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UTAH DEPARTMENT OF
ENVIRONMENTAL QUALITY

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DIVISION OF AIR QUALITY

VIA E-MAIL

Dear Air Quality Board Members:

The attached supplemental comments are submitted for your consideration as the Board reviews the Proposed Revision to Section IX, Control Measures for Area and Point Sources, Part H: Emission Limits and Operating Practices of the Utah State Implementation Plan, Part A.

Very truly yours,

Amanda Smith
Of Counsel

AS:bwt
Enclosure

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Compass Minerals

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October 31, 2018

SUPPLEMENTAL COMMENTS BY COMPASS MINERALS OGDEN ON THE PROPOSED REVISIONS TO SECTION IX, CONTROL MEASURES FOR AREA AND POINT SOURCES, PART H: EMISSION LIMITS AND OPERATING PRACTICES OF THE UTAH STATE IMPLEMENTAL PLAN, PART A

Compass Minerals appreciates the additional time and opportunity to submit comments on the Draft PM 2.5 State Implementation Plan ("SIP") Section IX, Control Measures for Area and Point Sources and the BACT/BACM analysis for the Salt Lake Area as well as the TSD's for PM 2.5 Serious SIP Salt Lake. This letter provides general comments as well as more specific responses to questions and comments posed by Todd Wetzel and Jon Black to Compass Minerals on August 28, 2018. We understand that following the public comment period, the Division will provide analysis and recommendations to the Board to support adoption of the serious SIP, and hope this information is helpful in that process.

Compass Minerals Has Provided a Robust BACT Analysis for Boilers #1 and #2

UDAQ requested Compass Minerals provide additional information regarding the use of a 20-year life for the BACT analysis submitted for NOx control for the 108.11 MMBtu/hour Boilers #1 and #2. Attached to these comments is a document titled "Supplemental Information Site-Wide BACT Analysis's for PM2.5 Precursors" that provides additional information on the BACT analysis submitted originally to UDAQ for these two boilers. A 20-year life analysis is supported by the EPA cost manual which uses a 20-year life for some boilers.[1] However, in other documents, EPA has based analysis on a 10 year-life for process heater burners.[2] Ultimately, the useful life of a boiler is determined by the manufacturer specifications and the specifics of the manufacturing site and the production use.[3] Compass Minerals operates these boilers in a highly "salty" environment which leads to accelerated corrosion and a shorter useful life. It is a well-documented fact that equipment used for processing saline and salt product have shorter useful lives.

The Salt Lake Area BACT Analysis for Fugitive Emissions Meets Federal Requirements

The Salt Lake Area BACM Analysis for fugitive dust is adequate and meets federal requirements for a serious non-attainment area. In determining BACM for the Salt Lake Area, UDAQ conducted a thorough analysis of the Utah fugitive dust program that included a review of other arid non-attainment fugitive dust rules, regional options outlined in the WRAP Fugitive Dust Handbook, as well as internal engineering and source expertise. Utah uses specific Best Management Practices ("BMPs") to address issues identified as being most problematic for the nonattainment area. UDAQ's BACM clearly meets federal requirements as there are no other potential requirements that would lead to meaningful further emission reductions.

[1] EPA Cost Manual, Chapter 1
[2] John S. Seitze Office of Air Quality Planning and Standards (MD-10) Memorandum, 2001
[3] EPA Cost Manual, Chapter 2

EPA's General Preamble for State Implementation Plans provides that RACM for moderate areas generally corresponds to BACM for serious areas:

> For those areas that will be reclassified as serious, EPA believes it may be reasonable, in some limited circumstances, for States to consider the compatibility of RACM and RACT with the BACM and BACT that will ultimately be implemented under the serious area plans for those areas.
>
> In the case of RACM for area sources, EPA anticipates that any future implementation of BACM for these sources will be additive to, and hence compatible with, RACM. . . . Since EPA anticipates that RACM and BACM for these sources will be compatible, the SIP's for these areas should reflect the application of available control measures to existing sources in moderate nonattainment areas as determined by the analysis described above for RACM.

57 Fed. Reg. 13498, 13544 (Apr. 16, 1992). EPA guidance further applies this interpretation to fugitive dust:

> Since a moderate area with fugitive dust sources may be reclassified to serious, RACM and BACM must be consistent to allow for a new control measure to be mandated or appended without loss of the efficiency of the first measure. The measures described in this document as available for fugitive dust BACM are more stringent than RACM, and therefore should result in greater control efficiencies. When a fugitive dust source has been controlled under a RACM strategy, the implementation of BACM will generally involve additive measures that consist of a more extensive application of fugitive dust control measures imposed under RACM.

U.S. EPA, *Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures*, at 1-6 (Sept. 1992).

