ASRC
AMERICAN SYNTHETIC RUBBER COMPANY

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May 16, 2017

Matt King
Compliance and Enforcement Manager
Louisville Metro Air Pollution Control District
701 West Ormsby Avenue
Suite 303
Louisville, Kentucky 40203

RE: American Synthetic Rubber Company
Plant I.D. 0011
Revised Request for Modification

Dear Mr. King:

Enclosed is the Revised Request for Modification of Certain STAR Program Goals (May 15, 2017) for American Synthetic Rubber Company, and the Strategic Toxic Air Reduction (STAR) Environmental Acceptability Demonstration (May 12, 2017), prepared by Aecom.

As announced at the public hearing conducted on April 19, 2017, ASRC is withdrawing its Request for Modification of Certain STAR Program Goals (December 7, 2015), and the Revised Strategic Toxic Air Reduction (STAR) Environmental Acceptability Demonstration for 2013 and 2014 (September 17, 2015).

ASRC has achieved significant reductions in fugitive emissions over the past two years. ASRC is confident that these reductions will be maintained and improved upon.

As a result, ASRC is withdrawing its request to modify the environmental acceptability goal applicable to emissions of all toxic air contaminants from all processes on industrial property. ASRC is continuing to request a modification of the environmental acceptability goal applicable to emissions of an individual toxic air contaminant from an individual process on non-industrial property for emissions of 1,3-butadiene from the Flare, on the same basis as that modification was originally requested in the Request for Modification of the EA Goal Applicable to a Single Process for a Single TAC: Flare and Plant-Wide Fugitive Emissions (June 30, 2007). That request was conditionally approved by the District in 2008. ASRC is submitting this Revised Request for Modification of the environmental acceptability goals applicable to emissions of an individual toxic air contaminant from an individual process on industrial and non-industrial property for fugitive emissions of 1,3-butadiene.

Please contact me at (502) 449-7217 if you have any questions.

Based upon information and belief formed after reasonable inquiry, I certify that that the statements and information in the Revised Request for Modification of Certain STAR Program Goals are true, accurate, and complete.

Sincerely,

Guillaume Coiraton
Chief Operating Officer
American Synthetic Rubber Company,
A Division of Michelin North America, Inc

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ADMINISTRATION

Enclosures

American Synthetic Rubber Company
A Division of Michelin North America

Revised Request for Modification
of Certain STAR Program Goals

AMERICAN SYNTHETIC RUBBER COMPANY

4500 Campground Road
Louisville KY 40216
May 15, 2017

American Synthetic Rubber Company
A Division of Michelin North America

Revised Request for Modification of Certain STAR Program Goals

AMERICAN SYNTHETIC RUBBER COMPANY

4500 Campground Road
Louisville KY 40216
May 15, 2017

Table of Contents

I. Introduction

The STAR Program establishes three Environmental Acceptability Goals ("EAGs") applicable to emissions of Toxic Air Contaminants ("TACs") from stationary sources for non-industrial property: (1) a facility-wide cancer risk goal of 7.5 in a million for emissions of all TACs from all processes; (2) a cancer risk goal of 1 in a million for emissions of an individual TAC from an individual process; and (3) a non-cancer risk goal of a Hazard Quotient of 1.0 for emissions of an individual TAC from an individual process. Regulation 5.21 Section 3.1. On industrial property, the STAR Program establishes adjusted EAGs for emissions from stationary sources: (1) a facility-wide cancer risk goal of 75 in a million for emissions of all TACs from all processes; (2) a cancer risk goal of 10 in a million for emissions of an individual TAC from an individual process; and (3) a non-cancer risk goal of a Hazard Quotient of 3.0 for emissions of an individual TAC from an individual process. Regulation 5.21 Section 3.6.

On December 28, 2006, American Synthetic Rubber Company ("ASRC") submitted a report entitled *Modeling of LMAPCD Category 1 Toxic Air Contaminants* to the Louisville Metro Air Pollution Control District ("District") in accordance with the STAR Program. Due to an error in the location of the Powerhouse, ASRC submitted the *Re-Submittal of Modeling of LMAPCD Category 1 Toxic Air Contaminants* in December 2007 ("*Category 1 Report*").

The *Category 1 Report* described the modeling of emissions of Category 1 Toxic Air Contaminants from all of the processes and process equipment at the ASRC facility to determine compliance with the Environmental Acceptability Goals ("EAGs") of the STAR Program. With the exception of emissions of 1,3-butadiene from two individual processes, emissions of individual Category 1 TACs from ASRC's processes and process equipment complied with the EAGs for cancer risk and non-cancer risk on both industrial and non-industrial property. Only emissions of 1,3-butadiene from the Flare and plant-wide fugitive emissions of 1,3-butadiene exceeded the EAG for an individual process or process equipment on an individual TAC basis. The *Category 1 Report* demonstrated that facility-wide emissions of all Category 1 TACs from all processes at ASRC complied with the STAR Program's EAGs for cancer risk and non-cancer risk on both industrial property and non-industrial property based upon the emissions modeled in that report.

On June 30, 2007, ASRC submitted the *Request for Modification of the EA Goal Applicable to a Single Process for a Single TAC: Flare and Plant-Wide Fugitive Emissions* ("*Original Request*"). ASRC requested that the District limit the maximum potential amount of 1,3-butadiene that could be directed to the vent header to no more than 9,500,000 pounds per year, and that the required minimum destruction efficiency for the Flare Thermal Oxidizer ("C-Flare-TO") be increased from 99.5% to 99.99%. 1,3-butadiene emissions through the stacks at ASRC were modeled on this basis. Plant-wide fugitive emissions of 1,3-butadiene were modeled based on annualized emissions as reported on APCD Form SAM 81 (2006) and submitted to the District pursuant to

Regulation 1.06 Section 5. Emissions from the Powerhouse were modeled based on the maximum allowable emissions permitted pursuant to Title V Permit No. 154-97-TV.

On March 31, 2008, ASRC submitted the *Modeling of LMAPCD Category 2 Toxic Air Contaminants* ("*Category 2 Report*"). In addition to the Category 2 TACs emitted by ASRC, the *Category 2 Report* included modeling of styrene, a Category 4 TAC, which was required to be considered for the finishing process due to a modification for which an application was submitted to the District in October 2006 for the construction of new Finishing Line 7, as provided in Regulation 5.21 Section 4.15.1.2. The emissions of all Category 2 TACs and styrene were either de minimis or met the EAG for emissions of an individual TAC from an individual process for cancer risk and non-cancer risk on both industrial and non-industrial property.

By letter of October 13, 2008, the District stated that it would approve the *Original Request*, contingent upon public comment regarding the proposed Best Available Technology for Toxics ("T-BAT") and inclusion of conditions in ASRC's permit. The District has not yet issued a permit to ASRC with conditions related to the STAR Program.

By letter of March 19, 2015, the District directed ASRC to submit a revised environmental acceptability demonstration for fugitive emissions of 1,3-butadiene. The District's directive was based on ASRC's reported fugitive emissions of 1,3-butadiene for calendar year 2013.

On May 1, 2015, ASRC submitted to the District the *Request for Modification of the EA Goal Applicable to an Individual Process for an Individual TAC: Flare and Plant-Wide 1,3-Butadiene Fugitive Emissions, and Compliance Plan for 1,3-Butadiene Fugitive Emissions.* The *Modeling of Fugitive Emissions of 1,3-Butadiene for Calendar Years 2013 and 2014* (April 20, 2015) was provided in Appendix 1 as the revised environmental acceptability demonstration. The modeling of fugitive emissions for calendar year 2014 was included since ASRC reported its fugitive emissions in 2014 to the District on April 15, 2015. That modeling indicated that the fugitive emissions of 1,3-butadiene in calendar years 2013 and 2014 exceeded the EAGs applicable to emissions of an individual TAC from an individual process and exceeded the EAGs applicable to emissions of all TACs from all processes on industrial and non-industrial property. By letter of July 17, 2015, ASRC submitted a *Compliance Plan Supplement* to the District.

ASRC undertook a rigorous review of its reported fugitive emissions of 1,3-butadiene in both 2013 and 2014 to confirm whether the amount of fugitive emissions had been correctly calculated. ASRC also undertook a review of the model used to determine whether the inputs were correct and whether the maximum concentrations were correct. As a result of that review, ASRC determined that the amount of fugitive emissions previously reported for 2013 and 2014 had not been correctly calculated. ASRC also determined that there were errors in the model used for the environmental acceptability demonstration. ASRC made corrections to the amounts of calculated 1,3-

butadiene emissions for 2013 and 2014. ASRC also made corrections to the model. The corrected model was then run using the recalculated amounts for fugitive emissions of 1,3-butadiene.

The results of that modeling were submitted to the District on September 23, 2015 in the *Revised Strategic Toxic Air Reduction (STAR) Environmental Acceptability Demonstration for 2013 and 2014* (September 17, 2015) by URS Corporation. The corrected modeling demonstrated that the fugitive emissions of 1,3-butadiene exceeded the EAG applicable to emissions of an individual TAC from an individual process on both industrial and non-industrial property, and that total emissions exceeded the EAG applicable to emissions of all TACs from all processes on industrial property for both 2013 and 2014. The modeling demonstrated that total emissions did not exceed the EAG applicable to emissions of all TACs from all processes on non-industrial property for 2013 or 2014.

ASRC withdrew the *Request for Modification* submitted to the District on May 1, 2015, and the *Compliance Plan Supplement* submitted to the District on July 17, 2015. Instead, ASRC submitted the *Request for Modification of Certain STAR Program Goals* (December 7, 2015) ("*2015 Request for Modification*"). In the *2015 Request for Modification*, ASRC requested that the EAG for emissions of an individual TAC from an individual process be modified for plant-wide fugitive emissions and emissions from the Flare of 1,3-butadiene, and that the EAG for emissions of all TACs from all processes be modified for industrial property only. ASRC did not request a modification of the EAG for emissions of all TACs from all processes for non-industrial property. ASRC also proposed a new T-BAT for fugitive emissions of 1,3-butadiene.

On May 16, 2016, ASRC entered into an Agreed Board Order with the District that required ASRC to implement the provisions of the T-BAT proposed in the *2015 Request for Modification*, which consist of enhanced Leak Detection and Repair requirements applicable to fugitive emissions of 1,3-butadiene. ASRC is required to implement the proposed T-BAT until the District issues a permit with any modifications of the STAR Program Environmental Acceptability Goals.

As a result of the implementation of the proposed T-BAT, ASRC reduced its fugitive emissions of 1,3-butadiene from 6994.6 lbs. in 2013 to 3723.2 lbs. in 2016. Therefore, ASRC reevaluated the requests for modification of the EAGs made in the *2015 Request for Modification*. ASRC believes that continued implementation of the proposed T-BAT will result in ASRC meeting the EAG applicable to emissions of all TACs from all processes on industrial property. Therefore, ASRC has decided to revise the *2015 Request for Modification* to withdraw the request for modification of that goal.

ASRC submits this *Revised Request for Modification of Certain STAR Program Goals* (May 15, 2017) ("*2017 Revised Request*") to withdraw the request for modification of the EAG applicable to emissions of all TACs from all processes on industrial property made in the *2015 Request for Modification*. ASRC is also submitting the attached *STAR Environmental Acceptability Demonstration* (May 12, 2017) ("2017

STAR EAD"). ASRC continues to request a modification of the EAG applicable to emissions of an individual TAC from an individual process for emissions of 1,3-butadiene from the Flare on non-industrial property and for fugitive emissions of 1,3-butadiene on industrial and non-industrial property. ASRC is not amending or revising the T-BAT proposed in the *2015 Request for Modification*.

II. Background for the Request to Modify the EAG Applicable to Emissions of an Individual TAC from an Individual Process

A. The ASRC Facility

ASRC's facility is located on a 60.5 acre site in southwest Jefferson County, Kentucky. The facility was originally constructed by the United States Government in 1943 within the industrial area known as "Rubbertown" to provide a vital supply of synthetic rubber during World War II. ASRC is a division of Michelin North America, Inc. and produces synthetic rubber used to manufacture automobile tires and a liquid rubber for solid rocket propellants.

ASRC produces three types of synthetic rubber at its Louisville facility: (1) 1,3-polybutadiene rubber ("PBR"); (2) solution styrene-butadiene rubber ("SSBR"); and (3) butadiene-acrylic acid-acrylonitrile terpolymer ("PBAN"). Raw materials used in the manufacturing process include toluene, 1,3-butadiene, acrylonitrile, acrylic acid, and styrene. None of these products can be manufactured without 1,3-butadiene. There is no alternative material that can be substituted for 1,3-butadiene.

ASRC also owns and operates a Powerhouse consisting of two coal-fired boilers, two standby natural gas boilers, and associated coal, lime and ash handling systems (collectively the "Powerhouse") to provide steam for its facility.

ASRC employs 365 technicians, chemists, engineers, and production employees at its Louisville facility with an annual payroll of over $36 million. Annual local taxes paid by ASRC exceed $2.5 million. ASRC also purchases approximately $10 million in goods and services from area businesses in support of the local economy.

B. ASRC Measures Implemented since 2003 to Reduce 1,3-Butadiene Emissions

1,3-butadiene was identified as a constituent of concern in ambient air in the *Final Report: West Louisville Air Toxics Study Risk Assessment* (October 2003) ("*WLATS Report*") and the *Final Report: West Louisville Air Toxics Study Risk Assessment* (November 16, 2006) ("*WLATS Update*").

In response to a request from the Mayor of Louisville in 2004, ASRC voluntarily committed to implement measures to reduce emissions of 1,3-butadiene from its facility. On May 17, 2004, ASRC formalized the voluntary commitment by entering into an

Enforceable Board Agreement with the Louisville Metro Air Pollution Control Board ("Board").

