Tessenderlo
KERLEY

✓# 219577
$1000.00

April 12, 2012

Air Quality Permit to Construct Fees
Fiscal Office,
Idaho Department of Environmental Quality
Puget Sound Clean Air Agency
1410 N. Hilton
Boise, ID 83706-1255

RE: *Tessenderlo Kerley, Inc. – Burley, Idaho*
Permit to Construct Application

To Whom It May Concern:

This letter serves to notify the Idaho Department of Environmental Quality (IDEQ) that Tessenderlo Kerley, Inc. (TKI) is proposing to construct an ammonium thiosulfate (ATS) plant in Burley, Idaho adjacent to our existing metam sodium manufacturing facility.

Please find enclosed one complete copy of the Permit to Construct (PTC) application for the TKI ATS plant. The enclosed application addresses requirements under the Prevention of Significant Deterioration (PSD) permitting program, New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and the Idaho Toxic Air Pollutant (TAP) permitting program, in addition to other federal and state regulations.

PTC requirements codified in Idaho Administrative Procedures Act (IDAPA) 58.01.01.200 through 228 have been thoroughly reviewed and are addressed in the PTC application.

TKI requests IDEQ review this application in accordance with PTC submittal requirements as outlined under IDAPA 58.01.01.202. TKI has enclosed a payment of $1,000 for the application fee along with this application package, as required by IDAPA 58.01.01.224. As outlined in IDAPA 58.01.01.225, TKI will pay additional processing fees as requested by IDEQ.

TKI appreciates IDEQ's expedient review of this PTC application. Please do not hesitate to me at (602-889-8401) or Anna Henolson at Trinity Consultants (253-867-5600) if you have any questions.

Sincerely,

TESSENDERLO KERLEY, INC.

Dawn Kominski

Dawn Kominski
Director of Regulatory Affairs

Enclosures

cc: Ms. Anna Henolson – Trinity Consultants

TESSENDERLO GROUP

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1. INTRODUCTION

Tessenderlo Kerley, Inc. (TKI) owns and operates a facility in Burley, Idaho (Burley Facility) consisting of a metam sodium production manufacturing plant (Metam Plant). TKI proposes to construct an ammonium thiosulfate (ATS) plant (ATS Plant) adjacent to the existing Metam Plant. TKI will manufacture ATS at this location for sale as a fertilizer.

No owner or operator in the state of Idaho may commence construction or modification of any stationary source without first obtaining a Permit to Construct (PTC) from the Idaho Department of Environmental Quality (IDEQ), which satisfies Idaho Administrative Procedures Act (IDAPA) 58.01.01.200 through 228. This report presents the PTC application for the ATS Plant and includes the following elements:

- Section 1: Introduction
- Section 2: Background
- Section 3: Emission Calculations
- Section 4: Regulatory Applicability
- Section 5: TAP Compliance Demonstration

- Appendix A: Area Map, Plot Plan, Process Flow Diagram, Equipment List
- Appendix B: Detailed Emission Calculations
- Appendix C: Permit to Construct Forms
- Appendix D: AERSCREEN Model Parameters, Results, and File Directory
- Appendix E: AERMOD Modeling Protocol, Modeling Protocol Approval Letter
- Appendix F: AERMOD Model Parameters, Results, and File Directory
- Appendix G: Certification Form

TKI requests IDEQ review this application in accordance with PTC submittal requirements as outlined under IDAPA 58.01.01.202. TKI has enclosed a payment of $1,000 for the application fee along with this application package, as required by IDAPA 58.01.01.224.[1]

[1] As outlined in IDAPA 58.01.01.225, TKI will pay additional processing fees as requested by IDEQ.

2. BACKGROUND

2.1. FACILITY DESCRIPTION

TKI currently owns and operates a Metam Plant consisting of metam sodium reactors, process and storage tanks, a cooling tower, a hot water heater, and loading/unloading stations. A PTC was not required for the Metam Plant when it was constructed in the late 1990's. At the Metam Plant, sodium hydroxide (NaOH), carbon disulfide (CS_2), monomethylamine (CH_3NH_2; or MMA), and water are reacted to produce metam sodium ($C_2H_4NNaS_2$) solution in a dual reactor system. The vent from the reactors is pressure controlled and any venting from the reactors is routed to a scrubber before discharge to the atmosphere.

The Metam Plant includes raw material storage for sodium hydroxide, carbon disulfide, monomethylamine, and metam sodium, including one metam sodium day tank. The facility also acts as a terminal for metam potassium ($C_2H_4KNS_2$) solution. Two cooling towers provide cooling water to the metam plant and a hot water heater provides process heat. Truck and rail loading/unloading stations are used for raw material and finished product loading/unloading. Appendix A provides a map of the facility and surrounding area.

2.2. PROJECT DESCRIPTION

TKI proposes to construct the ATS Plant to produce and manufacture ATS ($H_8N_2O_3S_2$) for sale as a fertilizer. The addition of the ATS Plant will in no way affect production or process operations at the Metam Plant. The two facilities will operate separately and independently and will not share process equipment. TKI is proposing to add the following areas and/or operations at the Burley Facility:

- Raw material feed
- ATS plant reactor, absorbers, and sulfur incinerator
- ATS storage and loading
- Sulfur storage tanks
- Anhydrous ammonia tanks
- Propane boiler (3.5 MMBtu/hr)

At the ATS Plant, the first stage of the ATS process takes place in the sulfur incinerator. There, combustion air reacts with liquid elemental sulfur to form sulfur dioxide.

Immediately downstream of the incinerator, a waste heat boiler will cool the sulfur dioxide and also produce medium to high pressure steam. The cooled sulfur dioxide vapor stream will be sent to the sulfur dioxide absorber in the ATS process area, where it will be mixed with water and ammonia. The resulting solution is typically a liquid ammonium bisulfite solution (ABS). The ABS solution is then routed to the ATS reactor. The vapor stream will be sent to the vent stack filters, which are high efficiency particulate filters that remove particulate, entrained liquid and remaining traces of sulfur dioxide. The liquid removed in the filters is routed back to the absorber, and the vapor stream is sent to the stack and vented to the atmosphere.

At the ATS reactor, liquid from the sulfur dioxide absorber will react with elemental sulfur and water to produce ATS solution. The final product is a liquid and is approximately 60 percent by weight ATS. It will be stored in two ATS storage tanks. The vapor vented from the ATS reactor is also sent to the vent stack filters.

Additional storage tanks will hold raw materials, including elemental sulfur and ammonia. Smaller process tanks, such as the ABS and ATS day tanks, will be located in the process area. The ATS day tank is used for the daily storage of product and is quality checked prior to transfer to bulk storage.

A new cooling tower will provide non-contact cooling water to the ATS Plant to cool the process steam as reactions occur. A package steam boiler will provide steam during start-up. During normal operation, steam will be recovered from the waste heat boiler. Additional loading/unloading areas for rail and truck will facilitate loading/unloading of raw materials and finished product.

The criteria pollutants expected to increase as a result of this project include particulate matter (PM), sulfur dioxide (SO_2), nitrogen oxides (NO_x), volatile organic compounds (VOCs), and carbon monoxide (CO). Emissions of ammonia, hydrogen sulfide, and nitrous oxide are also expected. The existing Metam Plant will not be modified as part of the ATS Plant project; as such, emissions from the Metam Plant are not considered when evaluating PTC applicability and the project's impacts on ambient air.

Ammonia, hydrogen sulfide, and nitrous oxide are considered toxic air pollutants (TAPs) under IDEQ's TAP program. As such, emission increases of ammonia, hydrogen sulfide, and nitrous oxide need to be quantified in order to demonstrate compliance with IDEQ's TAP program codified under IDAPA 58.01.01, Sections 210, 585, and 586. For PTCs, the project-wide emissions increases of TAPs are first compared to the emission levels (ELs) in IDAPA Section 585 and 586. Any TAP that has a total project emission increase that exceeds the EL must be modeled. A TAP screening analysis for emitted TAPs is presented in Table 4.8-1. The dispersion modeling analysis and results presented in Section 5 demonstrate preconstruction compliance for the proposed ATS Plant in accordance with IDAPA 58.01.01 Subsection 203.03.

The potential emission increases associated with the proposed project are calculated using the methodologies described in the following sub-sections. Per IDEQ's Minor Source PTC Completeness Checklist, a facility is required to submit both the uncontrolled PTE and the controlled PTE in the PTC application. The only control devices present at the ATS Plant are the high efficiency particulate filters prior to the S500 Vent Stack.[2] The purpose of the filters is to remove particulate matter, though entrained liquid and remaining traces of sulfur dioxide may also be removed in the process.[3] Section 3 presents the controlled PTE of the ATS Plant. The uncontrolled PTE (in which the vent filters are disregarded) is included in Appendix B. Detailed emission calculations with emission factors, equipment ratings, assumptions, and reference sources for the new combustion equipment, cooling towers, loading racks, ATS stack, storage tanks, and fugitive sources are presented in Appendix B.

3.1. COMBUSTION EQUIPMENT

TKI plans to install a 3.5 MMBtu/hr propane-fired boiler, B600 Package Steam Boiler. Emissions from the B600 Package Steam Boiler include limited quantities of particulate matter, sulfur dioxide, nitrogen oxides, total organic compounds (TOC), carbon monoxide, and greenhouse gases (GHG). Emission estimates for these pollutants are determined based on emission factors in AP-42 for propane combustion.[4] The calculations assume continuous annual operation of the boiler (i.e., 8,760 hours per year).

The B600 Package Steam Boiler falls under a Category II Exemption in IDAPA 58.01.01 Section 222. Pursuant to 58.01.01.222(02)(c), a PTC is not required for:

> *"Fuel burning equipment for indirect heating and for heating and reheating furnaces using natural gas, propane gas, liquefied petroleum gas, or biogas (gas produced by the anaerobic decomposition of organic material through a controlled process) with hydrogen sulfide concentrations less than two hundred (200) ppmv exclusively with a capacity of less than fifty (50) million btu's per hour input."*

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[2] Emission rates from fugitive volume sources are based on the use of rupture disks and sealless design pumps. These devices are preventative in nature and do not actively or directly reduce ammonia emissions; therefore, they are not considered control equipment

[3] According to the specification sheet for the Kimre Technologies Fiber-Bed Filters, the high efficiency filters have a removal efficiency of 99.5 percent for particulate smaller than a micron in diameter. The filters may provide some control of ammonia and sulfur dioxide, but no information is available regarding the level of control provided (i.e., the filters do not have a rated removal efficiency for pollutants other than particulate matter).

[4] Emission factors for propane fired boilers (<100 MMBtu/hr) are provided in Table 1.5-1 in Chapter 1.5 of AP-42 (07/2008).

However, because the total emissions increase from the proposed project triggers PTC permitting, boiler combustion emissions are included in the determination of the total PTE of the ATS Plant project. Similarly, combustion emissions of TAP from the B600 Package Steam Boiler are included in the TAP analysis.

3.2. CT600 COOLING TOWER

TKI proposes to install unit CT600, a cooling tower that will provide non-contact cooling water to the ATS Plant. The CT600 Cooling Tower has a maximum cooling water flow rate of 1,000 gallons per minute, a total dissolved solid (TDS) content of 2,700 ppm, and a drift rate of 0.001 percent. Emissions from the cooling tower are limited to a small quantity of particulate matter, including PM, PM_{10}, and $PM_{2.5}$. Emissions are calculated using process engineering calculations and factors in AP-42 for cooling towers.[5] Calculations assume continuous annual operation of the cooling tower (i.e., 8,760 hours per year).

3.3. S500 VENT STACK

The S500 Vent Stack will vent exhaust from the R505 ATS Reactor, T501 1st Stage ABS Tower, and T502 2nd Stage ABS Tower. These process units are first routed to the D503A/B gas filters before venting to the S500 Vent Stack. Uncontrolled emissions from the S500 Vent Stack include particulate matter, sulfur dioxide, nitrogen oxides, and ammonia. High efficiency particulate filters in the stack eliminate 99.5 percent of particulate matter smaller than one micron in diameter. Emission factors are determined based on engineering and mass balance and data from similar facilities. Emission calculations assume continuous annual operation of the facility (i.e., 8,760 hours per year).

3.4. SULFUR STORAGE TANKS

TKI will install a 110,000 gallon capacity tank, denoted "V315 Sulfur Storage Tank," and a 29,000 gallon capacity sulfur unloading tank, denoted "D314 Sulfur Unloading Tank," to store and unload elemental liquid sulfur. Emissions from the sulfur storage tanks consist only of hydrogen sulfide. The molten sulfur contains a maximum of 350 ppm hydrogen sufide (0.037 percent by weight). The annual throughput of sulfur through the sulfur storage tanks is 16,745 tons sulfur per year. Hydrogen sulfide emissions are calculated using mass balance by conservatively assuming that 100 percent of the hydrogen sulfide in the stream is released during storage. Since the tanks are in series, a given H_2S molecule can be emitted from either one tank or the other. For the purposes of dispersion modeling, it is assumed that all H_2S is emitted from the tank with the worst-case dispersion characteristics. In reality, some of the H_2S will be emitted from each tank and some will remain in the sulfur as it is fed into the sulfur incinerator. In the sulfur incinerator, the H_2S would form SO_2, which is the desired intermediate chemical sent to the SO_2 absorber.

3.5. LOADING RACK

ATS loaded by rail and truck is stored as an aqueous solution and has a low volatility. According to a material data safety sheet (MSDS)[6], the vapor pressure for a 60 percent ATS solution is 2.3 kilopascals (kPa), or 0.334 pounds per square inch (psia). This is close to the vapor pressure of water at room temperature. The ATS product that will pass through the loading rack is approximately 65 percent ATS and has a vapor pressure similar to that of the 60 percent solution. Due to its low volatility, loading loss emissions from the loading racks are negligible.

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[5] Particle Emission Factors for Wet Cooling Towers are provided in Table 13.4-1 in Chapter 13.4 of AP-42 (01/1995). Particle size distribution is determined based on the methodologies in *Calculating Realistic PM_{10} Emissions from Cooling Towers* by J. Reisman and G. Frisbie

[6] http://www.sciencelab.com/msds.php?msdsId=9922935

3.6. FUGITIVE SOURCES

Fugitive emissions that are not released from a specific stack, chimney, vent, or other functionally equivalent opening will emanate from process areas in the facility. These areas are distinct from one another as described by the facility's process and instrumentation diagrams and include the D400 Incinerator, the B400 Incinerator Boiler, the T501 1st Stage ABS Tower, the T502 2nd Stage ABS Tower, the R505 ATS Reactor, the D540A and D540B Ammonia Storage Tanks, and propane to the boiler and sulfur incinerator. Fugitive emissions include emissions of VOC, sulfur dioxide, and ammonia.

The November 1995 EPA-453/R-95-017 document *Protocol for Equipment Leak Emission Estimates* (Protocol) provides fugitive emission factors for leaking equipment. Specifically, Table 2-1 in the Protocol gives synthetic organic chemical manufacturing industry (SOCMI) average emission factors for leaking valves, pump seals, compressor seals, pressure relief valves, connectors, open-ended lines, and sampling connections. Fugitive emissions from each area are determined using the fugitive emission factors in Table 2-1 of the Protocol and the number of each component type. Calculations assume continuous annual operation of the facility (i.e., 8,760 hours per year).

The ATS Plant will use sealless design pumps and rupture disk assembly pressure relief devices. Table 5-1 in the Protocol provides approximate control efficiencies of certain emission prevention equipment, including sealless design pumps and rupture disks on pressure relief devices, which both have an approximate control efficiency of 100 percent. The ATS Plant will also use a piston compressor, which will be designed with an oil bath located in between the cartridge seal at the piston and the mechanical seal at the shaft. This assembly will result in a reduction in emissions by approximately 90 percent compared to a traditionally designed compressor.[7]

3.7. TOTAL EMISSIONS

Potential emission increases of criteria pollutants for the proposed project are summarized in Table 3.7-1. Note that this section presents the controlled potential emission increases from the proposed project; the uncontrolled PTE of the ATS Plant is included in Appendix B.

The IDEQ document *Guideline for Performing Air Quality Analyses (Guideline)* establishes short-term (pound per hour) and long-term (ton per year) Level II thresholds for certain criteria pollutants, including carbon monoxide, nitrogen oxides, sulfur dioxide, PM_{10}, $PM_{2.5}$, and lead; Level II thresholds are included in Table 3.7-1 and Table 3.7-2. Pursuant to the *Guideline*, modeling is not required in most instances for a given pollutant if the emission rate increase is less than the Level II threshold; instead, a qualitative description of the impact is adequate, unless there is a unique situation that warrants modeling. Unique situations that warrant modeling include the following:

- Sources where a substantial portion of the new or modified emissions have poor dispersion characteristics (e.g., rain caps, horizontal stacks, fugitive releases, or building downwash) in close proximity to ambient air;
- Sources located in complex terrain (e.g., there is terrain above stack height that is in close proximity to the source);
- Sources located in areas with poor existing air quality; and
- Modifications at existing major stationary sources, including grandfathered sources that have never been modeled before.

Emission sources of criteria pollutants at the ATS Plant (the propane boiler and ATS vent stack) have good dispersion characteristics (unobstructed vertical releases with stack heights not subject to substantial building downwash) and do not meet any of the other listed criteria; thus, the sources do not warrant modeling if the emission rate of a given criteria pollutant is below the Level II threshold.

[7] Ninety percent control compared to a traditional compressor was provided in a telephone conversation between the vendor and Daniel Johnson, TKI, March 21, 2012.

As shown in Table 3.7-1 and Table 3.7-2, respectively, the short term emission rate and long-term emission rates of applicable criteria pollutants are below the Level II modeling thresholds; thus, modeling is not required for criteria pollutants.

Emission increases of TAP and HAP are summarized in Table 3.7-3. The Burley Facility is currently not a major source for HAP, nor will it become a major source as a result of the proposed project, as presented in Table 3.7-4. A TAPs screening analysis is presented in Section 5.

Detailed emission calculations are included in Appendix B.

Table 3.7-1. ATS Plant Increase of Criteria Pollutants (pounds per hour)

	Hourly Emissions (lb/hr)							
Source Category	NO_x	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	GHGs
Combustion	0.34	0.29	0.03	0.03	0.03	0.02	2.06E-03	-
Fugitives	-	-	-	-	-	0.39	0.05	-
Loading Racks	-	-	-	-	-	0.00	-	-
Cooling Towers	-	-	0.01	0.01	2.46E-04	-	-	-
ATS Vent Stack	2.04	0.29	0.27	0.27	0.27	-	2.271	-
Storage Tanks	-	-	-	-	-	-	-	-
Total Increases	2.38	0.58	0.30	0.30	0.29	0.40	2.32	0
Level II Threshold [a]	2.4	175		2.6	0.63		2.5	

[a] Applicable Level II thresholds include short-term (lb/hr) NO_x, CO, PM_{10}, $PM_{2.5}$, and SO_2 emission rates. Emission rates of these criteria pollutants from the ATS Plant are below the Level II modeling thresholds. In addition, the emission sources do not warrant modeling or comparison to the Level I thresholds due to meeting one of the situations included in the bulleted list in Section 3.7, above; therefore, air dispersion modeling is not required for any criteria pollutant.

Table 3.7-2. ATS Plant Increase of Criteria Pollutants (tons per year)

Source Category	Annual Emissions (tpy)							
	NO_x	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	GHGs
Combustion	1.50	1.26	0.11	0.11	0.11	0.08	0.01	2,142
Fugitives [a]	-	-	-	-	-	1.69	0.22	-
Loading Racks	-	-	-	-	-	-	-	-
Cooling Towers	-	-	0.06	0.05	1.08E-03	-	-	-
Stacks	8.92	1.27	1.16	1.16	1.16	-	9.95	-
Storage Tanks	-	-	-	-	-	-	-	-
Total Increases	10.43	2.54	1.34	1.32	1.28	1.77	10.18	2,142
Significant Emission Rate (SER)	40	100	25	15	-	40	40	75,000
10 percent of SER [b]	4	10	2.5	1.5	-	4	4	7,500
Level II Threshold [c]	14				4.1		14	

[a] Fugitive equipment leaks of VOC and SO_2 occur in the following process areas: D400 Incinerator, B400 Incinerator Boiler, and T501/502 ABS Tower.

[b] The trigger for PTC permitting is 10 percent of the SER; that is, PTC permitting is triggered if the annual emission increase of a given criteria pollutant is above 10 percent of the SER for that pollutant (IDAPA 58.01.01.221.01). As shown in the table, NO_x and SO_2 trigger PTC permitting for the ATS Plant.

[c] Applicable Level II Thresholds include long term (tpy) NO_x, PM_{10}, and SO_2 emission rates. Emission rates of these criteria pollutants from the ATS Plant are below the Level II modeling threshold. In addition, the emission sources do not warrant modeling due to one of the situations listed in Section 3.7; therefore, air dispersion modeling is not required for any criteria pollutant.

Table 3.7-3. ATS Plant Increase of TAP and HAP Emissions

Pollutant	CAS	HAP (Y/N)	TAP (Y/N)	B600 Package Boiler (lb/hr)	S500 Vent Stack (lb/hr)	R505 ATS Reactor (lb/hr)	T501/502 ABS Tower (lb/hr)	D540A/B Ammonia Storage Tanks (lb/hr)	D314 or V135 Sulfur Tank [a] (lb/hr)	Total TAP (lb/hr)	Total HAP (lb/hr)
Ammonia	7664-41-7	N	Y		7.610E-01	1.039E-01	3.408E-01	9.895E-01		2.195E+00	-
Hydrogen Sulfide	7783-06-4	N	Y						1.415E+00	1.415E+00	-
Nitrous Oxide	10024-97-2	N	Y	3.443E-02						3.443E-02	-
Total Emissions (lb/hr)										3.644E+00	0
Total Emissions (tpy)										1.596E+01	0

[a] Because the two sulfur tanks are aligned in series, 100 percent of hydrogen sulfide emissions are assumed to emanate from either the D314 Sulfur Unloading Tank or the V315 Sulfur Storage Tank. The more conservative modeling result is assumed; i.e., screening analyses are conducted for both sulfur tanks assuming 100 percent of hydrogen sulfide emissions from each. The worse-case scenario is assumed.

Table 3.7-4. HAP Thresholds

Applicable Facilities	Pollutant Category	HAP Increase (tpy)	Major Source Permitting Threshold (tpy)	Below Threshold? [c]
ATS Plant	Total HAP	0	25	Yes
	Individual HAP	0	10	Yes
Burley Facility [a]	Total HAP	1.497E+01	25	Yes
	Individual HAP [b]	8.072E+00	10	Yes

[a] Includes the ATS Plant and existing Metam Plant.
[b] The maximum potential to emit of any individual HAP at the Burley Facility is 8.07 tons per year of carbon disulfide.
[c] The aggregate potential to emit of the existing Metam Plant and the proposed ATS Plant will remain below the individual and combined HAP major source thresholds of 10 tons per year and 25 tons per year, respectively.

4. REGULATORY APPLICABILITY

The ATS Plant will be located in Burley, Idaho to the north of the existing Metam Plant. The area is currently in attainment for all pollutants. The following sections examine the applicable state and federal regulatory requirements for the proposed project.

4.1. PERMIT TO CONSTRUCT (PTC)

IDEQ issues PTCs pursuant to IDAPA 58.01.01 Sections 200 through 228. No owner or operator may commence construction or modification of any stationary source, facility, major facility, or major modification without first obtaining a permit to construct from IDEQ which satisfies the requirements of Sections 200 through 228. Pursuant to IDAPA 58.01.01.203, the applicant must show to the satisfaction of IDEQ that a new stationary source:

> Will comply with all applicable local, state, and federal emissions standards;
> Will not cause or significantly contribute to a violation of any ambient air quality standard; and
> Will not emit TAPs such that human or animal life or vegetation become injured or unreasonably affected.

To address local, state, and federal emission standards, an analysis of potentially applicable federal and state regulations is included. To address ambient air quality standards, criteria air pollutant emissions are compared to the Level II modeling thresholds established in Section 3.3 of the *Guideline*, and toxic air pollutant emissions are compared to the TAP emission limits codified in IDAPA 58.01.01 Sections 585 and 586.[8] Lastly, to address the health of human and animal life and vegetation, a dispersion modeling analysis of those pollutants whose emission levels are above the state toxics thresholds is included.

The ATS Plant does not qualify for any of the PTC exemptions in Sections 220 through 223 (General Exemption Criteria for Permit to Construct Exemptions, Category I Exemption, Category II Exemption, Exemption Criteria and Reporting Requirements for Toxic Air Pollutant Emissions), nor has TKI chosen to comply with the requirements in Section 213 (Pre-Permit Construction). As such, TKI is submitting this PTC application prior to the construction of the ATS Plant, pursuant to IDAPA 58.01.01.201.

To satisfy applicable PTC application requirements, the forms required by IDEQ are included in Appendix C.

4.2. PREVENTION OF SIGNIFICANT DETERIORATION (MAJOR NEW SOURCE REVIEW)

An emission source, located in attainment or unclassifiable areas, is subject to the Prevention of Significant Deterioration (PSD) permitting program if the new installation is either a major modification to an existing major source, or is a major source unto itself as outlined under IDAPA 58.01.01.205. The Metam Plant is not classified as a major source as defined by IDAPA 58.01.01.205; as such, PSD applicability is triggered only if the proposed construction project would constitute a major stationary source by itself. In other words, the proposed modifications must increase emissions of a regulated air pollutant by more than the major source threshold to trigger PSD review. The PSD major source thresholds are either 100 tons per year or 250 tons per year of any criteria air pollutant, depending on whether the facility belongs to one of the categories of stationary sources codified under 40 CFR 52.21(b)(1)(iii). The ATS Plant falls under the category of a chemical process plant; thus, the 100 ton per year PSD threshold is used to determine applicability. PSD review is not required for the proposed project, as the emission increase from the project will not be in excess of the 100 ton per year PSD major source threshold, as demonstrated in Table 3.7-2.