In the moderate PM 2.5 SIP adopted by the Utah Air Quality Board in 2014, fugitive dust rules requiring BMPs were adopted as RACM.[4] In 2017, EPA proposed to approve Utah's R307-309 regulations for fugitive emissions and fugitive dust, which includes the fugitive dust control plans, as RACM for Utah's Moderate PM2.5 SIPs. 82 Fed. Reg. 43205, 43207 (Sept. 14, 2017). In accordance with the agency's interpretations of RACM and BACM, EPA will likely interpret Utah's fugitive dust control plans to be consistent when BACM for a serious non-attainment area. This is further evidenced by EPA's express citation to the 1992 General Preamble when proposing to approve R307-309. *Id.* at 43206.

Compass Mineral's Revised BACT Analysis provides site-wide source specific BACT on fugitive dust associated with each process at the Ogden facility. Additionally, as outlined in the Revised BACT Analysis, Compass Minerals operates under permit conditions that require a Fugitive Dust Control Plan ("FDCP") for roads and disturbed, unpaved areas that meets state regulatory requirements under Utah Admin. Code R307-309.

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[4] PM 2.5 SIP for the Salt Lake City, UT Nonattainment Area, Section IX, Part A.21, p. 61

Compass Minerals Ogden Inc.

765 North 10500 West, Ogden, UT 84404

Title V Permit Number 5700001003

Supplemental Information
Site-Wide BACT Analyses for PM2.5 and Precursors

Prepared by Strata, LLC

September 19, 2018

Compass Minerals Ogden Inc. (Compass Minerals) owns and operates a facility located at 765 North 10500 West, Ogden, UT 84404 (Title V permit number 5700001003, dated July 11, 2016).

In a letter dated January 23, 2017, the Utah Department of Environmental Quality, Division of Air Quality (DAQ) notified Compass Minerals of its work on a serious area attainment control plan in accordance with 40 CFR 51 Subpart Z. The rule requires DAQ to identify, adopt and implement Best Available Control Measures (BACM) on major sources of PM2.5 and PM2.5 precursors. The major source threshold is 70 tons per year (tpy) in an area of serious non-attainment for PM2.5. The operating permit issued to Compass Minerals allows emissions of more than 70 tpy for PM2.5 and/or PM2.5 precursors, therefore the Compass Minerals facility emission units will be included in the serious attainment area control plan.

The letter outlined a request that Compass Minerals assist in the development of the control plan as follows:

1) Conduct a BACT analysis of each emitting unit of PM2.5/PM2.5 precursors - Identify and evaluate all applicable control measures to include a detailed, written justification of each available control strategy, considering technological and economic feasibility, and including documentation to justify the elimination of any controls.
2) Propose appropriate emission limits and monitoring requirements for each emitting unit, along with a justification of the adequacy of the suggested measures.
3) Provide an assessment of when a potential measure could be implemented.

Compass Minerals submitted the above information, per the DAQ site-wide BACT request in May 2017. Subsequently, a number of revision documents were submitted in response to comments from UDAQ. The documents included a BACT analysis for all significant point and fugitive sources known at the site to emit PM2.5 or precursors.

The revised BACT analyses followed the "Top-Down" approach, per EPA guidance. Existing controls were included in Step 1 of each analysis. Where the existing control was identified as the only technically feasible control option in Step 2 or the highest ranked control option in Step 3, then the existing control was determined as BACT. If a technically feasible, more effective (compared to the existing technology) control option was identified in Step 3, an economic analysis was provided in Step 4. The economic analysis used the potential PM2.5 and PM2.5 precursor emissions reduction and the cost of the more effective and technically feasible control option. The economic analysis was presented to reflect the cost per ton of **additional** control gained over the existing control of potential emissions.

Recently, UDAQ requested supplemental BACT information for the facility natural gas fired boilers. Specifically, Compass has been requested to evaluate post-combustion NOx controls.

Compass operates two large boilers, with heat input capacities of 108.11 MMBtu/hr, each. The boilers were installed in partial fulfillment of the RACT requirements of the moderate PM2.5 SIP on July 30, 2012 (DAQE-AN109170030-12). The original BACT analysis and revisions selected BACT to be the existing Ultra-Low NOx Burners (ULNB) with Flue Gas Recirculation (FGR) and continuous oxygen trim system., plus pipeline quality natural gas and good combustion practices.

On July 1, 2018, UDAQ published its PM SIP Evaluation Report for the Compass Minerals — Ogden Inc. facility. Section 5.3.1 of the evaluation summarizes the available NOx post-combustion controls as follows.

- SNCR
- SCR
- EMx™
- Xonon Cool Combustion®
- LoTOx™

- Pahlmann™
- NOxOUT

Xonon®, EMx™, LoTOx™, and Pahlmann™ were all eliminated from further consideration. As stated in section 5.3.2,

> "Xonon® is not technically feasible. The Xonon combustor is specifically designed for use in combustion turbines and not for industrial boilers. At this time, there is no information available on the transferability of the technology to other combustion processes.
>
> The EMx™ system has not been demonstrated in practice on large industrial boilers. The catalyst system operates best in a gas temperature range of 500-700°F, well above the expected 250°F exhaust temperature of the two boilers.
>
> LoTOx™ requires the use of another pollutant control system such as a wet gas scrubber to remove the N2O. This other control imposes additional infrastructure for little additional pollutant removal.
>
> The Pahlmann™ system also requires the addition of a baghouse or other particulate control system, an aqueous sorbent regeneration system, and wastewater treatment and disposal. The system has not been demonstrated in practice on natural gas-fired equipment, especially on industrial boilers."

