Air Quality Permitting
Statement of Basis

February 19, 2004

Permit to Construct No. P-030042

Michael's of Oregon Co., Meridian

Facility ID No. 001-00193

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TECHNICAL SERVICES DIVISION

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ACRONYMS, UNITS, AND CHEMICAL NOMENCLATURES

AAC	acceptable ambient concentration
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
EL	screening emissions level
EPA	Environmental Protection Agency
gal/hr	gallons per hour
gal/yr	gallons per year
HAPs	Hazardous Air Pollutants
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pounds per hour
lb/yr	pounds per year
MACT	maximum achievable control technology
mg/m^3	milligrams per cubic meter
m^3	cubic meter
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
O_3	ozone
PAH	polyaromatic hydrocarbons
Pb	lead
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	Potential to Emit
Rules	*Rules for the Control of Air Pollution in Idaho*
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2	sulfur dioxide
SO_x	sulfur oxides
TAP	Toxic Air Pollutant
TSP	total suspended particulate
T/yr	tons per year
$\mu g/m^3$	micrograms per cubic meter
VOC	volatile organic compound
wt%	percent by weight

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, *Rules for the Control of Air Pollution in Idaho,* for issuing permits to construct.

2. PROJECT DESCRIPTION

Michael's of Oregon Co. (Michael's) is proposing to modify Permit to Construct (PTC) No. 001-00193 issued on December 16, 2002, for increased production of their main product, Hoppes No. 9. The current permit allows for the production of 30,000 gallons annually, and the application requests raising the production limit by 30,000 gal/yr to a total production limit of 60,000 gallons annually.

3. FACILITY DESCRIPTION

Michael's manufactures shooting and law enforcement related products. The product of concern in this application, Hoppes No. 9, is a gun-cleaning solvent and a bluing chemical. Hoppes No. 9 consists of 33% kerosene, 33% ethyl alcohol, 25% red mineral oil, and 9% other compounds.

4. SUMMARY OF EVENTS

June 18, 2003	The Department of Environmental Quality (DEQ) received an application from Michael's to amend the current restrictions on the production of Hoppes No. 9.
July 28, 2003	DEQ issued Michael's an incompleteness letter.
August 26, 2003	DEQ received supplemental information from Michael's.
August 27, 2003	DEQ issued Michael's a completeness letter.

5. PERMIT HISTORY

December 16, 2002 Permit No. 001-00193 was issued to Michael's for the construction of a shooting and law enforcement accessory product manufacturing facility in Meridian.

6. TECHNICAL ANALYSIS

6.1 Process Description

Michael's of Oregon Co. is currently producing just less than the 30,000 gal/yr of Hoppes No. 9 as approved by PTC No. 001-00193. They currently seek to increase this production by 30,000 gal/yr for a total limit of 60,000 gal/yr. The facility will increase their hours of operation to achieve the increase in production, but will not add to or modify their equipment. The facility expects to operate eight hours a day, three to four days a week.

There are three chemicals used in making Hoppes No. 9 that are emitted as Toxic Air Pollutants (TAPs). These are ethanol, mineral oil mist, and their proprietary compound. The increased production of Hoppes No. 9 will also increase the volatile organic compound (VOC) emissions, as all of the compounds used in the production of Hoppes No. 9 are VOCs upon volatilization.

6.2 Equipment Listing

No proposed equipment changes.

6.3 Emissions Estimates

Table 6-1 EMISSIONS ESTIMATES

Compound	30,000 gal/yr Production (lb/yr)	60,000 gal/yr Production (lb/yr)	Increase (lb/yr)	Increase (lb/hr)	Screening Emission Level (lb/hr)
Ethanol	58.04	68.97	10.93	1.78E-2	125
Mineral Oil Mist	0.12	0.15	0.03	4.88E-5	0.333
Kerosene	1.35	1.6	0.25	4.07E-4	--
Proprietary Compound	1.72	2.13	0.41	6.67E-4	<30

The emissions estimates are from Tanks 4.0, the EPA recommended modeling software for emissions estimates from tanks. The complete modeling output used in this analysis is provided in Appendix A.

