State of Utah
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF AIR QUALITY

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October 18, 1994

DAQE-915-94

James R. Van Orman
Director, Environmental Management Office
Department of the Air Force
Headquarters Ogden Air Logistics Center (AFLC)
Hill Air Force Base, Utah 84056

Re: Change of Jet Fuel from JP-4 to JP-8

Dear Mr. Van Orman:

The Division has received your letter dated August 8, 1994, requesting approval for the use of JP-8 instead of JP-4 as currently specified in your Approval Order (DAQE-167-92 dated October 13, 1992). It is our understanding that the true vapor pressure of JP-8 is significantly lower than that of JP-4 and that emissions associated with handling and storage of this fuel will result in lower emissions than previously reviewed in your present AO. It is also our understanding that no physical changes will occur such as tank sizes or the addition of new tanks emission control equipment etc..

Since no new equipment will be added and because there will be no change (or a decrease) in emissions, no change is necessary to your existing Approval Order. However, if this is a permanent change and you wish to receive emission credit for the emission reductions that may have occurred, you will need to submit a Notice of intent for a modification to your AO. In addition, if there are other conditions that need to be changed such as condition #4 (fuel use limitations etc.) a NOI should be submitted and the AO will be modified.

Thank you for keeping us informed of the changes that are being made to operations at your facility. If you have further questions regarding requirements for an AO modification please don't hesitate to call me at 536-4096.

Sincerely,

Lynn R. Menlove

Lynn R. Menlove, Manager
New Source Review Section
Utah Division of Air Quality

LRM:DC:aj

4.2.4-415

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS OGDEN AIR LOGISTICS CENTER (AFMC)
HILL AIR FORCE BASE, UTAH

08 August 1994

OO-ALC/EM
7274 Wardleigh Road
Hill AFB UT 84056-5137

Mr. Russell A. Roberts
State of Utah
Division of Air Quality
P.O. Box 144820
Salt Lake City Ut 84114-4820

Re: Approval Order DAQE-167-92 for JP-4 Tank Throughput Limitations

Dear Mr. Roberts

Hill AFB will change from JP-4 to JP-8 in October 1995. The storage tank approval order allows a JP-4 throughput of 1,260,000 barrels per 12-month period. Since the vapor pressure of JP-8 (0.0085 psia) is much lower than JP-4 (1.3 psia), HC-emissions are less than 2% of JP-4 emissions. Calculations of the HC-emissions based on 1993 throughput are included at Attachment 1. AP-42 emission factors for the floating and fixed roof tanks and a simplified distribution schematic were used to compare JP-4 and JP-8 emissions.

Edwards AFB, located in California, has changed to JP-8, but California does not regulate JP-8 vapor emissions. How will Utah

handle JP-8 vapor emissions and should the Approval Order be modified because of the change?

If you have any questions, please call Mr. Andreas Zekorn at 777-0359.

