Statement of Basis

Tier II Operating Permit No. T2-2012.0016
Project ID 61025

P4 Production LLC
Soda Springs, Idaho

Facility ID 029-00001

Final

March 4, 2014
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Permit Writer

The purpose of this Statement of Basis is to satisfy the requirements of IDAPA 58.01.01.et seq, Rules for the Control of Air Pollution in Idaho, for issuing air permits.

ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURE

acfm	actual cubic feet per minute
ACI	Activated Carbon Injection
BACI	Bromated Activated Carbon Injection
Btu	British thermal units
CAA	Clean Air Act
CFR	Code of Federal Regulations
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EPA	U.S. Environmental Protection Agency
HAP	hazardous air pollutants
Hg	Mercury
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
km	kilometers
lb/hr	pounds per hour
MACT	Maximum Achievable Control Technology
MBACT	Mercury Best Available Control Technology
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NSPS	New Source Performance Standards
PM	particulate matter
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTE	potential to emit
RBLC	RACT/BACT/LAER Clearinghouse
Rules	*Rules for the Control of Air Pollution in Idaho*
scf	standard cubic feet
SIP	State Implementation Plan
T/yr	tons per consecutive 12 calendar month period
T2	Tier II operating permit
TAP	toxic air pollutants
U.S.C.	United States Code

FACILITY INFORMATION

Description

P4 Production, L.L.C. (P4) owns and operates an elemental phosphorous production facility (Facility) near Soda Springs, Idaho. The Facility processes phosphate ore to produce elemental phosphorus (P4) for sale. There are two primary departments at the Facility – the Burden Preparation Department and the Furnace Department.

The Burden Preparation Department includes activities associated with handling and beneficiation of raw materials (coke, quartzite, and phosphate ore) to produce a suitable feedstock for processing by the Furnace Department to produce elemental phosphorus. Ore is received and stockpiled onsite. Ore is then conveyed to a nodulizing kiln for processing. The resulting nodules are cooled and stockpiled or sent directly to the nodule sizing and scale room from the cooler. In the scale room the nodules are blended with coke and quartzite. The coke and quartzite are received and stockpiled separately at the Facility and are dried to a desired moisture content, if necessary, prior to blending with the nodules. The nodule-coke-quartzite blend (burden) is then sent to the Furnace Department for processing. Fuel used in the nodulizing kiln is primarily carbon monoxide (CO) off-gas from the furnace process which is supplemented with small quantities of natural gas and coal. The kiln off-gas is treated with existing air pollution control equipment including a series of dust bins, a spray tower, and four parallel hydrosonic venturi scrubbers. The hydrosonic venturi scrubbers are fed with lime concentrated dual alkali (LCDA) solution to scrub acid gases, primarily SO_2, from the gas flow.

The Furnace Department operations utilize electric arc furnaces to melt the burden, chemically react the components, and create off-gases containing elemental phosphorus. The burden enters one of three electric furnaces (No. 7, No. 8, and No. 9) that operate on a continuous basis at temperatures of 1,400 to 1,500°C (2,550 to 2732°F). The reducing environment in the furnaces reacts phosphate from the nodules to form phosphorus gas, carbon monoxide gas, and molten slag and ferrophosphorus. The furnace gases, composed of mainly carbon monoxide and phosphorus, are drawn through electrostatic precipitator (ESP) dust collectors where particulate matter is removed. The cleaned gases are then sent through water spray condensers where the gases are cooled - condensing the phosphorus. The condensed phosphorus is pumped to settling/storage tanks for further solids removal and product storage. The stored phosphorus is loaded into water-blanketed railroad cars for shipment to market.

After the removal of phosphorus, the furnace off-gas is composed primarily of CO and water vapor. The CO is then sent to the nodulizing kiln as fuel. Excess CO is combusted in a thermal oxidizer (TO) unit the resulting off-gases are treated with three parallel high energy venturi scrubbers.

The furnaces are periodically tapped to remove accumulated molten slag and ferrophosphorus. Slag taps occur about 45-48 times per day per furnace and last about 15 minutes per tap. The ferrophosphorus is tapped once or twice per day per furnace. The tapping gases pass through a high energy venturi scrubber equipped with a cyclonic separator before discharge to the atmosphere.

The molten slag is tapped into cast steel ladles that are transported and poured onto the slag storage pile at the site. The ferrophosphorus is also collected in ladles, cooled, and stockpiled on-site.

Permitting History

This permitting action is solely to include Mercury Best Available Control Technology (MBACT) requirements. A complete listing of the permitting history may be seen in the Statement of Basis that supports Tier I operating permit No. T1-2009.0121 issued July 14, 2009.

Application Scope

P4 Production has applied for a Tier II operating permit to satisfy the MBACT requirements of IDAPA 58.01.01.401.02.a.ii. This Rule requires existing facilities that have annual actual mercury emissions over 62 pounds per year to submit a Tier II operating permit application and an MBACT analysis.

Application Chronology

April 9, 2012	DEQ received an application.
April 9 – May 4, 2012	DEQ provided an opportunity to request a public comment period on the application and proposed permitting action.
May 7, 2012	DEQ determined that the application was incomplete.
August 16, 2012	DEQ received requested supplemental information from the applicant.
September 10, 2012	DEQ determined that the application was incomplete.
October 12, 2012	DEQ received requested supplemental information from the applicant.
November 7, 2012	DEQ determined that the application was complete.
November 9, 2012	DEQ received requested supplemental information from the applicant.
February 11, 2013	DEQ received requested supplemental information from the applicant.
April 26, 2013	DEQ made available the draft permit and statement of basis for peer and regional office review.
June 27, 2013	DEQ made available the draft permit and statement of basis for applicant review.
July 17, 2013	DEQ received comments on the facility draft permit.
October 1, 2013	DEQ provided P4 an updated facility draft permit for review.
October 16, 2013	DEQ received comment on the most recent facility draft permit.

TECHNICAL ANALYSIS

Emissions Units and Control Equipment

Table 1 EMISSIONS UNIT AND CONTROL EQUIPMENT INFORMATION

Source	Control Equipment
Nodulizing Kiln	Dust knockout chamber, North spray tower (nodulizing kiln spray tower)[a], Eight parallel cyclonic separators (four pairs), Four parallel Hydro-Sonic scrubbers, Demisters, LCDA SO_2 scrubbing system

a) The north spray tower is upstream of the hydrosonic scrubbers and is different than the "cooler spray tower" listed in P4's Permit No. T1-2009.0121 as controls for the "Nodule cooler" source in Table 3.1 of that permit.

Emissions Inventories

Table 2 provides a summary of the potential emissions (as permitted) of mercury from P4 Productions operations.

