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MEMORANDUM FOR MS. MARCY LEAVITT, CHIEF
GROUNDWATER QUALITY BUREAU
NEW MEXICO ENVIRONMENT DEPARTMENT
PO BOX 26110
SANTA FE NM 87502

FROM: 377 ABW/EM
2050 Wyoming Blvd SE, Suite 125
Kirtland AFB NM 87117-5270

SUBJECT: Addendum to the Stage I Abatement Plan for ST-106, Kirtland AFB Bulk Fuels Facility

1. We are forwarding a copy of the final addendum to the Stage I Abatement Plan for the subject site. There are no volumes of appendices associated with this workplan. Included is an electronic copy of the document in Word 97 on a 3.5" disk. A copy of the addendum is being distributed to the Hazardous Waste Bureau as required by your conditional approval of the Stage 1 Abatement Plan.

2. Please contact Mr. Mark Holmes at 505-846-9005 or me at 505-846-2751 if you have any questions on this matter.

CHRISTOPHER B. DEWITT, GS-13
Chief, Restoration Branch
Environmental Management Division

Atch:
1. Addendum to the Abatement Plan

cc:
NMED-HWB (Mr. Kieling) w atch
NMED-HWB KAFB (Mr. Moats) w atch
EPA Region 6 (Ms. Tellez) w atch
HQ AFMC/CEVC (Mr. Fort) w atch
AFCEE (Mr. Arnold) w/o atch
CH2MHILL (Ms. Minchak) w/o atch
377 ABW/EMC (Mr. Montano) w/o atch

KAFB2225

Kirtland Air Force Base
Albuquerque, New Mexico

Addendum 2 to
Stage 1 Abatement Plan
ST-106, Kirtland AFB
Bulk Fuels Facility

16 November, 2000

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2050 Wyoming Blvd. SE
Kirtland AFB, New Mexico 87117-5270

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

ADDENDUM 2 TO, STAGE 1 ABATEMENT PLAN ST-106
KIRTLAND AFB BULK FUELS FACILITY

NOVEMBER 16, 2000

Prepared By
CH2M HILL
ALBUQUERQUE, NEW MEXICO

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ACRONYMS

AFB	Air Force Base
bgs	belowground surface
EPA	U.S. Environmental Protection Agency
IDWMP	Investigation-Derived Waste Management Plan
MS/MSD	matrix spike/matrix spike duplicate
NMED	New Mexico Environment Department
PID	photoionization detector
ppm	parts per million
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SVOC	semi-volatile organic compound
TPH	total petroleum hydrocarbon
USAF	U.S. Air Force
VOC	volatile organic compound

ADDENDUM 2 TO STAGE 1 ABATEMENT PLAN ST-106, KIRTLAND AFB BULK FUELS FACILITY NOVEMBER 16, 2000

The following additional information is being provided to supplement the final Stage 1 Abatement Plan submitted for ST-106, Kirtland Air Force Base (AFB) Bulk Fuels Facility, on 19 April 2000 (Figure 1). The 14-inch-diameter belowground pipelines that transfer fuel from the off-loading rack to the pump house at the Kirtland AFB Bulk Fuels Facility failed during pressure testing three times in November 1999. The specific details of the releases were detailed in the 7-day and 15-day notifications, submitted 19 November and 16 December 2000, respectively, and in the first Addendum to the Stage 1 Abatement Plan. This second Addendum presents a revised plan for a groundwater investigation and further defines the investigation to be performed to define the horizontal extent of the detected contamination.

Previous Investigations

A soil-gas survey, a shallow soil investigation using a direct-push method, and a limited deep soil investigation have been completed at the site. The soil-gas survey showed relatively low total petroleum hydrocarbon (TPH) concentrations in the soil gas across the whole ST-106 site. The data from the soil-gas survey are presented in Attachment 1 to this Addendum. The locations of the soil-gas monitoring points are shown in Figure 2.

In the soil investigations, contamination was detected in several shallow soil borings (SB-01 through SB-24 are ≤40 ft belowground surface [bgs] each) at the ST-106 site (Figure 1) (Table 1). Contamination was found along the JP-8 off-loading rack that supplies the 300-ft long belowground pipeline. The horizontal extent of the shallow (<40 ft bgs) contamination has been delineated during the direct push investigation. The contamination appeared to be limited to within 50 ft of the belowground pipelines, and to the area previously affected by the surface spill.