[8] See Section 3.7 for an explanation of the applicability of the Level II modeling thresholds.

4.3. TITLE (TIER I) AIR OPERATING PERMIT PROGRAM

As outlined under IDAPA 58.01.01.301.01, a Title V (Tier I) Operating Permit is required in order to operate a Tier I source. A Tier I source is defined as any of the following under IDAPA 58.01.01.006:

- Any source located at a major facility as defined in Section 008
- Any source subject to NSPS requirements under 40 CFR 60 and required to obtain a Part 70 permit (Title V)
- Any source subject to National Emissions Standards for Hazardous Air Pollutants (NESHAP) requirements under 40 CFR 61 and 63, and required to obtain a Part 70 permit (Title V)
- Any phase II source
- Any source in a source category designated by the Department

The definition of a major facility is specified in IDAPA 58.01.01.008.10 as any facility that emits or has the potential to emit 100 tons per year of any criteria pollutant, 10 tons per year or more of any single HAP, or 25 tons per year or more of total HAP. The Burley Facility is not currently a major facility nor will the Burley Facility become a major facility as a result of the proposed project, as demonstrated in Section 3.7 and Appendix B, which contains facility-wide emission totals. TKI is not required to obtain a Title V permit due to any applicable NSPS or NESHAP. In addition, TKI is not a phase II source. Thus, TKI is not subject to the Tier I program.

4.4. TIER II AIR OPERATING PERMIT PROGRAM

The optional Tier II air operating permit program is codified in IDAPA 58.01.01 Sections 400 through 410. Pursuant to 58.01.01.401.01, an owner or operator of any stationary source or facility which is not subject to (or wishes to accept limitations on the facility's potential to emit so as to not be subject to) Sections 300 through 399 (for Tier I Permits) may apply to IDEQ for an operating permit to:

- Authorize the use of alternative emission limits (bubbles) pursuant to Section 440;
- Authorize the use of an emission offset pursuant to Sections 204.02.b. or 206;
- Authorize the use of a potential to emit limitation, an emission reduction or netting transaction to exempt a facility or modification from certain requirements for a permit to construct;
- Authorize the use of a potential to emit limitation to exempt the facility from Tier I permitting requirements; or
- Bank an emission reduction credit pursuant to Section 461.

TKI is not requesting to take any of these actions, and is thus not requesting an optional Tier II Operating Permit.

4.5. NEW SOURCE PERFORMANCE STANDARDS

NSPS apply to certain types of equipment that are newly constructed, modified, or reconstructed after a given applicability date. The potentially applicable NSPS subparts are discussed in the following sections.

4.5.1. NSPS Subpart Dc - Standards of Performance for Small Industrial - Commercial - Institutional Steam Generating Units

NSPS Subpart Dc, *Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units*, applies to each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 100 MMBtu/hr or less, but greater than or equal to 10 MMBtu/hr.[9] The B600 Package Steam Boiler has a maximum design capacity of 3.5 MMBtu/hr and is thus not subject to NSPS Subpart Dc.

[9] 40 CFR 60.40c(a)

4.5.2. NSPS Subpart E - Standards of Performance for Incinerators

NSPS Subpart E, *Standards of Performance for Incinerators*, applies to each incinerator of more than 50 tons/day charging rate for which construction or modification commenced after August 17, 1971. *Incinerator* is defined in 60.51 as "any furnace used in the process of burning solid waste for the purpose of reducing the volume of the waste by removing combustible matter." The B400 Incinerator boiler facilitates the reaction of combustion air with liquid elemental sulfur to form sulfur dioxide. In this process, sulfur dioxide is not a solid waste, as defined in §60.51; it is a necessary raw material used in the production of ATS. Thus, the B400 Incinerator does not meet the definition of incinerator as defined in NSPS Subpart E.

4.5.3. NSPS Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for which Construction, Reconstruction, or Modification Commenced After July 23, 1984

NSPS Subpart Kb, *Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984, applies to storage vessels with a capacity greater than or equal to 75 cubic meters (19,812 gallons) for which construction or modification commenced after July 23, 1984.*[10] Volatile organic liquid is defined in § 60.111b as "any organic liquid which can emit volatile organic compounds (as defined in 40 CFR 51.100) into the atmosphere." Volatile organic compound is defined in 40 CFR 51.100 as "any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions."

The ATS Plant will include two ATS storage tanks, a sulfur storage tank, a sulfur unloading tank, two ammonia storage tanks, and an ABS day tank. ATS, sulfur, ammonia, and ABS do not meet the above definition of volatile organic liquid; thus, the ATS storage tanks, sulfur storage tanks, ammonia storage tanks, and ABS day tank are not subject to NSPS Subpart Kb.

4.5.4. SOCMINSPS Requirements

ATS is not a Synthetic Organic Chemical Manufacturing Industry (SOCMI) chemical as defined under § 60.489 in NSPS Subpart VV. Therefore, the ATS Plant is not subject to SOCMI NSPS requirements, including:

- NSPS VVa, *Standards of Performance for Equipment Leaks of VOC in the SOCMI Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006*;
- NSPS III, *Standards of Performance for VOC Emissions from the SOCMI Ai Oxidation Unit Processes*;
- NSPS NNN, *Standards of Performance for VOC Emissions from SOCMI Distillation Operations*; and
- NSPS RRR, *Standards of Performance for VOC Emissions from SOCMI Reactor Processes.*

4.6. NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

NESHAPs have been established in 40 CFR 61 and 63 to control the emissions of Hazardous Air Pollutants (HAPs). NESHAP regulations codified in 40 CFR 63 establish Maximum Achievable Control Technology (MACT) standards for specific types of equipment at qualifying facilities. MACT regulations typically apply to facilities that are major sources of HAP. Under 40 CFR 63, a major source is defined as "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAP..."

[10] 40 CFR 60.110b(a)

The existing Metam Plant is an area source since HAP emissions are below the major source thresholds. The ATS Plant will be constructed adjacent to the Metam Plant. The plants will share a site and a fenceline, and thus will be "located within a contiguous area and under common control." For the Burley Facility to remain an area source of HAP, the aggregate potential to emit of both facilities must remain under the major source thresholds.

As shown in Table 3.7-4 and in Appendix B, the aggregate potential to emit of the existing Metam Plant and the proposed ATS Plant will remain below the individual and combined HAP major source thresholds of 10 tons per year and 25 tons per year respectively. Therefore, only those NESHAP regulations applicable to area sources are potentially applicable to the ATS Plant.

4.6.1. NESHAP Subparts F, H, and G (HON)

Chemical manufacturing process units that meet the criteria specified in 40 CFR 63.100(b)(1), (2), and (3) are required to comply with the Subpart F, G, and H (collectively known as the HON).[11] Per §63.100(b)(1), facilities that manufacture as their primary product one of more of the chemicals listed in Table 1 to Subpart F are subject to Subpart F, H, and G. The ATS Plant will manufacture ATS as its primary product, which is not included in Table 1 to Subpart F. Furthermore, the ATS Plant will not use as a reactant or manufacture as a product or co-product any of the organic HAPs listed in Table 2 to Subpart F, as required for applicability by §63.100(b)(2); nor is the Burley Facility a major source for HAP, as required for applicability by §63.100(b)(3).

The ATS Plant does not meet any of the applicability requirements in §63.100(b)(1), (2), and (3); thus, it is not subject to Subparts F, G, and H.

4.6.2. NESHAP Subpart EEEE - NESHAP: Organic Liquid Distribution (Non-Gasoline)

Subpart EEEE, *National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)*, establishes national emission limitations, operating limits, and work practice standards for organic HAPs emitted from organic liquids distribution (OLD) (non-gasoline) operations at major sources of HAP emissions. The Burley Facility is an area source and is thus not subject to the provisions of Subpart EEEE. Furthermore, ATS is not an organic compound and does not meet the definition of organic liquid in §63.2406. Thus, if the Burley Facility becomes a major source of HAP, Subpart EEEE will remain inapplicable.

4.6.3. NESHAP Subpart DDDDD - NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters

Subpart DDDDD, *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers*, applies only to those boilers and process heaters that are located at, or are part of, a major source of HAP.[12] Because the Burley Facility is an area source of HAP, the B600 Package Steam Boiler is not subject to the requirements of Subpart DDDDD.

4.6.4. NESHAP Subpart JJJJJ - NESHAP for Industrial, Commercial, and Institutional Boilers Area Sources

Subpart JJJJJJ, *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources*, applies to industrial, commercial, or institutional boilers within the coal, biomass, or oil subcategory that are located at, or are part of, an area source of HAP, as defined in §63.2, except as specified in §63.11195.[13] Per §63.11195(e), gas-fired boilers as defined in Subpart JJJJJJ are not subject to any of the requirements

[11] 40 CFR 63.100(b)

[12] 40 CFR 63.7485

[13] 40 CFR 63.11193 and 63.11194.

of Subpart JJJJJJ. A *gas-fired boiler* is defined in §63.11237 as "any boiler that burns gaseous fuels not combined with any solid fuels, burns liquid fuel only during periods of gas curtailment, gas supply emergencies, or periodic testing on liquid fuel, and periodic testing of liquid fuel shall not exceed a combined total of 48 hours during any calendar year."

The B600 Package Steam Boiler meets this definition of *gas-fired boiler* and, pursuant to §63.11195(e), is not subject to Subpart JJJJJJ.

4.7. IDAHO TOXIC AIR POLLUTANT REGULATIONS

In Idaho, all new sources emitting TAPs are required to show compliance with the Idaho TAP program pursuant to IDAPA 58.01.01 Sections 210, 585, and 586. IDEQ has established an emission level (EL) and an acceptable ambient concentration (AAC) for each listed TAP.[14] If the TAP emission rate from a source is above its respective EL, further determination of compliance through modeling is required. If the source's ambient concentration at the point of compliance is less than or equal to the applicable AAC, no further procedures from demonstrating preconstruction compliance are required.

TAP emissions from the ATS Plant include ammonia, hydrogen sulfide, and nitrous oxide resulting from propane combustion. A screening analysis was conducted using the AERSCREEN model to evaluate impacts to ambient air for those pollutants whose emission rates exceeded the respective ELs, and the results were compared to AACs. The screening modeling results showed that ambient air concentrations were less than the AACs for all TAPs, with the exception of ammonia. As such, TKI conducted refined dispersion modeling using AERMOD to demonstrate compliance with the ammonia AAC. Results show that ambient concentrations of ammonia at the point of compliance are below the ammonia AAC. Therefore, the ATS Plant is in compliance with the Idaho TAP program.

The refined dispersion modeling analysis for ammonia is presented in detail in Section 5.2.

4.8. OTHER IDAHO RULES - IDAPA 58.01.01

The applicability requirements of the following subsections of the IDAPA 58, *Rules for the Control of Air Pollution in Idaho,* to the ATS Plant are addressed below.

4.8.1. Subsection 123: Certification of Documents

IDAPA 58.01.01.123 requires that all documents submitted by the applicant to IDEQ contain a certification by a responsible official. "The certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete." An appropriate certification statement is included Appendix G.

4.8.2. Subsection 155: Circumvention

IDAPA 58.01.01.155 states "No person shall willfully cause or permit the installation or use of any device or use of any means that conceals emissions of pollutants that would otherwise violate the provisions of this chapter without resulting in a reduction in the total amount of emissions." TKI will not conceal emissions of pollutants.

4.8.3. Subsections 224-225: Permit to Construct Fees

Subsection 224 (PTC Application Fee) and Subsection 225 (PTC Processing Fee) apply to the proposed project at the Burley Facility. A $1,000 application fee is submitted with this application. Additional processing fees will be submitted as requested by IDEQ.

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[14] Emission levels and acceptable ambient concentrations are provided for each TAP in IDAPA 58.01.01.585 (non-carcinogenic increments) and IDAPA 58.01.01.586 (carcinogenic increments).

4.8.4. Subsections 210, 585, and 586: Toxic Air Pollutant Requirements

As described in Section 5, the TKI ATS Plant is in compliance with the TAP requirements outlined in IDAPA 58.01.01, Subsections 210, 585, and 586.

5. TAP COMPLIANCE DEMONSTRATION

In the state of Idaho, all new and modified sources of TAP emissions are required to demonstrate compliance with the Idaho TAP standards, pursuant to IDAPA 58.01.01.210.04. This section includes a TAPs screening analysis and dispersion modeling analysis performed to estimate impacts on near-field ground-level concentrations of TAPs from the ATS Plant.

Table 4.8-1. Initial Screening for TAP Modeling

Pollutant	Total TAP (lb/hr)	Averaging Period	EL (lb/hr)	ACC (mg/m³)	Is Modeling Required?
Ammonia	2.20E+00	24-hr	1.20E+00	9.00E-01	**Yes**
Hydrogen Sulfide	1.41E+00	24-hr	9.33E-01	7.00E-01	**Yes**
Nitrous Oxide	3.44E-02	24-hr	6.00E+00	4.50E+00	No

As shown in Table 4.8-1, emissions of ammonia and hydrogen sulfide are above the ELs and thus require modeling to demonstrate compliance with Idaho's TAP standards. Compliance with the TAP standards must be met using one of the methods described in Subsection 210.05 through 210.08. For this modeling analysis, the method described in Subsection 210.06 of comparing the uncontrolled ambient concentration to the applicable AAC is used to demonstrate preconstruction compliance.[15] Pursuant to Subsection 210.06(b), if the source's uncontrolled ambient concentration at the point of compliance is less than or equal to the applicable AACs, no further procedures for demonstrating preconstruction compliance is required for that TAP as part of the application process.

Section 5.1 presents the TAPs screening analysis conducted using AERSCREEN. The screening analysis demonstrates that hydrogen sulfide is in compliance with the respective AAC; however, ammonia requires refined modeling to demonstrate compliance. As such, Section 5.2 presents refined dispersion modeling of ammonia using AERMOD.

5.1. AERSCREEN MODELING

TAPs screening is performed for TAP emission increases resulting from the ATS Plant project using the modeling inputs and options described in the following sections.

5.1.1. Dispersion Model Selection

TKI used the AERSCREEN dispersion model to perform the dispersion modeling analysis. AERSCREEN is a screening dispersion model approved and recommended by the EPA for evaluating ambient air impacts.[16] Results from the AERSCREEN modeling tend to produce conservative (i.e., high) estimates of impacts from emission sources.

5.1.2. Modeling Parameters

There are two sources of hydrogen sulfide emission: the D314 Sulfur Unloading Tank and the V315 Sulfur Storage Tank. Hydrogen sulfide is emitted through a vertical, unobstructed stack located on the top of each tank; thus, the sources are modeled as point sources. As discussed in Section 3.4, since the tanks are in series, a given molecule of hydrogen sulfide can be emitted from either one tank or the other. For the purposes of this project, two cases are analyzed, in which it is assumed that 100 percent of the hydrogen sulfide in the molten sulfur is emitted from either

[15] The only control devices present at the ATS Plant are the high efficiency particulate filters in the S500 Vent Stack. Emission rates from fugitive volume sources are based on the use of rupture disks and sealless design pumps. These devices are preventative in nature and do not actively or directly reduce ammonia emissions; therefore, they are not considered control equipment.

[16] Per U.S. EPA Memorandum titled "AERSCREEN released as the EPA Recommended Screening Model", April 11, 2011

one tank or the other. The more conservative result (i.e., the higher resulting ambient concentration of hydrogen sulfide) is compared to the AAC. The modeling input parameters used for point sources of hydrogen sulfide in this screening analysis are presented in Table 5.1-1.

Table 5.1-1. Point Emission Sources of Hydrogen Sulfide

Parameter	D314 Sulfur Unloading Tank	V315 Sulfur Storage Tank	Units
Source Type	Point	Point	
Stack Height	29.2	38	ft
Inside Diameter	0.8	0.8	ft
Exit Temperature [a]	280	160	°F
Exit Velocity [a]	4.01	2.99	ft/s
Distance to Property Line	48.5	159.4	ft
Building Downwash	Y	Y [b]	
Building Height	9.2	-	ft
Minimum Horizontal Dimension	9.2	-	ft
Maximum Horizontal Dimension	60	-	ft
Maximum Direction Angle to North	20.14	-	degrees
Direction from Stack to Building Center	0	-	ft
Minimum Temperature [c]	-23	-23	°F
Maximum Temperature [c]	104	104	°F
Surface Profile	Cultivated Land	Cultivated Land	
Climate Profile	Average	Average	

[a] The exit temperature and exit velocity of the sulfur tank vents are based on chemical engineering design calculations conducted to maintain the H_2S concentrations below the lower explosive limit.

[b] The V315 Sulfur Storage Tank vent is located near three potential dominant downwash structures (the V530A and V530B ATS Storage Tanks, and the V315 Sulfur Storage Tank); rather than selecting a single downwash structure, a building parameter input program (BPIP) input file that includes all three tanks, as well as the Process Building, was used as the building input. The buildings are shown in the plot plan included in Appendix A. The BPIP input file is included in Appendix D.

[c] Meteorological data for Burley, ID obtained from the National Weather Service for Twin Falls, Idaho from 1963-2011.

There are four modeled sources of ammonia emissions: the S500 Vent Stack, the R505 ATS Reactor, the T501/502 ABS Tower, and the D540A/B Ammonia Storage Tanks. The vent stack is modeled as a point source; the remaining sources are sources of fugitive emissions and are modeled as volume sources. The modeling input parameters used for the point source of ammonia are presented in Table 5.1-2. The modeling input parameters used for the volume sources of ammonia are presented in Table 5.1-3.

Table 5.1-2. Point Emission Sources of Ammonia

Parameter	S500 Vent Stack	Units
Source Type	Point	
Stack Height	110	ft
Inside Diameter	2.1	ft
Exit Temperature [a]	100	°F
Exit Velocity [a]	11.98	ft/s
Distance to Property Line	135.1	ft
Building Downwash [b]	Y	
Building Height	40	ft
Minimum Horizontal Dimension	75	ft
Maximum Horizontal Dimension	100	ft
Maximum Direction Angle to North	0	degrees
Direction from Stack to Building Center	41.6	ft
Minimum Temperature [c]	-23	°F
Maximum Temperature [c]	104	°F
Surface Profile	Cultivated Land	
Climate Profile	Average	

[a] The S500 Vent Stack exhaust exit temperature and exit velocity are determined based on chemical engineering design calculations.

[b] The dominant downwash structure affecting the plume from the S500 Vent Stack is the Process Building. The location of the Process Building relative to the S500 Vent Stack is shown in the facility plot plan included in Appendix A.

[c] Meteorological data for Burley, ID obtained from the National Weather Service for Twin Falls, Idaho from 1963-2011.

Table 5.1-3. Volume Emission Sources of Ammonia

Parameter	R505 ATS Reactor	T501/502 ABS Tower	D540A/B Ammonia Storage Tanks	Units
Source Type	Volume	Volume	Volume	
Centerpoint Height [a]	20	56	6	ft
Initial Lateral Dimension [b]	17.4	1.0	5.8	ft
Initial Vertical Dimension [c]	18.6	14.9	5.6	ft
Distance to Property Line	162.8	194	138.6	ft
Building Downwash	NA	NA	NA	
Minimum Temperature [d]	-23	-23	-23	F
Maximum Temperature [d]	104	104	104	F
Surface Profile	Cultivated Land	Cultivated Land	Cultivated Land	
Climate Profile	Average	Average	Average	

[a] Per EPA Air Quality Modeling Guidelines (1999), the centerpoint height of a volume source is equal to half the distance of the maximum height of the source. The modeling protocol submitted to IDEQ includes the determination of the centerpoint height of each volume source listed in Table 5-4

[b] Per EPA Air Quality Modeling Guidelines (1999), the initial lateral dimension of a volume source is the length of the source divided by 4.3. The modeling protocol submitted to IDEQ includes the determination of the initial lateral dimension of each volume source listed in Table 5-4.

[c] Per EPA Air Quality Modeling Guidelines (1999), the initial vertical dimension is the height of the source divided by 2.15. The modeling protocol submitted to IDEQ includes the determination of the initial vertical dimension of each volume source listed in Table 5-4.

[d] Meteorological data for Burley, ID obtained from the National Weather Service for Twin Falls, Idaho from 1963-2011.

Source parameters, specifically the determination of the centerpoint height, initial lateral dimension, and initial vertical dimension, for the S500 Vent Stack, R505 ATS Reactor, T501/502 ABS Tower, and D540A/B Ammonia Storage Tanks are discussed in detail in Section 5.2.

5.1.3. Emission Source Emission Rates

Emissions of hydrogen sulfide are determined based on the maximum hydrogen sulfide content in the stream (350 ppm, or 0.037 percent by weight) and the annual throughput of sulfur through the sulfur storage tanks (16,745 tons sulfur per year). Hydrogen sulfide emissions are calculated using mass balance by conservatively assuming that 100 percent of the hydrogen sulfide in the stream is released during storage. The hydrogen sulfide emission rate is presented in Table 5.1-4.

Emissions of ammonia from the S500 Vent Stack are determined based on process engineering and mass balance, as presented in the process flow diagrams included in Appendix A.

Emissions that emanate from the R505 ATS Reactor, the T501/502 ABS Tower, and the D540A/B Ammonia Storage Tanks are fugitive emissions; they are not released from a specific vent or stack. The November 1995 EPA-453/R-95-017 document *Protocol for Equipment Leak Emission Estimates (Protocol)* provides fugitive emission factors for leaking equipment. Specifically, Table 2-1 in *Protocol* gives synthetic organic chemical manufacturing industry (SOCMI) average emission factors for leaking valves, pump seals, compressor seals, pressure relief valves, connectors, open-ended lines, and sampling connections. Emission rates, presented in Table 5.1-4, are determined for each of the three volume sources using the component emission factors given in Table 2-1 in *Protocol* and the number of each component present in the three sources.

Table 5-1 in *Protocol* provides control efficiencies for certain types of pumps, compressors, and pressure relief devices. The ATS Plant will use sealless design pumps, which have a listed control efficiency of 100 percent, a dual mechanical seal compressor, which has a control efficiency of 90 percent, and a rupture disk assembly for pressure relief valves, which also provides a 100 percent control efficiency.

Table 5.1-4. Modeled Source Emission Rates

Source ID	Associated Pollutant	Emission Rate (lb/hr)	Emission Rate (g/s)
D314, V315	Hydrogen Sulfide [a]	1.415E+00	1.782E-01
S500	Ammonia	7.610E-01	9.588E-02
R505	Ammonia	1.039E-01	1.309E-02
T501502	Ammonia	3.408E-01	4.295E-02
D540AB	Ammonia	9.895E-01	1.247E-01

[a] A given molecule of hydrogen sulfide is emitted from either the D314 Sulfur Storage Tank or the V315 Sulfur Unloading Tank.

5.1.4. Meteorological Data

The MAKEMET program in AERSCREEN generates meteorological conditions based on user-specified surface characteristics, ambient temperatures, minimum wind speed, and anemometer height. For this project, the suggested default values of MAKEMET are used for the minimum wind speed (0.5 m/s) and the anemometer height (10 meters). The 5 kilometer circular area surrounding the ATS Plant consists entirely, or nearly entirely, of farm land; thus, the selected surface profile for the dispersion models is 'cultivated land.' The city of Burley, Idaho is located in a semi-arid climate and experiences moderate annual rainfall; thus, the climate profile selected is 'average' precipitation.[17]

5.1.5. Building Downwash

The purpose of a building downwash analysis is to determine whether the plume discharged from a stack will become caught in the turbulent wake of a building (or other structure). Wind blowing near a building creates zones of turbulence that are greater than in open air, resulting in plume downwash, which can result in elevated ground-level concentrations. Building downwash analysis is not required for volume sources.

Building downwash must be considered for screening analyses of point sources to accurately represent the dispersion of emissions from the modeled stack. Modeled point sources include the V315 Sulfur Storage Tank vent, the D314 Sulfur Unloading Tank vent, and the S500 Vent Stack. The dominant downwash structures are presented with the respective source parameters in Section 5.1.2.

5.1.6. Screening Results

The AERSCREEN model reports concentrations on a 1-hour averaging period. Per IDAPA 58.01.01.210.03(a)(i), the maximum 1-hour concentration output from the AERSCREEN model is multiplied by a persistence factor of 0.4 to convert the 1-hour concentration to a 24-hour average concentration. The AAC presented in IDAPA 58.01.01.585 is based on a 24-hour averaging period.

AERSCREEN is capable of modeling one source and one pollutant per model run. Therefore, the individual ambient concentration from each ammonia source is aggregated, and the total is compared against the AAC for ammonia. As described in Section 5.1.2, there are two sources of hydrogen sulfide, and a given hydrogen sulfide molecule can be emitted from one source or the other. Therefore, the worst-case (i.e., most conservative) ambient air concentration is compared against the AAC for hydrogen sulfide.

The AERSCREEN modeling results for ammonia and hydrogen sulfide are presented in Table 5.1-5.

[17] Per National Weather Service data for Burley, Idaho, found online at http://www.nws.noaa.gov, the city of Burley has received on average approximately ten inches of rain per year during the period 1981-2010.

Table 5.1-5. AERSCREEN Dispersion Modeling Results

Pollutant	Averaging Period	Modeling Results (mg/m³)	AAC (mg/m³)	Modeling Results Below AAC?
Ammonia	24-hour	1.63	0.9	No
Hydrogen Sulfide [a]	24-hour	0.397	0.7	Yes

[a] For hydrogen sulfide, the worst-case (i.e., most conservative) scenario is the one in which 100 percent of hydrogen sulfide emission emanate from the V315 Sulfur Storage Tank.