Table 2 Mercury Emissions

Emissions Source	Potential Emissions (lb/yr)
Kiln Hydrosonic Stacks (total)[a]	746.4
Nodule Crushing and Screening Scrubber Stack[b]	2.72
Cooler Spray Tower Stack[b]	0.6615
#7 THFC Stack	0.0626
#9 THFC Stack	0.0118
#8 THFC Stack	0.0539
SDM Bin Vent Stack	2.39E-04
Coke Handling Baghouse Stack	7.43E-05
Nodule Reclaim Baghouse Stack	9.54E-05
Scaleroom Baghouse Stack	8.16E-05
Main Furnace Baghouse Stack	2.8E-05
No. 9 CO Dust Baghouse Stack	8.9E-05
No. 8 CO Dust Baghouse Stack	8.68E-06
Dryer Baghouse Stack	1.64E-05
#309 Coke Fines Bin Vent Stack	5.01E-06
No. 7 CO Dust Baghouse Stack	4.18E-06
#9 CO Dust Collection Bypass Stack	2.33E-06
#8 CO Dust Collection Bypass Stack	3.67E-06
#305 Coke Fines Bin Vent Stack	1.69E-06
#307 Coke Fines Bin Vent Stack	2.06E-06
#7 CO Dust Collection Bypass Stack	1.20E-06
105 Baghouse Stack	7.26E-06
#304 Coke Fines Bin Vent Stack	6.18E-07
#308 Coke Fines Bin Vent Stack	1.08E-06
104 Baghouse Stack	6.55E-04
#306 Coke Fines Bin Vent Stack	7.43E-07
Coke Bunker Baghouse Stack	5.46E-08
Bulk Storage Bin Baghouse Stack	8.91E-09
Vactor Truck Vent Stack	9.3E-09
Vactor Truck Vent Stack	4.13E-09
Vactor Truck Vent Stack	4.13E-09
Vactor Truck Vent Stack	2.31E-09
Vactor Truck Vent Stack	3.09E-09
Vactor Truck Vent Stack	3.01E-09
Vactor Truck Vent Stack	2.80E-09
Vactor Truck Vent Stack	2.71E-09
Vactor Truck Vent Stack	4.46E-10
Total	749.9

a) Requested MBACT emission limitation.

b) Mercury source test results were below detection limits. Emissions estimates are based on assuming actual emissions were half the detection limit (0.00015 mg/filter).

In accordance with IDAPA 58.01.01.401.02.a.ii, a Tier II operating permit is required because the facility has actual mercury emissions greater than 62 pounds per year. Mercury emissions originate from raw materials used in the process (e.g. coke, quartzite, and phosphate ore). Over 99 percent of the mercury emitted is from the Kiln Hydrosonic Stacks.

Ambient Air Quality Impact Analyses

The purpose of this Tier II permitting action is to incorporate emission standards for MBACT. Ambient standards for mercury do not exist and the facility is not making any physical or operational change, therefore an ambient impact assessment is not required.

REGULATORY ANALYSIS

Permit to Construct (IDAPA 58.01.01.201)

IDAPA 58.01.01.201 ....Permit to Construct Required

P4 Production has not proposed to commence construction or modify any existing source therefore a permit to construct is not required.

Procedures and Requirements for Tier II Operating Permits (IDAPA 58.01.01.400)

IDAPA 58.01.01.401 ....Tier II Operating Permit

In accordance with IDAPA 58.01.01.401.02.a.ii, a Tier II operating permit is required because the facility has annual actual mercury emissions greater than 62 pounds. The applicant submitted a MBACT analysis as required.

IDAPA 58.01.01.407................................Tier II Operating Permit Fee

Permitted mercury emissions are less than 0.4 tons per year. The processing fee for permitted emissions less than one ton per year is $1,250. The processing fee calculation spreadsheet may be found in Appendix B.

Mercury Best Available Control Technology (MBACT) (IDAPA 58.01.01.006.67)

MBACT is defined, in part, as:

"An emission standard for mercury based on the maximum degree of reduction practically achievable as specified by the Department on an individual case-by-case basis taking into account energy, economic and environmental impacts, and other relevant impacts specific to the source."

The sources of mercury emissions at the facility may be seen in Table 2. Because the mercury emissions estimate for the nodulizing kiln are greater than two orders of magnitude greater than emissions from the nodule crushing and screening process or any other source of mercury emissions at the Facility P4's MBACT review focuses only on control of mercury from the nodulizing kiln.

The MBACT analysis for the nodulizing kiln was conducted using the "Top Down" approach. In the Top Down approach the technologies that are potentially available for use are identified. Technically infeasible options are eliminated. The remaining options are listed in descending order of mercury control efficiency and are evaluated considering energy, economic, and environmental factors. The highest performing technology that is not eliminated after considering energy, economic, and environmental factors is selected as MBACT. A summary of the provided MBACT analysis is provided in the following paragraphs, for a more in-depth review see the application materials provided by P4.

Initial mercury emissions from the kiln are believed to be predominately elemental mercury because of the high temperature of the kilns. As the gas cools from the kilns some of the mercury reacts with other exhaust constituents and is oxidized to the Hg^{2+} form, and some exists in the particulate matter form. Table 3 summarizes the mercury speciation data from source tests on the kiln. The oxidized and particulate-bound forms of mercury are the readily controlled forms, while control of elemental mercury is much more difficult. In general, the mercury control strategies evaluated include maximizing the control of the Hg^{2+} and particulate bound mercury, and forcing the elemental mercury (Hg^0) to the controllable form (Hg^{2+}). For instance activated carbon has much more affinity for oxidized mercury than elemental mercury, and oxidized mercury is soluble in water and can be captured in scrubbers where elemental mercury does not exhibit any appreciable water solubility and is not captured in any significant amount by wet scrubbers.

Table 3 Mercury Speciation Data from Emissions Testing

Hg Species	% of Total
Hg (particulate)	6%
Hg^{+2}	1%
Hg^0	93%

The following technologies were identified as potentially available for use:

- Calcium bromide and activated carbon injection (ACI) with the addition of a baghouse;
- Bromated activated carbon injection (BACI) with the addition of a baghouse,
- ACI or BACI prior to the existing scrubbers;
- Non-carbon sorbent/reactant injection;
- Halogen injection;
- Fixed-Bed Oxidation catalysts;
- Ore Pre-treatment;
- Mercuric chloride scrubbing; and
- The existing control equipment (e.g. spray tower and scrubbers)

P4 provided details in the application for rejecting some of the potentially available control technologies because they are technically infeasible, while two control technologies were identified for further evaluation. The details of the analysis are not repeated in this Statement of Basis but a summary of the analysis is provided in Table 4 and in the paragraphs following Table 4.

