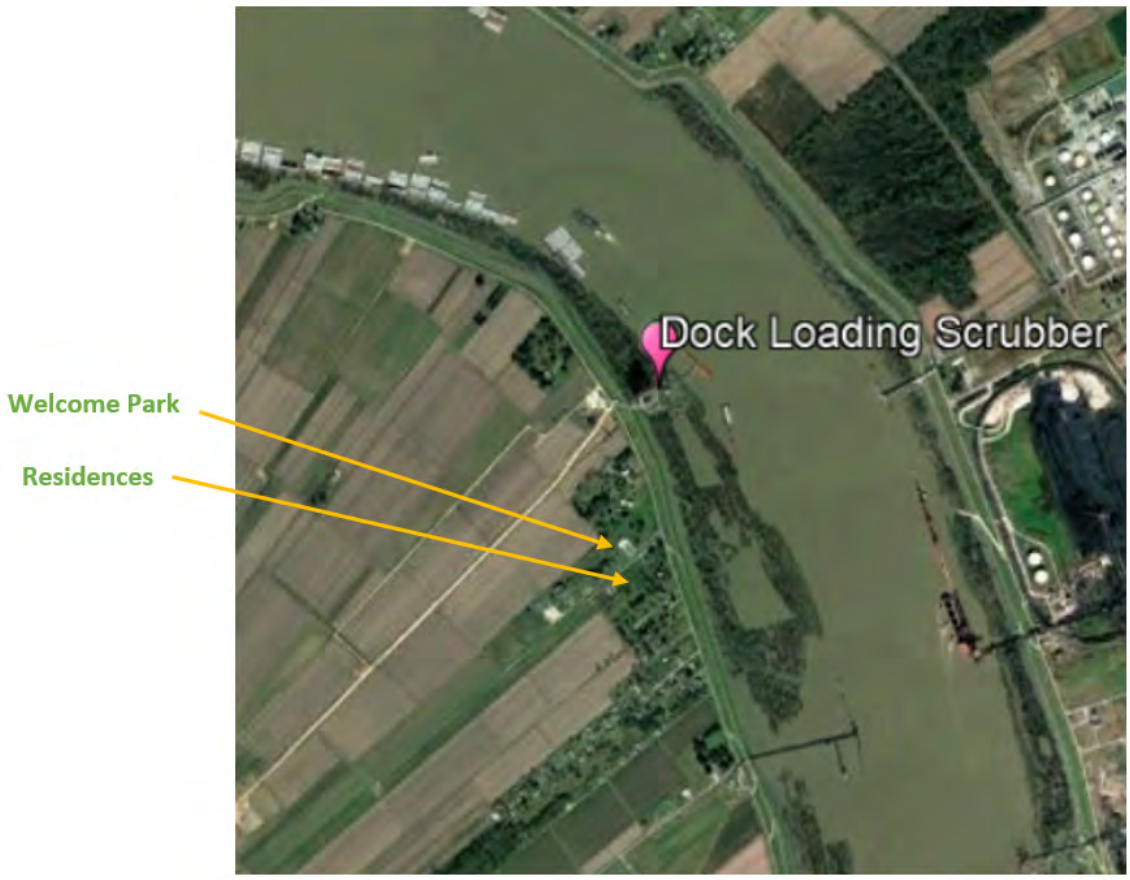
c) Impact on Ambient Air Modeling for Methanol

Because of the lack of enforceable permit conditions, short-term methanol emissions during loading may be considerably higher than the listed maximum hourly emission

[55] *See* Draft permit package, pdf 153-154.

rates for the three terminal loading scrubbers. This is of particular concern for the marine loading scrubber, which would be located near residences and Welcome Park, as shown in Figure 4 below. (The distance to the nearest residential property is less than 750 feet and the distance to Welcome Park is about 1,700 feet.)

Figure 4: Proximity of marine loading scrubber to residences and Welcome Park



Map provided by Todd Cloud, dock location from modeling files

As permitted, the marine loading scrubber accounts for about 30% of maximum hourly methanol emissions from the Methanol Complex with a maximum hourly emission rate of 19.26 lb/hr.[56] The ambient air quality modeling conservatively assumed a scrubber control efficiency of only 98% control for the marine loading terminal, corresponding to a methanol emission rate from of 38.5 lb/hr.[57] However, because there is no requirement in the permit conditions for demonstrating compliance on an hourly basis,

[56] *See* draft permit package, pdf 30-33 (Emission Rates for TAP/HAP & Other Pollutants).

[57] From modeling files "FINAL SCENARIO 1A_2018_METHANOL.LST" or "FINAL SCENARIO 2_2018_METHANOL.LST" for emission source "DOCKSCRUB": (4.8522 g/s) × (3,600 s/hr) / (453.592 g/lb) = **38.51 lb/hr**.

this modeled emission rate may by far underestimate actual emissions at dock. As a result, LDEQ's finding that modeled 8-hour ambient methanol concentrations (280.3 μg/m^3) would not exceed 7.5% of Louisiana's risk-based 8-hour ambient air standard for this pollutant (468 μg/m^3)[58] is not supported and the modeling results do not demonstrate that ambient concentrations of methanol do not exceed the threshold beyond the access-restricted boundary of the Methanol Complex.

Because of the proximity of sensitive receptors, including residences and Welcome Park, methanol emissions from the marine loading dock must be strictly enforced by practically enforceable permit conditions.

I.G.2 Ammonia Slip Emissions

The Methanol Complex production train would operate SCR systems as emission controls on the reformer vent (EQT0001, RV-13) and the two auxiliary boilers (EQT0003, B1-13 and EQT0004, B2-13).[59] Ammonia is injected into SCR systems to induce the catalytic reduction of NOx. To ensure maximum conversion of NOx, ammonia is used in excess of its stoichiometric requirement (the minimum amount required to react with a given amount of NOx). Any unreacted ammonia remaining is released to the atmosphere and is referred to as "ammonia slip." Excessive ammonia emissions can indicate poor SCR system performance.

Although ammonia is not a regulated PSD pollutant, ammonia emissions can nonetheless contribute to condensable particulate, regional haze, and nitrogen deposition. Furthermore, ammonia is a regulated toxic air pollutant pursuant to LAC 33.III.5112, Class III (acute and chronic). (*See* Comment I.E.1.b.) Accordingly, the permit must include enforceable ammonia emission limits for all operating conditions.

The permits recognize ammonia slip from the facility's SCR systems[60] and the supporting Application calculates ammonia emissions based on an ammonia slip of 10 parts per million ("ppm") as provided by SLM.[61] However, the permits do not include any permit conditions related to ammonia slip for the SCR systems operated at the Methanol Complex. The permits must be revised to include enforceable permit conditions for ammonia slip (as a one-hour average) for at least 95% of the time that the SCR is operating and a requirement to submit a plan for monitoring ammonia slip. Further, ammonia slip emissions from SCR systems of less than 5 ppm can readily be

[58] Draft permit package, pdf 13 and pdf 399.

[59] Draft permit package, pdf 114 and 123.

[60] Draft permit package, pdf 112 and 121.

[61] Application, pdf 199, 200, and 201.

achieved and permit limits of 5 ppm are routinely required elsewhere and should be required here to reduce emissions of this toxic air contaminant.

II. 2019 ENVIRONMENTAL ASSESSMENT STATEMENT

As discussed in the following comments, the 2019 EAS submitted by the Applicant in support of the proposed permits fails to satisfy the requirements of the public trustee requirements set forth in Article IX, Section 1, of the Louisiana Constitution. In general, the tone of the 2019 EAS is dismissive of concerns about the impacts of the proposed project and the document is ill-supported and full of disingenuous claims.

To begin with, the 2019 EAS vaguely identifies the location of the Methanol Complex as "on Highway 18, five miles north of St. James, Louisiana;"[62] rather, the facility would be located within St. James community—an area of District 5 that the parish has classified as Residential Growth.[63] Further, this vague description obscures the fact the site is located squarely between and around residential areas and wraps around the only recreational facility and community center in St. James District 5, Welcome Park. The site contains the Welcome Senior Center, a baseball/softball diamond, a basketball court, a pavilion, a playground, a pond, and a walking track.[64]

Substantively, as discussed below, the 2019 EAS fails to adequately address alternatives and impacts on air quality, traffic, noise and light; fails entirely to address impacts on health and safety and greenhouse gas emissions and impacts on climate change; and fails to demonstrate that the social and economic benefits of the facility outweigh the environmental impacts. In sum, the 2019 EAS is inadequate as an informational document.

II.A The 2019 EAS Alternatives Analysis Is Inadequate

The 2019 EAS prefaces its discussion of environmental impacts by asserting that the Methanol Complex is currently under construction and that LDEQ has already determined that construction and operation of the facility is consistent with the public trust requirements set forth in Article IX, Section I, of the Louisiana Constitution. Therefore, the 2019 EAS reckons, it need only analyze the proposed changes to the Methanol Complex's current Title V Permit and PSD Permit, *i.e.*, construction and operation of the proposed methanol export storage and terminal services and other modifications to previously permitted emission units and activities. For environmental

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[62] Draft permit package, pdf 393 (2019 EAS, p. 1).

[63] St. James Parish Council Ordinance 18-02, attached as Exhibit 1.

[64] St. James, Facilities, Welcome Park; available at: https://www.stjamesla.com/Facilities/Facility/Details/Welcome-Park-8.

impacts associated with previously permitted sources at the methanol production facility, the 2019 EAS simply incorporates the environmental assessment statement submitted with the initial application in 2013 ("2013 EAS) and the Supplemental EAS submitted in 2016 ("2016 EAS") by reference.[65] This is not acceptable.

First, the methanol production facility is not "currently under construction," as asserted. The only construction activities on site so far occurred in 2018 and involved only minor site clearing and pouring of a concrete pad for a control building. No construction activities occurred for any of the emission units permitted by LDEQ for the methanol production facility.[66] In April 2020, SLM formally put construction on hold for an indefinite period because of the economic downturn from the coronavirus pandemic with a letter to LDEQ.[67]

Second, the methanol production facility under review before LDEQ is not the same facility analyzed in the 2013 EAS and the 2016 EAS. The proposed extensive modifications to the facility's current permits indicate a redesign of the methanol production train and its layout, which the 2019 EAS and the draft permits only cryptically acknowledge as "updates" to stack parameters and locations for previously permitted sources.[68] Nowhere in the record before the LDEQ does the Applicant acknowledge that the entire methanol production train has been completely redesigned. The only site maps submitted to LDEQ are not detailed enough make out any changes, as shown in Figure 2 (*see* Comment I.D.1 and Figure 5 below.

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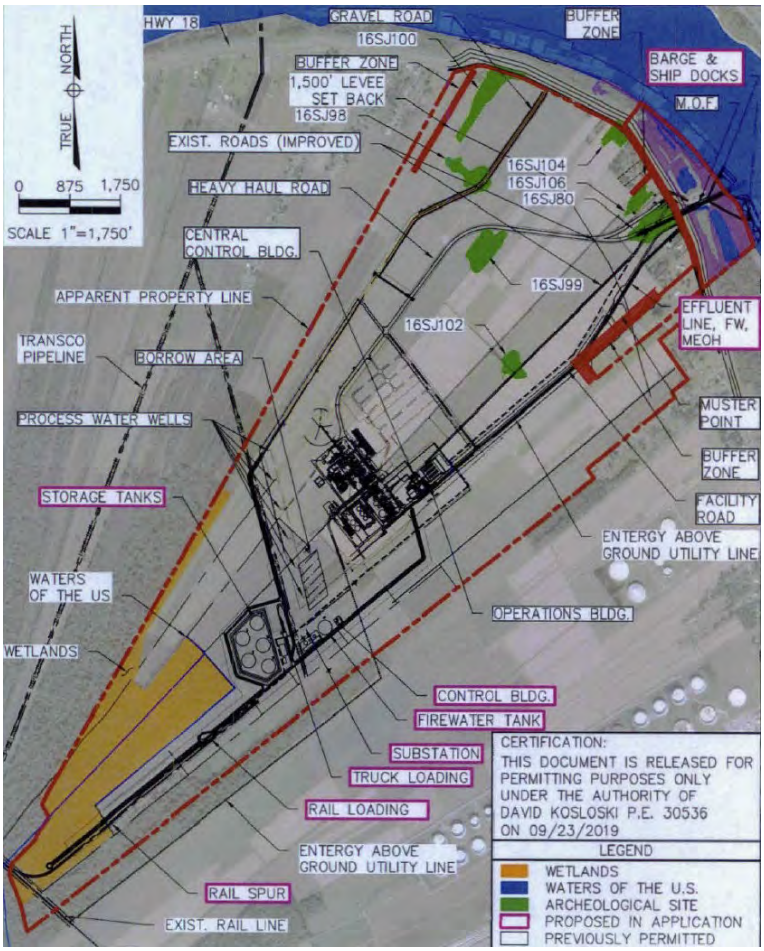
[65] Draft permit package, pdf 393 and 395 (2019 EAS, pp. 1 and 3).

[66] Personal communication with Corinne van Dalen, Earthjustice, November 9, 2020.

[67] EDMS No. 12144013 (Paul Moore, SLM, Letter to LDEQ, Re: South Louisiana Methanol LP, St. James Methanol Plant, AI No. 188074, PSD-LA-780, PSD-LA-780(M-1), and Title V Permit No. 2560-00292-V2, Request for Extension of Construction Discontinuance Period, April 22, 2020.).

[68] EDMS No. 11856641, pdf 2 (Application, p. 2) and draft permit package, pdf 394 (2019 EAS, p. 2).

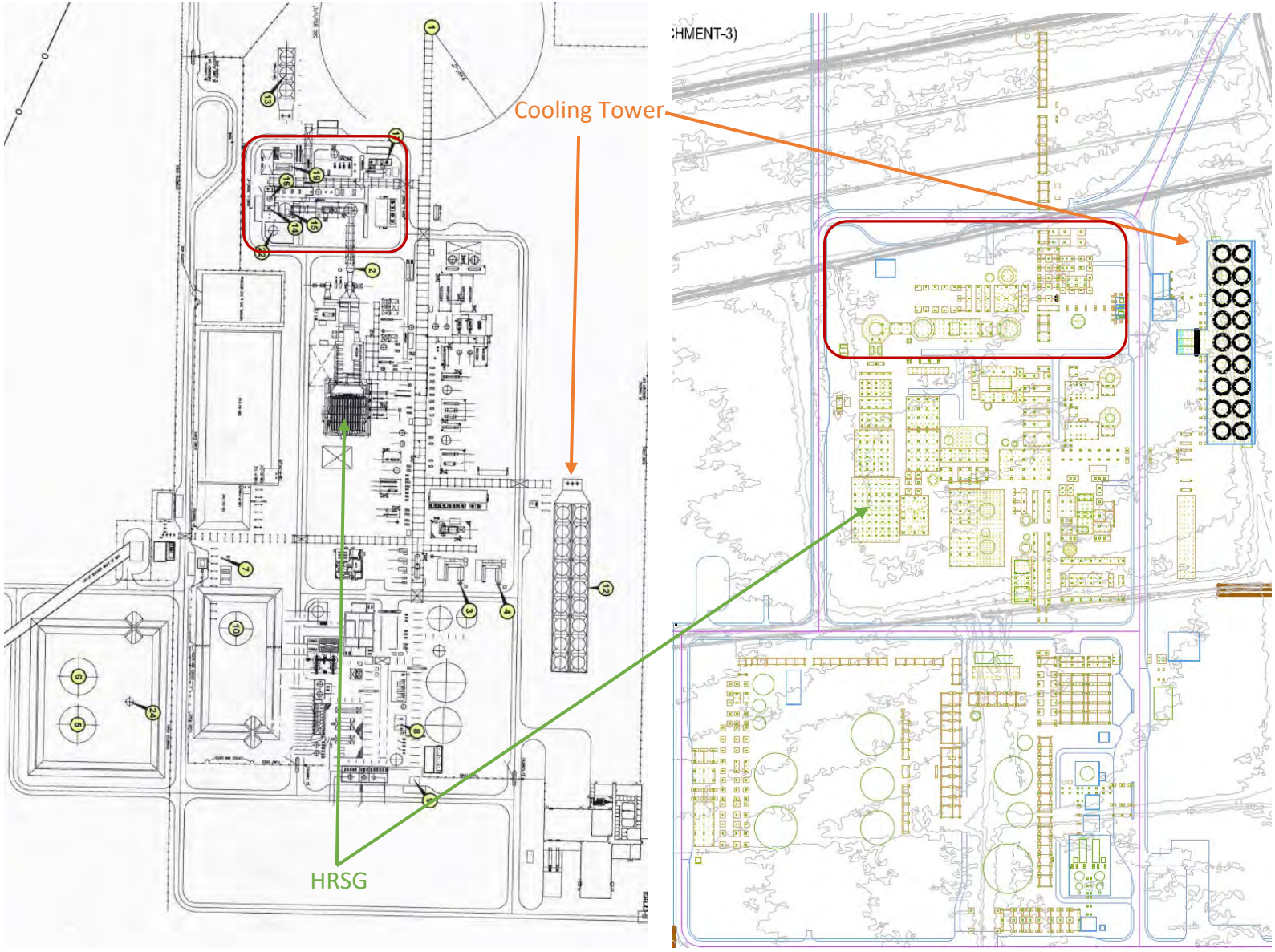
Figure 5: Methanol Complex site map



Excerpted from: 2019 EAS, Sheet No. 1

However, documents submitted by SLM to the Department of Natural Resources ("DNR") and U.S. Army Corps of Engineers ("USACE") to support an application for a Coastal Use Permit ("CUP")[69] clearly show a complete redesign of the methanol production train. The excerpted site maps below show the methanol production train layout as currently permitted by LDEQ (left) and the foundations for the facility in the drainage plan submitted to DNR/USACE (right). Note, for example, the location of the heat recovery steam generator ("HRSG") and the cooling tower in relation to the methanol synthesis area (red outline) and the arrangement of the internal roads encircling the various facility areas.

[69] C. Price Howard, SLM, Letter to Karl Morgan, DNR, and John Herman, USACE, Re: Request for Coastal Use Permit and MVN-2014-00702-CM Permit Modification, South Louisiana Methanol LP, St. James Methanol Plant, St. James Parish, Louisiana, November 8, 2019; available at: http://sonlite.dnr.state.la.us/sundown/cart_prod/cart_crm_application?pcup_num=P20191180&pline_id=1&pshow_appl_email=N.



Excerpted from: EDMS No. 10053134, pdf 245 (same as in EDMS No. 11181908 but more legible) (left) and CUP Application, *op. cit.*, Appx. G, Drainage Impact Study (right)

In sum, because construction of the methanol production plant has not begun and the facility has been completely redesigned, an EAS must address the environmental impacts of the entire Methanol Complex, instead of only looking at the proposed modifications. This requires a completely new alternatives analysis for the Methanol Complex and the 2019 EAS must be revised accordingly. Assuming, *arguendo*, that a new alternatives analysis for the Methanol Complex were not required, the alternatives analysis presented in the 2019 EAS is deeply flawed, as discussed in Comments II.A.1 through III.A.3 below.

Further, the facility as described in the draft permits and subject of the 2019 EAS consists of one methanol production train with a processing capacity of 6,000 metric tons per day (~2.2 million metric tons per year[70]). Nowhere does the 2019 EAS even acknowledge that the Applicant envisions a much larger facility than that currently under review by LDEQ. The Applicant describes this expansion in the application for a land use permit to the St. James Parish Planning Commission as follows:

> In addition, the tracts of property that SLM has invested in would allow SLM to potentially expand the permitted natural gas to liquid products manufacturing facility in the event future circumstances and business conditions make further development and/or expansion feasible. As such, SLM is also requesting approval of any potential future development and/or expansion of the property required to be permitted under the Clean Air Act, in areas on the property as designated in its Application and Supporting Documentation, where such development and/or expansion would result in similar uses of the property, processing natural gas into liquid products, and where such developments and/or expansions are issued permits and authorizations under the Clean Air Act (42 U.S.C.A. §7401, et seq.) authorizing construction and operation of the future development and/or expansion facility. Such approval should also include associated infrastructure and structures, such as, roads, buildings and other structures not required to be permitted under the Clean Air Act.

In fact, the Applicant ultimately plans to construct a facility that is five times larger than that (or more). Specifically, as shown in the excerpt below, SLM's website describes the currently proposed facility as "Train One" with a nameplate capacity production of ~2 million metric tons per year" and states that "[t]he St James site has sufficient space for at least five trains."[71]

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[70] (6,000 metric tons methanol/day) × (365 days/year) = **2,190,000 tons methanol/year**.

[71] SLM, St. James Parish Project; the company since removed the website but a snapshot from October 20, 2020 is available at: https://web.archive.org/web/20201020035155/https://www.southlouisianamethanol.com/st-james-parish-project/.

South Louisiana Methanol

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St. James Parish Project

SLM is in advanced stages of developing a world scale Methanol project in St. James Parish, Louisiana.

The project site in south Louisiana is situated at the nexus of North American petrochemicals production and prolific natural gas plays in Louisiana and Texas, with access to world-class transportation infrastructure, and interstate and intrastate natural gas pipelines.

The St James site has sufficient space for at least five trains and the plant's life is expected to be in excess of 30 years. The first train will produce approximately two million tonnes per annum of methanol, with plant feed natural gas of approximately 65 PJ per annum, for delivery to the United States Gulf Cost petrochemicals market and potentially overseas markets

SLM – Train One

- Nameplate capacity production of ~ 2 million metric tons per annum ("MMTPA")
- ~ $2 billion production facility
- Proven methanol technology based off of existing operating facility; proven CO2 recapture technology
- Front end engineering design completed
- Title V Air Permit has been received
- Strategically located on the Mississippi River in St. James Parish, Louisiana between Baton Rouge and New Orleans
- Seven natural gas pipelines exist within a five mile radius
- Location on the Mississippi River provides access for both barges and deep water vessels
- Land buttressed and with access to major highway and rail line

The EAS before the LDEQ must include an adequate discussion of this potential future expansion of the Methanol Complex and the impacts on the community.

II.A.1 Alternative Projects

The 2019 EAS claims without any support that no alternative projects exist that would offer more protection to the environment than the proposed facility without unduly curtailing non-environmental benefits. Yet, methanol production can employ several synthesis technologies to convert natural gas to methanol with different thermodynamic performance of the plant and conversion efficiencies, and, thus, different emissions per unit of methanol produced. These technologies should have been analyzed but were not. For example, the Methanol Complex would have a methanol production capacity of 6,000 MTPD and emit about 2 million tons per year of

carbon dioxide equivalent ("CO_2e) greenhouse gas emissions[72] In contrast, the Northwest Innovation Works Kalama methanol production facility proposed in Washington State would have a methanol production capacity of 10,000 MTPD and emit about 1 million tons per year of CO_2e greenhouse gas emissions,[73] about a third of the Methanol Complex.[74]

II.A.2 Alternative Sites

The 2019 EAS based its alternatives analysis for the proposed methanol export terminal on the following screening criteria:

- Terminal must be located within a 5-mile radius of the SJMP.
- Location must enable a transportation and distribution network with proximity to customer.
- Location must include highway access, deep water and barge shipping channel access (estimated 40' minimum depth required), and rail access, which will allow shipment via rail as needed.
- Property to support 30 days of methanol storage (approximately 5 x 350,000 bbl methanol tanks).
- Preferred that property have an "Attainment" Air Quality Designation: Locations in areas designated with an Attainment area for air quality lessen potential impacts to air quality in the area.
- Economic viability.
- Minimal wetland impacts.

These screening criteria appear to be predetermined to select the Methanol Complex site as the only viable alternative for the methanol terminal. As such, they are incomplete and self-serving and fail to consider important applicable criteria that should be in included the alternatives analysis, such as:

- Location must avoid impacts to residents and recreational areas to the greatest extent feasible, for example, by requiring a minimum distance to the nearest

[72] Draft permit package, p. 1 (2,023,770 tons/year CO_2e).

[73] *See*, Final Air Discharge Permit Northwest Innovation Works Kalama, *op. cit.*, p. 18, and Technical Support Document for Northwest Innovation Works Kalama, *op. cit.*, p. 1.

[74] SLM: (2,023,770 tons CO_2e/year) / (6,000 MTPD methanol × 365 days/year) = **0.924 ton CO_2e/metric ton methanol**; Northwest Innovation Works Kalama: (1,076,000 tons CO_2e/year) / (10,000 MTPD methanol × 365 years) = **0.295 ton CO_2e/metric ton methanol**; (0.295/0.924) = **0.319**.

sensitive receptor (including residents, hospitals, churches, schools, senior centers, daycare centers, and recreational facilities) of one half of a mile or more;

- Location must not be in an area where existing or permitted industrial sources disproportionately impact minority populations;
- Location must not impact local evacuation routes (*see* Comment II.F); and
- Location must conform with the current zoning requirements established by St. James Parish.

With respect to the SLM's screening criterion that the property be located in an ambient air quality attainment area, this appears to have more to do with the Applicant intent on avoiding the more stringent permitting requirements that would apply in a nonattainment area (for example, the use of LAER, as discussed above, and the requirement to purchase offsets) than with a genuine concern for the air quality in the area and the health impacts on residents.

II.A.3 Alternative Site Layout

The 2019 EAS makes no mention of the fact that sections of the pipeline delivering methanol to the marine terminal and the main facility road would be located very close to Welcome Park (in fact they appear to run straight through the proposed 50-foot tree buffer zone along the north and west side of the park), as shown in Figure 7 below (*See* Comment II.B.2).