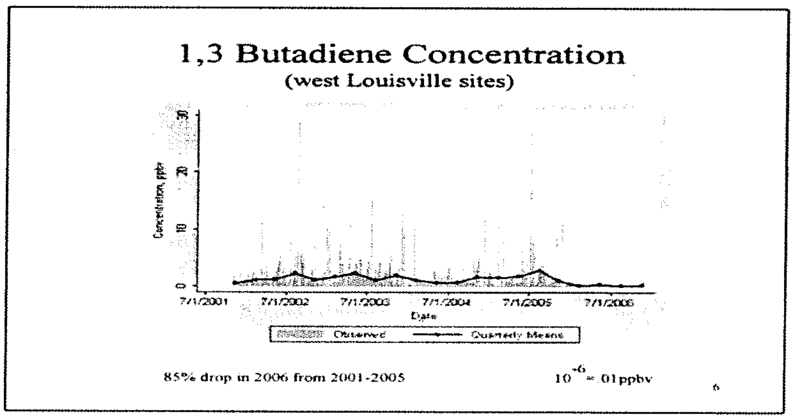
As part of its voluntary commitment, ASRC implemented the following measures to reduce emissions of 1,3-butadiene:

- Installation of Gas Chromatograph ("GC") technology in August 2003 on all production lines to allow more accurate measurement and control of the amount of 1,3-butadiene used in the manufacturing process, to eliminate excess 1,3-butadiene not consumed in the manufacturing process;
- Applying for and received a construction permit on October 20, 2003, to modify the two production lines that were capable of making only PBR to have the capability to make either PBR or SSBR products, since the manufacture of SSBR uses less 1,3-butadiene than the production of PBR;
- Quarterly reporting of plant-wide 1,3-butadiene emissions to the District beginning with the first quarter of 2004;
- Installation of a decontamination system in 2004 to minimize emissions of 1,3-butadiene during maintenance operations;
- Completion of a report entitled *Study of the Flare Used as an Emission Control Device for 1,3-butadiene Emissions* ("*Flare Study*"), which was submitted to the District on April 19, 2004. This report analyzed the ability to improve the design or operation of the Flare to reduce 1,3-butadiene emissions, and proposed conditions for inclusion in the ASRC Title V Operating Permit for operation of the Flare at maximum destruction efficiency;
- Completion of a report entitled *Study of 1,3-butadiene Processes* ("*Process Study*"), which was submitted to the District on May 17, 2004. This report analyzed every process at ASRC which uses 1,3-butadiene to identify potential actions that could be implemented to reduce 1,3-butadiene emissions. This report identified the following voluntary measures which were implemented during 2004 and 2005:
    - Increased cooling of 1,3-butadiene tanks in the Purification Process to reduce volatilization (completed December 2004);
    - Increased reintroduction of 1,3-butadiene in the Concentration Process to eliminate unused 1,3-butadiene (completed December 2004);
    - Modification of the two product lines to conform to the construction permit issued on October 20, 2003 (completed December 2004);
    - Increased the efficiency of recovery equipment by upgrading and adding instrumentation (completed December 2004);

- Implemented a recycling process during priming of 1,3-butadiene pumps in the tank storage area (completed December 2004); and
- Installed the Flare Thermal Oxidizer ("C-FLARE-TO") to replace the Flare as the primary control device for emissions of 1,3-butadiene and to increase the destruction efficiency, with the Flare to be maintained as a safety device and backup control device (completed December 2005).

After installation of the C-FLARE-TO at the end of 2005, a statistical analysis of monitoring data from all ambient air monitors at west Louisville sites conducted by the University of Louisville indicated that ambient concentrations of 1,3-butadiene in 2006 dropped 85% from concentrations monitored during 2001-2005. *University of Louisville Air Toxic Monitoring: Statistical Analysis January – December 2006*, s. 6.[1] ("Statistical Analysis"). The Statistical Analysis indicates that the 85% drop in monitored emissions of 1,3-butadiene remained stable for all of 2006. Statistical Analysis, s. 7.

2001- 2006 Monitored 1,3-butadiene Concentrations



Source: University of Louisville Air Toxic Monitoring: Statistical Analysis January – December 2006, s. 6.

[1] The University of Louisville's document incorrectly states that ASRC was "shut down for several weeks in January 2006 due to weather damage." *Id.* at s. 7. See Louisville Metro Air Pollution Control District, *Excess Emission Reports: December 6, 2005 through January 9, 2006* (January 10, 2006). On January 2, 2006, certain portions of ASRC's facility suffered damage as a result of a class F-1 tornado. *Id.* Damage was limited to two warehouses, several office buildings, and vehicles in the parking lot. Richard M. Robinson, Address at the *Rubbertown Community Advisory Council* (January 12, 2006). Repairs to the warehouse roofs were estimated to take approximately 30 days. *Id.* ASRC immediately shut down its production operation upon hearing the community sirens *Id.* The operation of the C-Flare-TO was interrupted for approximately one hour due to a power outage following the tornado. Louisville Metro Air Pollution Control District, *Excess Emission Reports: December 6, 2005 through January 9, 2006* (January 10, 2006). During the power outage, emissions from the facility were vented to the Flare for destruction. *Id.* Limited production operations resumed within 48 hours of the power outage. Full production operations resumed within five days.

ASRC has also implemented these measures to reduce emissions of 1,3-butadiene, in addition to the voluntary measures described in the 2004 Enforceable Board Order:

- Eliminated the use of its Reject Butadiene System in late 2006 through the use of on-line Gas Chromatographs and improvements in raw material systems. Two 1,3-butadiene Recovery Compressors subject to LDAR were eliminated.
- ASRC replaced 12 control valves with 10 bellow seal control valves and 2 rotary V-ball control valves with Enviro-Seal packaging in 2008.
- Reduction of fugitive emissions during planned shutdowns by removing materials where possible from piping, tanks and vessels to eliminate the possibility of fugitive emissions during these shutdown periods.
- Since 2006, all 14 reactor agitator seals have been upgraded to nitrogen seals. ASRC has also installed nitrogen monitoring panels on the 14 reactors to help monitor potential issues associated with reactor agitator seal failures.
- Installation of zero-emissions bellow-sealed control valves in 2008 to eliminate the potential for fugitive leaks.
- Replaced one of the three 1,3-butadiene compressors in 2010 with a more modern compressor and incorporated more modern seal technology to minimize fugitive emissions.
- Retrofitted the other two 1,3-butadiene compressors in 2011-12 with new parts (additional packing glands) as recommended by the manufacturer to incorporate improved emission control features.
- Implemented revisions in 2012 and 2014 to piping specifications on 1,3-butadiene use.
    - Piping connections are to be minimized when possible to decrease fugitive emission points
    - The use of threaded fittings is to be minimized in future installations in favor of socket weld fittings
    - The use of Teflon or Delron as seat material is prohibited in favor of PEEK, based upon a recommendation by the equipment supplier
- Installed flex hose on 1,3-butadiene unloading compressor in 2012 to limit vibration and lower the likelihood of broken piping.

- Implemented a project in 2014 to remove screwed components in 1,3-butadiene piping in the 1,3-butadiene unloading pump house that eliminated 242 components from the LDAR monitoring program.

III. Request for Modification of the EAG for Emissions of an Individual TAC from an Individual Process for the Flare and Plant-Wide 1,3-Butadiene Fugitive Emissions

A. Introduction

Under the STAR Program, the EAG for emissions of an individual TAC from an individual process may be modified following a demonstration that the process complies with or, pursuant to a proposed plan and schedule, will comply with T-BAT based on a review of the practices and measures potentially applicable to the process or process equipment, including technology transfer, identified from readily available air pollution control information, including, but not limited to, the RACT/BACT/LAER Clearinghouse. Regulation 5.21 Section 5.1.

"T-BAT" or "Best Available Technology for Toxics" means

> an emission standard that reflects the maximum reduction in emissions of, and risk from, a TAC that the District determines can reasonably be achieved by the process or process equipment, taking into account energy, environmental, and economic impacts and other costs, and health and welfare benefits.

Regulation 5.00 Section 1.3.

T-BAT may include one or more of the following:

1. work practices,
2. raw material substitutions,
3. alternative processes and process design characteristics,
4. air pollution control equipment,
5. pollution prevention measures,
6. equipment maintenance measures (including leak detection and repair), and
7. upset condition prevention measures.

Id.

B. Emissions of 1,3-Butadiene from the Flare

1. Destruction Efficiency of the Flare

The Flare at ASRC was installed in the early 1940s primarily as a safety device designed to accept and combust gases that otherwise could cause over-pressurization of pressure vessels throughout the facility. To avoid a buildup of the gases that could cause over-pressurization, pressure vessels at the facility are protected by rupture disks and relief valves, which allow the gases to leave the pressure vessels and ultimately travel to the Flare to be destroyed. Process vents from the emulsion rubber processes were also vented to the Flare for thermal destruction.

In the early 1970s, a John Zink Company model STF-SA-18 smokeless tip was installed on the Flare to control visible emissions from both the emergency relief valves and the process valves. The District permitted this modification under Permit Number 197-74 issued on March 28, 1974, and set a destruction efficiency of 99% for the Flare. Several years ago, the District advised ASRC that the originally permitted destruction efficiency of 99% for the Flare was to be replaced by an assumed destruction efficiency of 98% based on U.S EPA's *Flare Efficiency Study* (July 1983), which states that flares achieved combustion efficiencies of greater than 98% when operated under optimized conditions representative of good industrial operating practices. *Flare Study*, Enclosures 1 and 7. ASRC's permit for the Flare was modified by the District to apply the assumed destruction efficiency of 98%.

As part of the *Flare Study*, ASRC's operation of the Flare was reviewed by the John Zink Company. *Flare Study*, p. 2. According to the John Zink Company, ASRC's Flare is expected to achieve a destruction efficiency of greater than 99% due to ASRC's optimized operating factors. *Id.*

2. The MACT Applicable to the Flare

In September 1996, U.S. EPA published the Maximum Achievable Control Technology ("MACT") rule for rubber manufacturing facilities. The intent of the MACT rule was to define "best practices" (both in pollution control technology and procedures) in controlling emissions of Hazardous Air Pollutants ("HAPs"), including 1,3-butadiene, from rubber manufacturing facilities. ASRC, along with other rubber manufacturers, cooperated and provided input to U.S. EPA in developing the MACT rule.

In the MACT rule, U.S. EPA identified a flare, such as the one installed at ASRC by the John Zink Company in the early 1970s, as the first choice in controlling HAP emissions from the "front-end" of the process. The "front-end" of the process is the manufacturing process itself, with units such as storage, monomer purification, chemical addition, reactor concentration, blending and solvent stripping. The MACT rule did not set a limit on the amount of emissions to be allowed from the front end of the process because these emissions depend so much on the type of and precise "recipe" for the rubber produced, the specific type of process, and other variable factors.

For the "back end" of the rubber manufacturing process (the finishing operations where the rubber is dried, baled and packaged), the MACT rule requires each facility to meet a limit of 10 kilogram HAP emission per megagram of production, using stripping technology or some other control device. ASRC uses both stripping technology and another control device, the Regenerative Thermal Oxidizer (RTO), to bring emissions from the "back end" below the required limit. There are no emissions of 1,3-butadiene from the back end of the manufacturing process.

As a result of U.S. EPA's industry-wide review in developing the MACT, the technology and practices in use by ASRC were acknowledged as "best practices" in the MACT rule. ASRC was the lowest-emitting rubber manufacturing plant of the five that U.S. EPA studied for the MACT rule.

3. Evaluation of the Flare to Reduce 1,3-Butadiene Emissions

As discussed in the Background section above, ASRC evaluated the use of the Flare and its operation in the *Flare Study* performed in 2004 to determine whether changes could be made to the design or operation of the Flare to achieve reductions in emissions of 1,3-butadiene from the Flare. Based on ASRC's evaluation, operation of the Flare was already at maximum efficiency, and there were no changes that could be made to the Flare to achieve additional emissions reductions of 1,3-butadiene. *Flare Study*, Enclosure 10.

As part of the *Process Study* performed in 2004, ASRC evaluated every process at the facility to determine if reductions in emissions of 1,3-butadiene could be achieved. Through the *Process Study*, ASRC identified two control devices, a thermal oxidizer and an enclosed ground flare system, that could potentially be used instead of the Flare to reduce emissions of 1,3-butadiene that could not be reintroduced into the manufacturing process. *Process Study*, pp. 12-13. ASRC committed to installing a new control device to replace the Flare that would have a minimum destruction efficiency of 99.5%, with the Flare to be maintained as a safety device and backup control device as part of its voluntary commitment to the Board and District. Following additional review, ASRC selected the C-Flare-TO manufactured by the John Zink Company as the new primary control device. APCD Construction Permit 112-04-C, Additional Condition 1.a. Installation of the C-Flare-TO was completed at the end of 2005.

C. T-BAT for the Flare

The modeling of emissions from the Flare is based on the maximum permitted operating limit for the Flare of 876 hours of operation (10% of ASRC's annual operations or not more than 36 days of operation in a 12 month period), and a destruction efficiency of 98%. Title V Permit No. 154-97-TV, U1/U2 Additional Condition 1.a.vi.

On the basis of this maximum operating scenario for the Flare, the emissions of 1,3-butadiene from the Flare on non-industrial property were modeled to result in a potential cancer risk of 1.93 in a million at the point of maximum ambient concentration for emissions from the Flare. These estimated emissions exceed the EAG for emissions of an individual TAC from an individual process in Regulation 5.21 Section 3.1.1. The emissions of 1,3-butadiene from the Flare on industrial property were modeled to have an estimated cancer risk of 3.12 in a million, which is less than the EAG of a cancer risk of ten in a million for industrial property. Regulation 5.21 Section 3.6.

If the destruction efficiency of the Flare is greater than 98% (based on the destruction efficiency recommended by the Flare's manufacturer), the estimated risk of the emissions from the Flare would be less because the amount of emissions would be less. See Table 1.

Table 1
Comparison of Flare Destruction Efficiency

Destruction Efficiency	Throughput (based on 876 hours)	Amount of emissions
98%	9,500,000 pounds	190,000 pounds
99%	9,500,000 pounds	95,000 pounds

As discussed above, there are no design or operational changes that can be made to the Flare to further reduce emissions of 1,3-butadiene. Consequently, T-BAT for the Flare is the replacement of the Flare by the C-Flare-TO as the primary control device. T-BAT for the Flare also includes the limitation on operation of the Flare to a maximum period of 876 hours in any 12 consecutive month period, and use of the Flare solely as a safety device and back-up control for the C-Flare-TO, as required by Title V Permit No. 154-97-TV, U1/U2 Additional Condition 1.

The C-Flare-TO has been determined by compliance testing to exceed the minimum required destruction efficiency of 99.5% required by the Board Agreement and Construction Permit 112-04-C. *VOC Destruction Efficiency of the Flare Thermal Oxidizer* (May 2-3, 2006), p. 1-1. ASRC requested in the *Original Request* that the District revise U1/U2 Additional Condition 1.a.iii for the C-Flare-TO to require that the minimum destruction efficiency of the C-Flare-TO be 99.99% rather than 99.5% and to establish a limit of 9,500,000 pounds per year of 1,3-butadiene as the maximum amount that may be directed to the vent header to the C-Flare-TO and Flare.

Table 2
Comparison of C-Flare-TO Destruction Efficiency

Destruction Efficiency	Annual Throughput	Amount of Emissions
99.5%	9,500,000 pounds	47,500 pounds
99.99%	9,500,000 pounds	950 pounds

Modeled emissions of 1,3-butadiene from the C-Flare-TO are estimated to have a potential cancer risk of 0.25 in a million on non-industrial property and 0.53 in a million on industrial property. The emissions from the C-Flare-TO comply with all applicable

EAGs. As the primary control device, the C-Flare-TO represents the maximum degree of TAC emission and risk reduction for the Flare that can be reasonably achieved, when combined with the existing permit limits on the maximum operation of the Flare.

ASRC requests that the District determine the C-Flare-TO to be T-BAT for the Flare under these conditions, and modify the EAG for emissions of an individual TAC from the Flare pursuant to APCD Regulation 5.21 Section 5.

D. Proposed Emission Standard for the Flare

ASRC requests that the District set emissions limits for emissions of 1,3-butadiene from the Flare and the Flare Thermal Oxidizer as the T-BAT emission standard for the Flare, in addition to the existing permit limits on the maximum hours of operation of the Flare. ASRC requests that emissions of 1,3-butadiene from the Flare shall not be allowed to equal or exceed 19,000 pounds per 12-consecutive month period, and that emissions of 1,3-butadiene from the Flare Thermal Oxidizer shall not be allowed to equal or exceed 950 pounds per 12-consecutive month period.

