EXHIBIT A

University of Arizona
Laboratory Questionnaire
Required Quantification of
Regulated Air Pollutants in Labs

PLEASE PRINT

Questionnaire # _____

UNIVERSITY OF ARIZONA

REQUIRED QUANTIFICATION OF REGULATED AIR POLLUTANTS IN LABS

This questionnaire will be used by the University of Arizona Risk Management Department to quantify use of volatile organic compounds (VOCs) and listed hazardous air pollutants (HAPs) in laboratories. Please complete this form and return it to Cindy Melillo, c/o Risk Management Office, 1610 N. Vine Ave., by Friday June 30, 1995. For technical questions, please contact Linda Micale or Laura Miner at 325-1202; for other questions call Lloyd Wundrock at 621-1590. Please retain a copy for your files for future follow-up. Be sure answers are for designated Room number(s) only.

1. Contact Name and Title _____
   a. Alternate Contact _____
   b. Principal Investigator _____
2. Phone number / Alternate Phone # _____
3. Room number _____
4. Building name _____
5. Building number _____
6. Date completed _____

7. IS THIS LAB A TEACHING LAB? Yes or No (Circle one) If yes contact Cindy Melillo at 626-2083 and return the form to Risk Management completed through #8 only.

8. Description. Please give a general description of the activities, types of research, and/or general processes which occur in this area.

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PLEASE PRINT

Questionnaire # _____ Date Completed _____

UNIVERSITY OF ARIZONA
Required Quantification of Regulated Air Pollutants in Labs

9. OPERATING SCENARIO — Please complete the table showing the *hours per day*, average number days per week in operation, or *months per year* (e.g. January - May) when routine and peak chemical usage occurs.

ACTIVITY	HOURS/DAY	AV. DAYS/WEEK	MONTH/YR
Routine			
Peak			

Future Operating Scenario — Please indicate any anticipated changes in chemical usage/ rates due to new grants, change in research focus, etc.

_____

_____

_____

_____

_____

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Please answer the following questions about equipment and activities specifically regulated by Pima County:

10. OVENS - An oven is considered to be used for curing only if the chemical process specifically requires curing (chemical fixing or reaction) rather than enhanced drying. Drying ovens are used for enhanced (quick) drying and removal of moisture and other liquid component.

    a. How many and what types of ovens do you have, curing ovens (C) or drying ovens (D)?

    _____ Number of (C)

    _____ Number of (D)

PLEASE PRINT

Questionnaire # _____ Date Completed _____

UNIVERSITY OF ARIZONA
Required Quantification of Regulated Air Pollutants in Labs

b. If there is a curing oven in your lab, are more or less than 15 lb/day (~1.8 gal/day) or 3 pounds per hour (lb/hr) (~0.4 gal/hr) of volatile organic compounds (VOCs) part of the process for each oven?

☐ More ☐ Less ☐ N/A (no curing oven)

Please be sure to include these chemicals on the spreadsheet following question 21.

11. SURFACE COATING (SC)

a. Do you conduct general surface coating, including:

- manual painting, stenciling and marking - roller, brush or manual application (Yes/No)?
- use of spray adhesives or manually applied adhesives such as two-part epoxies (Yes/No)?

b. If you use surface coating materials, do you use them to paint plastic or metal parts, and if so, is the average VOC content of paint less than 3 lb/gal?

☐ More ☐ Less ☐ Not Sure ☐ No Paints

Please be sure to include these chemicals on the spreadsheet following question 21.

12. SPRAY PAINT BOOTHS (PB) - Spray paint booths are enclosed painting areas, usually using paint guns to apply paint.

a. _____ Number of spray paint booths in your lab

_____ hours/wk used

_____ gals/wk paint (or list other unit of measure)

Please be sure to include these paints on the spreadsheet following question 21.

PLEASE PRINT

Questionnaire # _____ Date Completed _____

UNIVERSITY OF ARIZONA
Required Quantification of Regulated Air Pollutants in Labs

13. SPOT PAINTING (SP) - Spot Painting is often conducted for the purpose of: lettering, stenciling, or identifying containers or for touch-up work. A spray can or any spray painting where less than 50 % of the total surface area of the object is coated and the total surface area is less than 16 square feet.

    a. _____ spot painting conducted (Yes/No)?

    _____ hours/wk spot painting

    _____ oz/wk paint

14. SOLVENT WASHING (SW)

    a. Do you have solvent washing or wiping operations associated with surface coating operations (Yes/No)? If solvent washing does not correspond to surface coating, see question 15.

    b. _____ number of solvent washing stations. Please be sure to include these chemicals on the spreadsheet following question 21.

15. GENERAL SOLVENT WASHING AND DEGREASING

    a. How is solvent degreasing conducted:

    - by wiping with a Q-tip and disposable towel or by dipping the substrate into a beaker (SO1) ☐
    - by using a degreasing unit that is ≥2 gallons, but <30 gallons (SU1) ☐
    - by using a degreasing unit that is ≥30 gallons (SU2) ☐

    b. _____ number of solvent degreasing stations in your lab?

    Please be sure to include these chemicals on the spreadsheet following question 21.

    c. Is your average usage for volatile organic chemicals more or less than 2.4 pounds per day (lb/day)? (Assuming that the specific gravity is 1.00, 2.4 lb/day equals approximately 0.29 gallons per day (gal/day), 1.2 quarts per day (qt./day), or 1.1 liters per day (l/day)?

    ☐ More ☐ Less ☐ N/A (no VOC usage)

PLEASE PRINT

Questionnaire # _____ Date Completed _____

UNIVERSITY OF ARIZONA
Required Quantification of Regulated Air Pollutants in Labs

d. Would you estimate that all solvent usage in your lab is more or less than 40 lb/day (~ 5 gal/day) or 8 lb/hr (~ 1 gal/hr)?

☐ More ☐ Less ☐ N/A (no solvent usage)

16. What system does your lab use to purchase chemicals? Please assign a percentage for each purchasing system listed below.

Location	Percentage
Central Stores	_____
Blanket Purchase Order	_____
Other, please specify	_____
_____	_____
_____	_____

17. In an effort to protect the proprietary nature of work conducted in labs, please indicate the information which would be considered confidential to your area. You may include entire question numbers, individual chemicals or equipment, etc. Please indicate these areas below.

_____

_____

_____

PLEASE PRINT

Questionnaire # _____ Date Completed _____

UNIVERSITY OF ARIZONA
Required Quantification of Regulated Air Pollutants in Labs

18. Equipment Summary — List those pieces of equipment, including fume hoods, which vent chemicals to outside air. **Make copies of this page if you need additional space and continue item numbers consecutively.** If no A-Tag, provide number and reference source of information.

Item #	A-Tag or Inventory Number*	Equipment Name / Description/Room #	Approximate Vent Diameter (D)** (in.)	Height of Sash Certification Arrow**(in.)	Width of Sash Opening**(in.)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

*A-Tag is usually a metal tag or Inventory # is typically on a fume hood sticker of varying color.

** If not applicable, please call for further instructions.

PLEASE PRINT

Questionnaire # _____ Date Completed _____

UNIVERSITY OF ARIZONA
Required Quantification of Regulated Air Pollutants in Labs

19. Quantify Regulated Air Pollutants (RAPs).

    a. Please use the tables on pages 9-21 to indicate which RAPs are used in your laboratory area or in PRODUCTS CONTAINED in your area.

    b. In addition, please indicate where the RAPs are used by indicating Item Number from Question 18.

    c. Briefly identify the type of activity, e.g., distillation, titration.

    d. Estimate weekly usage of chemical and unit of measure if other than ounces. If this chemical is a by-product of a reaction that results in emission but is not a raw material, please provide emission and put (E) in the same column. Note: Emissions estimates from chemicals, taking reactions into account, are preferable. Where these are not available use estimated usage rates. Where emissions rates are provided, usage rates are not necessary for the same process or experiment. Indicate emissions rates or usage rates for type of estimate.

    e. Identify percent of product consumed in a reaction when available or applicable.

    f. Identify amount of chemical waste product generated per week. Indicate another unit of measure if more appropriate.

    g. Indicate number of weeks per year this activity will be conducted.

    h. Provide your own list of organic compounds that are not identified on this table at the end and complete the columns.

20. Total number of questionnaire pages _____ (insert only if additional pages attached).

Questionaire # _____

Date Completed _____

University of Arizona

Required Quantification of Regulated Air Pollutants In Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr Active
Acetaldehyde	75-07-0						
Acetamide	60-35-5						
Acetone	67-64-1						
Acetonitrile	75-05-8						
Acetophenone	98-86-2						
Acetylaminofluorene, 2-	53-96-3						
Acetylene	74-86-2						
Acrolein	107-02-8						
Acrylamide	79-06-1						
Acrylic Acid	79-10-7						
Acrylonitrile	107-13-1						
Acrylyl Chloride	814-68-6						
Allyl Alcohol	107-18-6						
Allyl Chloride	107-05-1						
Allylamine	107-11-9						
Aminobiphenyl, 4-	92-67-1						
Ammonia	7664-41-7						
Aniline	62-53-3						
Anisidine, o-	90-04-0						
Antimony Compounds	1309-64-4						
Arsenic and Compounds	7440-38-2						
Asbestos	1332-21-4						
Benzene	71-43-2						
Benzidine	92-87-5						
Benzotrichloride	98-07-7						
Benzyl Chloride	100-44-7						
Berylium Oxide	1304-56-9						

* If another unit of measure is applicable, please indicate.