6.4 Modeling

Modeling is not required for this permit amendment because the increase in emissions do not exceed the screening emissions level (EL) for any TAP, as per the State of Idaho Air Quality Modeling Guideline, section 2.0, and IDAPA 58.01.01.210.09 of the *Rules*.

6.5 Facility Classification

Michael's is classified as a minor facility (B) because the facility does not have the potential to emit more than 100 T/yr of any criteria pollutant, nor 10 T/yr of any HAP or 25 T/yr of aggregate HAPs. Therefore, Michael's is not a major facility as defined in IDAPA 58.01.01.008.10, nor are they classified as a Tier I source as defined in IDAPA 58.01.01.006.104.

6.6 Area Classification

This facility is located in Meridian, which is in Ada County, AQCR 64, and Zone 11. The portion of Ada County where this facility is located is designated as a maintenance area for carbon monoxide and PM_{10}. The area is unclassified for all other criteria air pollutants.

7. PERMIT REQUIREMENTS

7.1 Regulatory Review

This permit to construct is subject to the following permitting requirements:

IDAPA 58.01.01.123 ..... Certification of Documents

All documents submitted to DEQ shall contain a certification by the responsible official.

IDAPA 58.01.01.157 ..... Test methods and Procedures

All test methods and results shall be conducted in accordance with EPA reference test methods or DEQ alternative methods.

IDAPA 58.01.01.201 ..... Permit to Construct Required

This facility is required to obtain a permit before construction or modification can commence.

IDAPA 58.01.01.203 ..... Permit Requirements for New and Modified Stationary Sources

The facility must show that it complies with emissions standards, NAAQS, and the TAP rules in IDAPA 58.01.01.210. For this facility, compliance is shown via throughput limits.

IDAPA 58.01.01.209 ..... Procedures for Issuing Permits

DEQ shall follow a timeline to assure issuance in a timely manner.

IDAPA 58.01.01.210 ..... Demonstration of Preconstruction Compliance with Toxic Standards

The facility identifies TAPs, quantifies emission rates and compares to screening emission levels in IDAPA 58.01.01.585, and calculates net emissions to demonstrate premodification compliance. The increase in emissions from this facility does not require modeling.

IDAPA 58.01.01.211 ..... Conditions for Permits to Construct

DEQ may impose reasonable monitoring, testing, or notification requirements on the facility. The monitoring and recordkeeping requirements in PTC No. P-030042, when complied with, assure reasonable compliance with regulatory standards.

IDAPA 58.01.01.212 ..... Obligation to Comply

The permit does not relieve the facility of obligations to comply with all other applicable rules and regulations.

IDAPA 58.01.01.224 ..... Permit to Construct Application Fee

All applicants applying for a permit to construct are subject to a $1,000 application fee.

IDAPA 58.01.01.225 ..... Permit to Construct Processing Fee

A permitted facility will pay a processing fee to DEQ determined by the increase in pollutant emissions. The increase in emissions at this facility corresponds to a $1,000 processing fee.

IDAPA 58.01.01.577 ..... Ambient Air Quality Standards

Ambient air quality standards for criteria pollutants are established for the state of Idaho to define acceptable ambient concentrations of PM_{10}, NO_2, SO_x, Pb, O_3, CO, and Flourides.

IDAPA 58.01.01.585-586..... Toxic Air Pollutants

Screening emissions levels and AACs for TAPs apply to this facility. If the emission rate in pounds per hour of a pollutant is higher than the screening emission level, the facility would have to model the concentrations out to demonstrate compliance with all applicable ambient TAP increments.

40 CFR 52..... Prevention of Significant Deterioration

Prevention of Significant Deterioration (PSD) requirements do not apply because the facility is not a PSD major facility and the modification does not result in a significant net emissions increase.

40 CFR 60..... New Source Performance Standards

This facility is not specifically regulated under the performance standards for new sources. The appendices to 40 CFR 60 list EPA approved test methods for determining emissions.

40 CFR 61 and 63 ..... National Emission Standards for Hazardous Air Pollutants & MACT

This facility is not currently subject to any NESHAP or MACT performance standards.