Sincerely

James R. VanOrman

JAMES R. VAN ORMAN
Director of Environmental Management

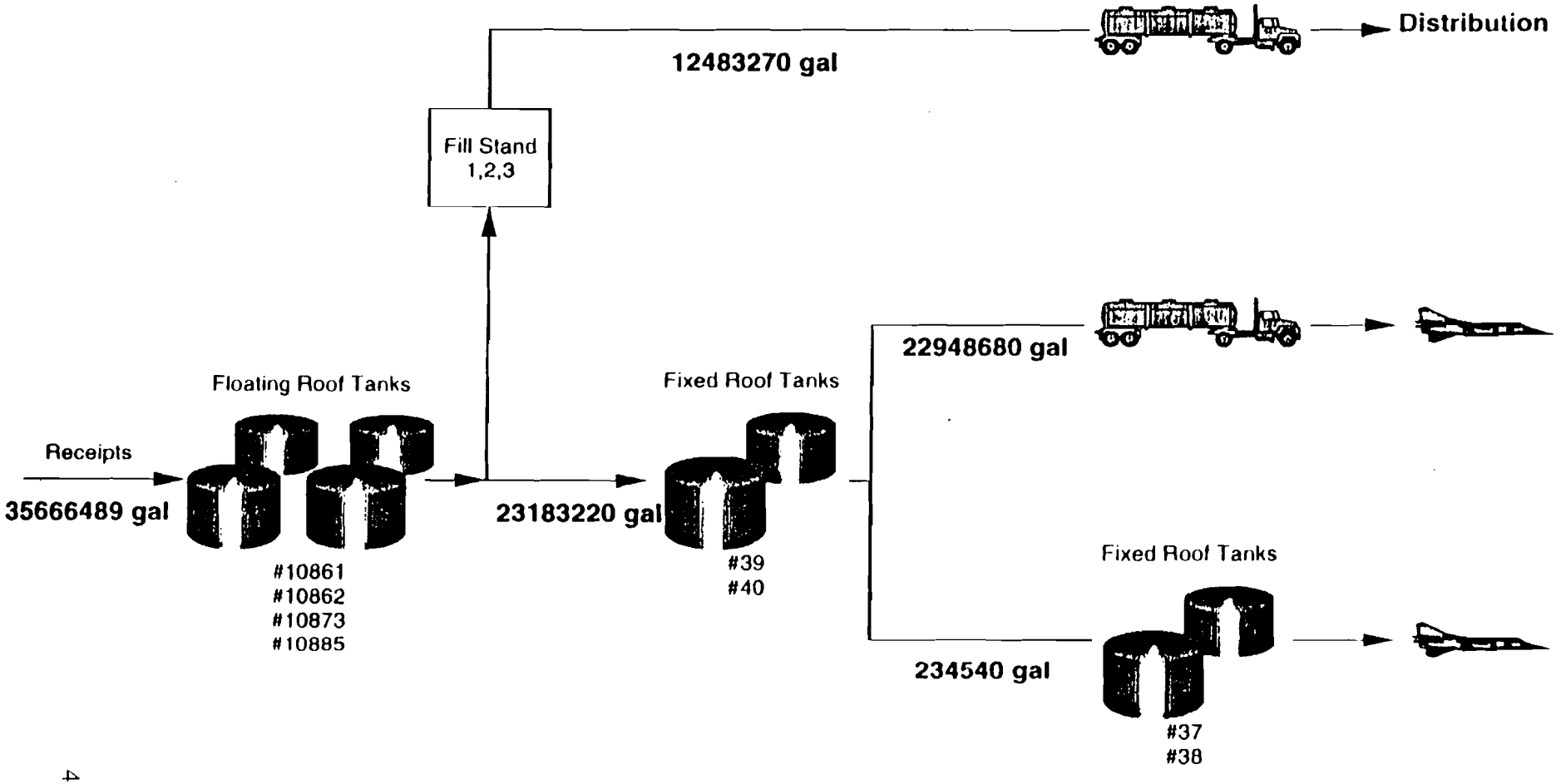
Attachment
HC-Emissions calculations

Storage Tanks HC-Emissions

	JP-4	JP-8
Tank #10885 Floating Roof :	2373.5 lb/yr	69.2 lb/yr
Tank #10873 Floating Roof	800.6 lb/yr	65.0 lb/yr
Tank #10861 Floating Roof	152.4 lb/yr	3.0 lb/yr
Tank #10862 Floating Roof	193.5 lb/yr	10.9 lb/yr
Tank #37 Fixed Roof	972.6 lb/yr	44.8 lb/yr
Tank #38 Fixed Roof	972.6 lb/yr	44.8 lb/yr
Tank #39 Fixed Roof	8991.8 lb/yr	130.0 lb/yr
Tank #40 Fixed Roof	8991.8 lb/yr	130.0 lb/yr
Total	23448.7 lb/yr	497.7 lb/yr
	11.7 tons/yr	0.2 tons/yr
Difference	22951.0 lb/yr	
	11.5 tons/yr	

4.2.4-418

Simplified JP-4 Distribution Schematic



4.2.4-419

Storage Tanks & Fuel Transfer Losses

External Floating Roof Tanks

Tank #10885-Emissions with Dual Seal System

LT=LR+LW+LF+LD

LT = total loss(lb/yr)
LR = rim seal loss
LW = withdrawal loss
LF= deck fittings loss
LD = deck seam loss

LR=KS VN P* D MV KC

LR=	rim seal loss (lbs/yr)
KS=	table 4.3-4.AP-42. for welded tank with liquid mounted resilient seal and rim mounted secondary seal)
n=	table 4.3-2
D=	tank diameter in ft
MV=	molecular weight (Table 4.3-2)
KC=	product factor
V=	average wind speed
P=	true vapor pressure
PA=	average atmospheric pressure at tank location
P*=	vapor pressure function

	JP-4	JP-8
KS=	1.6	
n=	0	
MV=	80 lb/lbmole	130 lb/lbmole
KC=	1	
V=	8 mph	
D=	93 ft	
P*=(P/PA)/(1+(1-P/PA)^0.5)^2		
PA=	12.4 PSIA	12.4 PSIA
P=	1.3 PSIA	0.0085 PSIA

