PROPOSED

PERMIT APPLICATION REVIEW
Covered Source Permit (CSP) No. 0209-01-C
Renewal and Modification Application No. 0209-05

Applicant: 15th Airlift Wing

Located at: Hickam Air Force Base, Oahu

Mailing Address: 15th Airlift Wing
United States Air Force
800 Scott Circle
Hickam Air Force Base, Hawaii 96853-5328

Responsible Official:	Colonel Raymond G. Torres	**Contact:**	Mr. Melvin Muraoka
Title:	Commanding Officer	**Title:**	Environmental Engineer
Phone:	(808) 671-8383	**Phone:**	(808) 449-1584, etc. 241
		Fax:	(808) 448-0247
		e-mail:	melvin.muraoka@hickam.af.mil

1. Background.

1.1 Hickam Air Force Base has submitted an application to renew their covered source permit for equipment and facilities that include boilers, internal combustion engines, aircraft engine test operations, fueling facilities, solvent cleaning units, and incinerators. Hickam Air Force Base also submitted an application for permit modification to add crushing and screening equipment operating at the base without a permit. The modification and renewal applications have been consolidated into one application assigned number 0209-05. Requirements will also be incorporated into the permit renewal for a tub grinder used for composting and new bottom loading load rack and hydrant fueling system that will replace existing JP-8 fueling operations. The Standard Industrial Classification Code for this facility is 9711 (National Security). Modifications applicable to the permit renewal are as follows:

a. Adding a 130 TPH Construction Equipment Company jaw crushing plant and Read CV-40-D screening plant operated together with 1,000 hr/yr limit.

b. Adding a 175 kW Perkins diesel engine servicing the 130 TPH jaw crushing plant and operating with a 1,000 hr/yr limit.

c. Adding a Nordberg SW348 portable screening plant operated with 1,000 hr/yr limit.

d. Adding an Olathe Manufacturing, Inc. tub grinder operating with 1,000 hr/yr limit.

e. Adding a 450 hp Cummins diesel engine servicing the tub grinder and operating with 1,000 hr/yr limit.

f. Incorporating conditions for a new JP-8 fueling facility that is currently under construction to replace the existing load rack. The hydrant loading system at aircraft ramps, supplied by pipe line from load rack, is also being modified.

g. Change model no. for boiler no. B-906A from CL-210-S-1150-FDO to CL-210-S-150-FDO;

h. Replacing the 1.3 MMBtu/hr York Shipley boiler B-906B with a 2.1 MMBtu/hr Bryan boiler, model no. CL-210-S-150-FDO, serial no. 8992 (boiler was replaced and operated without modifying the permit prior to its renewal, both old and new boilers are fired on fuel oil No. 2).

i. Removing boilers less than 1 MMBtu/hr heat rate input capacity from the permit because the equipment is exempt from permitting in accordance with Hawaii Administrative Rules (HAR) §11-60.1-82 (f)(2).

j. Removing solvent cleaning units from the permit because each solvent cleaning unit is exempt from permitting in accordance with HAR, §11-60.1-82 (f)(7). No hazardous constituents were identified on the material safety data sheets for Unitek 146 and PD-68-2 solvents used for the solvent cleaning units. Based on emission factors from AP-42, Section 4.6 (4/81), maximum tons per year (TPY) VOC emissions for each unit are as follows:

waste solvent loss	0.18 TPY per unit
solvent carry-out	0.08 TPY per unit
bath and spray evaporation	0.07 TPY per unit
Total VOC =	0.33 TPY per unit < 2 TPY per unit

k. Removing operations from the permit for dispensing gasoline and diesel fuel into government motor vehicles at building 1037 because these operations are exempt pursuant to HAR §11-60.1-82 (f)(7). Emissions for dispensing diesel were not evaluated because there are no AP-42 emission factors for diesel dispensing. Emissions from this operation are likely to be negligible because diesel is a low volatile fuel. Based on a 50,000 gal/yr actual gasoline throughput during calendar year 2002, HAP data from the 2002 emissions inventory, and AP-42, Section 5.2 (1/95) emission factors, the potential VOC and HAP emissions from the military service station (building 1037) for dispensing gasoline are as follows:

shop operates 8 hours/day, 5 days per week, 52 weeks a year (minus 11 federal holidays).
(8 hr/day)(5 day/wk)(52 wk/yr) - (11 day/yr)(8 hr/day) = 2,080 - 88 = 1,992 hr/yr

Filling storage tanks with stage I controls using vapor balance that return gasoline vapors displaced from underground tank back to truck---------->

(50,000 gal/yr)(0.3 lb/1,000 gal)(ton/2,000 lb)(8,760/1,992) 0.033 TPY

Storage tank breathing losses attributable to gasoline evaporation and barometric pressure changes---------->

(50,000 gal/yr)(1.0 lb/1,000 gal)(ton/2,000 lb)(8,760/1,992) 0.110 TPY

Emissions from vapors displaced when dispensing gasoline into vehicle tank during refueling that are uncontrolled (no Stage II controls)---------->

(50,000 gal/yr)(11 lb/1,000 gal)(ton/2,000 lb)(8,760/1,992) 1.209 TPY

Vapors from inadvertent spillage of gasoline during refueling---------->

(50,000 gal/yr)(0.7 lb/1,000 gal)(ton/2,000 lb)(8,760/1,992) 0.077 TPY

Total VOC = 1.429 TPY < 2 TPY

Total HAPs = VOC_{tanks} ($\%HAP_{vapor}$) + $VOC_{spillage}$ ($\%HAP_{liquid}$)

benzene = 1.352TPY (0.006) + 0.077 TPY (0.018) = 0.009 TPY = 18.7 lb/yr

cumene = 1.352 TPY (0.0002) + 0.077 TPY (0.005) = 0.0006 TPY = 1.2 lb/yr

ethylbenzene = 1.352 TPY (0.0004) + 0.077 TPY (0.014) = 0.0016 TPY = 3.2 lb/yr

hexane = 1.352 TPY (0.005) + 0.077 TPY (0.01) = 0.0075 TPY = 15.1 lb/yr

methyl tert-butal ether = 1.352 TPY (0.046) + 0.077 TPY (0.045) = 0.0656 TPY = 131 lb/yr

naphthalene = 1.352 TPY (0) + 0.077 TPY (0.003) = 0.0002 TPY = 0.5 lb/yr

toluene = 1.352 TPY (0.007) + 0.077 TPY (0.07) = 0.0148 TPY = 29.7 lb/yr

2,2,4-trimehtylpentane = 1.352 TPY (0.007) + 0.077 TPY (0.04) = 0.0125 TPY = 25.1 lb/yr

xylene = 1.352 TPY (0.002) + 0.077 TPY (0.07) = 0.0081 TPY = 16.2 lb/yr

Total HAPs = 238 lb/yr < 500 lb/yr

I. Removing gasoline and diesel fuel tank truck loading operations at building 1037 from the permit because the operations are exemption pursuant to HAR §11-60.1-82 (f)(7). Emission estimates to determine permitting applicability were based on the 49,506 gal/yr actual gasoline throughput and the 101,161 gal/yr actual diesel throughput during calendar year 2002, HAP data from the 2002 emissions inventory, and AP-42, Section 5.2 (1/95) emission factor equation. The potential VOC and HAP emissions are as follows:

shop operates 8 hours/day, 5 days per week, 52 weeks a year (minus 11 federal holidays).
(8 hr/day)(5 day/wk)(52 wk/yr) - (11 day/yr)(8 hr/day) = 2,080 - 88 = 1,992 hr/yr

loading fuel into tank trucks from fill stand at building 1037 is submerged loading (S = 0.6)

true vapor pressure of gasoline with RVP of 10 at 80 ^{O}F = 7.4 psi
true vapor pressure of distillate fuel at 80 ^{O}F = 0.012 psi
molecular weight of gasoline with RVP 10 = 66 lb/lb-mole
molecular weight of distillate fuel = 130 lb/lb-mole
temperature = 540 ^{O}R

gasoline throughput = 49,506 gal/yr

L_L (lb/1,000 gal) = 12.46 SPM/T = 12.46(0.6)(7.4)(66/540) =(6.762 lb/1,000 gal)