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Date Co

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr Active
Beryllium and Compounds	7440-41-7						
Biphenyl	92-52-4						
Bis(chloromethyl)ether	542-88-1						
Boron Trichloride	10294-34-5						
Boron Trifluoride	7637-07-2						
Boron Trifluoride Compound w/Methyl Ether	353-42-4						
Bromine	7726-95-6						
Bromoform	75-25-2						
Bromotrifluorethylene	598-73-2						
Butadiene, 1,3-	106-99-0						
Butane	106-97-8						
Butene	25167-67-3						
Butene, 1-	106-98-9						
Butene, 2-	107-01-7						
Butene-cis, 2-	590-18-1						
Butene-trans, 2-	624-64-6						
Cadmium	7440-43-9						
Cadmium Oxide	1306-19-0						
Calcium Cyanamide	156-62-7						
Caprolactam	105-60-2						
Captan	133-06-2						
Carbaryl	63-25-2						
Carbon Disulfide	75-15-0						
Carbon Tetrachloride	56-23-5						
Carbonyl Sulfide	463-58-1						
Catechol	120-80-9						
Chloramben	133-90-4						

* If another unit of measure is applicable, please indicate.

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Date Com

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr. Active
Chlordane	57-74-9						
Chlorine	7782-50-5						
Chlorine Dioxide	10049-04-4						
Chlorine Monoxide	7791-21-1						
Chloroacetic Acid	79-11-8						
Chloroacetophenone, 2-	532-27-4						
Chlorobenzene	108-90-7						
Chlorobenzilate	510-15-6						
Chloroform	67-66-3						
Chloromethyl Methyl Ether	107-30-2						
Chloroprene	126-99-8						
Chloropropylene, 1-	590-21-6						
Chloropropylene, 2-	557-98-2						
Chromic Acid	1333-82-0						
Chromium Oxide	1308-38-9						
Chromium and Compounds	7440-47-3						
Cobalt and Compounds	7440-48-4						
Cresol, m-	108-39-4						
Cresol, o-	95-48-7						
Cresol, p-	106-44-5						
Cresols/Cresylic Acid	1319-77-3						
Crotonaldehyde	4170-30-3						
Crotonaldehyde, (E)	123-73-9						
Cumene	98-82-8						
Cyanogen	460-19-5						
Cyanogen Chloride	506-77-4						
Cyclohexylamine	108-91-8						

* If another unit of measure is applicable, please indicate.

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...ed Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated or Proce...	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	...l Week/Yr Active
Cyclopropane	75-19-4						
Diazomethane	334-88-3						
Dibenzofurans	132-64-9						
Diborane	19287-45-7						
Dibromo-3-Chloropropane, 1,2-	96-12-8						
Dibutyl Phthalate	84-74-2						
Dichloro-2-2-bis (p-chlorophenyl ethylene), 1,1-	3547-04-4						
Dichlorobenzene(p), 1,4-	106-46-7						
Dichlorobenzidene, 3,3-	91-94-1						
Dichlorodimethylsilane	75-78-5						
Dichloroethane, 1,2-	107-06-2						
Dichloroethyl Ether	111-44-4						
Dichlorophenoxyacetic acid, 2,4, inc. salts and esters	94-75-7						
Dichloropropene, 1,3-	542-75-6						
Dichlorosilane	4109-96-0						
Dichlorvos	62-73-7						
Diethanolamine	111-42-2						
Diethyl Aniline, N,N-	121-69-7						
Diethyl Glycol Monoethyl Ether Acetate	84-66-2						
Diethyl Sulfate	64-67-5						
Diethylene Glycol Dibutyl Ether	112-73-2						
Diethylene Glycol Monoethyl Ether	112-15-2						
Diethylene Glycol Monoethyl Ether Acetate	111-90-6						
Difluoroethane	75-37-6						
Dimethoxybenzidine, 3,3-	119-90-4						

* If another unit of measure is applicable, please indicate.

Questio _____

Date Compl

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed In Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr. Active
Ethyl Cyanide	107-12-0						
Ethyl Cyanoacrylate	7085-85-0						
Ethyl Mercaptan	75-08-1						
Ethyl Nitrite	109-95-5						
Ethylamine	75-04-7						
Ethylene	74-85-1						
Ethylene Diamine	107-15-3						
Ethylene Dibromide	106-93-4						
Ethylene Glycol	107-21-1						
Ethylene Glycol Butyl Ether Acetate	112-07-2						
Ethylene Glycol Dimethyl Ether	110-71-4						
Ethylene Glycol Ethyl Ether	110-80-5						
Ethylene Glycol Monobutyl Ether	111-76-2						
Ethylene Glycol Monoethyl Ether Acetate	111-15-9						
Ethylene Glycol Monomethyl Ether	109-86-4						
Ethylene Glycol Monomethyl Ether Acetate	110-49-6						
Ethylene Imine	151-56-4						
Ethylene Oxide	75-21-8						
Ethylene Thiourena	96-45-7						
Ethylidene Dichloride	75-34-3						
Fluorine	7782-41-4						
Formaldehyde	50-00-0						
Furan	110-00-9						
Heptachlor	76-44-8						
Hexachlorobenzene	118-74-1						
Hexachlorobutadiene	87-68-3						
Hexachlorocyclopentadiene	77-47-4						

* If another unit of measure is applicable, please indicate.

Questio. _____ Date Compl.

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr Active
Hexachloroethane	67-72-1						
Hexamethylphosphoramide	680-31-9						
Hexane	110-54-3						
Hexane Methylene Diisocyanate, 1,6-	822-06-0						
Hydrazine	302-01-2						
Hydrogen	1333-74-0						
Hydrogen Cyanide	74-90-8						
Hydrogen Selenide	7783-07-5						
Hydrogen Sulfide	7783-06-4						
Hydroquinone	123-31-9						
Iron Pentacarbonyl	13463-40-6						
Isobutane	75-28-5						
Isobutylene	115-11-7						
Isobutyronitrile	78-82-0						
Isopentane	78-78-4						
Isophorone	78-59-1						
Isoprene	78-79-5						
Isopropyl Chloride	75-29-6						
Isopropyl Chloroformate	108-23-6						
Isopropylamine	75-31-0						
Lindane (all Isomers)	58-89-9						
Maleic Anhydride	108-31-6						
Manganese Carbonate	598-62-9						
Manganese Dioxide	1313-13-9						
Manganese and Compounds	7439-96-5						
Mercury	7439-97-6						
Methacrylonitrile	126-98-7						

* If another unit of measure is applicable, please indicate.

Question _____

Date Comple

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr Active
Methane	74-82-8						
Methanol	67-56-1						
Methoxychlor	72-43-5						
Methyl Amine	74-89-5						
Methyl Bromide	74-83-9						
Methyl Chloride	74-87-3						
Methyl Chloroformate	79-22-1						
Methyl Cyanoacrylate	137-05-3						
Methyl Ether	115-10-6						
Methyl Ethyl Ketone	78-93-3						
Methyl Formate	107-31-3						
Methyl Hydrazine	60-34-4						
Methyl Iodide	74-88-4						
Methyl Isobutyl Ketone	108-10-1						
Methyl Isocyanate	624-83-9						
Methyl Mercaptan	74-93-1						
Methyl Methacrylate	80-62-6						
Methyl Tert Butyl Ether	1634-04-4						
Methyl Thiocyanate	556-64-9						
Methyl-1-Butene, 2-	563-46-2						
Methyl-1-Butene, 3-	563-45-1						
Methylene Chloride	75-09-2						
Methylene Dianaline	101-77-9						
Methylene bis(2-chloroaniline), 4,4-	101-14-4						
Methyltrichlorosilane	75-79-6						
Napthalene	91-20-3						
Nickel Acetate	373-02-4						

* If another unit of measure is applicable, please indicate.

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Date Comple.

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr Active
Nickel Carbonyl	13463-39-3						
Nickel Oxide	1313-99-1						
Nickel Sulfamate	13770-89-3						
Nickel Sulfate	7786-81-4						
Nickel and Compounds	7440-02-0						
Nitric Acid	7697-37-2						
Nitric Oxide	10102-43-9						
Nitrobenzene	98-95-3						
Nitrobiphenyl, 4-	92-93-3						
Nitrophenol, 4-	100-02-7						
Nitropropane, 2-	79-46-9						
Nitroso-N-Methylurea, N-	684-93-5						
Nitrosodimethylamine, N-	62-75-9						
Nitrosomorpholine, N-	59-89-2						
Oleum (Fuming Sulfuric Acid)	8014-95-7						
Paracetic Acid	79-21-0						
Parathion	56-38-2						
Pentachloronitrobenzene	82-68-8						
Pentachlorophenol	87-86-5						
Pentadiene, 1,3-	504-60-9						
Pentane, n-	109-66-0						
Pentene, 2- (E)	646-04-8						
Pentene, 2- (Z)	627-20-3						
Pentenes, Mixed	109-67-1						
Perchloromethylmercaptan	594-42-3						
Phenol	108-95-2						
Phenylenediamine, p-	106-50-3						

* If another unit of measure is applicable, please indicate.