P*=	0.027680768	P*=	0.00017143
LR=	**329.5 lb/yr**	**LR=**	**3.3 lb/yr**

4.2.4-420

LW= 0.943 Q C WL (1 + (NC FC/D)) / D

LW=	withdrawal loss (lb/yr)
Q=	througput (bbl/yr)
C=	shell clingage factor (bbl/1000 ft^2)
WL=	average organic liquid density (lb/gal)
D=	tank diameter (ft)
NC=	number of columns
FC=	effective column diameter (ft)

Q=	18029375	gal		
	429279.42	bbl		
C=	0.0015	bbl/1000 ft^2		
WL=	6.4	lbs/gal	WL=	7 lbs/gal
D=	93	ft		
NC=	0			
FC=	1			
LW=	**41.8**	**lbs/yr**	**LW=**	**45.7 lbs/yr**

LF=FF P* MV KC

LF=	fitting loss (lb/yr)
FF=	total deck fitting loss factor (lb-mole/yr)
P*,MV,KC=	see above

P*=	0.027680768		P*=	0.00017143
MV=	80	lb/lbmole	MV=	130 lb/lbmole
KC=	1			
FF=	316	lbs Mole/yr		
LF=	**699.8**	**lbs/yr**	**LF=**	**7.0 lbs/yr**

4.2.4-421

LD= KD SD D^2 P* MV KC

LD=	deck seam losses (lb/yr)
KD=	deck seam loss per unit seam length factor (lb-mole/ft yr)
SD=	deck seam length factor (ft/ft^2)
D.P*.MV.KC=	see above

KD=	0.34 lb mole / ft yr		
D=	93 ft		
P*=	0.027680768	P*=	0.00017143
MV=	80 lb/lbmole	MV=	130 lb/lbmole
KC=	1		
SD=	0.2 ft/ft^2		
LD=	**1302.4 lb/yr**	**LD=**	**13.1 lb/yr**

Total HC Emissions Tank #10335 with Double Seal

	JP-4		JP-8
LT=	**2373.5 lb/yr**	**LT=**	**69.2 lb/yr**

Difference: 2304.3 lb/yr

Tank #10873-Emissions with Dual Seal System

LR=KS VN P* D MV KC

	JP-4	JP-8
KS=	1.6	
n=	0	
MV=	80 lb/lbmole	130 lb/lbmole
KC=	1	
V=	8 mph	
D=	63 ft	

P*=(P/PA)/(1+(1-P/PA)^0.5)^2

PA=	12.4 PSIA		12.4 PSIA
P=	1.3 PSIA		0.0085 PSIA
P*=	0.027680768	P*=	0.00017143
LR=	**223.2 lb/yr**	**LR=**	**2.2 lb/yr**

LW= 0.943 Q C WL (1 + (NC FC/D)) / D

Q=	15368388 gal		
	365921 bbl		
C=	0.0015 bbl/1000 ft^2		
WL=	6.4 lbs/gal	WL=	7 lbs/gal
D=	63 ft		
NC=	0		
FC=	1		
LW=	**52.6 lbs/yr**	**LW=**	**57.5 lbs/yr**

LF=FF P* MV KC

P*=	0.027680768	P*=	0.00017143
MV=	80 lb/lbmole	MV=	130 lb/lbmole
KC=	1		
FF=	237 lbs Mole/yr		
LF=	**524.8 lbs/yr**	**LF=**	**5.3 lbs/yr**

4.2.4-423

LD= KD SD D^2 P* MV KC

KD=	0	lb mole / ft yr			
D=	63	ft			
P*=	0.027680768		P*=	0.00017143	
MV=	80	lb/lbmole	MV=	130	lb/lbmole
KC=	1				
SD=	0.2	ft/ft^2			
LD=	**0.0**	**lb/yr**	**LD=**	**0.0**	**lb/yr**

Total HC Emissions Tank#10873 with Double Seal

	JP-4			JP-8	
LT=	800.6	lb/yr	LT=	65.0	lb/yr

Difference: 735.6 lb/yr

4.2.4-424

Tank #10861-Emissions with Dual Seal System

LR=KS VN P* D MV KC

	JP-4		JP-8	
KS=	0.7			
n=	0.4			
MV=	80	lb/lbmole	130	lb/lbmole
KC=	1			
V=	8	mph		
D=	42.417	ft		

P*=(P/PA)/(1+(1-P/PA)^0.5)^2

PA=	12.4	PSIA	12.4	PSIA	
P=	1.3	PSIA	0.0085	PSIA	
P*=	0.027680768		P*=	0.00017143	
LR=	**151.1**	**lb/yr**	**LR=**	**1.5**	**lb/yr**