As shown in Table 5.1-5, the modeled impact of hydrogen sulfide is below the AAC; thus, compliance with the preconstruction TAP requirements outlined under IDAPA 58.01.01.210.03 is demonstrated for hydrogen sulfide.

AERSCREEN tends to produce conservative (i.e., high) emission estimates. Ammonia did not pass initial screening and therefore requires refined dispersion modeling. A refined modeling analysis using AERMOD considers additional conditions that affect ambient concentrations of pollutants, including meteorology, geography, and the physical layout of the facility. Thus, a refined analysis more accurately predicts ambient air concentrations of pollutants.

Detailed modeling results, a copy of the AERSCREEN output files, and a directory for electronic files are included in Appendix D.

5.2. REFINED AERMOD MODELING

The following sections describe the methodology used to conduct refined dispersion modeling for ammonia. Because the initial screening analysis did not demonstrate compliance for ammonia, a refined modeling analysis is performed to determine if emissions of ammonia have a significant impact on ambient air quality.

5.2.1. Dispersion Model

The American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) modeling system, the AERMOD dispersion model, version 11353, with Plume Rise Model Enhancements (PRIME) advanced downwash algorithms are used as the dispersion model for this air quality analysis.

5.2.2. Meteorological Data

This modeling analysis is performed using five years of representative meteorological data (January 1, 2006 to December 31, 2010) for the AERMOD dispersion model.[18] Surface meteorological data and upper air meteorological data are taken from the meteorological station at the Burley Airport, located at latitude 42.533 N and longitude 113.767 W. The AERMOD meteorological preprocessor AERMET (Version 11059) was used to process the data.

5.2.3. Terrain Elevations

Terrain elevations for receptors, buildings, and sources are determined using the National Elevation Dataset (NED) supplied by the United States Geologic Survey (USGS).[19] The NED is a seamless dataset with the best available raster elevation data of the conterminous United States. It is the primary elevation product of the USGS. NED data provides elevations based on one arc-second (approximately 30 meters), one-third arc-second (approximately 10 meters), and one-ninth arc-second (approximately 3 meters).[20] One-third arc-second data is used for the Burley, Idaho area.

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[18] AERMET data files wereprovided via email by Kevin Schilling, IDEQ, to Anna Henolson, Trinity Consultants, on February 3, 2012.

[19] NED data obtained at http://seamless.usgs.gov

[20] http://ned.usgs.gov

Elevations are converted from the NED grid spacing to the air dispersion model spacing using the AERMOD preprocessor, AERMAP version 11103. All data obtained from the NED files were checked for completeness and spot-checked for accuracy.

5.2.4. Coordinate System

The location of emission sources, structures, and receptors are represented in the Universal Transverse Mercator (UTM) coordinate system using the World Geodetic System 1984 (WGS84) projection. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km). UTM coordinates for this analysis are based on UTM Zone 12. The location of the ATS Plant is approximately 4,705,400 Northing and 266,100 Easting in UTM Zone 12.

5.2.5. Receptor Grids

Receptors are placed in all areas directly surrounding the facility considered to be ambient air. This modeling analysis uses a Cartesian receptor grid extending 2000 meters from the approximate center of the ATS Plant in each of the cardinal directions, creating a four kilometer by four kilometer square receptor grid. Receptors are spaced at 50 meter intervals.

Boundary receptors spaced 10 meters from one another circumscribe the facility at the ambient air boundary. The ambient air boundary at the ATS Plant is determined pursuant to the requirements of Section 6.5 of the "State of Idaho Guideline for Performing Air Quality Impact Analyses." The ambient air boundary is the fenceline shown in the attached plot plan (see Appendix A). The fence acts as a physical barrier and effectively precludes public access to the facility.

5.2.6. Building Downwash

Emissions from the ATS Plant are evaluated in terms a source's proximity to nearby structures. Building downwash effects are included to determine if emission discharges become caught in the turbulent wakes of nearby structures. Wind blowing around a building creates zones of turbulence that are greater than if the buildings were absent. Direction-specific building dimensions and the dominant downwash structure parameters used as inputs to the dispersion models are determined using the *BREEZE-WAKE/BPIP* software, developed by Trinity. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME), version 04274. BPIP is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.

Table 5.2-1 presents the list of buildings that are included in this modeling analysis.

Table 5.2-1. Building Description and Heights

Building ID	Description	Length/Diameter [a] (m)	Width (m)	Height (m)
Process	ATS Process Building	21.36	22.86	12.19
Utility[b]	Attached to the Process Building	9.14	22.86	7.62
T501502	T501/502 ABS Tower	1.30	--	21.95
V315	Sulfur Storage Tank	11.58	--	8.53
V530A	ATS Storage Tank	22.26	--	10.67
V530B	ATS Storage Tank	22.26	--	10.67

[a] Buildings without listed widths are circular; the reported length is the diameter of the structure.
[b] The Utility Building is attached to the west side of the Process Building.

5.2.7. Emission Source Parameters

Ammonia emissions occur from the S500 Vent Stack and fugitive leak components grouped into the following process areas: the R505 ATS Reactor, the T501 1st Stage ABS Tower, the 2nd Stage ABS Tower, and the D540A and D540B Ammonia Bullet Storage Tanks.

The S500 Vent Stack is oriented vertically, and is the only point source included in this modeling analysis. It is located near the north fenceline of the ATS Plant, to north of the ATS Process Building and to the south of the gravel road.

The R505 ATS Reactor is located inside of the ATS Process Building near the center of the building. Ammonia emissions from the reactor are not emitted from an associated vent or stack; thus, the source is modeled as a volume source based on the dimensions of the ATS Process Building, from which fugitive ammonia leaks are expected to occur through doors, windows, and general building heating and ventilation vents.

The T501 1st Stage ABS Tower and 2nd Stage ABS Tower are modeled as a single volume source, denoted "T501/502 ABS Tower." Together, these towers protrude above the southeast corner of the ATS Process Building.

The D540A and D540B ammonia bullet storage tanks are modeled as a single fugitive volume source, denoted "D540A/B Ammonia Storage Tanks." The tanks are horizontally-oriented tanks; their lengths are oriented north-south. They are located due east of the ATS Process Building.

Table 5.2-2 describes the sources of ammonia modeled at the ATS Plant as part of this modeling analysis. Table 5.2-2 provides the modeled point source parameters; Table 5.2-3 provides the modeled volume source parameters.

Table 5.2-2. ATS Plant Ammonia Source Descriptions

Model ID	Source Description
S500	Stack vent for process emissions from the R505 ATS Reactor and T501/502 ABS Towers
R505	Reactor in which liquid sulfur from storage, tail gas, and ammonia are reacted to produce ATS
T501502	ABS towers which receive tail gas from the B400 Incinerator Boiler and ammonia from the D540A/B Ammonia Storage Tanks
D540AB	Horizontally-oriented ammonia bullet storage tanks

Table 5.2-3. Modeled Point Source Release Parameters

Source ID	UTM X (m)	UTM Y (m)	Elevation (m)	Stack Height [a] (m)	Stack Temperature [b] (K)	Stack Velocity [b] (m/s)	Stack Diameter [a] (m)
S500	266,067	4,705,455	1,294	33.53	310.93	3.65	0.64

[a] The stack height and stack diameter of the S500 Vent Stack are provided in the process flow diagrams included in Appendix A.
[b] The stack temperature and stack velocity are based on chemical engineering design calculations.

Table 5.2-4. Modeled Volume Source Release Parameters

Source ID	UTM X (m)	UTM Y (m)	Elevation (m)	Release Height [a] (m)	Initial Lateral Dimension [a] (m)	Initial Vertical Dimension [a] (m)
R505	266,060	4,705,433	1,295	6.10	5.32	5.67
T501502	266,069	4,705,424	1,295	17.07	0.30	4.54
D540AB	266,125	4,705,443	1,294	1.83	1.77	1.70

[a] The release height, initial lateral dimension, and initial vertical dimension of the modeled volume sources are based on scaled dimensioning of the ATS Plant plot plan included in Appendix A.

5.3. MODELING RESULTS

Dispersion modeling is conducted to demonstrate compliance with Idaho's TAP standard for ammonia codified in IDAPA 58.01.01.585.

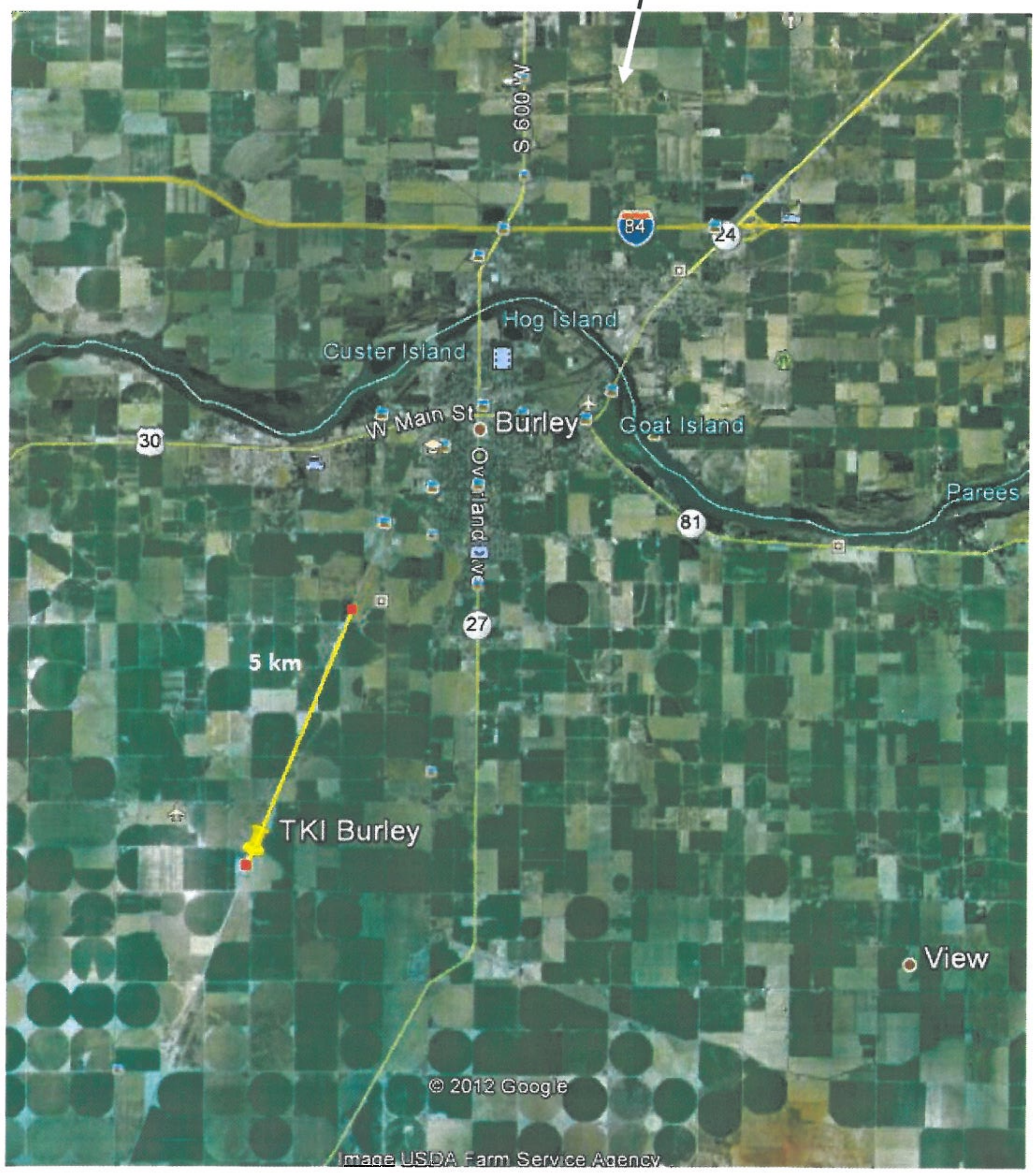
For this analysis, if the uncontrolled ambient concentration at the point of compliance is less than or equal to the AAC for ammonia, no further procedures for demonstrating preconstruction compliance is required as part of the application process. The point of compliance to which the AAC should be compared is defined in IDAPA 58.01.01.210.03(b) as "the receptor site that is estimated to have the highest ambient concentration of the TAP of all the receptor sites that are located either at or beyond the facility property boundary or at a point of public access." As such, this modeling analysis uses the highest modeled ammonia concentration to evaluate compliance with the toxics standards.

Ambient concentrations of ammonia are based on the AERMOD modeling results using the emission rates for ammonia presented in Table 5.1-4, assuming an annual operation of 8,760 hours. Ammonia modeling results are summarized in Table 5.3-1 below for each year. The maximum concentration from the five years is also presented. As demonstrated in Table 5.3-1, the maximum ambient concentration of ammonia is below the respective AAC; therefore, the project impacts are not expected to cause or contribute to a violation of the Idaho TAP standard for ammonia. Modeling files and a directory for electronic files are included in Appendix F.

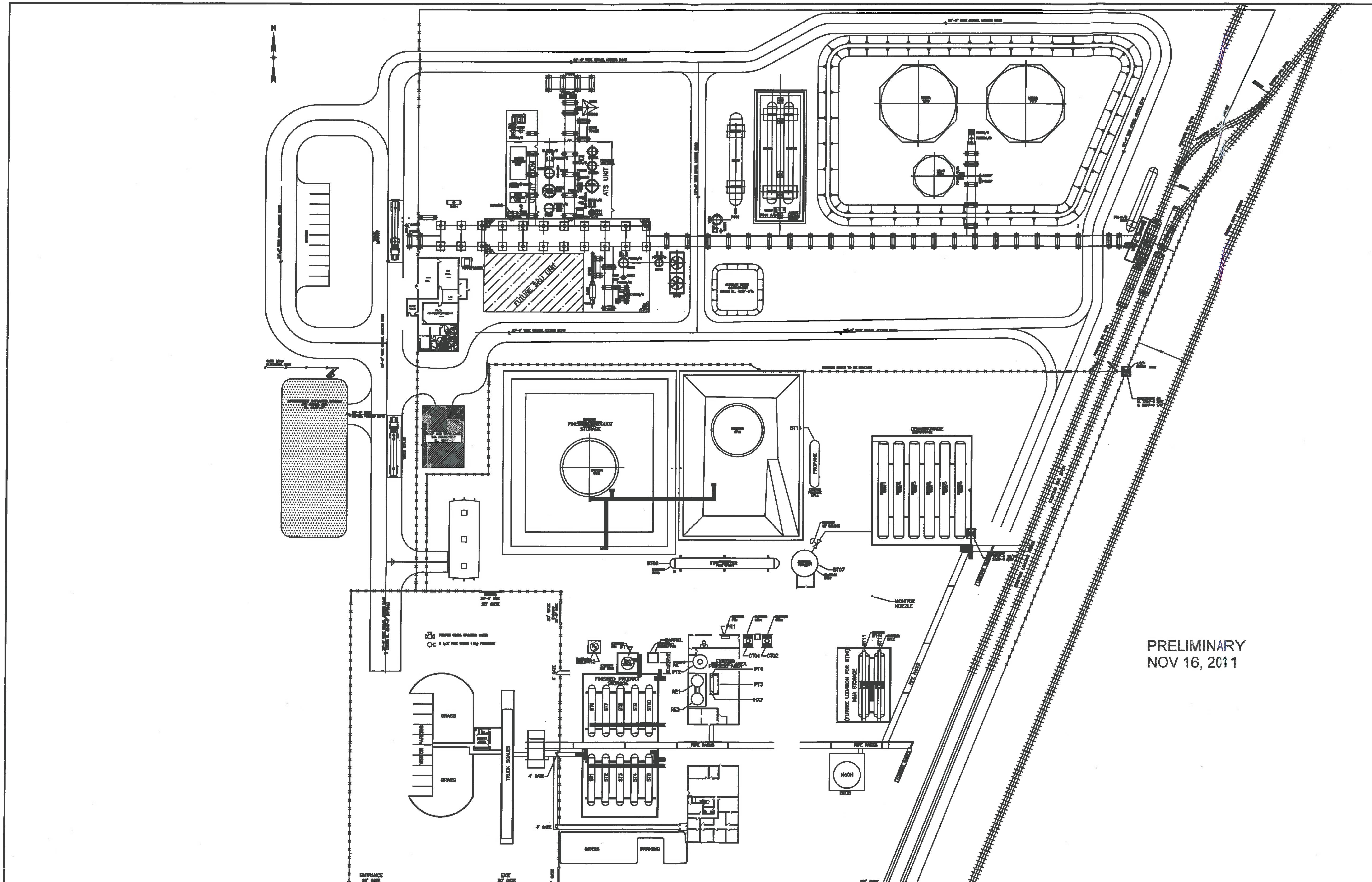
Table 5.3-1. Modeling Results

Year	Toxic Air Pollutant	Averaging Period	UTM Location [a] East (m)	UTM Location [a] North (m)	Modeled Results (mg/m³)	ACC (mg/m³)	Below AAC?
Maximum	Ammonia	24-hour	266,148	4,705,484	0.700	0.9	Yes
2006			266,128	4,705,484	0.633		
2007			266,148	4,705,484	0.700		
2008	Ammonia	24-hour	266,128	4,705,484	0.581	-	-
2009			266,108	4,705,484	0.540		
2010			266,128	4,705,484	0.564		

[a] The UTM location is the location of the receptor at which the maximum ambient concentration of ammonia occurs.
[b] The AAC is the acceptable ambient concentration for ammonia listed in IDAPA 58.01.01.585.



This area map is taken using the August 19, 2009 Google Earth projection. The ATS Plant is located in the southwest corner of the picture at the point labeled "TKI Burley." Note the 5 kilometer measurement extending northeast toward the city of Burley.



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CARLSBAD, NEW MEXICO 88220
(575) 885-4764

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BURLEY, ID.

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SCALE AS NOTED	

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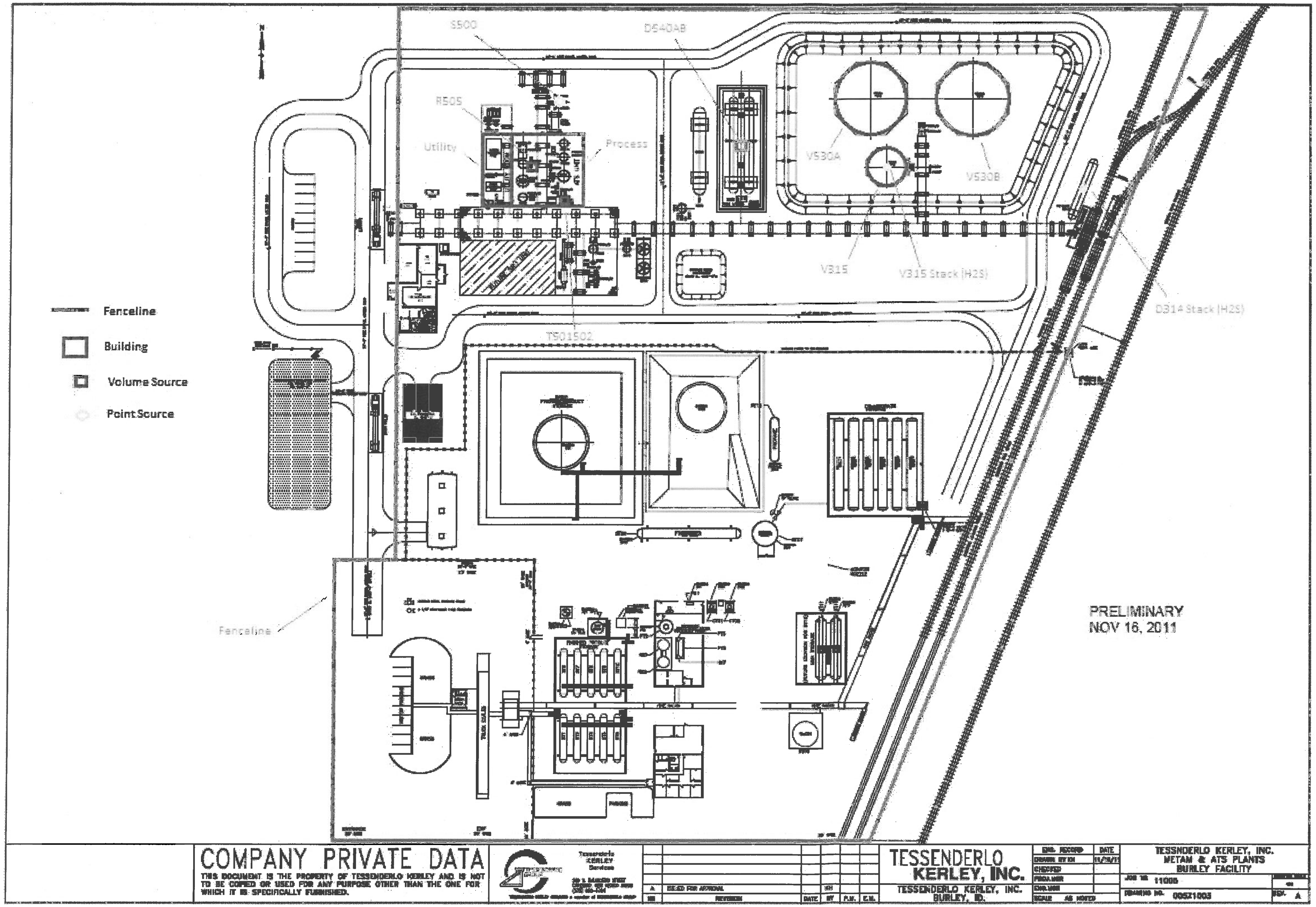
METAM & ATS PLANTS
BURLEY FACILITY

JOB NO 11005

DRAWING NO. 005Z1003

REV. A


S500
D640AB
R505
Utility
Process
V530A
V530B
V315
V315 Stack (H2S)
D314 Stack (H2S)
TS01502
Fenceline
Fenceline
Building
Volume Source
Point Source
PRELIMINARY
NOV 16, 2011
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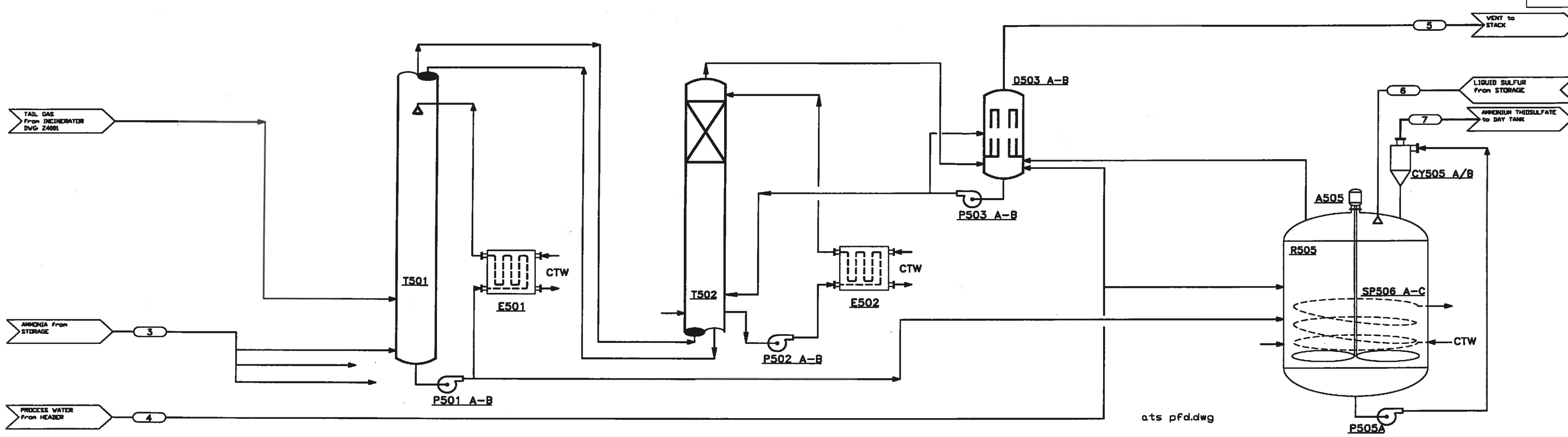
METAM & ATS PLANTS
BURLEY FACILITY
11005
00521003

T501	T502	D503 A-B	A505	R505
1st STAGE ABS TOWER	2nd STAGE ABS TOWER	GAS FILTERS	ATS REACTOR AGITATOR	ATS REACTOR
E501	**E502**	**P503 A-B**	**SP506 A-C**	**P505A**
1st STAGE COOLER	2nd STAGE COOLER	GAS FILTER PUMPS	ATS REACTOR COOLING COILS	ATS REACTOR PUMP
P501 A-B	**P502 A-B**			**CY505 A-B**
1st STAGE TOWER PUMPS	2nd STAGE TOWER PUMPS			ATS REACTOR CYCLONES