Questionn _____ Date Complet

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr Active
Phosgene	75-44-5						
Phosphine	7803-51-2						
Phosphorus	7723-14-0						
Phosphorus Oxychloride	10025-87-3						
Phosphorus Trichloride	7719-12-2						
Phthalic Anhydride	85-44-9						
Pigment, Iron/Cobalt/Chromite	68186-97-0						
Piperidine	110-89-4						
Polychlorinated Biphenyls	1336-36-3						
Potassium Cyanide	151-50-8						
Potassium Dichromate	7778-50-9						
Potassium Ferrocyanide	13746-66-2						
Potassium Zinc Chromate	11114-59-9						
Propadiene	463-49-0						
Propane	74-98-6						
Propane Sultone, 1,3-	1120-71-4						
Propiolactone, beta-	57-57-8						
Propionaldehyde	123-38-6						
Propoxur	114-26-1						
Propyl Chloroformate	109-61-5						
Propylene	115-07-1						
Propylene Dichloride	78-87-5						
Propylene Glycol Methyl Ether Acetate	108-65-6						
Propylene Glycol Monoethyl Ether	52125-53-8						
Propylene Glycol Monomethyl Ether	107-98-2						
Propylene Oxide	75-56-9						
Propylene/Dipropylene Glycol Phenyl Ether	4169-04-4						

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Questio _____

Date Complet

University of Arizona

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Propyne	74-99-7						
Quinoline	91-22-5						
Quinone	106-51-4						
Selenium and Compounds	7882-49-2						
Silane	7803-62-5						
Sodium Chromate	7775-11-3						
Sodium Cyanide	143-33-9						
Sodium Dichromate	1588-01-9						
Styrene	100-42-5						
Styrene Oxide	96-09-3						
Sulfur Tetrafluoride	7783-60-0						
Sulfur Trioxide	7446-11-9						
Tetrachlorodibenzo-p-dioxin, 2,3,7,8-	1746-01-6						
Tetrachloroethane, 1,1,2,2-	79-34-5						
Tetrachloroethylene	127-18-4						
Tetrafluoroethylene	116-14-3						
Tetramethylsiane	75-76-3						
Tetranitromethane	509-14-8						
Titanium Tetrachloride	7550-45-0						
Toluene	108-88-3						
Toluene Diamine, 2,4-	95-80-7						
Toluene-2,4-Diisocyanate	584-84-9						
Toluidine, o-	95-53-4						
Toxaphene	8001-35-2						
Trichlorobenzene, 1,2,4-	120-82-1						
Trichloroethane, 1,1,1-	71-55-6						
Trichloroethane, 1,1,2-	79-00-5						

* If another unit of measure is applicable, please indicate.

Questic _____ Date Compl _____

University of Arizona

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Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr. Active
Trichloroethylene	79-01-6						
Trichlorophenol, 2,4,5-	95-95-4						
Trichlorophenol, 2,4,6-	88-06-2						
Trichlorosilane	10025-78-2						
Triethylamine	121-44-8						
Trifluorochloroethylene	79-38-9						
Trifluralin	1582-09-8						
Trimethylamine	75-50-3						
Trimethylchlorosilane	75-77-4						
Trimethylpentane, 2,2,4-	540-84-1						
Tripropylene Glycol Methyl Ether	20324-33-8						
Vinyl Acetate	108-05-4						
Vinyl Acetylene	689-97-4						
Vinyl Bromide	593-60-2						
Vinyl Chloride	75-01-4						
Vinyl Ethyl Ether	109-92-2						
Vinyl Fluoride	75-02-5						
Vinyl Methyl Ether	107-25-5						
Vinylidene Chloride	75-35-4						
Vinylidene Fluoride	75-38-7						
Xylene (mixed)	1330-20-7						

* If another unit of measure is applicable, please indicate.

Question _____

Date Complet

University of Arizona

Required Quantification of Regulated Air Pollutants in Labs

Regulated Air Pollutant	CAS #	Use Location (Equip. Item #)	Associated Activity or Process	Estimated Weekly Usage (oz.)*	% Consumed in Reaction	Estimated Weekly Waste Generated (oz)*	Number of Weeks/Yr. Active
Liquid Photographic Chemicals (unk. composition)	VARIOUS						
Cleaning Solvents (unk. composition)	VARIOUS						
Other Volatile Organic Compounds (unk. composition)	VARIOUS						

* If another unit of measure is applicable, please indicate.

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Appendix D

UA Potential to Emit Emissions Calculations

Equipment or Activity: **Small Boilers (rated at less than 100 MM Btu/hr).**

Character: Non-Fugitive, **Controlled** (equipped with Low NOx combustor technology).

Fuel: Pipeline Quality Natural Gas Exclusively.

Heating value for natural gas fuel estimated at: 1,020 Btu/scf

Emission Factors: (in lb/MMBtu for NOx and CO)

Boiler ID #s	**460303**	**460304**	**460305**	**2050208**	**2050209**	**2050210**
Test Date[1]	2/13/2003	2/4/2003	12/20/2002	12/4/2002	12/3/2002	11/13/2008
NOx	0.022	0.023	0.028	0.023	0.023	0.029
CO	0.0004	0.00	0.00043	0.00002	0.00009	0.055

SO2	0.6 lb/MMscf	AP-42, Sec. 1.4 (7/98) Table 1.4-2
VOC	5.5 lb/MMscf	AP-42, Sec. 1.4 (7/98) Table 1.4-2
PM_{10} / $PM_{2.5}$ [2]	7.6 lb/MMscf	AP-42, Sec. 1.4 (7/98) Table 1.4-2
HAPs	1.888 lb/MMscf	AP-42, Sec. 1.4 (7/98) Table 1.4-3 & 4

Capacities in maximum heat input Btu/hr. Emissions in tons per year.

Equipment ID	**Capacity**	**Hrs/year**	**NOx**	**CO**	**SO2**	**VOC**	**PM10 / PM2.5**	**HAPs**	
Bldg 46 Boiler Set									
460303 (Boiler 2)	59,520,000	8,760	5.735	0.104	0.153	1.406	1.942	0.483	
460304 (Boiler 1)	59,520,000	8,760	5.996	0.026	0.153	1.406	1.942	0.483	
460305 (Boiler 3)	67,500,000	8,760	8.278	0.127	0.174	1.594	2.203	0.547	**NO OPERATING LIMIT**
Bldg 205 Boiler Set									
2050208 (Boiler 2)	42,200,000	8,760	4.251	0.004	0.109	0.997	1.377	0.342	
2050209 (Boiler 1)	42,200,000	8,760	4.251	0.017	0.109	0.997	1.377	0.342	
2050210 (Boiler 3)	60,100,000	8,760	7.634	14.478	0.155	1.419	1.961	0.487	
		Totals:	**36.15**	**14.76**	**0.85**	**7.82**	**10.80**	**2.68**	

[1]EEMC Measured Emissions (in lb/MMBtu)

[2] Per Note 'c' below AP-42 Table 1.4-2, all PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter and this PM emission factor may be used to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Small Boilers (rated at less than 100 MM Btu/hr).**

Character: Non-Fugitive, **Uncontrolled (control efficiency, c.e. = 0)**

Fuel: Pipeline Quality Natural Gas Exclusively.

Heating value for natural gas fuel estimated at: 1,020 Btu/scf

Emission Factors: (lb/MMscf)

NOx	100	AP-42, Sec. 1.4 (7/98) Table 1.4-1
CO	84	AP-42, Sec. 1.4 (7/98) Table 1.4-1
SO2	0.6	AP-42, Sec. 1.4 (7/98) Table 1.4-2
VOC	5.5	AP-42, Sec. 1.4 (7/98) Table 1.4-2
PM_{10} / $PM_{2.5}$ [3]	7.6	AP-42, Sec. 1.4 (7/98) Table 1.4-2
HAPs	1.888	AP-42, Sec. 1.4 (7/98) Table 1.4-3 & 4

Capacities in maximum input Btu/hr. Emissions in tons per year.