LW= 0.943 Q C WL (1 + (NC FC/D)) / D

Q=	273527	gal			
	6513	bbl			
C=	0.0015	bbl/1000 ft^2			
WL=	6.4	lbs/gal	WL=	7	lbs/gal
D=	42.417	ft			
NC=	0				
FC=	1				
LW=	**1.4**	**lbs/yr**	**LW=**	**1.5**	**lbs/yr**

LF=FF P* MV KC

P*=	0.027680768		P*=	0.00017143	
MV=	80	lb/lbmole	MV=	130	lb/lbmole
KC=	1				
FF=	0	lbs Mole/yr			
LF=	**0.0**	**lbs/yr**	**LF=**	**0.0**	**lbs/yr**

LD= KD SD D^2 P* MV KC

KD=	0 lb mole / ft yr		
D=	42.417 ft		
P*=	0.027680768	P*=	0.00017143
MV=	80 lb/lbmole	MV=	130 lb/lbmole
KC=	1		
SD=	0.2 ft/ft^2		
LD=	**0.0 lb/yr**	**LD=**	**0.0 lb/yr**

Total HC Emissions Tank #10361 with Double Seal

	JP-4		JP-8
LT=	**152.4 lb/yr**	**LT=**	**3.0 lb/yr**

Difference: 149.4 lb/yr

Tank #10862-Emissions with Dual Seal System

LR=KS VN P* D MV KC

	JP-4		JP-8	
KS=	0.7			
n=	0.4			
MV=	80	lb/lbmole	130	lb/lbmole
KC=	1			
V=	8	mph		
D=	52	ft		

P*=(P/PA)/(1+(1-P/PA)^0.5)^2

PA=	12.4	PSIA	12.4	PSIA	
P=	1.3	PSIA	0.0085	PSIA	
P*=	0.027680768		P*=	0.00017143	
LR=	**185.2**	**lb/yr**	**LR=**	**1.9**	**lb/yr**

LW= 0.943 Q C WL (1 + (NC FC/D)) / D

Q=	1995239	gal			
	47507	bbl			
C=	0.0015	bbl/1000 ft^2			
WL=	6.4	lbs/gal	WL=	7	lbs/gal
D=	52	ft			
NC=	0				
FC=	1				
LW=	**8.3**	**lbs/yr**	**LW=**	**9.0**	**lbs/yr**

LF=FF P* MV KC

P*=	0.027680768		P*=	0.00017143	
MV=	80	lb/lbmole	MV=	130	lb/lbmole
KC=	1				
FF=	0	lbs Mole/yr			
LF=	**0.0**	**lbs/yr**	**LF=**	**0.0**	**lbs/yr**

4.2.4-427

LD= KD SD D^2 P* MV KC

KD=	0 lb mole / ft yr		
D=	52 ft		
P*=	0.027680768	P*=	0.00017143
MV=	80 lb/lbmole	MV=	130 lb/lbmole
KC=	1		
SD=	0.2 ft/ft^2		
LD=	**0.0 lb/yr**	**LD=**	**0.0 lb/yr**

Total HC Emissions Tank #10862 with Double Seals

	JP-4		JP-8
LT=	**193.5 lb/yr**	**LT=**	**10.9 lb/yr**

Difference: 182.5 lb/yr

4.2.4-428

Fixed Roof Tanks

Tank #37-Emissions with Fixed Roof

LB=2.26E-2 MV (P/(PA-P))^0.68 D^1.73 H^0.51 dT^0.50 FP C KC

LB=	breathing loss
MV=	molecular Weight (Table 4.3-2)
PA=	average atmospheric pressure at tank location
P=	true vapor pressure
D=	tank diameter
H=	average vapor space height, including roof volume correction
dT=	average ambient diurnal temperature chnage
FP=	paint factor
C=	adjustment factor for small diameter tanks
KC=	product factor

	JP-4		JP-8
MV=	80 lb/lbmole	MV=	130 lb/lbmole
PA=	12.4 psia	PA=	12.4 psia
P=	1.3 psia	P=	0.0085 psia
D=	16 ft		
H=	20 ft		
dT=	10		
FP=	1.2		
C=	1		
KC=	1		
LB=	**890.6 lb/yr**	**LB=**	**43.9 lb/yr**

4.2.4-429

LW=2.40E-5 MV P V N KN KC

LW=	working loss
MV=	molecular weight
P=	true vapor pressure
V=	tank capacity
N=	number of turnovers per year
KN=	turnover factor
KC=	product factor