		AMMONIA				PROCESS WATER				VENT				SULFUR to REACTOR				ATS			
		3				4				5				6				7			
COMP	MW	MOLS	M%	LBS	W%	MOLS	M%	LBS	W%	MOLS	M%	LBS	W%	MOLS	M%	LBS	W%	MOLS	M%	LBS	W%
CH4	16.04																				
C2H6	30.07																				
C3H8	44.10																				
C4H10	58.12																				
C5H12	72.15																				
C6H14	86.18																				
N2	28.01									277.63	90.08	7777.4	92.28								
O2	32.00									6.917	2.244	221.32	2.626								
H2	2.016																				
CO2	44.01																				
CO	28.01																				
NO2	46.01									0.044	0.0144	2.037	0.024								
NH3	17.03	133.14	1.00E+02	2.27E+03	1.00E+02					0.045	0.0145	0.761	0.009					0.297	0.072	5.054	0.032
H2S	34.08																				
SO2	64.06									0.035	0.0115	2.271	0.027								
S	32.07													61.52	100.00	1972.8	100.00				
H2O	18.02					437.05	1.00E+02	7.87E+03	1.00E+02	23.53	7.634	423.84	5.029					347.21	83.88	6255.1	39.19
SO3	80.06																				
(NH4)2SO3	116.14																	4.087	0.987	474.62	2.973
(NH4)HSO3	99.11																				
(NH4)2SO4	132.14																	0.795	0.192	105.08	0.658
(NH4)2S2O3	148.21																	61.55	14.87	9122.4	57.15
	TOTAL	133.14	100.00	2268	100.00	437.05	100.00	7873.6	100.00	308.20	100.00	8427.6	100.00	61.52	100.00	1972.8	100.00	413.94	100.00	15962	100.00
		DegF	575.00			DegF	70.00			DegF	100.00	GPM		DegF	300.00			DegF	200.00	GPM	24.56
		psig	PUMP			psig	PUMP			psig	0.006	ACFM	2451.3	psig	PUMP			psig	PUMP	ACFM	

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E	ADDED REACTOR TO GAS FILTER VENT	11/3/11	jwm		
D	MODIFICATION PER REVIEW of 10/10/2011	10/11/11	jwm		
C	ISSUE for REVIEW	10/10/11	jwm		

TKI / MARSULEX
BURLEY, ID

ENG. RECORD		DATE
DRAWN	jwm	8-Jul-11
CHECKED		
PROJ MGR		
ENG MGR		
SCALE	NONE	

PROCESS FLOW DIAGRAM
TKI
BURLEY, ID - ATS PRODUCTION FACILITY
BURNING SULFUR

JOB NO. 01-11-005
DWG NO. Z5002 REV. E

Table A-1. Equipment List

Tag	Description	Comment
B400	Incinerator Boiler	13.5 MMBtu/hr
B600	Packaged Boiler	3.5 MMBtu/hr
C400A/B	Incinerator Air Blowers	
C540	Ammonia Unloading Compressor	
C600	Package Boiler Blower	
CT600	Cooling Tower	1000 gpm
D400	Incinerator	
D503A/B	Gas Filters	
D520	ATS Day Tank	5,902 gallons
D523	Reactor Feed Tank	3,300 gallons
D540A/B	Ammonia Storage Bullets	45,000 gallons (each)
D601	Propane Storage	
D314	Sulfur Unloading Tank	29,000 gallon
D609	Fire Water Tank	20,000 gallon
D615	Condensate Flash Drum	3,803 gallons
D620	Blowdown Drum	160 gallons
E501	1st Stage Cooler	
E502	2nd Stage Cooler	
E520	ATS Cooler	
E600	Steam Condenser Fin-Fan	
E609	Fire Water Tank Heater	
F400	Incinerator Burner	
FL520A/B	ATS Filters	
FL523	ABS Cleanup Filter	
FL530A/B	Loadout Filters	
FL605A/B	Particulate Filters	
FL607A/B	Coalescing Filter	
FL625	Waste Water Filter	
FL651	Waste Water Filter	
P314	Sulfur Pit Pump	
P315A/B	Sulfur Feed Pumps	
P500	Stack Pump	
P501A/B	1st Stage Tower Pump	
P502A/B	2nd Stage Tower Pumps	
P503A/B	Gas Filter Pumps	
P505	ATS Reactor Pumps	
P520A/B	ATS Forwarding Pumps	
P523A/B	Reactor Forwarding Pumps	
P525A/B	ABS Forwarding Pumps	
P530A/B	ATS Loading Pumps	
P540A/B	Ammonia Feed Pumps	
P600A/B	Cooling Tower Pumps	
P609	Firewater Recirculation Pumps	
P610A/B	Boiler Feed Water Pumps	
P615A/B	Condensate Pumps	
P620A/B	Boiler Blowdown Pumps	
P625A-G	Area sump Pumps	
P650 A/B	Process Water Pumps	
P651	Waste Water Pumps	
PS601	Water Softening System	
R505	ATS Reactor	
S500	Vent Stack	110 feet tall
T501	1st Stage ABS Tower	
T502	2nd Stage ABS Tower	
V315	Sulfur Storage Tank	110,000 gallon
V525	ABS Day Tank	22,400 gallon
V530A/B	ATS Storage Tanks	1,000,000 gallon (each)
V650	Process Water Tank	11,782 gallon
V651	Waste Water Tank	11,782 gallon
	Utility Air System	

APPENDIX B

Detailed Emission Calculations

Table B-1. ATS Plant Emission Summary (pounds per hour)

Source Category	Hourly Emissions (lb/hr)										
	NOx	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	H_2S	NH_3	GHGs	HAP
Combustion	0.34	0.29	0.03	0.03	0.03	0.02	2.06E-03	-	-	-	-
Fugitives	-	-	-	-	-	0.39	0.05	-	1.43	-	-
Loading Racks	-	-	-	-	-	0.00	-	-	-	-	-
Cooling Towers	-	-	0.01	0.01	2.46E-04	-	-	-	-	-	-
ATS Vent Stack	2.04	0.29	0.27	0.27	0.27	-	2.271	-	0.761	-	-
Storage Tanks	-	-	-	-	-	-	-	1.41	-	-	-
Total Increases	**2.38**	**0.58**	**0.30**	**0.30**	**0.29**	**0.40**	**2.32**	**1.41**	**2.20**		**0**
Level II Threshold	**2.4**	**175**		**2.6**	**0.63**		**2.5**				

Table B-2. ATS Plant Emission Summary (tons per year)

Source Category	Annual Emissions (tpy)										
	NOx	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	H_2S	NH_3	GHG	HAP
Combustion	1.50	1.26	0.11	0.11	0.11	0.08	0.01	-	-	2,142	-
Fugitives	-	-	-	-	-	1.69	0.22	-	6.28	-	-
Loading Racks	-	-	-	-	-	-	-	-	-	-	-
Cooling Towers	-	-	0.06	0.05	1.08E-03	-	-	-	-	-	-
ATS Vent Stack	8.92	1.27	1.16	1.16	1.16	-	9.95	-	3.33	-	-
Storage Tanks	-	-	-	-	-	-	-	6.20	-	-	-
Total Increases	**10.43**	**2.54**	**1.34**	**1.32**	**1.28**	**1.77**	**10.18**	**6.20**	**9.62**	**2,142**	**0**
Significant Emission Rate (SER)	**40**	**100**	**25**	**15**	**-**	**40**	**40**	**10**	**-**	**75,000**	**-**
10% SER	**4.0**	**10.0**	**2.5**	**1.5**		**4.0**	**4.0**	**1.0**		**7,500**	
Level II Threshold	**14**				**4.1**		**14**				

Table B-3. Facility-wide Emission Summary (pounds per hour) [a]

Source Category	Hourly Emissions (lb/hr)													
	NOx	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	H_2S	NH_3	CS_2	MMA	Metam	GHG	HAP
Combustion	0.56	0.41	0.04	0.04	0.04	0.04	2.39E-03	-	-	-	-	-	-	-
Fugitives	-	-	-	-	-	4.24	0.05	-	1.43	1.84	1.57	0.44	-	-
Loading Racks	-	-	-	-	-	83.55	-	-	-	-	-	83.55	-	-
Cooling Towers	-	-	0.32	0.26	5.81E-03	-	-	-	-	-	-	-	-	-
ATS Vent Stack	2.037	0.29	0.27	0.27	0.27	-	2.271	-	0.761	-	-	-	-	-
Storage Tanks	-	-	-	-	-	-	-	1.41	-	-	-	-	-	-
Site-Wide Totals	**2.59**	**0.70**	**0.62**	**0.57**	**0.31**	**87.82**	**2.32**	**1.41**	**2.20**	**1.84**	**1.57**	**83.99**		**3.42**
Major Source Thresholds														

[a] Table B-3 includes the total emissions from the ATS Plant and existing Metam Plant

Table B-4. Facility-wide Emission Summary (tons per year) [a]

Source Category	Annual Emissions (tpy)													
	NOx	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	H_2S	NH_3	CS_2	MMA [b]	Metam	GHG	HAP [c]
Combustion	2.43	1.80	0.16	0.16	0.16	0.15	0.01	-	-	-	-	-	891	-
Fugitives	-	-	-	-	-	18.59	0.22	-	6.28	8.07	6.89	1.93	-	-
Loading Racks	-	-	-	-	-	8.76	-	-	-	-	-	8.76	-	-
Cooling Towers	-	-	1.40	1.15	2.55E-02	-	-	-	-	-	-	-	-	-
ATS Vent Stack	8.92	1.27	1.16	1.16	1.16	-	9.95	-	3.33	-	-	-	-	-
Storage Tanks	-	-	-	-	-	-	-	6.20	-	-	-	-	-	-
Site-Wide Totals	**11.36**	**3.07**	**2.73**	**2.48**	**1.35**	**27.50**	**10.18**	**6.20**	**9.62**	**8.07**	**6.89**	**10.69**	**891**	**14.97**
Major Source Thresholds	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**10**	**10**	**10**	**75,000**	**25**

[a] Table B-4 includes the total emission from the ATS Plant and the existing Metam Plant.

[b] MMA is methyl methacrylate; MMA is a regulated HAP.

[c] The maximum annual emissions of any individual HAP is 8.07 tons per year of carbon disulfide.

Table B-5. ATS Plant Uncontrolled Emission Summary (pounds per hour)

Source Category	Hourly Emissions (lb/hr)										
	NOx	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	H_2S	NH_3	GHGs	HAP
Combustions	0.34	0.29	0.03	0.03	0.03	0.02	0.00	-	-	-	-
Fugitives	-	-	-	-	-	0.39	0.05	-	1.43	-	-
Loading Racks	-	-	-	-	-	0.00	-	-	-	-	-
Cooling Towers	-	-	0.01	0.01	0.00	-	-	-	-	-	-
ATS Vent Stack	2.04	0.29	53.06	53.06	53.06	-	2.27	-	0.76	-	-
Storage Tanks	-	-	-	-	-	-	-	1.41	-	-	-
Total Increases	**2.38**	**0.58**	**53.10**	**53.10**	**53.09**	**0.40**	**2.32**	**1.41**	**2.20**		**0**
Level II Threshold	**2.4**	**175**		**2.6**	**0.63**		**2.5**				

Table B-6. ATS Plant Uncontrolled Emission Summary (tons per year)

Source Category	Annual Emissions (tpy)										
	NOx	CO	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	H_2S	NH_3	GHG	HAP
Combustions	1.50	1.26	0.11	0.11	0.11	0.08	0.01	-	-	2,142	-
Fugitives	-	-	-	-	-	1.69	0.22	-	6.28	-	-
Loading Racks	-	-	-	-	-	-	-	-	-	-	-
Cooling Towers	-	-	0.06	0.05	0.00	-	-	-	-	-	-
ATS Vent Stack [a]	8.92	1.27	232.40	232.40	232.40	-	9.95	-	3.33	-	-
Storage Tanks	-	-	-	-	-	-	-	6.20	-	-	-
Total Increases	**10.43**	**2.54**	**232.58**	**232.57**	**232.52**	**1.77**	**10.18**	**6.20**	**9.62**	**2,142**	**0**
Significant Emission Rate (SER)	**40**	**100**	**25**	**15**	**-**	**40**	**40**	**10**	**-**	**75,000**	
10% SER	**4.0**	**10.0**	**2.5**	**1.5**		**4.0**	**4.0**	**1.0**		**7,500**	
Level II Threshold	**14**				**4.1**		**14**				

[a] The only control devices present at the ATS Plant are the high efficiency particulate filters in the S500 Vent Stack. According to the specification sheet for the Kimre Technologies Fiber-Bed Filters, the high efficiency filters have a removal efficiency of 99.5 percent for particulate smaller than a micron in diameter. The filters may provide some control of ammonia and sulfur dioxide, but no information is available regarding the level of control provided.

Table B-7. Fugitive Emission Factors

Component Type	Component Service	SOCMI Average Emission Factors [1] (kg/hr/Comp)
Valves	Gas	0.00597
	Light Liquid	0.00403
	Heavy Liquid	0.00023
Pumps	Light Liquid	0.0199
	Heavy Liquid	0.00862
Compressors	Gas	0.228
PRVs	Gas	0.104
Connectors	Gas	0.00183
	Light Liquid	0.00183
	Heavy Liquid	0.00183
Open-Ended Lines	Gas	0.0017
	Light Liquid	0.0017
	Heavy Liquid	0.0017
Sampling Connections	Gas	0.015
	Light Liquid	0.015
	Heavy Liquid	0.015

[1] Emission Factors acquired from "TABLE 2-1. SOCMI AVERAGE EMISSION FACTORS" of the*EPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, November 1995.*

Table B-8. ATS Plant Component Count

ATS Plant		H2S ppm		NH3 - 100%		S02 - 19%		S02 ppm		Natural Gas		Other
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Count
P&ID	**005Z306**											
Sulfur storage	Pumps											
	Compressors											
	Relief Devices											
	Instrumentation											
	Valves											
	Vent Sulfur Storage											
	Flanges (to equipment)											
	Sum	0	0	0	0	0	0	0	0	0	0	0
P&ID	**005Z307**											
Sulfur storage	Pumps											
	Compressors											
	Relief Devices											
	Instrumentation											
	Valves											
	Vent Sulfur Storage											
	Flanges (to equipment)											
	Sum	0	0	0	0	0	0	0	0	0	0	0
P&ID	**005Z402**											
Incinerator	Pumps											
	Compressors											
	Relief Devices											
	Instrumentation										3	
	Valves										15	
	Vent Sulfur Storage											
	Flanges (to equipment)						9				1	
	Sum	0	0	0	0	0	9	0	0	0	19	0
P&ID	**005Z403**											
Incn. Boiler	Pumps											
	Compressors											
	Relief Devices											
	Instrumentation						2					
	Valves											
	Vent Sulfur Storage											
	Flanges (to equipment)						3					
	Sum	0	0	0	0	0	5	0	0	0	0	0
P&ID	**005Z501**											
ABS 1st stg	Pumps											
	Compressors											
	Relief Devices			4								
	Instrumentation			1			1					
	Valves			17								
	Vent Sulfur Storage											
	Flanges (to equipment)											
	Sum	0	0	22	0	0	1	0	0	0	0	0
P&ID	**005Z502**											
ABS 2nd stg	Pumps			0								
	Compressors											
	Relief Devices			4								
	Instrumentation			1	0							
	Valves			14	0							
	Vent Sulfur Storage											
	Flanges (to equipment)			0								
	Sum	0	0	19	0	0	0	0	0	0	0	0

P&ID	**005Z503**											
Gas filters	**Pumps**											
	Compressors											
	Relief Devices											
	Instrumentation											
	Valves											
	Vent Sulfur Storage											
	Flanges (to equipment)											
	Sum	0	0	0	0	0	0	0	0	0	0	0
P&ID	**005Z504**											
Stack	**Pumps**											
	Compressors											
	Relief Devices											
	Instrumentation											
	Valves											
	Vent Sulfur Storage											
	Flanges (to equipment)											
	Sum	0	0	0	0	0	0	0	0	0	0	
P&ID	**005Z505**											
ATS Reactor	**Pumps**											
	Compressors											
	Relief Devices			4								
	Instrumentation			1								
	Valves			8								
	Vent Sulfur Storage											
	Flanges (to equipment)											
	Sum	0	0	13	0	0	0	0	0	0	0	
P&ID	**005Z506**											
NH3 storage	**Pumps**			2								
	Compressors				1							
	Relief Devices			9	3							
	Instrumentation			6	7							
	Valves			20	18							
	Vent Sulfur Storage											
	Flanges (to equipment)			9	15							
	Sum	0	0	46	44	0	0	0	0	0	0	0
P&ID	**005Z601**											
Nat. Gas	**Pumps**											
	Compressors											
	Relief Devices											
	Instrumentation										1	
	Valves										4	
	Vent Sulfur Storage											
	Flanges (to equipment)											
	Sum	0	0	0	0	0	0	0	0	0	5	0
	Totals											
	Pumps	0	0	2	0	0	0	0	0	0	0	0
	Compressors	0	0	0	1	0	0	0	0	0	0	0
	Relief Devices	0	0	21	3	0	0	0	0	0	0	0
	Instrumentation	0	0	9	7	0	3	0	0	0	4	0
	Valves	0	0	59	18	0	0	0	0	0	19	0
	Vent Sulfur Storage	0	0	0	0	0	0	0	0	0	0	0
	Flanges (to equipment)	0	0	9	15	0	12	0	0	0	1	0
	Sum	0	0	100	44	0	15	0	0	0	24	0

Table B-9. Metam Plant Component Count [a]

Metam Plant		CS2 - 100%		MMA - 100%		Reactor 1		Reactor 2		Vent header	
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
P&ID	**005Z102**										
CS2 tanks	Pumps	2									
	Compressors										
	Relief Devices	6	6								
	Instrumentation	2	13								
	Valves	40	25								
	Flanges (to equipment)	6	24								
	Sum	56	68	0	0	0	0	0	0	0	0
P&ID	**005Z103**										
MMA tanks	Pumps			2							
	Compressors				1						
	Relief Devices			5	6						
	Instrumentation			5	8						
	Valves			26	16						
	Flanges (to equipment)				10						
	Sum	0	0	38	41	0	0	0	0	0	0
P&ID	**005Z105**										
Day tanks	Pumps										
	Compressors										
	Relief Devices										
	Instrumentation										
	Valves										
	Flanges (to equipment)										
	Sum	0	0	0	0	0	0	0	0	0	0
P&ID	**005Z108**										
Reactors	Pumps					2		2			
	Compressors										
	Relief Devices										2
	Instrumentation			1		11		8			
	Valves	9		9		26		28			13
	Flanges (to equipment)					4		4			8
	Sum	9	0	10	0	43	0	42	0	0	23
P&ID	**005Z109**										
Flash vessels	Pumps	1									
	Compressors										
	Relief Devices	1									
	Instrumentation	1	1								
	Valves	5	4				3		3		3
	Flanges (to equipment)	1	5				2		2		2
	Sum	9	10	0	0	0	5	0	5	0	5
	Totals										
	Pumps	3	0	2	0	2	0	2	0	0	0
	Compressors	0	0	0	1	0	0	0	0	0	0
	Relief Devices	7	6	5	6	0	0	0	0	0	2
	Instrumentation	3	14	6	8	11	0	8	0	0	0
	Valves	54	29	35	16	26	3	28	3	0	16
	Flanges (to equipment)	7	29	0	10	4	2	4	2	0	10
	Sum	74	78	48	41	43	5	42	5	0	28

[a] Table B-9 provides the component count for the existing Metam Plant.

Table B-10. ATS Plant Fugitive Emission Calculation

Unit	Component Type	Component Service	Average Emission Factor (kg/hr/Comp)	Control Efficiency (%)	NH_3 Component Count	NH_3 Content (wt%)	NH_3 Emissions (lb/hr)	NH_3 Emissions (tpy)	SO_2 Component Count	SO_2 Content (wt%)	SO_2 Emissions (lb/hr)	SO_2 Emissions (tpy)	Propane Component Count	Propane Content (wt%)	Propane Emissions (lb/hr)	Propane Emissions (tpy)
P&ID: 005Z306																
Sulfur Storage	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: Sulfur Storage					**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**
P&ID: 005Z307																
Sulfur Storage	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: Sulfur Storage					**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**
P&ID: 005Z402																
Incinerator	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	3	100	0.10	0.43
	Instrumentation	Light Liquid	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	15	100	0.20	0.86
	Valves	Light Liquid	0.00403		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	9	35	0.01	0.06	1	100	0.00	0.02
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: Incinerator					**0**		**0.00**	**0.00**	**9**		**0.01**	**0.06**	**19**		**0.30**	**1.31**

P&ID: 005Z403																
Incn. Boiler	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	2	35	0.02	0.10	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	3	35	0.00	0.02	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: Incn. Boiler					**0**		**0.00**	**0.00**	**5**		**0.03**	**0.12**	**0**		**0.00**	**0.00**
P&ID: 005Z501																
ABS 1st stg	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	4	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	1	35	0.01	0.05	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		1	100	0.03	0.14	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		17	100	0.15	0.66	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: ABS 1st stg					**22**		**0.1837**	**0.80**	**1**		**0.01**	**0.05**	**0**		**0.00**	**0.00**
P&ID: 005Z502																
ABS 2nd stg	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	4	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		1	100	0.03	0.14	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		14	100	0.12	0.54	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: ABS 2nd stg					**19**		**0.1571**	**0.69**	**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**

P&ID: 005Z503																
Gas filters	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: Gas filters					**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**
P&ID: 005Z504																
Stack	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: Stack					**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**
P&ID: 005Z505																
ATS Reactor	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	4	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		1	100	0.03	0.14	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		8	100	0.07	0.31	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: ATS Reactor					**13**		**0.1039**	**0.46**	**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**

P&ID: 005Z506																
NH_3 Storage	Pumps	Light Liquid	0.01990	100	2	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800	90	1	100	0.05	0.22	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	3	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	9	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		7	100	0.23	1.01	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Light Liquid	0.01500		6	100	0.20	0.87	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		18	100	0.24	1.04	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Light Liquid	0.00403		20	100	0.18	0.78	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		15	100	0.06	0.26	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		9	100	0.04	0.16	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: NH3 Storage					**90**		**0.9895**	**4.33**	**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**
P&ID: 005Z601																
Propane	Pumps	Light Liquid	0.01990	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Compressors	Gas	0.22800		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Gas	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Relief Devices	Light Liquid	0.10400	100	0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Instrumentation	Gas	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	1	100	0.03	0.14
	Instrumentation	Light Liquid	0.01500		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Valves	Gas	0.00597		0	100	0.00	0.00	0	35	0.00	0.00	4	100	0.05	0.23
	Valves	Light Liquid	0.00403		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Vent Sulfur Storage	Gas	0.00170		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Gas	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.00183		0	100	0.00	0.00	0	35	0.00	0.00	0	100	0.00	0.00
Subtotal: Propane					**0**		**0.00**	**0.00**	**0**		**0.00**	**0.00**	**5**		**0.09**	**0.37**
Total ATS Plant	Pumps	Light Liquid			2		0.00	0.00	0		0.00	0.00	0		0.00	0.00
	Compressors	Gas			1		0.05	0.22	0		0.00	0.00	0		0.00	0.00
	Relief Devices	Gas			3		0.00	0.00	0		0.00	0.00	0		0.00	0.00
	Relief Devices	Light Liquid			21		0.00	0.00	0		0.00	0.00	0		0.00	0.00
	Instrumentation	Gas			7		0.23	1.01	3		0.03	0.15	4		0.13	0.58
	Instrumentation	Light Liquid			9		0.30	1.30	0		0.00	0.00	0		0.00	0.00
	Valves	Gas			18		0.24	1.04	0		0.00	0.00	19		0.25	1.09
	Valves	Light Liquid			59		0.52	2.29	0		0.00	0.00	0		0.00	0.00
	Vent Sulfur Storage	Gas			0		0.00	0.00	0		0.00	0.00	0		0.00	0.00
	Flanges (to equipment)	Gas			15		0.06	0.26	12		0.02	0.07	1		0.00	0.02
	Flanges (to equipment)	Light Liquid			9		0.04	0.16	0		0.00	0.00	0		0.00	0.00
					144		**1.43**	**6.28**	**15**		**0.05**	**0.22**	**24**		**0.39**	**1.69**