Equipment ID	Capacity	c.e.	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
170004	1,995,000	0	8,760	0.8567	0.7196	0.0051	0.0471	0.0651	0.0162	NO OPERATING LIMIT
850105	3,000,000	0	8,760	1.2882	1.0821	0.0077	0.0709	0.0979	0.0243	
96P0104A [1]	400,000	0	8,760	0.1718	0.1443	0.0010	0.0094	0.0131	0.0032	
96P0104B [1]	400,000	0	8,760	0.1718	0.1443	0.0010	0.0094	0.0131	0.0032	
96P0104C [1]	400,000	0	8,760	0.1718	0.1443	0.0010	0.0094	0.0131	0.0032	
96P0106 [2]	1,800,000	0	8,760	0.7729	0.6493	0.0046	0.0425	0.0587	0.0146	
96P0107 [2]	1,800,000	0	8,760	0.7729	0.6493	0.0046	0.0425	0.0587	0.0146	
1080201	1,730,000	0	8,760	0.7429	0.6240	0.0045	0.0409	0.0565	0.0140	
1080202	1,730,000	0	8,760	0.7429	0.6240	0.0045	0.0409	0.0565	0.0140	
1170304	2,650,000	0	8,760	1.1379	0.9559	0.0068	0.0626	0.0865	0.0215	
1180002	1,630,000	0	8,760	0.6999	0.5880	0.0042	0.0385	0.0532	0.0132	
1310102	1,210,000	0	8,760	0.5196	0.4365	0.0031	0.0286	0.0395	0.0098	
1320002	2,270,000	0	8,760	0.9748	0.8188	0.0058	0.0536	0.0741	0.0184	
1510103	1,210,000	0	8,760	0.5196	0.4365	0.0031	0.0286	0.0395	0.0098	
1760101	2,160,000	0	8,760	0.9275	0.7791	0.0056	0.0510	0.0705	0.0175	
			Totals:	**10.47**	**8.80**	**0.06**	**0.58**	**0.80**	**0.20**	

[1] Although the individual capacities of these boilers are below 1 MMBtu/hr, they are listed because they can be operated simultaneously and the combined capacity is greater than 1 MMBtu/hr.

[2] ICA replaced the old Lochinvar boilers with new Raypacs, same Btu/hr.

[3] Per Note 'c' below AP-42 Table 1.4-2, all PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter and this PM emission factor may be used to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Small Boilers (rated at less than 100 MM Btu/hr).**

Character: Non-Fugitive, **Uncontrolled.**

Fuel: Pipeline Quality Natural Gas Exclusively.

Heating value for natural gas fuel estimated at: 1,020 Btu/scf

Boilers are low NO_x per the manufacturer's data.

Emission Factors: (lb/MMscf)		**Emission Factor Source:**
NO_x	50	AP-42, Sec. 1.4; Table 1.4-1 (7/98)
CO	84	AP-42, Sec. 1.4; Table 1.4-1 (7/98)
SO_2	0.6	AP-42, Sec. 1.4; Table 1.4-2 (7/98)
VOC	5.5	AP-42, Sec. 1.4; Table 1.4-2 (7/98)
PM_{10} / $PM_{2.5}$ [1]	7.6	AP-42, Sec. 1.4; Table 1.4-2 (7/98)
HAPs	1.88	AP-42, Sec. 1.4; Table 1.4-3 (7/98)

Emissions in tons per year.

Equipment ID	Maximum Heat Input Rating	Hrs/year	NO_x	CO	SO_2	VOC	PM10 / PM2.5	HAPs	
460307	11.54 MMBtu/hr	8,760	2.478	4.163	0.0297	0.2725	0.3766	0.0933	**NO OPERATING LIMIT**
460308	11.54 MMBtu/hr	8,760	2.478	4.163	0.0297	0.2725	0.3766	0.0933	
460309	11.54 MMBtu/hr	8,760	2.478	4.163	0.0297	0.2725	0.3766	0.0933	
		Totals:	**7.4331**	**12.4876**	**0.0892**	**0.8176**	**1.1298**	**0.2798**	

[1] Per Note 'c' below AP-42 Table 1.4-2, all PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter and this PM emission factor may be used to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Emergency Generators (rated at less than 600 h.p. (447 kW)).**
Character: Non-Fugitive, **Uncontrolled.**
Fuel: Diesel Fuel.
Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.
Heating value for diesel fuel estimated at: 137,000 Btu/gallon (AP-42, Appendix A, page A-5)
Brake Specific Fuel Consumption (BSFC Diesel) of 7,000 Btu/hp-hr used to convert from lb/MMBtu to lb/hp-hr per Note 'a' below Table 3.3-1.

Emission Factors: (lb/MMBtu Fuel Input)

NOx	4.41	AP-42, Sec. 3.3 (10/96) Table 3.3-1
CO	0.95	AP-42, Sec. 3.3 (10/96) Table 3.3-1
SO2	0.29	AP-42, Sec. 3.3 (10/96) Table 3.3-1
VOC	0.36	AP-42, Sec. 3.3 (10/96) Table 3.3-2
PM_{10} / $PM_{2.5}$ [1]	0.31	AP-42, Sec. 3.3 (10/96) Table 3.3-1
HAPs	3.87E-03	AP-42, Sec. 3.3 (10/96) Table 3.3-2

Capacities in kilowatts. Fuel use calculated in gallons per hour based on kW rating of engine and factors listed above. Emissions in tons per year.

Equipment ID	Capacity (kW)	Fuel	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
40105	55	3.77	100	0.11384	0.02452	0.00749	0.00929	0.00800	0.00010	OPERATING LIMIT
290001	10	0.69	100	0.02070	0.00446	0.00136	0.00169	0.00145	0.00002	
550103	350	23.98	100	0.72444	0.15606	0.04764	0.05914	0.05092	0.00064	
760101	155	10.62	100	0.32082	0.06911	0.02110	0.02619	0.02255	0.00028	
760103	650	44.54	100	1.34539	0.28982	0.08847	0.10983	0.09457	0.00118	
770101	250	17.13	100	0.51746	0.11147	0.03403	0.04224	0.03637	0.00045	
1010103	275	18.84	100	0.56920	0.12262	0.03743	0.04647	0.04001	0.00050	
1030111	50	3.43	100	0.10349	0.02229	0.00681	0.00845	0.00727	0.00009	
1040206	125	8.56	100	0.25873	0.05574	0.01701	0.02112	0.01819	0.00023	
1060101	300	20.56	100	0.62095	0.13376	0.04083	0.05069	0.04365	0.00054	
1080106	300	20.56	100	0.62095	0.13376	0.04083	0.05069	0.04365	0.00054	
730106	33	2.26	100	0.06830	0.01471	0.00449	0.00558	0.00480	0.00006	
1200101	200	13.70	100	0.41397	0.08918	0.02722	0.03379	0.02910	0.00036	
1580001	250	17.13	100	0.51746	0.11147	0.03403	0.04224	0.03637	0.00045	
1760103	100	6.85	100	0.20698	0.04459	0.01361	0.01690	0.01455	0.00018	
2070101	260	17.81	100	0.53816	0.11593	0.03539	0.04393	0.03783	0.00047	
4700001	100	6.85	100	0.20698	0.04459	0.01361	0.01690	0.01455	0.00018	
Spare 2	200	13.70	100	0.41397	0.08918	0.02722	0.03379	0.02910	0.00036	
			Totals:	**7.58**	**1.63**	**0.50**	**0.62**	**0.53**	**0.01**	

[1] Per Note 'b' below AP-42 Table 3.3-1, all particulate is assumed to be less than 1.0 micrometer in diameter. Therefore, the UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Emergency Generators (rated at less than 600 h.p. (447 kW)).**

Character: Non-Fugitive, **Uncontrolled.**

Fuel: Diesel Fuel.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Emission Factors: (lb/hp-hr)		**Emission Factor Source:**
NOx	1.01E-02	Manufacturer Data from Cummins [1]
CO	4.19E-04	Manufacturer Data from Cummins
SO2	3.09E-04	Manufacturer Data from Cummins
VOC	2.51E-03	AP-42, Sec. 3.3; Table 3.3-1 (TOC; 10/96)
PM_{10} / $PM_{2.5}$ [2]	4.41E-05	Manufacturer Data from Cummins (Emission Factor for PM) [2]
HAPs	1.94E-04	AP-42, Sec. 3.3; Table 3.3-2 (10/96); converted from lb/MMBtu to lb/hp-hr based on diesel Brake Specific Fuel Consumption of 7,000 Btu/hp-hr per footnote 'a' below Table 3.3-1.

Engine power in horsepower. Emissions in tons per year.

Equipment ID	Engine Power	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
45B0001	324	100	0.1636	0.0068	0.0050	0.0407	0.0007	0.0031	**OPERATING LIMIT**
		Totals:	**0.164**	**0.007**	**0.005**	**0.041**	**0.001**	**0.003**	

[1] The emission factor used for the NOx calculation is Cummins data for a standby unit at full (100%) load and is greater than the US EPA NSPS Stationary Emergency Tier 3 Limit because the Tier 3 limit is a weighted rating that considers a range of different engine loads.

[2] The emission factor used for the PM_{10} calculation was the emission factor for PM provided by the manufacturer. Based on note 'b' below AP-42 Table 3.3-1 for diesel particulates, the UA is using this emission factor to estimate emissions of PM_{10} and $PM_{2.5}$.

Equipment or Activity: **Diesel Engine (rated at less than 600 h.p. (447 kW)).**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Diesel Fuel.

Diesel Engine Brake Specific Fuel Consumption (BSFC): 7,000 Btu/hp-hr (AP-42, Table 3.3-1)

Heating value for diesel fuel: 137,000 Btu/gallon. (AP-42, Appendix A, page A-5)

Fuel use calculated in gallons per hour based on hp rating of engine and factors listed above.