E. Proposed Modification of the EAG Applicable to Emissions of an Individual TAC from an Individual Process on Non-Industrial Property for the Flare

ASRC requests that the District modify the environmental acceptability goal applicable to emissions of 1,3-butadiene from the Flare for emissions of an individual TAC from an individual process on non-industrial property to 1.93.

F. Plant-Wide Fugitive Emissions of 1,3-Butadiene

1. Modeling of Fugitive Emissions

"Fugitive emissions" are "those emissions that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening." Regulation 1.02 Section 1.34. Sources of potential fugitive emissions from process equipment at the facility include storage vessels, process vents, equipment leaks, and transfer unloading operations.

Fugitive emissions of 1,3-butadiene are modeled and evaluated for environmental acceptability on a plant-wide basis because there is no accurate method to allocate fugitive emissions to a specific location within the facility for modeling purposes. To comport with the requirement of the ISC3ST model used for the modeling, modeling was conducted based on seven defined fugitive emission areas. These seven areas are the Liquid Polymer Source, Daytanks, Purification Level 1, Purification Level 2, Purification Level 3, 1,3-butadiene Spheres Area and the Rail Car Unloading Area. A portion of the total plant-wide fugitive emissions were allocated to each of the seven defined areas on a percentage basis based on best engineering judgment. The model was subsequently set and run to treat all of these seven fugitive sources as a single Source Group. The basis upon which fugitive emissions were modeled is described in the *2017 STAR EAD*.

Because the manufacturing processes that use 1,3-butadiene at the facility are pressurized, the amount of fugitive emissions at the facility is not related to the amount of 1,3-butadiene directed to the vent header, and is not related to or controlled by the amount of production. Instead, fugitive emissions at ASRC are primarily the result of leaks. The amount of fugitive emissions of 1,3-butadiene varies over time because different components leak at different times at different rates. Consequently, fugitive emissions of 1,3-butadiene cannot be subjected to a throughput limit such as that requested for the Flare.

2. ASRC Measures to Control Fugitive Emissions

ASRC is subject to the Hazardous Organic NESHAP ("HON"), which regulates fugitive emissions for storage vessels, process vents, equipment leaks and transfer unloading operations, and requires reductions of emissions of hazardous air pollutants, including 1,3-butadiene.[2]

Under the HON, Leak Detection and Repair (LDAR) programs include various work practices and equipment standards. See, for example, 59 FR 19402 (National Emission Standards for Hazardous Air Pollutants for Source Categories; Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry and Other Processes Subject to the Negotiated Regulation for Equipment Leaks, Final Rule; April 22, 1994) and 61 FR 46906 (National Emission Standard for Hazardous Air Pollutant Emissions: Group I Polymers and Resins; Final Rule; September 5, 1996). LDAR programs require periodic monitoring for VOC leaks using a portable device. 59 FR 19402, 19409. The frequency of monitoring is established by the regulation and depends on the percent of leaking components identified and the consistency of performance demonstrated by the facility. *Id.* For example, connectors in gas or light liquid service that have 0.5% or greater leaking connectors are required to monitor all connectors annually. Units with less than 0.5% may monitor every two years, while units that demonstrate less than 0.5% leaking for two monitoring cycles may monitor only once every four years. *Id.* A component is defined as "leaking" if the measured concentration exceeds the threshold regulatory value. Once a leak is identified, it must be repaired within a certain amount of time as established in the regulation.

ASRC implemented its LDAR program in January 1990, four years before the LDAR program was required by regulation. As a result of ASRC's early implementation of LDAR, data from ASRC's LDAR program was used in setting some of the standards used in U.S. EPA's final regulation.

Of the 72,959 total components registered in ASRC's LDAR database for all chemical products in 2016, approximately 9,841 components are in 1,3-butadiene

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[2] ASRC is subject to Subpart H of the HON, National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks, pursuant to 40 CFR 63.502.

service.[3] These components are monitored for fugitive emissions by TEAM Industrial Services, a third-party contractor. Monitoring is conducted using a Thermo Electron Toxic Vapor Analyzer, TVA-1000B, which utilizes a flame ionization detector (FID) to detect leaks. ASRC contractually obligates TEAM Industrial Services to conduct self audits of its performance every three years. The audit must be conducted by a person outside TEAM's supervising regional office.

As a result of ASRC's implementation of its LDAR program, ASRC is currently required to monitor its components in 1,3-butadiene service no more frequently than annually in accordance with the HON. For example, ASRC is below a leak rate of 0.5% for valves and connectors, and is only required to monitor those components every four (4) years in accordance with the HON. However, ASRC monitored all components in 1,3-butadiene service on a semi-annual basis from January 2005 until January 2016. In January 2016, ASRC began monitoring components in 1,3-butadiene service on the frequency described in Table 3 below.

G. T-BAT for Fugitive Emissions of 1,3-Butadiene

ASRC conducted a reevaluation of the T-BAT proposed in the *Original Request* and the *2015 Request for Modification*, as required by Regulation 5.21 Section 5.

The reevaluation included a review of the U.S. EPA's RACT/BACT/LAER Clearing House to identify practices that could potentially be used to control fugitive emissions of 1,3-butadiene that have been listed since 2007.[4] No new practices have been identified in the Clearing House since 2007 for the control of fugitive emissions of volatile organic compounds, such as 1,3-butadiene.

ASRC determined that the practices identified in the Clearing House for the control of fugitive emissions of volatile organic compounds involve an enhanced LDAR program. The three adjustments that may be considered to enhance an LDAR program are more frequent monitoring of components, use of a decreased rate of leakage to define a leak, and an attempt to repair a leaking component in a shorter period of time.

ASRC conducted an engineering analysis of the fugitive emissions reported for 2013 and 2014. ASRC analyzed those fugitive emissions by reviewing fugitive emissions by area and fugitive emissions by component type. ASRC assessed the number of leaks and rate of leaks for all types of components in 1,3-butadiene service.

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[3] "In 1,3-butadiene service" means that the material in the component contains 90% or more of 1,3-butadiene by weight.

[4] On December 21, 2006, U.S. EPA issued its final evaluation of the maximum achievable control technologies and the residual risk from certain equipment also subject to the HON. 71 FR 76603, 76605 (Final Rule: National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry; December 21, 2006). As part of its technology review, U.S. EPA "did not identify any significant developments, practices, processes or control technologies since promulgation of the original standards in 1994," including those related to Subpart H, National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks. 71 FR 76603, 76605. ASRC is subject to Subpart H.

ASRC had leaks from 53 components out of a total of 10,225 components in 1,3-butadiene service in 2013, or 0.52% of the total. Those leaks accounted for approximately 60% of the reported fugitive emissions of 1,3-butadiene in 2013. ASRC had leaks from 50 components out of a total of 10,177 components in 1,3-butadiene service in 2014, or 0.49% of the total. Those leaks accounted for approximately 70% of the reported fugitive emissions of 1,3-butadiene in 2014.

ASRC determined that rupture disk holders tend to have the highest rate of leakage out of all of the component types. ASRC identified a new type of rupture disk holder that was used to replace the existing rupture disks. The new assembly will help assure that the disks are properly placed and torqued evenly so that fugitive emissions are less likely to occur. Before May 1, 2015, the new rupture disk holders had been installed on Day Tanks 11 and 16 (four rupture disk assemblies total). Subsequent monitoring of the rupture disks installed on Day Tanks 11 and 16 indicated significant reductions in leakage.

ASRC previously proposed to install the new rupture disk holders at these twenty (20) additional locations:

- Distillation columns C-1, C-1A and C-1T (2 rupture disc assemblies each, for a total of 6 replacements); and
- Day tanks 7-10 and 13-15 (2 rupture disc assemblies each, for a total of 14 replacements).

ASRC completed the installation of these rupture disc assemblies in December 2015.

ASRC determined that compressors are prone to leakage. ASRC has already implemented all of the technology controls that it has been able to identify for compressors, as previously discussed.

ASRC determined that a significant portion of previously reported fugitive emissions of 1,3-butadiene were attributable to components that are exempt from monitoring under the LDAR program and are assigned a default value leak rate, instead of using an actual leak rate determined by monitoring. ASRC was able to monitor most of those components in 1,3-butadiene service to establish an actual leak rate to calculate actual fugitive emissions from those components.

After reviewing the types of components at ASRC's facility that can leak, and historical data regarding the frequency and rate of leakage of each type of component, ASRC determined that use of more frequent monitoring of components in 1,3-butadiene service in combination with the application of engineering solutions to correct delay of repair components is the most effective practice to reduce fugitive emissions of 1,3-butadiene. This approach resulted in significant reductions in the calculated plant-wide fugitive emissions of 1,3-butadiene in 2016, because monitoring these components more frequently and the ability to correct leaks that cannot be repaired using conventional methods reduces the duration of any detected leaks that must be assumed under the LDAR program.[5]

ASRC proposes that future monitoring of components in 1,3-butadiene service be conducted at the frequency listed in Table 3 as part of the T-BAT for fugitive emissions of 1,3-butadiene that exceed the EAG applicable to emissions of all TACs from all processes.

Table 3

Comparison of Monitoring Frequency for Components in 1,3-butadiene Service

Component Type	HON Required Monitoring	2007 Proposed Enhanced Monitoring	2015 Enhanced Monitoring
Valves	Annually	Semi-annually	Quarterly
Connectors	Every 4 years	Semi-annually	Quarterly
Compressors	Annually	Semi-annually	Monthly
Pumps with an External Shaft and Agitator Seals	Monthly	Monthly	Monthly
Pressure Relief Devices (Valves, Rupture Disks and Closed Loop Vent Systems (CLVS-H PRD))	Annually	Semi-annually	Monthly
Closed Vent Systems	Annually	Semi-annually	Quarterly (Visual, Olfactory, and Auditory Method)
Potentially Open-ended Lines	Every 4 years	Semi-annually	Quarterly
Instruments	Exempt	Semi-annually	Quarterly
Any component in 1,3-butadiene service designated as unsafe to monitor (UTM) or difficult to monitor (DTM)	Annually	Annually	Annually

ASRC also agrees to the District's request that the threshold for determining when the first attempt to fix a leak under the LDAR program is required be lowered from 500 ppm to 250 ppm.

A component in 1,3-butadiene service with a monitored leak rate of more than 250 ppm will have a first attempt at repair implemented, as provided in the LDAR program. A component in 1,3-butadiene service with a monitored leak rate of more than 500 ppm will have a second attempt at repair implemented, as provided in the LDAR program. A component in 1,3-butadiene service with a monitored leak rate of more than 500 ppm that cannot be corrected by conventional repair methods will have a permanent repair or engineered solution placed on the component within ninety (90) days of the monitored leak, provided that the cost shall not exceed five thousand dollars ($5,000.00).

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[5] Under the LDAR program, any detected leak is conservatively assumed to have been leaking since the previous monitoring event for that component when it was not leaking. For example, with semi-annual monitoring, this could be up to 183 days. In contrast, with quarterly monitoring, a detected leak would only be assumed to have been ongoing for a maximum of 92 days.

ASRC also analyzed whether attempting to repair a leaking component in a shorter period of time would have a significant effect on reducing fugitive emissions. ASRC determined that it will not, because most of the calculated fugitive emissions for a leaking component relate to the LDAR assumption that the component has been leaking since the last date the component was monitored as not leaking, not the time to complete a repair. Decreasing the time to attempt a repair may not be possible, because it may be necessary to order parts or make arrangements to conduct the repair.

Based upon this analysis, ASRC proposes the following actions as the T-BAT for fugitive emissions of 1,3-butadiene to meet the EAG applicable to emission of all TACs from all processes on industrial property:

- Replacement of the rupture disks with the new type of rupture disk that is less prone to leaking (completed). As each failure occurs for rupture disks in 1,3-butadiene service, the failed rupture disk holder/ assembly will be upgraded to technology that is as efficient as a unibody device and minimizes the number of leak points;
- Monitoring of components in 1,3-butadiene service on the frequency listed in Table 3;
- Reduce the threshold for first attempt to repair a leak for components in 1,3-butadiene service to 250 parts per million or greater above background level; and
- Components in 1,3-butadiene service with a monitored leak rate of more than 500 ppm that cannot be corrected by conventional methods will have a permanent repair or engineered solution placed on the component within ninety (90) days, provided that the cost shall not exceed five thousand dollars ($5,000.00).

ASRC requests that the District determine these practices and measures to be T-BAT for fugitive emissions of 1,3-butadiene to meet the EAG applicable to emissions of all TACs from all processes on industrial property.

H. Proposed Emission Standard for Fugitive Emissions of 1,3-Butadiene

ASRC requests that the District establish an emission standard for fugitive emissions of 1,3-butadiene to be no more than 4694 pounds on a calendar year basis.

I. Proposed Modification of the EAG Applicable to Emissions of an Individual TAC from an Individual Process on Industrial and Non-Industrial Property for Fugitive Emissions of 1,3-Butadiene

ASRC requests that the District modify the environmental acceptability goal applicable to fugitive emissions of 1,3-butadiene from the Flare for emissions of an individual TAC from an individual process on industrial property to 63.36 and on non-industrial property to 3.04.

J. Reconsideration of T-BAT for Fugitive Emissions of 1,3-Butadiene for Emissions of an Individual TAC from an Individual Process

As provided in the District's proposed permit condition S1.c.xv, ASRC asks for the opportunity to request in writing a reconsideration of these proposed T-BAT requirements if the calculated annual risk is below 75 in a million for industrial property for three consecutive years.

AMERICAN SYNTHETIC RUBBER COMPANY

STRATEGIC TOXIC AIR REDUCTION (STAR) ENVIRONMENTAL ACCEPTABILITY DEMONSTRATION

Prepared for:

AMERICAN SYNTHETIC RUBBER COMPANY

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May 12, 2017

AMERICAN SYNTHETIC RUBBER COMPANY

STRATEGIC TOXIC AIR REDUCTION (STAR) ENVIRONMENTAL ACCEPTABILITY DEMONSTRATION

Prepared for:

American Synthetic Rubber Company
4500 Camp Ground Road
Louisville, KY 40216

Report Basis:

The analysis presented in this report is based on emissions information, previous modeling inputs, and other data furnished to AECOM by ASRC and/or third parties. AECOM has relied on this information as furnished, and is neither responsible for nor has confirmed the accuracy of this information. The data, site conditions and other information used is generally applicable as of May 2017, and the conclusions of this report are therefore applicable only to that time frame.

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1.0 Introduction / Summary

1.1 Background

American Synthetic Rubber Company (ASRC) requested that AECOM update its previous Revised Strategic Toxic Air Reduction (STAR) Environmental Acceptability Demonstration for 2013 and 2014 (September 17, 2015) ("2015 Report").[1] In conjunction with ASRC's ongoing evaluation, ASRC has implemented actions to reduce fugitive emissions. Due to these actions, ASRC has achieved significant reduction in fugitive emissions over the past two years. ASRC is confident that these reductions will be maintained and improved upon.