Table B-11. Metam Plant Fugitive Emissions

Unit	Component Type	Component Service	Average Emission Factor (kg/hr/Comp)	Control Efficiency (%)	CS_2 Component Count	CS_2 Content (wt%)	CS_2 Emissions (lb/hr)	CS_2 Emissions (tpy)	MMA Component Count	MMA Content (wt%)	MMA Emissions (lb/hr)	MMA Emissions (tpy)	Reactor 1 Component Count	Reactor 1 - CS_2 Content (wt%)	Reactor 1 - CS_2 Emissions (lb/hr)	Reactor 1 - CS_2 Emissions (tpy)	Reactor 1 - MMA Content (wt%)	Reactor 1 - MMA Emissions (lb/hr)	Reactor 1 - MMA Emissions (tpy)	Reactor 1 - Metam Content (wt%)	Reactor 1 - Metam Emissions (lb/hr)	Reactor 1 - Metam Emissions (tpy)	Reactor 2 Component Count	Reactor 2 - CS_2 Content (wt%)	Reactor 2 - CS_2 Emissions (lb/hr)	Reactor 2 - CS_2 Emissions (tpy)	Reactor 2 - MMA Content (wt%)	Reactor 2 - MMA Emissions (lb/hr)	Reactor 2 - MMA Emissions (tpy)	Reactor 2 - Metam Content (wt%)	Reactor 2 - Metam Emissions (lb/hr)	Reactor 2 - Metam Emissions (tpy)	Vent Header Component Count	Vent Header - CS_2 Content (wt%)	Vent Header - CS_2 Emissions (lb/hr)	Vent Header - CS_2 Emissions (tpy)	Vent Header - MMA Content (wt%)	Vent Header - MMA Emissions (lb/hr)	Vent Header - MMA Emissions (tpy)
CS2 tanks	Pumps	Light Liquid	0.019900	100	2	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Compressors	Gas	0.228000		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Gas	0.104000	100	6	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Light Liquid	0.104000	100	6	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Gas	0.015000		13	100	0.43	1.88	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Light Liquid	0.015000		2	100	0.07	0.29	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Gas	0.005970		25	100	0.33	1.44	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Light Liquid	0.004030		40	100	0.35	1.55	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Gas	0.001830		24	100	0.10	0.42	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.001830		6	100	0.02	0.11	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
Subtotal: CS2 tanks					124		1.30	5.69	0		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00
MMA tanks	Pumps	Light Liquid	0.019900	100	0	100	0.00	0.00	2	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Compressors	Gas	0.228000		0	100	0.00	0.00	1	100	0.50	2.20	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Gas	0.104000	100	0	100	0.00	0.00	6	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Light Liquid	0.104000	100	0	100	0.00	0.00	5	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Gas	0.015000		0	100	0.00	0.00	8	100	0.26	1.16	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Light Liquid	0.015000		0	100	0.00	0.00	5	100	0.17	0.72	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Gas	0.005970		0	100	0.00	0.00	16	100	0.21	0.92	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Light Liquid	0.004030		0	100	0.00	0.00	26	100	0.23	1.01	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Gas	0.001830		0	100	0.00	0.00	10	100	0.04	0.18	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.001830		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
Subtotal: MMA tanks					0		0.00	0.00	79		1.41	6.18	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00
Day tanks	Pumps	Light Liquid	0.019900	100	0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Compressors	Gas	0.228000		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Gas	0.104000	100	0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Light Liquid	0.104000	100	0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Gas	0.015000		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Light Liquid	0.015000		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Gas	0.005970		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Light Liquid	0.004030		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Gas	0.001830		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.001830		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
Subtotal: Day tanks					0		0.00	0.00	0		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00
Reactors	Pumps	Light Liquid	0.019900	100	0	100	0.00	0.00	0	100	0.00	0.00	2	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	2	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Compressors	Gas	0.228000		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Gas	0.104000	100	0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	2	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Light Liquid	0.104000	100	0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Gas	0.015000		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Light Liquid	0.015000		0	100	0.00	0.00	1	100	0.03	0.14	11	9.6	0.03	0.15	4.4	0.02	0.07	30.1	0.11	0.48	8	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.11	0.49	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Gas	0.005970		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	13	85.6	0.15	0.64	7.3	0.01	0.05
	Valves	Light Liquid	0.004030		9	100	0.08	0.35	9	100	0.08	0.35	26	9.6	0.02	0.10	4.4	0.01	0.04	30.1	0.07	0.30	28	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.10	0.46	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Gas	0.001830		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	8	85.6	0.03	0.12	7.3	0.00	0.01
	Flanges (to equipment)	Light Liquid	0.001830		0	100	0.00	0.00	0	100	0.00	0.00	4	9.6	0.00	0.01	4.4	0.00	0.00	30.1	0.00	0.02	4	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.01	0.03	0	85.6	0.00	0.00	7.3	0.00	0.00
Subtotal: Reactors					9		0.08	0.35	10		0.11	0.49	43		0.06	0.26		0.03	0.12		0.18	0.80	42		0.00	0.00		0.00	0.01		0.22	0.98	23		0.17	0.76		0.01	0.07
Flash vessels	Pumps	Light Liquid	0.019900	100	1	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Compressors	Gas	0.228000		0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Gas	0.104000	100	0	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Relief Devices	Light Liquid	0.104000	100	1	100	0.00	0.00	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Gas	0.015000		1	100	0.03	0.14	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Instrumentation	Light Liquid	0.015000		1	100	0.03	0.14	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Valves	Gas	0.005970		4	100	0.05	0.23	0	100	0.00	0.00	3	9.6	0.00	0.02	4.4	0.00	0.01	30.1	0.01	0.05	3	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.02	0.07	3	85.6	0.03	0.15	7.3	0.00	0.01
	Valves	Light Liquid	0.004030		5	100	0.04	0.19	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
	Flanges (to equipment)	Gas	0.001830		5	100	0.02	0.09	0	100	0.00	0.00	2	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.01	2	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.01	2	85.6	0.01	0.03	7.3	0.00	0.00
	Flanges (to equipment)	Light Liquid	0.001830		1	100	0.00	0.02	0	100	0.00	0.00	0	9.6	0.00	0.00	4.4	0.00	0.00	30.1	0.00	0.00	0	0.0	0.00	0.00	0.4	0.00	0.00	42.2	0.00	0.00	0	85.6	0.00	0.00	7.3	0.00	0.00
Subtotal: Flash vessels					19		0.19	0.82	0		0.00	0.00	5		0.00	0.02		0.00	0.01		0.01	0.06	5		0.00	0.00		0.00	0.00		0.02	0.09	5		0.04	0.18		0.00	0.02
Total Metam Plant	Pumps	Light Liquid			3		0.00	0.00	2		0.00	0.00	2		0.00	0.00		0.00	0.00		0.00	0.00	2		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00
	Compressors	Gas			0		0.00	0.00	1		0.50	2.20	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00
	Relief Devices	Gas			6		0.00	0.00	6		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	2		0.00	0.00		0.00	0.00
	Relief Devices	Light Liquid			7		0.00	0.00	5		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00
	Instrumentation	Gas			14		0.46	2.02	8		0.26	1.16	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00		0.00	0.00	0		0.00	0.00		0.00	0.00
	Instrumentation	Light Liquid			3		0.10	0.43	6		0.20	0.87	11		0.03	0.15		0.02	0.07		0.11	0.48	8		0.00	0.00		0.00	0.00		0.11	0.49	0		0.00	0.00		0.00	0.00
	Valves	Gas			29		0.38	1.67	16		0.21	0.92	3		0.00	0.02		0.00	0.01		0.01	0.05	3		0.00	0.00		0.00	0.00		0.02	0.07	16		0.18	0.79		0.02	0.07
	Valves	Light Liquid			54		0.48	2.10	35		0.31	1.36	26		0.02	0.10		0.01	0.04		0.07	0.30	28		0.00	0.00		0.00	0.00		0.10	0.46	0		0.00	0.00		0.00	0.00
	Flanges (to equipment)	Gas			29		0.12	0.51	10		0.04	0.18	2		0.00	0.00		0.00	0.00		0.00	0.01	2		0.00	0.00		0.00	0.00		0.00	0.01	10		0.03	0.15		0.00	0.01
	Flanges (to equipment)	Light Liquid			7		0.03	0.12	0		0.00	0.00	4		0.00	0.01		0.00	0.00		0.00	0.02	4		0.00	0.00		0.00	0.00		0.01	0.03	0		0.00	0.00		0.00	0.00
					152		1.57	6.86	89		1.52	6.68	48		0.06	0.28		0.03	0.13		0.20	0.87	47		0.00	0.00		0.00	0.01		0.24	1.06	28		0.21	0.94		0.02	0.08

Table B-12. ATS Plant Sulfur Dioxide Emissions

Stream		Sulfur [1] 1				Combustion Air [1] 2				Incinerator Tail Gas [2]			
COMP	MW	MOLS	M%	LBS	W%	MOLS	M%	LBS	W%	MOLS	M%	LBS	W%
N2	28.01					277.65	79	7778	76.71	277.65	79.00	7,777.0	63.39
O2	32.00					73.81	21	2361.7	23.29	7.37	2.10	235.70	1.92
H2S	34.08	0.023	0.035	0.792	0.037								
SO2 [3]	64.06									66.43	18.90	4,255.7	34.69
S	32.07	66.41	99.97	2129.6	99.96								
H2O	18.02					0.003	7.27E-04	0.046	4.54E-04	0.03	0.0074	0.47	0.0038
Total		**66.43**	**100.0**	**2,130.4**	**100.0**	**351.46**	**100.0**	**10,140**	**100.0**	**351.47**	**100.00**	**12,268.8**	**100.00**

[1] Stream composition per Process Flow Diagram for Sulfur Burning dated 10/11/2011.

[2] Assuming 100% conversion of S and H_2S into SO_2.

[3] Calculated volume percent (18.9%) is consistent with data provided by TKI (19%).

Table B-13. ATS Plant Combustion Emissions

Description	Capacity [a] (MMBtu/hr)	Fuel Type	Annual Operation (hr/yr)	Pollutant	Emission Factor [b] (lb/MMbtu)	Potential Emissions (lb/hr)	(tpy)
B600 Package Steam Boiler	3.50	Propane	8,760	$PM/PM_{10}/PM_{2.5}$ [c]	0.00765	0.03	0.12
				SO_2	0.000219	0.001	0.003
				NO_X	0.1421	0.50	2.18
				VOC	0.01093	0.04	0.17
				CO	0.0820	0.29	1.26
				CO_2	136.6120	478.14	2,094
				N_2O	0.0098	0.03	46.74
				CH_4	0.0022	0.01	0.70
				CO_2e [e]	--	--	2,142
Hot Water Heater	1.50	Propane	8,760	$PM/PM_{10}/PM_{2.5}$ [c]	0.00765	0.01	0.05
				SO_2 [d]	0.000219	0.0003	0.001
				NO_X	0.1421	0.21	0.93
				VOC	0.0109	0.02	0.07
				CO	0.0820	0.12	0.54
				CO_2	136.6120	204.51	896
				N_2O	0.0098	0.01	20.0
				CH_4	0.0022	0.00	0.30
				CO_2e [e]	--	--	916

[a] The capacity of the B600 Package Steam Boiler is given in the ATS Plant equipment list included in Appendix A. Water heater capacity provided via email by Dawn Kominski, TKI to Anna Henolson, Trinity Consultants on 12/14/2011.

[b] Propane emission factors are based on emission factors for LPG Combustion, Industrial Boilers, given in AP-42 Section 1.5 Liquified Petroleum Gas Combustion, July 2008. Per Table 1.5-1, a heat content of 91.5 MMBtu/1000 gal is used for propane.

[c] It is conservatively assumed that $PM_{2.5} = PM_{10} = PM$.

[d] Sulfur content in fuel conservatively assumed to be 0.2 grains/100 cubic feet

[e] Carbon dioxide equivalent (CO_2e) is the sum of CO_2, N_2O, and CH_4. Global warming potentials are considered when determining the potential emissions of each GHG. Global warming potentials are as follows: CO_2 - 1; N_2O - 310; and CH_4 - 21.

Table B-14. Cooling Tower Particulate Emissions

Unit ID	Description	Cooling Tower Water Circulation Rate [1]	Concentration of Total Dissolved Solids in Water [2]	Drift Loss of Circulating Water [3]	Hourly Emissions (lb/hr) [4, 5]			Annual Emissions (tpy)		
		(gal/min)	(ppm by weight)	(%)	PM	PM_{10}	$PM_{2.5}$	PM	PM_{10}	$PM_{2.5}$
CT01	Metam Cooling Tower #1	1,500	1,500	0.020	0.225	0.185	0.0041	0.99	0.81	0.018
CT02	Metam Cooling Tower #2	540	1,500	0.020	0.081	0.067	0.0015	0.36	0.29	0.006
CT600	ATS Cooling Tower	1,000	2,700	0.001	0.014	0.011	0.0002	0.06	0.05	0.001
Totals					*0.320*	*0.263*	*0.0058*	*1.40*	*1.15*	*0.025*

[1] Metam plant cooling tower pump flowrate provided via email by Dawn Kominski, TKI to Anna Henolson, Trinity Consultants on December 14 and 15, 2011.
ATS cooling tower pump flowrate provided via email by Dawn Kominski, TKI to Anna Henolson, Trinity Consultants on January 31, 2012.
[2] TSD for cooling tower water (with softening system) provided via email by Dawn Kominski, TKI to Anna Henolson, Trinity Consultants on January 31, 2012.
[3] Drift rate for CT600 cooling tower provided via email by Dawn Kominski, TKI to Anna Henolson, Trinity Consultants on January 3, 2012. The Metam cooling towers drift rates are based on AP-42 Table 13.4-1.

[4] Hourly PM emission rate (lbs/hr) = (Cooling tower water circulation rate [gal/min]) x (Concentration of total dissolved solids in circulating water [ppm by weight]) / (1,000,000) x (Drift loss of circulating water [%]) / (100) x (Density of water [lb/gal]) x (60 min/hr),
where, Density of water: 8.35 lb/gal
[5] The PM_{10} and $PM_{2.5}$ speciation methodology is based on the technical paper "Calculating Realistic PM_{10} Emissions from Cooling Towers", by Joel Reisman and Gordon Frisbie.
Hourly PM10 emission rate (lbs/hr) = (Hourly emissions of PM) x (Percent of PM10 emissions (%)/100)
Hourly PM2.5 emission rate (lbs/hr) = (Hourly emissions of PM) x (Percent of PM2.5 emissions (%)/100)

Table B-15. Particle Size Distribution Based on TDS [1]

TDS (ppm)	1,500	
EPRI Droplet Diameter (um) [2]	Solid Particle Diameter (um) [3]	EPRI % Mass Smaller [2]
10	0.88	0
20	1.76	0.196
30	2.64	0.226
40	3.52	0.514
50	4.40	1.816
60	5.28	5.702
70	6.16	21.348
90	7.92	49.812
110	9.68	70.509
130	11.44	82.023
150	13.20	88.012
180	15.84	91.032
210	18.48	92.468
240	21.12	94.091

[1] Particle size distribution calculated based on emission calculations outlined in *Reisman, J. and G. Frisbie "Calculating Realistic PM10 Emissions from Cooling Towers" Greystone Environmental Consultants, Inc., 650 University Avenue, Suite 100, Sacramento, CA 95825.*

[2] The EPRI Droplet Diameter and the EPRI % Mass Smaller were provided by Brentwood Industries, a drift eliminator manufacturer, from a test conducted by Environmental Systems Corporation (ESC) at the Electric Power Research Institute (EPRI) test facility. The drift eliminator used in this study achieved a tested drift rate of 0.0003 percent. The droplets produced during the study are expected to be smaller than those produced from Linde's drift eliminator, which has a larger drift rate.

[3] Solid particle diameter is calculated from EPRI droplet diameter assuming that each water droplet evaporates shortly after being emitted into a single, solid, spherical particle. Other assumptions include:

$\rho_{droplet}$	1	g/cm^3
ρ_{solid}	2.2	g/cm^3

Table B-16. Particle Size Distribution for PM2.5 and PM10

TDS (ppm)	Solid Particle Diameter used for PM10 (um)	% of Particles where diameter < 10 um	Solid Particle Diameter used for PM2.5 (um) [1]	% of Particles where diameter < 2.5 um
1500	11.44	82.023	4.40	1.816

[1] For conservatism, the particle size diameter which is two increments greater than 2.5 um size classification is used in determining the fraction of particles less than 2.5 um in diameter.

Table B-17. S500 Vent Stack Controlled Emissions

Emission Factor/Total	Pollutant			
	PM	PM_{10} [d]	$PM_{2.5}$ [d]	CO
Emission Factor (lb/dscf) (x10^-6) [a]	2.02	2.02	2.02	2.22
Emission Factor (lb/hr) [b]	0.27	0.27	0.27	0.29
Emission Total (tpy) [c]	1.16	1.16	1.16	1.27

[a] Pound per dry standard cubic foot emission factors are based on source testing at a similar ATS Plant.

[b] The pound per hour emission factor is based on a flow rate of 2451.3 acfm and 5.029 vapor weight percent.

[c] Assumes continuous operation of 8,760 hours per year.

[d] Conservatively assumes all particulate emissions are less than 2.5 microns in diameter; i.e., PM = $PM_{10} = PM_{2.5}$.

Table B-18. Sulfur Storage Tank Emissions

Unit ID	Description	Stream Composition [a]		Throughput [b]	H_2S Emissions [c]	
		S wt%	H_2S wt%	(tpy)	(lb/hr)	(tpy)
V315	Sulfur Storage Tank	99.96	0.037	16,745	1.41	6.20

[a] Stream composition per Process Flow Diagram for Sulfur Burning dated 10/11/2011.

[b] Annual throughput per Products RM Logistics dated 11/01/11.

[c] It is conservatively assumed that all H_2S in the sulfur feed is released during storage.

Table B-19. Emission Factor for Liquid Loading

Description	Material Loaded	Vapor Molecular Weight (lb/lb-mol)	Density [a] (lb/gal)	Vapor Pressure [b] (psia)	Saturation Factor [c]	Loading Loss [d] (lb/1,000 gal)
Metam by Rail	Metam	129.19	10.07	0.41	1.45	1.80
Metam by Truck	Metam	129.19	10.07	0.41	1.45	1.80
ATS by Rail [e]	ATS	148.21	-	N/A	N/A	-
ATS by Truck [e]	ATS	148.21	-	N/A	N/A	-

[a] Density at 68 °F per TKI MSDS #65700 for Metam

[b] Vapor pressure provided via email by Dawn Kominski, TKI to Anna Henolson, Trinity Consultants on 12/09/2011.

[c] Saturation factor per EPA AP-42, Section 5.2, Transportation And Marketing Of Petroleum Liquids, July 2008, for Splash loading of a clean cargo tank.

[d] Methodology from AP-42, Section 5.2, Transportation And Marketing Of Petroleum Liquids, July 2008. Note that due to the low volatility of ATS, the loading loss associated with the ATS Plant is negligible.

It is assumed that loading temperature for Metam is 68 °F, which i 527.67 °R

[e] No loading emission is expected from ATS loading operation due to low volatility of the ATS solution.

Sample Calculation - Metam Rail Loading

$L_L = 12.46\ (SPM/T)$

where

L_L = loading loss, lb/1,000 gallons of liquid loaded
S = saturation factor (from AP-42 Table 5.2-1)
P = true vapor pressure, psia
M = vapor molecular weight
T = temperature of liquid loaded, °R

Loading Loss (lb/1,000 gal):

12.46	1.45	0.41 psia	129.19 lb		=	1.80 lb
			lb-mol	527.67 R		1,000 gal

Table B-20. Material Transfer Rate for Liquid Loading

Description	Material Loaded	Short-Term Transfer Rate		Annual Transfer Rate	
		(gal/min)	(1,000 gal/hr)	(tpy)	(1,000 gal/yr)
Metam by Rail	Metam	400	24.00	24,560	4,878
Metam by Truck	Metam	375	22.50	24,560	4,878

[1] Short-Term Transfer Rate provided via email by Dawn Kominski, TKI to Anna Henolson, Trinity Consultants on 12/14/2011.

[2] Annual throughput was conservatively estimated by applying 10% buffer on top of the highest historic actual annual throughput (2010).

Table B-21. Emissions from Liquid Loading

Description	Material Loaded	Hourly Emissions (lb/hr)	Annual Emissions (tpy)
Metam by Rail	Metam	43.12	4.38
Metam by Truck	Metam	40.43	4.38
Totals	*Metam*	*83.55*	*8.76*

Sample Calculation - Metam Rail Loading

Maximum Hourly Emissions (lb/hr):

$$\frac{1.80\ \text{lb}}{1{,}000\ \text{gal}} \times \frac{24 \times 1{,}000\ \text{gal}}{\text{hr}} = \frac{43.12\ \text{lb}}{\text{hr}}$$

Annual Emissions (tpy):

$$\frac{1.797\ \text{lb}}{1{,}000\ \text{gal}} \times \frac{4{,}878 \times 1{,}000\ \text{gal}}{\text{yr}} \times \frac{\text{ton}}{2{,}000\ \text{lb}} = \frac{4.38\ \text{ton}}{\text{yr}}$$

Table B-22. TAPs Project Emission Screening Calculations[a]

Pollutant	CAS	HAP (Y/N)	TAP (Y/N)	B600 Package Boiler (lb/hr)	S500 Vent Stack (lb/hr)	R505 ATS Reactor (lb/hr)	T501502 ABS Tower (lb/hr)	D540AB Ammonia Storage Tanks (lb/hr)	D314 or V135 Sulfur Tank[b] (lb/hr)	Total TAP (lb/hr)	Total HAP (lb/hr)	Averaging Period	EL (lb/hr)	ACC (mg/m^3)	Is Modeling Required?
Ammonia	7664-41-7	N	Y		7.610E-01	1.039E-01	3.408E-01	9.895E-01		2.195E+00	--	24-hr	1.20E+00	9.00E-01	Yes
Hydrogen Sulfide	7783-06-4	N	Y						1.415E+00	1.415E+00	--	24-hr	9.33E-01	7.00E-01	Yes
Nitrous Oxide	10024-97-2	N	Y	3.443E-02						3.443E-02	--	24-hr	6.00E+00	4.50E+00	No
Total Emissions (lb/hr)										3.644E+00	0.000E+00				
Total Emissions (tpy)										1.596E+01	0.000E+00				

[a] Includes TAP and HAP increases from the ATS Plant; facility-wide TAP and HAP emission totals are given in Table A-16.

[b] 100 percent of hydrogen sulfide emissions are assumed to emanate from either the D314 Sulfur Unloading Tank or the V315 Sulfur Storage Tanks. The more conservative modeling result is assumed; i.e., screening analyses are conducted for both sulfur tanks assuming 100 percent of hydrogen sulfide emissions from each. The worse-case scenario is assumed.

Table B-23. HAP/TAP Facility-wide Emission Screening Calculations[a]

Pollutant	CAS	HAP (Y/N)	TAP (Y/N)	B600 Package Boiler/ Hot Water Heater (lb/hr)	S500 Vent Stack (lb/hr)	R505 ATS Reactor (lb/hr)	T501502 ABS Tower (lb/hr)	D540AB Ammonia Storage Tanks (lb/hr)	D314 or V135 Sulfur Tank[b] (lb/hr)	Metam Plant Fugitives (lb/hr)	Total TAP (lb/hr)	Total HAP (lb/hr)
Ammonia	7664-41-7	N	Y		7.61E-01	1.04E-01	3.41E-01	9.90E-01			2.20E+00	--
Carbon Disulfide	75-15-0	Y	Y							1.84E+00	1.84E+00	1.84E+00
Hydrogen Sulfide	7783-06-4	N	Y						1.41E+00		1.41E+00	--
Nitrous Oxide	10024-97-2	N	Y	4.92E-02							4.92E-02	--
Methyl Methacrylate	80-62-6	Y	Y							1.57E+00	1.57E+00	1.57E+00
Total Emissions (lb/hr)											7.076E+00	3.417E+00
Total Emissions (tpy)											3.099E+01	1.497E+01

[a] Includes TAP and HAP emission totals from the entire Burley Facility (ATS Plant and Metam Plant).

APPENDIX C

Permit to Construct Forms

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Cover Sheet for Air Permit Application – Permit to Construct **Form CSPTC**

Please see instructions on page 2 before filling out the form.

COMPANY NAME, FACILITY NAME, AND FACILITY ID NUMBER

1. Company Name	Tessenderlo Kerley, Inc.		
2. Facility Name	ATS Plant	3. Facility ID No.	
4. Brief Project Description - One sentence or less	TKI proposes to construct an ammonium thiosulfate plant to manufacture ammonium thiosulfate for sale as a fertilizer.		

PERMIT APPLICATION TYPE

5. ☐ New Source ☒ New Source at Existing Facility ☐ PTC for a Tier I Source Processed Pursuant to IDAPA 58.01.01.209.05.c
☐ Unpermitted Existing Source ☐ Facility Emissions Cap ☐ Modify Existing Source: Permit No.:____ Date Issued:____
☐ Required by Enforcement Action: Case No.:____

6. ☒ Minor PTC ☐ Major PTC

FORMS INCLUDED

Included	N/A	Forms		DEQ Verify
☒	☐	Form CSPTC – Cover Sheet		☐
☒	☐	Form GI – Facility Information		☐
☐	☐	Form EU0 – Emissions Units General		☐
☐	☒	Form EU1– Industrial Engine Information	Please specify number of EU1s attached: ____	☐
☐	☒	Form EU2– Nonmetallic Mineral Processing Plants	Please specify number of EU2s attached: ____	☐
☐	☒	Form EU3– Spray Paint Booth Information	Please specify number of EU3s attached: ____	☐
☒	☐	Form EU4– Cooling Tower Information	Please specify number of EU3s attached: 1	☐
☒	☐	Form EU5 – Boiler Information	Please specify number of EU4s attached: 1	☐
☐	☒	Form CBP– Concrete Batch Plant	Please specify number of CBPs attached: ____	☐
☐	☒	Form HMAP – Hot Mix Asphalt Plant	Please specify number of HMAPs attached: ____	☐
☐	☒	PERF – Portable Equipment Relocation Form		☐
☐	☒	Form AO – Afterburner/Oxidizer		☐
☐	☒	Form CA – Carbon Adsorber		☐
☐	☒	Form CYS – Cyclone Separator		☐
☐	☒	Form ESP – Electrostatic Precipitator		☐
☐	☒	Form BCE– Baghouses Control Equipment		☐
☐	☒	Form SCE– Scrubbers Control Equipment		☐
☐	☒	Form VSCE – Venturi Scrubber Control Equipment		☐
☐	☒	Form CAM – Compliance Assurance Monitoring		☐
☐	☒	Forms EI— Emissions Inventory		☐
☐	☐	PP – Plot Plan		☐
☐	☐	Forms MI1 – MI4 – Modeling	(Excel workbook, all 4 worksheets)	☐
☒	☐	Form FRA – Federal Regulation Applicability		☐

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

General Information **Form GI**
Revision 7
2/18/10

Please see instructions on page 2 before filling out the form.

All information is required. If information is missing, the application will not be processed.

IDENTIFICATION

1. Company Name	2. Facility Name:
Tessenderlo Kerley, Inc.	ATS Plant
3. Brief Project Description:	TKI is proposing to construct an ammonium thiosulfate plant. TKI will manufacture ammonium thiosulfate at the plant for sale as a fertilizer.

