

COMMONWEALTH OF PENNSYLVANIA

Department of Environmental Protection
Southwest Regional Office

MEMO

SUBJECT Review of Title V Operating Permit Renewal Application
Langeloth Metallurgical Company, LLC
Smith Township, Washington County

DATE May 13, 2014

TO Air Quality Permit File TV-63-00074

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BACKGROUND

This facility has been in existence since approximately 1929, under a series of various owners. Company operates equipment for the production of molybdenum trioxide (technical grade) from molybdenum disulfide ore ($2 \text{ MoS}_2 + 7 \text{ O}_2 \rightarrow 2 \text{ MoO}_3 + 4 \text{ SO}_2$), processing other high sulfur and low sulfur feedstocks, producing ferromolybdenum alloys and producing pure grade molybdenum oxide by refining technical grade molybdenum oxide. Site operates under SIC Codes 3313, "Electrometallurgical Products, except Steel," SIC Code 2819, "Industrial Inorganic Chemicals, NEC," and SIC Code 1061, "Ferroalloy Ores except Vanadium." Facility has the potential to emit greater than 100 tons of SO_2 , making them a major facility, subject to Part 70 permitting. The initial TVOP was issued for the site on December 20, 2001, with an expiration date of December 20, 2006. A TVOP renewal application was received on May 15, 2006 and determined to be administratively complete on June 27, 2006.

EQUIPMENT AND EMISSIONS

The six Nichols Herreshoff roasters (Sources 101-106, Roasters 1-6) that are used for the production of technical grade (96% pure) molybdenum and the processing of other high and low sulfur feedstocks were installed between 1929 and 1944. The roasters are large, brick-lined cylinders, 40 to 50 feet tall, and 16 to 18 feet in diameter, containing between 12 and 16 hearths. Molybdenum disulfide ore (or other approved high or low sulfur feedstock) is fed to each roaster. A rotating shaft is equipped with arms and teeth, which rake the material alternately inward and outward, dropping it down through each hearth. Natural gas burners provide ignition of the material at the top three hearths during start-up. Once ignited, reaction is self-sustaining. Hearth temperatures range between 700°F and 1400°F. When operated on high sulfur feedstocks, roasters produce particulate matter emissions that are controlled by multi-cyclones and an electrostatic precipitator, and SO_2 emissions that are converted to sulfuric acid in the sulfuric acid plant. When operated on low sulfur feedstocks, exhaust particulate matter emissions that are controlled by multi-cyclones and an electrostatic precipitator bypasses the sulfuric acid plant. Supporting equipment for the roasters includes various delivery, charging, screening, conveying, storage and packaging equipment.

Roasters 101 and 102 are each rated at a nominal 20 tons feedstock per day, and are each equipped with natural gas burners rated at a nominal 9 MMBTU/hr total and an exhaust fan rated at 6,250 SCFM. Roasters 103 and 104 are each rated at a nominal 30 tons feedstock per day, and are each equipped with natural gas burners rated at nominal 13 MMBTU/hr total, and an exhaust fan rated at 7,500 SCFM. Roasters 105 and 106 are each rated at a nominal 40 tons feedstock per day, and are each equipped with natural gas burners rated at a nominal 17 MMBTU/hr total, and an exhaust fan rated at 9,000 SCFM.

Company also operates grandfathered (pre-1972) equipment for the production of ferromolybdenum alloys (Source 130, Aluminothermic Process). Raw materials (metal oxides, aluminum, lime, mill scale, ferrosilicon, and feldspar) are transferred into storage silos, conveyed, weighed, mixed, and placed in metal, refractory-lined smelting cylinders, approximately 3 feet tall, and 8 feet across. Cylinders containing the raw materials are placed on, and partially buried under, sand. Approximately 6 cylinders are sequentially reacted. Reaction in the first cylinder is initiated with a barium bomb. Reaction in the other cylinders is initiated by transferring some of the molten material from the first cylinder to each of the others. Reaction is violent, reaching temperatures of 3000°F, and producing smoke. Once reaction is complete, slag from the alloying process is tapped, and the resulting "button" is cooled, crushed, screened, and packaged. Emissions from this process are controlled by 2 baghouses, operating alternately.