Table 4 Summary of MBACT Analysis

Technology	Summary of Analysis
Calcium bromide and ACI with baghouse addition	Is evaluated but is determined to be too costly at a cost of $53,000 per pound of mercury controlled.
BACI with baghouse addition	Is evaluated but is determined to be ineffective and too costly. High concentrations of water and other chemicals compete with mercury for adsorption sites on BACI. Is not demonstrated on exhaust gases from elemental phosphorus plants.
Calcium bromide and ACI prior to existing scrubbers	Eliminated – P4 asserts gas temperature and residence time do not allow conversion of Hg^0 to Hg^{+2} so that it can be adsorbed by ACI. High concentrations of water and other chemicals compete with Hg^{+2} for adsorption sites on ACI. Potential issues with scrubbers handling the additional particulate matter loading. Is not demonstrated on exhaust gases from elemental phosphorus plants.
BACI prior to existing scrubbers	Eliminated - High concentration of water and other chemicals compete with mercury for adsorption sites on BACI. Potential issues with scrubber handling the additional particulate matter loading. Is not demonstrated on exhaust gases from elemental phosphorus plants.
Non-carbon sorbent injection	Eliminated – Either not available on a commercial scale or is in the research stage. Is not demonstrated on exhaust gases from elemental phosphorus plants.
Halogen injection prior to existing scrubbers	Eliminated – asserted to be technically infeasible. Issues with temperatures and residence time necessary to allow reaction (Hg^0 to Hg^{+2}), reactant would be scrubbed by the existing spray tower prior to reacting. Potential corrosion issues. Issues with halides affecting the existing scrubbing system and mercury reemission at the scrubber. Is not demonstrated on exhaust gases from elemental phosphorus plants.
Fixed-Bed Oxidation catalysts	Eliminated – erosion, fouling and temperature issues (technically infeasible). Is not demonstrated on exhaust gases from elemental phosphorus plants.
Ore Pre-treatment	Eliminated – would require process change (not within scope of MBACT).
Mercuric chloride scrubbing	Eliminated – relatively low mercury concentrations in off-gas, temperature issues, and relatively large gas flow rates. Is not demonstrated on exhaust gases from elemental phosphorus plants.
Existing Scrubbers	Selected as MBACT – the existing equipment, including the scrubbers, provides approximately 35% reduction in potential mercury emissions.

Technologies Identified as Technically Feasible

The two control options from the identified potentially available control technologies that were evaluated are:

1. calcium bromide injection followed by activated carbon injection (ACI) with the addition of a baghouse; and
2. bromated activated carbon injection (BACI) with the addition of a baghouse.

These two options are discussed in more detail in the following paragraphs.

Calcium Bromide and Activated Carbon Injection with the Addition of a Baghouse

It was documented in the application that the calcium bromide and activated carbon injection option may remove 15% of the mercury that is now emitted from the kiln, an emissions reduction of 174 pounds of mercury per year. Since the technology has not been demonstrated on a phosphate nodulizing kiln, it is not possible for DEQ to verify the estimated 15% mercury removal efficiency. P4 determined that the cost for this control technology would be $53,000 per pound of mercury removed. P4 concluded that this cost was too excessive and eliminated its use. DEQ agrees that this cost is excessive. In making this determination DEQ reviewed EPA's "beyond the floor" analysis for mercury control for the development of the mercury MACT standard for new coal and oil fired electric utility steam generating units[1]. In developing the MACT EPA must consider requiring emission standards beyond what is currently being achieved by controls on the best performing 12 percent of existing sources (the MACT "floor"). In determining if "beyond the floor" emission standards are warranted EPA must consider the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements. These criteria for the MACT "beyond the floor" analysis are similar to the requirements for establishing mercury BACT emission limits in accordance with IDAPA 58.01.01.006.67. Both analyses require considering cost, environmental impact and energy in developing standards. In proposing MACT standards for new coal and oil fired electric utility steam generating units, EPA determined[1] that a cost of $61,000 per pound of mercury removed was not a reasonable cost, but did not specify a cost that would be reasonable. No other regulatory based mercury control cost effectiveness data was found in the RBLC[2] for any source type. DEQ has determined that a control technology that may remove 15% of the mercury that is emitted at a cost of $53,000 per pound is unreasonable.

Bromated Activated Carbon Injection with the Addition of Baghouse

P4 determined that bromated activated carbon injection with the addition of baghouse after the existing air pollution control equipment would provide no additional mercury control. Since the technology has not been demonstrated on a phosphate nodulizing kiln it is not possible for DEQ to determine the level of control that may be achieved. P4 states that the "… mercury speciation, low mercury concentration and residence time, the high exhaust gas moisture content, flow rate and temperature, and the presence of a myriad of chemical species present at much higher concentrations than mercury that will compete for BACI…" will render this control ineffective. Emission rates of various contaminants after the existing air pollution control equipment are listed in Table 5. The sum of these emissions is significantly higher than the emissions of mercury.

Table 5. Emissions After the Existing Air Pollution Control Equipment

PM_{10}[1] (lb/yr)	SO_2[1] (lb/yr)	Cd[2] (lb/yr)	Zn[2] (lb/yr)	As[2] (lb/yr)	Cu[2] (lb/yr)	Pb[2] (lb/yr)	Se[2] (lb/yr)	Ni[2] (lb/yr)	Sb[2] (lb/yr)	Cr[2] (lb/yr)	Hg[2] (lb/yr)
262,800	1.25E6	7,640	2.54	519	70.6	343	2,630	585	186	573	746

1) Allowable emission rates
2) Estimated Emissions rates provided by P4

DEQ believes that there would be some level of additional control from the injection of BACI but cannot determine what that level of control would be. Similar to ACI discussed in the previous section, it is believed that research and technology development would be required on the use of carbon based control technologies on the nodulizing kiln in order to accurately determine (and optimize) the level of control that could be achieved in practice. In short, carbon injection technologies are available for use on the nodulizing kiln but their use has not been demonstrated on a phosphorous plants nodulizing kiln's off-gas and there is no known means of accurately calculating what level of control may be achieved.

For the sake of providing an economic evaluation for this control technology P4 assumed for the purposes of the analysis that an additional one pound per year of mercury would captured. The resulting cost is $7,964,400 per pound of mercury removed. P4 eliminated BACI as a control technology.

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1. Nick Hutson, U.S. EPA Office of Air and Radiation, NESHAP Beyond the Floor Analysis for Revised Proposed Emission Standards for New Source Coal and Oil-fired Electric Utility Steam Generating Units, November 16, 2012
2 The EPA Reasonably Available Control Technology/ Best Available Control Technology/Lowest Achievable Emission Rate Clearinghouse was searched to see if mercury control technology cost effectiveness data was available – no data was available.

Summary

Neither of these technologies has been demonstrated on an elemental phosphate plant's nodulizing kiln exhaust (P4's Kiln is the only one known to exist in the United States and no data was found on mercury control from phosphate nodulizing kilns in other countries); therefore they represent technology transfer from other source types. Information on controlling relatively low mercury concentrations in high volume gas steams using carbon injection exists for coal fired sources. When considering transferring carbon injection based mercury control technologies demonstrated on coal fired emissions units to the nodulizing kiln the chemical and physical differences of the exhaust streams causes significant uncertainty regarding the level of control that can be expected. From the available information on coal-fired units it is evident that considerable research was conducted on carbon injection in order to determine the amount of mercury control that could be achieved for coal fired power plants. In fact mercury control efficiencies on coal-fired units were found to vary significantly based on the type of coal that is burned, demonstrating that the chemical and physical properties of the flue gas strongly influences mercury control efficiencies. It is believed that similar research and technology development would be required for the use of carbon based control technologies on the nodulizing kiln in order to accurately determine (and optimize) the level of control that could be achieved in practice. In short, carbon injection technologies are available for use on the nodulizing kiln but their use has not been demonstrated on that source type.