Emission Factors: (lb/MMBtu Fuel Input)

NOx	4.41	AP-42, Sec. 3.3 (10/96) Table 3.3-1
CO	0.95	AP-42, Sec. 3.3 (10/96) Table 3.3-1
SO2	0.29	AP-42, Sec. 3.3 (10/96) Table 3.3-1
VOC	0.36	AP-42, Sec. 3.3 (10/96) Table 3.3-2
PM_{10} / $PM_{2.5}$ [1]	0.31	AP-42, Sec. 3.3 (10/96) Table 3.3-1
HAPs	3.87E-03	AP-42, Sec. 3.3 (10/96) Table 3.3-2

Capacities in horsepower. Fuel in gallons per hour. Emissions in tons per year.

Equipment ID	Capacity	Fuel	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
1740101	38.2	1.95	1,500	0.88443	0.19052	0.05816	0.07220	0.06217	0.00078	**OPERATING LIMIT**
			Totals:	**0.884**	**0.191**	**0.058**	**0.072**	**0.062**	**0.001**	

[1] Per Note 'b' below AP-42 Table 3.3-1, all particulate is assumed to be less than 1.0 micrometer in diameter. Therefore, the UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Emergency Generators (rated at less than 600 h.p. (447 kW)).**
Character: Non-Fugitive, **Uncontrolled.**
Fuel: Diesel Fuel.
Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.
Diesel Engine Brake Specific Fuel Consumption (BSFC) = 7,000 Btu/hp-hr (AP-42, Table 3.3-1)
Heating value for diesel fuel: 137,000 Btu/gallon. (AP-42, Appendix A, page A-5)
Fuel use calculated in gallons per hour based on hp rating of engine and factors listed above.

Emission Factors:

NOx	3.10E-02	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
CO	6.68E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
SO2	2.05E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
VOC	2.51E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
PM_{10} / $PM_{2.5}$ [1]	2.20E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
HAPs	3.87E-03	lb/MMBtu	AP-42, Sec. 3.3 (10/96) Table 3.3-2

Capacities in horsepower. Emissions in tons per year.

Equipment ID	Capacity	Fuel	Hours/Yr	NO_X	CO	SO_2	VOC	PM10 / PM2.5	HAPs	
1130302	480	24.53	100	0.74400	0.16032	0.04920	0.06024	0.05280	0.00065	OPERATING LIMIT
1320001	560	28.61	100	0.86800	0.18704	0.05740	0.07028	0.06160	0.00076	
1310001	297	15.18	100	0.46035	0.09920	0.03044	0.03727	0.03267	0.00040	
			Totals:	**2.072**	**0.447**	**0.137**	**0.168**	**0.147**	**0.002**	

[1] Per Note 'b' below AP-42 Table 3.3-1, all particulate is assumed to be less than 1.0 micrometer in diameter. Therefore, the UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Diesel Engine (rated at less than 600 h.p. (447 kW)).**

Character: Non-Fugitive, **Uncontrolled.**

Fuel: Diesel Fuel.

Source self imposed limitation of **200** operating hours per year for generators.

Diesel Engine Brake Specific Fuel Consumption (BSFC) = 7,000 Btu/hp-hr (AP-42, Table 3.3-1)

Heating value for diesel fuel: 137,000 Btu/gallon. (AP-42, Appendix A, page A-5)

Fuel use calculated in gallons per hour based on hp rating of engine and factors listed above.

Emission Factors:

NOx	3.10E-02	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
CO	6.68E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
SO2	2.05E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
VOC	2.51E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
PM_{10} / $PM_{2.5}$ [1]	2.20E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
HAPs	3.87E-03	lb/MMBtu	AP-42, Sec. 3.3 (10/96) Table 3.3-2

Capacities in horsepower. Fuel in gallons per hour for HAPs calculation only. Emissions in tons per year.

Equipment ID	Capacity	Fuel	Hours/Yr	NO_X	CO	SO_2	VOC	PM10 / PM2.5	HAPs	
Spare 7	98	5.01	200	0.3038	0.0655	0.0201	0.0246	0.0216	0.0003	**OPERATING LIMIT**
			Totals:	**0.304**	**0.065**	**0.020**	**0.025**	**0.022**	**0.0003**	

[1] Per Note 'b' below AP-42 Table 3.3-1, all particulate is assumed to be less than 1.0 micrometer in diameter. Therefore, the UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Emergency Generators (rated at less than 600 h.p. (447 kW)).**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Diesel Fuel.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Diesel Engine Brake Specific Fuel Consumption (BSFC) = 7,000 Btu/hp-hr (AP-42, Table 3.3-1)

Heating value for diesel fuel: 137,000 Btu/gallon. (AP-42, Appendix A, page A-5)

Conversion factor for kW to hp: 1 kW = 1.341 hp.

Fuel use in gallons per hour provided by Manufacturer Data from Caterpillar: 11.8 gallons/hr

3.73 g/kW-hr x 1 kW/1.341 hp x 1 lb/454 g x 1 hp-hr/7,000 Btu x 1,000,000 Btu/MMBtu = 0.893 lb/MMBtu

Emission Factors:		Converted Emission Factors:	
NOx	3.73 g/kWh	0.893 lb/MMBtu	Manufacturer Data From Caterpillar
CO	0.78 g/kWh	0.187 lb/MMBtu	Manufacturer Data From Caterpillar
SO2	0.29 lb/MMBtu	-	AP-42, Sec. 3.3; Table 3.3-1 (10/96)
VOC	0.36 lb/MMBtu	-	AP-42, Sec. 3.3; Table 3.3-1 (TOC) (10/96)
PM_{10} / $PM_{2.5}$ [1]	0.156 g/kWh	0.037 lb/MMBtu	Manufacturer Data From Caterpillar
HAPs	3.87E-03 lb/MMBtu	-	AP-42, Sec. 3.3; Table 3.3-2 (10/96)

Engine power in horsepower. Fuel use in gallons per hour. Emissions in tons per year.

Equipment ID	Engine Power	Fuel	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
760102 (Spare 8)	274	11.80	100	0.0722	0.0151	0.0234	0.0291	0.0030	0.0003	**OPERATING LIMIT**
			Totals:	**0.072**	**0.015**	**0.023**	**0.029**	**0.003**	**0.0003**	

[1] The emission factor used for the PM_{10} calculation was the emission factor for PM provided by the manufacturer. Based on note 'b' below Table 3.3-1 for diesel particulates, the UA is using this emission factor to estimate emissions of PM_{10} and $PM_{2.5}$.

Equipment or Activity: **Emergency Generators (rated at less than 600 h.p. (447 kW)).**

Character: Non-Fugitive, **Uncontrolled.**

Fuel: Diesel Fuel.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Emission Factors: (lb/hp-hr)		Emission Factor Source:
NOx	1.01E-02	Manufacturer Data from Cummins
CO	4.19E-04	Manufacturer Data from Cummins
SO2	3.09E-04	Manufacturer Data from Cummins
VOC	2.51E-03	AP-42, Sec. 3.3; Table 3.3-1 (TOC) (10/96)
PM_{10} / $PM_{2.5}$ [1]	2.20E-03	AP-42, Sec. 3.3; Table 3.3-1 (10/96)
HAPs	1.94E-04	AP-42, Sec. 3.3; Table 3.3-2 (10/96)

Engine power in horsepower. Emissions in tons per year.

Equipment ID	Engine Power	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
58E0001	324	100	0.1636	0.0068	0.0050	0.0407	0.0356	0.0031	**OPERATING LIMIT**
		Totals:	**0.164**	**0.007**	**0.005**	**0.041**	**0.036**	**0.003**	

[1] Per Note 'b' below AP-42 Table 3.3-1, all particulate is assumed to be less than 1.0 micrometer in diameter. Therefore, the UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Emergency Generators (rated at less than 600 h.p. (447 kW)).**
Character: Non-Fugitive, **Uncontrolled**.
Fuel: Diesel Fuel.
Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Emission Factors: (lb/hp-hr)

NOx[1]	4.0	g/kW-hr	40 CFR Part 89.112(a)
CO	3.5	g/kW-hr	40 CFR Part 89.112(a)
SO2	2.05E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
VOC	2.51E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
PM_{10} / $PM_{2.5}$ [2]	0.20	g/kW-hr	40 CFR Part 89.112(a)
HAPs[3]	2.65E-05	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-2

Emissions in tons per year.

Equipment ID	Engine Power		Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
670112	274	hp	100	0.0901	0.0788	0.0281	0.0344	0.0045	0.0004	**OPERATING LIMIT**
	204	kW_m[4]								
			Totals:	**0.090**	**0.079**	**0.028**	**0.034**	**0.005**	**0.0004**	

[1] Caterpillar emissions data states that the engine complies with US EPA CFR Part 89 Tier 3 emission standards. Based on note 'b' below AP-42 Table 3.3-1 for diesel particulates, the UA is using this emission factor to estimate emissions of PM10 and PM2.5.

[2] Converted from lb/MMBtu to lb/hp-hr based on diesel Brake Specific Fuel Consumption of 7,000 Btu/hp-hr.

[3] Mechanical kW rating (electrical rating is 175 kW)

Equipment or Activity: **Emergency Generators (rated at less than 600 h.p. (447 kW)).**
Character: Non-Fugitive, **Uncontrolled**.
Fuel: Diesel Fuel.
Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.
The electrical output rating for the generator is 300 kW_e.