The 2019 EAS states that the chosen alternative "would allow trucks to use the existing access roads, adding fewer than two vehicle trips per hour to the estimated traffic pattern, and eliminating any need to build an additional road access to Highway 18 (River Road).[75] The alternatives analysis is not about providing the Applicant with the most cost-effective solution but must consider protecting the public to the greatest extent feasible.

Because of the potentially serious health and safety impacts from an accidental methanol release from tanker trucks traveling on the main facility road (discussed in Comment II.B), an EAS for the facility must consider alternative site layouts. The site is large and provides plenty of alternatives for transport of hazardous chemicals and there is no reason that they be transported close to a recreational facility. Alternatives that must be evaluated include truck access via Highway 3127, which would eliminate potential health and safety impacts on Welcome Park and residents along Highway 18. This alternative access route would also alleviate traffic impacts on Highway 18, which is a two-lane, two-way rural connector with no traffic signals near the proposed

[75] Draft permit package, pdf 414 (2019 EAS, p. 23).

Methanol Complex site and main facility entrance. The residential areas near SLM's site have only one access point—and that is to Highway 18. In the event of an emergency where Highway 18 may be blocked due to an industrial accident, people may not be able to drive to residential areas to help people without transportation escape. The nearby Formosa Sunshine Complex, for example, elected to direct as much construction and operational traffic to Highway 3127 and away from Highway 18. The company will be widening Highway 3127 to minimize the community impacts of traffic associated with the facility's construction and operation and provide a lasting improvement.[76] This approach should be similarly feasible here.

In sum, an EAS for the Methanol Complex must analyze alternative sites for the main facility road traveled by tanker trucks carrying hazardous materials and for the pipeline used to transport methanol to the marine loading terminal to minimize impacts on Welcome Park and nearby residents.

II.B The 2019 EAS Fails to Address Health and Safety Impacts

The Methanol Complex production train, like any industrial facility, has the potential to experience plant upsets and accidental releases, *e.g.*, from tank failures or pipeline ruptures. The facility would require transport and storage of a number of hazardous substances, including large quantities of the toxic chemicals ammonia and methanol (exposure to high concentrations can result in coma or death). Methanol is also a highly flammable and explosive substance and is susceptible to ignition and fire from seasonal lightning strikes.[77] Factors that can lead to upsets and accidental releases include equipment malfunction or failure; human error or fatigue; terrorism, sabotage, or vandalism; floods, storms, and ground settlement; metallic corrosion and/or fatigue, etc. Methanol was involved in catastrophic and lethal industrial and transportation incidents in the past. (*See* Comment II.B.4.) The methanol industry recognizes that recent growth in demand and new users with limited understanding of the high severity potential of methanol represent an increased risk of incidents in this industry sector.[78] In fact, the growing demand appears to have led to an accelerating

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[76] Keh-Yen Lin, FGA LA LLC, Letter to St. James Parish Planning Commission, Re: FGA LA LLC Application and Supporting Documentation Requesting Planning Commission Approval of its Proposed Use and Development of Property in Accordance with the St. James Parish Code of Ordinances Section 86-37, June 25, 2018 (herafter "Formosa Land Use Application").

[77] Robert Smith, Environmental, Health, and Safety Department, Ashland, Inc., Methanol Tank Fires, prepared for presentation at Mary Kay O'Connor Process Safety 2000 Symposium, Texas A&M University, October 25, 2000; available at: http://pscmembers.tamu.edu/wp-content/uploads/2000_smith-ashland.pdf.

[78] Enrique Medina, Methanol Hazards & Safeguards, Lessons Learned From the Global Supply Chain, American Society of Safety Professionals, Program Development, June 2014; available at: https://aeasseincludes.assp.org/professionalsafety/pastissues/059/06/F3Medina_0614.pdf.

occurrence of previously rare, but serious, incidents related to methanol production, storage and transportation. (*See* Comment II.B.4.)

Despite these well-known health and safety risks, the 2019 EAS lacks any discussion of the potential health and safety impacts associated with operation of the Methanol Complex production train and the methanol loading terminals or with tanker trucks, railcars, and ships and barges. The 2019 EAS also fails to address the emergency responses SLM would provide onsite for the Methanol Complex and for on- and off-site methanol transportation accidents.

Neither the 2013 EAS nor the 2016 EAS addressed health and safety risk from upsets at the methanol production train save for one perfunctory sentence simply asserting that "SLM does not expect this project to pose potential health risks to any surrounding neighbors or employees."[79] This mere assertion does not satisfy the public trustee requirements set forth in Article IX, Section 1, of the Louisiana Constitution.

In sum, the 2019 EAS fails as an informational document.

II.B.1 Risks Associated with the Methanol Complex Must Be Disclosed

LDEQ recognizes the entire facility (UNF0001 - SLM - St. James Methanol Plant) as subject to 40 CFR 68 and LAC 33:III, Chapter 59,[80] which requires preparation of a risk management plan ("RMP") and off-site consequence analyses for worst-case and alternative release scenarios. The goal of an off-site consequence analysis is to determine distances to toxic or flammable endpoints from a potential chemical release (*i.e.*, the magnitude of exposure to a specific incident scenario). This information is vital in aiding emergency response crews and company officials with emergency response planning and when responding to an emergency situation. The results from these off-site consequence analyses should have been discussed in the 2019 EAS for review by the affected population but was not.

Agencies frequently require the preparation of very detailed off-site consequence analyses for facilities that have the potential to release hazardous materials and disclose the risks of chemical releases and other disasters in public review documents. For example, the California Energy Commission ("CEC"), the state agency in charge of permitting thermal power plants of 50 Megawatts or more, routinely requires the preparation of off-site consequence analyses for public review. Published off-site consequence analyses include, for example for accidental ammonia releases at the

[79] EDMS No. 8911465 (2013 EAS, p. 9).

[80] Draft permit package, pdf 15 and 18.

Stanton Energy Reliability Center,[81] the LSP South Bay, LLC Replacement Project,[82] the Orange Grove Power Plant Project,[83] and others.[84]

At least one facility under LDEQ's permitting purview has recently provided an off-site consequence analyses with their public trust review document: the EAS for the nearby proposed Formosa Sunshine Complex in St. James Parish discussed the results of an offsite-consequence analysis for several potential onsite failure scenarios; the report is appended to the respective EAS.[85] This analysis identified the distances to impact area endpoints for accidental release scenarios for several onsite stationary sources, including boiling liquid expanding vapor explosion ("BLEVE").[86]

In addition, the Methanol Complex would require deliveries of ammonia and other hazardous chemicals and would export methanol via rail, barge, and marine vessels from the site. Accidental releases of these chemicals can result in injuries and fatalities. Risk analyses for such incidents are typically included in environmental review documents for similar facilities. For example, for the proposed 10,000-MTPD Northwest

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[81] CEC, Application for Certification, Stanton Energy Reliability Center, Docket No. 16-AFC-01, Vol. 2, Appx. 5.5A - Offsite Consequences Analysis, October 26, 2016; https://efiling.energy.ca.gov/GetDocument.aspx?tn=214207-29&DocumentContentId=23438/.

[82] CEC, Application for Certification, LSP South Bay, LLC Replacement Project, 06-AFC-03, Appx. 8.12A, Offsite Consequence Analysis, June 23, 2006; available at: https://ww2.energy.ca.gov/sitingcases/southbay/documents/applicants/afc/SBRP%20AFC%20Volume%202/Appendix%208.12/Appendix%208.12A%20Offsite%20Consequences.pdf.

[83] CEC, Application for Certification, Orange Grove Project, AFC 08-AFC-4, Appx. 6.15A, Offsite Consequences Analysis; available at: https://ww2.energy.ca.gov/sitingcases/orangegrovepeaker/documents/applicant/afc/Volume_3/Section%206.15%20-%20Hazardous%20Materials%20Handling/Appendix%206.15-A_Offsite%20Consequences%20Analysis.pdf.

[84] *See* California Energy Commission at: https://www.energy.ca.gov/search/site?keys=off-site+consequence+analysis.

[85] EDMS No. 11457119 (FG LA, LLC, Supplemental Environmental Assessment Statement for the Sunshine Project, submitted January 7, 2019, pdf 13 and Exhibit R, pdf 59-69).

[86] A BLEVE is an explosion resulting from the failure of a vessel containing a liquid at a temperature significantly above its boiling point at normal atmospheric pressure. A BLEVE occurs when a vessel containing a superheated liquid catastrophically fails, usually as a result of external fire exposure (*i.e.*, a pool fire under the vessel or a jet- or torch-type fire impinging on the vessel wall. (In contrast to a pool fire or a vapor cloud explosion, the liquid within a tank does not have to be flammable to cause a BLEVE. An external fire around a tank or railcar, for example, can heat the tank contents above its boiling point, resulting in an explosion.) *See*, for example, Michael W. Roberts, Analysis of Boiling Liquid Expanding Vapor Explosion (BLEVE) Events at DOE Sites, 2000; available at: http://efcog.org/wp-content/uploads/Wgs/Safety%20Working%20Group/_Nuclear%20and%20Facility%20Safety%20Subgroup/Documents/Analysis%20of%20Boiling%20Liquid%20Expanding%20Vapor%20Explosion%20(BLEVE)%20Events%20at%20DOE%20Sites.pdf.

Innovation Works Kalama methanol plant, the Port of Kalama published three reports with respect to health and safety: a quantitative risk assessment for accidental releases from the methanol production, storage, and vessel loading operations (84 pages); a report on safety and health aspects discussing the hazards posed by natural gas, synthesis gas, methanol, and aqueous ammonia and the facility's emergency response system (31 pages); and a report on a methanol spill simulation involving a large marine vessel (30 pages).[87] For the proposed 3,000-MTPD GTL Methanol Plant in Australia, the permitting agency required the preparation of a quantitative risk assessment after a preliminary risk assessment showed that risk contours indicating unacceptable risks extended beyond the facility property boundary.[88] The agency recommended that the quantitative risk assessment include:

> 1. **The potential for all knock-on/escalation effects associated with the operation of plant as well as the pipeline and loading facility, should be considered in sufficient detail. For the pipeline and loading facility, the potential impact to and from any other dangerous goods pipelines and stores in the vicinity needs to be included.**
> 2. **Calculation of consequences and assessment of risk from all hazardous events associated with the loading operations to determine whether an exclusion zone is required.**
> 3. **Calculation of risk based on the actual inventory likely to be released in a hazardous event taking into consideration the capability and limitations of the emergency shutdown system, such as time required to achieve an isolation.**
> 4. **The possibility of catastrophic failures and full-bore releases of all equipment should be considered.**
> 5. **Verification that a 60-second response time for manual shutdown is achievable.**
> 6. **A list of credible scenarios and a description of each event should be included.**

LDEQ can and should require the Applicant to prepare a comprehensive risk assessment for both stationary and mobile sources for the Methanol Complex and provide a discussion of the results in a revised EAS.

II.B.2 Health Risks Associated with Accidental Release of Methanol

Methanol is harmful by ingestion, inhalation, or through skin absorption and cause temporary or permanent blindness when inhaled, ingested, or passed through the skin. Exposure to high concentrations can result in coma or death. In general, if liquid

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[87] Port of Kalama, Final Environmental Impact Statement, Kalama Manufacturing and Marine Export Facility, September 2016, Appx. G1, G2, and G3; available at: https://kalamamfgfacilitysepa.com/.

[88] GTL Methanol Plant, Burrup Peninsula, Public Environmental Review, 2002, Vol. 3, Appx. M, Preliminary Risk Assessment, by QEST Consulting Group; available at: https://www.epa.wa.gov.au/sites/default/files/PER_documentation/A1438_R1075_PER__Volume%203_Appendix%20M_Prelim%20Risk%20Assessment.pdf.

methanol is present, then methanol vapor in concentrations above toxic limits might also be present.[89,90]

In 2014, SLM provided a brief discussion of the potential health risks of the Methanol Complex to surrounding neighbors in its application for a land use permit to the St. James Parish Planning Commission.[91] The document discusses the results of potential health impacts from a 30,000-gallon release scenario from a railcar in secondary containment, based on the following parameters:

- Quantity released –30,000 gallons
- Released methanol into earthen containment area – 20,000 square feet
- Models were developed with the source at 30°02'19.30"N and 90°51'51.98"W (methanol tank)
- Two nearest residences were selected as threat targets
- Wind, 4 mph at SSE (140) and WSW (260)
- Dispersion models measured at 7 feet above the ground
- All temperatures set at 85 degrees F, humidity set at 85 percent

The excerpt from the Applicant's land use application in Figure 6 shows the results of SLM's modeling.

[89] Medina, *op. cit.*

[90] Methanol Institute, Methanol Safe Handling Manual, 5th Edition; available at: https://3xxngg2wmai7100rss2cgkmj-wpengine.netdna-ssl.com/wp-content/uploads/2020/03/Safe-Handling-Manual_5th-Edition_Final.pdf.

[91] Barry Williamson, SLM, Letter to St. James Parish Planning Commission, Re: South Louisiana Methanol, LP Application and Supporting Documentation Requesting Planning Commission Approval of its Proposed Use and Development of Property in Accordance with St. James Parish Code of Ordinances Section 86-37, April 2014, attached as Exhibit 2.

Figure 6: Ambient concentrations of methanol corresponding to AEGL1 through AEGL3

Figure 6 shows three isopleths (lines) for modeled ambient concentrations of methanol resulting from this release scenario, which the legend indicates correspond to the acute exposure guideline levels ("AEGL"), established by the National Advisory Committee for the Development of Acute Exposure Guideline Levels for Hazardous Substances ("AEGL Committee") as threshold exposure limits for the general public:[92]

- **AEGL-1** is the airborne concentration expressed as parts per million ("ppm") or milligram per cubic meter ("mg/m^3"); of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic, non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

- **AEGL-2** is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects, or an impaired ability to escape.

[92] AEGL Committee, Interim Acute Exposure Guideline Levels (AEGLs), Methanol (CAS Reg. No. 67-56-1), February 2005; available at: https://www.epa.gov/sites/production/files/2014-07/documents/methanol_interim4_february2005_c.pdf.

- **AEGL-3** is the airborne concentration (expressed as ppm or mg/m^3) of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Although the AEGL values represent threshold levels for the general public, including sensitive subpopulations, it is recognized that certain individuals, subject to unique or idiosyncratic responses, could experience the effects described at concentrations below the corresponding AEGL level.[93]

AEGLs for emergency exposure periods were established for a range from 10 minutes to 8 hours. The Applicant chose an exposure period of 60 minutes for modeling the railcar scenario (AEGL 1 of 530 ppm, AEGL 2 of 2,100 ppm, and AEGL3 of 7,200 ppm[94]).[95] Figure 6 above indicates that modeled ambient concentrations corresponding to these AEGLs would not extend beyond SLM's property boundary. Based on these dispersion modeling results, the Applicant concluded that "it does not appear that a release of 30,000 gallons will create a threat to public health." I disagree; on the contrary it appears to indicate that the facility presents a serious threat to the public.

The Applicant's analysis is revealing because it illustrates the large area that would be impacted by a release of only 30,000 gallons of methanol from a railcar into an onsite containment area. Several other release scenarios exist that would result in potentially much more serious impacts with far higher ambient concentrations of methanol:

First, an onsite train derailment can result in methanol release from more than one railcar and also outside of the railcar containment area. Further, an accidental release of methanol can occur anywhere in transit along the rail corridor, which runs directly through communities, *e.g.*, through Donaldsonville in Ascension Parish.

Second, tanker trucks loaded with methanol would travel on the main facility road from the truck loading terminal towards Highway 18.[96] A section of the main facility road towards the main facility entrance runs very close to Welcome Park, where children and adults recreate, and near residences, as shown in Figure 7 below.

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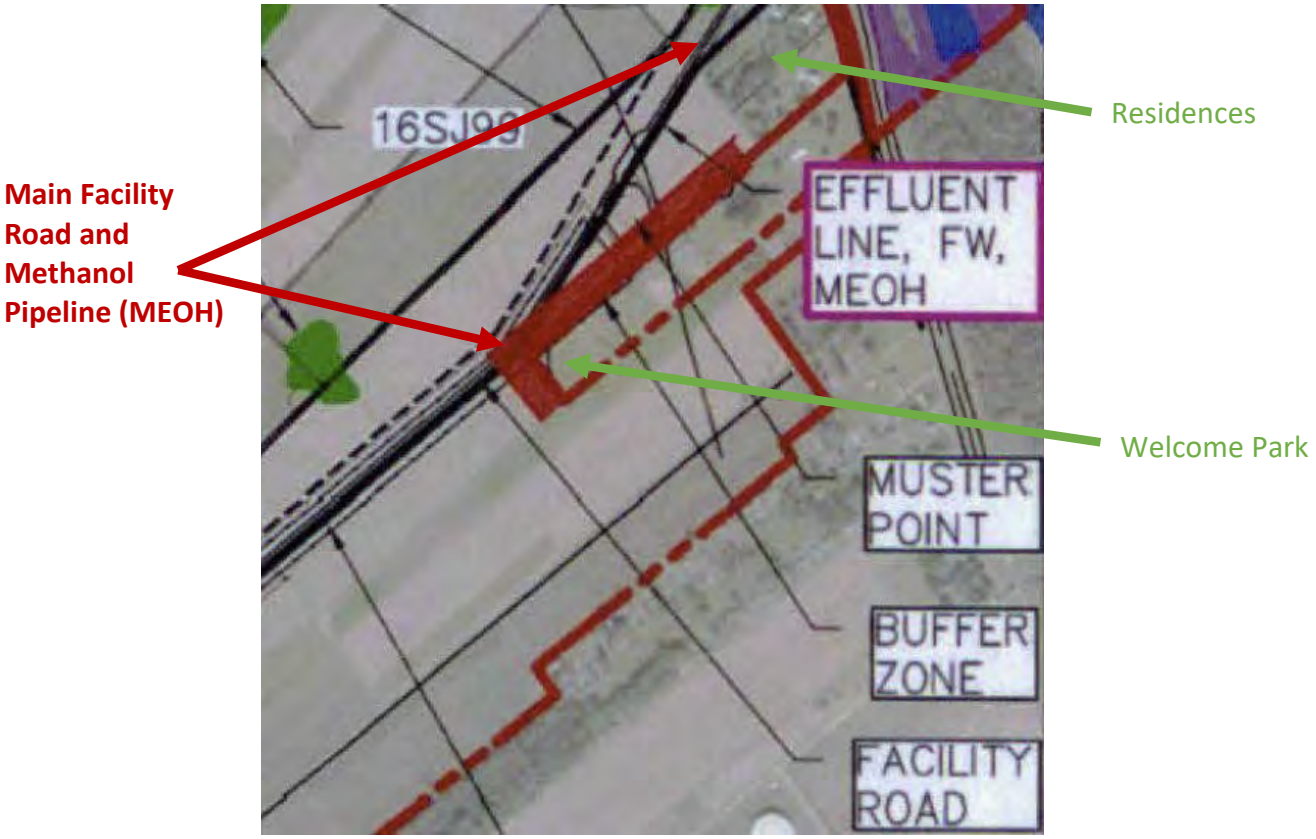
[93] *Id*, p. ii.

[94] National Advisory Committee for Acute Exposure, Guideline Levels for Hazardous Substances, Interim Acute Exposure Guideline Levels (AEGLs) Methanol (CAS Reg. No. 67-56-1), February 2005; available at: https://www.epa.gov/aegl/methanol-results-aegl-program.

[95] Note that the colors indicated in the legend do not correspond to the colors for the isopleths; I have assumed the most conservative interpretation.

[96] Draft permit package, pdf 414 (2019 EAS, p. 23.).

Figure 7: Location of main facility access road and methanol pipeline to marine terminal in relation to Welcome Park



Excerpted from: EAS, SLM Terminal and Storage Project Element Map

A tanker truck accident on the main facility road could easily result in ambient concentrations of methanol high enough to cause serious injuries or death.

Third, the facility would contain eight very large methanol storage tanks with capacities between 1.3 million and 13.2 million gallons,[97] which have the potential to release substantially more than the modeled scenario of 30,000 gallons. A large release or catastrophic failure of one or more of these methanol tanks could therefore result in ambient concentrations by far exceeding those modeled above, possibly exceeding all AEGLs at Welcome Park and the nearest residences and beyond and result in serious health risks or death. This is not a far-fetched scenario because of the Methanol Complex's location in an area that faces the increasing frequency and intensification of tropical storms and hurricanes. For example, during Hurricane Harvey, some

[97] Draft permit package, pdf 25.

80,000 gallons of methanol spilled from a tank rupture at the Channel Biorefinery & Terminals in Texas.[98]

In sum, the 2019 EAS, is severely deficient and must be revised to address health risks resulting from accidental methanol releases.

II.B.3 Fire and Explosion Risks Associated with Methanol Storage and Transport

Methanol is a highly flammable and toxic liquid whose hazardous properties can result in incidents with substantial human and material impacts. Methanol retains its flammability even at dilute solutions (a 25% methanol solution in water is considered to be a flammable liquid). Methanol is easily ignited and can cause explosions. Because methanol vapors are slightly denser than air, they can pool or migrate near the ground and ignite.[99]

In the event of accidents, first responders are advised to treat methanol as highly flammable and highly toxic. The 2020 edition of the *Emergency Response Guidebook* published by the U.S. Department of Transportation and Transport Canada recommends an immediate isolation distance of 150 feet in all directions. So-called "running fires" may be expected with large volume releases and flashback can be expected. Running fires are particularly hazardous if allowed to flow into sewers and drains. In the event of an accidental release as a result of derailment of a railcar or truck or some other circumstance that compromises containment, the guidebook recommends that responders isolate and consider evacuating in all directions from the release to a radial distance of one half mile. Ignition sources must be eliminated to a distance of at least one-half mile.[100] Again, it will be difficult (if not impossible) to evacuate people from nearby residential areas if Highway 18 is blocked due to the emergency event.

Methanol burns with a non-luminescent flame, which may be invisible in bright sunlight. Responders should be equipped with infrared devices that allow remote heat and relative temperature detection. The Methanol Institute, the global trade association for the methanol industry, recommends it as highly desirable "to have this capability overhead in an emergency response helicopter, if at all possible.[101]

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[98] Frank Bajak, Associated Press, Hurricane Harvey's Toxic Impact Deeper than Public Told, March 23, 2018; available at: https://apnews.com/article/e0ceae76d5894734b0041210a902218d.

[99] Medina, *op. cit.*

[100] U.S. Department of Transportation and Transport Canada, 2020 Emergency Response Guidebook, p. 109; available at: https://tc.canada.ca/sites/default/files/2020-08/PDF%20English.pdf.

[101] Methanol Safe Handling Manual, 5th Ed., *op. cit.*, p. 42.

For transportation purposes, methanol has similar properties as ethanol and the precautions for rail and tanker truck transport are much the same as those for ethanol and gasoline. Methanol tanker cars are known to BLEVE (Boiling Liquid Expanding Vapor Explosion, an instantaneous tank failure and catastrophic release and ignition of vapor) when involved in flames and/or when subject to high radiant heat flux.[102]

II.B.4 History of Industrial and Transportation Accidents Involving Methanol

Although there have been many reported significant incidents of spills involving methanol, including fires and explosions, no comprehensive list of incidents and accidents exists. Incident data from 1998 through 2011 compiled by the Methanol Institute shows that fires or explosions account for 81% of all incidents, and spills represent 14%. Industrial methanol users and the transportation sector together account for more than four out of every five incidents reported and 88% of all fatalities; transportation-related accidents accounted for the highest number of casualties, with 54% of all fatalities.[103] Several serious incidents occurred since. The following discusses some notable incidents involving methanol storage and transportation.

a) Vessel Transport

In 2012, the tanker Bunga Alpinia was berthed at the Petronas methanol jetty on the small island of Labuan in Malaysia and had loaded about 6,000 tons methanol, when fire broke out during a thunderstorm. The fire quickly turned into a raging inferno sparking off at least three major explosions that could be felt about 5 miles away. The explosions caused damages to windows about 1,700 feet away and required evacuation of some 1,000 residents. The accident claimed the lives of five crewmembers and destroyed the two-year old ship.[104,105,106]

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[102] Methanol Safe Handling Manual, 5th Ed., *op. cit*.

[103] Methanol Safe Handling Manual, 5th Ed., *op. cit*.

[104] Quintella Koh, Rigzone, IEM: Fatal Accident on MT Bunga Alpinia Yet Another Unfortunate Incident , August 12, 2012; available at: https://www.rigzone.com/news/oil_gas/a/119952/iem_fatal_accident_on_mt_bunga_alpinia_yet_another_unfortunate_incident/

[105] Officer of the Watch, Tanker Bunga Alpinia Inferno, July 27, 2012; available at: https://officerofthewatch.com/2012/07/27/tanker-bunga-alpinia-inferno/.

[106] Paul Hancock, Bunga Alpinia, July 26, 2012; available at: https://shipwrecklog.com/log/2012/07/bunga-alpina/

From: gCaptain, Bunga Alpinia Death Toll Rises to Three, July 27, 2012; available at: https://gcaptain.com/bunga-alpinia-explosion-death-toll/

From: Rob Almeida, Chemical Tanker Explodes Off Malaysia, Fire Now Threatens Nearby Methanol Silo [UPDATED], July 26, 2012; available at: https://gcaptain.com/tanker-explodes-malaysia-fire/

b) Rail Transport

In February 2003, a Canadian National freight train derailed 22 of 108 cars in Tamaroa, Illinois, while traveling at 40 mph on a main line rail line. This accident was caused by a rail failure. Of the 108 railcars being transported, 76 were loaded and 32 were empty.