Equipment for the production of pure (99.99% pure) molybdenum trioxide (Source 131, Pure Oxide Production) was installed in 1996. An electric furnace heats the tech grade molybdenum to its vaporization temperature. The pure molybdenum sublimates, and then condenses in the primary and secondary product collection baghouses. Product is packaged, and tails are returned to the tech oxide process.

In 2013, Langeloth emitted 0.6 tons CO, 2.8 tons NO_x, 7.7 tons PM₁₀, 32.7 tons Sox, 0.5 tons CO₂, and 0.1 tons CH₄. Potential criteria pollutants are estimated as shown in the following table.

| Potential Emissions | | | | | |
|---|----------------------------|--------------------------------|-----------------|----------------|----------------|
| SOURCES | SO ₂ | PM | NO _x | VOC | CO |
| Roasters 1-6 (High Sulfur Feedstocks) | 50 ppm 30 tons/year | 0.04 gr/dscf 36.7 tons/year | 3.5 tons/year | 0.18 tons/year | 1.05 tons/year |
| Roasters 1-6 (Low Sulfur Feedstocks) | 500 ppm 214.5 tons/year | | | | |
| Aluminothermic Process | 500 ppm 2.5 tons/year | 0.04 gr/dscf 1.9 tons/year | N/A | N/A | N/A |
| Pure Oxide | 500 ppm 2.5 tons/year | 0.02 gr/dscf 21 tons/year | 8.8 tons/year | N/A | N/A |
| TOTAL | 249.5 tons/year | 59.6 tons/year | 12.3 tons/year | 0.18 tons/year | 1.05 tons/year |

PREVIOUS OPERATING PERMITS, PLAN APPROVALS and EXEMPTIONS

Air Quality Plan Approval 63-308-006 was issued on October 24, 1974 to allow the construction of a sulfuric acid plant on the exhaust from the six roasters. The acid plant was installed to bring facility into compliance with the 500 ppm sulfur dioxide (SO₂) limitation of PA Code Title 25 § 123.21, established on September 10, 1971.

It is important to note that the sulfuric acid plant functions as a control device, to reduce SO₂ emissions. In accordance with the definition found at 40 CFR § 60.81(a), a “*sulfuric acid production unit* means any facility producing sulfuric acid by the contact process by burning elemental sulfur, alkylation acid, hydrogen sulfide, organic sulfides and mercaptans, or acid sludge, but **does not include facilities where conversion to sulfuric acid is utilized primarily as a means of preventing emissions to the atmosphere of sulfur dioxide or other sulfur compounds** (emphasis added).” Therefore, the sulfuric acid plant is not subject to the provisions of 40 CFR 60, Subpart H - Standards of Performance for Sulfuric Acid Plants.

The sulfuric acid plant is represented twice in AIMS —as Control Device 19, and as Process 107. In actual fact, and as interpreted by 40 CFR 60, Subpart H, the Acid Plant is a control device. The map in AIMS shows a roaster feeding a multicyclone (a control device), feeding the electrostatic precipitator (a control device), feeding the sulfuric acid plant (a control device). Unfortunately, AIMS will not allow emissions to be reported from control devices. Therefore, emissions from the Acid Plant have historically been reported as coming from Source 107 Acid Plant.

On March 10, 1993, Plan Approval PA-63-308-006B was issued to authorize the reactivation of roasters 3, 4 and 5 for purposes of processing low sulfur feedstocks.

Plan Approval 63-308-039 was issued on May 14, 1996 to allow the construction of a pure oxide electric furnace, and associated equipment. The original Plan Approval referred to the product collection baghouses as control devices. They are actually part of the process rather than control devices. Therefore, the language in the initial Title V Operating Permit more properly refers to them as product collection baghouses.