FACILITY INFORMATION

4. Primary Facility Permit Contact Person/Title	Dawn Kominski		Director of Regulatory Affairs	
5. Telephone Number and Email Address	602-889-8401		dkominski@tkinet.com	
6. Alternate Facility Contact Person/Title	Steve Sailors		Plant Manager	
7. Telephone Number and Email Address	208-678-9565		ssailors@tkinet.com	
8. Address to Which the Permit Should be Sent	2255 N. 44th St., Suite 300			
9. City/County/State/Zip Code	Phoenix	Maricopa	Arizona	85008
10. Equipment Location Address (if different than the mailing address above)				
11. City/County/State/Zip Code	Burley	Cassia	Idaho	83318
12. Is the Equipment Portable?	☐ Yes ☒ No			
13. SIC Code(s) and NAICS Code	Primary SIC: 2819	Secondary SIC:	NAICS: 325188	
14. Brief Business Description and Principal Product	The ATS Plant will manufacture ammonium thiosulfate for sale as a fertilizer.			
15. Indentify any adjacent or contiguous facility that this company owns and/or operates	TKI owns and operates a metam sodium manufacturing plant adjacent to the proposed location of the ammonium thiosulfate plant.			
16. Specify the reason for the application	☒ Permit to Construct (PTC) For Tier I permitted facilities only: If you are applying for a PTC then you must also specify how the PTC will be incorporated into the Tier I permit. ☐ Incorporate the PTC at the time of the Tier I renewal ☐ Co-process the Tier I modification and PTC ☐ Administratively amend the Tier I permit to incorporate the PTC upon your request (IDAPA 58.01.01.209.05.a, b, or c) ☐ Tier I Permit ☐ Tier II Permit ☐ Tier II/Permit to Construct			

CERTIFICATION

In accordance with **IDAPA 58.01.01.123** (Rules for the Control of Air Pollution in Idaho), I certify based on information and belief formed after reasonable inquiry, the statements and information in the document(s) are true, accurate, and complete.

17. Responsible Official's Name/Title	Ken Gagon	Group Vice President	
18. Responsible Official's Signature	Ken Gagon	Date:	April 12, 2012

19. ☒ Check here to indicate that you would like to review the draft permit prior to final issuance.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

AIR PERMIT APPLICATION

Revision 6
10/7/09

For each box in the table below, CTRL+click on the blue underlined text for instructions and information.

IDENTIFICATION	
1. Company Name: Tessenderlo Kerley, Inc.	2. Facility Name: ATS Plant
3. Brief Project Description:	TKI proposes to construct an ammonium thiosulfate plant to manufacture ammonium thiosulfate for sale as a fertilizer.

APPLICABILITY DETERMINATION	
4. List applicable subparts of the New Source Performance Standards (NSPS) (40 CFR part 60). Examples of NSPS affected emissions units include internal combustion engines, boilers, turbines, etc. The applicant must thoroughly review the list of affected emissions units.	List of applicable subpart(s): **None** ☐ Not Applicable
5. List applicable subpart(s) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) found in 40 CFR part 61 and 40 CFR part 63. Examples of affected emission units include solvent cleaning operations, industrial cooling towers, paint stripping and miscellaneous surface coating. EPA has a web page dedicated to NESHAP that should be useful to applicants.	List of applicable subpart(s): **None** ☐ Not Applicable
6. For each subpart identified above, conduct a complete a regulatory analysis using the instructions and referencing the example provided on the following pages. **Note** - Regulatory reviews must be submitted with sufficient detail so that DEQ can verify applicability and document in legal terms why the regulation applies. Regulatory reviews that are submitted with insufficient detail will be determined incomplete.	☐ A detailed regulatory review is provided (Follow instructions and example). ☐ DEQ has already been provided a detailed regulatory review. Give a reference to the document including the date.

IF YOU ARE UNSURE HOW TO ANSWER ANY OF THESE QUESTIONS, CALL THE AIR PERMIT HOTLINE AT 1-877-5PERMIT

It is emphasized that it is the applicant's responsibility to satisfy all technical and regulatory requirements, and that DEQ will help the applicant understand what those requirements are prior to the application being submitted but that DEQ will not perform the required technical or regulatory analysis on the applicant's behalf.

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Units - Industrial Boiler Information **Form EU5**
Revision 5
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3 Facility ID No:
Tessenderlo Kerley, Inc.	ATS Plant	

4. Brief Project Description: TKI proposes to construct an ammonium thiosulfate plant to manufacture ammonium thiosulfate

EXEMPTION

Please see IDAPA 58.01.01.222 for a list of industrial boilers that are exempt from Permit to Construct requirements.

BOILER (EMISSION UNIT) DESCRIPTION AND SPECIFICATIONS

5. Type of Request: ☒ New Unit ☐ Unpermitted Existing Unit ☐ Modification to a Unit with Permit #:

6. Use of Boiler: ☒ % Used For Process ☐ % Used For Space Heat ☐ % Used For Generating Electricity ☐ Other:

7. Boiler ID Number: B600	8. Rated Capacity: ☒ 3.50 Million British Thermal Units Per Hour (MMBtu/hr) ☐ 1,000 Pounds Steam Per Hour (1,000 lb steam/hr)	
9. Construction Date: To be determined	10. Manufacturer: To be determined	11. Model: To be determined
12. Date of Modification (if applicable):	13. Serial Number (if available):	14. Control Device (if any): **Note: Attach applicable control equipment form(s)**

FUEL DESCRIPTION AND SPECIFICATIONS

15. Fuel Type	☐ Diesel Fuel (#) (gal/hr)	☐ Natural Gas (cf/hr)	☐ Coal (unit: /hr)	☒ Other Fuels (unit:gal /hr)
16. Full Load Consumption Rate				To be determined
17. Actual Consumption Rate				To be determined
18. Fuel Heat Content (Btu/unit, LHV)				91,500 Btu/gal
19. Sulfur Content wt%				0
20. Ash Content wt%		N/A		0

STEAM DESCRIPTION AND SPECIFICATIONS

21. Steam Heat Content	NA	NA		NA
22. Steam Temperature (°F)	N/A	N/A		NA
23. Steam Pressure (psi)	N/A	N/A		NA
24 Steam Type	N/A	N/A	☐ Saturated ☐ Superheated	☐ Saturated ☐ Superheated

OPERATING LIMITS & SCHEDULE

25. Imposed Operating Limits (hours/year, or gallons fuel/year, etc.):	None
26. Operating Schedule (hours/day, months/year, etc.):	To be determined
27. NSPS Applicability: ☐ Yes ☒ No	If Yes, which subpart:

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Units - Cooling Towers Information **Form EU4**
Revision 5
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION		
1. Company Name: Tessenderlo Kerley, Inc.	2. Facility Name: ATS Plant	3. Facility ID No:
4. Brief Project Description:	TKI proposes to construct an ammonium thiosulfate plant to manufacture ammonium thiosulfate for	

COOLING TOWER IDENTIFICATION AND DESCRIPTION	Tower 1	Tower 2	Tower 3	Tower 4
5. Emission Unit Name	Cooling Tower			
6. Emission Unit ID Number	CT600			
7. Stack/Vent ID Number				
8. Tower Type (N: New, U: Unpermitted, M: Modification)	☒ N, ☐ U, ☐ M	☐ N, ☐ U, ☐ M	☐ N, ☐ U, ☐ M	☐ N, ☐ U, ☐ M
9. Current Permit Number	N/A			
10. Tower Construction Date	To be determined			
11. Tower Manufacturer	To be determined			
12. Tower Model Number	To be determined			
13. Number of Cells in Tower	To be determined			
14. Tower Maximum Water Flow Rate	1,000 gal/min			
15. Measured TDS Content (if known)	2,700 ppmw			
16. Do you use additives in the water? If Yes, provide an MSDS form for each additive	☐ No ☒ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
CONTROL EQUIPMENT INFORMATION				
17. Control Equipment	☒ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes	☐ No ☐ Yes
18. Control Equipment ID Number				
19. Control Equipment Efficiency				
OPERATING SCHEDULE				
20. Actual Operation (hours per year)	8,040			
21. Maximum Operation (hours per year)	To be determined			

REQUEST FOR PERMIT LIMITATIONS

22 Are you requesting any permit limits? ☒ No ☐ Yes. If Yes, fill in all that apply below.

Tower Served	Operation Hour Limits:	TDS Limits (ppm):	Material Usage Limits:	Other:
Tower 1				
Tower 2				
Tower 3				
Tower 4				

23. Rationale for Requesting the Limit(s):

#1

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MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY PHONE
CHEMTREC 1-800-424-9300
2470 Warren Avenue
Twin Falls, Idaho 83301
(208)734-7279 ♦ 1-800-367-3250
FAX (208)733-0460

PRODUCT
CWT-254

SECTION 1: PRODUCT IDENTIFICATION

TRADE NAME:	CWT-254
CHEMICAL NAME:	Sodium Hypochlorite
CHEMICAL FAMILY:	Bleach; Hypochlorous Acid; Sodium Salt; Soda Bleach
FORMULA:	NaOCl
CAS NUMBER:	Mixture
DOT PROPER SHIPPING NAME:	Hypochlorite solution *containing more than 7% available chlorine by weight.* (RQ 100/45.4)
DOT HAZARD CLASS:	Corrosive Material
DOT I.D. NUMBER:	UN 1791
DOT LABEL(S):	Corrosive
RQ PER EPA CERCLA REGS:	100 pounds
EPA RCRA HAZ WASTE NO.:	D002

SECTION 2: HAZARDOUS INGREDIENTS

ONE PERCENT OR GREATER NAME:	Sodium Hypochlorite
CAS NUMBER:	7681-52-9
PERCENT:	7 - 16
TLV	N/A
CARCINOGEN 0.1 PERCENT OR GREATER:	None

SECTION 3: PHYSICAL DATA

SPECIFIC GRAVITY:	1.18-1.21
PH	12.72-13.32
FLASH POINT:	Not Flammable
BOILING POINT:	Decomposes at 125°F
VAPOR PRESSURE (mm/Hg):	100 @ 125°F
% VOLATILE BY VOLUME:	N/E
VAPOR DENSITY (Air = 1):	0.9
EVAPORATION RATE (=1):	As Water
SOLUBILITY IN WATER:	100%
REACTIVITY IN WATER:	No
APPEARANCE AND ODOR:	Light yellow to green clear liquid; Chlorine odor
FLAMMABLE LIMITS IN AIR % BY VOLUME:	LOWER: N/A UPPER: N/A
AUTO-IGNITION TEMPERATURE:	N/A

N/A – Not Applicable N/E – Not Established

Issued: 1/23/88
Revised: 11/30/01

SECTION 4: FIRE AND EXPLOSION DATA

SPECIAL FIRE FIGHTING PROCEDURES: Cool fire exposed containers with spray. Must wear MSHA/NIOSH approved SCBA.

EXTINGUISHING MEDIA: Dry chemical, CO_2, Water fog or Standard foam

UNUSUAL FIRE AND EXPLOSION HAZARD: Containers of this material can explode under fire conditions. Oxygen may be liberated upon contact with certain metals. Toxic fumes are liberated by contact with acids or heat.

THERMAL DECOMPOSITION PRODUCTS: HOCl, Chlorine, HCl, NaCl, Sodium Chlorate and Oxygen which depends on pH, temperature and time.

SECTION 5: HEALTH HAZARDS

ACGIH THRESHOLD LIMIT VALUE (TLV): N/E

OSHA PERMISSIBLE EXPOSURE LIMIT (PEL): N/E

PRIMARY ROUTE(S) OF ENTRY: Inhalation, Skin

TOXICITY DATA: LD_{50} 760 mg/kg for males and females combined.
Dermal: LD_{50} 1700 mg/kg

NFPA HAZARD RATING (0-1-2-3-4, 0=LEAST/4=MOST): Health 2 Flammability 2 Reactivity 0

SIGNS AND SYMPTOMS OF EXPOSURE:
1. ACUTE OVER EXPOSURE
EYES: Corrosive, severe eye damage can result from direct contact.
SKIN: Severe irritant
INGESTION: May be fatal. Burning pain in the mouth, throat, abdomen, severe swelling of the larynx, skeletal muscle paralysis affecting the ability to breathe, circulatory shock, convulsions.
2. CHRONIC OVER EXPOSURE
None Reported.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: N/A

CHEMICAL(S) LISTED AS CARCINOGEN OR POTENTIAL CARC. BY NATIONAL TOXICOLOGY PROGRAM: None
I.A.R.C. MONOGRAPHS: None
OSHA: None

EMERGENCY AND FIRST AID PROCEDURES:
1. INHALATION: Remove to fresh air; if not breathing, give artificial respiration. Seek medical attention.
2. EYES: Flush immediately with water for at least fifteen minutes and seek medical attention immediately.
3. SKIN: Flush with water while removing contaminated clothing. Wash contaminated clothing before reuse.
4. INGESTION: Do not induce vomiting. Drink water or milk to dilute and seek medical attention. Note to physician: Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression and convulsion may be needed.

N/A – Not Applicable N/E – Not Established

SECTION 6: REACTIVITY DATA

STABILITY:	Stable
CONDITIONS TO AVOID:	Mixing with strong oxidizers or reducing agents.
HAZARDOUS DECOMPOSITION PRODUCTS:	Toxic hydrogen chloride fumes, oxides of carbon and nitrogen.
HAZARDOUS POLYMERIZATION:	Will not occur
CONDTIONS TO AVOID:	N/A

SECTION 7: SPILL OR LEAK PROCEDURES

GENERAL:	Alkali-resistant slicker suit and complete protective equipment. SCBA in the pressure demand mode or a supplied-air respirator.
PROCEDURE FOR LARGE SPILL/RELEASE:	Contain by diking with soil or other non-combustible, absorbent Material and carefully neutralize with dilute hydrochloric acid. Keep non-neutralized material out of sewers, storm drains, surface waters and soil. Very toxic to aquatic life.
PROCEDURE FOR SMALL SPILL/RELEASE:	Use full facepiece air-purifying cartridge respirator equipped with acid gases/mists filters. Mop or wipe up and dispose of in DOT approved waste containers.
WASTE DISPOSAL:	Dispose of in accordance with all applicable federal, state, and local laws or ordinances and regulations governing handling, transportation and disposal of hazardous waste materials and environmental protection.

SECTION 8: SPECIAL PROTECTION

RESPIRATORY:	NIOSH/MESA approved respirator appropriate for the vapor or Mist concentration at the point of use.
VENTILATION:	Provide ventilation that will keep airborne contaminants within prescribed limits.
EYE PROTECTION:	Chemical goggles and full face shield.
PROTECTIVE CLOTHING:	Long sleeved shirt, trousers, rubber boots, rubber gloves and rubber apron.
OTHER PROTECTIVE MEASURES:	Eyewash and safety shower

N/A – Not Applicable N/E – Not Established

SECTION 9: SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store in a cool, dry, well ventilated place away from incompatible materials. Keep container tightly closed when not in use. Do not use pressure to empty container. Do not store on wooden floors, pallets or near wood of any kind.

OTHER PRECAUTIONS: Always obey hazard warnings and handle empty containers as if they were full.

SECTION 10: MISCELLANEOUS

N/A – Not Applicable   N/E – Not Established

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MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY PHONE
CHEMTREC 1-800-424-9300
2470 Warren Avenue
Twin Falls, Idaho 83301
☎(208)734-7279 ♦ 1-800-367-3250
FAX (208)733-0460

PRODUCT
TECHNAFLEX 285

SECTION 1: PRODUCT IDENTIFICATION

TRADE NAME:	TECHNAFLEX 285
CHEMICAL NAME:	Proprietary
CHEMICAL FAMILY:	Proprietary
FORMULA:	Proprietary
CAS NUMBER:	N/A
EPA TSCA INVENTORY:	None
DOT PROPER SHIPPING NAME:	Not Regulated
DOT HAZARD CLASS:	N/A
DOT I.D. NUMBER:	N/A
DOT LABEL(S):	None
RQ PER EPA CERCLA REGS:	N/A
EPA RCRA HAZ WASTE NO.:	N/A

SECTION 2: HAZARDOUS INGREDIENTS

ONE PERCENT OR GREATER NAME:	Sodium Tolyltriazole	2-Phosphono butane, 1,2,4 Tricarboxylic acid
CAS NUMBER:	64665-57-2	55995-42-6
PERCENT:	>1	>1
CARCINOGEN 0.1 PERCENT OR GREATER:	None	

SECTION 3: PHYSICAL DATA

SPECIFIC GRAVITY:	1.040 to 1.100	
pH:	3.04 to 3.64	
FLASH POINT:	N/E	
BOILING POINT:	N/E	
VAPOR PRESSURE (mm/Hg):	N/E	
% VOLATILE BY VOLUME:	N/E	
VAPOR DENSITY (Air = 1):	N/E	
EVAPORATION RATE (=1):	N/E	
SOLUBILITY IN WATER:	Complete	
REACTIVITY IN WATER:	No	
APPEARANCE AND ODOR:	Amber with slight organic/acidic odor	
FLAMMABLE LIMITS IN AIR % BY VOLUME:	LOWER: N/E	UPPER: N/E
AUTO-IGNITION TEMPERATURE:	N/E	

N/A – Not Applicable N/E – Not Established

SECTION 4: FIRE AND EXPLOSION DATA

EXTINGUISHING MEDIA:	Product is non-flammable as supplied. Use Dry Chemical, CO_2, Halon, Water Spray or Standard Foam
UNUSUAL FIRE AND EXPLOSION HAZARD:	Product is non-flammable as supplied. It may splatter if temperature exceeds boiling point. Dried polymer films are capable of burning.
THERMAL DECOMPOSITION PRODUCTS:	Stable under normal temperatures and pressure.
SPEICAL FIRE FIGHTING PROCEDURES:	Wear SCBA while extinguishing fire.

SECTION 5: HEALTH HAZARDS

ACGIH THRESHOLD LIMIT VALUE (TLV):	N/E	
OSHA PERMISSIBLE EXPOSURE LIMIT (PEL):	N/E	
PRIMARY ROUTE(S) OF ENTRY:	Ingestion, Inhalation, Skin, Eyes	
TOXICITY DATA:	N/E	
NFPA HAZARD RATING (0-1-2-3-4, 0=LEAST/4=MOST):	Health 1 Flammability 0 Reactivity 0	
SIGNS AND SYMPTOMS OF EXPOSURE:	1. ACUTE OVER EXPOSURE	
	INGESTION:	Nausea and vomiting may occur.
	INHALATION:	No hazards in normal industrial use.
	SKIN:	Frequent or prolonged contact may irritate skin.
	EYES:	Eye irritation is moderate
	2. CHRONIC OVER EXPOSURE	
	None Known.	
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:	None Known	
CHEMICAL(S) LISTED AS CARCINOGEN OR POTENTIAL CARC. BY NATIONAL TOXICOLOGY PROGRAM:	None	
I.A.R.C. MONOGRAPHS:	None	
OSHA:	None	
EMERGENCY AND FIRST AID PROCEDURES:	INGESTION:	Dilute by drinking two glasses of water and obtain medical attention.
	INHALATION:	First aid is not normally required. If breathing is difficult, give oxygen and obtain medical attention.
	SKIN:	Wash affected areas with soap and water and obtain medical attention.
	EYES:	Wash eyes with large volumes of water for at least 15 minutes. Obtain medical attention immediately

N/A – Not Applicable N/E – Not Established

SECTION 6: REACTIVITY DATA

STABILITY: Stable
CONDITIONS TO AVOID: Avoid extreme temperatures. Protect from freezing.
HAZARDOUS DECOMPOSITION PRODUCTS: N/A
HAZARDOUS POLYMERIZATION: Will not occur

SECTION 7: SPILL OR LEAK PROCEDURES

PROCEDURE FOR LARGE SPILL/RELEASE: Soak up spills with absorbent material and scoop into drums. Floor may be slippery. Use caution to avoid falls.

PROCEDURE FOR SMALL SPILL/RELEASE: Soak up spills with absorbent material and scoop into drums. Floor may be slippery. Use caution to avoid falls.

WASTE DISPOSAL: Non-hazardous waste. Do not discharge to lakes and/or streams. Dispose of in accordance with all applicable federal, state, and local laws or ordinances and regulations governing handling, transportation and disposal.

SECTION 8: SPECIAL PROTECTION

RESPIRATORY: Use an approved respirator if ventilation is not adequate to prevent concentration of vapor.

VENTILATION: Provide ventilation that will prevent vapor from concentrating in the local area.

PROTECTIVE EQUIPMENT: Chemical goggles or face shield and rubber gloves. Other protection for skin and clothing is recommended.

OTHER: Follow normal hygienic practices for handling chemicals.

N/A – Not Applicable   N/E – Not Established

SECTION 9: SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Wear rubber gloves and appropriate eye protection
OTHER PRECAUTIONS: Avoid breathing vapors and avoid skin contact.

SECTION 10: MISCELLANEOUS

N/A – Not Applicable N/E – Not Established

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MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY PHONE
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2470 Warren Avenue
Twin Falls, Idaho 83301
☎(208)734-7279 ♦ 1-800-367-3250
FAX (208)733-0460

PRODUCT
CWT-257

SECTION 1: PRODUCT IDENTIFICATION

TRADE NAME	CWT-257
CHEMICAL NAME	Tetrakis (hydroxymethyl) Phosphonium Sulfate; THPS
CHEMICAL FAMILY	Phosphonium Sulfates
FORMULA	$2(C_4 H_{12} O_4 P): O_4 S$
CAS NUMBER	55566-30-8
EPA REGISTRATION NUMBER	4564-15-46207
DOT PROPER SHIPPING NAME	Toxic liquid, Organic, N.O.S.
DOT HAZARD CLASS	6.1
DOT I.D. NUMBER	UN2810
DOT LABEL(S)	Toxic
RQ PER EPA CERCLA REGS	N/A
EPA RCRA HAZ WASTE NO	N/A

SECTION 2: HAZARDOUS INGREDIENTS

ONE PERCENT OR GREATER NAME	Phosphonium, Tetrakis(hydroxymethyl)-,sulfate
CAS NUMBER	55566-30-8
PERCENT	20%
TLV	N/E

SECTION 3: PHYSICAL DATA

SPECIFIC GRAVITY	1.09 @ 20°C
pH	3.24
FLASH POINT	N/A
BOILING POINT	N/A
VAPOR PRESSURE (mm/Hg)	N/A
% VOLATILE BY VOLUME	N/A
VAPOR DENSITY (Air = 1)	N/A

N/A – Not Applicable N/E – Not Established

MATERIAL SAFETY DATA SHEET
CWT-257

EVAPORATION RATE (=1)	N/A
SOLUBILITY IN WATER	Miscible
REACTIVITY IN WATER	No
APPEARANCE AND ODOR	Colorless organic liquid with pungent odor
FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER: N/A UPPER: N/A
AUTO-IGNITION TEMPERATURE	N/A
MOLECULAR WEIGHT	406.3g/gmol

SECTION 4: FIRE AND EXPLOSION DATA

GENERAL HAZARD	Evacuate personnel downwind of fire to avoid inhalation of irritating and/or harmful fumes and smoke.
EXTINGUISHING MEDIA	Chemical type foam, C02 (Carbon Dioxide), Dry Chemical, Water fog to prevent overheating.
SPECIAL FIRE FIGHTING PROCEDURES	Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind; keep out of low areas. Evacuate residents who are downwind of fire.
HAZARDOUS DECOMPOSITION MATERIALS (UNDER FIRE CONDITIONS)	Oxides of sulfur, oxides of phosphorus, oxides of carbon
UNUSUAL FIRE AND EXPLOSION HAZARDS	Containers may explode (due to the build-up of pressure) when exposed to extreme heat.

SECTION 5: HEALTH HAZARDS and INFORMATION

ACGIH THRESHOLD LIMIT VALUE (TLV)	N/E
OSHA PERMISSIBLE EXPOSURE LIMIT (PEL)	N/E
PRIMARY ROUTE(S) OF ENTRY	Ingestion, inhalation, skin, eyes
TOXICITY DATA	Oral: LD_{50} - Rats: 575/kg Dermal: LD_{50} - Rabbit > 2000 mg/kg Inhalation: LC_{50} - Rat > 22 mg/1 for 1 hr calculated **May be harmful if swallowed.**
ACUTE EYE EFFECTS	This material is expected to cause significant irritation to the eyes. Can cause tearing, pain, burns, permanent damage to the cornea.
ACUTE SKIN EFFECTS	May cause irritation upon prolonged contact. May cause sensitizations
ACUTE INHALATION EFFECTS	Harmful if inhaled. May cause coughing, shortness of breath, chest pain.
ACUTE INJESTION EFFECTS	Harmful if ingested. May cause nausea, vomiting.