The damaged train cars contained hydrochloric acid, vinyl chloride, methanol and methanol/formaldehyde mixtures. Four of derailed cars released methanol and the methanol from two of the derailed cars fueled a fire that burned for about 24 hours necessitating the evacuation of about 1,000 residents. Local officials assessed $500,000 in damage to nearby roads and culverts.[107,108]

From: Arnold Wyrick, KFVS12, Railroad Settles Lawsuit with Tamaroa Residents Six Years After Derailment, March 10, 2009; available at: https://www.kfvs12.com/story/9981940/railroad-settles-lawsuit-with-tamaroa-residents-six-years-after-derailment/

c) Truck Transport

In 2012, a tanker hauling methanol jack-knifed on Interstate 35 in Texas. Another 18-wheeler then hit the tanker, setting it ablaze. Due to the intensity of the fire, which burned for almost three hours, and the volume of fuel, the fire was allowed to burn down before firefighters from three counties approached it. The accident closed the northbound lanes of the highway for the better part of the day to remove the remove wreckage and inspect the road for damage.[109]

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[107] Dustin Duncan, The Southern, Aging Rail Tank Cars Carry Big Risk, updated December 4; available at: https://thesouthern.com/news/local/aging-rail-tank-cars-carry-big-risk/article_6c1aeabc-5a4c-11e3-b820-0019bb2963f4.html

[108] G. Adams, T. Mintz, M. Necsoiu, and J. Mancillas, U.S. Nuclear Regulatory Commission, Analysis of Severe Railway Accidents Involvin Long Duratoin Fires, February 2011; available at: https://www.nrc.gov/docs/ML1106/ML110620107.pdf.

[109] CBS Local, DFW, Tanker Truck Fire Stops Traffic In Alvarado, April 27, 2012; available at: https://dfw.cbslocal.com/2012/04/27/tanker-truck-fire-shuts-down-highway-in-alvarado/.

From: CBS Local, DFW, Tanker Truck Fire Stops Traffic In Alvarado, April 27, 2012; available at: https://dfw.cbslocal.com/2012/04/27/tanker-truck-fire-shuts-down-highway-in-alvarado/

In June 2020, a methanol tractor-trailer in Colorado rolled over and lost its cargo. Most of the methanol either evaporated or soaked into the ground. The accident caused a seven-mile stretch of the two-lane road to be shut down for 6 hours. Residents of 88 homes within half a mile of the crash were evacuated.[110]

Most recently, in October 2020, an overturned methanol tanker truck on a two-lane road in Texas caused an hours-long closure. While the methanol tank itself was not breached, the methanol needed to be offloaded into another tanker before the accident scene could be cleared.[111]

d) Industrial Facilities

Between 1989 and 1996, three facilities of the Ashland Distribution Company and Ashland Specialty Chemical Company ("Ashland") in Plaquemine, LA, Tampa, FL, and Savannah, GA, experienced serious tank fires involving bulk methanol storage during

[110] CBS Denver, Rolled Semi Shuts Down Rabbit Ears Pass for Six Hours, Forces Evacuations, July 14, 2020; available at: https://denver.cbslocal.com/2020/07/14/rolled-semi-rabbit-ears-pass-closure-evacuations-methanol/.

[111] Overturned Methanol Tanker Causes Road Closure, Hazmat Cleanup, October 15, 2020; available at: https://www.hazmatnation.com/news/overturned-methanol-tanker-causes-road-closure-hazmat-cleanup/.

thunderstorms. It was determined that lightning, low tank inventories, and the tank venting design resulted in ignition with subsequent fire and tank damage.[112]

In 2012, at another Ashland facility in Garland, Texas (sold to Nexeo Solutions the year before) methanol was being offloaded from a railcar when an overflow tank exploded. The fire burned through roughly 10,000 gallons of methanol and several loud explosions occurred while the fire burned through adjacent containers. Nearby railcars also contained chemicals that posed a significant risk of exploding. The plume of smoke from the fire rose to 7,000 feet. An area about the size of a quarter mile around the facility was evacuated because of concerns the fire would spread and possibly cause additional explosions.[113,114,115,116]

Garland Chemical Plant Fire, November 16, 2012; available at: https://dfw.cbslocal.com/photo-galleries/2012/11/16/garland-chemical-plant-fire/

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[112] Frank Heinz, NBCDFW, Chemical Facility on Fire in Garland, published November 16, 2012, updated November 17, 2012; available at: https://www.nbcdfw.com/news/local/industrial-facility-on-fire-in-garland/1938935/.

[113] Frank Heinz, NBCDFW, Chemical Facility on Fire in Garland, published November 16, 2012, updated November 17, 2012; available at: https://www.nbcdfw.com/news/local/industrial-facility-on-fire-in-garland/1938935/

[114] CBS Local, DFW, Massive Explosion & Chemical Fire at Garland Plant, November 16, 2012; available at: https://dfw.cbslocal.com/2012/11/16/massive-explosion-chemical-fire-at-garland-plant/.

[115] The Dallas Morning News, Cleanup Begins at Site of Large Chemical Plant Explosion in Garland, November 17, 2012; available at: https://www.dallasnews.com/news/2012/11/18/cleanup-begins-at-site-of-large-chemical-plant-explosion-in-garland/.

[116] EPA, Nexeo Solutions; available at: https://response.epa.gov/site/site_profile.aspx?site_id=8303.

In 2006, an explosion and fire occurred at a wastewater treatment plant in Daytona Beach, Florida, killing two employees and severely burning a third. Maintenance workers using a cutting torch on a roof above the methanol storage tank accidentally ignited vapors coming from the tank vent. The flame flashed back into the storage tank, causing an explosion inside the tank that precipitated multiple methanol piping failures and a large fire that engulfed the tank and workers.[117]

Most recently, in December 2019, an explosion occurred inside a methanol storage tank during inspection in the state of Gujarat in India, resulted in five deaths. According to local police, the blast occurred just 500 meters (1,700 feet) away from storage tanks belonging to Indian Oil which contained large quantities of petroleum.[118,119]

Excerpted from: Hazardex, *op. cit.*

II.C The 2019 EAS Fails to Adequately Address Air Quality

The 2019 EAS provides a 5-page discussion of the project's impacts on air quality, which essentially consists of summaries and excerpts from the draft permits for Methanol Complex's stationary emissions units permitted by LDEQ for compliance with the

[117] U.S. Chemical Safety And Hazard Investigation Board, Investigation Report No. 2006-03-I-FL, , Methanol Tank Explosion And Fire, (2 Dead, 1 Critically Injured), Bethune Point Wastewater Treatment Plant, City of Daytona Beach, Florida, January 11, 2006, March 2007; available at: https://www.hsdl.org/?view&did=234992.

[118] HazardEx, Four Dead after Methanol Tank Explosion in India, January 3, 2020; available at: http://www.hazardexonthenet.net/article/176310/Four-dead-after-methanol-tank-explosion-in-India.aspx.

[119] Fire Direct, India – Five Dead In Methanol Fire At Gujarat's Kandla Port & Refinery Chemical Storage Terminal, January 1, 2020; http://www.firedirect.net/index.php/2020/01/india-five-dead-in-methanol-fire-at-gujarats-kandla-port-refinery-chemical-storage-terminal/.

federal Clean Air Act.[120] This discussion does not satisfy the requirements of Louisiana's public trustee doctrine because it fails to recognize and analyze emissions from sources other than those requiring a stationary source permit from LDEQ. Specifically, substantial amounts of criteria pollutants, diesel particulate matter, and greenhouse gases would be emitted by fuel combustion in mobile sources during the multi-year construction period of the Methanol Complex (from construction equipment, haul trucks, and worker vehicles) and during the operational phase of the project from methanol transport from the proposed new methanol export terminals (from locomotives, trucks, ships, and barges).

Further, the 2019 EAS fails to analyze the cumulative impacts of the construction of nearby proposed facilities, *e.g.*, the Yuhuang Chemical Inc. Methanol Plant, the Formosa Sunshine Complex, and other industrial facilities in the area, which may occur concurrently. The impacts on air quality from these emission sources and associated health risks must be analyzed in a revised EAS.

LDEQ should require SLM to prepare a health risk assessment for emissions from stationary and mobile sources during the multi-year construction period and decades of operation.

II.C.1 Construction Emissions

SLM estimated that construction of the Methanol Complex production train would take about three years.[121] The company provided no information about the time required to construct the Methanol Complex production train and the new methanol loading terminals. During these several years of construction, the combustion of fuel in heavy-duty construction equipment, haul trucks, and construction worker commuter vehicles on site and in route to and from the Methanol Complex site would result in substantial amounts of criteria pollutants, hazardous air pollutants, and harmful diesel particulate matter ("DPM"), affecting local and regional air quality and the health of residents.

Diesel exhaust, which consists of gases and soot (particles), is of particular concern and is a recognized human carcinogen.[122] While *new* diesel-fired construction equipment has been subject to increasingly stringent federal non-road regulations, with phase-in

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[120] Draft permit package, pdf 395-400 (EAS, pp. 3-8).

[121] Barry Williamson, SLM, Letter to St. James Parish Planning Commission, Re: South Louisiana Methanol, LP Application and Supporting Documentation Requesting Planning Commission Approval of its Proposed Use and Development of Property in Accordance with St. James Parish Code of Ordinances Section 86-37, April 2014, Figure 5: SLM Project Details Timeline, attached as Exhibit 2.

[122] *See*, for example, EPA, Clean Diesel, Construction and Agriculture; available at: https://www.epa.gov/cleandiesel/construction-and-agriculture.

schedules starting in 1996, *existing* equipment in construction fleets remains unregulated at the federal level.[123] Some states and regional authorities have developed, or are in the process of developing, programs addressing emissions from existing construction (and other off-road) equipment (including California,[124] Oregon,[125] Massachusetts,[126] and states in the north east[127]), however, Louisiana does not appear to be among them. Because diesel engines, especially those with higher power ratings and larger displacement in heavy-duty equipment (*e.g.*, in graders, scrapers, bulldozers) can last for decades, many fleets still contain equipment that is not regulated or meet only the minimum standard of nonroad diesel engine emission standards.[128,129] The use of this older equipment can result in substantial emissions (including harmful DPM), as

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[123] For a summary, *see* DieselNet, Emission Standards, United States: Nonroad Diesel Engines; available at: https://dieselnet.com/standards/us/nonroad.php.

[124] California Air Resources Board, In-Use Off-Road Diesel-Fueled Fleets Regulation; available at: https://ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation.

[125] Oregon Department of Environmental Quality, Oregon Clean Diesel Initiative; available at: https://www.oregon.gov/deq/aq/programs/Pages/Diesel-Initiative.aspx.

[126] State of Massachusetts, Department of Transportation, MassDOT Specification for Retrofitting Diesel Equipment; available at: https://www.mass.gov/massdot-specification-for-retrofitting-diesel-equipment.

[127] Northeast Diesel Collaborative, Construction, NEDC Clean Construction Workgroup; available at: https://www.northeastdiesel.org/construction.html.

[128] The useful life of construction equipment, *i.e.*, the age at which half the equipment of a given model year has been retired, can exceed 30 years. *See* Union of Concerned Scientists, Digging Up Trouble: The Health Risks of Construction Pollution in California, November 2009, p. 4; available at: https://www.ucsusa.org/resources/digging-trouble#ucs-report-downloads.

[129] *See*, for example, EPA providing grants and rebates under the Clean Diesel Funding Assistance Program; available at: https://www.epa.gov/cleandiesel; Phil Lewis and Apif Hajji, Evaluation of Construction Equipment Fleets through Fuel Use and Emissions Inventories, Ninth Asia Pacific Transportation Development Conference, Chongqing, China, June 29 to July 1, 2012 ("The purpose of this paper is to evaluate the current status of the nonroad diesel construction equipment fleet for the City of Stillwater, Oklahoma by developing and analyzing a fuel use and emissions inventory… approximately 20% of the fleet is over 20 years old and almost 75% of the fleet is either unregulated or meets only the minimum standard of nonroad diesel engine emissions standards."); available at: https://ascelibrary.org/doi/10.1061/9780784412299.0017; Tom Jackson, Equipment World, Engine Repowers: The Complicated Business of Putting a New Diesel in an Old Machine, July 11, 2017 (Discussing retrofits: "The good news is that in most of the country you can still do a like-for-like swap, … "); ; available at: https://www.equipmentworld.com/engine-repowers-the-complicated-business-of-putting-a-new-diesel-in-an-old-machine/; Oregon Regional Workgroup, Clean Air Construction Standards Taking Local Action for Health and Cleaner Air, November 13, 2018 (discussing statewide standards for phase-out of unregulated engines in construction equipment by 2021); available at: https://www.portlandoregon.gov/brfs/article/702876; and Massachusetts Department of Environmental Protection, Massachusetts 2016 Diesel Particulate Matter Inventory, April 2018; available at: https://www.mass.gov/files/documents/2018/04/24/Massachusetts-2016-Diesel-Particulate-Matter-Inventory-Report-April-23-FINAL.pdf.

anyone who has ever witnessed black soot belching from diesel exhaust stacks can imagine. Clouds of soot emitted by construction equipment at the site can travel downwind for miles and drift into populated areas.[130]

The Methanol Complex project would require substantial onsite cut-and-fill work as well as import of large quantities of materials such as aggregate and concrete to the site.[131] Heavy-duty trucks delivering these materials, construction equipment, and facility components to the site would emit diesel exhaust into communities on their way along Highway 18.

II.C.2 Emissions from Trucks, Rail, Marine Vessels, and Barges

Substantial emissions of both criteria pollutants (including ozone precursors and particulate matter), hazardous air pollutants, and diesel particulate matter would also be emitted with the combustion exhaust from mobile sources during the operational phase of the Methanol Complex project. These emissions include tanker trucks and locomotives hauling railcars loaded with methanol (and empty on their way back), and the ships, barges, and tugboats that are involved in exporting methanol from the site.

II.C.3 Control of Emissions from Methanol Storage Tanks

The 2019 EAS claims that SLM would minimize emissions beyond BACT requirements by installing scrubbers on the methanol tank vents, claiming that this combination "is not required by any regulation and surpasses any control technology currently being used by other methanol storage facilities."[132] This is incorrect, as discussed previously. (*See* Comment I.F.)

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[130] Janet Wilson, Los Angeles Times, Dire Health Effects of Pollution Reported, December 6, 2006; available at: https://www.latimes.com/archives/la-xpm-2006-dec-06-me-dig6-story.html (citing Don Anair, author of the Union of Concerned Scientists report Digging up Trouble, *op. cit.*, "Clouds of soot emitted by 750-horsepower excavators can travel downwind for miles, then drift into heavily populated areas…").

[131] For the Methanol Complex production train: USACE, MVN-2014-00702-CM, October 22, 2018; available at: https://www.mvn.usace.army.mil/Missions/Regulatory/Public-Notices/Article/1668669/mvn-2014-00702-cm/; ("Approximately 1,114,054.00 cubic yards material will be excavated and placed back on site, and approximately 666,073.00 cubic yards of gravel, concrete, rock, and earthen fill material will be hauled in and used as fill for the project."). For the methanol loading terminals: USACE, MVN 2014-00702-CM, May 25, 2020; available at: https://www.mvn.usace.army.mil/Missions/Regulatory/Public-Notices/Article/2194380/mvn-2014-00702-cm/; ("Approximately 300,000 cubic yards of dredged material will be deposited back into the river below the 55-foot contour, and approximately 83,315 cubic yards of native material will be excavated and re-deposited on site. Additionally, approximately 277,293 cubic yards of hauled in topsoil, sand, rock, and aggregate material will be placed on site.").

[132] EAS, pp. 4-5.

II.C.4 Storage and Terminal Emissions Previously Permitted by Third Party

SLM originally planned to utilize an existing third-party facility, the nearby NuStar Terminals facility, for storage and terminal services, which would have required construction and operation of storage and loading infrastructure dedicated for the Methanol Complex. The 2019 EAS argues that methanol emissions from methanol storage and terminal service have already been considered and permitted by LDEQ and the proposed modifications at the Methanol Complex would, in effect, just replace them:

> To be viable, a methanol production facility like SJMP requires storage and terminal services to store and load the methanol product onto ships, barges, rail, and trucks for offsite shipment to customers. SLM originally planned to utilize an existing third-party facility for storage and terminal services. This option would have required construction and operation of storage and loading infrastructure dedicated for the SJMP. The third-party amended its Title V air permit to authorize the construction and operation of the necessary infrastructure, but subsequently, the third-party did not move forward with construction and allowed the authorization to construct the required infrastructure to expire. As a result, SLM and the third-party were unable to reach reasonable commercial terms as initially planned. However, the methanol emissions from the nearby third-party storage and terminal operations have, in effect, already been considered and permitted by LDEQ. With the permit modification requested here, the previously permitted emissions for the third-party storage and terminal services are in effect being replaced with the emissions related to the Terminal as set forth in the application for modification.

This discussion is irrelevant and deceptive. Emissions from the NuStar Terminal facility would have occurred in a different location and would not be the same for the residents of St. James (*i.e.*, Welcome and Freetown) and users of Welcome Park. Further, criteria pollutant and hazardous/toxic air pollutants are not only emitted the facility's permitted sources but also with the combustion emissions from trucks, railcar, ships, and barges, which do not require a permit from LDEQ. These emissions, which contain diesel particulate matter, a known carcinogen, contribute to health risks from hazardous/toxic air pollutants. (*See* Comment II.C.1.)

Further, the 2019 EAS argues that the proposed Methanol Complex's design incorporates emissions control technologies that are superior to those incorporated in the third-party design. This is incorrect. According to the 2019 EAS, SLM proposes to install scrubbers as control equipment with a control efficiency of 98% for storage tanks vent streams and of 99% for loading emissions from the rail, truck, and ships, and barges terminals.[133] (As discussed in Comment I.G.1, the actual control efficiency of the

[133] Draft permit package, pdf 396-397 (2019 EAS, pp. 4 and 5).

proposed scrubbers may be much lower.) Review of the docket for the NuStar Terminals shows that the company proposed using control equipment with a control efficiency of 99% for loading of methanol at the facility's railcar, truck, and marine terminals.[134]

II.D The 2019 EAS Fails to Address Greenhouse Gas Emissions and Climate Change

Like the 2013 EAS and the 2016 EAS before, the 2019 EAS completely fails to address greenhouse gas emissions from the Methanol Complex and the impact on climate change. LDEQ previously dismissed the requirement to analyze greenhouse gas emissions for the following "particularly relevant" facts:

1. The permits require BACT for CO_2e greenhouse gas emissions and limit facility-wide emissions per metric ton of methanol produced;
2. No current methodology or guidance exists to determine any industrial facility's incremental contribution to climate change;
3. Exposure to greenhouse gases does not adversely affect human health;
4. The facility would have the same impact if it were built elsewhere; and
5. The Methanol Complex will employ state-of-the-art technology that would result in reduced consumption of natural gas feedstock and reduced greenhouse gas emissions compared to many existing methanol production facilities and may therefore *decrease* net greenhouse gas emissions if it displaces methanol produced elsewhere.[135]

These arguments do not hold up to scrutiny:

1. As discussed above, the proposed Methanol Complex would have a methanol production capacity of 6,000 MTPD and emit about two (2) million tons per year of carbon dioxide equivalent ("CO_2e) greenhouse gas emissions[136] In contrast, the Northwest Innovation Works Kalama methanol production facility proposed in Washington State would have a methanol production capacity of 10,000 MTPD and emit about one (1) million tons per year of CO_2e greenhouse gas

[134] EDMS No. 9789373 (NuStar Logistics, LP, Title V Permit Modification Application, June 2015; *see* Emissions Calculations for Vapor Combustion Units 1 (barges), 3 (ships and barges) and 4 (trucks and railcars), which specify a control efficiency of 99% for methanol and VOC emissions from loading.

[135] EDMS No. 10693710, pdf 28.

[136] Draft permit package, p. 1 (2,023,770 tons/year CO_2e).

emissions,[137] about a third of the Methanol Complex.[138] Clearly, the BACT determination for the Methanol Complex is insufficient to reduce greenhouse gas emissions to the extent feasible, *e.g.*, by using a different methanol production technology.

2. Life-cycle assessment methodology, which has been around for decades, can be used to determine an industrial facility's impacts with respect to climate change. For example, the proposed Northwest Innovation Works Kalama methanol production facility provided such an analysis during its environmental review process. In fact, the Washington Department of Ecology recently halted permitting of the Kalama facility (the decision was upheld by a Cowlitz County Superior Court), over concerns that the initial greenhouse gas emissions analysis was not extensive enough and required an additional analysis with greater detail.[139] The analysis investigated how the new supply would impact worldwide emissions. Key information included evidence showing how the project would impact other sources of methanol rather than narrowly looking at emissions tied to the facility's products.
3. The lack of direct health impacts of greenhouse gases is irrelevant in the context of requiring an analysis of impacts on climate change. Further, the argument fails to consider that Article IX of the Louisiana Constitution concerns itself with the protection and conservation of the natural resources of the state consistent with the "health, safety, and welfare of the people." LDEQ's narrow focus on health impacts of greenhouse gas emissions ignores the safety and welfare aspect. Climate change will affect Louisiana severely. It is estimated that by 2050, the state could see conditions that make it difficult for the human body to cool itself for nearly one out of every 20 days in the year.[140] Further, climate change contributes to the land loss crisis in Louisiana and to intensifying tropical storms

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[137] *See*, Final Air Discharge Permit Northwest Innovation Works Kalama, *op. cit.*, p. 18, and Technical Support Document for Northwest Innovation Works Kalama, *op. cit.*, p. 1.

[138] SLM: (2,023,770 tons CO_2e/year) / (6,000 MTPD methanol × 365 days/year) = **0.924 ton CO_2e/metric ton methanol**; Northwest Innovation Works Kalama: (1,076,000 tons CO_2e/year) / (10,000 MTPD methanol × 365 years) = **0.295 ton CO_2e/metric ton methanol**; (0.295/0.924) = **0.319**.

[139] Washington Department of Ecology, Northwest Innovation Works – Kalama Manufacturing and Marine Export Facility; available at: https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Shoreline-permits-enforcement/Northwest-Innovation-Works-Kalama.

[140] Al Shaw, Abrahm Lustgarten, and Jeremy W. Goldsmith, ProPublica, New Climate Maps Show a Transformed United States, September 15, 2020; available at: https://projects.propublica.org/climate-migration/.

and hurricanes.[141] These impacts will directly affect the safety and welfare of the people.

4. The decision before LDEQ concerns the proposed facility, not a hypothetical facility constructed elsewhere. The simple fact is that the Methanol Complex would contribute to the global greenhouse gas inventory.
5. The Methanol Complex would not "displace" methanol produced elsewhere. If global demand for methanol is increasing, as SLM suggests, then displacement is not relevant.[142] Thus, an adequate analysis is essential to understanding how the project would ultimately change greenhouse gas emissions relative to a "business as usual" scenario for methanol markets if the facility is not built. The above-discussed additional analysis for the Kalama facility found that that the project would inevitably lead to more methanol being burned as fuel because it would increase methanol supply globally.[143]

II.E The 2019 EAS Fails to Adequately Address Impacts on Traffic

With respect to impacts on traffic, the 2019 EAS provides the following one-paragraph discussion:[144]

> As discussed in the 2013 Environmental Assessment Statement, a traffic study demonstrated that the SJMP would have no significant impact on traffic in the area. A recent supplement to the traffic study demonstrates that the modifications requested here would not impact the findings of the original study. Specifically, these proposed modifications will only add two vehicle trips per hour to the estimated traffic pattern.

The 2019 fails to provide the "recent supplement to the traffic study" just as the 2013 EAS failed to provide the original traffic study.

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[141] EPA, What Climate Change Means for Louisiana, EPA 430-F-16-020, August 2016; available at: https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-la.pdf.

[142] *See* draft permit package, pdf 405 (2019 EAS, p. 14 ("There continues to be a need for the permitted Methanol Complex, which will help keep pace with the global demand growth for methanol. In particular, the global methanol market is expected to experience a compound annual growth rate of 5.42% in 2019-2027. During that period, the Asia Pacific region's demand for methanol is projected to continue to surge. The key drivers for global demand growth are the increasing acceptance of methanol-to-olefins technology, the rising demand for petrochemicals, and the use of methanol as an alternative fuel." Internal citations omitted.)

[143] Cassandra Profita, OGB, Washington Ecology Finds New Climate Impacts from Kalama Methanol Plant, September 2, 2020; https://www.opb.org/article/2020/09/02/kalama-methanol-plant-emissions/.

[144] Draft permit package, pdf 403 (2019 EAS, p. 12.)

Elsewhere, the 2019 EAS states that the proposed modifications would add, on average, *fewer than two* additional vehicle trips per hour to the previously estimated traffic pattern.[145] This claim unsupported, misleading, and erroneous:

First, the 2019 EAS provides no support for this estimate. Nowhere in the record before LDEQ does SLM provide a breakdown of, let alone commitment to, the share of the modes of transportation used to export methanol from the site. The draft permits do not contain any conditions limiting truck traffic to two truck trips per hour. Thus, this claim is not supported by any evidence in the record.

Second, based on information supplied by the Applicant with the application to DNR/USACE shows that the average number of truck trips per hour would be *more than two per hour*. Specifically, SLM estimated that about 130,000 barrels ("bbl") of methanol would be exported by tanker trucks with 800 "monthly movements," as shown in the excerpted table below:

> The Terminal must have adequate capacity to store and transport the supplied methanol. The table below estimates the capacity needed at the Terminal, so that the Terminal can adequately transport the supplied methanol using the various transportation modes when accounting for peak demand and sales variability.