Both of the evaluated technologies include adding a baghouse downstream of the existing wet scrubbers. ACI or BACI would be injected downstream of the existing scrubbers then removed in the baghouse. The 300,000 cubic feet per minute of exhaust gas would need to be heated from 161°F to 250°F a temperature above the saturation temperature to prevent condensation and fouling of the baghouse. Reheating the exhaust gas is estimated to cost over 4.6 million dollars per year making both control technologies very expensive.

Technologies Eliminated as Technically Infeasible

Calcium Bromide and ACI Prior to Existing Scrubbers

P4 provided several reasons why calcium bromide and ACI prior to the existing scrubbers is not technically feasible. Details are provided in the application materials. The most compelling reasons for elimination is that the reactive bromide would be scrubbed in the cooling tower prior to having an opportunity to oxidize mercury, and the concentration of off-gas constituents (i.e. Cd, Zn, As, Cu, Pb, Se, Ni, Sb, Cr, SO_2, H_2O, and particulate matter) that compete for carbon adsorption sites are several orders of magnitude greater than mercury and would render the system inefficient in removing mercury. High levels of SO_2 are known[3] to significantly inhibit Hg capture by ACI and BACI in utility boilers and SO_2 has been estimated to be present at a rate of 2,800 pounds per hour in the kiln off-gas prior to scrubbers. Additionally, this control has not been demonstrated on an elemental phosphate plant's nodulizing kiln.

Bromated Activated Carbon Injection (BACI) Prior to Existing Scrubbers

Reasons for elimination include that the concentration of off-gas constituents (i.e. Cd, Zn, As, Cu, Pb, Se, Ni, Sb, Cr, SO_2, H_2O, and particulate matter) that compete for carbon adsorption sites are several orders of magnitude greater than mercury and would render the system inefficient in removing mercury. High levels of SO_2 are known[3] to significantly inhibit Hg capture by ACI and BACI in utility boilers and SO_2 has been estimated to be present at a rate of 2,800 pounds per hour in the kiln off-gas prior to scrubbers. Additionally, this control has not been demonstrated on an elemental phosphate plant's nodulizing kiln.

Non-carbon Sorbent Injection

None of the identified non-carbon sorbents have been demonstrated on phosphate plant's nodulizing kilns. Most appear to be in the development phase and DEQ's literature search on mercury adsorption indicates that activated carbon is overwhelmingly the predominate mercury sorbent.

Halide Injection Prior to Existing Scrubbers

Sodium hypochlorite and calcium bromide injection were contemplated but were rejected.

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3 Impact of Sulfur Oxides on Mercury Capture by Activated Carbon, Alerta, Presto and Granite, Environ.Sci. Technol., 2007, 6579-6584

P4 mentions the use of sodium hypochlorite in the application because this control was proposed by the EPA Office of Research and Development on February 10, 2011 (EPA attendees: Susan Fairchild, Nick Hutson, Mike Thrift, Peter Westlin, Barrett Parker) during information gathering efforts to support a new MACT standard for mercury standards at elemental phosphorus plants . DEQ contacted Susan Fairchild regarding mercury control at P4. Susan confirmed that EPA concluded that with the current level of understanding of mercury control there are no clearly available control technologies that would work effectively in controlling mercury emissions at P4's nodulizing kiln. EPA was not able to refute P4's assertion that mercury control would not be effective.

P4 asserts that "The appropriate physical and chemical conditions simply do not exist to allow hypochlorite or any other halogenated species to oxidize mercury." The typical kiln off-gas temperature is 1,112 °F with a residence time of 2 seconds prior to the spray tower which would scrub the halogen out of the gas. The off-gas has approximately 2,800 pounds per hour of SO_2 and 30-40 tons per hour of dust and relatively small amount of mercury. DEQ believes that some oxidation of the elemental mercury would occur but cannot determine how much would be oxidized and then captured. Because of the complexity of the off-gases DEQ believes experiments would need to be conducted to determine how much mercury would be oxidized and captured. Chlorine and bromine are highly reactive elements and in the kiln off-gas it would have many chemicals to react with at much higher concentrations than mercury. Injecting large quantities of chlorine or bromine into the process may lead to corrosion of the equipment and may upset the chemistry of the existing acid gas scrubber.

Even if mercury were oxidized and captured by the existing wet scrubber there is a possibility that the mercury may be remitted at the scrubber as has been reported on scrubbers used on coal fired units. Chemical additives may be available that would reduce the potential for reemission of the mercury at the scrubber but they have not been demonstrated on P4's scrubbing system.

Requiring experiments to be conducted on existing systems to determine how effective a technology may be is not a requirement of BACT. BACT control technologies must be available and demonstrated.

Fixed-Bed Oxidation Catalysts

Fixed-bed oxidation catalysts would not be effective with the nodulizing kiln off-gas. Placement of the catalyst in the high-dust environment upstream of the spray tower would cause erosion of the catalyst surface or fouling of active catalyst surface if accumulation of solids were to occur. Furthermore, the presence of high sulfur dioxide concentrations would promote formation of sulfur trioxide and inhibit the oxidation of mercury at the catalyst. If placed downstream from the spray tower, a low-temperature catalyst would need to be used and there is little information in the literature to suggest that such a catalyst would promote mercury oxidation. Additionally, the same challenge with sulfur trioxide inhibiting the oxidation of mercury would exist at that location. The size of the fixed bed would also be large, and there are uncertainties regarding the durability of fixed-bed catalyst. Based on these concerns, a fixed-bed oxidation catalyst is eliminated from further consideration as representing MBACT for the nodulizing kiln.

Ore Pre-treatment

An ore pre-treatment conceptional control would entail removing the mercury from the ore prior to being added to the kiln. This technology would require changes and/or redesign of the existing process, and is therefore not within the realm of MBACT requirements.

Mercuric Chloride Scrubbing

The Boliden-Norzink process is used at some 50 installations around the world to recover mercury from ore roaster off-gas. These installations include gold mines as well as zinc, copper, lead, and pyrite smelters. A prominent application of this process occurs at Barrick Gold's Goldstrike Mine in northern Nevada, where some 133,000 lbs of Hg_2Cl_2 (mercurous chloride, or calomel) were reportedly recovered in 2002. An estimated 85% of the mercury recovered from gold mining in Nevada comes from Barrick, with the majority of this resulting from the Boliden-Norzink process. The process reacts aqueous $HgCl_2$ (mercuric chloride) with elemental mercury vapour (Hg^0) to form an Hg_2Cl_2 precipitate that can be captured and refined or sold to a mercury refiner. A portion of the Hg_2Cl_2 is combined with chlorine to regenerate Hg_2Cl_2 for recycle through the reactor, while the remainder is bled to the solids collection system. In evaluating this technology as a potential candidate to treat the nodulizing kiln off-gas, the kiln was assumed to replace the ore roaster as the source of high-temperature gas to be treated.