(6.762 lb/1,000 gal)(49,506 gal/yr)(ton/2,000 lb)(8,760/1,992) = 0.7 TPY

diesel throughput = 101,161 gal/yr

L_L (lb/1,000 gal) = 12.46 SPM/T = 12.46(0.6)(0.012)(130/540) = (0.022 lb/1,000 gal)

(0.022 lb/1,000 gal)(101,161 gal/yr)(ton/2,000 lb)(8,760/1,992) = 0.005 TPY

Total VOC = 0.7 TPY < 2TPY

Total HAPs = Total VOC(%$HAP_{vapor\ -gasoline\ worst-case}$)

benzene = 0.7 TPY (0.006) = 0.0042 TPY =	8.4 lb/yr
cumene = 0.7 TPY (0.0002) = 0.0001 TPY =	0.3 lb/yr
ethylbenzene = 0.7 TPY (0.0004) = 0.0003 TPY =	0.6 lb/yr
hexane = 0.7 TPY (0.005) = 0.0035 TPY =	7 lb/yr
mehyl tert-butal ether = 0.7 TPY (0.046) = 0.032 TPY =	64.4 lb/yr
naphthalene = 0.7 TPY (0) =	0 lb/yr
toluene = 0.7 TPY (0.007) = 0.0049 TPY =	9.8 lb/yr
2,2,4-trimehtylpentane = 0.7 TPY (0.007) = 0.0049 TPY	9.8 lb/yr
xylene = 0.7 TPY (0.002) = 0.0014 TPY =	2.8 lb/yr
Total HAPs =	103 lb/yr < 500 lb/yr

m. Allowing photographic material waste to be burned by either of the base's two incinerators because both incinerators are located at the same site. Also, emission factors for refuse combustion to estimate emissions are the same irrespective of the waste burned.

n. Imposing opacity limits for the hush house because this aircraft engine test facility has a stack duct and is thereby considered a point source.

o. Removing the testing of C-130 aircraft engine testing from the permit because C-130 aircraft are being replaced by C-17 aircraft. As indicated by base personnel, the C-17 aircraft engines will be tested in the mainland.

p. Removing the two 1.2 MMBtu/hr boilers at building 1860 from the permit because the fuel for the boilers will change to liquid petroleum gas (LPG) only. As such, the units are exempt from permitting pursuant to HAR, §11-60.1-82(f)(3).

1.2 As indicated by Mr. Muraoka from Hickam Air Force Base, fuel fired by permitted boilers will eventually be changed from fuel oil No. 2 to LPG. If fuel switches from fuel oil No. 2 to LPG, the units will be exempt from permitting pursuant to HAR, §11-60.1-82(f)(3).

1.3 Metso Minerals has acquired the Nordberg company that manufactured the base's SW348 screening plant. Per telephone conversation with Metso Minerals representative at the Mobile Screen Division (at 800-643-4321), the maximum capacity of the Nordberg SW348 screening plant is 210 TPH based on conveyor belt feed capacity.

1.4. Perkins Pacific in Vancouver, Washington (at 800-882-3860) was contacted to obtain specifications on the portable crushing plant's 175 kW Perkins diesel engine. It was indicated that the 175 kW diesel engine's exhaust flow rate and temperature are 26.4 ft^3/min and 865 ^{O}F, respectively. The information was based on specifications from another diesel engine with similar horse power rating. It was also indicated, "rule of thumb", that the maximum fuel consumption for a diesel engine is one gallon per 20 hp-hr. Based on the equipments capacity, the 175 kW diesel engine is subject to permitting because the engine does not meet the exemption criteria specified in HAR §11-60.1-82(f)(2). Based on the manufacturer's information, the maximum fuel consumption and capacity were determined as follows:

(175 kW)(1.34) = 235 hp

(235 hp)(gallon/20 hp-hr) = 11.75 gal/hr

(11.75 gal/hr)(0.137 MMBtu/gal) = 1.6 MMBtu/hr > 1 MMBtu/hr

1.5 Representatives from Cummins Engine Company, Inc. were contacted (Tim Johnson at 808-682-8110 and Robert Bumgardner and Eric Mondel at 510-351-6101) to obtain information on the 450 hp diesel engine servicing the tub grinder. Specifications indicate an exhaust stack temperature of 825 ^{O}F, a maximum fuel consumption of 22.69 gal/hr, and an exhaust flow rate of 5,435 lb/hr. To convert lb/hr exhaust rate to cubic feet per minute, it was assumed that the exhaust was air. Exhaust flow rate was converted to cubic feet per minute based the density of air at 825 ^{O}F. Exhaust flow rate is as follows:

$R = R^*/MW = (1{,}545.33 \text{ ft-lbf/lbmol-}^0R)(\text{lb-mol}/29 \text{ lbm}) = 53.28 \text{ ft-lbf/lbm -}^0R$

$T = 825\ ^0F + 460 = 1{,}285\ ^0R$

$\text{density} = p/RT = (14.7 \text{ lbf/in}^2)(144 \text{ in}^2/\text{ft}^2)(^0R\text{-lbm}/53.28 \text{ ft-lbf})(1/1{,}285\ ^0R) = 0.0309 \text{ lb/ft}^3$

$(5{,}435 \text{ lb/hr})(\text{ft}^3/0.0309 \text{ lb})(\text{hr}/60 \text{ min}) = 2{,}931 \text{ ft}^3/\text{min}$

1.6 Equipment for Hickam Air Force Base may be split among three different organizations with separate noncovered source permits to simplify the base's monitoring requirements. The base will make its decision on whether or not to split equipment among different responsible officials after reviewing monitoring requirements after the covered source permit renewal is issued.