N/A – Not Applicable N/E – Not Established

CARCINOGENICITY	There was no evidence of carcinogenicity in F344/N rats and B6C3F1 mice (both sexes) dosed by gavage at 5 or 10 mg THPS/kg/Day for 2 years.
MUTAGENICITY	Negative in the Ames Test. Chinese hamster ovary cells (chromosomal aberrations): Positive. Negative in cultured rat hepatocytes unscheduled DNA synthesis.
REPRODUCTIVE EFFECTS	This material is not a reproductive toxin. Material tested was a 75% aqueous solution of Tetrakis (hydroxymethyl) phosphonium sulfate.
TERATOGENIC EFFECTS	Studies in both rats and rabbits showed no indications of developmental toxicity in the absence of marked maternal (parental) toxicity. No observed effect level for development 15 mg/kg/body weight. No observed effect level for development 18 mg/kg body weight. Material tested was a 75% aqueous solution of Tetrakis (hydroxymethyl) phosphonium sulfate.
SIGNS AND SYMPTOMS OF EXPOSURE	EYES: Redness and possible burning and tearing of the eyes. SKIN: Redness and possible burning of the skin. INGESTION: Possible nausea and/or vomiting INHALATION: Coughing, burning, tightness of chest and/or shortness of breath.
ACUTE TOXICITY	Not expected to cause significant adverse effects if absorbed through the skin. May cause significant adverse effects if ingested. Not expected to cause significant adverse effects if mist or vapor is inhaled.
NFPA HAZARD RATING	(0-1-2-3-4, 0=LEAST/4=MOST): Health 2 Flammability 0 Reactivity 1

SECTION 6: FIRST AID MEASURES

EYES	Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. Seek immediate medical attention.
SKIN	In case of contact, immediately wash with plenty of soap and water for at least 15 minutes. Seek medical attention. Remove contaminated clothing and shoes while washing. Clean contaminated clothing and shoes before re-use or discard if they cannot be thoroughly cleaned.
INGESTION	Wash out mouth with water and keep at rest. Seek immediate medical attention. Do not induce vomiting unless instructed to do so by a physician
INHALATION	Remove from further exposure. Keep warm and at rest. If cough or other symptoms develop, seek medical attention.

SECTION 7: REACTIVITY DATA

STABILITY	Stable under normal ambient conditions of temperature and pressure.
CONDITIONS TO AVOID	Heat, temperatures above 160° C.
HAZARDOUS DECOMPOSITION PRODUCTS	Oxides of sulfur, oxides of phosphorus, oxides of carbon, phosphine gas
HAZARDOUS POLYMERIZATION	Will not occur

N/A – Not Applicable N/E – Not Established

MATERIAL SAFETY DATA SHEET
CWT-257

SECTION 8: SPILL OR LEAK PROCEDURES

EVACUATION PROCEDURES AND SAFETY	Ventilate closed spaces before entering. Personnel handling this material should be thoroughly trained to handle spills and releases. Wear appropriate protective gear for the situation. Evacuate and isolate spill area.
CONTAINMENT OF SPILL	Stop leak if it can be done without risk. Dike spill using absorbent or impervious materials such as earth, sand or clay. Dike area to prevent runoff. Collect and contain contaminated absorbent and dike material for disposal.
ENVIRONMENTAL PRECAUTIONS	Do not flush to drain. Runoff from fire control or dilution water may cause pollution. Prevent material from entering public sewer system or any waterways. Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies.
CLEANUP AND DISPOSAL OF SPILL	Recover material, if possible. DO NOT RETURN MATERIAL TO ITS ORIGINAL CONTAINER. Absorb with an inert absorbent. Shovel up into an appropriate closed container. Clean up residual material by washing area with water. Collect washings for disposal. The material should be properly packaged and disposed of in compliance with applicable regulations. Decontaminate tools and equipment following cleanup.

SECTION 9: SPECIAL PROTECTION

EXPOSURE GUIDELINES

Exposure limits represent regulated or recommended worker breathing zone concentrations measured by validated sampling and analytical methods, meeting the regulatory requirements. The following limits apply to this material, where, if indicated, S = skin and C = ceiling limit:

TETRAKIS (HYDROXYMETHYL) PHOSPHONIUM SULFATE

	Notes	TWA	STEL
ACGIH		2 mg/cu m	

ENGINEERING CONTROLS

Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures: general area dilution/exhaust ventilation.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Wear safety glasses with side shields or goggles when handling this material.
SKIN: To prevent any contact, wear impervious protective clothing such as neoprene or butyl rubber gloves, apron, boots or whole body suit, as appropriate.
RESPIRATORY: Always wear NIOSH approved respiratory protective equipment when vapor or mists may exceed applicable concentration limits.
WORK HYGIENIC PRACTICES: Facilities storing or using this material should be equipped with an eyewash facility and a safety shower. Good personal hygiene practices should always be followed.

COMMENTS

No PEL's, TLV's or OEL's for this product or its ingredients are listed in the current issue of ACGIH's Guide to Occupational Exposure Values nor have they been determined by the manufacturer.

N/A – Not Applicable N/E – Not Established

SECTION 10: ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION AND INTERPRETATION	LC50 – lethal concentration 50% of test species, 19.4 mg/1/48 hr, Daphnia magna. LC50 – lethal concentration 50% of test species, 93 mg/1/96 hr, bluegill sunfish (Lepomis macrochirus). LC50 – lethal concentration 50% of test species, 119 mg/1/96 hr, rainbow trout (Oncorhynchus mykiss). LC50 – lethal concentration 50% of test species, 86 mg/1/96 hr, Juvenile Plaice. LC50 – lethal concentration 50% of test species, 340 mg/1/96 hr, Brown Shrimp. LC50 – ecotox Method for association with dry sediment weight., 2174 mg/kg/10 gays, Corophium volutator. (dry sediment weight). LD50 – lethal dose 50% of test species, 311 mg/kg, Mallard duck (Anas platyrhynchos). Material tested was a 75% aqueous solution of Tetrakis (hydroxymethyl) phosphonium sulfate.
CHEMICAL FATE INFORMATION	Product is not expected to bioaccumulate. The following data is for similar or related product. This product is readily biodegradable under aerobic and anaerobic conditions in a sediment-water system. 28 days (aerobic) and 30 days (anaerobic). THPS has been shown to degrade rapidly once diluted to sub-ppm concentrations and forms trishydroxymethyl phosphine oxide which is classified as non-toxic.

SECTION 11: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD	Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material. EPA Hazardous Waste - NO

SECTION 12: MISCELLANEOUS

REGULATORY INFORMATION

UNITED STATES

SARA TITLE HAZARD CLASSES:

Fire Hazard	NO
Reactive Hazard	NO
Release of Pressure	NO
Acute Health Hazard	YES
Chronic Health Hazard	NO

CERCLA (COMPREHENSIVE RESPONSE, COMPENSATION AND LIABILITY ACT)
CERCLA RQ: Not applicable

N/A – Not Applicable N/E – Not Established

MATERIAL SAFETY DATA SHEET
CWT-257

NFPA CODES
FIRE: 0 HEALTH: 2 REACTIVITY: 1
HMIS CODES
FIRE: 0 HEALTH: 2 REACTIVITY: 1 PROTECTION: D

WATERTECH, Inc. has compiled the information contained in this MATERIAL SAFETY DATA SHEET from sources believed to be reliable and to represent current opinion on the subject when the MSDS was prepared. No warranty, guarantee or representation is made as to the correctness or sufficiency of the information. The user of this product must determine for themselves what safety measures are necessary to safely use this product, either alone or in combination with other products.

APPENDIX D

AERSCREEN Model Parameters
AERSCREEN Model Results
AERSCREEN Electronic File Directory

Table D-1. Toxic Air Pollutant Screening - Model Inputs and Outputs, Point Sources

Emission Source [a]	Associated Pollutant	Source Type [b]	Stack Height [c] (ft)	Stack Inside Diameter (ft)	Stack Exit Temperature (F)	Exit Velocity (ft/s)	Building Height (ft)	Building Maximum Horizontal Dimension [d] (ft)	Building Minimum Horizontal Dimension [d] (ft)	Distance From Stack to Center of Building [e] (ft)	Distance to Property Line [f] (ft)	Modeled Output [g] (mg/m^3)
S500 Vent Stack	Ammonia	Point	110	2.1	100	11.98	40.0	100.0	75.0	41.6	135.1	**0.03092**
D314 Sulfur Unloading Tank	Hydrogen sulfide	Point	29.2	0.8	280	4.01	9.2	60.0	9.2	0.0	48.5	**0.1348**
V315 Sulfur Storage Tank	Hydrogen sulfide	Point	38	0.8	160	2.99	--	--	--	--	159.4	**0.7010**

a Source parameters are provided for each emission point source that emits either ammonia or hydrogen sulfide (the pollutants emitted by the ATS Plant that require modeling). The emission rate of 1 lb/hr is used as an input to the AERSCREEN model to determine the modeled concentration.

b Vents and stacks are modeled as point sources.

c The stack height is the distance from the top of the stack to the ground. For the S500 Vent Stack, this distance is 110 feet. For the vent on the vertically-oriented V315 Sulfur Storage Tank, this distance is the sum of the tank height, 28 feet, and the stack height above the tank, 10 feet. For the vent on the horizontally-oriented D314 Sulfur Unloading Tank, this distance is the sum of the tank diameter, 9 feet, and the stack height above the vessel, 20 feet.

d The Process Building is the dominant downwash structure affecting the plume from the S500 Vent Stack. The Process Building has height 40 feet, dimensions 100 feet by 75 feet, and is oriented north-south. The V315 Sulfur Storage Tank vent is located near three potential dominant downwash structures; rather than selecting a single downwash structure, a building parameter input program (BPIP) input file that includes all three structures, as well as the Process Building, is used as the building input. The D314 Sulfur Unloading Tank is the dominant downwash structure affecting its associated vent. The D314 Unloading tank has a height and diameter of 9.2 feet, and a length of 60 feet. It is oriented approximately 20.14 degrees east of north.

e The distance from the V500 Vent Stack to the center of the Process Building (the dominant downwash building acting on the stack) is approximately 41.6 feet. The vents on the D314 Sulfur Unloading Tank and V315 Sulfur Storage Tank are assumed to be located at the center of the sulfur tanks. The distance from the D314 Sulfur Unloading Tank vent to the center of the D314 Sulfur Unloading Tank is zero. Distances are measured using the ATS Plant plot plan dated November 27, 2011.

f The receptor distance is the distance from the stack to the nearest property fenceline. It is assumed that the vents on the V315 Sulfur Storage Tank and D314 Sulfur Unloading Tank are located at the center of the sulfur tanks.

g The AERSCREEN modeled ouput represents the maximum 1-hour concentration outside of the property boundary.

Table D-2. Toxic Air Pollutant Screening - Model Inputs and Outputs, Volume Sources

Emission Source [a]	Associated Pollutant	Source Type [b]	Centerpoint Height [c] (ft)	Initial Lateral Dimension [d] (ft)	Initial Vertical Dimension [e] (ft)	Distance to Property Line [f] (ft)	Modeled Output [g] (mg/m^3)
R505 ATS Reactor	Ammonia	Volume	20	17.4	18.6	162.8	**0.6658**
T501502 ABS Tower	Ammonia	Volume	56	1.0	14.9	194.0	**0.1567**
D540AB Ammonia Storage Tanks	Ammonia	Volume	6	5.8	5.6	138.6	**3.980**

a Source parameters are provided for each emission volume source that emits ammonia or hydrogen sulfide (the pollutants emitted by the ATS Plant shown to require modeling). The emission rate of 1 lb/hr is used as an input to the AERSCREEN model to determine the modeled concentration.

b Fugitive emissions from the R505 ATS Reactor are modeled as a volume source encompassing the Process Building, in which the R505 ATS Reactor is located. The T501502 ABS Tower is modeled as a volume source with dimensions equal to the physical dimensions of the T501502 ABS Tower. Fugitive emissions from the D540AB Ammonia Storage Tanks are modeled as a volume source encompassing the physical location of the ammonia tanks.

c The centerpoint height is half the distance of the release height. The centerpoint height of the R505 ATS Reactor is taken as half the height of the 40-foot tall Process Building. The centerpoint height of the T501502 ABS Tower is taken as the sum of half the distance of the T501502 ABS Tower that protrudes above the 40-foot tall Process Building, and the Process Building; the centerpoint height is thus 32/2 feet plus 40 feet, or 56 feet. The D540AB Ammonia Storage Tanks are oriented horizontally and have a 12-foot outer diameter; thus it is assumed they have a screening height of 12 feet, and a centerpoint height of 6 feet.

d The initial lateral dimension is the smaller of the two volume source dimensions divided by 4.3. The volume source representing the R505 Reactor has dimensions 102 feet x 75 feet; the volume source representing the T501502 ABS Tower has dimensions 4.25 feet by 4.25 feet; and the volume source representing the D540AB Ammonia Storage Tanks has dimensions 24.9 feet x 99.5 feet; .

e The initial vertical dimension is the height of the source divided by 2.15. The R505 ATS Reactor has a screening height of 40 feet; the T501502 ABS Tower has a screening height of 32 feet; and the D540AB Ammonia Storage Tanks have a screening height of 12 feet;

f Per the AERSCREEN User's Guide Section 3.4, March 2011, receptor distances are measured relative to the center of volume sources.

g The AERSCREEN modeled ouput represents the maximum 1-hour concentration outside of the property boundary.

Table D-3. AERSCREEN Meteorological Data

Location	Minimum Temperature [a] (F)	Maximum Temperature [a] (F)	Minimum Wind Speed [a] (m/s)	Surface Profile [b]	Climate Profile [b]
Twin Falls, ID	-23	104	0.5	Cultivated Land	Average

a Meteorological data is taken from the National Weather Service and is based on record extremes in Twin Falls, ID from 1963-2011. Minimum wind speed is based on the AERSCREEN default value of 0.5 m/s.

b The TKI Burley facility is surrounded by 10 kilometers of farmland in almost every direction; as such, the cultivated land surface profile is chosen as the dominant landuse type for the facility. An "average" climate profile, as opposed to "dry" or "wet," is chosen to represent the climate of the area surrounding the facility.

Table D-4. Toxic Air Pollutant Screening - Modeling Results

Pollutant	Is Modeling Required?	S500 Vent Stack (mg/m³)	R505 ATS Reactor (mg/m³)	T501502 ABS Tower (mg/m³)	D540AB Ammonia Storage Tanks (mg/m³)	D314 Sulfur Unloading Tank (mg/m³) [a]	V315 Sulfur Storage Tank (mg/m³) [a]	Scaling Factor [b]	Maximum Concentration[b] (mg/m³)	Scaled Concentration[b] (mg/m³)	AAC (mg/m³)	Pass AAC? (Yes/No)
Ammonia	Yes	2.35E-02	6.92E-02	5.34E-02	3.94E+00	0.00E+00	0.00E+00	0.4	4.08E+00	1.63E+00	9.00E-01	No
Hydrogen Sulfide	Yes	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.91E-01	9.92E-01	0.4	9.92E-01	3.97E-01	7.00E-01	Yes

a Two screening analyses are performed for hydrogen sulfide, in which it is assumed 100 percent of hydrogen sulfide emissions emanate from either the V315 Sulfur Storage Tank or the D314 Sulfur Unloading Tank. The more conservative screening analysis is compared to the AAC. Table D-1 provides modeled outputs for point sources; the more conservative assumption is that 100 percent of hydrogen sulfide is emitted from the V315 Sulfur Storage Tank.

b Section 585 and Section 586 of the Idaho Administrative Code, Toxic Air Pollutants Non-carcinogenic Increments and Carcinogenic Increments, presents acceptable ambient concentrations (AAC) as averaged over 24 hours and over one year, respectively. The AERSCREEN User's Guide, Section 1.1, March 2011, gives a scaling factor of 0.6 for a 24-hour averaging period; however, IDAPA 58.01.01.210.03(a)(i) states that the maximum hourly concentration ouput from the model should be multiplied by a persistence factor of 0.4 to convert the hourly concentration to a 24-hour average. Thus a scaling factor of 0.4 is used.

AERSCREEN 11126 / AERMOD 1110 03/14/12
09:34:28

TITLE: S500 VENT STACK

********************** AERSCREEN MAXIMUM IMPACT SUMMARY ********************

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	30.92	30.92	27.82	18.55	3.092

DISTANCE FROM SOURCE 119.00 meters directed toward 10 degrees

IMPACT AT THE AMBIENT BOUNDARY	2.885	2.885	2.596	1.731	0.2885

DISTANCE FROM SOURCE 41.18 meters directed toward 10 degrees

AERSCREEN 11126 / AERMOD 1110 03/04/12
17:34:46

TITLE: R505 ATS REACTOR

********************** AERSCREEN MAXIMUM IMPACT SUMMARY ********************

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	665.8	665.8	599.2	399.5	66.58

DISTANCE FROM SOURCE 49.62 meters

IMPACT AT THE AMBIENT BOUNDARY	665.8	665.8	599.2	399.5	66.58

DISTANCE FROM SOURCE 49.62 meters

AERSCREEN 11126 / AERMOD 1110 02/27/12
19:20:03

TITLE: T501502 ABS TOWER

********************** AERSCREEN MAXIMUM IMPACT SUMMARY ********************

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	156.7	156.7	141.0	94.02	15.67

DISTANCE FROM SOURCE 95.00 meters

IMPACT AT THE AMBIENT BOUNDARY	124.0	124.0	111.6	74.39	12.40

DISTANCE FROM SOURCE 59.13 meters

AERSCREEN 11126 / AERMOD 1110 03/04/12
17:32:22

TITLE: D540AB AMMONIA STORAGE TANKS

********************** AERSCREEN MAXIMUM IMPACT SUMMARY *********************

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	3980.	3980.	3582.	2388.	398.0

DISTANCE FROM SOURCE 42.24 meters

IMPACT AT THE AMBIENT BOUNDARY	3980.	3980.	3582.	2388.	398.0

DISTANCE FROM SOURCE 42.24 meters

AERSCREEN 11126 / AERMOD 1110 03/01/12
11:11:37

TITLE: V315 SULFUR STORAGE TANK VENT

********************** AERSCREEN MAXIMUM IMPACT SUMMARY *********************

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	701.0	701.0	630.9	420.6	70.10

DISTANCE FROM SOURCE 50.00 meters directed toward 330 degrees

IMPACT AT THE AMBIENT BOUNDARY	593.7	593.7	534.4	356.2	59.37

DISTANCE FROM SOURCE 48.58 meters directed toward 320 degrees

'BREEZE BPIP'
'p'
'METERS' 1.0
'UTMY' 0.00
6
'V530A' 1 1294.31
24 10.67
266166.00 4705467.13
266168.88 4705466.75
266171.57 4705465.64
266173.87 4705463.87
266175.64 4705461.56
266176.75 4705458.88
266177.13 4705456.00
266176.75 4705453.12
266175.64 4705450.43
266173.87 4705448.13
266171.56 4705446.36
266168.88 4705445.25
266166.00 4705444.87
266163.12 4705445.25
266160.43 4705446.36
266158.13 4705448.13
266156.36 4705450.44
266155.25 4705453.12
266154.87 4705456.00
266155.25 4705458.88
266156.36 4705461.57
266158.13 4705463.87
266160.44 4705465.64
266163.12 4705466.75
'V530B' 1 1294.48
24 10.67
266198.00 4705467.13
266200.88 4705466.75
266203.57 4705465.64
266205.87 4705463.87
266207.64 4705461.56
266208.75 4705458.88
266209.13 4705456.00
266208.75 4705453.12
266207.64 4705450.43
266205.87 4705448.13
266203.56 4705446.36
266200.88 4705445.25
266198.00 4705444.87
266195.12 4705445.25
266192.43 4705446.36
266190.13 4705448.13
266188.36 4705450.44
266187.25 4705453.12
266186.87 4705456.00
266187.25 4705458.88

266188.36 4705461.57
266190.13 4705463.87
266192.44 4705465.64
266195.12 4705466.75
'PROCESS' 1 1294.62
4 12.19
266053.00 4705422.00
266053.00 4705444.86
266074.36 4705444.86
266074.36 4705422.00
'V315' 1 1294.45
24 8.53
266171.00 4705440.79
266172.50 4705440.59
266173.90 4705440.01
266175.09 4705439.09
266176.01 4705437.89
266176.59 4705436.50
266176.79 4705435.00
266176.59 4705433.50
266176.01 4705432.10
266175.09 4705430.91
266173.89 4705429.99
266172.50 4705429.41
266171.00 4705429.21
266169.50 4705429.41
266168.10 4705429.99
266166.91 4705430.91
266165.99 4705432.11
266165.41 4705433.50
266165.21 4705435.00
266165.41 4705436.50
266165.99 4705437.90
266166.91 4705439.09
266168.11 4705440.01
266169.50 4705440.59
'T501502' 1 1294.50
24 21.95
266069.00 4705424.65
266069.17 4705424.63
266069.33 4705424.56
266069.46 4705424.46
266069.56 4705424.32
266069.63 4705424.17
266069.65 4705424.00
266069.63 4705423.83
266069.56 4705423.67
266069.46 4705423.54
266069.32 4705423.44
266069.17 4705423.37
266069.00 4705423.35
266068.83 4705423.37
266068.67 4705423.44
266068.54 4705423.54

```
266068.44 4705423.68
266068.37 4705423.83
266068.35 4705424.00
266068.37 4705424.17
266068.44 4705424.33
266068.54 4705424.46
266068.68 4705424.56
266068.83 4705424.63
'UTILITY' 1 1294.62
4 7.62
266044.00 4705422.00
266044.00 4705444.86
266053.14 4705444.86
266053.14 4705422.00
1
'S500' 1294 33.53 266067 4705455
```

AERSCREEN 11126 / AERMOD 1110 04/02/12
15:40:51

TITLE: D314 SULFUR UNLOADING TANK VENT

********************** AERSCREEN MAXIMUM IMPACT SUMMARY *********************

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	134.8	134.8	121.3	80.90	13.48

DISTANCE FROM SOURCE 80.00 meters directed toward 120 degrees

IMPACT AT THE AMBIENT BOUNDARY	17.57	17.57	15.81	10.54	1.757

DISTANCE FROM SOURCE 14.78 meters directed toward 10 degrees

TABLE D-5. AERSCREEN MODELING DIRECTORY

File Name	File Type	Master Folder	Description
S500 Vent Stack	OUT	TAP Files	Ammonia TAPs Modeling Output File
R505 ATS Reactor	OUT	TAP Files	Ammonia TAPs Modeling Output File
T501502 ABS Tower	OUT	TAP Files	Ammonia TAPs Modeling Output File
D540AB Ammonia Storage Tanks	OUT	TAP Files	Ammonia TAPs Modeling Output File
V315 Sulfur Tank_refined BPIP	OUT	TAP Files	Ammonia TAPs Modeling Output File
D314 Sulfur Unloading Tank	OUT	TAP Files	Ammonia TAPs Modeling Output File

APPENDIX F

AERMOD Model Parameters
AERMOD Model Results
AERMOD Electronic File Directory

Table F-1. AERMOD Ammonia Modeling Results

Year	Toxic Air Pollutant	Averaging Period	UTM Location [a] East (m)	North (m)	Modeled Results mg/m³	AAC mg/m³	Below AAC?
Maximum	Ammonia	24-hour	266,148	4,705,484	0.700	0.9	Yes
2006	Ammonia	24-hour	266,128	4,705,484	0.633		
2007	Ammonia	24-hour	266,148	4,705,484	0.700		
2008	Ammonia	24-hour	266,128	4,705,484	0.581		
2009	Ammonia	24-hour	266,108	4,705,484	0.540		
2010	Ammonia	24-hour	266,128	4,705,484	0.564		

[a] The UTM location is the location of the receptor at which the maximum ambient concentration of ammonia occurs.

[b] The AAC is the acceptable ambient concentration for ammonia listed in IDAPA 58.01.01.585.

APPENDIX F

AERMOD Model Parameters
AERMOD Model Results
AERMOD Electronic File Directory

Table F-1. AERMOD Ammonia Modeling Results

Year	Toxic Air Pollutant	Averaging Period	UTM Location [a] East (m)	North (m)	Modeled Results mg/m³	AAC mg/m³	Below AAC?
Maximum	Ammonia	24-hour	266,148	4,705,484	0.700	0.9	Yes
2006	Ammonia	24-hour	266,128	4,705,484	0.633		
2007	Ammonia	24-hour	266,148	4,705,484	0.700		
2008	Ammonia	24-hour	266,128	4,705,484	0.581		
2009	Ammonia	24-hour	266,108	4,705,484	0.540		
2010	Ammonia	24-hour	266,128	4,705,484	0.564		

[a] The UTM location is the location of the receptor at which the maximum ambient concentration of ammonia occurs.

[b] The AAC is the acceptable ambient concentration for ammonia listed in IDAPA 58.01.01.585.

Table F-2. TKI ATS Plant Point Source Locations

EPN	POINT	UTM East (m)	UTM North (m)	Elevation (m)
S500	POINT	266067	4705455	1294

Table F-3. Point Source Parameters

EPN	Emission Rate (lb/hr)	Emission Rate (g/s)	Height (ft)	Height (m)	Temperature (°F)	Temperature (K)	Flow Rate (acfm)	Velocity (ft/min)	Velocity (m/s)	Equivalaent Diameter (ft)	Side of Rectangular Opening (ft)	Diameter (m)
S500	0.7610	9.588E-02	110 [a]	33.53	100 [b]	310.93	2,451 [b]	719	3.65	2.08 [c]		0.64

[a] The height of the S500 Vent Stack, 110 feet, was provided via email to Trinity from Dawn Kominski, TKI, on December 14, 2011.

[b] The temperature and flow rate of the stack exhaust are given in the TKI Burley ATS Production Facility process flow diagram, dated July 6, 2011.

[c] The stack inner diameter, 25 inches, was provided via email to Trinity from Dawn Kominski, TKI, on December 14, 2011.