Several factors led to the conclusion that the process used at Goldstrike is technically infeasible for this application as follows:

- Gas flow rates are an order of magnitude apart. The Barrick operation combines off-gas from two roasters, each emitting 12,000 normal cubic meters (Nm^3) per hour, into a common gas treatment system. This translates to roughly 14,000 acfm, as compared to the nodulizing kiln off-gas stack flow rate of 300,000 acfm. Despite the similar ore feed rates, the Barrick roaster produces far less off-gas by utilizing oxygen rather than air.
- Mercury concentrations are three orders of magnitude higher at Goldstrike. This poses issues of vessel sizing and gas-to-liquid contact ratios. The dilute concentrations of elemental mercury in the scrubbed nodulizing kiln off-gas create the potential for adding mercury to the exhaust gas (from the makeup mercuric chloride) rather than removing it.
- Temperatures would have to be lowered. Due to mercury vapor pressure concerns, the mercuric chloride scrubber at Goldstrike is operated at temperatures no higher than 40 °C. This constraint would necessitate further cooling of the nodulizing kiln off-gas. For this reason $HgCl_2$ scrubbing and other metals refining and mercury recovery methods are eliminated from further consideration as representing MBACT for the nodulizing kiln.

MBACT

Existing Equipment

P4 determined from a mercury mass balance that the existing process and air pollution control equipment isolates 35% of the potential mercury emissions from the nodulizing kiln. Mercury emissions after this level of control, 62.2 pounds per month on a 12 month rolling average (746.4 pounds per any consecutive 12 month period), are proposed to be the MBACT standard. In absence of any demonstrated control technology and taking into account energy, economic and environmental impacts DEQ accepts this MBACT emission standard.

MACT Applicability (40 CFR 63)

The existing elemental phosphorus plant is not regulated by 40 CFR 63 National Emission Standard for Hazardous Air Pollutants (NESHAP). However, in the spring of 2010 EPA published a notification of proposed rulemaking[4] for Elemental Phosphorous Production facilities. Susan Fairchild, the EPA contact for the rulemaking, was contacted regarding information pertaining to mercury standards contemplated for elemental phosphorous plants (P4's plant is the only one that exists in the United States). Susan indicated that work on the rule has ceased but did provide background regarding work that had been done on mercury emissions. She indicated that there were two major obstacles in contemplating mercury standards for the P4 facility. One of the obstacles was that MACT (NESHAP) standards are to be based on the best performing 12 percent of existing sources (the "floor") and P4 is the only existing elemental phosphorous plant. The other obstacle was determining a mercury control technology that would work at the facility. She indicated that EPA was not able to determine an available technology that would work effectively to control mercury emissions from the kiln. P4 provided EPA many reasons why technology transfers would not effectively control mercury emissions from the kiln and EPA was not able to refute P4's claims.

4 http://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201004&RIN=2060-AP97

Title V Classification (IDAPA 58.01.01.300, 40 CFR Part 70)

IDAPA 58.01.01.301 ....Requirement to Obtain Tier I Operating Permit

P4 is an existing Tier I major facility and is operating under Tier I Operating Permit T1-2009.0121 issued July 14, 2009. Tier I permits include all existing applicable requirements as defined by IDAPA 58.01.01.008.03. The MBACT Tier II permit requirements of IDAPA 58.01.01.401.02.a.ii are not applicable requirements definition because the rule is not part of Idaho's Clean Air Act State Implementation Plan. Therefore the Tier I operating permit does not need to be reopened to include the permit conditions.

PSD (40 CFR 52.21)

40 CFR 52.21 ....Prevention of Significant Deterioration of Air Quality

The facility is not undergoing a physical or operational change therefore PSD requirements are not applicable to this permitting action.

NSPS Applicability (40 CFR 60)

This permit action does not affect any emission unit subject to an NSPS.

Permit Conditions Review

This section describes the permit conditions for this initial permit.

Permit Condition 2.1 & 2.2

These permit conditions provide a process description and emission control description for the nodulizing kilns.

Permit Condition 2.3

Includes the mercury BACT emission limit for the nodulizing kiln. The 746.4 pound per year mercury BACT is P4's requested BACT limit (62.2 lb/month)[5]. The existing process and air pollution control system removes approximately 35% of the potential mercury emissions. Mercury emissions after controls were determined through source testing in 2002 to be 3.41×10^{-4} lb/ton of throughput. This emission factor is the basis for emission estimates and for establishing the mercury BACT limit.

By definition MBACT is an emission standard. An emission standard is defined as "A permit or regulatory requirement established by the Department or EPA which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirements which limit the level of opacity, prescribe equipment, set fuel specifications, or prescribe operation or maintenance procedures for a source to assure continuous emission reduction." The MBACT emission standards in this permit consist of the following:

1) Mercury emission rate limit (746.4 lb/yr.)

2) Hydrosonic scrubber pressure drop and scrubbing media operating parameters (Permit Condition 2.4)

3) North Spray Tower water flow rate (Permit Condition 2.5)

4) The total kiln input limit (Permit Condition 2.6)

Permit Condition 2.4

Requires that hydro-sonic scrubbing system be used to control emissions from the kiln. There are 4 scrubbers. The three-hour rolling average pressure drop and scrubbing media flow rate must not be less than what was measured during the most recent mercury source test for each scrubber that was operated during the test. There are similar restrictions on pressure drop and scrubbing media flow rate tied to particulate matter emissions testing in another existing Tier II permit. Therefore, this permit condition makes clear that the permittee cannot violate any permit restrictions on the scrubbers even if they are not in this permit. These scrubbers are high energy scrubbers and it is important that they continually operate as they did during the most recent source test.

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5 P4's application Form EUo, 4/9/12, and P4's application MBACT for Elemental Phosphorus Process page 29.

Permit Condition 2.5

When the kiln is in use the water spray rate to the spray tower shall be equal to or greater than the flow rate monitored during the most recent performance test. The spray tower is a low energy system and monitoring less frequently than the high energy hydro-sonic scrubbers is sufficient to assure that the spray tower operates as it did during the most recent source test.

Permit Condition 2.6

After each source test the permittee shall calculate the allowable input to the kilns. The input includes all materials added to the kiln. The calculated input limitation is for each consecutive 12-month period beginning after each source test or 2,188,856 tons each consecutive 12-month period whichever is most stringent. The 2,188,856 tons per year input limitation is calculated using the mercury BACT limit of 746.4 lb/yr. and the mercury emission factor developed during the 2002 source test (3.41×10^{-4} lb Hg/ton of throughput).

(746.4 lb Hg/yr)/ (3.41×10^{-4} lb Hg/ton) = 2,188,856 tons/yr. input

Permit Condition 2.7

Mercury source testing is required on each of the four kiln stacks within 180 of permit issuance then during the third and fifth calendar year of the permit. Nothing shall prevent the facility from conducting additional tests. Each stack is required to be tested during the initial test because emission rates may be different from each stack. If after the initial testing the permittee is able to demonstrate that mercury concentrations are consistent in each exhaust stream DEQ may approve testing on only one stack. Currently there is limited mercury source test data and P4 has not provided documentation that source testing less frequently will reasonably assure ongoing compliance. Requiring a minimum of an additional 3 tests to be conducted during the permit term allows information to be gathered to aid in determining the testing frequency necessary to assure continuing compliance with the MBACT standard of 746.4 pounds of mercury per year when the permit is renewed.