	JP-4		JP-8	
MV=	80	lb/lbmole	130	lb/lbmole
P=	1.3	psia	0.0085	psia
V=	50000	gal		
Throughput:	117270	gal		
N=	2.3454			
KN=	0.28			
KC=	1			
LW=	**82.0**	**lb/yr**	**LW=**	**0.9 lb/yr**

Total HC Emissions Tank #37

	JP-4		JP-8	
LB=	890.6	lb/yr	LB=	43.9 lb/yr
LW=	82.0	lb/yr	LW=	0.9 lb/yr
	972.6	lb/yr		44.8 lb/yr

Difference: 927.8 lb/yr

4.2.4-430

Tank #38-Emissions with Fixed Roof

LB=2.26E-2 MV (P/(PA-P))^0.68 D^1.73 H^0.51 dT^0.50 FP C KC

LB=Breathing loss

	JP-4		JP-8
MV=	80 lb/lbmole	MV=	130 lb/lbmole
PA=	12.4 psia	PA=	12.4 psia
P=	1.3 psia	P=	0.0085 psia
D=	16 ft		
H=	20 ft		
dT=	10		
FP=	1.2		
C=	1		
KC=	1		
LB=	**890.6 lb/yr**	**LB=**	**43.9 lb/yr**

LW=2.40E-5 MV P V N KN KC

LW=Working loss

	JP-4		JP-8
MV=	80 lb/lbmole	MV=	130 lb/lbmole
P=	1.3 psia	P=	0.0085 psia
V=	50000 gal		
Throughput:	117270 gal		
N=	2.3454		
KN=	0.28		
KC=	1		
LW=	**82.0 lb/yr**	**LW=**	**0.9 lb/yr**

Total HC Emissions Tank #38

	JP-4		JP-8
LB=	890.6 lb/yr	LB=	43.9 lb/yr
LW=	82.0 lb/yr	LW=	0.9 lb/yr
	972.6 lb/yr		44.8 lb/yr

Difference: 927.8 lb/yr

4.2.4-431

Tank #39-Emissions with Fixed Roof

LB=2.26E-2 MV (P/(PA-P))^0.68 D^1.73 H^0.51 dT^0.50 FP C KC

LB=Breathing loss

	JP-4		JP-8
MV=	80 lb/lbmole	MV=	130 lb/lbmole
PA=	12.4 psia	PA=	12.4 psia
P=	1.3 psia	P=	0.0085 psia
D=	16 ft		
H=	20 ft		
dT=	10		
FP=	1.2		
C=	1		
KC=	1		
LB=	**890.6 lb/yr**	**LB=**	**43.9 lb/yr**

LW=2.40E-5 MV P V N KN KC

LW=Working loss

	JP-4		JP-8
MV=	80 lb/lbmole	MV=	130 lb/lbmole
P=	1.3 psia	P=	0.0085 psia
V=	50000 gal		
Throughput:	11591610 gal		
N=	231.8322		
KN=	0.28		
KC=	1		
LW=	**8101.1 lb/yr**	**LW=**	**86.1 lb/yr**

Total HC Emissions Tank #39

	JP-4		JP-8
LB=	890.6 lb/yr	LB=	43.9 lb/yr
LW=	8101.1 lb/yr	LW=	86.1 lb/yr
	8991.8 lb/yr		130.0 lb/yr

Difference: 8861.8 lb/yr

4.2.4-432

Tank #40-Emissions with Fixed Roof

LB=2.26E-2 MV (P/(PA-P))^0.68 D^1.73 H^0.51 dT^0.50 FP C KC

LB=Breathing loss

	JP-4		JP-8
MV=	80 lb/lbmole	MV=	130 lb/lbmole
PA=	12.4 psia	PA=	12.4 psia
P=	1.3 psia	P=	0.0085 psia
D=	16 ft		
H=	20 ft		
dT=	10		
FP=	1.2		
C=	1		
KC=	1		
LB=	**890.6 lb/yr**	**LB=**	**43.9 lb/yr**

LW=2.40E-5 MV P V N KN KC

LW=Working loss

	JP-4		JP-8
MV=	80 lb/lbmole	MV=	130 lb/lbmole
P=	1.3 psia	P=	0.0085 psia
V=	50000 gal		
Throughput:	11591610 gal		
N=	231.8322		
KN=	0.28		
KC=	1		
LW=	**8101.1 lb/yr**	**LW=**	**86.1 lb/yr**

Total HC Emissions Tank #40

	JP-4		JP-8
LB=	890.6 lb/yr	LB=	43.9 lb/yr
LW=	8101.1 lb/yr	LW=	86.1 lb/yr
	8991.8 lb/yr		130.0 lb/yr

Difference: 8861.8 lb/yr

4.2.4-433