1.7 Site inspections of Hickam Air Force Base were conducted prior and during the processing of this permit renewal application. Pictures that document facilities and equipment at the base are shown in Enclosure (1). Site inspections disclosed the following information:

a. The two incinerators at the base exist at the same location (Bishop Point).

b. Incinerator identification no. 83366, operated by Hickam Air Force Base military personnel, has four secondary chamber burners and one primary chamber burner.

c. Incinerator identification no. 1097, operated by the Joint Intelligence Center Pacific civilian personnel, has three secondary chamber burners and one primary chamber burner.

d. The secondary chamber temperatures for incineration were greater than 1450 ^{O}F prior to incineration.

e. No smoke was observed from each incinerator during visible emissions observations.

f. Stack height and inside diameter of the 175 kW diesel engine servicing the 130 TPH jaw plant are 12.7 feet and 3.4 inches, respectively.

g. The jaw plant is approximately 25 feet long x 15 feet high x 8 feet wide and has four conveyors.

h. Water sprays for the rock crushing and CV-40-D screening plant are located as follows:

i. Manual spray hose at the operator platform;
ii One spray bar above main conveyor after primary crusher;
iii. Two spray bars above conveyor transfer from serge hopper;
iv. One spray bar at screen; and
v. One spray bar at screen side conveyor.

i. The SW348 screening plant is equipped with three conveyors.

j. An Olathe Manufacturing, Inc. tub grinder (model no. 867KBL, serial no. 867340KBL) for composting was observed at location of jaw crusher and screening plants. Power for the tub grinder is provided by 450 hp Cummins diesel engine (model no. NTA855). The tub grinder was about 34 feet long x 10 feet high x 8 feet wide and has one main conveyor that discharges to stockpile.

k. Stack height and inside diameter of the diesel engine servicing tub grinder are 11.8 feet and 5 inches, respectively.

l. The existing bottom loading load rack at Area 11 was being dismantled and taken out of service. Construction of a new load rack was in process next to the existing Area 11 load rack to increase capacity for additional fuel loading of C-17 aircraft that will be stationed at the base. The existing load rack was built with three loading stations (two stations; each with two JP-8 load arms, and one station with one JP-8 and one diesel load arm to load tank trucks for fueling aircraft on at ramp areas and supply diesel to base facilities. The existing load rack also supplies JP-8 to aircraft hydrant pits on the air strip via pipeline. The new load rack will be equipped with five loading stations; each with one JP-8 load arm to load tank trucks that will supply fuel to aircraft. The new load rack will also supply JP-8 via pipeline to hydrant pits at airport ramp areas for fueling aircraft. JP-8 is supplied to Area 11 from a pipeline.

m. Trucks that support fueling operations include R11 tank trucks to load JP-8 into aircraft and diesel into storage tanks for base equipment. VOC emissions are vented at the top of the truck's tank when filling at load rack. R12 trucks are used to filter fuel prior to loading from hydrant into aircraft. The R12 trucks have no vent. VOC emissions are vented from aircraft when fuel is supplied from hydrant, R11 tank truck, and R-12 tank truck. Observation of a plane during the site visit disclosed vents to be located on its wing.

n. A diesel fuel load rack exists at Area 5 to supply fuel to various base equipment (e.g., boilers, diesel engine generators, etc.). The load rack has two loading stations; each with one load arm. The loading stations are connected to large above ground diesel storage tanks that are supplied by the tank trucks.

o. F-15 aircraft engines are tested on test stand or installed on aircraft inside the hush house.

p. F-15 aircraft engines are tested on test stand or installed on aircraft at test site TC-11665A.

q. C-130 aircraft engines are tested on test stand at test site TC-11665B. The C-130 aircraft are too large for testing engines installed on aircraft.

2. Applicable Requirements.

2.1 Hawaii Administrative Rules (HAR)

- Chapter 11-59, Ambient Air Quality Standards
- Chapter 11-60.1, Subchapter 1, General Requirements
- Chapter 11-60.1, Subchapter 2, General Prohibitions
  - 11-60.1-31, Applicability
  - 11-60.1-32, Visible emissions
  - 11-60.1-33, Fugitive dust
  - 11-60.1-35, Incineration
  - 11-60.1-38, Sulfur Oxides from Fuel Combustion
- Chapter 11-60.1, Subchapter 5, Covered Sources
- Chapter 11-60.1, Subchapter 6, Fees for Covered Sources, Noncovered Sources, and Agricultural Burning
  - 11-60.1-111, Definitions
  - 11-60.1-112, General fee Provisions for Covered Sources
  - 11-60.1-113, Application Fees for Covered Sources
  - 11-60.1-114, Annual fees for Covered Sources
- Chapter 11-60.1, Subchapter 8, Standards of Performance for Stationary Sources
- Chapter 11-60.1, Subchapter 10, Field Citations

2.2 40 Code of Federal Regulations (CFR) Part 60-New Source Performance Standards (NSPS), Subpart OOO, Standards of Performance for Nonmetallic Mineral Processing Plants, is not applicable to the portable crushing and screening plants because the primary crusher of the jaw plant is less than 150 TPH (maximum rating is 130 TPH).

2.3 Based on information from calendar years 1999 and 2002 emission inventories, Hickam Air Force Base is not a major stationary source for hazardous air pollutants and is not subject to National Emissions Standards for Hazardous Air Pollutants (NESHAPS) or Maximum Achievable Control Technology (MACT) requirements under 40 CFR, Parts 61 and 63. This determination will be revisited upon submittal of future emissions inventories for the base.

2.4 The purpose of Compliance Assurance Monitoring (CAM) is to provide reasonable assurance that compliance is being achieved with large emission units that rely on air pollution control device equipment to meet an emissions limit or standard. Pursuant to 40 CFR, Part 64, for CAM to be applicable, the emissions unit must: (1) be located at a major source; (2) be subject to an emissions limit or standard; (3) use a control device to achieve compliance; (4) have potential precontrol emissions that are greater than the major source level; and (5) not otherwise be exempt from CAM. Although Hickam Air Force Base is a major source, there are no pollution control device equipment at the base that are required to achieve compliance with an applicable emissions limit or standard. As such, CAM is not applicable to equipment at the base.

2.5 The facility will be placed into the Compliance Data System (CDS) and annual emissions reporting is required because Hickam Air Force Base is a covered source.

2.6 The facility is not a synthetic minor source because Hickam Air Force Base is a major source. Potential emissions in the table below from permitted sources indicated that Hickam Air Force Base is a major source for CO. CO emissions are above the 100 TPY major source threshold pursuant to HAR §11-60.1-1. CO emissions are also above the 250 TPY major source threshold pursuant to §11-60.1-131.

MAJOR SOURCE APPLICABILITY	
Pollutant	[a,b,c,d]Potential Emissions (TPY) [Facility-Wide, Controlled With Applicable Limits]
NO_x	38.2
CO	322.8
SO_2	29.5
PM	43.6
VOC	27.7
HAPs	13.9

a: Includes emissions from the following sources:
   i. Boiler emissions from paragraph 6.1;
   ii. Internal combustion engine emissions from Paragraph 6.2
   iii. Aircraft engine testing emissions from the hush house that are listed in Paragraph 6.3.2;
   iv. Incinerator emissions from paragraph 6.4;
   v. Fugitive emissions from rock crushing and screening operations from Paragraph 6.6 for equipment of the type regulated by NSPS, Subpart OOO;
   vi. Fugitive emissions from stockpiles associated with type of equipment regulated by NSPS, Subpart OOO that are listed in Paragraph 6.7;
   vii. Fugitive emissions from vehicle travel associated with type of equipment regulated by NSPS, Subpart OOO that are listed in Paragraph 6.8;
   viii. Diesel engine emissions listed in Paragraphs 6.10 and 6.11.

b: Aircraft engine test stand emissions from Paragraphs 6.3.3 and 6.3.4 from operations aircraft engine test stands outside the hush house were not included because emissions are fugitive and the testing operations are not on the list of source categories that include fugitive emissions for major source applicability.

c: JP-8 loading facility emissions from Paragraph 6.5 were not included because emissions are fugitive and the fueling operations are not on the list of source categories that include fugitive emissions for major source applicability.

d: HAP emissions for major source applicability were considered from all permitted sources.

2.7 The Consolidated Emissions Reporting Rule (CERR) is applicable because SO_2, NO_x, and VOC emissions from the facility (For CERR applicability, the facility is a point source) exceed reporting levels for type B sources pursuant to 40 CFR 51, Subpart A (see table below).