During the tests the permittee shall monitor the total input to the kiln. The scrubbing media flow rate and pressure drop to the scrubbers shall be monitored once each 15 minutes during the test. These values will become the 3-hour rolling average minimum operating requirements for the scrubbers. The scrubbers are high energy systems that may include fluctuations in operating ranges. The permitte shall also determine the water flow rate to the North Spray Tower, monitoring this low energy system once during the source test is sufficient; the monitored flow rate will become a permit restriction. The permittee shall calculate the allowable input to the kiln by using the most recent measured total mercury emission rate per ton of kiln input, and the 746.4 pounds of mercury per any consecutive 12-month period emission limit. The allowable input will be calculated as follows:

Allowable input (Tons/yr.) = 746.4 lb Hg/yr./ (measured averaged total mercury emission rate in pounds/ ton kiln input)

Testing is required to be conducted in accordance with a DEQ approved protocol. A protocol is required to assure that appropriate test methods are used to determine particulate bound mercury, oxidized mercury and elemental mercury emissions.

Permit Condition 2.8

The permittee shall monitor and record the 3-hour rolling average scrubbing media flow rate and pressure drop of each scrubber. This monitoring requirement is identical to the existing scrubber monitoring requirements with the exception that now the averaging period is clearly specified in the permit consistent with DEQ's inspector's interpretation of the existing permit condition. The current permit states that limits are 3 hour average limitations without specifying whether they are block or rolling averages, now this is clarified and they are specified as 3 hour rolling averages.

Permit Condition 2.9

The water flow rate to the North spray tower (nodulizing kiln spray tower) shall be monitored and recorded to demonstrate compliance with permit restrictions on water flow rate limits. This spray tower is located upstream of the hydrosonic scrubbers and is different than the "Cooler Spray Tower" listed in the existing Tier I permit.

Permit Condition 2.10

Each month the permittee shall monitor the total input to the kiln and determine the input during the previous consecutive 12 months.

General Provision 1

The duty to comply general compliance provision requires that the permittee comply with all of the permit terms and conditions pursuant to Idaho Code §39-101.

General Provision 2

The maintenance and operation general compliance provision requires that the permittee maintain and operate all treatment and control facilities at the facility in accordance with IDAPA 58.01.01.211.

General Provision 3

The obligation to comply general compliance provision specifies that no permit condition is intended to relieve or exempt the permittee from compliance with applicable state and federal requirements, in accordance with IDAPA 58.01.01.212.01.

General Provision 4

The inspection and entry provision requires that the permittee allow DEQ inspection and entry pursuant to Idaho Code §39-108.

General Provision 5

The notification of construction and operation provision requires that the permittee notify DEQ of the dates of construction and operation, in accordance with IDAPA 58.01.01.211.03.

General Provision 6

The performance testing notification of intent provision requires that the permittee notify DEQ at least 15 days prior to any performance test to provide DEQ the option to have an observer present, in accordance with IDAPA 58.01.01.157.03.

The performance test protocol provision requires that any performance testing be conducted in accordance with the procedures of IDAPA 58.01.01.157, and encourages the permittee to submit a protocol to DEQ for approval prior to testing.

The performance test report provision requires that the permittee report any performance test results to DEQ within 30 days of completion, in accordance with IDAPA 58.01.01.157.04-05.

General Provision 7

The monitoring and recordkeeping provision requires that the permittee maintain sufficient records to ensure compliance with permit conditions, in accordance with IDAPA 58.01.01.211.

General Provision 8

The excess emissions provision requires that the permittee follow the procedures required for excess emissions events, in accordance with IDAPA 58.01.01.130-136

General Provision 9

The certification provision requires that a responsible official certify all documents submitted to DEQ, in accordance with IDAPA 58.01.01.123.

General Provision 10

The false statement provision requires that no person make false statements, representations, or certifications, in accordance with IDAPA 58.01.01.125.

General Provision 11

The tampering provision requires that no person render inaccurate any required monitoring device or method, in accordance with IDAPA 58.01.01.126.

General Provision 12

This permit shall be renewable on the expiration date, provided the permittee submits an application for renewal to the Department and continues to meet all terms and conditions contained in the permit. The expiration of this permit will not affect the operation of the stationary source of facility during the administrative procedure period associated with the permit renewal process.

General Provision 13

The transferability provision specifies that this permit is transferable, in accordance with the procedures of IDAPA 58.01.01.404.05.

PUBLIC REVIEW

Public Comment Period

A comment period was made available to the public in accordance with IDAPA 58.01.01.404.01.c between October 31, 2013 and December 2, 2013. During this time, comments were submitted in response to DEQ's proposed action.

A response to public comments document has been crafted by DEQ based on comments submitted during the public comment period. That document is part of the final permit package for this permitting action.

APPENDIX A – EMISSIONS INVENTORIES

Table 2 - Determination of Potential Hg Emissions for P4 Productions, Soda Springs, Idaho