	Vessel (ocean-going)	Vessel (U.S. Flag)	Barge	Rail	Truck
Monthly Volume (BBL)	820,000	300,000	310,000	120,000	130,000
Monthly Movements	< 5	< 5	30	175	800

From: Appx. A, p. 14; available at: http://sonlite.dnr.state.la.us/sundown/cart_prod/cart_crm_application?pcup_num=P20191180&pline_id=3&pshow_appl_email=N

Moving 130,000 barrels (5,460,000 gallons[146]) per month via tanker trucks corresponds to a tanker truck capacity of 6,825 gallons.[147] This is consistent with the typical tank capacity of tanker trucks carrying corrosive cargo such as methanol, *e.g.*, MC-312 (DOT-412), which hold between 6,000 and 7,000 gallons, shown in the photo below.[148]

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[145] Draft permit package, pdf 414 (2019 EAS, p. 23).

[146] (130,000 gal) × (42 gal/bbl) = **5,460,000 gal**.

[147] (5,460,000 gal/month) / (800 truck movements/month) = **6,825 gal/truck movement**.

[148] Matlack Leasing, LLC, Tdank Trailer Equipment Models for Chemical Transport & Storage; available at: https://www.matlackleasing.com/article/tank-trailer-equipment-models-for-chemical-transport/.

SafeRack, Fuel Transport Safety – Truck Tanker Types; available at: https://www.saferack.com/glossary/cargo-tanks-transport-safety/

The same number of tanker trucks leaving the site loaded with methanol will access the site empty, resulting in two truck trips per truck movement. Thus, based on the Applicant's information, the average number of truck trips is 1,600 per month and 2.2 per hour, *i.e.*, *more than* two per hour.[149]

Third, the "average" number of additional vehicle trips per hour based on an assumption of *monthly* methanol exports required to meet "peak demand and sales variability" is a meaningless measure to determine actual traffic impacts because trucks would not be entering or leaving the site on a fixed hourly schedule for the presumably 24/7 operation of the facility. Therefore, the number of trucks accessing and leaving the site will fluctuate on an hourly and daily basis, especially over the weekend. In other words, there is no guarantee that the trailer trucks loaded with methanol would leave like clockwork for their schedule to resemble anything like "average" hourly trips. Traffic impacts are determined by the actual additional vehicle trips entering or exiting the facility at a given time of day, most importantly during peak hours. (These include both the methanol trucks entering empty and exiting loaded SLM's above estimates.) Because the methanol throughput for the truck terminal's two loading arms is not limited by a permit condition in the proposed permits, the number of trucks that could be loaded per hour is only limited by the throughput capacity of the loading arms, which is unknown.

Fourth, the about two additional vehicles trips per hour quoted by the 2019 EAS for the proposed modifications only account for the methanol tanker trucks, the number does not include vehicles driven by the additional 12 employees for the terminals.[150]

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[149] (800 truck movements/month) × (2 truck trips/movement) × (12 months/year) / (365 days/year) / (24 hours/day) = **2.2 truck trips/hour**.

[150] Draft permit package, pdf 406, (EDMS, p. 15).

Fifth, the 2019 EAS does not address the cumulative traffic impacts from potential simultaneous construction and operation of the Yuhuang Chemical Inc. Methanol Plant and other facilities in the area.

Finally, the St. Louis Academy in Welcome (formerly 5th District Elementary) serves a lower income population (100 percent of the kids are on the lunch program) that is 99 percent black. Many of the kids may walk to school alongside Highway 18 (River Road). The increased traffic is of particular concern for these school children.

II.F The 2019 EAS Fails to Adequately Address Noise and Light Nuisance Impacts

The 2019 EAS claims that a "new noise study" demonstrates that, even with the proposed modifications, the incremental increase in community noise levels would under most conditions be negligible and inaudible.[151] The 2019 EAS fails to provide this study and it is not found in LDEQ's administrative record. The latest noise study I was able to locate dates to 2017 and was submitted by SLM to St. James Parish in support of its land use application.[152] This study only addresses noise from stationary sources at the Methanol Complex production train but does not address noise associated with the new loading terminals and, importantly, with mobile sources, which include heavy-duty tanker trucks which drive on the main facility road day in and out and directly by Welcome Park and near residences.

With respect to light impacts during operation of the Methanol Complex, the EAS states that increased light from the operations of the Methanol Complex operations would be most noticeable during nighttime operations but would have minimal to no increases above ambient light levels. "Indeed," the document continues, "most of the light from the main plant, dock area, and truck and rail loading area will be at or below that of moonlight."[153] This discussion is entirely inadequate and dismissive of the real impacts of the permanent and very noticeable light impacts experienced by nearby residents and users of Welcome Park. For one, the 2019 EAS fails to even mention the trucks that would travel the main facility road at night. Further, it is disingenuous to compare the nuisance impact of industrial lighting to moonlight. The moon does not shine all night or in the same location and its brightness and color varies with the moon phases, atmospheric conditions, and the cloud level of the sky.

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[151] Draft permit package, pdf 404 (EAS, p. 13).

[152] PlaceWorks, South Louisiana Methanol (SLM) Plant, Noise Technical Study, Modular Plant Design, Fluor Enterprises, October 2017, Version 2, attached as Exhibit 3.

[153] Draft permit package, pdf 404 (EAS, p. 13).

II.G The 2019 EAS Fails to Demonstrate that the Social and Economic Benefits of the Facility Outweigh the Environmental Impacts

The 2019 EAS it claims without any supporting evidence that the social and economic benefits of the proposed Methanol Complex will greatly outweigh its environmental impacts.[154] As discussed above, the 2019 EAS does not adequately address the potential environmental impacts of the Methanol Complex project; it also does not provide an economic analysis (nor is there any in LDEQ's administrative record). As such, this claim is entirely unsupported.

The 2019 EAS claims that the Methanol Complex, including the proposed methanol loading terminals, "will result in the investment of over $1.1 billion in Louisiana."[155] Since the 2019 EAS does not provide an economic analysis, it is unclear whether this figure actually refers to investment in Louisiana or the total cost of the plant, which would not necessarily be constructed in the state.

Modular construction of industrial plants is an increasingly common approach used by the chemical industry because building large pieces of the project elsewhere and shipping them in is less expensive than building everything on site. This approach, which drastically reduces the financial investment in Louisiana, is, for example, taken by the nearby Formosa Sunshine Complex, which expects that 60% to 80% of its capital expenditures will go out of state.[156]

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[154] Draft permit package, pdf 405 (2019 EAS, p. 14).

[155] Draft permit package, pdf 406 (2019 EAS, p. 15).

[156] Sara Sneath, The Times Picayune, State Tax Breaks Flow to Firms Building Chemical Plants Overseas, then Shipping them to Louisiana, December 6, 2019; available at: https://www.nola.com/news/environment/article_70ef1e1a-1840-11ea-85a2-977aac17576e.html.

A steel bridge constructed over the Mississippi River levee allows trucks to unload pieces of a methanol plant shipped from Chile to Louisiana; excerpted from: Sneath 2019, *op. cit.*

Further, the 2019 EAS states that "after closure, SLM will be solely responsible for the site. Due diligence process and analysis will determine future possible uses for the site."[157] Yet, nowhere in the record does the company provide any commitment that it would set aside sufficient funds to remediate the site after cessation of operations.

The EAS for the Methanol Complex should be revised to remedy the above discussed issues.

[157] Draft permit package, pdf 407 (2019 EAS, p. 16.)

Exhibit 1

PASSED

The following ordinance which was previously introduced at a regular meeting held on April 4, 2018, a summary thereof having been published in the official journal together with a notice of public hearing which was held in accordance with said public notice, was brought up for final passage on motion of Councilman Cooper and seconded by Councilman Patin:

ORDINANCE 18-02
ST. JAMES PARISH COUNCIL

AN ORDINANCE TO AMEND SECTION 86-37 OF THE ST. JAMES PARISH LAND USE ORDINANCE, AND TO AMEND THE ST. JAMES PARISH GENERALIZED FUTURE LAND USE PLAN

WHEREAS, on March 28, 2018, the St. James Parish Planning Commission favorably considered a proposal to change the land use designation in the St. James area of the 5th District from "Residential/Future Industrial" to "Residential Growth," and

WHEREAS, the Parish Council held public hearings on the recommended changes on April 18, 2018 in Vacherie and on May 2, 2018 in Convent, and has considered the public comments received during those hearings; and

WHEREAS, the Parish Council desires to change the St. James Parish Generalized Future Land Use Map to re-designate the "Residential/Future Industrial" area located on the West Bank in St. James to "Residential Growth;"

NOW, THEREFORE, the St. James Parish Council hereby ordains:

SECTION 1. Section 86-37(a) of the St. James Parish Code of Ordinances is hereby amended to read as follows:

Sec. 86-37. Land use plan

(a) **Adoption of future land use plan.** The following map is hereby adopted and incorporated herein by reference to guide to the development of St. James Parish: The "St. James Parish Generalized Future Land Use Plan" dated May 2, 2018 in its digital form, identified as File FutureLandUsePlan_05_02_18. A printed version of the plan is attached to this ordinance as Exhibit 1. Any ambiguity in the location of land use category boundaries, or any conflict between the printed and digital forms of the map shall be resolved by relying on the digital form of the map. Any ambiguity in the boundaries shown on the digital map shall be resolved as follows:

[*the remainder of Section 86-37 remains unchanged*]

SECTION 2. EFFECTIVE DATE. This ordinance shall be effective immediately upon its passage, or as soon thereafter as allowed by law, and shall apply to any then-pending permit or approval for which a final decision has not been rendered by the parish. This ordinance shall not apply to any approval granted prior to the effective date pursuant to Section 86-37(e) or (f), or to any permit issued pursuant to Chapter 18 prior to the effective date.

This ordinance having been submitted to a vote, the vote thereon was as follows:

YEAS:	St. Pierre, Amato, Patin, Cooper, Etienne-Steib, Kraemer, and Louque
NAYS:	None
ABSTAIN:	None
ABSENT:	None

And, the ordinance was declared adopted on this, the 2nd day of May, 2018.

Council Chairman

Secretary

Delivered to Parish President: 05-03-2018

Approved: 05/03/2018

Disapproved: _____

Parish President

Pless Aff. Attach. B

Returned to Secretary on 05-07-18

At 9:37 AM/PM

Received by Linda Hubbell

* * * * *

CERTIFICATE

I, Linda Hubbell, Secretary of the Council of the Parish of St. James, State of Louisiana, hereby certify that the foregoing is a true and correct copy of an ordinance adopted by the St. James Parish Council in regular meeting held on the 2nd day of May, 2018.

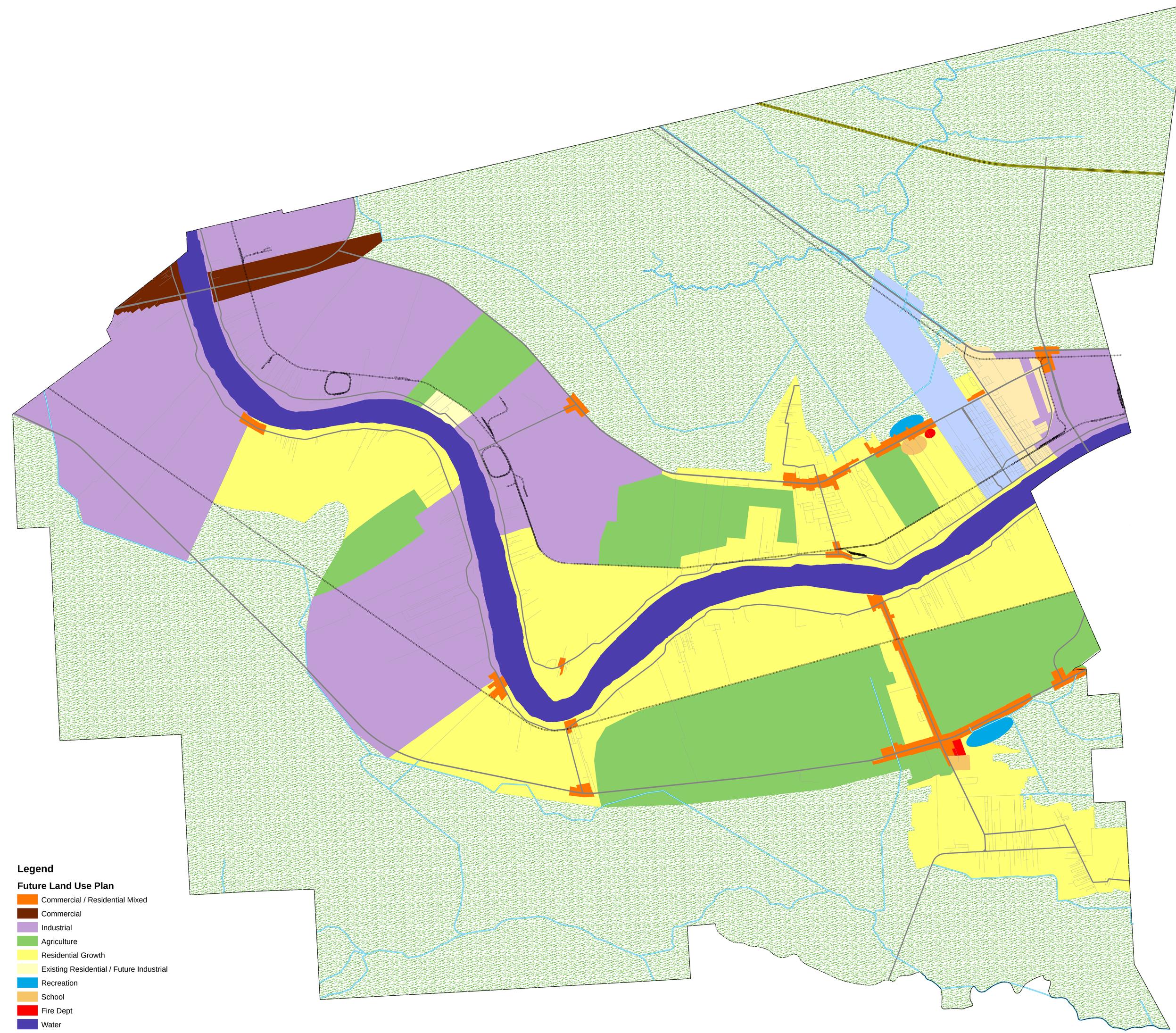
Signed at Vacherie, Louisiana, this 3rd day of May, 2018.

Linda Hubbell
Secretary

(S E A L)

St James Parish Generalized Future Land Use Plan

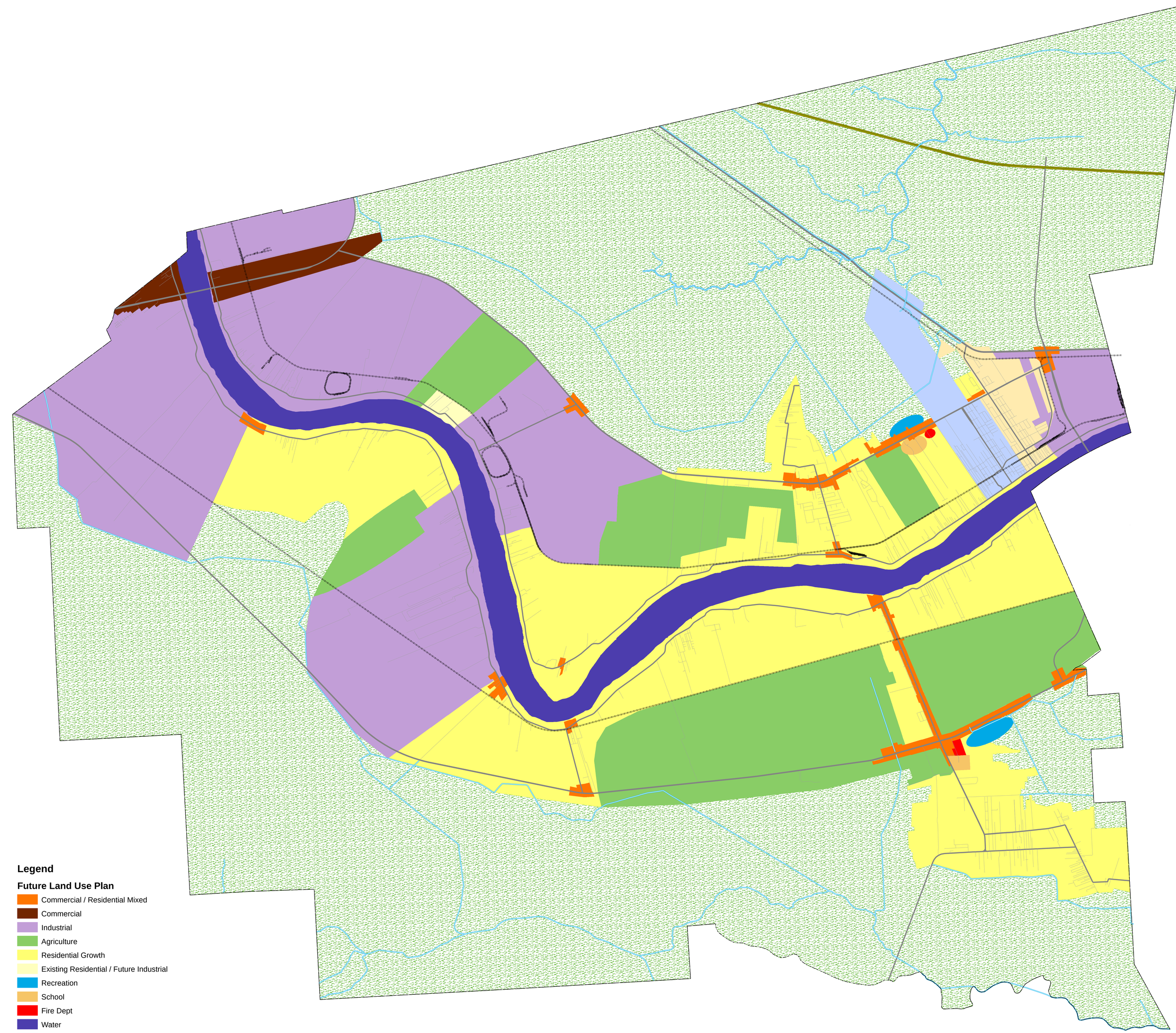
(Exhibit 1 to Ordinance 18 - 02, adopted May 2, 2018)



Pless Aff. Attach. B

St James Parish Generalized Future Land Use Plan

(Exhibit 1 to Ordinance 18 - 02, adopted May 2, 2018)



Pless Aff. Attach. B

Exhibit 2

South Louisiana
Methanol

April 21, 2014

St. James Parish Planning Commission
Attention: Mr. Glen Millet, Chairman
5800 Highway 44
Convent, Louisiana 70723

RE: South Louisiana Methanol, LP Application and Supporting Documentation Requesting Planning Commission Approval of its Proposed Use and Development of Property In accordance with St. James Parish Code of Ordinances Section 86-37

Dear Chairman Millet and Commission Members:

Pursuant to the Land Use Plan Ordinance, 14-03, adopted by the St. James Parish Council on April 2, 2014, South Louisiana Methanol, LP ("SLM") is submitting this request, along with ten (10) copies, for approval as required by St. James Parish Code of Ordinances Section 86-37(f) that its proposed development and use of the property, as set forth in detail in the attached Application and Supporting Documentation required by Section 86-37(g), is consistent and otherwise in compliance with the referenced Land Use Ordinance.

As set forth in the accompanying Application and Supporting Documentation, following an extensive and comprehensive site selection evaluation coordinated with the St James Parish leadership team, SLM invested in certain tracts of property along the Mississippi River in St. James Parish to construct and operate a facility to process natural gas to produce liquid products (methanol). SLM has completed the engineering design of the facility and has applied for and been issued permits and authorizations by the Louisiana Department of Environmental Quality ("LDEQ") under the Clean Air Act (42 U.S.C.A. §7401, et seq.), the Louisiana Department Environmental Quality Act, Subtitle II, Chapter 3 entitled "Louisiana Air Control Law" (La. R.S. 30:2051, et seq.), and Louisiana Administrative Code Title 33, Part III entitled "Air" (LAC 33:III) authorizing construction and operation of the proposed facility.

{N2803960.1}

South Louisiana Methanol, LLC
12912 Hill Country Boulevard, Suite F-225
Austin, TX 78738
http://www.southlouisianamethanol.com

Pless Aff. Attach. B

The proposed development of the property as permitted by LDEQ is sited on property designated by the Land Use Ordinance as "Residential/Future Industrial" that specifically authorizes "industrial uses".[1] In addition, other associated infrastructure and structures, such as, roads, administrative buildings and the fire hall will also be located on property with the same designation. SLM also notes that the development and uses of the property described above are all proposed to be sited outside of any areas encompassed by the "Plantations Schools and Churches 2Mi Buffer" referenced in Section 86-37(a) of the St. James Parish Codes of Ordinances. As such, there is no requirement to affirmatively consider buffer zones. Accordingly, SLM's proposed development of the property, including the associated uses of the property, conforms and is otherwise in compliance with the St. James Parish Land Use Ordinance and should be approved by the this Commission as requested herein.

In addition, the tracts of property that SLM has invested in would allow SLM to potentially expand the permitted natural gas to liquid products manufacturing facility in the event future circumstances and business conditions make further development and/or expansion feasible. As such, SLM is also requesting approval of any potential future development and/or expansion of the property required to be permitted under the Clean Air Act, in areas on the property as designated in its Application and Supporting Documentation, where such development and/or expansion would result in similar uses of the property, processing natural gas into liquid products, and where such developments and/or expansions are issued permits and authorizations under the Clean Air Act (42 U.S.C.A. §7401, et seq.) authorizing construction and operation of the future development and/or expansion facility. Such approval should also include associated infrastructure and structures, such as, roads, buildings and other structures not required to be permitted under the Clean Air Act.

If you have any questions concerning this application and supporting documentation, please contact Louis Buatt at (504) 582-8237.

Sincerely,

Barry Williamson, CEO
South Louisiana Methanol, LLC

[1] See St. James Parish Code of Ordinances Section 86-37(a) and (c).

{N2803960.1}

South Louisiana Methanol, LLC
12912 Hill Country Boulevard, Suite F-225
Austin, TX 78738
http://www.southlouisianamethanol.com

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the tank volume. Lubricating oils and cleaning solvents will be stored indoors on site for equipment maintenance and repairs.

Short and Long Term Effects

The land of the proposed facility as permitted by LDEQ is currently used for farming sugar cane, and the total land area to be used is approximately 100 acres. The gradient of the land will not be significantly altered as it is relatively flat. Current land use in the surrounding area is industrial mixed with some residential, agricultural, and commercial properties, as depicted on **Figures 1 and 3, Appendix A, Figures**.

The facility will be designed and maintained to minimize potential adverse effects to the environment. For example, the facility will implement an SPCC plan that will help prevent discharges to any other drainage areas. No wastes will remain on site permanently.

Assessment and Mitigation of Potential Health Risks

SLM does not expect this project to pose potential health risks to any surrounding neighbors or employees. For a safe and healthy work environment, SLM will set permissible exposure limits and action levels according to Occupational Safety and Health Administration (OSHA) regulations to establish safe work practices for employees. Additionally, SLM has established written Safety Process and Emergency Procedures for the proposed methanol facility. A copy of the referenced procedures in included herein as **Appendix J**.

In an effort to assess potential risk to the public, SLM considered reasonable maximum exposure scenarios and conducted a model to assess the impacts. SLM determined a reasonable maximum exposure scenario would be caused by a spill from a railcar. Accordingly, in addition to the measures previously mentioned, SLM is taking other measures to prevent and mitigate any potential impact to public health and safety. SLM will be installing fence line monitoring as depicted in **Figure 6, Proposed Fence Line Monitoring Location**, in **Appendix J**. Fence line monitoring will allow SLM to monitor air quality and can be used by SLM and regulatory agencies to confirm no impacts or to assess potential impacts in an effort to further protect public health and safety. SLM will also conduct process safety audits at least every three years to ensure the procedures and practices for process safety are in place and being implemented. Another example of SLM's measures to protect public health and safety is SLM's establishment of an Internal Industrial Fire Brigade to respond to fire, medical, and HAZMAT events.