Operating Permit OP-63-308-308, issued on July 29, 2006, consolidated all previous plan approval/operating permits that had been issued for the roasters, allowing two possible modes of roaster operation. (1) Traditional roasting of molybdenum sulfide ore and other high sulfur feedstocks, with SO₂ emissions controlled to 50 ppm by the sulfuric acid plant, and (2) roasting of low-sulfur feedstocks, mostly nickel and cobalt catalysts, bypassing the sulfuric acid plant, but still complying with the 500 ppm SO₂ limitation. High sulfur feedstocks are those which, when roasted in the aggregate, result in emissions which cannot meet the 500 ppm SO₂ criteria entering the main breach of the stack, and therefore require treatment in the sulfuric acid plant. Low sulfur feedstocks are those sulfur containing feedstocks, which when roasted in the aggregate, result in an SO₂ concentration of less than 500 ppm upon entering the main breach of the stack.

Applicable conditions from all previous Plan Approvals and Operating Permits were included in the Title V Operating Permit when it was initially issued in 2001.

On October 22, 2009, DEP exempted an upgrade to the existing wastewater treatment facility from Plan Approval requirements through the RFD process. No new equipment or emission increases were approved.

On August 24, 2012, DEP exempted the operation of five roasters at a time on high sulfur feedstocks controlled by the Acid Plant (as opposed to the earlier limitation of four roasters) from Plan Approval requirements through the RFD process. No new equipment or emission increases were approved.

ALTERNATE OPERATING SCENARIO

As established in previous permitting actions, the roasters are allowed to process certain low sulfur feedstocks. These are typically nickel and cobalt catalysts, containing small amounts of sulfur. They are roasted to regenerate them. This mode of operation has been authorized in the TVOP as an Alternate Operation. In this scenario, particulate emissions from the roasters are controlled by the multi-cyclone and electrostatic precipitator only — the sulfuric acid plant is bypassed. The SO₂ content of the exhaust stream is limited to 500 ppm in accordance with 25 Pa Code § 123.21.

The sulfur content of each feedstock is determined in the laboratory when the feedstock is first considered for processing at the facility, and is periodically checked from samples obtained from shipments into the site. Each feedstock is assigned an identifying number. When a truckload is received, the total weight of the material is entered into the database, along with its identifying number. Through material balance calculations on the sulfur content of the incoming feed, and the roaster exhaust volume, maximum allowable feed rates to the roasters are calculated to assure compliance with the 500 ppm SO₂ limitation. Company follows certain charging, temperature, recordkeeping, and monitoring requirements to ensure that the low sulfur feedstocks are processed in compliance with Pennsylvania's SO₂ and visible emission limitations.

PROPOSED TVOP RENEWAL

As part of their renewal application, company has requested that the following changes be made in the renewal TVOP.

The initial TVOP included annual SO₂ limitations on individual sources. For maximum flexibility, Langeloth requested that the SO₂ limits at the source level be removed and that a facility-wide limit of 249 tons of SO₂ be established at the site level. However, this change has **not** been incorporated into the proposed renewal TVOP. DEP has determined that this change must be authorized through a Plan Approval.

The initial TVOP included a 50 ppm SO₂ limit from the sulfuric acid plant. This was established during the reactivation of Roasters 3, 4, and 5 under Plan Approval PA-63-308-006B. However, the Acid Plant was originally designed and installed to achieve compliance with the 500 ppm SO₂ standard found at 25 Pa Code § 123.21. The more restrictive 50 ppm SO₂ limit was not established to avoid otherwise applicable requirements. Langeloth requested that the SO₂ limit from the sulfuric acid plant be revised back to 500 ppm. However, this change has **not** been incorporated into the proposed renewal TVOP. DEP has determined that this change must be authorized through a Plan Approval.