As a result, ASRC has informed AECOM that it is withdrawing its previous request to modify the environmental acceptability goal applicable to emissions of all toxic air contaminants from all processes on industrial property. ASRC is continuing to request a modification of the environmental acceptability goal applicable to emissions of an individual toxic air contaminant from an individual process on non-industrial property for emissions of 1,3-butadiene for emissions from the Flare on the same basis as that modification was originally requested in the *Request for Modification of the EA Goal Applicable to a Single Process for a Single TAC: Flare and Plant-Wide Fugitive Emissions* (June 30, 2007). That request was conditionally approved by the Louisville Metro Air Pollution Control District (District) in 2008. ASRC is submitting a revised request for modification of the environmental acceptability goals applicable to emissions of an individual toxic air contaminant from an individual process on industrial and non-industrial property for fugitive emissions of 1,3-butadiene.

Therefore, ASRC requested that AECOM update its air dispersion modeling based on limited acrylonitrile (AN) and 1,3 butadiene (BD) fugitive emissions, and other minor changes (discussed below). This Report presents the results of AECOM's analysis and modeling efforts to address that request, and serves as ASRC's revised environmental acceptability demonstration in accordance with District Regulation 5.21.

For this latest air dispersion modeling analysis, AECOM used the modeling files for its 2015 Report as the starting point. Before the 2015 Report, previous ASRC modeling had been performed on a piecemeal basis. That is, when new modeling was performed, only the new information was modeled and the results of that new modeling were added to the previous modeling results. For this Report, AECOM performed comprehensive modeling of all facility emissions subject to STAR.

1.2 Modeling Approach Summary

AECOM gathered information from the previous air dispersion modeling, conducted a quality assurance review of that information with both ASRC and the District, and merged the model inputs (with corrections where needed) into a comprehensive site-wide model. The vast majority of the model inputs and emissions were unchanged from previous modeling. All the specific changes to the model

[1] The 2015 Report addressed calendar year 2013 and 2014 toxic air contaminant (TAC) emissions from the Louisville facility to demonstrate compliance with the District's STAR Program environmental acceptability (EA) goals. (That report was prepared by the wholly owned AECOM subsidiary URS; however, AECOM is now the official name of the company.)

inputs or risk estimation approach are detailed in Section 2.0 of this Report, but it is worth highlighting the more significant changes.

1. The 2015 risk modeling for 1,3 butadiene fugitive emissions was based on 2013 actual emissions of 6994.6 pounds. The PTE emissions scenarios used actual fugitive emissions because it is not possible to estimate a PTE for fugitive leaks from piping and other components subject to the Leak Detection and Repair program. District policy recognizes the indeterminate nature of a PTE for fugitive emissions and allows use of actual fugitive emissions or a requested limit in STAR environmental acceptability demonstrations. Due to ongoing actions implemented by ASRC, fugitive emissions have been significantly reduced from 2013 levels. Accordingly, ASRC is requesting an annual limit on fugitive emissions of 1,3 butadiene of 4,694 pounds, which has been used in this modeling. This limit results in modeled cumulative cancer risk from all TACs/all process on both industrial and non-industrial property below the STAR environmental acceptability (EA) goals applicable to emissions of all TACs from all processes on both industrial and non-industrial property.

2. Similarly, previous modeling of acrylonitrile fugitive emissions was based on 2013 actual emissions. To allow for yearly variability in actual fugitive emissions in the future, and to keep modeled cumulative cancer risk from all TAC/all process on both industrial and non-industrial property below the EA goals, ASRC is requesting an annual limit on fugitive emissions of acrylonitrile of 295 pounds, which has been used in this modeling.

1.3 QUASAR for Cumulative Cancer Risk Evaluation

STAR requires cumulative risk reporting for emissions of all toxic air contaminants (TACs) from all processes; however, emissions of some TACs from some processes have their point of maximum impact at different locations than emissions of other TACs from other processes. Consequently, summing the maximum impact for each TAC is overly conservative and results in reporting a higher than actual cumulative risk. Instead, the AECOM QUASAR method[2], which requires conducting an additional air dispersion modeling run for a surrogate "risk emission" from each emission source, determines the actual cumulative risk at every individual receptor. Therefore, it can identify the actual location and risk level associated with the maximum cumulative risk. AECOM used the QUASAR method of risk modeling to determine the maximum cumulative risk for the emissions of all TACs from all processes at ASRC.

The risk-adjusted emission rates (lb/hr / $\mu g/m^3$) modeled using the QUASAR approach are presented in the emissions tables in Appendix B.

1.4 Summary of Results

STAR environmental acceptability for stack emissions[3] for each individual TAC/individual process was evaluated based on maximum potential to emit of the TAC/process. STAR environmental

[2] A detailed explanation of the QUASAR methodology is presented in AECOM's March 16, 2006 APCD Workshop #2 presentation: *"URS Tier 4 Aggregate Risk Modeling – "QUASAR"-Quantitative URS Approach to STAR Aggregate Risk"*.

[3] Stack emissions include un-captured emissions of styrene from Finishing Line 7 based upon PTE and 90% capture efficiency.

acceptability for fugitive emissions of each individual TAC was evaluated based on the requested annual emission limit for that TAC.

Significant conservativeness is built into the health risk assessment process by use of several overlapping layers of conservative assumptions. As a result, actual risks to public health are expected to be significantly less than the worst-case assessment process used to demonstrate compliance with the EA goals. Additional information about the conservative nature of the analysis is presented in Section 4.0.

The complete results of all the STAR modeling are presented in Section 4.0 of this Report. Table 1.1 highlights the key results, including the maximum cancer risk on both industrial and non-industrial property for comparison to the following EA goals:

- Cumulative Cancer Risk - All TACs from all processes (facility wide risk);
- Cumulative Cancer Risk - All TACs from all new and modified processes; and
- Cancer Risk - Single TAC/single process for the two processes with the highest risk:
  - Flare emissions of 1,3 butadiene; and
  - Plantwide fugitive emissions of 1,3 butadiene.

Table 1.1 Select STAR Modeling Results – Cancer Risks

		EA Goal (EAGc)	Modeled Risk
		Cancer Risk (x 10^{-6})	
All TACs/All Processes	Industrial	75	74.69
All TACs/All Processes	Non-Industrial	7.5	6.02
All TACS/New & Modified Processes	Industrial	38	2.78
All TACS/New & Modified Processes	Non-Industrial	3.8	0.53
Single TAC/Single Process (1,3 Butadiene/Flare)	Industrial	10	3.12
Single TAC/Single Process (1,3 Butadiene/Flare)	Non-Industrial	1	1.93
Single TAC/Single Process (1,3 Butadiene/Piping Fugitives)	Industrial	10	63.36
Single TAC/Single Process (1,3 Butadiene/Piping Fugitives)	Non-Industrial	1	3.04

As highlighted in Table 1.1, the modeling did show exceedances of the EA goals. Specifically:

- The EA Goal for cancer risk for emissions of a single TAC from a single process had modeled exceedances for 1,3 butadiene emissions for two process:
  - Plantwide fugitive emissions at both industrial and non-industrial locations; and
  - Emissions from the Flare at the point of maximum impact on non-industrial locations.

All other estimated maximum risks associated with the modeled ground level concentrations of non-de minimis TACs emitted from the facility are below applicable EA goals.

2.0 Changes for this EA Demonstration

2.1 Model Input Changes

Except as discussed below, the air dispersion model input parameters, including emission rates, source characterization (e.g. point vs volume vs area), air dispersion model, receptor grid, meteorological data, stack parameters (i.e. height, location, exhaust temperature and flowrate), and building parameters used by AECOM were the same as in AECOM's 2015 Report. AECOM confirmed that all TACs emitted in greater than de minimis quantities were included in the model inputs.

Based on our review of the modeling inputs, and consistent with the provisions of the STAR Program, AECOM made the following updates to the model input parameters:

- The rate of fugitive emissions of 1,3 butadiene was set to 4,694 pounds per year consistent with the limit requested by ASRC.
- Emissions of 1,3 butadiene from the Flare/Thermal Oxidizer have been reduced from 1070 pounds per year to 950 pounds per year to reflect the required control efficiency of 99.99%.
- The rate of fugitive emissions of acrylonitrile was set to 295 pounds per year consistent with the limit requested by ASRC.
- All TAC emissions associated with Boilers 3 and 4 have been removed. Previously, these boilers were dual fuel boilers that could burn both fuel oil and natural gas. ASRC has given up the ability to burn fuel oil. As natural gas-only boilers, emissions of all TACs from these boilers are considered de minimis. Regulation 5.21, Section 2.7.
- In 2008, ASRC planned to install a new Finishing Line 7 and proposed replacements for Finishing Lines 1-4. ASRC postponed the replacement of Finishing Lines 1-4 in 2008, but did make some changes to equipment that is controlled by the Flare/Thermal Oxidizer and Flare [Note: The equipment that is controlled is upstream of Finishing Line 5]. While it was conservatively assumed for the 2015 Report that these changes were modifications, it has been confirmed by both ASRC and the District that no modifications were made. Since Category 4 TACs are only required to be modeled for new and modified processes, styrene emissions from existing and unmodified processes/process equipment controlled by the Flare/Thermal Oxidizer and Flare were removed from the model inputs. Therefore, for this updated modeling, only the styrene emissions associated with the new Finishing Line 7 have been included.
- Emissions of sulfuric acid mist, a non-carcinogenic Category 2 TAC, were not addressed in the 2015 Report but have been included in this Report. (Sulfuric acid mist had been included in a modeling report submitted to the District before 2015). AECOM modeled the maximum allowed emissions of 1.73 pounds per hour of sulfuric acid mist for this Report.
- Previous modeling reports had assumed that emissions of hydrochloric acid (HCl) from the coal boilers were de minimis. Upon further review, it was determined that maximum

potential controlled emissions of HCl, a non-carcinogenic Category 2 TAC, are not de minimis. AECOM modeled the maximum potential controlled emissions of 2.17 pounds per hour of HCl for this Report.

- Upon a close review of the non-industrial receptor grid, it became apparent that the grid was originally generated by creating a receptor grid with 100 meter spacing starting from the center of the facility. Receptors that were on industrial property were then removed. This is an acceptable method for generating a receptor grid. But, it meant that a few receptors along the nearest non-industrial property to the south of the facility were approximately 80 meters further from the facility than the actual edge of the non-industrial property. Therefore, in accordance with accepted good modeling practice, AECOM added an additional row of receptors to better capture the nearest edge of non-industrial property.

3.0 Information on TACs Not Required To Be Evaluated

AECOM reviewed the list of TACs previously modeled to determine if any were emitted in quantities below the TAC-specific de minimis threshold. AECOM determined that the following TACs had been included in previous modeling, but are emitted in quantities below the TAC-specific de minimis threshold from each emitting process (coal boilers) based on maximum potential to emit: lead[4], benzene, bromoform, chloroform, hydrogen fluoride, trivalent chromium, and methylene chloride. See Appendix B.

The STAR Category 2 TACs cobalt and manganese are also emitted by the coal boilers; however, neither was reported in the 2006 TRI. See Appendix C. In accordance with Regulation 4.14.1, Group 1 sources, such as ASRC, may exclude emissions of Category 2 TACs from existing sources from their EA demonstrations if the TAC was not reported to EPA in the 2006 TRI. Therefore, AECOM did not include these TACs in the air dispersion modeling runs for this Report.

[4] The current Title V permit includes a combined limit of 0.00114 pounds of lead per hour from both boilers. This equates to 9.9864 pounds per year. These values are below the de minimis values of 0.043 pound per hour and 38.4 pounds per year, respectively. Therefore, lead emissions from the coal boilers are de minimis.

4.0 Model Setup and Inputs

Modeling Methodology

Air dispersion modeling is a mathematical estimation of impacts from emissions sources within a given area. Several factors affect the concentration and transportation of pollutants in the atmosphere, including meteorological conditions, site configuration, emission release characteristics, and surrounding terrain. For this modeling analysis, the latest version of ISCST3 was used. This is a "Tier 4" model, as defined by the STAR Program. Regulation 5.22.

ISCST3 is an air dispersion model that incorporates concepts such as planetary boundary layer theory and the emissions of contaminants from multiple sources/buildings simultaneously. The latest version of ISCST3 also incorporates the Plume Rise Model Enhancements (PRIME) building downwash algorithms, which provide a more realistic handling of downwash effects than previous approaches. All model options were set to regulatory standard "default."

Source Inputs

There are three different types of sources at the ASRC facility that were used in the modeling analysis for the non-de minimis sources: point, volume and area sources. Other than as described in Section 2.0, all source parameters came from the previous 2015 modeling files, and are summarized in Table A-1 in Appendix A.

Modeling of potential to emit, both for individual TACs and cumulatively, was based on the maximum annual TAC emissions for each point source and the requested limits for fugitive emissions. The specific emissions rates entered into the model (in units of pounds per hour) were provided by ASRC and are summarized in Table B-1 in Appendix B.

Receptor Grid

The modeling was performed using two separate receptor grids. One was set up to find the maximum impact to compare with the industrial EA goals and the second was set up to find the maximum impact to compare with the non-industrial EA goals. The industrial receptor grid used for this modeling is exactly the same as used in ASRC's previous modeling, while the non-industrial receptor grid is exactly the same except for the addition of a few more receptors as described above. The industrial receptor grid has "fenceline" receptor spacing every 20 meters and receptors in the area immediately surrounding the facility's property boundary every 20 meters. The non-industrial receptor grid, which begins at some distance out from the facility, has receptor spacing radiating out from the facility spaced approximately every 100 meters.

Meteorological Data

This modeling analysis used the same surface and upper air meteorological data as that used in previous modeling and originally obtained from the District. This data is posted on District's website for this purpose (five years of data from 1990 through 1994).

Building Downwash

The latest version of U.S. EPA's Building Profile Input Program (BPIP) was used to determine building downwash parameters for the modeling analysis. Figure A-1 in Appendix A shows a diagram of the source locations, the facility fence line, and the building orientations for reference. Table A-2 in Appendix A contains a summary of the building heights and tiers used in the model.

Terrain

This modeling analysis assumes flat, non-elevated terrain as specified by the STAR modeling guidance from the District. This is a reasonable description of the area immediately surrounding the ASRC facility.

5.0 Modeling Results

5.1 Modeled Exceedances

This section compares the modeling results (μg/m^3) and health risk (Rc and HQ) to the EA goals. The results show maximum impacts that are below most of the EA goals. The modeled emissions that exceed the EA goals are summarized in Table 4.1.