SLM modeled the potential impacts from a 30,000-gallon release scenario from a railcar, in secondary containment, at the proposed methanol production facility. EPA provides the CAMEO/ALOHA/MARPLOT software to develop air dispersion modeling for the release of methanol. For the referenced railcar scenario the following parameters were used:

- Quantity released –30,000 gallons
- Released methanol into earthen containment area – 20,000 square feet
- Models were developed with the source at 30°02'19.30"N and 90°51'51.98"W (methanol tank)
- Two nearest residences were selected as threat targets
- Wind, 4 mph at SSE (140) and WSW (260)
- Dispersion models measured at 7 feet above the ground
- All temperatures set at 85 degrees F, humidity set at 85 percent

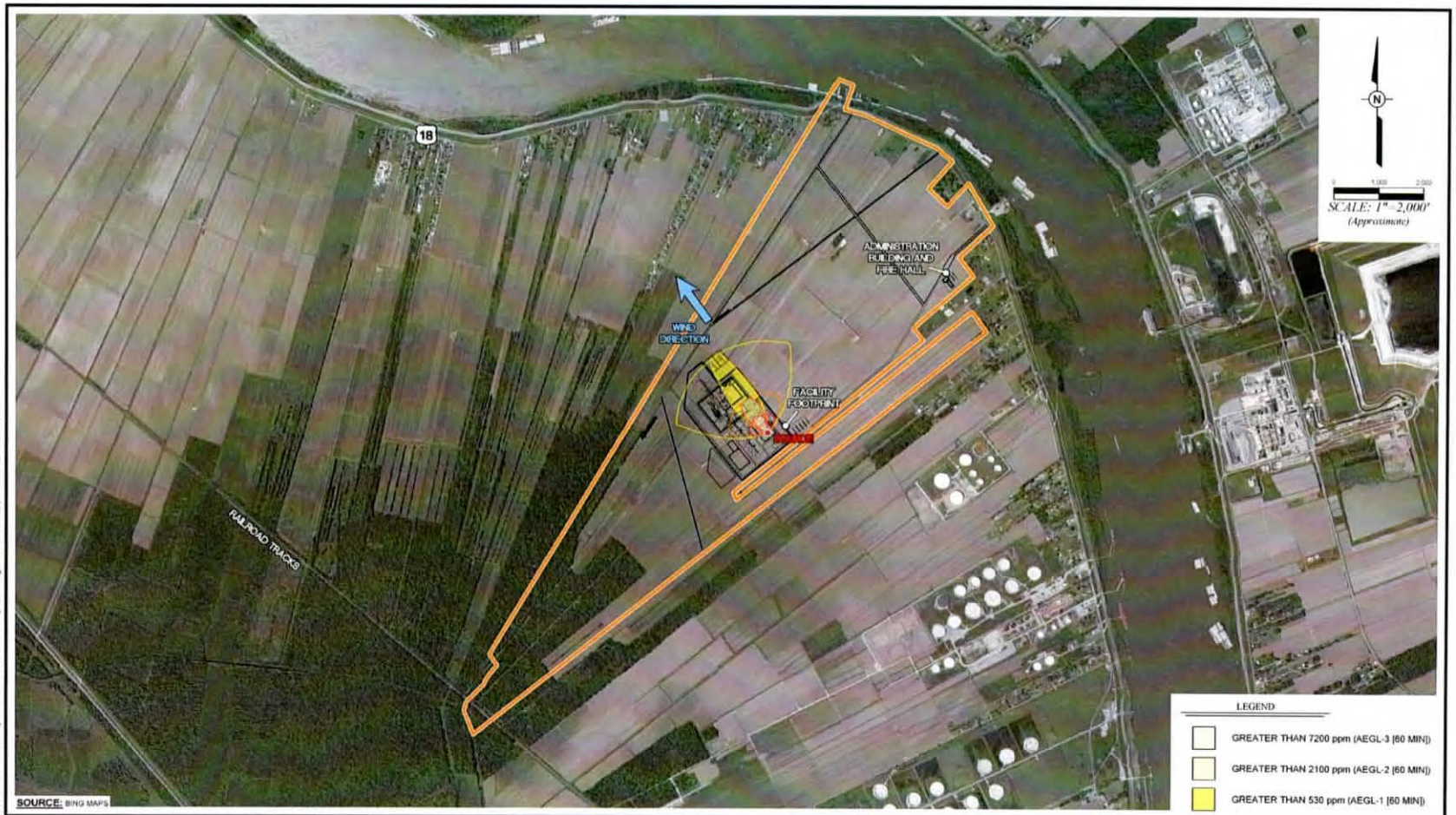
Based on the above-referenced input parameters and the dispersion model results, it does not appear that a release of 30,000 gallons will create a threat to public health. A map depicting the dispersion modeling results is included as **Figure 4, Toxicity Map**, in **Appendix A, Figures**.

2.5 ECONOMIC IMPACT

SLM is investing approximately $1.3 to $1.5 billion in the construction and operation of the proposed state of the art methanol facility. The St. James Parish Project will create 85 permanent onsite with an average salary of $66,500 per year. The facility will create approximately 650 construction jobs and approximately 350 indirect jobs to St. James Parish and surrounding communities. The facility construction is scheduled to begin in late 2014 and be completed and operating in early to middle 2017. A Project Details Timeline is included herein as **Figure 5, Project Details Timeline**, in **Appendix A, Figures**.

SLM Facility Toxicity Map

South Louisiana Methanol



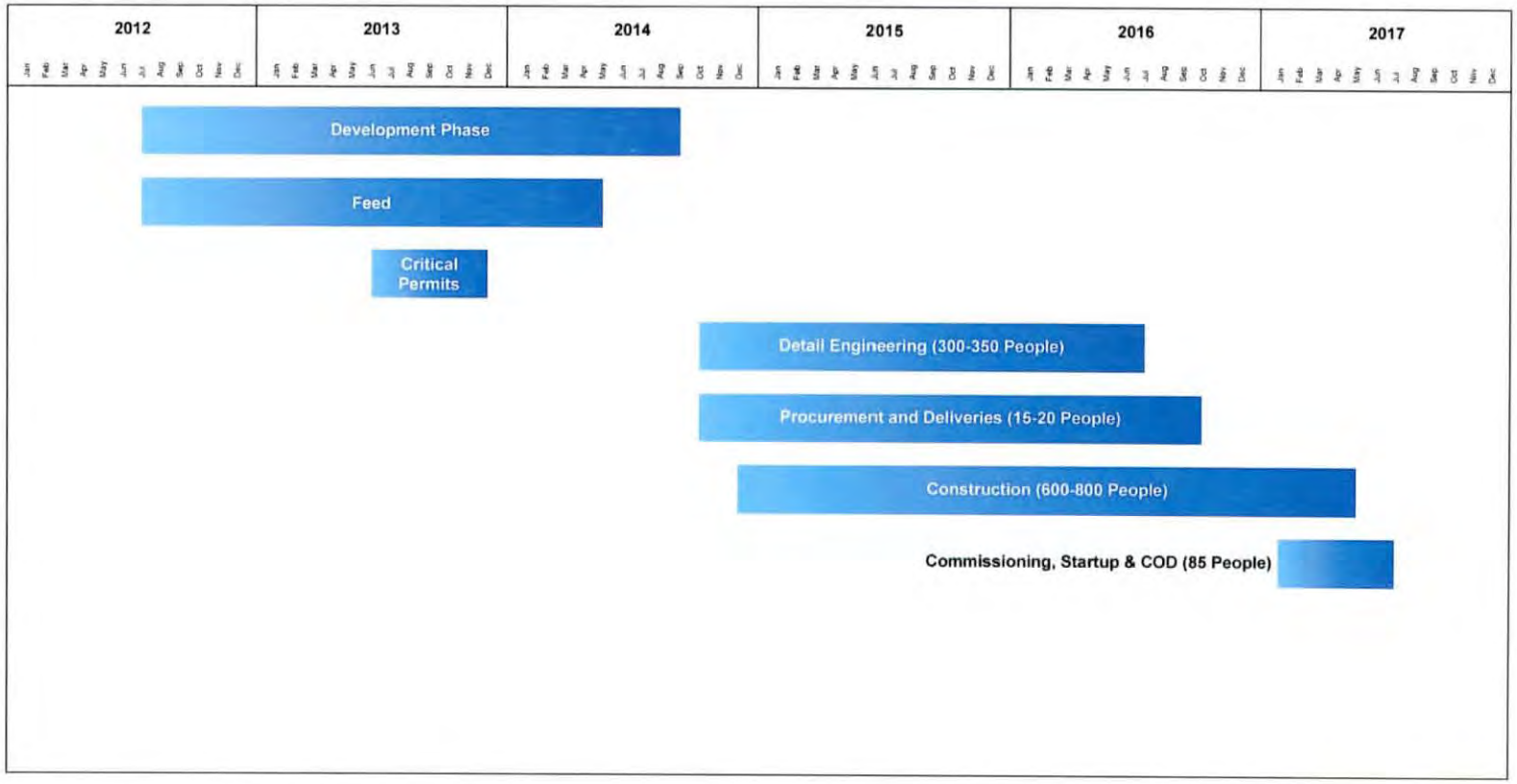
PPM CONSULTANTS, INC.		SOUTH LOUISIANA METHANOL, LP LOUISIANA HIGHWAY 18 ST. JAMES, LOUISIANA	TOXICITY MAP (SCENARIO - RAILCAR RELEASE)	FIGURE NUMBER
DRAWN BY: BWH	DRAWN DATE: 4/15/14			4
PROJECT NUMBER: 569201	BILLING GROUP: PMT			

Z:\South Louisiana Methanol LLC\569201\LDEQ\Air\April2014\569201-Pmt-LDEQ-Air-April2014.dwg 4 Scenario1 4/22/2014 12:33:26 PM jasan hicks

Pless Aff. Attach. B

SLM Project Details Timeline

South Louisiana Methanol



PPM — PPM CONSULTANTS, INC. www.ppmcs.com	SOUTH LOUISIANA METHANOL, LP LOUISIANA HIGHWAY 18 ST. JAMES, LOUISIANA	PROJECT DETAILS TIMELINE	FIGURE NUMBER 5
DRAWN BY: BWH — DRAWN DATE: 4/15/14			
PROJECT NUMBER: 569201 — BILLING GROUP: PMT			

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Exhibit 3

October 2017 | **Noise Technical Study**
Version 2

South Louisiana Methanol (SLM) Plant, Noise Technical Study Modular Plant Design

Fluor Enterprises

Prepared for:

Fluor Enterprises
Contact: Sohail Saleem, Director – HSE
Fluor Enterprises, Inc.
1 Fluor Daniel Drive
Sugar Land, Texas 77478-3899
281.263.4383
Sohail.Saleem@fluor.com

Prepared by:

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PLACEWORKS

Pless Aff. Attach. B

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ATTACHMENTS

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1. Introduction

South Louisiana Methanol (SLM) is proposing to design and build a commercial-scale methanol production plant to convert natural gas into industrial-grade methanol. This report is the Noise Technical Study for the Modular Design of the South Louisiana Methanol (SLM) Project, located near Welcome, Louisiana, in St. James Parish. Previous, similar noise studies have been conducted on the SLM plant, and reports have been generated since January of 2014 by PlaceWorks[1] for various stages of the Project's design development. The milestones for these studies and reports are summarized in Attachment A.

1.1 EXECUTIVE SUMMARY

Methodology. As part of the Project design engineering, PlaceWorks was contracted to perform an evaluation of the future noise environments for the Project. The goals of the Study were to (a) predict future exterior noise conditions at the plant, (b) lay the groundwork for subsequent noise evaluations during later engineering design phases and (c) document the technical conditions of approval for contractual agreements between Fluor Enterprises, Inc. (Fluor) and South Louisiana Methanol, a ZEEP/Todd Corporation joint venture company. A review of municipal code regulations for St. James Parish showed that there are no parish-level regulations that pertain to noise emanations from an industrial facility, nor any numerical sound level limits for such a facility.

To evaluate the potential noise environment around the SLM plant site and to identify any need for noise reduction measures, a noise modeling study of the Project was performed. SoundPLAN noise prediction software was used to simulate and model the existing and future noise conditions around the proposed SLM Project site. Using reference data for similar equipment and/or industry-accepted estimation techniques, the proposed Project's equipment noise-emissions levels were determined. These predicted equipment levels were conservatively modeled to synthesize the expected future noise conditions for the plant site.

Off-Site Receptors. The SLM contributions at off-site, community receptors (in residential areas) are predicted to be predominantly in the mid-30s dBA L_{eq}. The closest noise-sensitive receptors (represented by modeling location K at the end of King View Street) are predicted to experience plant levels of approximately 47 dBA L_{eq}, which, on a 24-hour basis is approximately equal to 54 dBA CNEL. Other, more-distant locations would be expected to have SLM plant noise below 35 dBA L_{eq} (or approximately 41 dBA CNEL).

Given the outcome of the ambient noise measurements (also conducted by PlaceWorks in 2015), which noted existing sound levels in the mid-40s to low-50s dBA (L_{eq}), the noise from the SLM plant is predicted to be, at worst, comparable to the current noise environments. Thus, the SLM plant equipment may be audible at some nearby residential receptors, but would not be expected to increase the noise environment by more

[1] For reports prior to March 2014, the firm's name was "The Planning Center | DC&E."

1. Introduction

than 3 to 4 dB. At other, more distant locations, the SLM contributions would be totally inaudible. These results would depend somewhat on the changing activities and varying sound levels throughout the surrounding area, such as for intermittent traffic flows on SR-18 or farming machinery usage in the agricultural areas around the plant site.

With respect to contractual obligations, predicted plant-aggregate sound levels at the six assessment locations are between 46 and 54 dBA CNEL, which is well below the current guarantee threshold value of 65 dBA CNEL. When factoring in the relatively high ambient conditions—which are typically 6 to 12 dB higher than the predicted plant-only contributions—the combined, total future noise conditions are still below the threshold value of 65 dBA CNEL by at least 1½ dB.

On-Site Receptors. The results show that the currently configured SLM modular design should result in the majority of on-site, outdoor areas being well within worker exposure noise standards, presupposing an appropriate level of plant operations automation and assuming that vendors can supply equipment per the evaluations. However, the potential noise exposure to workers should be regulated via an appropriate hearing conservation program following OSHA mandates. For example, limitations should be placed on time spent in the proximity of large compressors/blowers (such as the LP and HP synthesis gas compressors, the CO_2 product compressor, and the lean vapor compressor), large pump trains (such as the boiler feedwater pumps), large fans/blowers (such as the CO_2 unit blower), and most knock-out drums to avoid exposures above the 8-hour 85 dBA action level.

Conclusion. The Project, as currently designed and configured, is predicted to result in a prudent, yet effective, approach to controlling worker noise exposure as well as producing sound levels in the surrounding community that are comparable to or below the existing conditions and, more importantly, that are well below the contractual limits at the key assessment locations. Additional measures may be called for, though, as more refined Project processes, equipment specifications, and layout configurations are established during subsequent engineering phases. With these changing Project characteristics, the evaluation of plant noise emissions and the associated equipment item limitations (for use in equipment supplier conditioning) should be refined and verified during subsequent phases of engineering design on the Project.

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1.2 PROJECT BACKGROUND

South Louisiana Methanol, a ZEEP/Todd Corporation joint venture company, is developing the largest methanol project in North America.[2] The Project is in a rural, agricultural area of St. James Parish in Louisiana, approximately halfway between New Orleans and Baton Rouge. The Project will utilize state-of-the-art gasification technology to convert natural gas to synthesis gas (syngas) and then catalytically reform the syngas into methanol. The basic process flow and the associated intermediate products are shown in Figure 1, *Overview of SMR Technology for Methanol Production.*

The $1.3 billion (estimated) SLM Project will convert 180,000 MMBtu/day[3] of natural gas into 5,500 metric tons per day (MTPD) of methanol for delivery to the Gulf Coast petrochemicals market and (potentially) other markets overseas. Fluor started the design engineering effort for the SLM plant based on a template facility using proven carbon dioxide–assisted steam methane reformer (SMR) technology, which has been operating at the M5000 plant in Trinidad since 2005.

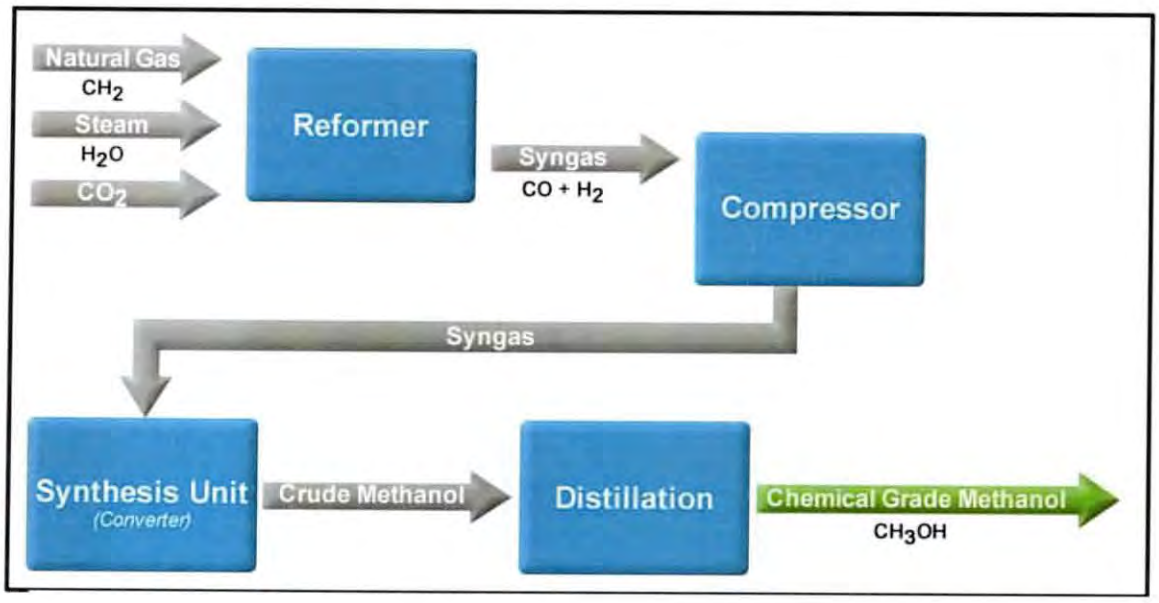
For this iteration of the plant design, Fluor was tasked with utilizing technological updates and scaling advantages inherent with a modular design philosophy to further enhance the SLM facility's efficiency, throughput, and potential scalability/expansion. As with previous design iterations, PlaceWorks was contracted by Fluor to perform a noise evaluation study of future noise environments for the Project. In the middle of these design iterations, PlaceWorks was also contracted by Fluor to conduct technical studies to establish (a) a set of standardized assessment locations (for both field measurements and predictive modeling efforts), (b) a prudent noise emission criterion level, (c) a formalized field measurement protocol, and (d) an extensive field survey of ambient, pre-plant noise conditions.

This Noise Technical Study provides the results of the evaluation of future noise conditions in and around the Project as part of the currently planned modular equipment configurations and layout arrangements. The study also summarizes the related technical studies for locations, criterion, protocol, and existing conditions.

[2] The ZEEP and Todd corporate websites are at http://zeep.com and http://toddcorporation.com. The SLM project website is http://www.southlouisianamethanol.com.
[3] MMBtu = one million British Thermal Units.

1. Introduction

Figure 1 Overview of SMR Technology for Methanol Production



Source: http://zeep.com/projects/south-louisiana-methanol.

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2. Environmental Setting

This section will provide details on the general setting of the proposed SLM plant site, a discussion of acoustics and noise fundamentals, the pertinent regulatory aspects for the plant, and a summary of the existing conditions around the site.

2.1 GENERAL SETTING

The Project site is near the southeast corner of Louisiana, approximately halfway between New Orleans and Baton Rouge. It is approximately 28 miles due west of Lake Pontchartrain and approximately 100 miles from the Mississippi River Delta. Figure 2, *Regional Setting for the SLM Project*, shows the plant location in relation to major cities in southeast Louisiana (as well as an inset of the entire state for reference). The Project site is approximately 1½ miles west of the Mississippi River and is accessed from State Route 18. Figure 3, *General Vicinity of the SLM Project Site (within St. James Parish)*, shows the area around the SLM Project. Donaldsonville, Louisiana, is approximately 10 miles northwest from the Project site. Other nearby townships include Welcome (to the west) and Romeville (across the river to the north). There are scattered residential areas near the northeast and northwest corners of the site, all primarily accessed from SR-18.

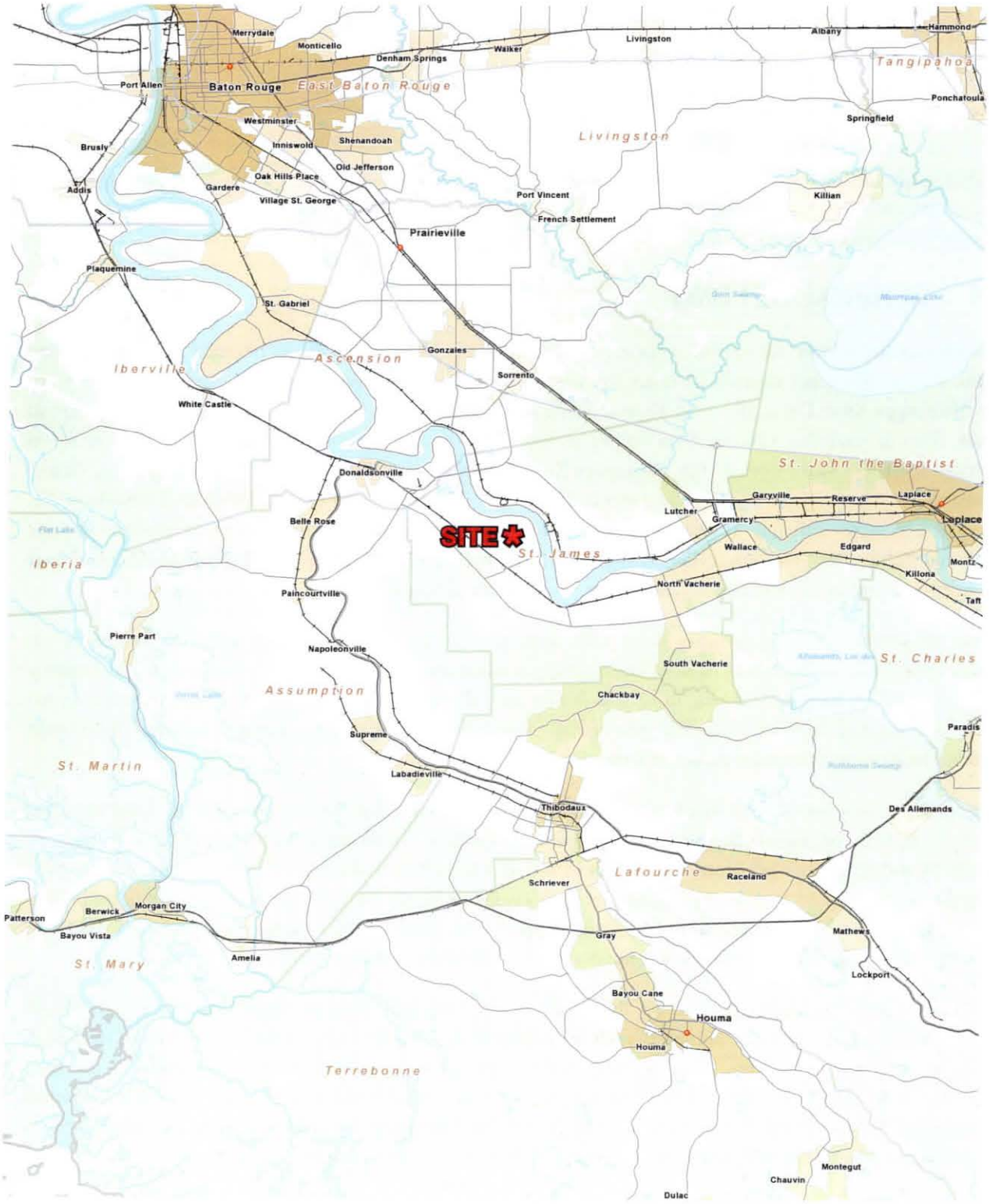
There are several industrial facilities along both sides of the Mississippi River that utilize the waterway for transporting bulk materials and liquids. The nearest such industrial facility is a crude oil storage and shipping facility owned by Ergon-St. James, Inc.,[4] that is just east of the site and near SR-18. There are also several docks and loading facilities along the river, most of which have loading/unloading equipment to support material handling to/from the transport barges and ships.

Although the area has several chemical storage facilities near the river, the character of the local region is primarily agricultural, largely focusing on sugar cane production. There are several roadways that branch off of SR-18 and progress away from the river (and toward the agricultural areas). Within an approximate two-mile radius of the SLM site, these roadways are typically less than one-half mile in length. The longest is King View Street, which is 0.85 mile long (progressing southwest from SR-18). Along these scattered roads are rows of residences, which are the closest noise-sensitive land uses to the Project site.

St. James Parish is relatively close to the Gulf of Mexico and receives approximately 61 inches of precipitation per year. Further, humidity levels are generally elevated throughout the year. Flooding from high water levels in the Mississippi River is controlled via a large earthen berm that runs parallel to the river between SR-18 and the shoreline. The SLM site and the area around it are generally very flat, with a nominal elevation of 10 feet (3 m) above sea level. The fall of the Mississippi River is also quite flat (resulting in a generally meandering channel) and is approximately 5 feet (1.5 m) above sea level.

[4] According to http://ergon.com/refining-marketing.

Figure 2 - Regional Setting for the SLM Project



0 10
Scale (Miles)

Source: The Planning Center, 2014; ESRI, 2014.