CERR APPLICABILITY

Pollutant	Facility Emissions (TPY)	CERR Triggering Levels (TPY)	
		1 year cycle (type A sources)	3 year cycle (type B sources)
PM-10	56.9	≥ 250	≥ 100
PM-2.5	54.2	≥ 250	≥ 100
SO_2	247.7	≥ 2,500	≥ 100
NO_x	487.7	≥ 2,500	≥ 100
VOC	108.7	≥ 250	≥ 100
CO	612.7	≥ 2,500	≥ 1,000

2.8 A Best Available Control Technology (BACT) analysis is not applicable because emissions from equipment and facilities added to the base are below significant levels as defined in HAR §11-60.1-1 (see table below). Fugitive dust emissions from the crushing and screening equipment, stockpiles, and vehicle travel were considered because crushers and screeners are types of equipment covered by NSPS (Subpart OOO).

BACT APPLICABILITY

Pollutant	Emissions (TPY)[a]	Significant Level (TPY)
CO	1.6	100
NO_x	8.5	40
SO_2	6.0	40
PM	18.3	25
PM-10	5.0	15
VOC	23.2	40

a: Includes the following emissions from new sources:

i. 2.1 MMBtu/hr boiler operating 8,760 hr/yr that replaced existing 1.3 MMBtu/hr boiler;

ii. Fugitive dust associated with crushing and screening equipment added to permit and operated with 1,000 hr/yr limit;

iii. 175 kW diesel engine for the jaw crushing plant added to permit and operated with 1,000 hr/yr limit;

iv. 450 hp diesel engine for the tub grinder added to permit and operated with 1,000 hr/yr limit; and

v. JP-8 fueling operations with 300,000,000 gal/yr throughput limit that are replacing existing fueling operations at the base.

2.9 Although the base is a major source (emissions are greater than 250 TPY carbon monoxide for sources that are not on the list of 1 of 28 industrial categories as defined in HAR §11-60.1-131), Prevention of Significant Deterioration (PSD) review does not apply because the modifications do not increase emissions above significant levels. Comparison of emissions from the modifications to significant levels is shown in table from Paragraph 2.8.

3. Insignificant Activities and Exemptions.

3.1 The following is a list of insignificant activities from information provided in the 2002 Air Emissions Inventory for Hickam Air Force Base:

a. Abrasive blasting operations are exempt pursuant to HAR, §11-60.1-82(f)(7). Emissions based on 2002 emissions inventory data are as follows:

potential PM emissions = 0.012 TPY < 2 TPY

b. Diesel fired boilers and heaters less than 1 MMBtu/hr heat input capacity are exempt in accordance with HAR, §11-60.1-82 (f) (2).

c. LPG fired boilers less than a total combined heat input capacity of 5 MMBtu/hr at any one location are exempt pursuant to HAR, §11-60.1-82(f)(3).

d. Fuel cell maintenance operations are exempt in accordance with HAR, §11-60.1-82(f)(7). Emissions, based on 2002 emissions inventory data, are as follows:

worst-case potential VOC emissions per facility are 353 lb/yr < 2 TPY

worst-case potential HAP emissions associated with the VOC would be < 500 lb/yr

e. Aboveground and underground storage tanks less than 40,000 gallon capacity are exempt pursuant to HAR, §11-60.1-82(f)(1).

f. Underground storage tanks greater than 40,000 gallon capacity storing jet kerosene are exempt pursuant to HAR, §11-60.1-82(f)(7). Emissions, based on 2002 emissions inventory data, are as follows:

worst-case potential VOC emissions from a single tank are 1.3 TPY < 2 TPY

worst-case potential HAP emissions from a single tank are 247 lb/yr < 500 lb/yr

g. Internal floating roof storage tanks above 40,000 gallon capacity storing jet kerosene and diesel are exempt pursuant to HAR, §11-60.1-82(f)(7). Emissions, based on 2002 emissions inventory data, are as follows:

worst-case potential VOC emissions from a single tank are 654 lb/yr < 2 TPY

worst-case potential HAP emissions from a single tank are 59 lb/yr < 500 lb/yr

h. Tank truck loading of diesel at Area 5 is exempt pursuant to HAR, §11-60.1-82(f)(7).

i. Fuel dispensing of gasoline and diesel into government motor vehicles at Building 1037 is an insignificant activity pursuant to HAR, §11-60.1-82(f)(7). See Paragraph 1.1.k.

j. Bottom loading gasoline and diesel into tank trucks at Building 1037 is exempt in accordance with HAR, §11-60.1-82(f)(7). See Paragraph 1.1.i.

k. Paint spray booths are exempt pursuant to with HAR, §11-60.1-82(f)(6). Emissions, based, on 2002 emissions inventory data, are as follows:

maximum potential VOC emissions from a single facility (building 1055) are

1.6 TPY < 2 TPY

l. Emergency diesel engine generators at the base are exempt in accordance with HAR, §11-60.1-82(f)(5).

m. Solvent cleaning units are exempt pursuant to HAR, §11-60.1-82(f)(7). See Paragraph 1.1.j.

n. Cooling towers are exempt pursuant to HAR, §11-60.1-82(f)(7). Emissions, based on 2002 emissions inventory data, are as follows:

maximum potential particulate emissions from a single facility (building 1102) are

0.17 lb/yr < 2 TPY

4. Alternate Operating Scenarios.

4.1 Hickam Air Force Base requested that the following alternate operating scenario be incorporated into the permit:

> When a national security emergency occurs, the resulting surge conditions shall not be considered in determining compliance with permit terms. A "national security emergency" is where extremely quick action is needed, and when timing of such action may make it impractical to meet one or more requirements of an applicable permit. National security emergencies are actions necessary to support operations of the United States forces introduced into hostilities or introduced into situations where involvement in hostilities is indicated or a possibility, peacekeeping operations, rendering emergency humanitarian relief, actions to extinguish wildfires, immediate responses to the release or discharge of oil or hazardous material and responses to natural disasters such as hurricanes, earthquakes, or civil disturbances such as terrorist acts and military mobilizations. A "surge condition" occurs when the temporary response to the national security emergency requires an increase above and beyond the normal operating levels of the installation or activity, and such increase cannot be accommodated with the terms of the applicable permit limitations.

4.2 It was decided not to incorporate the alternate operating scenario listed in Paragraph 4.1 above to eliminate the burden on the Department of defining a "surge condition" when enforcing permit requirements. Enforcement action regarding violations are handled by the Department on a case-by case basis.

5. Air Pollution Controls.

5.1 The jaw crushing plant with CV-40-D screener is equipped with a water spray system to abate fugitive dust. The system is described in Paragraph 1.6.h.

5.2 A water spray truck and water sprinklers will be used to control fugitive dust along facility grounds for the jaw crusher, screeners, and tub grinder and used as necessary to prevent dust from becoming airborne.