Table 4.1 – STAR Goals with Modeled Exceedances

STAR Program Goal		EA Goal (EAGc)	Modeled Risk
		Cancer Risk (x 10^{-6})	
Single TAC/Single Process (1,3 Butadiene/Flare)	Non-Industrial	1	1.93
Single TAC/Single Process (1,3 Butadiene/Fugitive Emissions)	Industrial	10	63.36
Single TAC/Single Process (1,3 Butadiene/Fugitive Emissions)	Non-Industrial	1	3.04

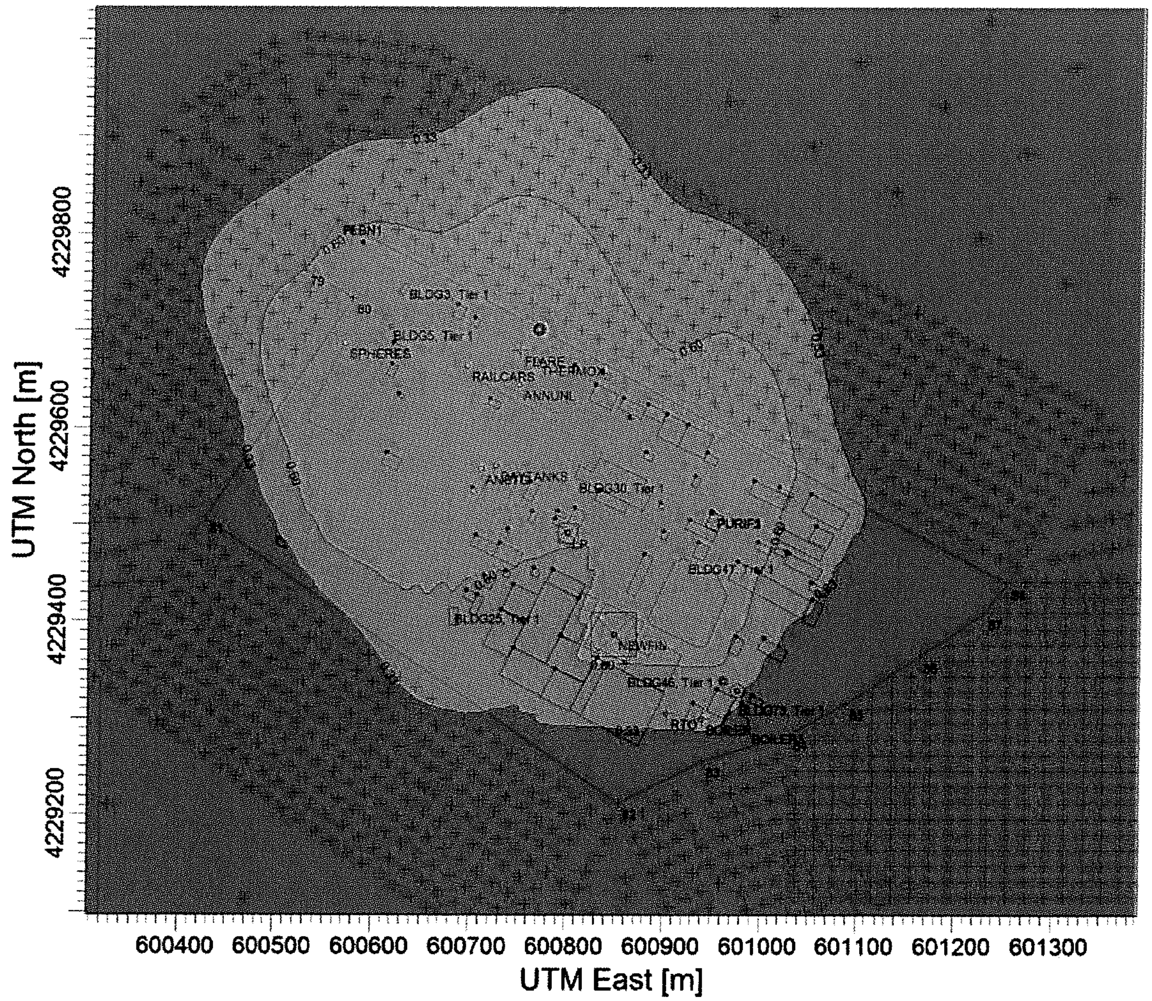
All other estimated maximum impacts associated with the modeled ground level concentrations of non-de minimis TACs emitted from the facility are below the applicable EA goals, and are fully detailed in the tables in Appendix D.

The maximum modeled ambient impacts and risks presented in this Report are for the points of highest impact. Impacts typically dissipate quickly as one moves away from the point of maximum concentration. For example, the above indicated increased cancer risk of 63.36 x 10^{-6} for 1,3 butadiene fugitive emissions on industrial property is located at a single point on the northern fenceline of the facility (near the Flare Thermal Oxidizer). Figure 4.1 below shows this point of maximum impact (red circle) and also shows constant risk isopleths from this risk modeling run. Modeled risks above the EA goal of 10 x 10^{-6} only extend approximately 200 meters beyond the fenceline. The total area above the EA goal is small. Similarly, the areas with modeled risks above the EA goal of 1 x 10^{-6} on non-industrial property are relatively small as shown in Figures 4.2 and 4.3.

Figure 4.1 ASRC 1,3 Butadiene Fugitive Emission Risk - Industrial

PROJECT TITLE:

Figure 4.1 ASRC STAR Modeling
1,3 Butadiene Fugitive Emission Risk (Industrial)



PLOT FILE OF PERIOD VALUES FOR SOURCE GROUP: FUGS ug/m^3

Max: 2.09 [ug/m^3] at (600768.75, 4229702.00)

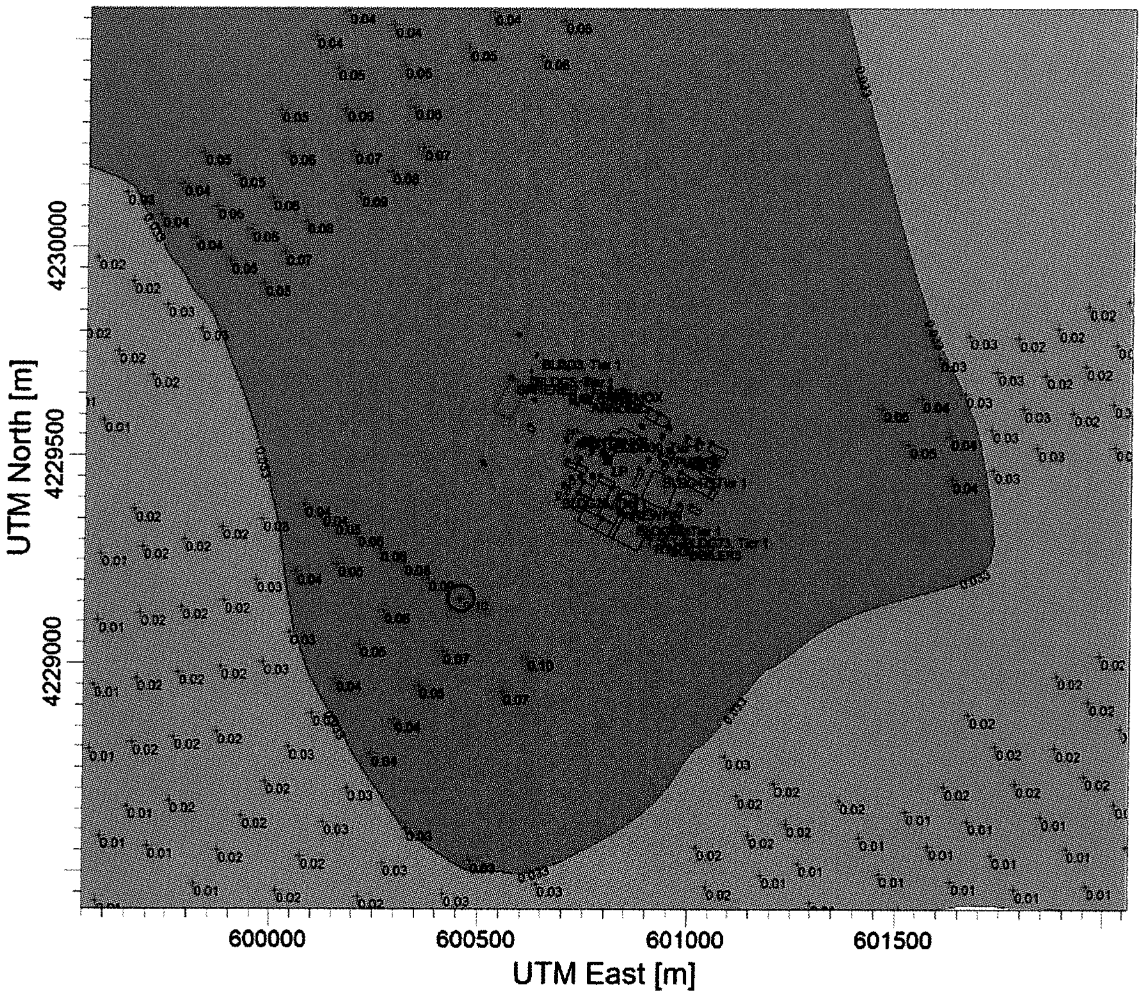
0.03 0.33 0.60 2.09

COMMENTS:	SOURCES:	COMPANY NAME:	
Flat Terrain ISCT3 (Industrial Receptors)	**15**		
	RECEPTORS: **5497**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:6,919 0 — 0.2 km	
	MAX: **2.09 u(**	DATE: **5/12/2017**	PROJECT NO.: **60438547**

Figure 4.2 ASRC 1,3 Butadiene Fugitive Emission Risk – Non-Industrial

PROJECT TITLE:

Figure 4.2 - ASRC STAR Modeling
1,3 Butadiene Fugitive Emission Risk - Non-Industrial



PLOT FILE OF PERIOD VALUES FOR SOURCE GROUP: FUGS

ug/m^3

Max: 0.100 [ug/m^3] at (600458.31, 4229157.00)

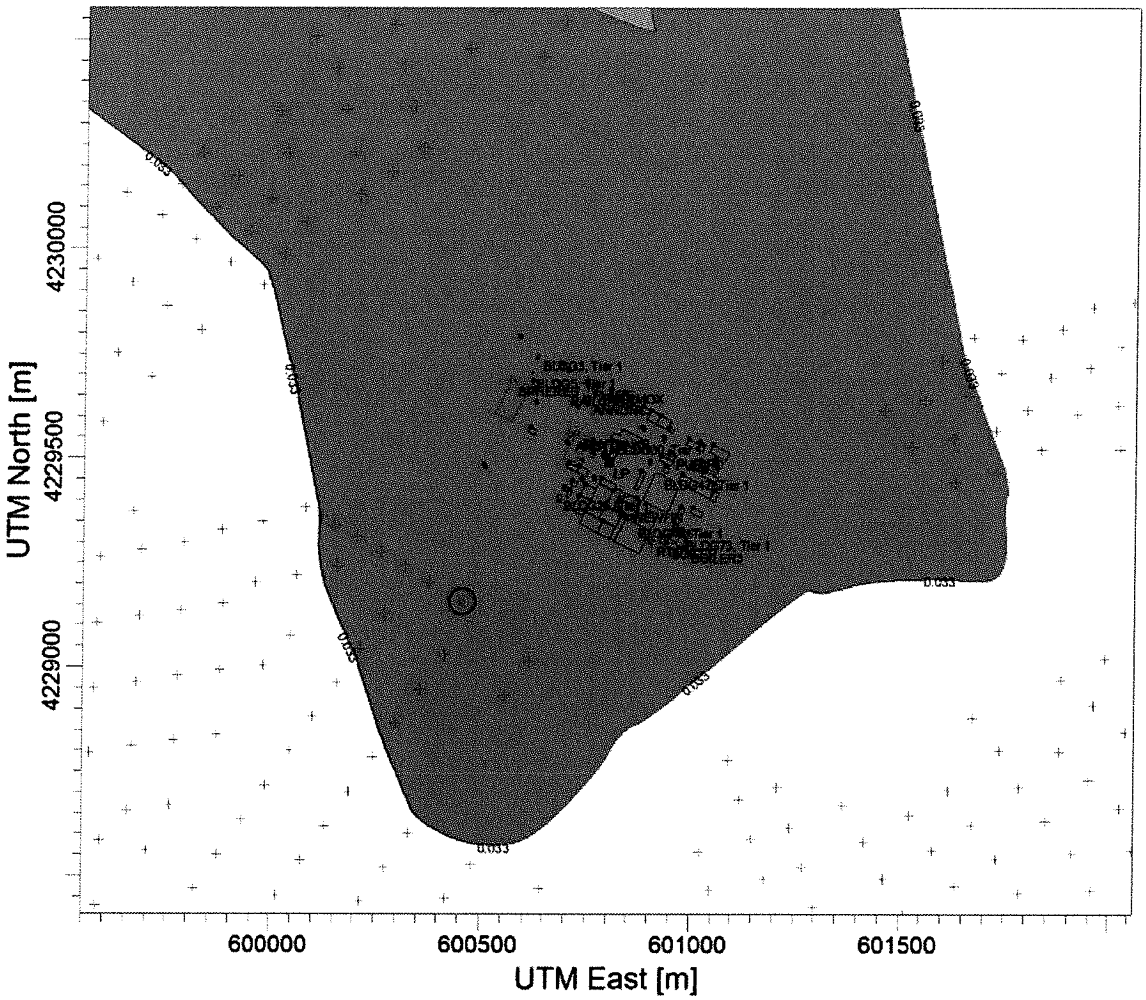
0.010 0.033 0.100 0.600

COMMENTS:	SOURCES:	COMPANY NAME:	
Flat Terrain ISCT3 (Non-Industrial Receptor)	**15**		
	RECEPTORS: **3216**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,014 0 — 0.5 km	
	MAX: **0.100 ug/m^3**	DATE: **5/12/2017**	PROJECT NO.: **60438547**

Figure 4.3 ASRC 1,3 Butadiene Flare Emission Risk – Non-Industrial

PROJECT TITLE:

Figure 4.3 - ASRC STAR Modeling
1,3 Butadiene Flare Emission Risk - Non-Industrial



PLOT FILE OF PERIOD VALUES FOR SOURCE GROUP: FLARE — ug/m^3

Max: 0.064 [ug/m^3] at (600798.94, 4230628.00)

0.033 — 0.060 — 0.064

COMMENTS:	SOURCES:	COMPANY NAME:	
Flat Terrain ISCT3 (Non-Industrial Receptor)	**15**		
	RECEPTORS: **3216**	MODELER:	
	OUTPUT TYPE: **Concentration**	SCALE: 1:16,014 0 — 0.5 km	
	MAX: **0.064 ug/m^3**	DATE: **5/12/2017**	PROJECT NO.: **60438547**

5.2 Detailed Results Summary Tables

Appendix D contains tables detailing the modeling results for emissions of non-de minimis TACs and cumulative risk for both industrial and non-industrial property. For each process, the tables contain (moving from left to right across the table):

- Source ID and Stack Description;
- The maximized emissions in units of pounds per year (not included for cumulative risk);
- The UTM coordinates (location) where the model indicates the maximum annual average ground-level concentration occurs;
- The maximum annual average ground-level concentration (not applicable for cumulative risk);
- The calculated "screening" level cancer risk (R_C – based on BAC_C) in units of 1 in a million (1×10^{-6}) and corresponding maximum Health Quotient (HQ – based on BAC_{NC}) for both industrial and non-industrial property; and
- The TAC specific Benchmark Ambient Concentration (BAC) for carcinogenic effects (BAC_C) and non-carcinogenic effects (BAC_{NC}).

The applicable EA goals (EAGs) listed in the tables are specified in Regulation 5.21 Sections 3.1, 3.6.1, and 3.6.2. In summary, these EAGs are:

1. EAG_C (compared to R_C) for single process/single TAC equals:
   - On industrial and roadway property, 10.0;
   - On non-industrial/non-roadway property, 1.0
2. EAG_{NC} (compared to HQ) for single process/single TAC equals:
   - On industrial and roadway property, 3.0;
   - On non-industrial/non-roadway property, 1.0
3. EAG_{NC} (compared to HQ) for all processes/single TAC equals:
   - On industrial and roadway property, 3.0;
   - On non-industrial/non-roadway property, 1.0
4. EAG_C (compared to RC) for all processes/all TACs equals:
   - On industrial and roadway property, 75;
   - On non-industrial/non-roadway property, 7.5
5. EAG_C (compared to RC for all new or modified processes/all TACs equals:
   - On industrial and roadway property, 38;
   - On non-industrial/non-roadway property, 3.8.