7.2 Hoppes No. 9 Production

Allowable emissions for Michael's are based on the production rate of Hoppes No. 9. Emissions were calculated by summing the emissions of each component from each holding and mixing tank using TANKS 4.0 modeling software. The mixing tanks were calculated like a holding tank, and the emissions resulting from bottling Hoppes No. 9 were considered negligible.

TANKS 4.0 estimates emissions in a pounds per year basis. Michael's can produce 48.8 gal/hr of Hoppes No. 9, and will operate 3-4 8-hour days per week. A worst case scenario was used in the calculation of pound per hour emissions by dividing the increased production, 30,000 gal/yr, by 48.8 gal/hr, resulting in Hoppes No. 9 production 614.75 hr/yr. The pounds per hour emissions were calculated at this worst case scenario production rate and compared to the screening emission levels (ELs) from IDAPA 58.01.01.585. TANKS 4.0 inputs and outputs are in Appendix A, and a detailed list of emission calculations is included in Appendix B.

Ethanol Emission Limits

Ethanol (Ethyl Alcohol) constitutes 33 percent by weight (wt%) of Hoppes No. 9, and is held in a 5,000-gallon vertical fixed roof tank prior to being pumped to a 400-gallon horizontal mixing tank. Ethanol is listed in IDAPA 58.01.01.585 as a noncarcinogenic TAP, with an EL of 125 lb/hr. The AAC is 94 mg/m^3, 24 hour average. Based on estimates from TANKS 4.0, TAP emissions will not exceed the EL. There are no limitations, other than throughput, based on TAP and VOC emissions. Throughput is limited to the amount necessary to produce 60,000 gal/yr of Hoppes No 9.

Mineral Oil Mist Emission Limits

Red mineral oil constitutes 25 wt% of Hoppes No. 9, and is pumped directly from 55 gallon drums. Mineral oil is a middle distillate in the refining of crude oil, and contains a wide variety of components, including polyaromatic hydrocarbons (PAHs), alkyl PAHs, and aromatics.[1] Mineral oil mist is listed in IDAPA 58.01.01.585 as a noncarcinogenic TAP with an EL of 0.333 lb/hr, with an AAC of 0.25 mg/m^3, 24 hour average. There are no limitations, other than throughput, required based on HAP or VOC emissions. Throughput is limited to the amount necessary to produce 60,000 gal/yr of Hoppes No 9.

Kerosene Emission Limits

Kerosene is a middle distillate in the refining of crude oil, and is made up of paraffins (alkenes), cycloparaffins (cycloalkenes), aromatics, and olefins from C9 to C20. The aromatic compounds include alkylbenzenes, toluene, naphthalenes, and PAHs. Benzene typically makes up less than 0.02% of kerosene, because kerosene has a boiling range well above the boiling point of benzene.[1] The list of carcinogenic TAPs in IDAPA 58.01.01.586 includes several alkenes, cycloalkenes, aromatics, and olefins. For example, the EL for benzene is 8E-4 lb/hr, and that for PAH is 9.1E-5 lb/hr.

The estimates of significant HAPs/TAPs in Jet-A kerosene from TANKS 4.0 are shown in Table 7.3.1. The overall increase in emissions from the tanks, estimated using TANKS 4.0, will be 1.25E-4 lb/hr

[1] Irwin, R.J., M. VanMouwerik, L. Stevens, M.D. Seese, and W. Basham. 1997. Environmental Contaminants Encyclopedia. National Park Service, Water Resources Division, Fort Collins, Colorado. Distributed within the federal government as an electronic document http://www.nature.nps.gov/toxic/jet_a.pdf . The relevant pages are included in Appendix C to this document.

(0.25lb/yr). Individual TAP emissions will be a fraction of this number. Because of the lack of available data of speciated vapor components for kerosene, and because the overall emissions for the use and storage of kerosene by this facility are small, DEQ concludes that there need be no additional limitations other than throughput based on these emission estimates. Throughput is limited to the amount necessary to produce 60,000 gal/yr of Hoppes No 9.