Emission Factors:

			Emission Factor Source:
NOx[1]	5.25E+00	g/hp-hr	Cummins Exhaust Emission Data Sheet
CO[1]	1.70E+00	g/hp-hr	Cummins 2013 EPA Tier 3 Exhaust Emission Compliance Statement
SO_2	2.05E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
VOC	2.51E-03	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-1
PM_{10} / $PM_{2.5}$ [1]	7.00E-02	g/hp-hr	Cummins 2013 EPA Tier 3 Exhaust Emission Compliance Statement
HAPs[2]	2.65E-05	lb/hp-hr	AP-42, Sec. 3.3 (10/96) Table 3.3-2

Engine power in horsepower. Emissions in tons per year.

Equipment ID	Engine Power		Hrs/year	NO_x	CO	SO_2	VOC	PM10 / PM2.5	HAPs	
1370001	464	hp	100	0.2685	0.0870	0.0476	0.0583	0.0036	0.0006	**OPERATING LIMIT**
			Totals:	**0.269**	**0.087**	**0.048**	**0.058**	**0.004**	**0.001**	

[1] The Cummins 2013 EPA Tier 3 Exhaust Emission Data Compliance Statement states that the engine meets the NOX+NMHC limit of 3.0 g/hp-hr. To be conservative, the exhaust emissions data from the Cummins Exhaust Emission Data Sheet was used for NOx (at full standby mode). Based on note 'b' below AP-42 Table 3.3-1 for diesel particulates, the UA is using this emission factor to estimate emissions of PM10 and PM2.5.

[2] Converted from lb/MMBtu to lb/hp-hr based on diesel Brake Specific Fuel Consumption of 7,000 Btu/hp-hr (AP-42, Sec. 3.3 (10/96) Table 3.3-1).

Equipment or Activity: **Emergency Generators (rated at 600 h.p. (447 kW) or more).**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Diesel Fuel.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.
Diesel Engine Brake Specific Fuel Consumption (BSFC) = 7,000 Btu/hp-hr (AP-42, Table 3.3-1)
Heating value for diesel fuel: 137,000 Btu/gallon. (AP-42, Appendix A, page A-5)
Assumes a sulfur content of 0.89% (i.e., just below the high sulfur fuel limit of 0.90%)
Fuel use calculated in gallons per hour based on kW rating of engine and factors listed above.

Emission Factors: (lb/MMBtu Fuel Input)

NOx	3.2	AP-42, Sec. 3.4; Table 3.4-1 (10/96)
CO	0.85	AP-42, Sec. 3.4; Table 3.4-1 (10/96)
SO2	0.8989	AP-42, Sec. 3.4; Table 3.4-1 (10/96)
VOC	0.09	AP-42, Sec. 3.4; Table 3.4-1 (TOC) (10/96)
PM_{10} / $PM_{2.5}$ [1]	0.0573	AP-42, Sec. 3.4; Table 3.4-2 (10/96)
HAPs	0.00149	AP-42, Sec. 3.4; Table 3.4-3 and Table 3.4-4 (10/96)

Capacities in kilowatts. Emissions in tons per year.

Equipment ID	Capacity	Fuel	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
730104	450	30.83	100	0.6759	0.1795	0.1899	0.0190	0.0121	0.0003	
730105	1750	119.91	100	2.6284	0.6982	0.7383	0.0739	0.0471	0.0012	
900001	514	35.22	100	0.7720	0.2051	0.2169	0.0217	0.0138	0.0004	**OPERATING LIMIT**
1070101	500	34.26	100	0.7510	0.1995	0.2109	0.0211	0.0134	0.0003	
2210105	600	41.11	100	0.9012	0.2394	0.2531	0.0253	0.0161	0.0004	
			Totals:	**5.728**	**1.522**	**1.609**	**0.161**	**0.103**	**0.003**	

[1] Per note 'c' below AP-42 Table 3.4-2, total PM-10 is the sum of filterable particulate less than 10 μm aerodynamic diameter and condensable particulate. The UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions because both size fractions are included in this emission factor.

Equipment or Activity: **Emergency Generators (rated at 600 h.p. (447 kW) or more).**
Character: Non-Fugitive, **Uncontrolled**.
Fuel: Diesel Fuel.
Conversion factor for kW to hp: 1 kW = 1.341 hp.
Assumes a sulfur content of 0.89% (i.e., just below the high sulfur fuel limit of 0.90%)
Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.
Diesel Engine Brake Specific Fuel Consumption (BSFC) = 7,000 Btu/hp-hr (AP-42, Table 3.3-1)
Heating value for diesel fuel: 137,000 Btu/gallon. (AP-42, Appendix A, page A-5)
Fuel use calculated in gallons per hour based on kW rating of engine and factors listed above.
Fuel consumption according to Caterpillar manufacturer's spec data.

Emission Factors:

NOx	5.84	g/kWh	Manufacturer Data From Caterpillar
CO	0.48	g/kWh	Manufacturer Data From Caterpillar
SO2	0.8989	lb/MMBtu	AP-42, Sec. 3.4; Table 3.4-1 (10/96)
VOC	0.09	lb/MMBtu	AP-42, Sec. 3.4 Table 3.4-1 (TOC) (10/96)
PM_{10} / $PM_{2.5}$ [1]	0.035	g/kWh	Manufacturer Data From Caterpillar
HAPs	0.00149	lb/MMBtu	AP-42, Sec. 3.4; Table 3.4-3 and Table 3.4-4(10/96)

Capacities in kilowatts. Fuel in gallons per hour. Emissions in tons per year.

Equipment ID	Capacity	Fuel	Hrs/yr [2]	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
460205	600	42.70	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**OPERATING LIMIT**
			Totals:	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.0000**	

[1] Based on note 'c' below AP-42 Table 3.4-2, total PM-10 is the sum of filterable particulate less than 10 μm aerodynamic diameter and condensable particulate. The UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions because both size fractions are included in this emission factor.
[2] Hour per year listed as zero because this generator is expected to be installed as a replacement to 460204 in Spring 2015. Upon installation, a revised PTE summary will be submitted to PDEQ.

Equipment or Activity: **Emergency Generators (rated at 600 h.p. (447 kW) or more).**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Diesel Fuel.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Heating value for diesel fuel estimated at 19,300 Btu/lb.[1]

Diesel fuel consumption of the generator is 504.103 lb/hr.[2]

Emission Factors:			**Emission Factor Source:**
NO_x	5.97	g/hp-hr	Manufacturer's Performance Data (March 24, 2014)
CO	0.24	g/hp-hr	Manufacturer's Performance Data (March 24, 2014)
SO_2[3]	0.001515	lb/MMBtu	AP-42, Sec. 3.4 (10/96) Table 3.4-1
VOC	0.09	lb/MMBtu	AP-42, Sec. 3.4 (10/96) Table 3.4-1
PM_{10} / $PM_{2.5}$[4]	0.0573	lb/MMBtu	AP-42, Sec. 3.4 (10/96) Table 3.4-2
HAPs	0.0014409	lb/MMBtu	AP-42, Sec. 3.4 (10/96) Table 3.4-3 and Table 3.4-4

Engine power in horsepower. Emissions in tons per year.

Equipment ID	Capacity	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
2010407	1,474 hp	100	0.9700	0.0390	0.00074	0.0438	0.027874	0.0007	**OPERATING LIMIT**
		Totals:	**0.970**	**0.039**	**0.001**	**0.044**	**0.028**	**0.001**	

[1] Based on AP-42 Table 3.4-1, Note "a."

[2] Based on the brake specific fuel consumption (BSFC) value of 0.342 lb/bhp-hr per the Manufacturer's General Performance Data (March 4, 2014).

[3] Based on ultra-low sulfur diesel fuel (15 ppm max sulfur content) requirement for nonroad engines (40 CFR 80.510 (b)(1)).

[4] Per note 'c' below AP-42 Table 3.4-2, total PM-10 is the sum of filterable particulate less than 10 µm aerodynamic diameter and condensable particulate. The UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions because both size fractions are included in this emission factor.

Equipment or Activity: **Emergency Generators (rated at 600 h.p. (447 kW) or more).**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Diesel Fuel.

Fuel use in gallons per hour.

Conversion factor for kW to hp: 1 kW = 1.341 hp.

Assumes a sulfur content of 0.89% (i.e., just below the high sulfur fuel limit of 0.9%)

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Heating value for diesel fuel estimated at: 137,000 Btu/gallon. (AP-42, Appendix A, page A-5)

Brake Specific Fuel Consumption (BSFC Diesel) of 7000 Btu/hp-hr used to convert from lb/MMBtu to lb/hp-hr

Fuel consumption according to Caterpillar manufacturers spec data

Emission Factors: (lb/MMBtu Fuel Input)		Converted Emission Factors:	
NOx	5.74 g/kWh	1.376 lb/MMBtu	Manufacturer Data From Caterpillar
CO	0.4 g/kWh	0.096 lb/MMBtu	Manufacturer Data From Caterpillar
SO2	0.8989 lb/MMBtu		AP-42, Sec. 3.4; Table 3.4-1 (10/96)
VOC	0.09 lb/MMBtu		AP-42, Sec. 3.4 Table 3.4-1 (TOC) (10/96)
PM_{10} / $PM_{2.5}$ [1]	1.80E-02 g/kWh	0.0043144 lb/MMBtu	Manufacturer Data From Caterpillar
HAPs	1.62E-03 lb/MMBtu		AP-42, Sec. 3.4; Table 3.4-3 and Table 3.4-4(10/96)

Capacities in kilowatts. Emissions in tons per year.