5.3 Above ground storage tanks at the base storing JP-8 are equipped with floating pan roofs to reduce VOC emissions.

6. Project Emissions.

6.1 Emission factors from AP-42, Section 1.3 (9/98), "Fuel Oil Combustion" were used to determine emissions from the four boilers requiring a permit. Emission rates were based on the maximum heat rate input capacity of each boiler that is 2.1 MMBtu/hr, 8,760 hr/yr operation, and a 137,000 Btu/gal heating value for fuel oil No. 2. Emissions are shown in Enclosure (2) and summarized below as follows:

Boiler Emissions			
Pollutant	Emission Factor (lb/MMBtu)	Emission Each Boiler (lb/hr)/(g/s)	Total Combined Emission (TPY) All Boilers 8,760 hr/yr
NO_X	20	0.307/0.039	2.7
CO	5	0.077/0.010	0.7
SO_2	71	1.088/0.137	9.5
PM	2	0.031/0.004	0.3
PM-10	1.08	0.017/0.002	0.1
PM-2.5	0.83	0.013/0.002	0.1
VOC	0.34	----------	0.046
HAPs	Various	----------	0.006

6.2 Emission factors from AP-42, Section 3.3 (10/96), "Gasoline and Industrial Engines" were used to determine emissions from the 66 hp internal combustion engines used to wind back cables that stop planes in an emergency at the airport runway. Emission rates were based on the maximum rated capacity of 65.9 hp for each engine. All engines are fired on gasoline. Emissions are shown in Enclosure (3) and summarized below as follows:

Internal Combustion Engine Emissions				
Pollutant	Emission Factor (lb/hp-hr)	Emission Rate (lb/hr)/(g/s)	Emission (TPY)	
			Some limits G-658 at 8,760 hr/yr G-675 at 8,760 hr/yr G-855 at 730 hr/yr G-856 at 730 hr/yr	No Limits All Engines at 8,760 hr/yr
NO_x	0.011	0.725/0.092	6.9	12.7
CO	0.439	28.930/3.653	274.5	506.9
SO_2	5.91E-04	1.065/0.134	0.4	0.7
PM	7.51E-04	0.049/0.006	0.5	0.8
PM-10	7.21E-04	0.048/0.006	0.5	0.8
PM-2.5	6.76E-04	0.045/0.006	0.4	0.7
VOCs	0.36	----------	13.5	24.9
HAPs	various	----------	4.0	7.5

6.3.1 Data from calendar year 1999 operations was used to determine emissions from aircraft engine testing. Because this data was used to estimate maximum potential emissions for the initial covered source permit, calendar year 1999 emissions are the base-line emissions for engine testing operations. Emission factors for F-15 and C-130 aircraft engines for NO_2, CO, PM, PM-10, VOC, and HAPs were provided by the Air Force's JP-8 Aircraft Engine Emissions Characterization Study. The SO_2 emission factor was based on an average JP-8 sulfur content of 0.067%. However, the material safety data sheet for JP-8 from Tesoro Hawaii Corporation indicates a maximum sulfur content of 0.5%. As such, a sulfur content of 0.5% was assumed to determine the SO_2 emission factor as follows:

EF_{SO2} = 20*(weight% sulfur) = 20*(0.5) = 10 lb/1,000 lb of JP-8 (per 2002 emissions inventory)

or

(1,000 lb fuel)(0.0005)(64 lb SO_2/32 lb S) = 10 lb SO_2/1,000 lb fuel

6.3.2 Emissions for testing F-15 engines installed on aircraft and on test stand inside the hush house were determined from calendar year 1999 fuel use records Fuel consumption was determined from spread sheet calculations that relate fuel use to operation time. Operating time and fuel use is logged for each test mode. Emissions are shown below.

F-15 Aircraft Engine Testing TC-11666/Hush House						
Pollutant	Emission Factor (lb/1000 lb fuel)	Engine Test Mode	Fuel Consumed (lb/yr)	Emission (TPY)		
			Hush House (TC-11666) (114 hours total test time)	Actual 114 hrs.	Limited 416 hrs.	No Limit 8,760 hrs.
NO_X	4.38	Idle	174,990	0.38	----------	----------
	30.89	70% Power	3,389	0.05		
	30.89	75% Power	13,430	0.21		
	30.89	80% Power	22,877	0.35		
	30.89	85% Power	20,006	0.31		
	39.44	Military	214,665	4.23		
	6.62	Afterburner	97,412	0.32		
			Total------->	5.9	21.5	453.4
CO	35.29	Idle	174,990	3.1	----------	----------
	0.91	70% Power	3,389	0.002		
	0.91	75% Power	13,430	0.006		
	0.91	80% Power	22,877	0.01		
	0.91	85% Power	20,006	0.009		
	0.9	Military	214,665	0.097		
	9.57	Afterburner	97,412	0.47		
			Total------->	3.7	13.5	284.3

SO_2	10	Idle	174,990	0.875	---------	----------
		70% Power	3,389	0.017		
		75% Power	13,430	0.067		
		80% Power	22,877	0.114		
		85% Power	20,006	0.160		
		Military	214,665	1.07		
		Afterburner	97,412	0.49		
			Total----->	2.8	10.2	215.2
PM & PM-10 PM-2.5	2.06	Idle	174,990	0.18	---------	----------
	2.06	70% Power	3,389	0.003		
	2.06	75% Power	13,430	0.014		
	2.06	80% Power	22,877	0.024		
	2.06	85% Power	20,006	0.021		
	1.33	Military	214,665	0.143		
	1.15	Afterburner	97,412	0.056		
			Total------->	0.44	1.6	33.8
VOC	8.6	Idle	174,990	0.75	---------	----------
	0.14	70% Power	3,389	0.0002		
	0.14	75% Power	13,430	0.0004		
	0.14	80% Power	22,877	0.0016		
	0.14	85% Power	20,006	0.0014		
	0.275	Military	214,665	0.0295		
	0.05	Afterburner	97,412	0.0024		
			Total--------->	0.79	2.9	60.7
HAPs	1.34	Idle	174,990	0.117		
	0.046	70% Power	3,380	0.0001		
	0.046	75% Power	13,430	0.0003		
	0.046	80% Power	22,877	0.0005		
	0.046	85% Power	20,006	0.0004		
	0.054	Military	214,665	0.0058		
	0.075	Afterburner	97,412	0.0037		
			Total------->	0.13	0.47	9.9

6.3.3 Emissions for testing F-15 engines on test stand at site TC-11665A were determined from calendar year 1999 fuel use records Total fuel use was determined from spread sheet calculations that relate fuel consumption to operation time. Operation time is logged for each test mode. Emissions are shown below.

F-15 Aircraft Engine Testing TC-11665A					
Pollutant	Emission Factor (lb/1000 lb fuel)	Engine Test Mode	Fuel Consumed (lb/yr)	Emission (TPY)	
			Site TC-11665 A (281 hours total test time)	Actual 281 hrs.	No Limit 8,760 hrs.
NO_X	4.38	Idle	423,408	0.927	----------
	12.33	70% Power	15,762	0.097	
	30.89	75% Power	50,746	0.784	
	30.89	80% Power	78,691	1.2	
	30.89	85% Power	66,467	1.0	
	39.44	Military	463,898	9.1	
	6.62	Afterburner	313,482	1.0	
			Total------->	14.1	439.6
CO	35.29	Idle	423,408	7.5	----------
	0.91	70% Power	15,762	0.007	
	0.91	75% Power	50,746	0.023	
	0.91	80% Power	78,691	0.036	
	0.91	85% Power	66,467	0.030	
	0.9	Military	463,898	0.208	
	9.57	Afterburner	313,482	1.5	
			Total------->	9.3	289.9
SO_2	10	Idle	423,408	2.1	----------
		70% Power	15,762	0.079	
		75% Power	50,746	0.254	
		80% Power	78,691	0.393	
		85% Power	66,467	0.332	
		Military	463,898	2.3	
		Afterburner	313,482	1.5	
			Total----->	7.0	218.2
PM PM-10 PM-2.5	2.06	Idle	423,408	0.436	----------
	2.06	70% Power	15,762	0.016	
	2.06	75% Power	50,746	0.052	
	2.06	80% Power	78,691	0.081	
	2.06	85% Power	66,467	0.068	
	1.33	Military	463,898	0.308	
	1.15	Afterburner	313,482	0.180	
			Total------->	1.1	34.3
VOC	8.6	Idle	423,408	1.8	----------
	0.14	70% Power	15,762	0.001	
	0.14	75% Power	50,746	0.004	
	0.14	80% Power	78,691	0.006	
	0.14	85% Power	66,467	0.002	