Emission Source	2006 Mercury Emissions (lb/yr)	2007 Mercury Emissions (lb/yr)	2008 Mercury Emissions (lb/yr)	2009 Mercury Emissions (lb/yr)	2010 Mercury Emissions (lb/yr)	2011 Mercury Emissions (lb/yr)	Average 2006 - 2011 Hg Emissions (lb/yr)	Potential Emissions[1, 2] (lb/yr)
Kiln Hydrosonics Stacks (Total)	656.11921	486.79771	609.20227	510.7019	583.84731	616.07465	577.12384	753
Nodule Crushing and Screening Scrubber Stack	2.5794089	1.8028905	2.1496504	1.5910945	2.1136017	2.2804197	2.0861776	2.72
Cooler Spray Tower Stack	0.2522395	0.2608637	0.7525532	0.5186095	0.6089667	0.6487775	0.5070017	0.6615
#7 THFC Stack	0.0251087	0.0255169	0.0614224	0.0429264	0.0663623	0.0666655	0.0480003	0.0626
#9 THFC Stack	0.0240382	0.0003801	0.0076329	0.0055505	0.0083459	0.0083773	0.0090542	0.0118
#8 THFC Stack	0.0226331	0.0181862	0.0552896	0.0457573	0.0489486	0.0570844	0.0413166	0.0539
SDM Bin Vent Stack	0.0002493	0.0002493	0.0001506	0.0001502	0.0001498	0.0001502	0.0001832	2.39E-04
Coke Handling Baghouse Stack	0.0001365	0.000141	1.633E-05	1.236E-05	1.746E-05	1.821E-05	5.698E-05	7.43E-05
Nodule Reclaim Baghouse Stack	7.021E-05	7.316E-05	7.367E-05	7.332E-05	7.398E-05	7.447E-05	7.313E-05	9.54E-05
Scaleroom Baghouse Stack	6.571E-05	6.251E-05	6.415E-05	4.817E-05	6.59E-05	6.878E-05	6.253E-05	8.16E-05
Main Furnace Baghouse Stack	2.015E-05	1.915E-05	2.317E-05	1.74E-05	2.382E-05	2.487E-05	2.142E-05	2.80E-05
No. 9 CO Dust Baghouse Stack	1.781E-05	1.669E-05	1.645E-06	1.196E-06	1.798E-06	1.805E-06	6.825E-06	8.90E-06
No. 8 CO Dust Baghouse Stack	1.522E-05	1.508E-05	2.567E-06	2.125E-06	2.273E-06	2.651E-06	6.651E-06	8.68E-06
Dryer Baghouse Stack	1.032E-05	1.238E-05	1.391E-05	1.048E-05	1.403E-05	1.454E-05	1.261E-05	1.64E-05
#309 Coke Fines Bin Vent Stack	7.827E-06	3.193E-06	1.771E-06	1.81E-06	4.096E-06	4.364E-06	3.844E-06	5.01E-06
No. 7 CO Dust Baghouse Stack	7.73E-06	7.293E-06	1.09E-06	7.62E-07	1.178E-06	1.183E-06	3.206E-06	4.18E-06
#9 CO Dust Collection Bypass Stack	5.136E-06	2.589E-06	3.77E-07	1.549E-06	7.896E-07	2.929E-07	1.789E-06	2.33E-06
#8 CO Dust Collection Bypass Stack	5.06E-06	6.189E-06	3.948E-07	5.018E-06	8.405E-08	1.095E-07	2.809E-06	3.67E-06
#305 Coke Fines Bin Vent Stack	3.667E-06	5.376E-07	5.231E-08	2.018E-07	1.198E-06	2.135E-06	1.299E-06	1.69E-06
#307 Coke Fines Bin Vent Stack	2.895E-06	1.397E-06	4.219E-07	8.286E-07	1.262E-06	2.673E-06	1.58E-06	2.06E-06
#7 CO Dust Collection Bypass Stack	2.83E-06	1.807E-06	1.256E-07	6.552E-07	5.242E-08	5.678E-08	9.212E-07	1.20E-06
105 Baghouse Stack	1.975E-06	4.894E-06	6.962E-06	5.025E-06	7.045E-06	7.478E-06	5.563E-06	7.26E-06
#304 Coke Fines Bin Vent Stack	6.856E-07	1.152E-07	3.064E-07	1.584E-07	5.895E-07	9.882E-07	4.739E-07	6.18E-07
#308 Coke Fines Bin Vent Stack	6.275E-07	3.028E-07	4.988E-07	5.594E-07	7.59E-07	2.201E-06	8.248E-07	1.08E-06
104 Baghouse Stack	6.016E-07	6.904E-07	0.0007294	0.0008036	0.0008046	0.0006746	0.0005022	6.55E-04
#306 Coke Fines Bin Vent Stack	3.051E-07	4.11E-07	3.404E-07	4.82E-07	6.052E-07	1.272E-06	5.692E-07	7.43E-07
Coke Bunker Baghouse Stack	1.076E-07	4.569E-08	2.604E-09	4.438E-08	5.063E-08	0	4.182E-08	5.46E-08
Bulk Storage Bin Baghouse Stack	8.883E-09	2.723E-09	1.982E-09	2.136E-09	9.704E-09	1.556E-08	6.831E-09	8.91E-09
Vactor Truck Vent Stack	7.125E-09	7.125E-09	7.125E-09	7.125E-09	7.125E-09	7.125E-09	7.125E-09	9.30E-09
Vactor Truck Vent Stack	4.744E-09	4.744E-09	2.372E-09	2.372E-09	2.372E-09	2.372E-09	3.163E-09	4.13E-09
Vactor Truck Vent Stack	4.744E-09	4.744E-09	2.372E-09	2.372E-09	2.372E-09	2.372E-09	3.163E-09	4.13E-09
Vactor Truck Vent Stack	4.339E-09	4.339E-09	4.821E-10	4.821E-10	4.821E-10	4.821E-10	1.768E-09	2.31E-09
Vactor Truck Vent Stack	2.666E-09	2.666E-09	2.222E-09	2.222E-09	2.222E-09	2.222E-09	2.37E-09	3.09E-09
Vactor Truck Vent Stack	2.309E-09	2.309E-09	2.309E-09	2.309E-09	2.309E-09	2.309E-09	2.309E-09	3.01E-09
Vactor Truck Vent Stack	2.147E-09	2.147E-09	2.147E-09	2.147E-09	2.147E-09	2.147E-09	2.147E-09	2.80E-09
Vactor Truck Vent Stack	2.074E-09	2.074E-09	2.074E-09	2.074E-09	2.074E-09	2.074E-09	2.074E-09	2.71E-09
Vactor Truck Vent Stack	3.418E-10	3.418E-10	3.418E-10	3.418E-10	3.418E-10	3.418E-10	3.418E-10	4.46E-10
Total Point Sources:	**659.02327**	**488.90616**	**612.2299**	**512.90698**	**586.6947**	**619.13703**	**579.8**	**757**
Total Fugitive Sources:	0.0374474	0.0342805	0.035594	0.0324296	0.038339	0.1240351	**0.050**	**0.07**

Note 1 - Potential Emissions have been determined by increasing the average actual emission rate for each point source by the ratio of Kiln PTE/Kiln Average Actual Hg Emissions

Note 2 - Hg Emissions of 753 lbs per year from the Nodulizing Kiln determined as follows:

Mercury emission test results:

Gaseous mercury: 0.0765 lb/hr (2002 stack test)
Ore throughput during 2002 gaseous test: 230 ton/hr
Particulate mercury: 0.00193 lb/hr (2002 stack test)
Ore throughput during 2002 particulate test: 238.5 ton/hr

Gaseous Hg emission factor:
$(0.0765 \text{ lb/hr})/(230 \text{ ton/hr}) = 3.33 \times 10^{-4}$ lb/ton

Particulate Hg emission factor:
$(0.00193 \text{ lb/hr})/(238.5 \text{ ton/hr}) = 8.09 \times 10^{-6}$ lb/ton

Overall Hg emission factor:
3.33×10^{-4} lb/ton + 8.09×10^{-6} lb/ton = 3.41×10^{-4} lb/ton
Maximum ore throughput:
(252 ton/hr) x (8,760 hr/yr) = 2,207,520 ton/yr

Maximum emissions (Potential to Emit):

$$(3.41 \times 10^{-4} \text{ lb/ton}) \times (2{,}207{,}520 \text{ ton/yr}) = 753 \text{ lb/yr}$$

APPENDIX B – PROCESSING FEE

Tier II Fee Calculation

Instructions:
Insert the following information and answer the following questions either Y or N. Insert the permitted emissions in tons per year into the table. TAPS only apply when the Tier II is being used for New Source Review.