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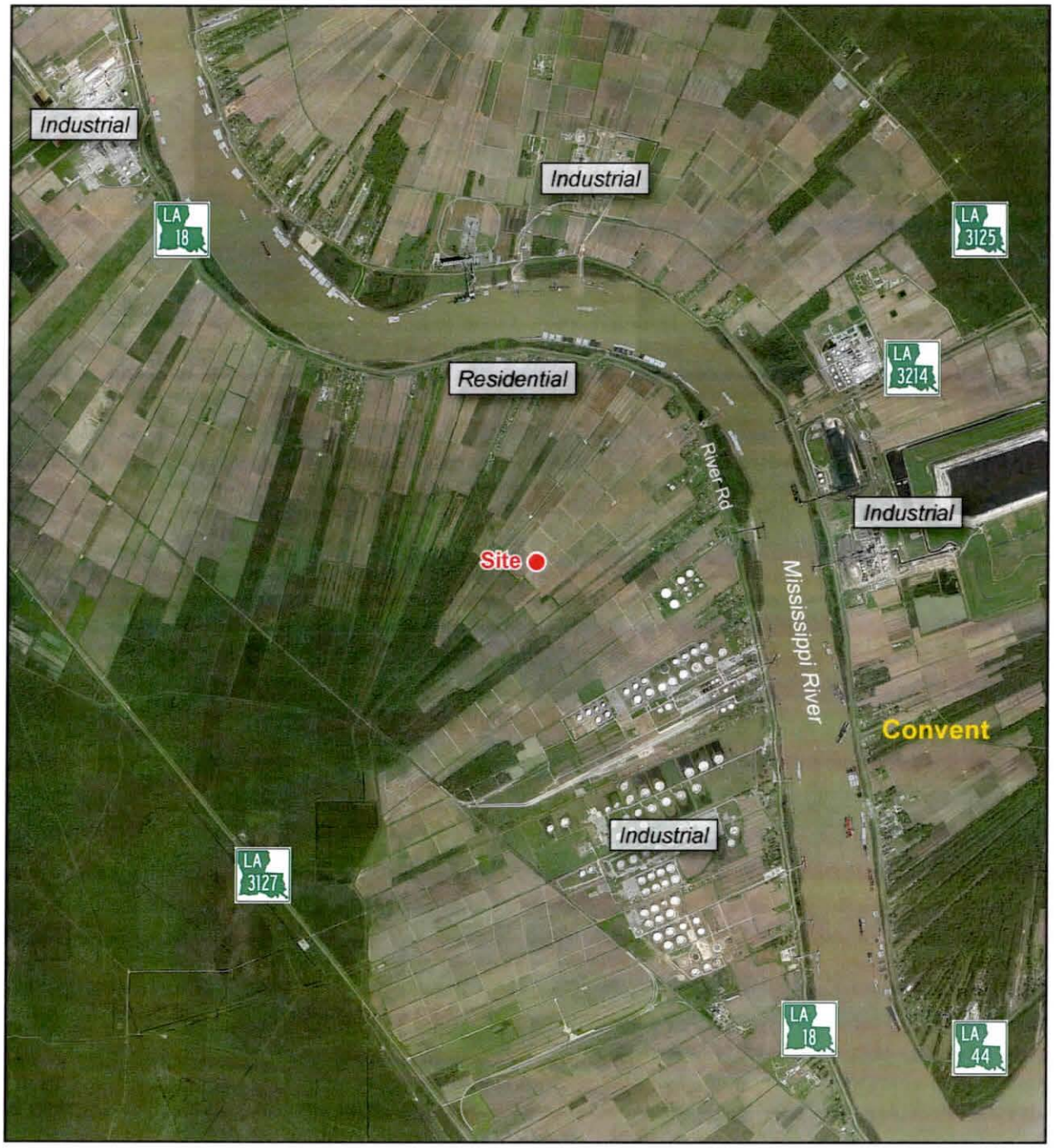
Figure 3 - General Vicinity of the SLM Project Site (within the St. James Parish)



0 1
Scale (Miles)

Source: Google Earth, 2017

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2.2 NOISE FUNDAMENTALS

When an object vibrates, it radiates part of its energy in the form of a pressure wave. Sound is that pressure wave transmitted through the air. Technically, airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure that creates sound waves. Sound is described in terms of loudness or amplitude (measured in dB), frequency or pitch (measured in Hertz [Hz] or cycles per second), and duration or time variations (measured in seconds or minutes).

2.2.1 Terminology and Noise Descriptors

Noise is most often defined as unwanted sound. Although sound can be easily measured, the perception of noise and the physical response to sound complicate the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "noisiness" or "loudness." The following are brief definitions of terminology used in this report:

- **Sound.** A vibratory disturbance that, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.

- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

- **Hertz (Hz).** A unit of frequency of change in state or cycle in a sound wave. The nearly universal usage is one (complete) cycle in one second. The unit 'Hertz,' named after the German physicist Heinrich Hertz (1857-1894), replaces the previous 'cycles per second' nomenclature.

- **Decibel (dB).** A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals (20 μPa).

- **Vibration Decibel (VdB).** A unitless measure of vibration, expressed on a logarithmic scale and with respect to a defined reference vibration velocity. In the United States, the standard reference velocity is 1 micro-inch per second ($1x10^{-6}$ in/sec).

- **A-Weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.

- **Equivalent Continuous Noise Level (L_{eq}), or Energy-Equivalent Noise Level.** The value of an equivalent, steady sound level that, in a stated time period (often over an hour) and at a stated location, has the same A-weighted sound energy as the time-varying sound. Thus, the L_{eq} metric is a single numerical value that represents the equivalent amount of variable sound energy received by a receptor over the specified duration.

- **Statistical Sound Level (L_n).** The sound level that is exceeded "n" percent of time during a given sample period. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is

exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum), and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

- **Day-Night Level (L_{dn} or DNL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10 PM to 7 AM.

- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring during the period from 7 PM to 10 PM and 10 dB added to the A-weighted sound levels occurring during the period from 10 PM to 7 AM. For general community/environmental noise, CNEL and L_{dn} values rarely differ by more than 1 dB. As a matter of practice, L_{dn} and CNEL values are interchangeable and are treated as equivalent in this assessment.

- **Sensitive Receptor.** Noise- and vibration-sensitive receptors include land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

2.2.2 Characteristics of Sound

When an object vibrates, it radiates part of its energy in the form of a pressure wave. Sound is that pressure wave transmitted through the air. Technically, airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure that creates sound waves. Sound is described in terms of loudness or amplitude (measured in dB), frequency or pitch (measured in Hertz [Hz] or cycles per second), and duration or time variations (measured in seconds or minutes).

Amplitude

The range of pressures that causes airborne vibrations (i.e., sound) is quite large and would be cumbersome to measure lineally. Therefore, noise is measured on a logarithmic scale, which has a more manageable range of numbers, and a decibel (dB) is the standard unit for measuring sound pressure amplitude.[5] All noise levels in this study—reported in terms of dB—are relative to the industry-standard reference sound pressure of 20 micropascals.

On a logarithmic scale, an increase of 10 dB is 10 times more intense than 1 dB, 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity

[5] The commonly held threshold of audibility is 20 micropascals, and the threshold of pain is around 200 million micropascals, a ratio of one to 10 million. By converting these pressures to a logarithmic scale (i.e., decibels), the range becomes a more convenient 0 dB to 140 dB.

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2. Environmental Setting

of sound and its perceived loudness to the human ear. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud). Changes of 1 to 3 dB are detectable under quiet, controlled conditions, and changes of less than 1 dB are usually not discernible (even under ideal conditions). A 3 dB change in noise levels is considered the minimum change that is detectable with human hearing in outside environments. A change of 5 dB is readily discernible to most people in an exterior environment, and a 10 dB change is perceived as a doubling (or halving) of the sound. These relationships are summarized in Table 1.

Table 1 Noise Perceptibility

± 3 dB	Threshold of human perceptibility
± 5 dB	Clearly noticeable change in noise level
± 10 dB	Half or twice as loud
± 20 dB	Much quieter or louder

Source: Bies and Hansen 2009.

Frequency

The human ear is not equally sensitive to all frequencies. Sound waves below 16 Hz are not heard at all, but "felt" more as a vibration. Similarly, though people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz.

When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to approximate the response of the human ear. The term "A-weighted" refers to a filtering of the noise signal in a manner corresponding to the way the human ear perceives the intensities of different frequencies of sound. The A-weighted noise level has been found to correlate well with people's judgments of the "noisiness" of different sounds and has been used for many years as a measure of community and industrial noise.

Since most people do not routinely work with decibels or A-weighted sound levels, it is often difficult to appreciate what a given sound pressure level number means. To help relate noise level values to common experience, Table 2 shows typical noise levels from noise sources.

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Table 2 Typical Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Onset of physical discomfort	120+	
	110	Rock Band (near amplification system)
Jet Flyover at 1,000 feet		
	100	
Gas Lawn Mower at three feet		
	90	
Diesel Truck at 50 feet, at 50 mph		Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime		
	70	Vacuum Cleaner at 10 feet
Commercial Area		Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
		Large Business Office
Quiet Urban Daytime	50	Dishwasher Next Room
Quiet Urban Nighttime	40	Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	30	Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	20	
		Broadcast/Recording Studio
	10	
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 2009.

Although the A-weighted scale and the energy-equivalent metric are commonly used to quantify the range of human response to individual events or general community sound levels, the degree of annoyance or other response also depends on several other perceptibility factors, including:

- Ambient (background) sound level
- General nature of the existing conditions (e.g., quiet rural or busy urban)
- Difference between the magnitude of the sound event level and the ambient condition
- Duration of the sound event
- Number of event occurrences and their repetitiveness
- Time of day that the event occurs

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2. Environmental Setting

Temporal Effects

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called L_{eq}), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. For example, the L_{50} noise level represents the noise level that is exceeded 50 percent of the time; half the time the noise level exceeds this level and half the time the noise level is less than this level. This level is also representative of the level that is exceeded 30 minutes in an hour. Similarly, the L_2, L_8 and L_{25} values represent the noise levels that are exceeded 2, 8, and 25 percent of the time or 1, 5, and 15 minutes per hour, respectively. These "n" values are typically used to demonstrate compliance for stationary noise sources with many cities' noise ordinances. Other values typically noted during a noise survey are the L_{min} and L_{max}. These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period, respectively.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law and many local jurisdictions use an adjusted 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL) or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment (or "penalty") of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00 PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The L_{dn} descriptor uses the same methodology except that there is no artificial increment added to the hours between 7:00 PM and 10:00 PM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher). The CNEL or L_{dn} metrics are commonly applied to the assessment of roadway and airport-related noise sources.

Propagation

Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single-point source, sound levels decrease by approximately 6 dB for each doubling of distance from the source (conservatively neglecting ground attenuation effects, air absorption factors, and barrier shielding). For example, if a backhoe at 50 feet generates 84 dBA, at 100 feet the noise level would be 79 dBA, and at 200 feet it would be 73 dBA. This drop-off rate is conservative and is appropriate for noise generated by onsite operations from stationary equipment/activities at a project site. This approach is commonly used for construction equipment noise evaluations. For more detailed assessments, if ground-level absorptive vegetation or other "soft site" conditions are considered, the distance attenuation (drop-off) rate would be increased by 1.5 dB per distance doubling; for a total of 7.5 dB per propagation distance doubling. Given the heavily vegetated area around the Project site—either with agricultural fields or zones of thick brush and trees—the vicinity of the plant would certainly fit into the "soft site" category, and notable ground effect attenuation would be expected.

If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dB for each doubling of distance over a reflective ("hard site") surface such as concrete or asphalt. Line source noise in a relatively flat environment with ground-level absorptive vegetation decreases by 4.5 dB for each doubling of distance.

Psychological and Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions, thereby affecting blood pressure and functions of the heart and the nervous system. Extended periods of noise exposure above 90 dBA results in permanent cell damage, which is the main driver for hearing protection regulations in the workplace. When the noise level reaches 120 dBA, an unpleasant "tickling" sensation occurs in the human ear; even with short-term exposure. This is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation becomes painful, and this is called the threshold of pain. A sound level of 160 to 165 dBA will result in dizziness or loss of equilibrium. In community environments, the ambient or background noise problem is widespread, though generally worse in urban areas than in outlying, less-developed areas. Elevated ambient noise levels can result in noise interference (e.g., speech interruption/masking, sleep disturbance, disturbance of concentration) and cause annoyance.

Loud noise can be annoying and it can have negative health effects (USEPA 1978). The effects of noise on people fall into three general categories:

- Subjective effects, i.e., annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, learning.
- Physiological effects such as startling and hearing loss (temporary and permanent).

In most cases, environmental noise produces effects in the first two categories only. However, unprotected workers in some industrial work settings may experience noise effects in the last category.

2.3 REGULATORY SETTING

Federal and local governments have established noise guidelines and regulations for protecting citizens from potential hearing damage and various other adverse physiological, psychological, and social effects associated with noise. For this noise evaluation, the focus is twofold: (a) worker health and safety with respect to potential noise exposure during normal operations of the Project and (b) adherence to pertinent noise-related regulations for the State of Louisiana and for St. James Parish.

2.3.1 Worker Noise Exposure (Federal)

In the United States, worker noise exposure limits are regulated by the federal Occupational Safety and Health Administration (OSHA) under the Occupational Safety and Health Act of 1970.[6] The noise exposure level of workers is limited to 90 dBA over a time-weighted average (TWA) eight-hour work shift to protect hearing.[7] This is called the permissible exposure level or PEL. If workers are exposed to a $TWA_{8\text{-}hr}$ above 85

[6] OSHA noise regulations are established in Code of Federal Regulation (CFR) Title 29, Part 1910-G, Section 1910-95, "Occupational Noise Exposure."

[7] In practice, workers are routinely exposed to varying noise levels for their eight-hour shift. So, to compute the entire shift's time-weighted-average (higher level means shorter duration and vice versa), the other key component of worker noise exposure— the exchange rate— comes into play. The exchange rate is simply the decibel trade-off factor for exposure duration. Under OSHA regulations, the exchange rate is 5 dB. Thus, for every 5 dB increase in sound level, the allowable exposure duration is halved (i.e., 90 dB(A) for 8 hours, 95 dB(A) for 4 hours, 100 dB(A) for 2 hours, and so on).

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dBA (i.e., the OSHA Action Level), the regulations call for a worker hearing protection program that includes baseline and periodic hearing testing, availability of hearing protection devices, and training in hearing damage prevention. A summary table of pertinent limits and parameters is given below.

Table 3 Summary of Pertinent Worker Noise Exposure Parameters

Maximum Permitted Daily Duration, hours (for 100% dose)	U.S. OSHA Limits (90 dBA criterion & 5 dB exchange rate)
8	90
4	95
2	100
1	105
½	110
¼ or less	115

Source: Code of Federal Regulation (CFR) Title 29, Part 1910-G, Section 1910-95, "Occupational Noise Exposure."

Given previous experience at similar facilities for power generation, chemical processing, syngas generation, and distillation, on-site noise levels during normal operations are expected to be generally in the range of 70 to 85 dBA. The relatively few areas that may be above 85 dBA should be posted as high noise level areas, and hearing protection will be required therein. Whether by administration controls, such as reduced time in high-noise areas, or by engineering controls, such as the use of enclosures for particularly noisy equipment, the Project should maintain $TWA_{8\text{-}hr}$ exposure levels below 90 dBA for all employees, per OSHA regulations.

2.3.2 State of Louisiana Noise Regulations

The State of Louisiana has regulations and codes for the general health and safety of the state's citizens.[8] Like most states, Louisiana has code sections that deal with excessive noise from motor vehicles on public highways and roadways. The state code also outlines philosophies and policies for reducing environmental pollution, including noise, which can be used for guidance at the parish or city level by local jurisdictions. Details for the state-level regulations on noise are summarized in Table 4.

[8] The library for Louisiana codes is found at: http://statutes.laws.com/louisiana/rs.

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Table 4 Summary of Pertinent State Noise Regulations

Reference	Overview Summary
Louisiana State Law **RS 14.103.1**	Limits sound emanations from vehicle-mounted sound amplification systems to no more than 85 decibels at 25 feet.
Louisiana State Law **RS 30.2051** (Louisiana Air Control Law)	(a) Deals with very general philosophies and policies for the protection of Louisiana residents regarding environmental pollution, including noise pollution. Provides that the Louisiana Secretary of State has the authority to establish criteria and standards for noise control and abatement. However, this section does not contain any such noise criteria and standards. (b) Deals with policies regarding noise associated with sport shooting ranges. No details or decibel level limits are established for such circumstances.

After review of these sections (i.e., RS 14.103.1 and RS 30.2051), there does not appear to be any state-level regulations that pertain to noise emanations from an industrial facility, nor are there any numerical sound level limits for such a facility.

2.3.3 St. James Parish Noise Regulations

St. James Parish[9] has a set of regulations and codes for general development within their jurisdiction. There are several sections of the code that refer to excessive sound or objectionable noise; particularly with respect to the use of local recreational facilities, campgrounds, and parks. The pertinent sections in the municipal code that deal with noise include sections 10, 26, 46, and 74.[10] Details for the parish-level regulations on noise are summarized in Table 5.

[9] The website for St. James Parish is: http://www.stjamesla.com.

[10] The page on St. James Parish website dealing with local ordinances is http://www.stjamesla.com/code-of-ordinances. The on-line library for St. James Parish municipal codes is http://library.municode.com/index.aspx?clientId=13122&stateId=18&stateName=Louisiana.

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Table 5 Summary of Pertinent Parish Noise Regulations

Reference	Overview Summary
St. James Parish MuniCode; Section **10-1**	Discusses "unreasonable volume" for music, instruments, and/or amplified sounds. Contains time-of-day restrictions, but no decibel level limits. Refers to State Law 30:2051 (see Table 4).
St. James Parish MuniCode; Section **26-3**	Similar to 78-4 (below), deals with intrusive sounds being generated at the St. James Parish Welcome Center Pavilion and grounds. The clear applicability is for park users having parties or organized events (where their damage deposit can be forfeited or their event can be closed). Discusses "unreasonably load or excessive sound or noise" from sound amplification systems that may cause inconvenience or annoyance (to unnamed recipients). A violation is determined by the town deputy or parish sheriff.
St. James Parish MuniCode; Section **46-36**	No loud music or other noise is permitted during Christmas bonfire events held on the Mississippi levee.
St. James Parish MuniCode; Section **74-81**	General design standards for mobile home parks so that site selection would preclude exposure to "adverse and objectionable influences," including noise. There is no definition of what constitutes "adverse and objectionable."
St. James Parish MuniCode; Section **74-161**	A general policy statement that uses of a mobile home campground should not be exposed to "adverse and objectionable influences," including noise. There is no definition of what constitutes "adverse and objectionable."
St. James Parish MuniCode; Section **78-4**	Deals with intrusive sounds generated at recreational parks. The clear applicability is for park users who are having parties or organized events (where their damage deposit can be forfeited or their event can be closed). Discusses "unreasonably load or excessive sound or noise" from sound amplification systems that may cause annoyance to residences in the vicinity of recreational parks. For music at Lutcher Park, a violation is determined by the town deputy. For music at Paulina Park, the violation is defined as audibility at 25 feet or exceeding 70 decibels.

After review of the above Parish Code, there does not appear to be any parish-level regulations that pertain to noise emanations from an industrial facility, nor are there any numerical sound level limits for such a facility.

2.4 STANDARDIZED ASSESSMENT LOCATIONS

A "Recommended Measurement Locations" study was conducted by PlaceWorks in July 2015.[11] The goal of this task was to establish measurement positions that—with a formal field survey effort—will establish the baseline conditions as well as the Project's noise contributions around the Project site. The locations throughout the surrounding community areas were chosen to:

(a) focus on residential or other noise-sensitive receptors (rather than on uninhabited farm land),
(b) provide existing sound level information at a range of distances from the proposed Project site,
(c) provide existing sound level information at a range of distances from Hwy 18,
(d) provide existing sound level information at other industrial land uses (e.g., the tank farm, piping, and associated rail transport lines to the southeast of the Project site).

The full details of the recommended measurement locations study are included as Attachment B.

[11] The assessment locations study report was dated 7/7/15 (version 4) and was addressed to Markus McGrath in the ESH group. This was conducted under Fluor contract number A6RN-90-K006 and under PlaceWorks project number FLUO-01.5, Task 1.

2.4.1 Key Project Assessment Locations

The recommended field measurement locations are summarized in Table 6.

Table 6 Summary of Project Assessment Locations

Location ID[1]	Description	Distance from SLM flare[2] (feet)	Distance from SR-18 (feet)
A	Utility pole near rough ball fields on unnamed street west of Heary Rd. (St. James Parish Gov.)	5,175	1,900
B	Utility pole at end of Communi St. (Mitchell House)	4,775	2,725
K	Utility pole at end of King View St. (Dumas House or Broden House)	2,600	3,825
L	Utility pole at end of Wood St. (Cantrelle House)	5,100	1,250
N	Tree trunk behind 7809 Hwy 18 (Sotile house)	6,750	525
P[3]	On SLM Project boundary, south of Project site	6,075	10,525
[illegible]	[illegible]	[illegible]	[illegible]

Source: PlaceWorks 2015.

1. The location identification labeling is consistent with the nomenclature used in the predictive evaluation study reports (of January 2014 through February 2015) to indicate predictive modeling locations. Locations O and P are 'new' locations not used in previous SLM noise studies (prior to July 2015).
2. Location of SLM flare as of the July 2015-era design.
3. Location P replaces the previously allocated Location E; Location A replaces previously allocated Location O; and Location D (as a potential alternate site) has been dropped from further consideration—all in coordination with SLM staff.
4. Location M added at the request of SLM staff. **However, 'M' is NOT part of plant noise emissions compliance process.**

This table shows that the representative residential receptors are from 2,600 to 6,750 feet (0.5 to 1.3 miles) from the reference point (i.e., the flare) at the proposed SLM facility. The nearest noise-sensitive receptors that could be found via aerial information were at the end of King View Street, approximately 0.6 of a mile from the SLM site centroid.

Since SR-18 is expected to carry a significant portion of local traffic flows and would be a notable noise source in the general area, the locations would provide information about vehicle-generated noise. The above table shows that the representative residential receptors are from 400 to 10,525 feet (0.08 to 2.0 miles) from the centerline of the roadway.

2.4.2 Summary of Assessment Locations

A final set of six locations would be used for Project compliance measurements (following plant commissioning and start-up). Specifically, Locations A, B, K, L, N, and P would be used for plant noise emissions verification; data (ambient or plant contributions) at Location M is for informational purposes only. These locations are shown graphically on Figure 4.

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Figure 4 - Project Site and Ambient Noise Measurement Locations

Project Boundary

A Noise Measurement Locations

0 2,000
Scale (Feet)

Source: Google Earth Pro, 2017

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2.5 NOISE EMISSION CRITERIA

An EPC Guarantee Noise Criteria Study was conducted by PlaceWorks in July 2015.[12] As discussed above in section 2.3.3, a review of municipal code regulations for St. James Parish showed that there are no parish-level or state-level regulations that pertain to noise emanations from an industrial facility, nor are there any numerical sound level limits for such a facility.

Thus, and in lieu of local regulations, Project-specific noise emissions criteria for the sound contributions due to the plant have been requested by Fluor and the SLM client team. The recommended noise guarantee criteria for the proposed SLM plant in St. James Parish, Louisiana, are summarized below. The full details of the Guarantee Noise Criteria Report are included as Attachment C.

2.5.1 Evaluation Philosophies

In order arrive at Project-specific noise emissions criteria, the following general philosophies for community noise environments were explored:

- Absolute Threshold, using pertinent local regulations
- Relative Increase (difference), using an accepted industry practice
- Absolute Threshold, using an accepted industry practice

Of these three main philosophies, the option that was considered the most prudent, verifiable, and defensible for all parties was the third option—an absolute threshold based on industry practice(s). By using an objective industry practice, potential complaints regarding an arbitrary, subjective threshold can be precluded. Additionally, an objective industry practice would effectively fill the void that results from the lack of a local noise code. Lastly, an absolute threshold, based on accepted industry practices, would provide for a reasonably evident determination of acceptability, with a minimum of adjustments or corrections to the measured data. Frequently-used industry practices that have absolute thresholds for noise acceptability included standards from the following organizations:

- U.S. Environmental Protection Agency
- U.S. Federal Aviation Administration
- U.S. Federal Transit Administration
- U.S. Department of Housing and Urban Development
- Institute of Noise Control Engineering—USA
- World Health Organization
- International Finance Corporation—World Bank Group

In consideration of the studied residential criteria, the recommended community noise criteria set was:

- **≤ 65 dBA CNEL/L_{dn} at residential land uses**
- **≤ 75 dBA CNEL/L_{dn} at industrial/commercial/manufacturing/agricultural land uses**

[12] The Guarantee Noise Criteria Study Report was dated 7/8//15 (version 3) and was addressed to Markus McGrath in the ESH group. This was conducted under Fluor contract number A6RN-90-K006 and under PlaceWorks project number FLUO-01.5, Task 2.

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These recommended values include a practical amount of conservatism, reasonable considerations of potential annoyance responses by local citizenry, and a prudent allocation of 'headroom' for engineering design purposes. It was recommended that field sound level data—both ambient environments and ambient-plus-Project conditions—should be acquired at the six community locations discussed above in section 2.4 (i.e., denoted as A, B, K, L, N, and P).[13]

All locations would be considered as residential areas, with the exceptions of Locations A and P, which are representative of a commercial and agricultural land uses, respectively. However, subsequent to the 2015 work, an agreement was reached between Fluor and the SLM client that Locations A and P, although commercial and agricultural land uses, would also have the same project contribution limits as the residential land uses. Thus, the final recommended community noise criterion, as of the writing of this document, is:

≤ 65 dBA CNEL/Ldn at the six community locations denoted as A, B, K, L, N, and P.

2.6 FIELD NOISE MEASUREMENT PROTOCOL

A "test procedure—plant noise survey" study was conducted by PlaceWorks in August 2015.[14] The objective of this procedure was to facilitate the acquiring and documenting of the (a) ambient conditions (without the Project contributions) and (b) operating noise levels (existing-plus-Project contributions) around the SLM plant. The prescribed measurements would document the process plant's noise emissions at the property boundaries and at far-field emissions at the specified residential and commercial community receptors. These measured levels would be compared to the Project's noise requirements to assess the acceptability of the noise environments. The full details of the test procedure are included as Attachment D.

2.7 AMBIENT NOISE ENVIRONMENTS

To establish the existing conditions around the Project site, ambient noise data were acquired by PlaceWorks and are summarized herein. The full details of the ambient survey report are included as Attachment E.

2.7.1 Ambient Survey Introduction

An ambient noise survey study was conducted by PlaceWorks in early September 2015.[15] Various sound level metrics were measured at a total of seven locations around the Project site, per both the Project's "assessment location selection" document and the "field noise test procedure" document. During the measurement sessions, the meteorological conditions were within appropriate ranges for acceptable outdoor noise measurements, per industry standards.