Table 7-1 HAP/TAP COMPOUNDS FOUND IN JET-A KEROSENE

HAP/TAP found in Jet-A Kerosene (TANKS 4.0)	Liquid Wt% in Jet-A Kerosene	Lb/yr Liquid Throughput Increase via Kerosene
Hexane	0.005	3.465
Benzene	0.004	2.772
Toluene	0.133	92.169
Ethylbenzene	0.127	88.011
Xylene	0.31	214.83

Proprietary Compound Emission Limits

The proprietary compound constitutes < 9 wt% of Hoppes No. 9. It is listed in IDAPA 58.01.01.585 as a noncarcinogenic toxic air pollutant with an EL value greater than 35 lb/hr, and an AAC value greater than 25 mg/m^3, 24 hour average. Based on emission estimates modeled with TANKS 4.0, TAP emissions will not exceed the EL. There are no limitations other than throughput based on TAP and VOC emissions. Throughput is limited to the amount necessary to produce 60,000 gal/yr of Hoppes No 9.

Compliance Demonstration

The permittee shall monitor and record the amount of Hoppes No. 9 produced on a monthly and annual basis to demonstrate compliance with Permit Condition 3.2. The annual amount of Hoppes No. 9 produced shall be determined by summing the daily Hoppes No. 9 produced monthly, expressed as gallons per month (gal/mo), and then summing the monthly Hoppes No. 9 produced over the previous consecutive 12-month period, expressed as gallons per year (gal/yr).

8. AIRS INFORMATION

Table 8.1 AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

AIRS POLLUTANT	SM	MSP	NSPS (Part 60)	NESHAP (Part 61/63)	TITLE V	AIRS CLASSIFICATION (SM/A/B/C/U)
SO_2						U
No_x						U
CO						M
PM_{10}						M
PT (Particulate)						
VOC		B			B	U
THAP (Total HAPs)						
			APPLICABLE SUBPART			

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For NESHAP only, class "A" is applied to each pollutant which is below the 10 T/yr threshold, but which contributes to a plant total in excess of 25 T/yr of all NESHAP pollutants.
SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
B = Actual and potential emissions below all applicable major source thresholds.
C = Class is unknown.
ND = Major source thresholds are not defined (e.g., radionuclides).
M = Maintenance area

9. FEES

Michael's of Oregon Co. paid the $1,000 application fee as required in IDAPA 58.01.01.224 on June 30, 2003.

A permit to construct processing fee of $1,000 was required in accordance with IDAPA 58.01.01.225 because the increase in emissions from the modification was less than 1 T/yr as indicated in Table 9.1. The processing fee was received on September 16, 2003.

The Michael's of Oregon Co. facility is not a major facility as defined in IDAPA 58.01.01.008.10. Therefore, regis
tration fees are not applicable in accordance with IDAPA 58.01.01.387.

Table 9-1 EMISSIONS INVENTORY

Emissions Inventory			
Pollutant	Annual Emissions Increase (Tons/yr)	Annual Emissions Reduction (Tons/yr)	Annual Emissions Change (Tons/yr)
NO_X	0.0	0	0.0
SO_2	0.0	0	0.0
CO	0.0	0	0.0
PM_{10}	0.0	0	0.0
VOC[a]	1.3e-4	0	1.3e-4
TAPS/HAPS[b]	5.7e-3	0	5.7e-3
Total:	5.8e-3	0	5.8e-3
Fee Due	$ 1,000.00		

[a] The number represents just the increase in kerosene.
[b] This number represents ethanol, mineral oil mist, and the proprietary compound, however these compounds are both TAPs and VOCs.

10. RECOMMENDATION

Based on review of application materials and all applicable state and federal rules and regulations, staff recommend that Michael's of Oregon Co. be issued a modified PTC No. P-030042. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

VAG/MS/sd Permit No. P-030042

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APPENDIX A

TANKS 4.0 MODELING INPUTS AND OUTPUTS

TANKS 4.0 Inputs

	60,000		30,000		60,000		30,000	
	Ethanol	Kerosene	Ethanol	Kerosene	Hoppes Tank	Mixing Tank	Hoppes Tank	Mixing Tank
Shell Height (ft)	15	15	15	15	15	15	15	15
Shell Diameter (ft)	7.58	7.58	7.58	7.58	7.58	7.58	7.58	7.58
Maximum Liquid Height (ft)	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
Average Liquid Height (ft)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Working Volume (gal)	5000	5000	5000	5000	5000	5000	5000	5000
Turnovers per Year	3.96	3.96	1.98	1.98	3.96	3.96	1.98	1.98
Net Throughput (gal/yr)	19800	19800	9900	9900	19800	19800	9900	9900
Site Selection	Boise ID	Boise ID	Boise ID	Boise ID	Boise ID			
Chemical Name	Ethyl Alcohol	Jet Kerosene	Ethyl Alcohol	Jet Kerosene	33% Jet Kerosene			
					33% Ethyl Alcohol			
					25% Distillation Oil No. 2			
					9% Proprietary Compound			