	0.275	Military	463,898	0.064	
	0.05	Afterburner	313,482	0.008	
			Total--------->	1.9	59.2
HAPs	1.34	Idle	423,408	0.284	----------
	0.046	70% Power	15,762	0.0004	
	0.046	75% Power	50,746	0.001	
	0.046	80% Power	78,691	0.002	
	0.046	85% Power	66,467	0.001	
	0.054	Military	463,898	0.013	
	0.075	Afterburner	313,482	0.012	
			Total--------->	0.3	9.4

6.4 Emission factors taken from AP-42, Section 2.1 (10/96), Refuse Combustion (Table 2.1-12) were used to predict emissions from two incinerators at the base that are operated to burn waste paper and photographic material. Emissions were based on the maximum rated capacity of each incinerator that is 750 lb/hr and 8,760 hr/yr operation. Because no emission factors were available for PM 2.5, it was assumed that PM-10 emissions equals those for PM 2.5. Emissions, shown in Enclosure (4), are summarized below as follows:

Incinerator Emissions

Pollutant	Emission Factor (lb/ton)	Emission Rate Each Incinerator (lb/hr)/(g/s)	Emissions (TPY) Both Incinerators at 8,760 hr/yr
NO_X	3	1.125/0.142	9.9
CO	10	3.750/0.473	32.9
SO_2	2.5	0.938/0.118	8.2
PM	7	2.625/0.331	23.0
PM-10	4.7	1.763/0.223	15.4
PM-2.5	4.7	1.763/0.223	15.4
VOC	3	1.125/0.142	9.9

6.5 Emissions from JP-8 fueling operations were determined using equation from AP-42, Section 5.2 (1/95), "Transportation and Marketing of Petroleum Liquids". Loading will be from bottom loading load rack to tank truck, tank truck to aircraft, and hydrant to aircraft. A total combined throughput limit of 300,000,000 gallons/yr for the various loading operations, as proposed by Hickam Air Force Base, was assumed. For emission estimates, Tesoro Hawaii Corporation indicated that the molecular weight of JP-8 is 170 lbs/lb-mole. Also, information from Military Services Convert from JP-4 to JP-8, A Pollution Prevention Story, indicates the true vapor pressure of JP-8 at 80 ^{O}F is 0.062 psi. The HAP emissions were based on each constituent's vapor mass fraction from Hickam

Air Force Base's 2002 emissions inventory times total VOCs. Maximum potential emissions for 8,760 hr/yr operation were based on the total combined throughput for calendar year 2002 multiplied by a factor of 8,760/1,992 based on information on shop operating hours [(8 hr/day)(5 day/wk)(minus 11 holidays)(52 wk/yr) = 1,992 hr/yr]. The most current inventory information was used because JP-8 fueling operations will be rebuilt and are considered a new source of emissions. Total combined fuel loading throughput was based on 32,262,913 gallons loaded from load rack to tank truck, 32,262,913 gallons loaded from tank truck to aircraft, and 59,914,982 gallons loaded from hydrant to aircraft [total combined throughput = 124,440,808 gallons]. JP-8 fueling emissions are shown in the following table:

JP-8 Loading Facility Emissions			
Pollutant	Vapor Mass Fraction	Emissions (TPY)	
		Limited[a] 300,000,000 gal/yr	No Limits[b] 8,760 hr/yr
VOC	----------	21.8	39.9
benzene	0.0061	0.132	0.243
cumene	0.0033	0.072	0.132
ethylbenzene	0.0027	0.059	0.108
naphthalene	0.00003	0.0007	0.001
toluene	0.0114	0.249	0.455
2,2,4 trimethylpentane	0.0001	0.002	0.004
xylene	0.019	0.414	0.758
	Total HAPs--------->	1.2	1.7

a. L_L (lb/1,000 gal) = 12.46 SPM/T = 12.46(0.6)(0.062)(170/540) = 0.1459 lb/1,000 gal
(0.1459 lb/1,000 gal)(300,000,000 gal/yr)(ton/2,000 lb) = 21.8 TPY

b. VOC emission TPY = (0.1459 lb/1,000 gal)(124,440,808 gal/yr)(ton/2,000 lb)(8,760/1,992) = 39.9

6.6 Emission factors taken from AP-42, Section 11.19.2 (1/95), "Crushed Stone Processing" were used to predict fugitive dust emissions from the rock crushing and screening operations. A 70% control efficiency was used to account for wet suppression methods used at the base. Emissions, shown in Enclosure (5), were based on the maximum rated capacity of each equipment and 1,000 hr/yr operation. Emissions are summarized below as follows:

Crushing, Screening and Plant Emissions		
Pollutant	Emission Rate (TPY) Limited with Water Sprays 1,000 hr/yr	PM Emission Rate (TPY) No Limits with Water Sprays 8,760 hr/yr
PM	10.3	90.6
PM-10	3.0	25.9
PM-2.5	1.5	13.1

6.7 Emissions from active stockpiles were determined using AP-42, Section 13.2.4 (1/95), "Aggregate Handling and Storage Piles". Emissions were based on a total production from the 130 TPH crushing and screening plan of 130,000 TPY and production from the screening plant of 225,000 TPY for 1,000 hr/yr operation. Emission factors were determined from the following data: 10.8 mph average wind speed for Honolulu for year 2004 based on data from the Western Regional Climate Center, K value for PM-2.5, PM-10, and PM of 0.11, 0.35, and 0.74, respectively, and 0.7% mean moisture content for stone quarrying and processing. A 70% control efficiency was assumed for the storage piles for using water sprays. Emissions are summarized below as follows:

Stockpile Emissions			
Pollutant	Emission Factor (lb/ton)	Emission Rate (TPY) Limited with Water Sprays 1,000 hr/yr	Emission Rate (TPY) No Limits with Water Sprays 8,760 hr/yr
PM	0.028	1.5	13.1
PM-10	0.013	0.7	6.1
PM-2.5	0.004	0.2	1.8