The tables in Appendix D show that the estimated maximum risks associated with the modeled ground level concentrations of all TAC emissions from the ASRC non-de minimis processes are below the EAGs except as noted in Section 4.1.

5.3 Conservative Nature of Results

The actual risks to public health are expected to be significantly less than the worst-case assessment used to demonstrate compliance with the EA goals described in this Report. Significant conservativeness is built into the health risk assessment process. This modeling is based on maximized emissions that were calculated based on the best available engineering and test data, and several overlapping layers of conservative assumptions. The results are not indicative of the facility's actual emissions. Actual emissions from the facility are anticipated to be substantially lower than the emissions modeled in this Report.

Additionally, to account for scientific uncertainty about the cancer risk estimates for exposure to low concentrations of toxic compounds, EPA uses conservative assumptions expected to reflect the "upper bounds" of possible risk in developing the factors used to estimate the risk associated with a given modeled concentration. Actual risk, at the exposures presented in this study, is likely to be less than presented in this Report.

Another important consideration is the human exposure assumptions. Most of the risks are chronic risks, such as cancer, that require long-term exposure. One would not expect to get cancer from a single day, or even a single year of exposure to the maximum concentrations determined by the modeling described in this Report. The chronic risk estimates presented in this Report conservatively assume that an individual is continuously exposed at the point of maximum ground-level impact from the facility for a period of 70 continuous years. This is obviously a conservative assumption.

Appendix A

Source Parameters

Table A-1
Source Parameters

Point Source

Source ID	Description	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Gas Exit Temperature [K]	Gas Exit Velocity [m/s]	Inside Diameter [m]
THERMOX	Thermal Oxidizer	600766.72	4229669.56	128	18.29	1088.71	2.86	1.83
BOILER	COAL FIRED BOILERS - 2	600940.69	4229299.22	128	53.34	341.483	18.288	2.21
RTO	RTO	600904.4	4229305.41	128	15.24	372.594	13.106	2.438
FLARE	RAILCAR AREA	600749.39	4229679.63	128	64.38	1273	20	0.457

Volume Sources

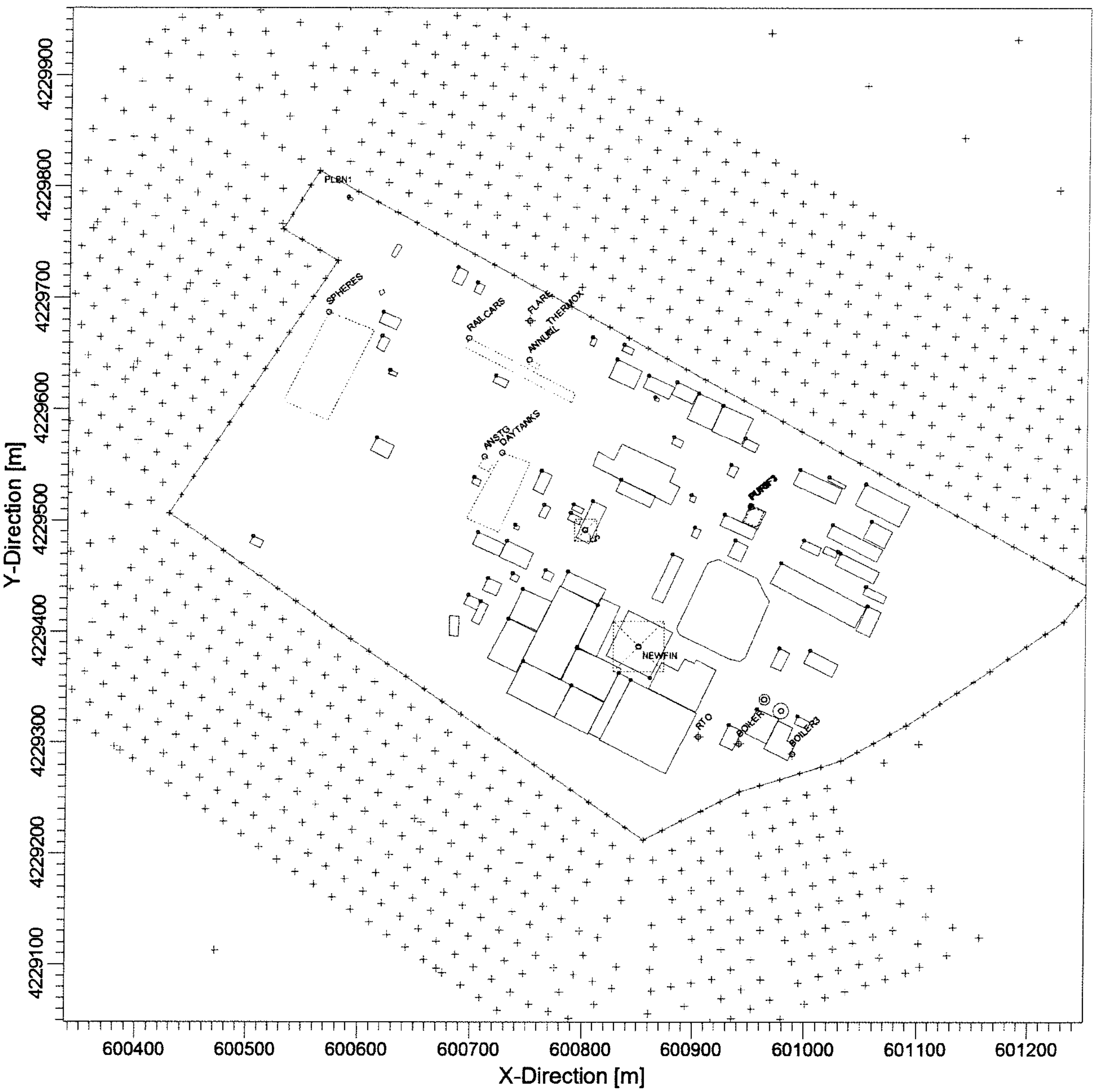
Source ID	Description	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Side Length [m]	Initial Lateral Dimension [m]	Initial Vertical Dimension [m]
LP	VOLUME SOURCE - LIQUID POLYMER	600800.26	4229491.5	128	9.14	19.999	4.65	13.95
NEWFIN	New Finishing	600834.81	4229366.23	128	18.29	45.679	10.62	4.96

Area Poly Sources

Source ID	Description	X Coord. [m]	Y Coord. [m]	Base Elevation [m]	Release Height [m]	Initial Vertical Dimension [m]	No. Vertices (or sides)
DAYTANKS	TANK FARM	600725.23	4229561.35	128	1	1.42	4
PURIF1	PURIFICATION	600949.27	4229512.69	128	1.52	6.38	4
PURIF2	PURIFICATION	600949.5	4229513	128	4.57	6.38	4
PURIF3	PURIFICATION	600949.95	4229513.18	128	7.62	6.38	4
SPHERES	BD SPHERE AREA	600569.79	4229687.41	128	2	3.54	4
RAILCARS	RAILCAR AREA	600694.81	4229664	128	1	1.42	4
ANNUNL	Acrylonitrile Unloading	600749.11	4229644.62	128	1	1	4
ANSTG	Acrylonitrile Storage	600710.02	4229557.75	128	1	1	4

PROJECT TITLE:

ASRC STAR Modeling
Figure A-1 Sources and Buildings



COMMENTS:	SOURCES: **15**		
	RECEPTORS: **5117**		
		SCALE: 1:5,740 0 ▬▬ 0.2 km	
			PROJECT NO.: **60438547**

AERMOD View - Lakes Environmental Software

Table A-2

ASRC Star Modeling

BPIP (Dated: 04274)

DATE : 9/ 2/2015
TIME : 12:10:59
ASRC Star Modeling

Number of buildings to be processed : 77

BLDG1 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG1	1	1	3.05	4		
					600702.26	4229714.26 meters
					600708.44	4229711.37 meters
					600704.62	4229703.19 meters
					600698.44	4229706.07 meters

BLDG2 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG2	1	2	5.18	4		
					600684.49	4229727.62 meters
					600693.21	4229723.56 meters
					600687.38	4229711.07 meters
					600678.66	4229715.13 meters

BLDG3 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG3	1	3	4.57	4		
					600630.18	4229748.74 meters
					600634.01	4229746.11 meters
					600627.90	4229735.93 meters
					600624.16	4229738.29 meters

BLDG4 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG4	1	4	4.57	4		
					600586.50	4229791.07 meters
					600590.22	4229789.57 meters
					600589.16	4229786.95 meters
					600585.44	4229788.45 meters

```
BLDG5     has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG5       1         5      4.57     4
                                               600614.05  4229706.09 meters
                                               600618.14  4229707.39 meters
                                               600619.17  4229704.28 meters
                                               600615.57  4229702.03 meters

 BLDG6     has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG6       1         6      6.10     4
                                               600618.68  4229687.62 meters
                                               600633.81  4229680.57 meters
                                               600629.55  4229671.44 meters
                                               600614.43  4229678.49 meters

 BLDG7     has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG7       1         7      4.57     4
                                               600617.48  4229666.00 meters
                                               600624.30  4229662.52 meters
                                               600618.81  4229651.75 meters
                                               600611.99  4229655.22 meters

 BLDG8     has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG8       1         8      4.57     4
                                               600625.00  4229635.39 meters
                                               600631.05  4229632.56 meters
                                               600629.62  4229629.48 meters
                                               600623.57  4229632.30 meters

 BLDG9     has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG9       1         9      4.57     4
                                               600613.62  4229574.59 meters
                                               600629.02  4229567.08 meters
                                               600623.38  4229555.50 meters
                                               600607.97  4229563.01 meters
```

BLDG10 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG10	1	10	4.57	4		
					600503.57	4229485.99 meters
					600513.25	4229481.48 meters
					600510.25	4229475.04 meters
					600500.57	4229479.56 meters

BLDG11 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG11	1	11	4.57	4		
					600719.09	4229630.74 meters
					600730.24	4229625.54 meters
					600727.49	4229619.64 meters
					600716.34	4229624.83 meters

BLDG12 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG12	1	12	4.57	4		
					600700.81	4229539.16 meters
					600706.85	4229536.34 meters
					600704.34	4229530.96 meters
					600698.30	4229533.78 meters

BLDG13 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG13	1	13	4.57	4		
					600805.64	4229665.18 meters
					600809.53	4229663.36 meters
					600806.40	4229656.64 meters
					600802.50	4229658.46 meters

BLDG14 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG14	1	14	3.05	4		
					600834.17	4229658.26 meters
					600843.04	4229654.13 meters
					600840.60	4229648.89 meters
					600831.73	4229653.02 meters

```
BLDG15   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

 BLDG15      1        15      6.71     4
                                               600827.83  4229645.13 meters
                                               600850.49  4229634.56 meters
                                               600842.91  4229618.31 meters
                                               600820.25  4229628.88 meters

BLDG16   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

 BLDG16      1        16      6.10     4
                                               600760.92  4229545.05 meters
                                               600770.06  4229540.79 meters
                                               600762.16  4229523.86 meters
                                               600753.03  4229528.12 meters

BLDG17   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

 BLDG17      1        17      4.57     4
                                               600763.27  4229514.66 meters
                                               600769.05  4229511.96 meters
                                               600764.29  4229501.76 meters
                                               600758.51  4229504.45 meters

BLDG18   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

 BLDG18      1        18      4.57     4
                                               600737.56  4229496.58 meters
                                               600741.45  4229494.77 meters
                                               600739.82  4229491.28 meters
                                               600735.93  4229493.09 meters

BLDG19   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

 BLDG19      1        19      4.57     4
                                               600730.11  4229481.95 meters
                                               600754.29  4229470.68 meters
                                               600747.53  4229456.18 meters
                                               600723.35  4229467.46 meters
```

```
BLDG20   has 1 tier(s) with a base elevation of  137.20 METERS
BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
  NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

BLDG20      1       20      4.57     4
                                             600704.69  4229489.62 meters
                                             600728.38  4229478.57 meters
                                             600723.29  4229467.66 meters
                                             600699.60  4229478.70 meters

BLDG21   has 1 tier(s) with a base elevation of  137.20 METERS
BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
  NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

BLDG21      1       21      4.57     4
                                             600735.81  4229452.77 meters
                                             600741.72  4229450.01 meters
                                             600739.15  4229444.50 meters
                                             600733.24  4229447.26 meters

BLDG22   has 1 tier(s) with a base elevation of  137.20 METERS
BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
  NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

BLDG22      1       22      6.10     4
                                             600713.70  4229448.50 meters
                                             600725.79  4229442.86 meters
                                             600720.85  4229432.25 meters
                                             600708.76  4229437.89 meters

BLDG23   has 1 tier(s) with a base elevation of  137.20 METERS
BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
  NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

BLDG23      1       23      4.57     4
                                             600696.41  4229433.33 meters
                                             600707.68  4229428.07 meters
                                             600703.73  4229419.59 meters
                                             600692.45  4229424.85 meters

BLDG24   has 1 tier(s) with a base elevation of  137.20 METERS
BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
  NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X          Y

BLDG24      1       24      4.57     4
                                             600707.43  4229427.55 meters
                                             600714.41  4229424.30 meters
                                             600705.89  4229406.03 meters
                                             600698.91  4229409.29 meters
```

BLDG25 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG25	1	25	4.57	4		
					600679.70	4229414.59 meters
					600688.01	4229413.84 meters
					600687.37	4229395.98 meters
					600679.88	4229396.38 meters

BLDG26 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG26	1	26	5.49	4		
					600856.55	4229630.85 meters
					600879.78	4229620.02 meters
					600874.70	4229609.14 meters
					600851.47	4229619.97 meters

BLDG27 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG27	1	27	3.96	4		
					600882.13	4229624.62 meters
					600901.12	4229615.76 meters
					600896.11	4229605.00 meters
					600877.11	4229613.86 meters

BLDG28 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG28	1	28	4.57	4		
					600862.65	4229611.43 meters
					600866.28	4229609.74 meters
					600864.96	4229606.92 meters
					600861.34	4229608.61 meters

BLDG29 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y
BLDG29	1	29	5.18	4		
					600880.11	4229575.19 meters
					600888.43	4229571.32 meters
					600885.68	4229565.41 meters
					600877.36	4229569.29 meters

BLDG30 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y	
BLDG30	1	30	8.53	9			
					600806.75	4229549.66	meters
					600811.37	4229561.88	meters
					600825.24	4229554.16	meters
					600825.44	4229554.90	meters
					600832.65	4229569.12	meters
					600881.31	4229546.58	meters
					600876.06	4229534.97	meters
					600885.33	4229530.65	meters
					600877.36	4229514.29	meters

BLDG31 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y	
BLDG31	1	31	15.54	4			
					600832.10	4229536.82	meters
					600863.31	4229522.26	meters
					600858.48	4229511.91	meters
					600827.27	4229526.46	meters