Proprietary Compound:
Molecular Weight (L and V), Liquid Density, and Vapor Pressure from Perry's Handbook for Chemical Engineers
Antoine Equation Constants from Perry's Handbook for Chemical Engineers for a similar compound

TANKS 4.0
Emissions Report - Brief Format
Individual Summaries

Annual Emissions Report

MO-Ethanol (9,900 gal/yr) Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethyl alcohol	5.56	28.79	34.35

MO-Hoppes Day Storage (15,000 gal/yr) Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hoppes No. 9	5.85	2.40	8.25
Michael's Proprietary Compound	0.39	0.16	0.55
Jet kerosene	0.05	0.02	0.08
Distillate fuel oil no. 2	0.03	0.01	0.04
Ethyl alcohol	5.38	2.20	7.58

MO-Hoppes Day Storage 2 (15,000 gal/yr) Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hoppes No 9	5.85	2.40	8.25
Distillate fuel oil no. 2	0.03	0.01	0.04
Ethyl alcohol	5.38	2.20	7.58
Jet kerosene	0.05	0.02	0.06
Michael's Proprietary Compound	0.39	0.16	0.55

MO-Hoppes Mixing Tank (30,000 gal/yr) Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hoppes No 9	6.63	2.65	9.29
Michael's Proprietary Compound	0.45	0.18	0.62
Distillate fuel oil no. 2	0.03	0.01	0.04

TANKS 4.0
Emissions Report - Brief Format
Individual Summaries (Continued)

Annual Emissions Report

Ethyl alcohol	6.09	2.44	8.53
Jet kerosene	0.06	0.02	0.09

MO-Kerosene (9,900 gal/yr) Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet kerosene	0.20	0.91	1.10

TANKS 4.0
Emissions Report - Brief Format
Total Emissions Summaries - All Tanks in Report

Annual Emissions Report

Tank Identification				Losses (lbs)
MO-Ethanol (9,900 gal/yr)	Michael of Oregon	Vertical Fixed Roof Tank	Boise, Idaho	34.35
MO-Hoppes Day Storage (15,000 gal/yr)	Michael of Oregon	Horizontal Tank	Boise, Idaho	8.25
MO-Hoppes Day Storage 2 (15,000 gal/yr)	Michael of Oregon	Horizontal Tank	Boise, Idaho	8.25
MO-Hoppes Mixing Tank (30,000 gal/yr)	Michael of Oregon	Horizontal Tank	Boise, Idaho	9.29
MO-Kerosene (9,900 gal/yr)	Michael of Oregon	Vertical Fixed Roof Tank	Boise, Idaho	1.10
Total Emissions for all Tanks:				61.24

TANKS 4.0
Emissions Report - Brief Format
Individual Summaries

Annual Emissions Report

MO-Ethanol (19,800 gal/yr) Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Ethyl alcohol	11.12	28.79	39.91

MO-Hoppes Day Storage (30,000 gal/yr) Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hoppes No. 9	7.80	2.40	10.20
Michael's Proprietary Compound	0.52	0.16	0.69
Jet kerosene	0.07	0.02	0.10
Distillate fuel oil no. 2	0.04	0.01	0.05
Ethyl alcohol	7.17	2.20	9.37

MO-Hoppes Day Storage 2 (30,000 gal/yr) Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hoppes No 9	7.80	2.40	10.20
Distillate fuel oil no. 2	0.04	0.01	0.05
Ethyl alcohol	7.17	2.20	9.37
Jet kerosene	0.07	0.02	0.10
Michael's Proprietary Compound	0.52	0.16	0.69