Equipment ID	Capacity	fuel	Hrs/yr[2]	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
2050211	645	36.60	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**OPERATING LIMIT**
			Totals:	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	

[1] Based on note 'c' below AP-42 Table 3.4-2, total PM-10 is the sum of filterable particulate less than 10 μm aerodynamic diameter and condensable particulate. The UA is using this emission factor to estimate PM_{10} and $PM_{2.5}$ emissions because both size fractions are included in this emission factor.

[2] Hour per year listed as zero because this generator is expected to be installed as a replacement to 2050207 in November 2015. Upon installation, a revised PTE summary will be submitted to PDEQ.

Equipment or Activity: **Emergency Generators**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Pipeline quality natural gas.

Fuel use in standard cubic feet per hour.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Heating value for natural gas fuel estimated at: 1,020 Btu/scf

Brake Specific Fuel Consumption (BSFC Natural Gas) = 7,500 Btu/hp-hr (API/OOC Gulf of Mexico Air Quality Task Force)

Conversion factor for kW to hp: 1 kW = 1.341 hp.

Fuel use in SCF per hour estimated by converting kW to hp and applying BSFC Natural Gas and natural gas heating value:

131.3 kW x 1.341hp/kW x 7500 Btu/hp-hr x 1 SCF/1020 Btu = 1294.7 SCF natural gas/hour

Emission Factors: (lb/MMBtu Fuel Input)

NOx	4.08	AP-42, Sec. 3.2 (7/00) Table 3.2-2
CO	3.72	AP-42, Sec. 3.2 (7/00) Table 3.2-3
SO2	0.000588	AP-42, Sec. 3.2 (7/00) Table 3.2-2
VOC	0.118	AP-42, Sec. 3.2 (7/00) Table 3.2-2
PM_{10} / $PM_{2.5}$	0.0095	AP-42, Sec. 3.2 (7/00) Table 3.2-3
HAPs	0.0722	AP-42, Sec. 3.2 (7/00) Table 3.2-2

Capacities in kW. Fuel in SCF. Emissions in tons per year.

Equipment ID	Capacity	Fuel	Hrs/year	NOx	CO	SO2	VOC	PM10/PM2.5	HAPs	
Spare 5	110	1084.63	100	0.2257	0.2058	0.0000	0.0065	0.0005	0.0040	OPERATING LIMIT
20805	30	295.81	100	0.0616	0.0561	0.0000	0.0018	0.0001	0.0011	
50109	10	98.60	100	0.0205	0.0187	0.0000	0.0006	0.0000	0.0004	
70105	8	78.88	100	0.0164	0.0150	0.0000	0.0005	0.0000	0.0003	
80101	10	98.60	100	0.0205	0.0187	0.0000	0.0006	0.0000	0.0004	
100111	10	98.60	100	0.0205	0.0187	0.0000	0.0006	0.0000	0.0004	
170608	205	2021.36	100	0.4206	0.3835	0.0001	0.0122	0.0010	0.0074	
310111	10	98.60	100	0.0205	0.0187	0.0000	0.0006	0.0000	0.0004	
340101	10	98.60	100	0.0205	0.0187	0.0000	0.0006	0.0000	0.0004	
370101	170	1676.25	100	0.3488	0.3180	0.0001	0.0101	0.0008	0.0062	
440001	1040	10254.71	100	2.1338	1.9455	0.0003	0.0617	0.0050	0.0378	
460204	50	493.01	100	0.1026	0.0935	0.0000	0.0030	0.0002	0.0018	
500103	20	197.21	100	0.0410	0.0374	0.0000	0.0012	0.0001	0.0007	
520106	20	197.21	100	0.0410	0.0374	0.0000	0.0012	0.0001	0.0007	
540101	15	147.90	100	0.0308	0.0281	0.0000	0.0009	0.0001	0.0005	
550102	250	2465.07	100	0.5129	0.4677	0.0001	0.0148	0.0012	0.0091	
590110	30	295.81	100	0.0616	0.0561	0.0000	0.0018	0.0001	0.0011	
630004	70	690.22	100	0.1436	0.1309	0.0000	0.0042	0.0003	0.0025	
630103	50	493.01	100	0.1026	0.0935	0.0000	0.0030	0.0002	0.0018	
650304	20	197.21	100	0.0410	0.0374	0.0000	0.0012	0.0001	0.0007	

670111	45	443.71	100	0.0923	0.0842	0.0000	0.0027	0.0002	0.0016	
680108	100	986.03	100	0.2052	0.1871	0.0000	0.0059	0.0005	0.0036	
690101	30	295.81	100	0.0616	0.0561	0.0000	0.0018	0.0001	0.0011	
700101	280	2760.88	100	0.5745	0.5238	0.0001	0.0166	0.0013	0.0102	
790104	30	295.81	100	0.0616	0.0561	0.0000	0.0018	0.0001	0.0011	
830107	30	295.81	100	0.0616	0.0561	0.0000	0.0018	0.0001	0.0011	
850106	15	147.90	100	0.0308	0.0281	0.0000	0.0009	0.0001	0.0005	
880002	100	986.03	100	0.2052	0.1871	0.0000	0.0059	0.0005	0.0036	
880104	45	443.71	100	0.0923	0.0842	0.0000	0.0027	0.0002	0.0016	
890101	15	147.90	100	0.0308	0.0281	0.0000	0.0009	0.0001	0.0005	
920207	100	986.03	100	0.2052	0.1871	0.0000	0.0059	0.0005	0.0036	
940001	45	443.71	100	0.0923	0.0842	0.0000	0.0027	0.0002	0.0016	
940405	185	1824.15	100	0.3796	0.3461	0.0001	0.0110	0.0009	0.0067	
950001	250	2465.0735	100	0.5129	0.4677	0.0001	0.0148	0.0012	0.0091	**OPERATING LIMIT**
1000101	35	345.11	100	0.0718	0.0655	0.0000	0.0021	0.0002	0.0013	
1170202 [1]	131	1291.70	100	0.2688	0.2451	0.0000	0.0078	0.0006	0.0048	
1180101	60	591.62	100	0.1231	0.1122	0.0000	0.0036	0.0003	0.0022	
1190206	375	3697.61	100	0.7694	0.7015	0.0001	0.0223	0.0018	0.0136	
1810001	85	838.13	100	0.1744	0.1590	0.0000	0.0050	0.0004	0.0031	
1820001	85	838.13	100	0.1744	0.1590	0.0000	0.0050	0.0004	0.0031	
2020001	100	986.03	100	0.2052	0.1871	0.0000	0.0059	0.0005	0.0036	
2220105	515	5078.05	100	1.0566	0.9634	0.0002	0.0306	0.0025	0.0187	
2400001	1040	10254.71	100	2.1338	1.9455	0.0003	0.0617	0.0050	0.0378	
2400002	1040	10254.71	100	2.1338	1.9455	0.0003	0.0617	0.0050	0.0378	
2410001	1040	10254.71	100	2.1338	1.9455	0.0003	0.0617	0.0050	0.0378	
180B0002	150	1479.04	100	0.3078	0.2806	0.0000	0.0089	0.0007	0.0054	
4680001	10	98.60	100	0.0205	0.0187	0.0000	0.0006	0.0000	0.0004	
			Totals:	**16.57**	**15.10**	**0.0024**	**0.48**	**0.04**	**0.29**	

[1] This generator is listed in the permit as 1170201.

Equipment or Activity: **Emergency Generators**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Pipeline quality natural gas.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Fuel use in standard cubic feet per hour per Manufacturer Data from Caterpillar.

Heating value for natural gas fuel estimated at: 1,020 Btu/scf

Conversion factor for grams to tons: 1.1023E-06 tons/gram

Emission Factors:

NOx	0.08	g/hp-hr	Manufacturer Data From Caterpillar
CO	0.92	g/hp-hr	Manufacturer Data From Caterpillar
SO2	0.000588	lb/MMBtu	AP-42, Sec. 3.2; Table 3.2-2 (7/00)
VOC	0.33	g/hp-hr	Manufacturer Data From Caterpillar
PM_{10} / $PM_{2.5}$	0.0095	lb/MMBtu	AP-42, Sec. 3.2; Table 3.2-3 (7/00)
HAPs	0.0722	lb/MMBtu	AP-42, Sec. 3.2 (7/00)

Capacities in hp. Fuel use in scf/hr. Emissions in tons per year.

Equipment ID	Capacity	Fuel	Hrs/year	NOx	CO	SO2	VOC	PM10/PM2.5	HAPs	
960102	274	2,200	100	0.0024	0.0278	0.0001	0.0100	0.0011	0.0081	**OPERATING LIMIT**
			Totals:	**0.002**	**0.028**	**0.0001**	**0.010**	**0.001**	**0.008**	

Equipment or Activity: **Emergency Generators**

Character: Non-Fugitive, **Uncontrolled**.