[13] The six locations A, B, K, L, N, and P would be used for plant noise emissions verification testing; the seventh location M is for informational purposes only and does not form the basis of the noise guarantee.

[14] The Procedure Document was dated 8/4/15 (version 0B). This was conducted under Fluor contract number A6RN-90-K006 and under PlaceWorks project number FLUO-01.5, Task 3.

[15] The Survey Report was dated 10/12/15 (version 2) and was addressed to Markus McGrath in the ESH group. This was conducted under Fluor contract number A6RN-90-K006 and under PlaceWorks project number FLUO-01.5, Task 4.

2. Environmental Setting

2.7.2 Survey Sessions

The site and surroundings were visited beginning Tuesday, September 1, 2015, at which time a general layout and accessibility scouting effort was conducted. Noise level instrumentation was deployed during the morning of Wednesday, September 2, at the six primary measurement locations and left to acquire data until the morning of Friday, September 4, 2015. Sound level data was also acquired at a seventh, informational location. Noise data were acquired and field observations were made by a PlaceWorks acoustical engineer.

During the survey, a combination of long-term monitoring and short-term sampling was employed to capture (a) overall sound levels, (b) statistical sound levels, and (c) frequency-band data at the various measurement locations. Specifically, for each long-term measurement location, various statistical sound levels, the minima/maxima, and the energy-average sound levels (L_{eq}) were acquired over at least one complete day-night cycle. These long-term measurements consisted of continuous noise level monitoring (but without audio recordings), using a sampling period of one hour. In addition, several short-term (i.e., 15-minute duration) samples were made during various times of the day and night to acquire supplemental information about the spectral content of the ambient noise environment and to document the observed noise sources contributing to the environment at that time. These short-term measurements consisted of discrete, 'snap-shot' summaries of the existing environments at the various times, all with 15-minute sample durations. The short-term measurements were conducted in the same general vicinity as for the long-term measurements.

2.7.3 Survey Instrumentation

All noise measurements were conducted in general accordance with industry standards and guidelines for the engineering evaluation of exterior noise sources. Instruments made by Brüel and Kjær (B & K), Larson-Davis (LD), and Norsonics were used to conduct the noise measurements. The data acquisition systems meet the requirements of the ANSI S1.4-1983 Standards for Type I quality and accuracy. Each instrument was field calibrated and operated according to the manufacturer's specifications. A windscreen was used on each instrument during all sampling periods, and all measurements were conducted with the microphone height approximately 5 feet (1.5 m) above ground level. The sound level meters were operated to sample noise using the A-weighting filter and the slow metering response. Measurements included the acquisition of time history data, frequency-band data (in one-third-octave bands), and statistical sound level data at selected locations.

2.7.4 Survey Meteorological Conditions

Site conditions and meteorological conditions were noted during the field survey[16] and can generally be described as warm and humid. Survey conditions are considered typical for this time of year in the area. The air temperature during the daytime was typically in the mid to upper 80s°F with relative humidity between 80 and 100 percent. During the evening and nighttime sessions, the temperature was in the low to mid-70s°F with humidity in the range of 95 to 100 percent. The temperature range during the survey was between 72.5 and 88.5 °F. The lowest humidity recorded during the survey was 61 percent. The barometric pressure was generally centered about 29.98 (± 0.1) inches of mercury. Skies were noted as being partly cloudy to overcast

[16] Field meteorological data was acquired from historical data at www.wunderground.com.

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during both the daytime and evening hours. On 9/3/15, the moon was in its waning gibbous phase (69 percent illumination), but was generally obscured by the cloud cover. During the survey, the predominant wind conditions were calm with an occasional, very light breeze (i.e., 3 to 4 mph). Winds, when present, were generally from the south, SSE, or ESE. All these meteorological conditions were within appropriate ranges for acceptable outdoor noise measurements per ANSI S1.13.

2.7.5 General Ambient Noise Environment

As the Project site is relatively remote and surrounded by undeveloped land, the major noise sources were either from nature, transportation sources, or from activities at the closest industrial facilities in the distance (primarily to the north and northeast). During the ambient survey, the following local noise sources were noted by the field engineer:

- Distant truck and automobile movements along SR-18 (Locations M and N)
- Localized vehicle operations and parking on the residential streets (Locations B, K, L)
- Industrial and/or dock facilities to the north and northeast (Locations A and B)
- Occasional rustling of vegetation during periods of light winds
- Crickets and other insects (to some extent, at all times)
- Rare aircraft overflights in the distance
- Somewhat rare train pass-bys in the distance
- Occasional and sporadic instances of farming/agricultural equipment operations[17]
- As a special case, at approximately noon on 9/3/15, a test of the community warning system occurred. This test lasted approximately 3½ minutes and consisted of both recorded speech and a wailing siren. The warning system test was witnessed while taking short-term data at Location N and was from 10 to 25 dB louder than the general ambient at that location.[18]

2.7.5.1 OVERALL SOUND LEVEL RESULTS: SHORT-TERM DATA

The short-term noise samples, made during several times of the day and night, are summarized in Table 7, which provides the minimum, maximum, and energy-average (L_{eq}) sound levels over each sample.

[17] At the time of the survey, the majority of cane fields were nearing harvest, but major harvesting efforts had not begun yet. Rather, localized and sporadic equipment operations were noted—primarily turning-over and processing of bare dirt—near Locations A and P, both on 9/3/15.

[18] It is assumed that the warning system—employing pole-mounted loudspeakers—is used for community emergencies such as hurricanes, levy breaches, industrial plant events, and the like. The timing for conducting these tests is unknown. The test consisted of a (recorded) verbal announcement (such as "This is a test of the St. James Warning System...this is only a test...repeat, this is only a test") followed by a wailing siren for approximately three minutes, and concluding with another verbal announcement (indicating that the test was finished).

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2. Environmental Setting

Table 7 Summary of Ambient Noise Short-term Measurements

Location	Start Time	A-weighted Sound Pressure Level, dBA		
		Minimum	L_{eq}	Maximum
A	13:26:00	38.2	43.5	50.4
	21:34:00	45.2	47.0	49.3
B	15:08:00[1]	43.6	47.4	52.8
K	10:26:00	44.9	47.0	51.3
	20:02:45	49.7	51.9	62.4
L	11:00:00	45.8	53.0	58.4
	20:27:00	46.6	48.5	51.1
M	11:32:00	43.5	47.8	58.3
	15:36:01	46.1	49.4	56.3
	22:42:00	46.7	49.9	53.6
N	***12:01:01[2]***	***40.2***	***67.4***	***79.0***
	12:12:00	41.4	48.2	59.0
	22:11:27	42.6	51.0	54.2
	8:23:00[3]	51.0	52.3	54.2
P	14:34:02	42.5	45.9	55.7
	21:05:02	44.7	48.8	50.8

Source: PlaceWorks, 2015.
Notes: All data acquired on 9/3/15 over 15-minute durations, except as noted.
1. Only one measurement was taken at Location B (during the daytime) due to concerns over security during late-night period(s).
2. **This was a community warning system test of approximately 3 minutes duration.**
3. Data acquired on the morning of 9/4/15.

Table 7 above demonstrates that the entire measurement area typically had ambient noise levels between 43 and 53 dBA (L_{eq}), with the preponderance of levels in the range of 47 to 50 dBA (L_{eq}). The short-term numerical and graphical results, in conjunction with the field notes, indicate that the existing noise environments were (a) relatively steady (within each sample), (b) relatively consistent (regardless of time-of-day), and (c) relatively uniform (throughout the survey extents). Given the noted observations, these steadiness, consistency, and uniformity results are primarily due to the pronounced contribution of insect- and bird-generated sounds, with secondary influences by traffic flows, rail movements, and industrial sources[19] (all typically in the distance). Distant aircraft fly-overs and distant HVAC operations were also audible, but had relatively minimal influence on the measured sound levels.

2.7.5.2 OVERALL SOUND LEVEL RESULTS: LONG-TERM DATA

As noted above, six long-term monitoring stations were set to acquire continuous data over at least a 24-hour period to investigate the day-to-night changes in the area's ambient noise conditions and to document the

[19] These included rotating equipment 'droning', venting incidents, and banging/clanging occurrences.

existing 24-hour noise level metrics (primarily the CNEL levels). These monitors were set to acquire and process noise data in continuous 1-hour samples at positions around the Project site that are representative of nearby receptors. Table 8 presents a summary of the CNEL and 24-hour $L_{eq\text{-}24hr}$ noise level metrics that were measured during the September 2015 ambient survey.

Table 8 Summary of Measured 24-hour Ambient Sound Levels

Location	Description	24-hour Energy Average Level, $L_{eq\text{-}24hr}$, dBA	Community Noise Equivalent Level, CNEL, dBA[1]
A	Utility pole near rough ball fields on unnamed street west of Heary Rd. (St. James Parish Gov.)	49.1	**57.2**
B	Utility pole at end of Communi St. (Mitchell House)	50.4	**56.7**
K	Tree trunk at 93 feet SW of last utility pole on west side access road to fields	53.9	**62.9**
L	Tree trunk at large tree bordering cane fields to the east of residential area	48.4	**54.1**
N	Tree trunk behind 7809 Hwy 18 (Sotile house)	50.2	**57.4**
P	On field access road north of SLM Project boundary, on tree trunk, south of Project site	46.4	**53.7**
M	**South of tree trunk behind [redacted] Hwy 18, at corner of open space ([redacted])**	**~51.8[1]**	**~57.9[2]**

Source: PlaceWorks, 2015.
1. The CNEL noise metric is the noise level basis for the plant noise emissions acceptability criteria.
2. Estimated from short-term data at Loc. M via time-correlation with the long-term data at the similar Loc N.

The long-term numerical and graphical results are consistent with the short-term results in that the ambient noise conditions held in a relatively small range of sound levels between 40 and 52 dBA $L_{eq\text{-}1hr}$; with the majority of the data centered around 45 to 48 dBA $L_{eq\text{-}1hr}$. These results held true, regardless of the time of day or night. This lack of variation indicates an absence of people-driven[20] noise generation. Rather, in this rural, primarily agricultural setting, the consistency and close grouping of noise levels points to relatively steady noise sources. In this case, the predominant noise sources in the areas around the Project site were insects, birds, and dogs. Insect noise was noted at nearly every location and at all times of the day and night. The most pronounced insect-driven noise result was at Location K, and significant contributions were also noted at Locations B, L, N, and P. Also, the field notes indicated that insects were clearly audible during the evening/nighttime hours at Location A.

2.7.5.3 SUMMARY OF AMBIENT NOISE RESULTS

In general, the short-term and long-term noise level records show a notable lack of variability, in terms of the fluctuations in the energy-average (L_{eq}) and residual minimum (L_{90}) levels from period to period. This is due to the predominance of non-human noise sources—primarily insect noise—that is controlling the soundscape regardless of time of day. The hourly energy-average ($L_{eq\text{-}1hr}$) levels around the site generally

[20] Such people-driven noise patterns—as seen in developed, urban environments—would commonly have a level peak during the morning and afternoon rush hours (due to heavy traffic flows related to typical working hours), a smaller peak during the lunchtime period, lulls during the midmorning and midafternoon hours, and decreasing noise levels during the late night period (with minimum 24-hour levels typically around 2 to 4 AM).

2. Environmental Setting

stayed in the 40s to 50s dBA range, which can be considered as fairly noisy, particularly for such a rural and sparsely populated area. As a consequence of the pronounced insect-driven noise results, the general noise environment would not be expected to notably change, as long as the existing ecosystem (i.e., fields, trees, bushes, birds, and insects) remains in place.

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3. Project-Related Noise

3.1 NOISE ANALYSIS AND EVALUATION METHODS

To evaluate the potential noise environment around the SLM plant site and identify any need for noise reduction measures, a noise modeling study of the Project was performed. SoundPLAN (ver. 8.0) noise prediction software was used to simulate and model the existing and future noise conditions around the proposed SLM Project site. The modeling program uses industry-accepted propagation algorithms based on International Organization for Standardization (ISO) and ÖAL-28 standards for outdoor sound propagation.[21]

The modeling calculations use a ray-tracing methodology to integrate the individual contributions from each source to each receptor position. The modeling algorithms account for classical sound wave divergence (spherical spreading loss with adjustments for source directivity from point sources) plus attenuation factors due to air absorption, ground effects, and barrier/shielding. Further, modeling calculations take into account reflected energy from sizable solid objects such as buildings and walls. The number of reflections to be considered along any given sound propagation pathway (source to receptor) is user selectable and was consistently modeled with an allowance for two reflections. Reflectivity characteristics for each façade were defined as being somewhat reflective (i.e., having reflection losses of 2 dB, which is considered appropriate for industrial structures with piping, conduits, and platforms along the periphery).

Calculations are performed using octave band sound power levels (abbreviated as PWL or L_w) as inputs from each noise source. The computer outputs are in terms of octave band and overall A-weighted noise levels (sound pressure levels, abbreviated SPL or L_p) at discrete receptor positions (or at grid map nodes in preparation for computing a contour map). The basic noise prediction equations and other technical considerations in the modeling process are included for reference in Attachment F.

3.2 NOISE MODELING PROCEDURES, INPUTS, AND ASSUMPTIONS

For conservatism, and as standard practice in the description of environmental noise, the modeling assumed stable atmospheric conditions suitable for reproducible measurements (under "standard-day" conditions of 59° F and 70 percent RH), that are favorable for outdoor propagation. These inherently conservative factors and assumptions result in a noise model that will tend be biased to higher predicted values than would be expected in the actual environment around the Project.

[21] Algorithms and methods for ISO are included in the ISO 9613, ISO 1913 (Part 1), and/or ISO 3891 standards. ÖAL-28 standards include the General Prediction Method for Industrial Plants.

3. Project-Related Noise

All currently planned, continuous-operation equipment items that will be significant noise sources at the Project were included in the outdoor noise model. The set of modeled sources included:

- Reformer
- Flue gas boiler
- CO_2 product compressor (8,000 hp)
- Syngas compressors (HP=40,685 hp, LP=36,100 hp)
- Air compressors (350 hp)
- Circulator compressor (10,800 hp)
- Process blowers, SCR blowers, combustion air fans,
- Reformer flue gas fan (9,862 hp)
- Process water handling pumps
- Wet cooling tower (18-cell, 250 hp per cell, all operating)
- Cooling water pumps (4,600 hp)
- Boiler feedwater pumps (3,200 hp)
- Intermediate-, final-, and by-product pumps (40 to 450 hp)
- Other significant pumps (i.e., those expected to be over ~25 horsepower each[22])
- Various drums, vessels, and other steam sources
- Main flare and associated vessels & packages (operating at normal, minimum conditions)
- CO_2 vaporizer package
- Nitrogen package (inside a building and 1,250 hp))
- Water pre-treatment package
- Aux boiler packages

Information about these systems and equipment items was gathered from Project documents supplied by Fluor, including the Equipment List (dated 04-May-2017, Rev A5) and the Electrical Load List (dated 13-Jun-2017, Rev 0). The process area layout drawings[23]—all supplied by Fluor—were used to establish the relevant physical and positional characteristics of the Project's equipment. With this information, the source locations and physical characteristics were translated into input x, y, z coordinates for the noise modeling program.

At this stage of the engineering design effort, limited vendor-related information is available. To estimate sound emissions factors for the various equipment items/systems, the standard Fluor noise specification was used as a starting reference. This specification reference level was modified, based on past experience with similar projects, to estimate sound emissions for "special" or "large" equipment items. For example, the

[22] Equivalent to approximately 19 kW.

[23] SLM plant layout drawings by Fluor:
- Plot Plan – ISBL Utilities and Methanol, Drawing SJT1-1101-50-PP-001, Rev 3 of 20-Jul-17
- Plot Plan – OSBL Utilities and Product Storage; Drawing SJT1-1201-50-PP-002, Rev 2 of 19-Jul-17
- Plot Plan – OSBL Storm/Plant Waste Water, Hydrogen Loading, Flare, and Cooling Tower; Drawing SJT1-1203-50-PP-003, Rev 2 of 20-Jul-17
- Plot Plan –Overall ISBL/OSBL Plot; Drawing SJT1-1101-50-PP-001, Rev 2 of 26-Jul-17
- Plot Plan –Overall Site Plan; Drawing SJT1-1001-50-PP-001, Rev 2 of 28-Jul-17
- Supplemented with NavisWorks file (A6RN.nwd), dated 10-Jul-2017

Synthesis Gas High-Pressure (HP) Compressor (Tag 012-K-201) has a nameplate rating of 40,685 horsepower. That is, model inputs were derived from noise levels on previous design efforts for similar-sized plant configurations. Additionally, generic industry reference information was used for other sound level emissions details. Conversely, line items from the equipment list that would be considered insignificant noise sources (e.g., metering pumps, shell-and-tube heat exchangers, filters, packing) were screened out from further consideration.

Lastly, NO special noise control treatments were assumed. That is, no enclosures, no stack silencers, no low-noise procurements were used. For example, the High Pressure Boiler Feedwater (HP BFW) Pumps—with a nameplate rating of 3,200 horsepower—were modeled to be approximately 97 dBA at 3 feet. This sound level is 12 dB over the nominal, standard specification limit, but it is a more realistic value for what would be expected in the real world.

These derived and expected sound pressure levels from the significant noise sources were converted into sound power levels (in decibels re 1 picoWatt) to serve as the initial inputs for the noise modeling programs. The total combined sound power rating for all the modeled equipment and systems at the plant summed to 126.4 PWL(A).

The Reformer structure was included as a barrier to account for propagation losses due to shielding between a given noise source and a receptor location. Likewise, 'large' buildings[24] and 'tall' tanks/vessels[25] were included as barrier structures. However, for conservatism, other on-site buildings, tanks, and structures were not considered as sound barriers. The cooling tower was also neglected as a sound barrier.

The significant exterior sources, delineated above and detailed in Attachment G, were modeled to predict the aggregate noise levels at discrete receptor locations around the Project. This modeling process was then extended to calculate plant-generated noise levels at regularly spaced grid points. From these grid results, a noise level contour map was produced for the nominal base case operating scenario. The Project was assumed to operate 24 hours per day at its design capacity, which means its noise output would be constant regardless of time of day. Other pertinent modeling assumptions included:

- Modeled area as essentially flat with a base elevation of 3 m above sea level.
- River taken to be 1.5 m above sea level.
- Assumed soft (absorptive) ground conditions throughout analysis area (except over water).
- Stacks heights were taken from the NavisWorks rendering.

The previously used off-site locations throughout the surrounding community areas were again used for the assessment. These off-site locations are at residential or other noise-sensitive receptors, include the official six assessment locations and range from approximately 0.6 to nearly 2 miles from the Project site centroid.

[24] The Central Control building, Maintenance/Warehouse/Engr'g building, and most Unit 108 buildings were included.
[25] Typically, and as general rule, such structures were included if they were at least 9 meters in height.

3.3 FUTURE CONDITIONS MODELING RESULTS

The noise model was run for the design case plant configuration, assuming full-load operations.[26] The major exterior noise sources for the base case configuration included the methanol process unit, the distillation area, and the synthesis area, including the large compressors, large pumps, other treatment packages, the cooling tower, the flare, and several knock-out or steam drums.

3.3.1 Off-Site Community Areas

The results for the base case (i.e., no special noise reductions features) model run at off-site, community locations are given in Table 9, *Summary of Predicted Noise Levels Due to SLM Plant*. These predicted noise levels are the SLM plant contributions without the influence of other, ambient noise sources.

Table 9 Summary of Predicted Noise Levels Due to SLM Plant only (without ambient contributions)

Receiver	Description	Leq dB(A)	CNEL, dBA	Guarantee Limit	Plant below Guarantee, dB
A	**unnamed street off of SR-18**	**43.3**	**50.0**	**65[1]**	**15.0**
B	**Communi Street**	**45.1**	**51.8**	**65**	**13.2**
C	Freetown Street	44.5	51.2	None	Not applicable
D	end of Lewis Road	39.8	46.5	None	Not applicable
E	Burton Street, near Celestin Cemetery	35.8	42.5	None	Not applicable
F	Burton Street, near rail line	No data[3]	No data[3]	None	Not applicable
G	near end of Braud Street	35.3	42.0	None	Not applicable
H	near end of Geason Street	37.4	44.1	None	Not applicable
I	unnamed street off of SR-18	38.6	45.3	None	Not applicable
J	Jones Street	40.0	46.7	None	Not applicable
K	**end of King View Street**	**47.4**	**54.1**	**65**	**10.9**
L	**end of unnamed street off of SR-18 (west of Wood St.)**	**41.4**	**48.1**	**65**	**16.9**
M	just off of SR-18 (east of Pierre St.)	39.0	45.7	Info only	Info only
N	**just off of SR-18 (east of Welcome Park St.)**	**39.2**	**45.9**	**65**	**19.1**
P	**Southeast property line, approx. 3,500 feet from R/R**	**40.4**	**47.1**	**65[2]**	**17.9**

Source: PlaceWorks 2017.
Note: Line items shown in **bold type** are the guarantee assessment locations
1. Although this location (the community baseball fields) was originally considered as a 'commercial' use with an applicable noise level limit of 75 dBA CNEL, later agreements included this as having a (residential) limit of 65 dBA CNEL.
2. Although this location was originally considered as an 'agricultural' use with an applicable noise level limit of 75 dBA CNEL, later agreements included this as having a (residential) limit of 65 dBA CNEL.
3. Although Location F was originally considered in early modeling and assessment efforts (circa 2014 and 2015), it was concluded that due to its long distance from the Project site, there was no further call to include evaluations at this distant location.

The SLM contributions at community receptors are predicted to be generally in the range of 35 to 47 dBA L_{eq}, which equate to a range of 42 to 54 dBA CNEL (assuming steady-state, full-load operations over 24 hours in any given day). The closest noise-sensitive receptors (at the end of King View Street) are predicted

[26] A few equipment items may be operating at partial load, even at nominal plant capacity. Some of these items may produce higher noise levels at partial load than at full load, but the deviations to the assumed full-load noise emissions are not considered significant for this noise modeling process.

to experience the upper bounds of these noise level ranges. Other, more distant locations, such as Location G, would be expected to experience SLM plant noise at or below 35 dBA L_{eq} (or 42 dBA CNEL).[27] The full details of the modeling outputs are provided in Attachment H.

Given the outcome of the ambient noise measurements, which noted existing sound levels in the range of 53 to 63 dBA CNEL, the noise from the SLM plant is predicted to be, at worst, comparable to the current noise environments. Thus, the SLM plant equipment may be audible, but only at the closest residential receptors. In these cases, the plant operations would not be expected to increase the noise environment by more than 3 to 4 dB. As distance away from the Project increased—at, for example, locations L, M, or N—the SLM noise contributions would decrease and would become increasingly difficult to discern in relation to the typical ambient conditions. At even more distant locations (such as locations D, G, and H), the SLM plant contributions would be 10 to 20 dB or more below the existing conditions and so would be totally inaudible. This effective or total inaudibility would apply to the majority of locations that have people present.

These results would depend somewhat on the changing activities and varying sound levels throughout the surrounding area, such as for intermittent traffic flows on SR-18 or farming machinery usage in the agricultural areas around the plant site. It should also be noted that receptors around modeling Locations B, C, D, and/or E may currently experience industrial noise contributions from pumping equipment associated with the existing tank farms, which would tend to mask SLM equipment contributions that would be much farther away (than the tank farm equipment).

The graphical results for the base case at grade-level exterior spaces are given in the noise level contour map shown in Figure 5. This map is a plot of constant, A-weighted sound levels in 5 dB increments for just the Project noise sources (without existing ambient sources). The contour map shows that the 45 dBA noise contour is approximately 3,325 feet from the center of the SLM plant, the 40 dBA noise contour is approximately 5,200 feet away, and the 35 dBA noise contour is approximately 8,000 feet away.

[27] Although Location F was originally considered in early modeling and assessment efforts (circa 2014 and 2015), it was concluded that due to its long distance from the Project site, there was no further call to include evaluations at this distant location. Note that Location F is an additional 300 feet from the plant centroid as is Location G. Thus, Location F results would be less than Location G results.

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3. Project-Related Noise

Using the results from this current *predictive* assessment, coupled with the results of this September 2015 *measurement* survey, an evaluation of future, combined noise environments is possible. That is, by adding the predicted contributions from the aggregate SLM plant equipment to the now-known, no-plant ambient conditions, calculations can be made to forecast what the noise environments would be after the plant is built and reaches ongoing, steady-state operations.[28] The results of this evaluation are summarized in Table 10.

Table 10 Comparison of Predicted Plant Contributions and Existing Ambient Sound Levels

Loc.	Community Noise Equivalent Level, CNEL, dBA			Increase, dB	Primary Noise Source in the Future Scenario
	MEASURED Ambient (Sept 2015)	PREDICTED Contribution from just the SLM Facility (Sept 2017)	Total, Future Noise Environment (ambient + SLM Plant		
A	57.2	50.0	58.0	0.8	Non-SLM ambient
B	56.7	51.8	57.9	1.2	Non-SLM ambient
K	62.9	54.1	63.4	0.5	Non-SLM ambient
L	54.1	48.1	55.1	1.0	Non-SLM ambient
N	57.4	45.9	57.7	0.3	Non-SLM ambient
P	53.7	47.1	54.6	0.9	Non-SLM ambient
M[2]	**~57.9[3]**	**45.7**	**58.2**	**0.3**	**Non-SLM ambient**

Source: PlaceWorks, 2015 and 2017.
1. *Estimated from results of Feb 2015 predictive report.*
2. *Recall that Location M is for informational purposes only and is not a contractual assessment location.*
3. *Estimated (see Table 4 footnote)*

The table shows that the measured, existing ambient conditions are from 5 to 12 dB higher than the predicted contributions from the future SLM plant equipment alone.[29] Following the modeling for the basic SLM plant, a set of extended calculations was performed to evaluate the additional influence of the currently envisioned control valves (numbering over 125 valves), with their estimated noise emissions. With the application of standard noise control features,[30] the entire compliment of valves is predicted to increase the Table 10 results for the plant-only aggregate noise emissions (the third column from the left) by approximately 0.5 dB. This small increment would change the fourth and fifth column results by only one- or two-tenths of a dB and is considered to be relatively negligible with respect to the rest of the noise sources at the SLM modular facility. A complete presentation of the control valve noise issue is provided in Attachment J.