MO-Hoppes Mixing Tank (60,000 gal/yr) Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Hoppes No 9	8.58	2.66	11.24
Michael's Proprietary Compound	0.58	0.18	0.75
Distillate fuel oil no. 2	0.04	0.01	0.05

TANKS 4.0
Emissions Report - Brief Format
Individual Summaries (Continued)

Annual Emissions Report

Ethyl alcohol	7.88	2.44	10.32
Jet kerosene	0.08	0.02	0.10

MO-Kerosene (19,500 gal/yr) Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Jet kerosene	0.40	0.91	1.30

TANKS 4.0
Emissions Report - Brief Format
Total Emissions Summaries - All Tanks in Report

Annual Emissions Report

Tank Identification				Losses (lbs)
MO-Ethanol (19,800 gal/yr)	Michael of Oregon	Vertical Fixed Roof Tank	Boise, Idaho	39.91
MO-Hoppes Day Storage (30,000 gal/yr)	Michael of Oregon	Horizontal Tank	Boise, Idaho	10.20
MO-Hoppes Day Storage 2 (30,000 gal/yr)	Michael of Oregon	Horizontal Tank	Boise, Idaho	10.20
MO-Hoppes Mixing Tank (60,000 gal/yr)	Michael of Oregon	Horizontal Tank	Boise, Idaho	11.24
MO-Kerosene (19,800 gal/yr)	Michael of Oregon	Vertical Fixed Roof Tank	Boise, Idaho	1.30
Total Emissions for all Tanks:				72.85

APPENDIX B

EMISSIONS CALCULATIONS

Calculation of Total Increase in Emissions

All values in lb/yr unless specified otherwise.
All values are outputs from Tanks 4.0

Previous Emission Estimates - For Production of 30,000 gal/yr of Hoppes No. 9

	Ethanol Tank	Kerosene Tank	Hoppes Holding Tank	Hoppes Holding Tank	Hoppes Mixing Tank	Total (lb/yr)
Ethanol	34.35		7.58	7.58	8.53	58.04
Kerosene		1.1	0.08	0.08	0.09	1.35
Proprietary			0.55	0.55	0.62	1.72
Red Min Oil			0.04	0.04	0.04	0.12

Proposed Emission Estimate - For production of 60,000 gal/yr of Hoppes No. 9

	Ethanol Tank	Kerosene Tank	Hoppes Holding Tank	Hoppes Holding Tank	Hoppes Mixing Tank	Total (lb/yr)
Ethanol	39.91		9.37	9.37	10.32	68.97
Kerosene		1.3	0.1	0.1	0.1	1.6
Proprietary			0.69	0.69	0.75	2.13
Red Min Oil			0.05	0.05	0.05	0.15

Increased Emissions - ([value at 60,000 gal/yr]-[value at 30,000 gal/yr])

	Ethanol Tank	Kerosene Tank	Hoppes Holding Tank	Hoppes Holding Tank	Hoppes Mixing Tank	Total (lb/yr)	IDAPA EL (lb/hr)	TAP Total (lb/hr)[b]	VOC Total (lb/hr)[c]
Ethanol	5.56	0	1.79	1.79	1.79	10.93	125	1.78E-02	1.78E-02
Kerosene[a]	0	0.2	0.02	0.02	0.01	0.25	--	--	4.07E-04
Proprietary	0	0	0.14	0.14	0.13	0.41	35.3	6.67E-04	6.67E-04
Red Min Oil	0	0	0.01	0.01	0.01	0.03	0.333	4.88E-05	4.88E-05
Totals						11.62		1.85E-02	1.89E-02
							Total T/yr	5.69E-03	5.81E-03

a Kerosene contains some TAPs, but they are not quantifiable so are not included in this table.
b Lb/hr estimates are made for a worst case scenario of maximum capacity production.
This results in 614.75 hours/year, calculated as (30,000gal/yr)/(48.8gal/hr).
c All emissions are considered VOCs for a worst case scenario emissions inventory.