Previous authorizations limited Langeloth to the operation of no more than four (4) roasters at a time in high-sulfur feedstock service. Langeloth believes that the sulfuric acid plant has enough capacity to operate up to five (5) roasters at a time in high sulfur feedstock service. This mode of operation was exempted from Plan Approval on August 24, 2012 and has been added to the proposed TVOP renewal. A condition has also been added requiring Langeloth to notify DEP seven (7) days in advance of this mode of operation. The sulfuric acid plant is equipped with SO₂ CEMS, so it will be easy to verify that the 50 ppm SO₂ limit is not being exceeded.

The initial TVOP included a requirement that the appearance of the exhaust from the Main Stack be observed and recorded each day at 7 a.m., 12 noon and 5 p.m.. Langeloth requested that some latitude be allowed before and after the designated times. Proposed TVOP renewal has been changed as requested.

Langeloth requested that the installation date of Roaster 1 be corrected from 1996 to 1941. Proposed TVOP renewal has been changed as requested.

The installation of Source 131 – Pure Oxide Production was authorized on May 14, 1996 under Plan Approval PA-63-308-039, and contained particulate limits of 0.02 grains per dry standard cubic foot (g/dscf) and an opacity limit of 10% using the authority of 25 Pa Code 127.12b. These limits were established as best available technology in accordance with 25 Pa Code § 127 and were not established to comply with any state or federal regulations or to avoid otherwise applicable permitting requirements. Langeloth requests that these limits be changed to 0.04 g/dscf and 20%/60% opacity in accordance with 25 Pa Code §§ 127.11 and 127.41, respectively. However, operation of this source in accordance with the more relaxed limits would not constitute operation in accordance with good air pollution control practices. Proposed TVOP renewal has not been changed.

Langeloth requests a minor change to the material balance and recordkeeping requirements associated with low sulfur feedstock operation. Proposed TVOP renewal has been changed as requested.

Langeloth requests the addition of work practice standards to be used in the event of a malfunction in the acid plant. Under this scenario, Langeloth would shut down the acid plant, vent all gases out the main stack, and remove product from the roasters. Proposed TVOP renewal has been changed as requested.

REGULATORY ANALYSIS

The following regulations have been evaluated for applicability to this facility.

40 CFR 60, Subpart H – Standards of Performance for Sulfuric Acid Plants

In accordance with 40 CFR § 60.80, (a) The provisions of this subpart are applicable to each sulfuric acid production unit, which is the affected facility. (b) Any facility under paragraph (a) of this section that commences construction or modification after August 17, 1971, is subject to the requirements of this subpart. However, the definition of sulfuric acid production unit specifically “does not include facilities where conversion to sulfuric acid is utilized primarily as a means of preventing emissions to the atmosphere of sulfur dioxide or other sulfur compounds.” Because the sulfuric acid plant is used as a control device, this regulation is not applicable to the Langeloth facility.

40 CFR 60 Subpart LL – Standards of Performance for Metallic Mineral Processing Plants

In accordance with 40 CFR § 60.380, (a) The provisions of this subpart are applicable to the following affected facilities in metallic mineral processing plants: Each crusher and screen in open-pit mines; each crusher, screen, bucket elevator, conveyor belt transfer point, thermal dryer, product packaging station, storage bin, enclosed storage area, truck loading station, truck unloading station, railcar loading station, and railcar unloading station at the mill or concentrator with the following exceptions. All facilities located in underground mines are exempted from the provisions of this subpart. At uranium ore processing plants, all facilities subsequent to and including the beneficiation of uranium ore are exempted from the provisions of this subpart. (b) An affected facility under paragraph (a) of this section that commences construction or modification after August 24, 1982, is subject to the requirements of this part. However, the definition of *Metallic mineral processing plant* found at 40 CFR § 60.381 means any combination of equipment that produces metallic mineral concentrates from ore. Metallic mineral processing commences with the mining of ore and includes all operations either up to and including the loading of wet or dry concentrates or solutions of metallic minerals for transfer to facilities at non-adjacent locations that will subsequently process metallic concentrates into purified metals (or other products), or up to and including all material transfer and storage operations that precede the operations that produce refined metals (or other products) from metallic mineral concentrates at facilities adjacent to the metallic mineral processing plant. Because this facility is not associated with the mining of ore and does not produce metallic mineral concentrates from ore, this regulation is not applicable to this facility.