From the Table 10 results and given the predominance of the existing noise environment (i.e., from 5 to 12 dB higher than the predicted contributions from the future SLM plant equipment only), the larger of the two

[28] It should be noted that these calculations inherently assume that the ambient conditions will be the same in several years as they were measured in September 2015.

[29] The difference is 13½ dB at the informational Location M.

[30] These 'standard noise control features' include one or a combination of (a) adherence to the Fluor-standard noise limit of 85 dBA at 3 feet, (b) procurement of a quiet-design valve type, and/or (c) application of external lagging for noise reduction of the valve and an appropriate length of the associated valving (probably both up-stream and down-stream of a particular valve. Additional information is provided in Attachment J.

will be the dominant source; in this case, the ambient environment would be dominant. Mathematically, the hypothetical combination of plant and ambient noises would cause no more than approximately 1 dB increase in the overall, 24-hour CNEL metric, which, generally speaking, would not be discernible,[31] even at the nearest residential receptor areas on King View Street.

That said, though, there may be certain portions of the day when the future SLM plant contributions would be higher than the ambient conditions. For example, at Location K in the absence of strong contributions from insects—such as during the daytime hours between 9 AM and 7 PM—the steady-state contribution of the SLM plant (predicted to be 54.1 dBA CNEL or, equivalently, 47.4 dBA L_{eq}) would most likely be audible to people toward the southern end of King View Street (as represented by Location K) who would be outdoors, since the existing daytime conditions were typically in the range of 38 to 42 dBA L_{eq}. This example is the most notable situation concerning potential audibility around the Project site, since all other locations are farther away from the SLM facility (than is Location K) and, as a result, would have ambient conditions that would typically remain higher than the associated SLM plant contributions, even during the quietest periods of ambient noise. Actual future audibility (limited in this discussion to outdoor listeners) would vary from person to person and from location to location, as well as be highly dependent on the non-SLM sound sources (e.g., insects) that were present at any given time or season. Thus, the subjectivity and variability of being potentially able to hear the SLM equipment is a poor tool for gaining insights into the future as-built noise environments. This discussion, therefore, is included for completeness in the presentation of ambient versus SLM plant noise conditions.

While the future SLM plant may, at certain times and in certain places, be discernible or audible to outdoor listeners,[32] this evaluation of the more objective measure of overall, long-term community noise (i.e., the CNEL noise metric), shows that the future soundscape around the SLM facility:

- will remain dominated by ambient sources and
- the SLM plant's noise contributions will raise the combined noise conditions by no more than 1 dB and
- the total, combined noise conditions (high ambient plus incremental plant contributions) be at least 1½ dB below the EPC Guarantee Noise Criterion level of 65 dBA CNEL at all pertinent receptor locations. The most constrained area is represented by Location K since this is the receptor area that is the closest to the planned SLM facility (and would, thus, receive the highest plant contributions).

As a side note, this dominance of ambient, non-SLM sources may present challenges for the future measurement of the combined ambient-plus-plant noise levels, since the relatively low levels from the SLM facility may be 'lost' or 'drowned out' with respect to the louder, no-plant (ambient) sources. This situation may create a problem if the future, no-plant noise levels are above 65 dBA CNEL due to, for example, particularly lively insect activities (recall that the environment at Location K was measured at approximately 2

[31] Recall from Table 1 above that ±3 dB is generally considered the minimum difference in discernibility for changes in general environmental sound levels.

[32] An existing resemblance to this situation may be taken from Location A (near the community ball fields), which was noted to be typically dominated by insect noise during the September 2015 survey, yet industrial noises (of indeterminate direction or origin) were audible to varying degrees during the daytime and evening periods.

dB below the Project criterion). To preclude this concern, the following assessment implementation adjustment is recommended with respect to future compliance verification measurements.

> For situations wherein the ambient conditions, without the SLM plant operating, are at or above 64 dBA CNEL, the Noise Criteria may be exceeded primarily due to the non-plant noise sources and not to the contribution of the SLM facility. In such a situation, the measurement of SLM plant noise for the purposes of demonstrating compliance with the EPC Guarantee Noise Criteria may alternatively be made at a location closer to the plant (e.g., 400 feet from the plant boundary) than at the actual off-site Assessment Location so as to attempt to isolate the plant's noise contributions from the background, ambient noise levels. The measured level at this closer location should then be mathematically extrapolated to determine the true plant noise contribution at the affected residence(s). If these mathematically extrapolated plant noise contributions are less than the no-plant ambient CNEL levels by 6 dB or more, then the plant's noise contributions to the combined CNEL would be less than 1 dB and, as such, should be considered acceptable regarding compliance with the EPC Guarantee Noise Criteria.

While the established Noise Criteria values include a practical amount of conservatism, reasonable considerations of potential annoyance responses by local citizenry, and a prudent allocation of 'headroom' for engineering design purposes, this adjustment methodology will help prevent an initial determination of a false-positive exceedance.

It is important to note, however, that the above side note is balanced by the fact that the SLM contributions are considerably lower than the measured ambient, even at Location K. As such, the SLM equipment noise portion would have to increase *substantially* to approach the 65 dBA CNEL criterion. Specifically, to arrive at a future, combined 65.0 dBA CNEL, the predicted SLM plant contribution, when added to the existing 62.9 dBA CNEL at Location K, would have to increase to 60.9 dBA CNEL.[33] This theoretical plant-only contribution is 6.8 dB higher than the level that is conservatively predicted herein for the base plant.

In summary, given the conservatism incorporated into the predictive modeling, linked with the ambient-versus-Project differentials noted in Table 10 (the aforementioned range of 5 to 12 dB), there should be a high degree of confidence that the future plant will comply with the 65 dBA CNEL EPC Guarantee Noise Criterion at all verification assessment locations.

3.3.2 On-Site Working Areas

For on-site workers, noise exposure would be a concern under both normal operating conditions and during off-design conditions (including start-up, shut-down, a system 'trip,' or an emergency). These are discussed separately below.

[33] That is, the ambient level of 62.9 dBA CNEL, when added to an artificially increased SLM contribution of 60.9 dBA CNEL would result in a total, future noise level of 65.0 dBA CNEL. This artificially increased SLM contribution of 60.9 dBA CNEL is 6.8 dB higher than the modeled value of 54.1 dBA CNEL.

3.3.2.1 NORMAL CONDITIONS

For the on-site, working environment, noise levels throughout the separate processing areas are predicted to be generally in the range of 55 to 85 dBA. Some areas behind buildings and in major noise shadow zones will have lower noise levels. Conversely, some localized areas very close to significant sources, such as the large compressors, large pumps, cooling tower, or certain loud steam discharge points, will have levels between 85 and 95 dBA. All such areas with consistent noise levels above the nominal 85 dBA worker exposure criterion (the OSHA Action Level) should be designated as "high-noise" zones. Additionally, such areas would call for at least an administrative hearing protection program focused on limiting exposure times and mandating the use of worker hearing protection devices. Interior noise environments for the Control/Lab Building and the Maintenance/Warehouse Building are anticipated to be well below worker exposure limits, and there would be little concern for these spaces.

Using the same equipment noise emissions inputs as with the above community modeling scenario, a 'zoomed-in' examination was made of working areas within the SLM plant. Rather than looking at this situation via discrete points within the plant layout, the results are shown graphically in the noise level contour maps shown in Figures 6 and 7 (which only differ by the amount of 'zooming' and the extent of the view). These maps are plots of constant, A-weighted sound levels in 5 dB increments for just the Project noise sources (without existing ambient sources) and is depicted at grade-level exterior spaces/areas. As noted above, the portions of the plant with predicted equipment noise levels greater than 85 dBA are quite limited in both number and size, and are very localized (that is, within only a few feet of the related noise source).

In summary, the majority of areas within the SLM processing plants will have noise levels that would not contribute to excessive worker noise exposures, depending on work patterns and how long any given worker stays around the noisier equipment items. However, for localized areas around particularly noisy equipment, consideration should be given to designating all such areas as "high noise" spaces that require the use of hearing protection devices. Beyond these administrative controls for limiting time exposure, engineering noise controls—such as treatments to the equipment, the use of enclosures, or the procurement of low-noise options—should be explored in finer detail during subsequent engineering design phases.

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3. Project-Related Noise

3.3.2.2 OFF-DESIGN CONDITIONS

A special case that was requested to be investigated was the situation of pressure safety valve(s) (PSVs) releasing during an emergency condition. Such PSV activations are intended to quickly vent large amounts of steam (primarily) to avoid over-pressuring systems and to preclude catastrophic failures. Emergency or intermittent releases are not part of the noise-related contractual obligations for the plant operations.

While saving equipment and piping with such quick venting, the large mass-flow discharges (of high pressure differential gases) have the downside of creating very high noise levels, particularly near the venting discharge point (to atmosphere). Such PSV exhaust points are typically located at relatively high elevations above grade, but there may be operators or maintenance personnel on catwalks or on other elevated levels that could be exposed to dangerously high noise levels, even if the exposure time is very brief. Also, the piping between the actual valve and the low-pressure discharge point can radiate substantial noise that is being generated inside the PSV body, which then migrates along the associated piping.

To investigate this condition, a listing of envisioned PSV services was provided by Fluor. This listing included projected values for noise emissions from each PSV valve in terms of noise ratings at a standard distance of 100 feet from the valve. The listing also included calculated noise levels at 3 feet from the valve (based on only spherical energy propagation with no accounting for near- or mid-zone sound fields).

The goals of this special case were to (a) evaluate off-set distances that the PSV valves should be spaced away from normal access by personnel and (b) recommend acoustical insulation/lagging for downstream piping should a common header system be used prior to the low-pressure discharge point. These off-set distances and acoustical insulation recommendations are summarized in Table 11. Additional details are presented in Attachment J-2.

Table 11 Recommended Distance Off-sets from PSVs to 'Normal' Worker Locations and Recommended Acoustical Insulation Types

Noise Rating at 100 feet, dBA[1]	Calculated Noise Level at 3 feet, dBA[2]	Recommended Off-set Distance, feet (m)	Recommended Piping Insulation Type[3]
>123	>154	33 (10m)	D
115 to 123	145 to 154	21 (6.5m)	C
110 to 115	140 to 145	10 (3m)	B
105 to 110	135 to 140	6 (2m)	A
100 to 105	130 to 135	3 (1m)	A
< 100	< 130	none	none

Source: PlaceWorks, 2017.
1. *Provided by Fluor.*
2. *Assuming only simple energy propagation (i.e., free-field conditions of 6 dB per distance doubling/halving).*
3. *See associated text in Attachment J-2 for details*

4. Noise Evaluation Summary

4.1 CONCLUSIONS

On-Site Receptors. The results show that the currently configured SLM Modular design should result in the majority of on-site, outdoor areas being well within worker exposure noise standards, presupposing an appropriate level of plant operations automation and assuming that vendors can supply equipment per the evaluations. However, the potential noise exposure to workers should be regulated via an appropriate hearing conservation program following OSHA mandates. For example, limitations should be placed on time spent in the proximity of large compressors/blowers (such as the LP and HP Synthesis Gas Compressors or the CO_2 Product Compressor), large pump trains (such as the Boiler Feedwater Pumps), large fans/blowers (such as the Reformer Flue Gas Fan), and most knock-out drums to avoid exposures above the 8-hour 85 dBA Action Level.

Off-Site Receptors. The updated, modular configuration plus is predicted to produce sound levels in the surrounding community that are generally much lower than the existing conditions (lower by approximately 6 to 12 dB). The incremental increase in community noise levels due to the SLM Project is shown to add only approximately 0.5 to 1.2 dB to the existing conditions; a change that would be considered negligible and inaudible under most conditions.

With respect to contractual obligations, predicted plant-aggregate sound levels at the six assessment locations are between 46 and 54 dBA CNEL, which is well below the current guarantee threshold value of 65 dBA CNEL. When factoring in the relatively high ambient conditions—which are typically 6 to 12 dB higher than the predicted plant-only contributions—the combined, total future noise conditions are still below the threshold value of 65 dBA CNEL, typically by 7 to 10 dB, with the smallest differential being 1½ dB.

However, noise control/reduction measures may be called for as more refined Project processes, equipment specifications, and layout configurations are established during subsequent engineering phases. With these changing Project characteristics, the evaluation of plant noise emissions and the associated equipment item limitations (for use in equipment supplier conditioning) should be refined and verified during subsequent phases of engineering design on the Project.

4.2 RECOMMENDATIONS

Given the results of this Noise Evaluation Study, the following recommendations are advanced:

- The engineering team should pay close attention to establishing and enforcing appropriate noise emissions specifications during the vendor selection phase of the engineering development (to ensure that vendors actually supply equipment that meets the noise emissions needed to achieve the Project's noise goals). The implementation of this practice would include the use of Fluor-standard noise specification documents (that requires equipment and piping systems to achieve a sound pressure level emissions limit of 85 dBA at three feet), to the extent reasonable and prudent.

- Any vendor-initiated deviations from the Fluor-standard noise specification should be identified and documented during the bid conditioning stage of the equipment procurement process. During the detailed EPC design phase, these 'off-spec' noisy equipment/systems should be accounted for with regard to the aggregate plant sound power emissions (and updated predictive noise modeling) to ensure meeting the Project's design goals for plant-wide noise control. See also Attachments G and I.

- For control valves in particular, 'standard noise control features' should be identified and documented during the bid conditioning stage of the valve procurement process. Such features can include one or a combination of (a) adherence to the Fluor-standard noise limit of 85 dBA at 3 feet, (b) procurement of a quiet-design valve type, and/or (c) application of external acoustical insulation/lagging for noise reduction of the valve and an appropriate length of the associated valving (probably both up-stream and down-stream of a particular valve). See also Attachment J-1.

- For pressure safety valves (PSV's) in particular, appropriate off-set distances from normal operations areas – based on the nominal noise rating at 100 feet for each PSV – should be documented during the detailed design phase so as to have noise exposures to operations and maintenance personnel be less than 140 dBA (for any amount of time). Additionally, the downstream piping should have appropriate acoustical insulation/lagging applied; also based on the 100 foot noise rating. See also Attachment J-2.

- Following the plant commissioning phase, the Project operators should implement a hearing protection program to require the use of appropriate hearing projection device(s) for worker protection and to promote training in the proper use of personal protection equipment.

- Further, the Project operators should implement administrative controls for limiting the time spent inside noisy buildings/enclosures and near noisy equipment items. (Note: With the typical high degree of automation for a modern process facility, prudent operations practices may inherently provide this time-limited noise exposure control, thus yielding the most cost-effective noise mitigation strategy).

As with the refinement of the other engineering disciplines during the Project's subsequent development phases, the noise control engineering function should also have ongoing involvement with the design groups to ensure that the Project noise goals are successfully maintained. All these recommendations—from appropriate equipment specification and selection to the definition of on-site, 'high-noise' zones—would be accomplished during detailed design.

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5. Technical. References

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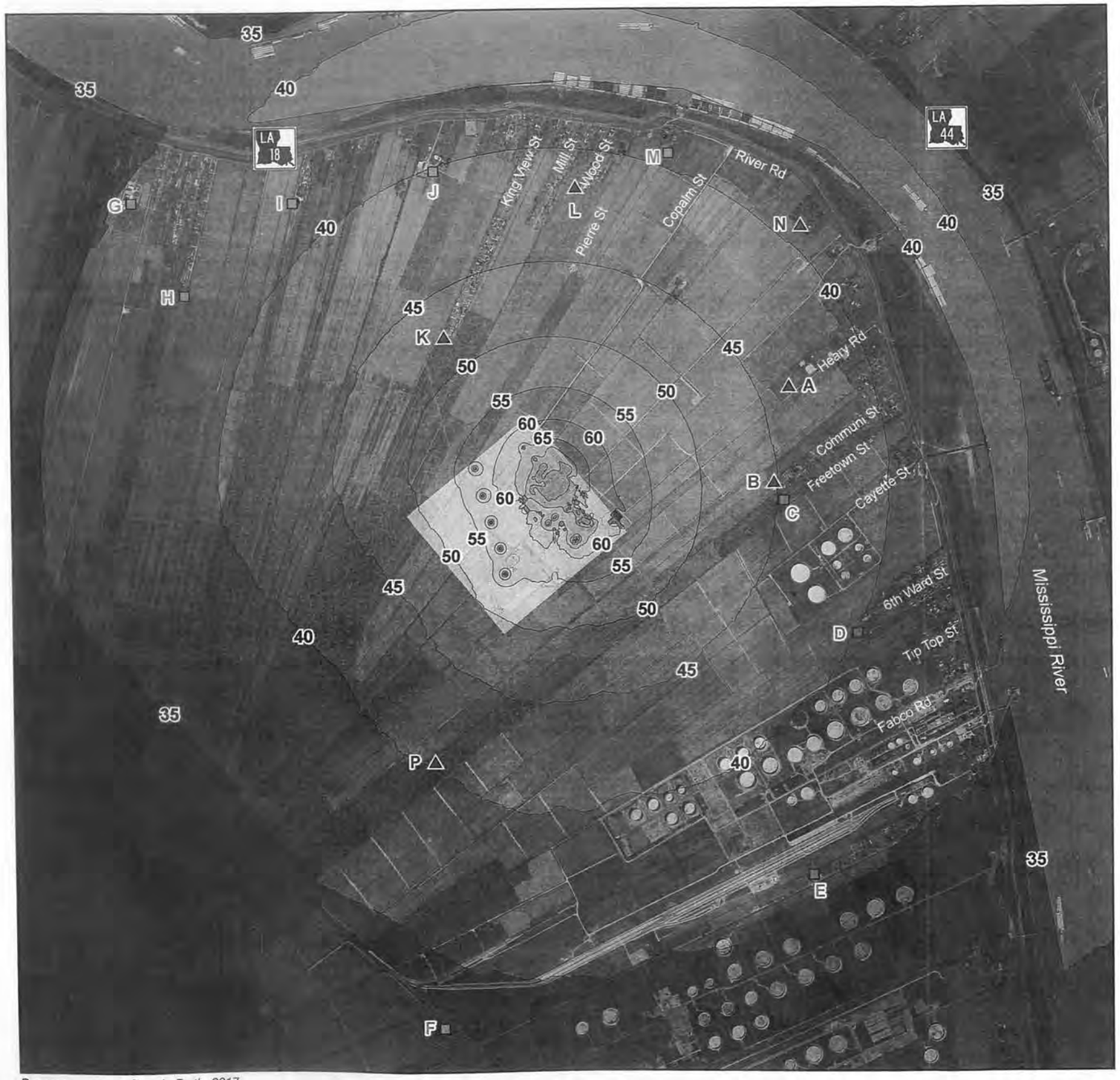
Figure 5 - Predicted Noise Contributions from Modular SLM Plant (area view)



Basemap source: Google Earth, 2017

Graphic shows predicted noise level contours (in 5 dB increments) due to only the SLM modular plant contributions (without the existing, ambient noise levels).

Locations with blue text and square symbols, denoted as "A", "B", etc., are modeling locations. Locations with red text and triangle symbols are contractual assessment locations. Also, Location M is an informational location.

Location of equipment was found via (as supplied by Fluor):
- Plot Plan – ISBL Utilities and Methanol, Drawing SJT1-1101-50-PP-001, Rev 3 of 20-Jul-17
- Plot Plan – OSBL Utilities and Product Storage; Drawing SJT1-1201-50-PP-002, Rev 2 of 19-Jul-17
- Plot Plan – OSBL Storm/Plant Waste Water, Hydrogen Loading, Flare, and Cooling Tower; Drawing SJT1-1203-50-PP-003, Rev 2 of 20-Jul-17
- Plot Plan – Overall ISBL/OSBL Plot; Drawing SJT1-1101-50-PP-001, Rev 2 of 26-Jul-17
- Plot Plan – Overall Site Plan; Drawing SJT1-1001-50-PP-001, Rev 2 of 28-Jul-17
- Supplemented with NavisWorks file (A6RN.nwd), dated 10-Jul-2017
- Locations with red text and triangle symbols are contractual assessment locations. Also, Location M is an informational location.

Noise level modeling conducted using SoundPLAN (ver. 8.0) predictive computer model. Basic assumptions:
- Modeled area is essentially flat with a base elevation of 3m above sea level.
- River taken to be 1.5m above sea level.
- Assumed soft (absorptive) ground conditions throughout analysis area (except over water).
- SLM plant listings by Fluor:
  - o Equipment List (dated 04-May-2017, Rev A5)
  - o Electrical Load List (dated 13-Jun-2017, Rev 0).
- Estimated or calculated sound emissions factors from:
  - o Standard Fluor noise specification
  - o Env. Engr'g Design Manual E4
  - o Past experience on similar projects to estimate sound emissions for 'special' or 'large' equipment items.
- Screened out line items from the equipment list that would not be considered as significant noise sources (e.g. metering pumps, shell-and-tube heat exchangers, filters, etc.).
- NO special noise control treatments were assumed (that is, no enclosures, no stack silencers, no low-noise procurements were used). That is, realistic values that would be expected in the real world – even if over the nominal Fluor-std spec limits – were assumed.
- Stacks heights were found via the NavisWorks rendering.
- For conservatism, only the Reformer Body, 'large' tanks, and selected buildings were used as barrier structures.
- Sources were considered to be steady state (i.e., constant noise emissions) and were taken to run 24 hours/day.

Noise Level Leq,d in dB(A)

75 70 65 60 55 50 45 40 35

A Noise Modeling Locations

B Contractual Assessment Locations

0 3,000
Scale (Feet)

Figure 6 - Predicted Noise Contributions from Modular SLM Plant (area view)

Graphic shows predicted noise level contours (in 5 dB increments) due to only the SLM modular plant contributions (without the existing, ambient noise levels).

Locations with blue text and square symbols, denoted as "A", "B", etc., are modeling locations. Locations with red text and triangle symbols are contractual assessment locations. Also, Location M is an informational location.

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- Plot Plan – OSBL Utilities and Product Storage; Drawing SJT1-1201-50-PP-002, Rev 2 of 19-Jul-17
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- Plot Plan – Overall ISBL/OSBL Plot; Drawing SJT1-1101-50-PP-001, Rev 2 of 26-Jul-17
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  - o Past experience on similar projects to estimate sound emissions for 'special' or 'large' equipment items.
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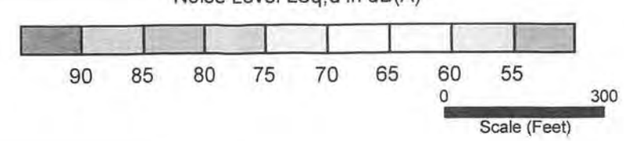
- NO special noise control treatments were assumed (that is, no enclosures, no stack silencers, no low-noise procurements were used). That is, realistic values that would be expected in the real world – even if over the nominal Fluor-std spec limits – were assumed.
- Stacks heights were found via the NavisWorks rendering.
- For conservatism, only the Reformer Body, 'large' tanks, and selected buildings were used as barrier structures.
- Sources were considered to be steady state (i.e., constant noise emissions) and were taken to run 24 hours/day.

Noise Level Leq,d in dB(A)



Basemap source: Google Earth, 2017

Figure 7 - Predicted Noise Contributions from Modular SLM Plant (area view)

Graphic shows predicted noise level contours (in 5 dB increments) due to only the SLM modular plant contributions (without the existing, ambient noise levels).

Locations with blue text and square symbols, denoted as "A", "B", etc., are modeling locations. Locations with red text and triangle symbols are contractual assessment locations. Also, Location M is an informational location.

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- Plot Plan – Overall ISBL/OSBL Plot; Drawing SJT1-1101-50-PP-001, Rev 2 of 26-Jul-17
- Plot Plan – Overall Site Plan; Drawing SJT1-1001-50-PP-001, Rev 2 of 28-Jul-17
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Noise level modeling conducted using SoundPLAN (ver. 8.0) predictive computer model. Basic assumptions:
- Modeled area is essentially flat with a base elevation of 3m above sea level.
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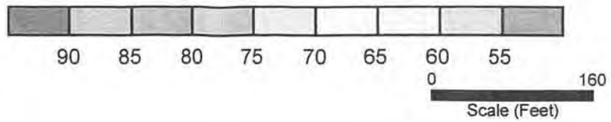
  - o Past experience on similar projects to estimate sound emissions for 'special' or 'large' equipment items.
- Screened out line items from the equipment list that would not be considered as significant noise sources (e.g. metering pumps, shell-and-tube heat exchangers, filters, etc.).
- NO special noise control treatments were assumed (that is, no enclosures, no stack silencers, no low-noise procurements were used). That is, realistic values that would be expected in the real world – even if over the nominal Fluor-std spec limits – were assumed.
- Stacks heights were found via the NavisWorks rendering.
- For conservatism, only the Reformer Body, 'large' tanks, and selected buildings were used as barrier structures.
- Sources were considered to be steady state (i.e., constant noise emissions) and were taken to run 24 hours/day.

Noise Level Leq,d in dB(A)



Basemap source: Google Earth, 2017