BLDG32 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y	
BLDG32	1	32	9.14	4			
					600789.63	4229515.08	meters
					600799.15	4229510.64	meters
					600796.99	4229506.01	meters
					600787.47	4229510.45	meters

BLDG33 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y	
BLDG33	1	33	9.14	4			
					600786.89	4229507.04	meters
					600797.02	4229502.32	meters
					600794.38	4229496.64	meters
					600784.24	4229501.37	meters

BLDG34 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	CORNER COORDINATES Y	
BLDG34	1	34	9.14	4			
					600807.17	4229517.76	meters
					600818.99	4229512.25	meters
					600803.58	4229479.22	meters
					600791.77	4229484.73	meters

BLDG35 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG35	1	35	5.79	4		
					600765.08	4229455.65 meters
					600773.14	4229451.89 meters
					600769.82	4229444.78 meters
					600761.76	4229448.53 meters

BLDG36 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG36	1	36	9.14	4		
					600785.00	4229454.02 meters
					600819.14	4229438.09 meters
					600812.78	4229424.46 meters
					600778.64	4229440.38 meters

BLDG37 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG37	1	37	10.39	4		
					600745.02	4229438.83 meters
					600770.40	4229427.00 meters
					600758.13	4229400.69 meters
					600732.75	4229412.52 meters

BLDG38 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG38	1	38	9.02	4		
					600812.42	4229424.24 meters
					600779.56	4229356.86 meters
					600744.89	4229373.77 meters
					600777.75	4229441.15 meters

BLDG39 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG39	1	39	5.55	4		
					600732.03	4229412.06 meters
					600757.50	4229399.08 meters
					600739.33	4229363.42 meters
					600713.86	4229376.40 meters

BLDG40 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG40	1	40	7.50	4		
					600745.57	4229373.52 meters
					600788.51	4229351.64 meters
					600774.00	4229323.16 meters
					600731.06	4229345.04 meters

BLDG41 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG41	1	41	5.55	4		
					600788.91	4229351.52 meters
					600818.76	4229336.31 meters
					600804.01	4229307.35 meters
					600774.15	4229322.56 meters

BLDG42 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG42	1	42	5.55	4		
					600794.11	4229386.08 meters
					600833.80	4229366.72 meters
					600819.25	4229336.90 meters
					600779.56	4229356.26 meters

BLDG43 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG43	1	43	8.53	4		
					600793.87	4229385.42 meters
					600814.95	4229430.64 meters
					600832.49	4229422.46 meters
					600811.41	4229377.24 meters

BLDG44 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG44	1	44	5.91	4		
					600831.76	4229362.73 meters
					600842.75	4229357.13 meters
					600815.43	4229303.51 meters
					600804.44	4229309.12 meters

BLDG45 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG45	1	45	5.94	4		
					600842.42	4229356.76 meters
					600902.19	4229326.30 meters
					600874.58	4229272.11 meters
					600814.80	4229302.57 meters

BLDG46 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG46	1	46	14.23	8		
					600859.00	4229348.60 meters
					600869.99	4229371.93 meters
					600885.45	4229364.79 meters
					600890.92	4229375.50 meters
					600900.03	4229371.39 meters
					600901.91	4229374.95 meters
					600919.45	4229365.48 meters
					600901.32	4229327.51 meters

BLDG47 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG47	1	47	3.05	11		
					600920.73	4229465.63 meters
					600955.14	4229447.99 meters
					600962.78	4229432.61 meters
					600966.48	4229427.41 meters
					600945.65	4229376.86 meters
					600940.82	4229373.72 meters
					600931.40	4229375.67 meters
					600886.42	4229397.51 meters
					600883.88	4229402.99 meters
					600884.45	4229404.57 meters
					600911.13	4229461.77 meters

BLDG48 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG48	1	48	9.14	4		
					600879.60	4229470.00 meters
					600888.98	4229465.62 meters
					600870.44	4229425.86 meters
					600861.06	4229430.23 meters

BLDG49 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG49	1	49	10.06	4		
					600935.59	4229482.42 meters
					600947.04	4229477.08 meters
					600940.53	4229463.13 meters
					600929.09	4229468.47 meters

BLDG50 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG50	1	50	3.05	4		
					600899.44	4229494.13 meters
					600904.87	4229491.59 meters
					600901.33	4229484.00 meters
					600895.90	4229486.53 meters

BLDG51 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG51	1	51	3.05	4		
					600896.16	4229523.10 meters
					600900.47	4229521.09 meters
					600898.25	4229516.34 meters
					600893.94	4229518.35 meters

BLDG52 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG52	1	52	13.72	4		
					600926.15	4229505.85 meters
					600954.86	4229492.46 meters
					600950.38	4229482.85 meters
					600921.67	4229496.24 meters

BLDG53 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER X	COORDINATES Y
BLDG53	1	53	5.27	4		
					600948.90	4229514.66 meters
					600962.49	4229508.32 meters
					600955.16	4229492.58 meters
					600941.56	4229498.92 meters

BLDG54 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG54	1	54	5.36	4		
					600931.54	4229550.57 meters
					600938.00	4229547.56 meters
					600933.83	4229538.61 meters
					600927.36	4229541.62 meters

BLDG55 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG55	1	55	5.79	4		
					600901.61	4229614.52 meters
					600923.82	4229604.16 meters
					600913.25	4229581.51 meters
					600891.05	4229591.86 meters

BLDG56 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG56	1	56	8.53	4		
					600923.62	4229603.59 meters
					600950.29	4229591.71 meters
					600940.12	4229568.87 meters
					600913.45	4229580.75 meters

BLDG57 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG57	1	57	8.53	4		
					600944.04	4229574.08 meters
					600955.93	4229568.53 meters
					600952.56	4229561.30 meters
					600940.66	4229566.84 meters

BLDG58 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG58	1	58	6.10	4		
					600993.18	4229545.96 meters
					601030.19	4229528.70 meters
					601024.03	4229515.48 meters
					600987.02	4229532.74 meters

BLDG59 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG59	1	59	6.22	4		
					601022.28	4229496.56 meters
					601066.81	4229473.87 meters
					601061.31	4229463.07 meters
					601016.78	4229485.76 meters

BLDG60 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG60	1	60	4.27	4		
					601051.62	4229532.92 meters
					601091.00	4229512.86 meters
					601081.72	4229494.64 meters
					601042.34	4229514.70 meters

BLDG61 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG61	1	61	4.11	4		
					601018.67	4229539.47 meters
					601033.99	4229531.66 meters
					601032.38	4229528.51 meters
					601017.07	4229536.31 meters

BLDG62 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG62	1	62	4.11	4		
					601057.03	4229499.45 meters
					601075.94	4229490.23 meters
					601068.60	4229475.18 meters
					601049.69	4229484.41 meters

BLDG63 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG63	1	63	4.57	4		
					601029.68	4229470.51 meters
					601063.91	4229453.82 meters
					601058.73	4229443.18 meters
					601024.49	4229459.88 meters

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BLDG64   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X            Y

 BLDG64      1        64      3.20     4
                                                601027.15  4229472.05 meters
                                                601024.52  4229466.41 meters
                                                601013.26  4229471.66 meters
                                                601015.89  4229477.31 meters

BLDG65   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X            Y

 BLDG65      1        65      3.96     4
                                                600997.04  4229482.65 meters
                                                601012.22  4229475.58 meters
                                                601008.94  4229468.54 meters
                                                600993.76  4229475.62 meters

BLDG66   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X            Y

 BLDG66      1        66      5.03     4
                                                601052.67  4229440.38 meters
                                                601071.03  4229431.82 meters
                                                601068.02  4229425.37 meters
                                                601049.66  4229433.93 meters

BLDG67   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X            Y

 BLDG67      1        67      7.01     4
                                                600976.54  4229462.11 meters
                                                601052.53  4229421.71 meters
                                                601042.86  4229403.52 meters
                                                600966.87  4229443.92 meters

BLDG68   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X            Y

 BLDG68      1        68      3.41     4
                                                601054.05  4229423.17 meters
                                                601065.94  4229417.63 meters
                                                601055.67  4229395.61 meters
                                                601043.79  4229401.15 meters
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BLDG69   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG69      1        69      3.05     4
                                              601003.49  4229383.19 meters
                                              601028.23  4229370.04 meters
                                              601022.24  4229358.77 meters
                                              600997.50  4229371.92 meters

 BLDG70   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG70      1        70      3.05     4
                                              600975.62  4229385.00 meters
                                              600984.81  4229380.71 meters
                                              600977.29  4229364.57 meters
                                              600968.10  4229368.86 meters

 BLDG71   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG71      1        71     15.24     4
                                              600992.79  4229324.05 meters
                                              601003.90  4229318.86 meters
                                              601000.78  4229312.16 meters
                                              600989.66  4229317.34 meters

 BLDG72   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG72      1        72     15.24     4
                                              600956.09  4229330.45 meters
                                              600975.42  4229321.44 meters
                                              600965.16  4229299.44 meters
                                              600945.84  4229308.45 meters

 BLDG73   has 1 tier(s) with a base elevation of  137.20 METERS
 BUILDING  TIER  BLDG-TIER  TIER   NO. OF      CORNER   COORDINATES
   NAME   NUMBER   NUMBER  HEIGHT  CORNERS        X           Y

 BLDG73      1        73     15.24     7
                                              600974.43  4229320.27 meters
                                              600975.00  4229319.96 meters
                                              600988.44  4229313.39 meters
                                              600983.25  4229301.63 meters
                                              600990.48  4229298.79 meters
                                              600983.91  4229283.90 meters
                                              600962.37  4229294.76 meters
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BLDG74 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG74	1	74	15.24	4		
					600931.46	4229316.27 meters
					600943.07	4229310.86 meters
					600934.98	4229293.53 meters
					600923.38	4229298.94 meters

BLDG75 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG75	1	75	15.24	8		
					600977.46	4229335.75 meters
					600972.52	4229333.71 meters
					600970.48	4229328.77 meters
					600972.52	4229323.84 meters
					600977.46	4229321.79 meters
					600982.39	4229323.84 meters
					600984.44	4229328.77 meters
					600982.39	4229333.71 meters

BLDG76 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG76	1	76	15.24	8		
					600962.68	4229343.68 meters
					600959.30	4229342.28 meters
					600957.90	4229338.90 meters
					600959.30	4229335.52 meters
					600962.68	4229334.12 meters
					600966.06	4229335.52 meters
					600967.46	4229338.90 meters
					600966.06	4229342.28 meters

BLDG 77 has 1 tier(s) with a base elevation of 137.20 METERS

BUILDING NAME	TIER NUMBER	BLDG-TIER NUMBER	TIER HEIGHT	NO. OF CORNERS	CORNER COORDINATES X	Y
BLDG 77	1	77	18.29	4		
					600860.06	4229358.71 meters
					600819.97	4229378.27 meters
					600839.85	4229419.02 meters
					600879.94	4229399.47 meters

Appendix B

Emissions Modeled and Coal Boiler PTE

Table B-1
Potential to Emit

Source ID	Description	Acrylonitrile	1,3-BD	Styrene	Arsenic	Cadmium	Hexavalent Chromium	Nickel	Formaldehyde	Sulfuric Acid	HCl	Risk
	BAC$_C$ (ug/m^3):	**0.015**	**0.033**	**1.7**	**0.00023**	**0.00056**	**0.000083**	**0.0038**	**0.077**			
Source ID	**Description**	[lb/hr]	[lb/hr]	[lb/hr]	[lb/hr]	[lb/hr]	[lb/hr]	[lb/hr]	[lb/hr]	[lb/hr]	[lb/hr]	**Risk Emission Rate (lb/hr/ μg/m^3)**
THERMOX	Thermal Oxidizer	0.000019	0.1084									3.28755
FLARE	Flare	0.00434	2.1699									66.04253
BOILER	Coal Fired Boilers - 2			0.05014	7.43E-03	9.24E-04	1.43E-03	5.07E-03	4.35E-03	1.73	2.17	52.61810
RTO	Regen. Therm Oxid.			0.04738								0.02787
LP	Liquid Polymer	0.01515	0.059569									2.81539
NEWFIN	Synthetic Rubber			2.78539								1.63846
DAYTANKS	Tank Farm		0.126671									3.83850
PURIF1	Purification		0.063335									1.91925
PURIF2	Purification		0.063335									1.91925
PURIF3	Purification		0.031664									0.95952
SPHERES	BD Sphere Area		0.063335									1.91925
RAILCARS	Railcar Area		0.127935									3.87683
ACNUNL	Acrylonitrile Unloading	0.00337										0.22453
ACNSTG	Acrylonitrile Storage	0.01515										1.01027
	Total Fugitives lbs/yr:	295.00	4694.0									
	Total Emissions lbs/yr:	333.18	24651.93	24400.00	65.079	8.095	12.540	44.444	38.095	15154.8	19047.385	

Table B-2

Coal Boiler PTE

ASRC CALCULATIONS
COAL FIRED BOILERS - 2

BOILER RATING	**212**	**MMBTU/HR EACH**
COAL HEAT CONTENT	**23.4**	**MMBTU/TON**
COAL USAGE	**9.060**	**TONS/HR EACH**
FF CONTROL EFF	**99.80%**	
SCRUBBER EFF	**90.00%**	**(for HCl and HF abatement)**

HAP	CONTROLLED*		EACH EMISSIONS	TOTAL EMISSIONS			Both Boilers Combined Deminimis	Deminimis
	FACTOR	UNITS	LBS/HR	LBS/HR	G/SEC	LBS/YR	lb/hr	lb/yr
ARSENIC	4.10E-04	lbs/ton	3.71E-03	7.429E-03	9.36E-04	65.079	0.00012	0.11
CADMIUM	5.10E-05	lbs/ton	4.62E-04	9.241E-04	1.16E-04	8.095	0.0003	0.27
CHROMIUM	1.81E-04	lbs/ton	1.64E-03	3.280E-03	4.13E-04	28.730	0.1	109.5
CHROMIUM (VI)	7.90E-05	lbs/ton	7.16E-04	1.431E-03	1.80E-04	12.540	0.000045	0.04
LEAD**	NA	lbs/ton	1.14E-03	1.140E-03	1.44E-04	9.986	0.043	38.4
NICKEL	2.80E-04	lbs/ton	2.54E-03	5.074E-03	6.39E-04	44.444	0.0021	1.82

* - AP-42, TABLE 1.1-18

** - Lead has a combined limit of 0.00114 lb/hr from both furnaces.

HAP	UNCONTROLLED		EACH EMISSIONS	TOTAL EMISSIONS*			Both Boilers Combined Deminimis	Deminimis
	FACTOR	UNITS	LBS/HR	LBS/HR	G/SEC	LBS/YR	lb/hr	lb/yr
HCl	1.20E+00	lbs/ton	1.09E+01	2.174E+00	2.74E-01	19047.385	10.8	9600
HF	1.50E-01	lbs/ton	1.36E+00	2.718E-01	3.42E-02	2380.923	7.56	6720
Formaldehyde	2.40E-04	lbs/ton	2.17E-03	4.349E-03	5.48E-04	38.095	0.042	36.96
Benzene	1.30E-03	lbs/ton	1.18E-02	2.356E-02	2.97E-03	206.347	0.24	216
Bromoform	3.90E-05	lbs/ton	3.53E-04	7.067E-04	8.90E-05	6.190	0.49	436.8
Chloroform	5.90E-05	lbs/ton	5.35E-04	1.069E-03	1.35E-04	9.365	0.023	20.64
Methylene chloride [Dichlor	2.90E-04	lbs/ton	2.63E-03	5.255E-03	6.62E-04	46.031	54	48000