APPENDIX C

National Park Service
Environmental Contaminants Encyclopedia
http://www.nature.nps.gov/toxic/jet_a.pdf
pages 1, 5, and 6 are reproduced here

ENVIRONMENTAL CONTAMINANTS ENCYCLOPEDIA

JET FUEL A ENTRY

July 1, 1997

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Jet Fuel A (Jet A, Commercial Jet Fuel)

Brief Introduction:

Br.Class: General Introduction and **Classification** Information:

Jet fuels, or turbine fuels, are one of the primary fuels for internal combustion engines worldwide and are the most widely available aviation fuel [743]. Jet fuel A, used for commercial and general aviation, is a petroleum distillate blended from kerosene fractions and used in civil aviation [560]. Jet fuel A is used for commercial and general aviation [743]. It is an operational fuel for commercial turboprop and turbojet aircraft in U.S. [560].

Because of its availability compared to gasoline during wartime, commercial illuminating kerosene was the fuel chosen for early jet engines. Consequently, the development of commercial jet aircraft following World War II centered primarily on the use of kerosene-type fuels [747].

In terms of refining crude oil, JP-A is a middle distillate. The middle distillates include kerosene, aviation fuels, diesel fuels, and fuel oil #1 and 2. These fuels contain paraffins (alkenes), cycloparaffins (cycloalkanes), aromatics, and olefins from approximately C9 to C20. Aromatic compounds of concern included alkylbenzenes, toluene, naphthalenes, and polycyclic aromatic hydrocarbons (PAHs). Compositions range from avgas and JP-4, which are similar to gasoline, to Jet A and JP-8, which are kerosene-based fuels [661]. Kerosene normally has a boiling range well above the boiling-point of benzene; accordingly, the benzene content of the kerosene fraction (and therefore jet fuel A) is usually below 0.02%. However, since wide-cut jet fuels (such as jet fuel 4) are made by blending with gasoline, they may contain more benzene (normally <0.5%) [747]. Jet A is not mixed with gasoline.

According to the US Coast Guard Emergency Response Notification System (ERNS), jet fuels JP-1 (kerosene), JP-4, and JP-5 are among the top spilled petroleum products in the United States [635].

See also: Jet Fuel, General entry.

Br.Haz: General **Hazard/Toxicity** Summary:

Short-term hazards of the some of the lighter, more

volatile and water soluble compounds (such as benzene compounds and toluene) in jet fuel include potential acute toxicity to aquatic life in the water column (especially in relatively confined areas) as well as potential inhalation hazards. Benzenes, toluene, and xylenes (all common components of jet fuels) tend to cause narcosis [878].

Jet fuels have moderate volatility and moderate solubility [777]. Jet fuels possess moderate to high acute toxicity to biota with product-specific toxicity related to the type and concentration of aromatic compounds [777]. Jet fuel spills could result in potential acute toxicity to some forms of aquatic life. Oil coating of birds, sea otters, or other aquatic life which come in direct contact with the spilled oil is another potential short-term hazard. Some of the same compounds found in gasoline are also found in jet fuels. As might be expected, there is therefore some overlap between the toxic effects potentially resulting from jet fuel spills and gasoline spills (see Gasoline entry). In the short term, spilled oil will tend to float on the surface; water uses threatened by spills include: recreation; fisheries; industrial, potable supply; and irrigation [608].

Jet A in the water column can depress Daphnia (zooplankton) populations for several weeks, resulting in algae blooms [877].

Two studies have been found on jet fuel in laboratory animals. In the first, subchronic exposure to unspecified doses produced tubular plugs in the male rat kidneys. The toxicity to the kidney may have been due to saturated branched aliphatic hydrocarbons [606].

Long-term potential hazards to humans of the some of the lighter, more volatile and water soluble compounds (such as benzenes, toluene, xylenes) in jet fuels would include contamination of groundwater. Long-term water uses threatened by spills include potable (ground) water supply.

Long-term effects may be associated with PAHs, alkyl PAHs, and alkyl benzene (such as xylene) constituents of jet fuel.0 Although PAHs, particularly heavy PAHs, do not make up a large percentage of jet fuels by weight, there are some PAHs in jet fuels, including naphthalene and alkyl naphthalenes [636,744]. Due to their relative persistence and potential for various chronic effects, PAHs, (and particularly the alkyl PAHs), can contribute to long-term (chronic) hazards of jet fuels in contaminated soils, sediments, and groundwaters.