Table F-4 TKI ATS Plant Volume Source Locations

EPN	VOLUME	UTM East (m)	UTM North (m)	Elevation (m)
R505	VOLUME	266060	4705433	1295
T501502	VOLUME	266069	4705424	1295
D540AB	VOLUME	266125	4705443	1294

Table F-5. Volume Source Parameters

EPN [a]	S-T Emission Rate (lb/hr)	S-T Emission Rate (g/s)	Release Height (ft) [a]	Release Height (m)	Lateral Dimension (ft)	Initial Lateral Dimension (m) [e]	Vertical Dimension (ft)	Initial Vertical Dimension (m) [i]
R505	0.1039	1.309E-02	20.0 [c]	6.10	75.00 [g]	5.32 [g]	40.0 [k]	5.67 [k]
T501502	0.3408	4.294E-02	56.0 [b]	17.07	4.25 [f]	0.30 [f]	32.00 [j]	4.54 [j]
D540AB	0.9895	1.247E-01	6.0 [d]	1.83	24.90 [h]	1.77 [h]	12.0 [l]	1.70 [l]

[a] The release height is equal to half the distance, or the midpoint, of the maximum height of the source.

[b] The release height of the T501 1st Stage ABS Tower and T502 2nd Stage ABS Tower, grouped together as emission source T501502 for the purpose of this modeling analysis, is the sum of half the tower height and the height of the ATS Process Building. Per the December 14, 2011 email from Dawn Kominski, TKI, to Trinity, the 1st and 2nd Stage ABS Tower rises 32 feet above the ATS process building, and the height of the ATS Process Building is 40 feet. Thus the release height is 40 + 32/2 = 56 feet.

[c] The release height of the R505 ATS Reactor is taken as half the height of the ATS Process Building because R505 is housed inside of the building. Per the December 14, 2011 email from Dawn Kominski, TKI, to Trinity, the ATS Proces Building height is 40 feet. Thus the release height is 20 feet.

[d] The release height of the horizontally-oriented D540AB Ammonia Storage Bullet Tanks is taken as half the diameter of the tanks. Per the TKI ATS Production Plant Equipment List, dated August 23, 2011, the diameter of D540AB is 12 feet. Thus the release height is 6 feet.

[e] The initial lateral dimension is the smaller of the two volume source dimensions divided by 4.3.

[f] Per the TKI ATS Production Plant Equipment List, dated August 23, 2011, the diameter of the T501 and T502 ABS Towers is 4 feet 3 inches. The initial lateral dimension is thus 4.25 feet divided by 4.3.

[g] Per the December 14, 2011 email from Dawn Kominski, TKI, to Trinity, the smaller dimension of the ATS Process Building is 75 feet; thus the initial lateral dimension of the R505 ATS Reactor, which is housed inside the ATS Process Building, is 75 feet divided by 4.3.

[h] As measured and scaled using the TKI Metam and ATS Plant plot plan, dated November 16, 2011, the volume source representing the D540AB Ammonia Storage Tanks has dimensions 24.9 feet x 99.5 feet. The initial lateral dimension is thus 24.9 feet divided by 4.3.

[i] The initial vertical dimension is the height of the source divided by 2.15.

[j] Per the December 14, 2011 email from Dawn Kominski, TKI, to Trinity, the T501 and T502 ABS Towers rise 32 feet above the ATS Process Building. Only the height above the ATS Process Building is considered when calculating the initial vertical dimension. The initial vertical dimension is thus 32 feet divided by 2.15.

[k] Per the December 14, 2011 email from Dawn Kominski, TKI, to Trinity, the height of the ATS Process Building is 40 feet. Because the R505 ATS Process Reactor is housed inside of the ATS Process Building, the initial vertical dimension of R505 is 40 feet divided by 2.15.

[l] Per the TKI ATS Production Plant Equipment List, dated August 23, 2011, the D540AB Ammonia Storage Tanks are horizontally-oriented tanks with 12-foot diameters. The initial vertical dimension is thus 12 feet divided by 2.15.

Table F-6. TKI ATS Plant Buildings

Building ID	Description	Height (ft)	Height (m)	Length (ft)	Length (m)	Width (ft)	Width (m)	Diameter (ft)	Diameter (m)	Radius (m)	Notes
PROCESS	ATS Process Building	40	12.19	100	21,36	75	22.86				Per 12/14/2011 email from Dawn Kominski, TKI.
UTILITY	Attached to the Process Building	25	7.62	30	9.14	75	22.86				
T501502	1st Stage and 2nd Stage ABS Tower	72	21.95					4.25	1.30	0.648	Per the TKI ATS Production Plant Equipment List, dated August 23, 2011, the diameter of the T501 and T502 ABS Towers is 4 feet 3 inches.
V315	Sulfur Storage Tank	28	8.53					38.00	11.58	5.791	Per the TKI Metam and ATS Plant plot plan, dated November 16, 2011, the diameter of V315 is 38 feet. Per the December 14, 2011 email from Dawn Kominski, TKI, the height of V315 is 28 feet.
V530A	ATS Storage Tank	35	10.67					73.00	22.25	11.125	Per the TKI Metam and ATS Plant plot plan, dated November 16, 2011, the diameter of V530A is 73 feet.
V530B	ATS Storage Tank	35	10.67					73.00	22.25	11.125	Per the TKI Metam and ATS Plant plot plan, dated November 16, 2011, the diameter of V530B is 73 feet.

Table F-7. TKI ATS Plant Modeling Grid

Grid	Spacing (m)	Extent (m)	SW Corner UTM East (m)	SW Corner UTM North (m)
Boundary	10	NA	NA	NA
Fine Grid	50	2,000	264100	4703400

Notes:
UTM NAD 83, Zone 12

Assume center of the facility:

UTM East (m)	266,100
UTM North (m)	4,705,400

TABLE F-8. AERMOD MODELING DIRECTORY

File Name	File Type	Master Folder	Description
KBYI_2006.PFL	PFL	Met Data	2006 Upper Air Met Data File
KBYI_2006.SFC	SFC	Met Data	2006 Surface Met Data File
KBYI_2007.PFL	PFL	Met Data	2007 Upper Air Met Data File
KBYI_2007.SFC	SFC	Met Data	2007 Surface Met Data File
KBYI_2008.PFL	PFL	Met Data	2008 Upper Air Met Data File
KBYI_2008.SFC	SFC	Met Data	2008 Surface Met Data File
KBYI_2009.PFL	PFL	Met Data	2009 Upper Air Met Data File
KBYI_2009.SFC	SFC	Met Data	2009 Surface Met Data File
KBYI_2010.PFL	PFL	Met Data	2010 Upper Air Met Data File
KBYI_2010.SFC	SFC	Met Data	2010 Surface Met Data File
Aermap input file	INP	Terrain Data	AERMAP Terrain Input File
Aermap output file	OUT	Terrain Data	AERMAP Terrain Output File
ATAyy.ami	INP	TAP Files	Ammonia TAPs Modeling Input File, Year 'yy
ATAyy.out	OUT	TAP Files	Ammonia TAPs Modeling Output File, Year 'yy

DISPERSION MODELING PROTOCOL
TESSENDERLO KERLEY, INC. ▪ BURLEY, IDAHO

Prepared by:

Ryan Hanna, E.I.T. ▪ Consultant
Anna Henolson ▪ Senior Consultant

TRINITY CONSULTANTS
20819 72nd Avenue South
Suite 610
Kent, Washington 98032
(253) 867-5600

February 2012

Project 114801.0022

Trinity Consultants

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1. Introduction

Tessenderlo Kerley, Inc. (TKI) is proposing to conduct a dispersion modeling analysis to demonstrate compliance with the acceptable ambient concentration (AAC) for ammonia in support of a Permit to Construct (PTC) application for an ammonium thiosulfate (ATS) plant (ATS Plant). The ATS Plant will be constructed adjacent to TKI's existing metam manufacturing plant (Metam Plant) in Burley, Idaho. The area is currently in attainment for all criteria pollutants.

The need to perform a refined dispersion modeling analysis was identified after screening analyses were conducted. This report describes the proposed methodologies that will be used in the air dispersion modeling analysis. The results of this analysis will be provided in a PTC application to be submitted in the near future.

TKI owns and operates a facility in Burley, Idaho (Burley Plant) currently consisting of the Metam Plant. TKI proposes to construct the ATS Plant adjacent to the existing Metam Plant. TKI will manufacture ATS at this location for sale as a fertilizer.

The criteria pollutants expected to increase as a result of this project include particular matter, sulfur dioxide, nitrogen oxides, volatile organic compounds (VOCs), and carbon monoxide. Emissions of ammonia, hydrogen sulfide, and trace pollutants in natural gas are also expected. Only project emissions increases are considered in this analysis. The existing Metam Plant will not be modified during the ATS Plant project; as such, emissions from the Metam Plant are not considered when evaluating impacts on ambient air.

Ammonia and hydrogen sulfide are considered toxic air pollutants (TAPs) under IDEQ's TAP program. As such, emissions increases of ammonia, hydrogen sulfide, and TAPs in natural gas need to be quantified in order to demonstrate compliance with IDEQ's TAP program codified under Idaho Administrative Procedures Act (IDAPA) 58.01.01, Sections 210, 585, and 586. For PTCs, the project-wide emissions of TAPs are first compared to the emission levels (EL) in IDAPA Section 585 and 586. Any TAP that has a total project emissions increase that exceeds the EL must be modeled.

Prior to this proposed dispersion modeling analysis, a screening analysis was conducted using the AERSCREEN model to evaluate impacts to ambient air for those pollutants whose emission rates exceeded the respective ELs. The results were compared to AACs for TAPs. The screening modeling results showed that ambient air concentrations were less than the AACs for all TAPs, with the exception of ammonia. As such, TKI is proposing to conduct refined dispersion modeling to demonstrate compliance with the ammonia AAC.

This report serves as TKI's dispersion modeling protocol using refined modeling techniques for submittal to IDEQ. This protocol describes the proposed methodologies that will be used in the air dispersion modeling analysis to demonstrate compliance with the AAC for ammonia.

3. Modeled Emission Rates

Emissions of ammonia are expected to occur from one stack and several fugitive locations. The fugitive areas are distinct from one another as described by the facility's process and instrumentation diagrams. Emissions of ammonia are expected to occur from the following sources:

- S500 Vent Stack;
- R505 ATS Reactor (fugitive equipment leaks);
- T501 1st Stage ABS Tower (fugitive equipment leaks);
- T502 2nd Stage ABS Tower (fugitive equipment leaks);
- D540A Ammonia Bullet Storage Tank (fugitive equipment leaks); and
- D540B Ammonia Bullet Storage Tank (fugitive equipment leaks).

The S500 Vent Stack is the only point source that will be modeled in this analysis. The five fugitive equipment leak sources will be characterized as volume sources based on the dimensions of the building, tank, or tower from which the fugitive equipment leaks would emanate. The T501 1st Stage ABS Tower and 2nd Stage ABS Tower protrude above the southeast corner of the ATS Process Building. For the purpose of this modeling analysis, both ABS Towers will be modeled as a single volume emission source, herein referred to as the "T501502 ABS Tower." Similarly, the D540A and D540B Ammonia Bullet Storage Tanks will be modeled as a single volume emission source, herein referred to as the "D540AB Storage Tanks."

Emissions from the S500 Vent Stack will be determined based on process engineering and mass balance. Emissions from fugitive equipment will be determined based on the November 1995 EPA-453/R-95-017 document "Protocol for Equipment Leak Emission Estimates." The emission rates that will be modeled for each source are presented below in Table 3-1.

Table 3-1. Modeled Emission Rates

Source ID	Description	Source Type	Modeled Emission Rate (lb/hr)	(g/s)
S500	Vent Stack	Point	0.7610	9.588E-02
R505	ATS Reactor	Volume	0.1039	1.309E-02
T501502	ABS Tower	Volume	0.3408	4.294E-02
D540AB	Storage Tanks	Volume	0.9394	1.184E-01

The emission rates presented in Table 3-1 assume facility operation of 8,760 hours per year. Emission factors are determined in units of pounds per hour and can be scaled for various averaging periods assuming continuous operation. The averaging period for ammonia, and for all TAPs listed in IDAPA 58.01.01.585, is 24 hours.

This section describes the air quality dispersion modeling analysis that will be performed to estimate ambient air impacts due to ammonia emissions from the ATS plant. Please note that the facility plot plan, process flow diagrams, and process and instrumentation diagrams are preliminary drafts. Modeling parameters based on these drawings that are presented in this modeling protocol may change. Any revisions will be noted in the final submittal that will be included with the PTC application.

4.1 DISPERSION MODEL

The American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) modeling system, the AERMOD dispersion model, version 11353, with Plume Rise Model Enhancements (PRIME) advanced downwash algorithms will be used as the dispersion model for this air quality analysis.

4.2 METEOROLOGICAL DATA

This modeling analysis will be performed using five years of representative data (January 1, 2006-December 31, 2010) for the AERMOD dispersion model.[1] Surface meteorological data and upper air meteorological data will be taken from the meteorological station at the Burley Airport, located at latitude 42.533 N and longitude 113.767 W. The AERMOD meteorological preprocessor AERMET (Version 11059) was used to process the data.

4.3 TERRAIN ELEVATIONS

Terrain elevations for receptors, buildings, and sources will be determined using the National Elevation Dataset (NED) supplied by the United States Geologic Survey (USGS).[2] The NED is a seamless dataset with the best available raster elevation data of the conterminous United States. It is the primary elevation product of the USGS. NED data provides elevations based on one arc-second (approximately 30 meters), one-third arc-second (approximately 10 meters), and one-ninth arc-second (approximately 3 meters).[3] One-third arc-second data will be used for the Burley, Idaho area.

Elevations will be converted from the NED grid spacing to the air dispersion model spacing using the AERMOD preprocessor, AERMAP version 11103. All data obtained from the NED files will be checked for completeness and spot-checked for accuracy.

4.4 COORDINATE SYSTEM

The location of emission sources, structures, and receptors will be represented in the Universal Transverse Mercator (UTM) coordinate system using the World Geodetic System 1984 (WGS84)

[1] AERMET data was provided by email from Kevin Schilling, IDEQ, to Anna Henolson, Trinity Consultants, on February 3, 2012.

[2] NED data obtained at http://seamless.usgs.gov

[3] http://ned.usgs.gov

projection. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 km). UTM coordinates for this analysis will be based on UTM Zone 12. The location of the ATS Plant is approximately 4,705,400 Northing and 266,100 Easting in UTM Zone 12.

4.5 Receptor Grids

Receptors are placed in all areas directly surrounding the facility considered to be ambient air. This modeling analysis will use a Cartesian receptor grid extending 2000 meters from the approximate center of the ATS Plant in each of the cardinal directions, creating a four kilometer by four kilometer square receptor grid. Receptors will be spaced at 50 meter intervals.

Boundary receptors spaced 50 meters from one another will circumscribe the facility at the ambient air boundary. The ambient air boundary at the ATS Plant is determined pursuant to the requirements of Section 6.5 of the "State of Idaho Guideline for Performing Air Quality Impact Analyses." The ambient air boundary is the fenceline shown in the attached plot plan (see Appendix A). The fence acts as a physical barrier and effectively precludes public access to the facility. Please note that the fenceline shown in the plot plan is based on a preliminary draft and may change. Any modification to the fenceline will be noted in the final submittal that will be included with the PTC application.

An additional medium-spaced grid with 100-meter receptor spacing extending five kilometers from the center of the facility, or to points where impacts are no longer significant, will be added to the model if concentrations at the edge of the four kilometer by four kilometer grid are nonnegligible.

4.6 Building Downwash

Emissions from the ATS Plant will be evaluated in terms of its proximity to nearby structures. Building downwash effects are included to determine if emission discharges become caught in the turbulent wakes of nearby structures. Wind blowing around a building creates zones of turbulence that are greater than if the buildings were absent. Direction-specific building dimensions and the dominant downwash structure parameters used as inputs to the dispersion models will be determined using the *BREEZE-WAKE/BPIP* software, developed by Trinity. This software incorporates the algorithms of the U.S. EPA-sanctioned Building Profile Input Program with PRIME enhancement (BPIP-PRIME), version 04274. BPIP is designed to incorporate the concepts and procedures expressed in the GEP Technical Support document, the Building Downwash Guidance document, and other related documents.

Table 4-1 presents the list of buildings that will be included in this modeling analysis.

Table 4-1. Building Descriptions and Heights

Building ID	Description	Length/ Diameter [a] (ft)	Length/ Diameter [a] (m)	Width (ft)	Width (m)	Height (ft)	Height (m)
Process [b]	ATS Process Building	102	31.09	75	22.86	40	12.19
T501502	T501502 ABS Tower	4.25	1.30	--	--	72	21.95
V315	Sulfur Storage Tank	38	11.58	--	--	28	8.53
V530A	ATS Storage Tank	73	22.25	--	--	35	10.67
V530B	ATS Storage Tank	73	22.25	--	--	35	10.67

[a] Buildings without listed widths are circular; the reported length is the diameter of the structure.

[b] The ATS Process Building dimensions are based on scaled measurements of the facility plot plan. Please note that this plot plan is a preliminary draft and may change. Any modification to the dimensions of the ATS Process Building (or any downwash building) will be noted in the final submittal that will be included with the PTC application.

4.7 Emission Source Parameters

Section 3 above lists the four emission sources that will be included in this analysis. This section details each source's dispersion parameters. A plot plan is included in Appendix A that shows the location of each emission source relative to the facility, potential downwash structures, and fenceline.

4.7.1 S500 Vent Stack

The S500 Vent Stack is oriented vertically, and is the only point source included in this modeling analysis. It is located near the north fenceline of the ATS Plant, to north of the ATS Process Building and to the south of the gravel road. The S500 Vent Stack source parameters that will be used in this modeling analysis are presented below in Table 4-2.

Table 4-2. S500 Vent Stack Parameters

Parameter	Value	Units
Type	Point	
UTM East	266,067	m
UTM North	4,705,455	m
Elevation	1,294	m
Stack Height [a]	33.53	m
Exit Temperature [b]	310.93	K
Inside Diameter [a]	0.64	m
Exit Velocity [b]	3.65	m/s

[a] The S500 Vent Stack height and inside diameter are based on engineering purchase plans.

[b] The S500 Vent Stack exit temperature and exit velocity are provided in the facility's process flow diagrams.

4.7.2 R505 ATS Reactor

The R505 ATS Reactor is located inside of the ATS Process Building near the center of the building. Ammonia emissions from the reactor are not emitted from an associated vent or stack. Thus, the source will be modeled as a volume source based on the dimensions of the ATS Process Building, from which fugitive ammonia leaks are expected to occur through doors, windows, and general building heating and ventilation vents. The R505 ATS Reactor volume source parameters that will be used in this modeling analysis are presented below in Table 4-3.

Table 4-3. R505 ATS Reactor Volume Source Parameters

Parameter	Value	Units
Type	Volume	
UTM East	266,060	m
UTM North	4,705,433	m
Elevation	1,295	m
Release Height [a]	6.10	m
Initial Lateral Dimension [b]	5.32	m
Initial Vertical Dimension [c]	5.67	m

[a] The release height is equal to half the distance, or the midpoint, of the maximum height of the ATS Process Building.
[b] The initial lateral dimension is the smaller of the two ATS Process Building dimensions divided by 4.3.
[c] The initial vertical dimension is the height of the ATS Process Building divided by 2.15.

4.7.3 T501502 ABS Tower

The T501 1st Stage ABS Tower and 2nd Stage ABS Tower will be modeled as a single volume source, denoted "T501502 ABS Tower." Together, these towers protrude above the southeast corner of the ATS Process Building. The T501502 ABS Tower source parameters that will be used in this modeling analysis are presented below in Table 4-4.

TABLE 4-4. T501502 ABS TOWER SOURCE PARAMETERS

Parameter	Value	Units
Type	Volume	
UTM East	266,069	m
UTM North	4,705,424	m
Elevation	1,295	m
Release Height [a]	17.07	m
Initial Lateral Dimension [b]	0.30	m
Initial Vertical Dimension [c]	4.54	m

[a] The T501 and T502 ABS Towers rise 32 feet above the ATS Process Building. The release height is the sum of half the tower height and the height of the ATS Process Building.
[b] The initial lateral dimension is the diameter of the ABS tower divided by 4.3.
[c] The T501 and T502 ABS Towers rise 32 feet above the ATS Process Building. Only the height above the ATS Process Building is considered when calculating the initial vertical dimension. The initial vertical dimension is thus 32 feet divided by 2.15.

4.7.4 D540AB STORAGE TANKS

The two ammonia bullet storage tanks, D540A and D540B, will be modeled as a single fugitive volume source, denoted "D540AB Storage Tanks." The tanks are horizontally-oriented tanks; their lengths are oriented north-south. They are located due east of the ATS Process Building. The D540AB source parameters that will be used in this modeling analysis are presented below in Table 4-5.

TABLE 4-5. D540AB STORAGE TANKS SOURCE PARAMETERS

Parameter	Value	Units
Type	Volume	
UTM East	266,125	m
UTM North	4,705,443	m
Elevation	1,294	m
Release Height [a]	1.83	m
Initial Lateral Dimension [b]	1.77	m
Initial Vertical Dimension [c]	1.70	m

[a] The release height of the horizontally-oriented D540AB Storage Tanks is taken as half the diameter of the tanks.
[b] The initial lateral dimension is the smaller of the width and length of the combined tanks, divided by 4.3.
[c] The initial vertical dimension is the diameter of the horizontally-oriented tanks, divided by 2.15.

Dispersion modeling will be conducted to demonstrate compliance with Idaho's TAP standard for ammonia codified in IDAPA 58.01.01.585.

5.1 IDAHO TAPS ANALYSIS

In the state of Idaho, all new and modified sources of TAP emissions are required to demonstrate compliance with the Idaho TAP standards, pursuant to IDAPA 58.01.01.210.04. Compliance with the ammonia TAP standard must be met using one of the methods described in Subsection 210.05 through 210.08.

For this modeling analysis, the method described in Subsection 210.06 of comparing the uncontrolled ambient concentration to the applicable AAC is will be used to demonstrate preconstruction compliance.[4] Pursuant to Subsection 210.06(b), if the source's uncontrolled ambient concentration at the point of compliance is less than or equal to the applicable AACs, no further procedures for demonstrating preconstruction compliance is required for that TAP as part of the application process. The point of compliance to which the AAC should be compared is defined in IDAPA 58.01.01.210.03(b) as "the receptor site that is estimated to have the highest ambient concentration of the TAP of all the receptor sites that are located either at or beyond the facility property boundary or at a point of public access." As such, this modeling analysis will use the highest modeled ammonia concentration to evaluate compliance with the toxics standards.

IDEQ has established occupation exposure levels (OELs), emission levels (ELs), and AACs for TAPs. The OEL, EL, and AAC for ammonia are presented below in Table 5-1.

TABLE 5-1. AMMONIA EL AND AAC

CAS Number	Substance	OEL (mg/m^3)	EL (lb/hr)	AAC (mg/m^3)
7664-41-7	Ammonia	18	1.2	0.9

AERMOD dispersion modeling will be conducted to show that the maximum ambient air concentration of ammonia surrounding the facility is below the AAC for ammonia.

[4] Emission rates from fugitive volume sources are based on the use of rupture disks and sealless design pumps. These devices are preventative in nature and do not actively or directly reduce ammonia emissions; therefore, they are not considered control equipment.

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 NORTH HILTON, BOISE, ID 83706 • (208) 373-0502

C. L. "BUTCH" OTTER, GOVERNOR
CURT FRANSEN, DIRECTOR

March 8, 2012

Anna Henolson
Trinity Consultants
Kent, WA

RE: Modeling Protocol for the Tessenderlo Kerley, Inc. facility near Burley, ID

Anna:

DEQ received your dispersion modeling protocol submitted to me via email on February 21, 2012. The modeling protocol was submitted on behalf of Tessenderlo Kerley, Inc. (TKI). The modeling protocol proposes methods and data for use in the ambient impact analyses of a Permit to Construct application for a proposed ammonium thiosulfate (ATS) plant adjacent to their existing metam manufacturing plant in Burley, Idaho.

The modeling protocol has been reviewed and DEQ has the following comments:

- Comment 1: DEQ did not review the emissions rate calculation methods. Emissions calculation methods will be reviewed by the permit writer during the application review process. If you have questions on emissions calculation methods, please contact a permit writer via the permitting hotline (1-877-573-7648).

- Comment 2: The proposed receptor grid appears reasonable. However, it is the applicant's responsibility to use a sufficiently tight receptor network such that the maximum modeled concentration is reasonably resolved. If DEQ conducts verification modeling analyses with a tighter receptor grid and compliance with standards is no longer demonstrated, the permit will be denied.

- Comment 3: Criteria pollutant emissions and modeling was not addressed in detail in the protocol. DEQ assumed that either criteria pollutant emissions from the project are below DEQ modeling thresholds or that modeled results from AERSCREEN were below significant contribution levels.

DEQ's modeling staff considers the submitted dispersion modeling protocol, with resolution of the additional items noted above, to be approved. It should be noted, however, that the approval of this modeling protocol is not meant to imply approval of a completed dispersion modeling analysis. Please refer to the *State of Idaho Air Quality Modeling Guideline*, which is available on the Internet at http://www.deq.state.id.us/air/permits_forms/permitting/modeling_guideline.pdf, for further guidance.

To ensure a complete and timely review of the final analysis, our modeling staff requests that electronic copies of all modeling input and output files (including BPIP and AERMAP input and output files) are submitted with an analysis report. If DEQ provided model-ready meteorological data files, then these do not need to be resubmitted to DEQ with the application. Also, please include with the application materials a copy of the protocol and this protocol approval notices. If you have any further questions or comments, please contact me at (208) 373-0112.

Sincerely,

Kevin Schilling

Kevin Schilling
Stationary Source Air Modeling Coordinator
Idaho Department of Environmental Quality
208 373-0112

APPENDIX G

Certification Form

Compliance Certification

Based on the information and belief formed after reasonable inquiry, I certify the statements and information in this document are accurate and complete.

4-12-12

Dawn Kominski
Director of Regulatory Affairs, Tessenderlo Kerley, Inc.

Date