Appendix C

2006 TRI Emissions

ASRC 2006 TRI Reported Emissions

TAC Cat	Facility	Fugitive Air Emissions	Point Source Air Emissions	Total
	AMERICAN SYNTHETIC RUBBER CO.4500 CAMPGROUND RD, LOUISVILLE KENTUCKY 40216 (JEFFERSON)	*170,229*	*479,833*	
1	1,3-BUTADIENE (325 - Chemicals)	2,400	5,960	8,360
4	ACRYLIC ACID (325 - Chemicals)	28	68	96
1	ACRYLONITRILE (325 - Chemicals)	98	5	103
2	AMMONIA (325 - Chemicals)	5	0	5
2	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY) (325 - Chemicals)	0	11,815	11,815
2	HYDROGEN FLUORIDE (325 - Chemicals)	0	1,477	1,477
2	LEAD COMPOUNDS (325 - Chemicals)	0	15	15
3	MERCURY COMPOUNDS (325 - Chemicals)	0	2	2
4	STYRENE (325 - Chemicals)	380	20,674	21,054
2	SULFURIC ACID (1994 AND AFTER "ACID AEROSOLS" ONLY) (325 - Chemicals)	0	3,810	3,810
4	TITANIUM TETRACHLORIDE (325 - Chemicals)	5	2	7
2	TOLUENE (325 - Chemicals)	167,313	436,005	603,318

Appendix D

Results Tables

2017 Potential to Emit

Table D-1a: Industrial/ Roadway Cumulative Risk Results
ALL SOURCES

Last Updated: 5/12/2017

		Location of Maximum		
Source ID	Stack Description	Easting (m)	Northing (m)	Cumulative Risk (vs 75)
ALL	All Sources	600768.75	4229702	74.69

Table D-1b: Non-Industrial/Non-Roadway (Residential) Cumulative Risk Results
ALL SOURCES

Last Updated: 5/12/2017

		Location of Maximum		
Source ID	Stack Description	Easting (m)	Northing (m)	Cumulative Risk (vs 7.5)
ALL	All Sources	600613.56	4229014.5	6.02

Table D-1c: Industrial/ Roadway Cumulative Risk Results
NEW OR MODIFIED SOURCES ONLY

Last Updated: 5/12/2017

		Location of Maximum		
Source ID	Stack Description	Easting (m)	Northing (m)	Cumulative Risk (vs 38)
RISKNEW	New or Mod Sources	600805.69	4229246.5	2.78

Table D-1d: Non-Industrial/Non-Roadway (Residential) Cumulative Risk Results
NEW OR MODIFIED SOURCES ONLY

Last Updated: 5/12/2017

		Location of Maximum		
Source ID	Stack Description	Easting (m)	Northing (m)	Cumulative Risk (vs 3.8)
RISKNEW	New or Mod Sources	600613.56	4229014.5	0.53

Table D-2a: Industrial/ Roadway Results for 1,3 Butadiene

BAC$_C$ (ug/m^3)	BAC$_{NC}$ (ug/m^3)
0.033	2.00

Last Updated: 5/10/2017

Process ID	Stack Description	13BD Emissions (lb/hr)	Location of Maximum Easting (m)	Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
THERMOX	Thermal Oxidizer	0.1084	600829.12	4229896.50	0.01541	0.47	0.01
FLARE	Flare	2.1699	600837.50	4230119.50	0.10304	3.12	0.05
Fugitives	Fugitives	0.5358	600768.75	4229702.00	2.09095	63.36	1.05
ALL	All sources	2.17	600768.75	4229702	2.09095	63.36	1.05

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

Table D-2b: Non-Industrial/Non-Roadway (Residential) Results for 1,3 Butadiene

BAC$_C$ (ug/m^3)	BAC$_{NC}$ (ug/m^3)
0.033	2.00

Last Updated: 5/10/2017

Process ID	Stack Description	Emissions (lb/hr)	Location of Maximum Easting (m)	Northing (m)	Concentration (µg/m^3)	R_c (EAG_c=1.0)	HQ (EAG_{NC}=1.0)
THERMOX	Thermal Oxidizer	0.1084	600798.94	4230628	0.00743	0.23	0.004
FLARE	Flare	2.1699	600798.94	4230628	0.06359	1.93	0.032
Fugitives	Fugitives	0.5358	600458.31	4229157.00	0.10042	3.04	0.050
ALL	All sources	2.17	600458.31	4229157	0.15503	4.70	0.078

Table D-3a: Industrial/ Roadway Results for Acrylonitrile

BAC$_C$ (ug/m^3)	BAC$_{NC}$ (ug/m^3)
0.015	2.00

Last Updated: 5/12/2017

Process ID	Stack Description	AN Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG$_c$=10)	Risk HQ (EAG$_{NC}$=3.0)
FLARE	Flare	4.34E-03	600837.50	4230119.50	0.00021	0.01	0.0001
Fugitives	Fugitives	3.37E-02	600768.75	4229702.00	0.14794	9.86	0.074
ALL	All sources	3.80E-02	600768.75	4229702.00	0.14794	9.86	0.074

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-3b: Non-Industrial/Non-Roadway (Residential) Results for Acrylonitrile

BAC$_C$ (ug/m^3)	BAC$_{NC}$ (ug/m^3)
0.015	2.00

Last Updated: 5/12/2017

Process ID	Stack Description	AN Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG$_c$=1.0)	Risk HQ (EAG$_{NC}$=1.0)
FLARE	Flare	4.34E-03	600798.94	4230628	0.00013	0.01	0.0001
Fugitives	Fugitives	3.37E-02	600613.56	4229014.5	0.00703	0.47	0.004
ALL	All sources	3.80E-02	600613.56	4229014.5	0.00713	0.48	0.004

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-4a: Industrial/ Roadway Results for Styrene

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
1.70	1000

Last Updated: 5/10/2017

Process ID	Stack Description	STY Emissions (lb/hr)	Location of Maximum: Easting (m)	Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
RTO	Regen. Therm Oxid.	0.04738	600959.31	4229261	0.02493	0.01	0.0000
NEWFIN	Synthetic Rubber	2.78539	600805.69	4229246.5	2.77209	1.63	0.003
ALL	All sources	2.88	600805.69	4229246.5	2.77843	1.63	0.003

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-4b: Non-Industrial/Non-Roadway (Residential) Results for Styrene

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
1.70	1000

Last Updated: 5/10/2017

Process ID	Stack Description	STY Emissions (lb/hr)	Location of Maximum: Easting (m)	Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=1.0)	Risk HQ (EAG_{NC}=1.0)
RTO	Regen. Therm Oxid.	0.04738	600026.88	4229989	0.00178	0.001	0.0000
NEWFIN	Synthetic Rubber	2.78539	600613.56	4229014.5	0.52524	0.31	0.001
ALL	All sources	2.88	600613.56	4229014.5	0.52709	0.31	0.001

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-5a: Industrial/ Roadway Results for Arsenic

BAC$_C$ (ug/m^3)	BAC$_{NC}$ (ug/m^3)
0.00023	0.015

Last Updated: 5/10/2017

Process ID	Stack Description	As Emissions (lb/hr)	Location of Maximum Easting (m)	Location of Maximum Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG$_c$=10)	Risk HQ (EAG$_{NC}$=3.0)
BOILER	Coal Fired Boilers - 2	7.43E-03	601054.69	4229774.5	2.27E-04	0.99	0.015
ALL	All sources	7.43E-03	601054.69	4229774.5	2.27E-04	0.99	0.015

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-5b: Non-Industrial/Non-Roadway (Residential) Results for Arsenic

BAC$_C$ (ug/m^3)	BAC$_{NC}$ (ug/m^3)
0.00023	0.015

Last Updated: 5/10/2017

Process ID	Stack Description	As Emissions (lb/hr)	Location of Maximum Easting (m)	Location of Maximum Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG$_c$=1.0)	Risk HQ (EAG$_{NC}$=1.0)
BOILER	Coal Fired Boilers - 2	7.43E-03	601462.13	4229615	1.35E-04	0.59	0.009
ALL	All sources	7.43E-03	601462.13	4229615	1.35E-04	0.59	0.009

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-6a: Industrial/ Roadway Results for Cadmium

						BAC_C (ug/m³)	BAC_{NC} (ug/m³)
						0.00056	0.02

Last Updated: 5/10/2017

Process ID	Stack Description	Cd Emissions (lb/hr)	Location of Maximum Easting (m)	Northing (m)	Concentration (µg/m³)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
BOILER	Coal Fired Boilers - 2	9.24E-04	601054.69	4229774.5	2.83E-05	0.05	0.001
ALL	All sources	9.24E-04	601054.69	4229774.5	2.83E-05	0.05	0.001

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-6b: Non-Industrial/Non-Roadway (Residential) Results for Cadmium

						BAC_C (ug/m³)	BAC_{NC} (ug/m³)
						0.00056	0.02

Last Updated: 5/10/2017

Process ID	Stack Description	Cd Emissions (lb/hr)	Location of Maximum Easting (m)	Northing (m)	Concentration (µg/m³)	Risk R_c (EAG_c=1.0)	Risk HQ (EAG_{NC}=1.0)
BOILER	Coal Fired Boilers - 2	9.24E-04	601462.13	4229615	1.67E-05	0.03	0.001
ALL	All sources	9.24E-04	601462.13	4229615	1.67E-05	0.03	0.001

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-7a: Industrial/ Roadway Results for Hexavalent Chromium

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
0.000083	0.008

Last Updated: 8/7/2015

Process ID	Stack Description	CrIV Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
BOILER	Coal Fired Boilers - 2	1.43E-03	601054.69	4229774.5	4.38E-05	0.53	0.005
ALL	All sources	1.43E-03	601054.69	4229774.5	4.38E-05	0.53	0.005

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-7b: Non-Industrial/Non-Roadway (Residential) Results for Hexavalent Chromium

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
0.000083	0.008

Last Updated: 8/7/2015

Process ID	Stack Description	CrIV Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=1.0)	Risk HQ (EAG_{NC}=1.0)
BOILER	Coal Fired Boilers - 2	1.43E-03	601462.13	4229615	2.59E-05	0.31	0.003
ALL	All sources	1.43E-03	601462.13	4229615	2.59E-05	0.31	0.003

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-8a: Industrial/ Roadway Results for Nickel

BAC_C (ug/m³)	BAC_{NC} (ug/m³)
0.0038	0.014

Last Updated: 5/10/2017

Process ID	Stack Description	Ni Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Location of Maximum: Concentration (µg/m³)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
BOILER	Coal Fired Boilers - 2	5.07E-03	601054.69	4229774.5	1.55E-04	0.04	0.011
ALL	All sources	5.07E-03	601054.69	4229774.5	1.55E-04	0.04	0.011

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-8b: Non-Industrial/Non-Roadway (Residential) Results for Nickel

BAC_C (ug/m³)	BAC_{NC} (ug/m³)
0.0038	0.014

Last Updated: 5/10/2017

Process ID	Stack Description	Ni Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Location of Maximum: Concentration (µg/m³)	Risk R_c (EAG_c=1.0)	Risk HQ (EAG_{NC}=1.0)
BOILER	Coal Fired Boilers - 2	5.07E-03	601462.13	4229615	9.19E-05	0.02	0.007
ALL	All sources	5.07E-03	601462.13	4229615	9.19E-05	0.02	0.007

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-9a: Industrial/ Roadway Results for Formaldehyde

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
0.077	9.00

Last Updated: 5/10/2017

			Location of Maximum				
Process ID	Stack Description	Formaldehyde Emissions (lb/hr)	Easting (m)	Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
BOILER	Coal Fired Boilers - 2	4.35E-03	601054.69	4229774.5	1.33E-04	0.00	0.0000
ALL	All sources	4.35E-03	601054.69	4229774.5	1.33E-04	0.00	0.0000

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-9b: Non-Industrial/Non-Roadway (Residential) Results for Formaldehyde

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
0.077	9.00

Last Updated: 5/10/2017

			Location of Maximum				
Process ID	Stack Description	Formaldehyde Emissions (lb/hr)	Easting (m)	Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=1.0)	Risk HQ (EAG_{NC}=1.0)
BOILER	Coal Fired Boilers - 2	4.35E-03	601462.13	4229615	7.88E-05	0.00	0.0000
ALL	All sources	4.35E-03	601462.13	4229615	7.88E-05	0.00	0.0000

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-10a: Industrial/ Roadway Results for Sulfuric Acid

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
NA	1.00

Last Updated: 5/10/2017

Process ID	Stack Description	H_2SO_4 Emissions (lb/hr)	Location of Maximum Easting (m)	Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
BOILER	Coal Fired Boilers - 2	0.00E+00	601054.69	4229774.5	5.30E-02	NA	0.053
ALL	All sources	0.00E+00	601054.69	4229774.5	5.30E-02	NA	0.053

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-10b: Non-Industrial/Non-Roadway (Residential) Results for Sulfuric Acid

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
NA	1.00

Last Updated: 5/10/2017

Process ID	Stack Description	H_2SO_4 Emissions (lb/hr)	Location of Maximum Easting (m)	Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=1.0)	Risk HQ (EAG_{NC}=1.0)
BOILER	Coal Fired Boilers - 2	0.00E+00	601462.13	4229615	3.13E-02	NA	0.031
ALL	All sources	0.00E+00	601462.13	4229615	3.13E-02	NA	0.031

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.

Table D-11a: Industrial/ Roadway Results for Hydrochloric Acid

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
NA	20.00

Last Updated: 5/10/2017

Process ID	Stack Description	HCl Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=10)	Risk HQ (EAG_{NC}=3.0)
BOILER	Coal Fired Boilers - 2	0.00E+00	601054.69	4229774.5	6.66E-02	NA	0.003
ALL	All sources	0.00E+00	601054.69	4229774.5	6.66E-02	NA	0.003

Note: EAGs for Industrial property incorporate the adjustment factor specified by the LMAPCD in Reg 5.21, paragraph 3.6.

As shown in the two right-hand columns of the above table, all individual processes have industrial area cancer risks (R_c) < 10 and HQ < 3.0. This complies with the STAR Goals.

Table D-11b: Non-Industrial/Non-Roadway (Residential) Results for Hydrochloric Acid

BAC_C (ug/m^3)	BAC_{NC} (ug/m^3)
NA	20.00

Last Updated: 5/10/2017

Process ID	Stack Description	HCl Emissions (lb/hr)	Location of Maximum: Easting (m)	Location of Maximum: Northing (m)	Concentration (µg/m^3)	Risk R_c (EAG_c=1.0)	Risk HQ (EAG_{NC}=1.0)
BOILER	Coal Fired Boilers - 2	0.00E+00	601462.13	4229615	3.94E-02	NA	0.002
ALL	All sources	0.00E+00	601462.13	4229615	3.94E-02	NA	0.002

As shown in the two right-hand columns of the above table, all individual processes have non-industrial/non-roadway (residential) area cancer risks (R_c) < 1.0 and HQ < 1.0. This complies with the STAR Goals.