40 CFR 60 Subpart JJJJ - Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

The emergency engines at Langeloth classified as new emergency stationary SI internal combustion engines rated at greater than 130 hp. They are subject to emission limitation, monitoring, recordkeeping, reporting and work practice standards, which have been included in the proposed TVOP.

40 CFR 63 Subpart ZZZZ - Stationary Reciprocating Internal Combustion Engines (RICE)

This rule applies to stationary RICE at facilities that are major or area sources of HAPs. Langeloth is an area source of HAPs. There are three (3) natural gas-fired, emergency engine/generator sets at Langeloth, rated at 454 hp each and constructed after June 12, 2006. As such, they are subject to the ZZZZ requirements for new spark ignition RICE at an area source. In accordance with 40 CFR § 63.6590(c), a new or reconstructed stationary RICE located at an area source must meet the requirements of this part (ZZZZ) by meeting the requirements of 40 CFR part 60 subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under this 40 CFR 63 Subpart ZZZZ.

40 CFR 63 Subpart JJJJJ - Industrial, Commercial and Institutional Boilers:

This rule applies to certain boilers and process heaters of various sizes and fuel types at facilities that are not major for HAPs. Langeloth operates four small boilers at this site. These boilers are fired exclusively on natural gas. In accordance with 40 CFR § 63.11195(e), natural gas boilers are not subject to this rule.

40 CFR 63 Subpart YYYYYY - National Emission Standards for Hazardous Air Pollutants for Area Sources: Ferroalloys Production Facilities

In accordance with 40 CFR § 63.11524, (a) You are subject to this subpart if you own or operate a ferroalloys production facility that is an area source of hazardous air pollutant (HAP) emissions. A ferroalloys production facility manufactures silicon metal, ferrosilicon, ferrotitanium using the aluminum reduction process, ferrovandium, ferromolybdenum, calcium silicon, silicomanganese zirconium, ferrochrome silicon, silvery iron, high-carbon ferrochrome, charge chrome, standard ferromanganese, silicomanganese, ferromanganese

silicon, calcium carbide or other ferroalloy products using electrometallurgical operations including electric arc furnaces (EAFs) or other reaction vessels, (b) The provisions of this subpart apply to each existing and new electrometallurgical operation affected source as defined in paragraph (b)(1) An electrometallurgical operation affected source is existing if you commenced construction or reconstruction of the EAF or other reaction vessel on or before. Source 130, Aluminothermic Process produces ferromolybdenum alloys and therefore meets the definition of a Ferroalloy Production Facility and is subject to the applicable requirements of this regulation. This rule contains emission restrictions for fugitive and visible emissions, testing requirements using Methods 9 and 22, and various recordkeeping and reporting requirements. These have been added to the proposed TVOP at the Source 130 Level. Langeloth is in compliance with the applicable requirements of this rule.

40 CFR Part 64 Compliance Assurance Monitoring

The Compliance Assurance Monitoring (CAM) requirements of 40 CFR §§ 64.1-64.10 have been evaluated for applicability to Langeloth. The CAM rule was promulgated by EPA in 1997 and it is intended to provide a reasonable assurance of compliance with applicable requirements under the Clean Air Act (CAA). In accordance with 40 CFR § 64.2(a), CAM applies to each pollutant-specific emission unit (PSEU) that:

- Is located at a major source that is required to obtain a Title V permit,
- Is subject to an emission limitation,
- Uses a control device to meet that limit, and
- Has pre-controlled emissions greater than the major source threshold.

In accordance with 40 CFR § 64.2(b), the requirements of the CAM rule do not apply to certain emission limitations or standards, including:

- Emission limitations or standards proposed by the Administrator after November 15, 1990 pursuant to section 111 or 112 of the Act.
- Emission limitations or standards for which a part 70 or 71 permit specifies a continuous compliance determination method, as defined in 40 CFR § 64.1.