SCR and SNCR remain as technically feasible options. The top control option identified is ULNB in conjunction with SCR, with an estimated rate of control of 85 – 99%. ULNB in conjunction with SNCR, has an estimated rate of control of 80 – 90%.

UDAQ provides a further evaluation of SCR/SNCR in section 5.3.4., where it states,

> "There are few energy related impacts with installation or operation of SCR or SNCR....
>
> One potential source of concern with operation of either SCR or SNCR is the generation of ammonia slip. Unreacted ammonia, meaning any ammonia which does not react with the NOx present in the exhaust stream, may react with HCl to form ammonium chloride, or with SO3 to form ammonium sulfate/sulfite. This can occur either in the exhaust stream or in the ambient air. The unreacted ammonia is referred to as "ammonia slip." Ammonia slip itself often requires permit limitations as a precursor pollutant.
>
> Installation of either SCR or SNCR does not appear to be cost effective for either of the two boilers. The lowest $/ton value for any SCR or SNCR unit UDAQ has investigated has been calculated at nearly $32K per ton of NOx removed. Although BACT economic infeasibility ranges vary from location to location, the most expansive of these (San Joaquin Valley Air Pollution Control District – SJVAPCD), tops out at $25K/ton."

Compass provides its own economic analysis below for adding SCR post-combustion controls on both boilers. The existing PTE is based on an hourly limit of 1.6 lb/hr as requested in the PM2.5 site-wide BACT analysis and based on a 12 ppmvd NOx emission concentration. The estimated SCR controlled PTE assumes 0.26 lb/hr based on a target concentration of 2 ppm recommended by vendor; multiplied by two boilers. The annualized capital costs assume a 7% interest rate and a fifteen-year equipment life. The Total capital Investment (TCI) includes vendor estimated cost of $550,000 per SCR unit x 2 units; includes housing, SCR instrumentation, NH3injection grid, and NH3 process control unit. Boiler retrofit/installation of equipment (included in TCI) is estimated at 1,650,0000 per boiler. Additional capital is included for anhydrous ammonia storage tank facilities, tank unloading facilities, and infrastructure; estimated at $2MM. Annual operating costs include NH3 consumption, catalyst change-outs every 3 years, estimated SCR routine maintenance, and estimated required maintenance of ammonia storage and handling facilities. Additional costs to implement a Process Safety Management (PSM) program have not been included. Currently the facility is not subject to PSM, therefore implementation of the requirements would require a significant investment and continued resources.

It is assumed that SNCR controls would require a similar TCI, but with a lower control efficiency and a greater cost per ton of pollutant controlled. Therefore, only the SCR detailed economic analysis is provided in the table below.

Information for Economic Analysis		Description
EU ID	NGB-1, NGB-2	Natural Gas Boilers #1&2
Existing Control	ULNB	Ultra-Low NOx Burners, Flue Gas Recirculation, Continuous Oxygen Trim System, Pipeline Quality Natural Gas, GoodCombustion Practices
Alternate Control	[redacted]	Selective Catalyst Reduction (SCR)
Interest Rate (i)	7.0%	Interest rate at which the company can borrow money.
Useful Life (n)	15	Estimated useful life of the new control equipment being considered

POLLUTANTS TO BE CONTROLLED	Existing PTE	SCR Controlled PTE
NOx	14.02	2.28

Existing PTE based on hourly limit of 1.6 lb/hr as requested in the PM2.5 site-wide BACT analysis and based on a 12 ppmvd Nox emission concentration. SCR controlled PTE assumes 0.26 lb/hr based on a target concentration of 2 ppm recommended by vendor; multiplied by two boilers.

Total Capital Investment (TCI)	Capital Recovery Factor (CRF) [i*(1+i)^n]/[(1+i)^n - 1]	Annual Capital Recovery Cost (CRC) (TCI x CRF)	Increased Annual O&M (DC)*	Other Indirect Costs (ID) (4% x TCI)	Total Annual Cost (TAC) (CRC+DC+ID)	Emission Reduction - TPY (ER)	Cost Per Ton (TAC/ER)
$ 6,400,000.00	0.1098	$ 702,685.60	$ 500,000.00	$ 256,000.00	$ 1,458,685.60	11.74	$ 124,266.13

Even these preliminary costs reflect approximately $124,000 per ton of NOx pollutant removed. Compass believes the estimated costs are exceptionally high in comparison to costs being borne by other sources of the same type to control the pollutant. The cost is far more expensive than the lowest $/ton value for any SCR or SNCR unit UDAQ has investigated, as indicated in section 5.3.4 of the PM SIP evaluation report. For these reasons, the use of the above listed control option is economically infeasible.