6.8 Emissions from vehicle travel on unpaved roads were calculated using the emission factor equation for vehicles traveling on unpaved surfaces at industrial sites. The equation was obtained from AP-42, Section 13.2.2 (12/03) "Unpaved Roads". Equation (1a) emission factor was extrapolated to annual average uncontrolled conditions using Equation (2). Emission rates were based on the following assumptions:

a. A distance of 8,095 vehicle miles traveled per year for the 130 TPH and 210 TPH plants based on 1,000 hr/yr operation, an average truck capacity of 21 tons that is data obtained from permit file no. 0562-01 for CTS Earth Moving, and a 0.5 mile two-way travel distance;

b. A k (constant) for PM, PM-10, and PM-2.5 of 4.9, 1.5, and 0.23 respectively based on data for industrial roads;
c. An a (constant) for PM, PM-10, and PM-2.5 of 0.7, 0.9, and 0.9 respectively based on data for industrial roads;
d. A b (constant) for PM, PM-10, and PM-2.5 of 0.45 based on data for industrial roads;
e. An s (silt content of road) value of 3.9% based on information from AP-42, Section 13.2.2 - Unpaved Roads Related Information (www.epa.gov//ttn/chief/ap42/ch13/related/c13s02-2.html;
f. A W (mean vehicle weight) value of 26.5 tons based on data from permit file no. 0562-01;
g. A p (# of days with 0.01" of rain/year) value of 81 based on available data between years 1962 and 2004 from Honolulu Observatory 702.2 from Wester Regional Climate Center (www.wrcc.dri.edu/cgi-bin/cliGCStP.pl?hiopih);
h. A 70% control efficiency was applied to account for dust control from water trucks; and
i. Vehicle travel emissions are listed as follows:

Vehicle Travel Emissions

Pollutant	Emission Factor (lb/VMT)	Emission Rate (TPY) Limited with Water Sprays 1,000 hr/yr	Emission Rate (TPY) No Limits with Water Sprays 8,760 hr/yr
PM	4.623	5.6	49.2
PM-10	0.113	0.5	4.0
PM-2.5	0.017	0.02	0.2

6.9 Fugitive emissions associated with the tub grinder were not evaluated because no emission factors were found to predict emissions from this operation. Tub grinders are not regulated by NSPS and fugitive emissions associated with this equipment would not be included in the major source determination.

6.10 Emission factors from AP-42, Section 3.3 (10/96), "Gasoline and Industrial Engines" were used to determine emissions for the 175 kW Perkins diesel engine servicing the portable crushing plant. Emission rates were based on a 11.75 gal/hr maximum fuel consumption, 1,000 hr/yr operation, and a fuel heating value of 137,000 Btu/gal. Emissions are summarized as follows:

175 kW Diesel Engine Emissions				
Pollutant	Emission Factor (lb/MMBtu)	Emission Rate (lb/hr)/(g/s)	Emission Rate (TPY) Limited 1,000 hr/yr	Emission Rate (TPY) Uncontrolled 8,760 hr/yr
NO_X	4.41	7.10/0.896	3.6	31.1
CO	0.95	1.53/0.193	0.8	6.7
[a]SO_2	based on mass balance	0.83/0.105	0.4	3.6
[b]PM	0.32	0.52/0.066	0.3	2.3
PM-10	0.31	0.50/0.063	0.3	2.2
[c]PM-2.5	0.29	0.47/0.059	0.2	2.1
VOC	0.36	----------	0.3	2.5
HAPs	Various (0.006)	----------	0.005	0.042

a. Based on mass balance as follows:

$S/SO_2 = 32.05/64.06$

(11.75 gal/hr)(7.1 lb diesel/gal)(0.005) = 0.417 lb/hr sulfur

$SO_2 = (0.417)(64.06/32.06) = 0.833$ lb/hr

b. Based on AP-42, Appendix B.2 (9/90), Table B.2-2, indicating 96% PM = PM-10 worst-case.

c. Based on AP-42, Appendix B.2 (9/90), Table B.2-2, indicating 90% PM = PM-2.5 worst-case.

6.11 Emission factors from AP-42, Section 3.3 (10/96), "Gasoline and Industrial Engines" were used to determine particulate emissions for the 450 hp Cummins diesel engine servicing the portable tub grinder. Emission rates were based on a 22.69 gal/hr maximum fuel consumption, 1,000 hr/yr operation, and 137,000 Btu/gal. Manufacturer's data from source testing for hydrocarbons, NO_X, and CO was also used. Emissions are summarized as follows:

450 hp Diesel Engine Emissions				
Pollutant	Emission Factor	Emission Rate (lb/hr)/(g/s)	Emission Rate (TPY) Limited 1,000 hr/yr	Emission Rate (TPY) Uncontrolled 8,760 hr/yr
[a]NO_X	7.07 g/hp-hr	6.999/0.884	3.5	30.7
[a]CO	0.76 g/hp-hr	0.752/0.095	0.4	3.5
[b]SO_2	based on mass balance	1.609/0.203	0.8	7.0
[c]PM	0.32 lb/MMBtu	0.995/0.125	0.50	4.4
[d]PM-10	0.31 lb/MMBtu	0.963/0.122	0.48	4.2
[e]PM-2.5	0.29 lb/MMBtu	0.901/0.114	0.45	3.9
[a]VOC	0.25 g/hp-hr	----------	1.1	9.6
[d]HAPs	Various (0.006 lb/MMBtu)	----------	0.009	0.079

a: Based on emissions data from the engine manufacturer.

b: Based on mass balance as follows:

$S/SO_2 = 32.05/64.06$

(22.69 gal/hr) (7.1 lb diesel/gal)(0.005) = 0.805 lb/hr of Sulfur

$SO_2 = (0.805)(64.06/32.06) = 1.609$ lb/hr

c: Based on AP-42, Appendix B.2 (9/90), Table B.2-2, indicating 96% PM = PM-10 worst-case.

d: Based on AP-42, Section 3.3, Table 3.3-1 emission factors.

e: Based on AP-42, Appendix B.2 (9/90), Table B.2-2, indicating 90% PM = PM-2.5 worst-case.

6.11 Worst-case yearly emissions of criteria pollutants and HAPs from base equipment are shown below.

FACILITY-WIDE EMISSIONS		
Pollutant	Potential Emissions (TPY) [Facility-Wide, Controlled With Applicable Limits]	Potential Emissions (TPY) [Facility-Wide, Uncontrolled 8,760 hr/yr]
NO_x	487.7	980.1
CO	612.7	1,124.9
SO_2	247.7	462.4
PM	77.9	251.8
PM-10	56.9	126.8
PM-2.5	54.2	105.4
VOC	108.7	206.7
HAPs	13.9	28.6

7. Air Quality Assessment.

7.1 An ambient air quality impact analysis (AAQIA) was conducted for the 175 kW diesel engine servicing the 130 TPH rock crushing plant, the 450 hp diesel engine servicing the tub grinder, and the 2.1 MMBtu/hr Bryan Boiler. An ISCST3 model was used for the analysis. Existing equipment at the base was considered to be part of background pollutant concentrations that were added to the total air impacts. Assumptions for the model to determine air impacts included:

a. Receptors surrounding sources within an 18,000 feet x 12,000 feet grid area that were located in 300 feet increments to determine general location of maximum impacts;

b. Receptors surrounding general area of maximum impacts within a 4,500 feet x 4,000 feet grid area that were located in 75 feet increments to determine maximum impacts;

c. EPA building profile input program (BPIP) was applied to evaluate downwash from buildings surrounding the boiler and from the rock crushing and tub grinder plants that the diesel engines service. An arbitrary axis was established in-line with the North arrow on the facility map for North and South coordinates and another axis was drawn perpendicular to the North-South axis for East and West coordinates;

d. Meteorological data from file LHON91.BIN from the Honolulu International Airport was converted to file LHON91ASC by the modeling program and used for evaluation;

e. No terrain data was used because Hickam Air Force Base is at sea level and relatively flat;

f. Rural land use;

g. Capped stack parameters for the boiler were used per EPA guidance and included the following:

1. Setting stack exit velocity to 0.001 m/s;
2. Reducing the stack height by three times the actual diameter; and
3. Increasing the stack diameter so that the flow rate is the same as actual flow rate at 0.001 m/s velocity; and

h. Selection of 1 hour, 3 hour, 24 hour, and annual averaging times to compare impacts against air standards;

7.2 The following background concentrations were used for the assessment:

a. PM_{10}, CO , and SO_2 - collected in 2003 from the Honolulu monitoring station; and
b. NO_2 - collected in 2003 from the Kapolei monitoring station.