When operating Roasters 1-6, under the High Sulfur Feedstock mode, Langeloth uses a continuous emission monitoring system (CEMS) for monitoring SO₂ emissions at the exhaust of the sulfuric acid plant; therefore a CAM plan is not required SO₂. Multiclones and ESPs are used to meet PM emission limitations under both High and Low Sulfur Feedstock modes. Both the initial and this proposed part 70 permit (TVOP-63-00074) specify monitoring of the appearance of the emissions from the Main Stack three times each day when operating, and requires that two people maintain Method 9 certification at all times. It is reasonable to assume that compliance with the visible emission standards of 25 Pa Code § 123.41 is sufficient for demonstrating compliance with the PM emission limitations of 25 Pa Code § 123.13. Since the TVOP specifies a compliance determination method, a separate CAM plan is not required for PM emissions from the Main Stack.

Although the Pure Oxide Process includes the use of 2 production collection baghouses, these are inherent process controls as defined in 40 CFR § 64.1 and not control devices subject to CAM.

Source 131 - Aluminothermic Process is subject to the applicable requirements of 40 CFR 63, Subpart YYYYYY - National Emission Standards for Hazardous Air Pollutants for Area Sources: Ferroalloys Production Facilities. This rule was proposed after November 15, 1990 and contains emission limitations or standards established pursuant to section 111 or 112 of the Act. Therefore, a CAM plan is not required.

40 CFR Part 68 Chemical Accident Prevention Provisions

This part sets forth the list of regulated substances and thresholds and the requirements for owners or operators of stationary sources concerning the prevention of accidental releases. The substances and threshold quantity that are considered a regulated substance under this part are listed in 40 § 68.130. Langeloth does not store any of the listed compounds at the facility; therefore, Langeloth is not subject to 40 CFR Part 68.

40 CFR Part 98 Mandatory Greenhouse Gas Reporting

This part was promulgated on October 30, 2009. In accordance with 40 CFR § 98.2(a), the Greenhouse Gas (GHG) reporting requirements and related monitoring, recordkeeping, and reporting requirements of this part apply to the owners and operators of any facility that is located in the United States and that meets the requirements of either paragraph 40 CFR § 98.2 (a)(1), (a)(2), or (a)(3) of this section.

However, public comments to the Greenhouse Gas Mandatory Reporting Rule (GHG MRR) questioned the requirements of this rule to meet current definitions of “applicable requirement” at 40 CFR §§ 70.2 and 71.2. The commentators requested that USEPA confirm their interpretation of the regulations. The EPA provided the following response: “As currently written, the definition of “applicable requirement” in 40 CFR §§ 70.2 and 71.2 does not include a monitoring rule such as today’s action, which is promulgated under CAA sections 114(a)(1) and 208.” The preamble of the final version of the GHG MRR, located at 74 Fed Reg 209, pp. 56287-56288, states that the GHG MRR is not considered an “applicable requirement” under the Title V Operating Permit program. Therefore, this Subpart, while it may be an obligation for Langeloth, is not considered an applicable requirement and has not been included in this Title V Operating Permit.

40 CFR Part 52 Greenhouse Gas Tailoring Rule

This regulation was issued on December 30, 2010. This rule establishes a process for conducting Prevention of Significant Deterioration (PSD) reviews, including Best Available Control Technology (BACT) determinations for control of greenhouse gases (GHG) when a new source or a modification to an existing source results in emissions of GHGs in excess of certain thresholds. Since 2010, there have not been any modifications to the Langeloth facility that triggered a GHG PSD review.

CONCLUSIONS AND RECOMMENDATIONS

Langeloth has met the regulatory requirements associated with this application submittal. Dennis Kozimer, Air Quality Specialist, conducted a Full Compliance Evaluation and Operating Permit Inspection of this facility on March 14, 2014, and found it to be in compliance with air quality regulations and their TVOP. I recommend that the proposed Title V Operating Permit be processed using the public participation provisions of 25 Pa Code §§ 127.424, 127.425 and 127.521.