Fuel: Pipeline quality natural gas.

Limitation for NSPS/NESHAP subject emergency generators is **100** hrs/yr for non-emergency use.

Heating value for natural gas fuel estimated at: 1,020 Btu/scf

Natural gas fuel consumption is 380 scf/hr per the manufacturer's data.

Emission Factors:

			Emission Factor Source:
NO_x	2.37	g/hp-hr	Olympian 2013 EPA Spark-Ignited Exhaust Emissions Data
CO	93.95	g/hp-hr	Olympian 2013 EPA Spark-Ignited Exhaust Emissions Data
SO_2	0.000588	lb/MMBtu	AP-42, Sec. 3.2 (10/96) Table 3.2-2
VOC	0.118	lb/MMBtu	AP-42, Sec. 3.2 (10/96) Table 3.2-2
PM_{10} / $PM_{2.5}$	0.0000771	lb/MMBtu	AP-42, Sec. 3.2 (10/96) Table 3.2-2
HAPs[1]	0.0722	lb/MMBtu	AP-42, Sec. 3.2 (10/96) Table 3.2-2

Engine power in horsepower. Emissions in tons per year.

Equipment ID	Engine Power	Hrs/year	NOx	CO	SO2	VOC	PM10/PM2.5	HAPs	
890102	38.39 hp	100	0.0100	0.3976	0.00001	0.0023	0.000001	0.0014	**OPERATING LIMIT**
		Totals:	**0.010**	**0.398**	**0.00001**	**0.002**	**0.000001**	**0.001**	

[1] Converted from lb/MMBtu to lb/MMscf based on heat content of 1,020 Btu/scf (AP-42, Sec. 3.2 (10/96) Table 3.2-2).

Equipment or Activity: **Consumat Model 300-CA Pathological Waste Incinerator.**
Character: Non-Fugitive, **Controlled** (secondary combustion chamber).
Fuel: Pipeline quality natural gas.

Emission Factors:

NOx	3.56	lb/ton	AP-42, Sec. 2.3 (7/93) Table 2.3-1
CO	2.95	lb/ton	AP-42, Sec. 2.3 (7/93) Table 2.3-1
SO2	2.17	lb/ton	AP-42, Sec. 2.3 (7/93) Table 2.3-1
VOC	0.299	lb/ton	AP-42, Sec. 2.3 (7/93) Table 2.3-2
PM_{10} / $PM_{2.5}$ [1]	0.49	lb/hr	Stack test conducted on 8/22/2006; average of three runs
HAPs	0.00244	lb/ton	Appendix A of the Documentation for the 1996 Base Year National Toxics Inventory for Area Sources (June 2, 2000)

Emissions in tons per year.

Equipment ID	Capacity (lb/hr)	Hrs/year	Capacity (tons/yr)	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs[2]	
1010102	135	3,060	206.55	0.3677	0.3047	0.2241	0.0309	0.7497	0.0003	**NO OPERATING LIMIT[2]**
			Totals:	**0.3677**	**0.3047**	**0.2241**	**0.0309**	**0.7497**	**0.0003**	

[1] UA is conservatively assuming all particulate is less than 2.5 micrometer in diameter. The UA is using this emission factor to estimate PM10 and PM2.5 emissions.
[2] Hydrogen chloride is the primary HAP constituent (99%).
[3] Incinerator may only be operated from sunrise to sunset per Air Quality Permit; assumed 12 hrs/day. The operational hours are limited by rule as opposed to a voluntary operational limitation.

Equipment or Activity: **Central Heating and Refrigeration Plant (CHRP) 7 MW gas turbine.**

Character: Non-Fugitive, **Controlled** (Low NOx combustors and CO catalyst).

Fuel: Pipeline quality natural gas.

Natural gas fuel consumption is 69 MMBtu/hr per the manufacturer's data.

Emission Factors: lb/MMBtu fuel input.

NOx	0.048	EEMC Measured Emissions (12/05-06/02 & 12/09/02 Report) (with low NOx combustors)
CO	0.0428	EEMC Measured Emissions (12/05-06/02 & 12/09/02 Report)
SO2	0.0034	AP-42, Sec. 3.1 (4/00) Table 3.1-2a
VOC	0.0021	AP-42, Sec. 3.1 (4/00) Table 3.1-2a
PM_{10} / $PM_{2.5}$ [1]	0.0066	AP-42, Sec. 3.1 (4/00) Table 3.1-2a
HAPs	0.00103	AP-42, Sec. 3.1 (4/00) Table 3.1-3

Fuel use in MMBtu per hour.

Equipment ID	Fuel (MMBtu/hr)	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
460306	69	8,760	14.51	12.94	1.03	0.63	1.99	0.31	**NO OPERATING LIMIT**
		Totals:	**14.51**	**12.94**	**1.03**	**0.63**	**1.99**	**0.31**	

[1] Per Section 3.1.3.3 in AP-42 3.1, all PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter and this PM emission factor may be used to estimate PM_{10} and $PM_{2.5}$ emissions.

Equipment or Activity: **Arizona Health Sciences Center (AHSC) Heating and Refrigeration Plant 5 MW gas turbine.**
Character: Non-Fugitive, **Controlled** (Low NOx combustors).
Fuel: Pipeline quality natural gas.
Natural gas fuel consumption is 53 MMBtu/hr per the manufacturer's data.

Emission Factors: lb/MMBtu fuel input.

NOx	0.057	EEMC Measured Emissions (12/05-06/02 & 12/09/02 Report with low NOx combustors)
CO	0.0374	EEMC Measured Emissions (12/05-06/02 & 12/09/02 Report)
SO2	0.0034	AP-42, Sec. 3.1 (4/00) Table 3.1-2a
VOC	0.0021	AP-42, Sec. 3.1 (4/00) Table 3.1-2a
PM_{10} / $PM_{2.5}$ [1]	0.0066	AP-42, Sec. 3.1 (4/00) Table 3.1-2a
HAPs	0.00103	AP-42, Sec. 3.1 (4/00) Table 3.1-3

Fuel use in MMBtu per hour.

Equipment ID	Fuel (MMBtu/hr)	Hrs/year	NOx	CO	SO2	VOC	PM10 / PM2.5	HAPs	
2050301	53	8,760	13.23	8.68	0.79	0.49	1.53	0.24	**NO OPERATING LIMIT**
		Totals:	**13.23**	**8.68**	**0.79**	**0.49**	**1.53**	**0.24**	

[1] Per Section 3.1.3.3 in AP-42 3.1, all PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter and this PM emission factor may b used to estimate PM_{10} and $PM_{2.5}$ emissions.

UA PTE Summary - 2014 Renewal Application

	NOx	CO	SO2	VOC	PM_{10}	$PM_{2.5}$	HAPs
Uncontrolled Fugitives (FN):	0	0	0	0	0	0	0
Controlled Fugitives (FC):	0	0	0	0	0	0	0
Uncontrolled Non-Fugitives (NN):	52.78	40.90	2.59	3.18	2.91	2.91	0.80
Controlled Non-Fugitives (NC):	64.25	36.68	2.89	8.97	15.08	15.08	3.23
Totals:	**117.03**	**77.58**	**5.48**	**12.15**	**17.99**	**17.99**	**4.04**

Estimation of Internal Combustion Engine Fuel Use from Engine Horsepower Rating

When fuel consumption data for an engine/generator set is unavailable, the following method may be used to estimate the fuel consumption rate for diesel, gasoline, or natural gas-fired internal combustion engines.

Required Values

Heating value of diesel fuel =	137,000 Btu/gallon	AP-42, Appendix A
Heating value of gasoline =	130,000 Btu/gallon	AP-42, Appendix A
Heating value of natural gas =	1,020 Btu/scf	AP-42, Table 3.3-2, Note b
Brake Specific Fuel Consumption of diesel fuel =	7,000 Btu/hp-hr	AP-42, Table 3.3-1, Emission factors for Uncontrolled Gasoline and Diesel Industrial Engines (10/96)
Brake Specific Fuel Consumption of gasoline =	7,000 Btu/hp-hr	AP-42, Table 3.3-1, Emission factors for Uncontrolled Gasoline and Diesel Industrial Engines (10/96)
Brake Specific Fuel Consumption of natural gas =	7,500 Btu/hp-hr	API/OOC Gulf of Mexico Air Quality Task Force

Example Calculations

Basis: 30 hp diesel-fired engine set

30 hp x 7,000 Btu/hp-hr x 1 gallon diesel / 137,000 Btu = 1.53 gallons diesel per hour fuel consumption rate

Basis: 30 hp gasoline-fired engine set

30 hp x 7,000 Btu/hp-hr x 1 gallon gasoline / 130,000 Btu = 1.62 gallons gasoline per hour fuel consumption rate

Basis: 30 hp natural gas-fired engine set

30 hp x 7,500 Btu/hp-hr x 1 scf natural gas / 1,020 Btu = 221 standard cubic feet (scf) natural gas per hour fuel consumption rate