7.3 The table below presents the emission rates and stack parameters used in the AAQIA for burning fuel oil No. 2 to determine the short term impacts.

SOURCE		EMISSION RATES				STACK PARAMETERS			
Equipment	Stack No.	NO_x (g/s)	SO_2 (g/s)	CO (g/s)	PM_{10} (g/s)	Height (m)	Temp. (K)	Vel. (m/s)	Dia. (m)
2.1 MMBtu/hr Boiler	1	0.039	0.137	0.010	0.002	5.25 actual 4.50 cap	422	11.58 actual 0.001 cap	0.25 actual 21.92 cap
175 kW Diesel Engine	2	0.896	0.105	0.193	0.063	3.87	736	2.1	0.086
450 hp Diesel Engine	3	0.884	0.203	0.095	0.122	3.60	714	108.7	0.127

a: d = (3.4 in)(2.54 cm/in)(m/100 cm) = 0.086 m
$A = \Pi(d^2)/4 = \Pi(0.086\ m)^2/4 = 0.0058\ m^2$
$Q = (26.4\ ft^3/min)(min/60\ s)(1{,}728\ in^3/ft^3)(16.387\ cm^3/in^3)(m^3/1{,}000{,}000\ cm^3) = 0.012\ m^3/s$
$V = Q/A = (0.012\ m^3/s)(1/0.0058\ m^2) = 2.1\ m/s$

b: d = (5 in)(2.54 cm/in)(m/100 cm) = 0.127 m
$A = \Pi(d^2)/4 = \Pi(0.127\ m)^2/4 = 0.0127\ m^2$
$Q = (2{,}931\ ft^3/min)(min/60\ s)(1{,}728\ in^3/ft^3)(16.387\ cm^3/in^3)(m^3/1{,}000{,}000\ cm^3) = 1.38\ m^3/s$
$V = Q/A = (1.38\ m^3/s)(1/0.0127\ m^2) = 108.7\ m/s$

7.4 The table below presents the emission rates and stack parameters used in the AAQIA for burning fuel oil No. 2 to determine the annual impacts. The gram per second emission rate for the diesel engines were multiplied by 1,000 hr/8,760 hr to account for the 1,000 hr/yr operation limit for the diesel engines.

SOURCE		EMISSION RATES		
Equipment	Stack No.	NO_x (g/s)	SO_2 (g/s)	PM_{10} (g/s)
2.1 MMBtu/hr Boiler	1	0.039	0.137	0.002
175 kW Diesel Engine	2	0.102	0.012	0.007
450 hp Diesel Engine	3	0.101	0.023	0.014

7.5 The predicted concentrations in the table below are based on full capacity operation of the boiler and diesel engines at 8,760 hr/yr operation. A 1,000 hour per year operation limit for each diesel engine was incorporated into the air impact analysis to determine maximum annual impacts. Results from the air modeling assessment show compliance with state and federal air standards.

PREDICTED AMBIENT AIR QUALITY IMPACTS						
AIR POLLUTANT	AVERAGING TIME	IMPACT (ug/m^3)	BACKGROUND (ug/m^3)	TOTAL IMPACT (ug/m^3)	AIR STANDARD (ug/m^3)	PERCENT STANDARD
SO_2	3-Hour	506	67	573	1,300	44
	24-Hour	219	17	236	365	65
	Annual	68	1	69	80	86
NO_2	Annual	19	9	28	70	40
CO	1-Hour	775	2,850	3,625	10,000	36
	8-Hour	199	1,539	1,738	5,000	35
PM_{10}	24-Hour	29	32	61	150	41
	Annual[a]	1	15	16	50	32

8. Significant Permit Conditions.

8.1 The total operating hours of internal combustion engine No. G-855, shall not exceed 730 hours in any rolling twelve-month (12-month) period.

8.2 The total operating hours of internal combustion engine No. G-856, shall not exceed 730 hours in any rolling twelve-month (12-month) period.

Reason for 8.1-8.2: These conditions were incorporated into the permit during a previous permit revision to prevent Hickam Air Force Base from triggering BACT. The BACT requirements are in accordance with PSD regulations if significant emission thresholds are exceeded. Previously, existing engines were replaced with entirely new engines. Although the engines are small (66 hp), because the units are fired on gasoline, CO emissions for continuous operation exceed the significant emissions level of 100 TPY for each engine.

8.3 The total combined hours of operation for testing F-15 aircraft engines installed on aircraft and on test stand inside the hush house (site TC-11666) shall not exceed 416 hours in any rolling twelve (12) month period.

Reason for 8.3: This condition was required for the initial permit pursuant to an air modeling assessment. The hush house, as a point source, was among those sources evaluated. Sources included two boilers, one generator, two incinerators, and the hush house.

8.4 The total combined JP-8 throughput for load rack to tank truck, tank truck to aircraft, and hydrant to aircraft loading shall not exceed 300,000,000 gallons in any rolling twelve-month (12-month) period for fuel supplied by existing and new bottom loading load racks.

Reason for 8.4: The condition was required for the permit renewal to prevent the facility from triggering BACT requirements. Continuous operation of the JP-8 loading facility in combination with other sources added to the permit will exceed the significant VOC emissions threshold of 40 TPY.

8.5 The total operating hours of the 130 TPH jaw crushing plant, as represented by the total operating hours of the 175 kW diesel engine, shall not exceed 1,000 hours in any rolling twelve-month (12-month) period.

8.6 The total operating hours of the CV-40-D screening plant, as represented by the total operating hours from control panel, shall not exceed 1,000 hours in any rolling twelve-month (12-month) period.

8.7 The total operating hours of the SW348 screening plant as represented by the total operating hours from control panel, shall not exceed 1,000 hours in any rolling twelve-month (12-month) period.

8.8 The total operating hours of the tub grinder and 450 hp diesel engine, as represented by the total operating hours from control panel, shall not exceed 1,000 hours in any rolling twelve-month (12-month) period.

Reason for 8.5 to 8.8: These conditions were required for the permit renewal to prevent the base from triggering BACT requirements. Continuous operation of the crushing, screening, and tub grinder would exceed significant emission levels for PM, PM-10, and NO_X. The limits also ensure compliance with the annual air quality standard for NO_X.

9. <u>Conclusion and Recommendation</u>.

9.1 Actual emissions from Hickam Air Force Base should be lower than predicted since calculations were base on operation of equipment and facilities at maximum capacity. Equipment and facilities at the base are not expected to reach maximum capacity for extended periods during actual service. The hour limitations on the diesel engines servicing the tub grinder and stone processing equipment should ensure compliance with state and federal ambient air quality standards for the combustion of fuel oil No. 2. Wet suppression measures will be used to control fugitive dust from crushing, screening, and tub grinding operations. Floating pan roofs are used inside JP-8 storage tanks at the base to control VOC emissions. Recommend issuance of the permit subject the 30 day public comment period, and 45 day EPA review period that will be initiated simultaneously.

Mike Madsen 4-14-2005