Company: **P4 Production LLC**
Address: **1853 Hwy 34**
City: **Soda Springs**
State: **Idaho**
Zip Code: **83276**
Facility Contact: **James McCulloch**
Title: **Facility Permitting Contact**
AIRS No.: **029-00001**

N	Did this permit meet the requirements of IDAPA 58.01.01.407.02 for a fee exemption Y/N?
N	Does this facility qualify for a general permit (i.e. concrete batch plant, hot-mix asphalt plant)? Y/N
N	Is this a synthetic minor permit? Y/N

Emissions Inventory	
Pollutant	Permitted Emissions (T/yr)
NO_X	0.0
PM10	0.0
PM	0.0
SO_2	0.0
CO	0.0
VOC	0.0
HAPS/TAPS	0.4
Total:	0.4
Fee Due	**$ 1,250.00**

Comments:

Air Quality Permitting
Response to Public Comments

Tier II Operating Permit No. T2-2012.0016

P4 Production LLC
Soda Springs, Idaho

Facility ID No. 029-00001

Prepared by:
Dan Pitman, P.E., Permit Writer
AIR QUALITY DIVISION

Final

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BACKGROUND

The Idaho Department of Environmental Quality (DEQ) provided for public comment on the a draft Tier II operating permit for P4 Production from October 31, 2013 through December 2, 2013, in accordance with IDAPA 58.01.01.404. The purpose of the draft permit is to establish a mercury best available control technology (MBACT) emission standard. Comments were submitted in response to DEQ's proposed action. Each comment and DEQ's response is provided in the following section. All comments submitted in response to DEQ's proposed action are included in the appendix of this document.

PUBLIC COMMENTS AND RESPONSES

Public comments regarding the technical and regulatory analyses and the air quality aspects of the proposed draft permit are summarized below.

Comment 1: In Reviewing the MBACT emissions standard that DEQ established for P4, we question how 746.4 pounds per any consecutive 12 month period was chosen. A review of P4's reporting to EPA's Toxic Release Inventory demonstrates that P4 has consistently emitted significantly less mercury than would be allowed pursuant to this MBCT permit. For instance, starting in the year 2000 and respectively thorough 2012, P4 emitted 670, 620, 620, 620, 620, 710, 725, 659, 489, 612, 513, 587, 619, and 604 pounds of mercury per year. It seems that a lower limit could be established which would be consistent with their current operations and also prevent future operations from emitting a greater amount of mercury.

Response 1: The 746.4 pounds of mercury per any consecutive 12 month period MBACT limit is established using a an emission factor developed during a 2002 source test (3.41×10^{-4} lb Hg/ton of throughput) and the maximum potential annual kiln throughput. This MBACT limit is only 3% higher than the maximum emissions between 2002 and 2012, which ranged from 489 and 725 pounds per year. The variability in P4's annual emissions is primarily based on the amount of raw phosphate ore processed to meet production demand.

For existing sources that emit more than 62 pounds of mercury per year the Rules for the Control of Air Pollution in Idaho (IDAPA 58.01.01.401.02) require that a MBACT analysis be submitted for all sources that emit mercury. Requiring an analysis of the sources emissions at less than design capacity in effect would cause a change of the basic purpose and design of the plant and is outside of the scope of the federal requirements for BACT determinations[1]. DEQ has aligned MBACT determinations to be consistent with BACT determination regarding the design of a plant. DEQ has issued a MBACT limit that incorporates the plants design capacity.

Comment 2: It does not appear the DEQ considered ore sorting as a possible means of reducing emissions. Might it be possible for P4 to identify if certain portions of their mine(s) contained high levels of mercury and, as a control measure, choose not to mine and process this particular portion of their ore? Or, perhaps this high mercury portion of their ore could be targeted for ore pre-treatment? Targeting a portion of their total ore for pre-treatment might alter the economics of this control measure as it would require a smaller control facility with less throughput.

Response 2: An ore sorting option to reduce potential mercury emissions was not considered in determining a MBACT emission standard. Requiring P4 to eliminate processing of certain portions of the

[1] Environmental Appeals Board, regarding Prairie State Generating Company, August 24, 2006, Page 1 & 2. "The statute contemplates that the permit issuer must look to the permit applicant to define the proposed facility's purpose or basic design in its application, at least where that purpose or design is objectively discernable, as it is in the present case. This approach not only harmonizes the BACT definition with the permit application process in which the definition must be applied, but also is consistent with the Agency's longstanding policy against redefining the proposed facility."

ore body would require a change to the basic purpose and design of the existing mine and processing plant. Consistent with EPA BACT determinations (see footnote 1 on page 3), control strategies that change the basic design and purpose of the plant are outside of the scope of the MBACT determinations.

Ore pre-treatment was identified as a potentially available control option. Though it was determined that requiring the design, construction and operation of a new ore pre-treatment process at the existing facility would constitute a redesign of the existing plant and is outside of the scope of MBACT determinations and was eliminated from further consideration. Therefore a cost based analysis was not performed, or required. Notably, even if requiring the source to design and build an ore pre-treatment facility was within the scope of MBACT DEQ is not aware of a demonstrated phosphate ore pre-treatment process to control mercury emissions.

Appendix

Public Comments Submitted for

Tier II Operating Permit No. T2-2012.0016

P4 Production LLC
Soda Springs, Idaho

Affiliation:

Idaho Conservation League

Comments:

Thank you for the opportunity to review the draft Tier II operating permit and Statement of Basis for P4's facility in Soda Springs.

It was interesting to review the materials provided by P4 and to see how DEQ processed Idaho's first MBACT permit. Clearly a hurdle for evaluating the potential effectiveness of controls is the fact that P4 is the only elemental phosphorous plant in the United States. As such, there is no opportunity to observe the controls at other similar facilities. We appreciated that DEQ reviewed the coal industry, and do a more limited degree the gold industry. It is unfortunate that it was concluded that there was not an opportunity to transfer technology from these other industries to the P4 facility.

In reviewing the MBACT emissions standard that DEQ established for P4, we question how 746.4 pounds per any consecutive 12 month period was chosen. A review of P4's reporting to EPA's Toxic Release Inventory demonstrates that P4 has consistently emitted significantly less mercury than would be allowed pursuant to this MBACT permit. For instance, starting in the year 2000 and respectively through 2012, P4 emitted 670, 620, 620, 620, 620, 710, 725, 659, 489, 612, 513, 587, 619, and 604 pounds of mercury per year. It seems that a lower limit could be established which would be consistent with their current operations and also prevent future operations from emitting a greater amount of mercury.

These annual emissions figures display significant variability. Presumably this is due to the mercury content of the ore and the amount processed in any given year.

It does not appear the DEQ considered ore sorting as a possible means of reducing emissions. Might it be possible for P4 to identify if certain portions of their mine(s) contained high levels of mercury and, as a control measure, choose not to mine and process this particular portion of their ore? Or, perhaps this high mercury portion of their ore could be targeted for ore pre-treatment? Targeting a portion of their total ore for pre-treatment might alter the economics of this control measure as it would require a smaller control facility with less throughput.