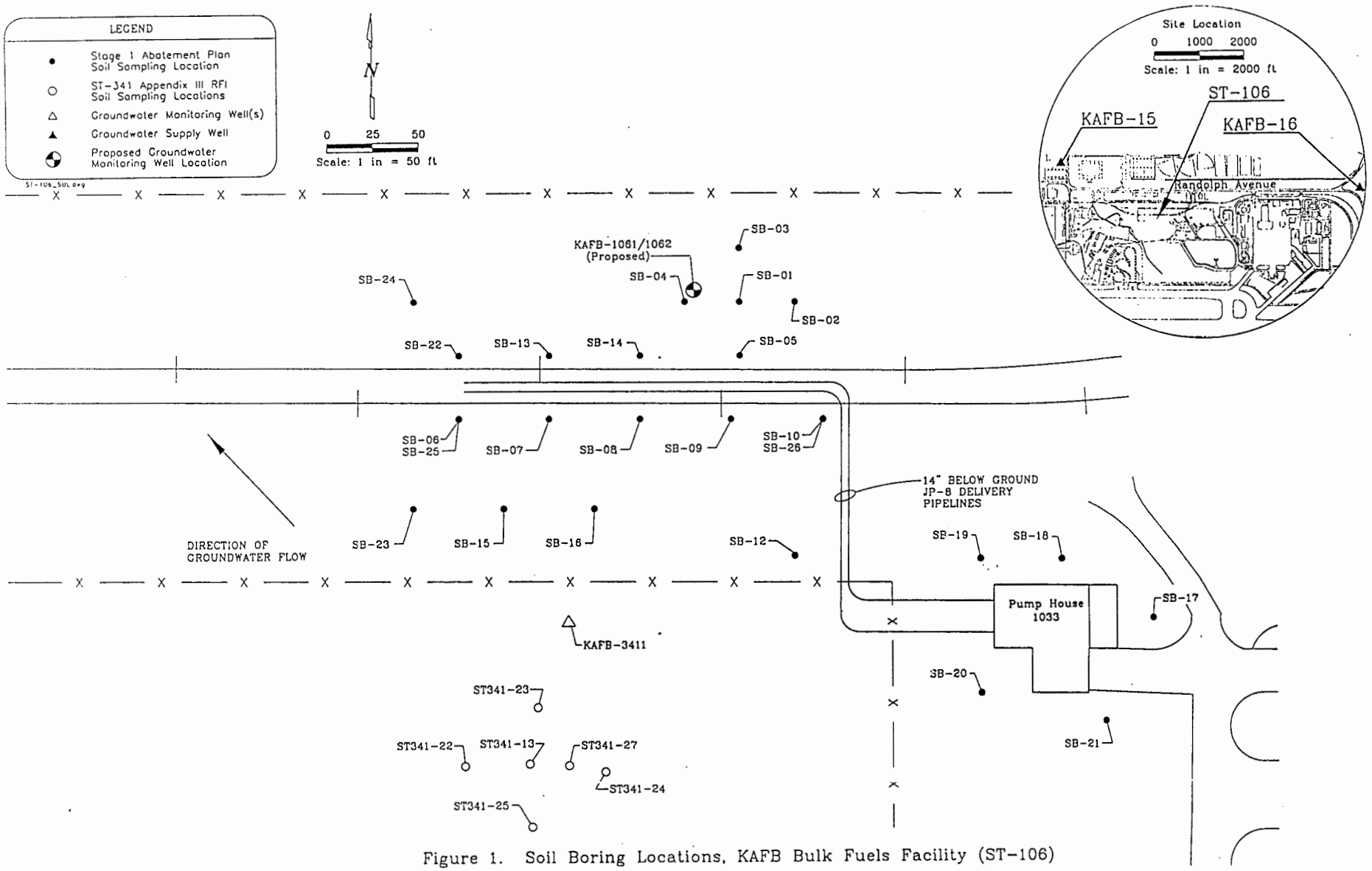

Figure 1. Soil Boring Locations, KAFB Bulk Fuels Facility (ST-106)

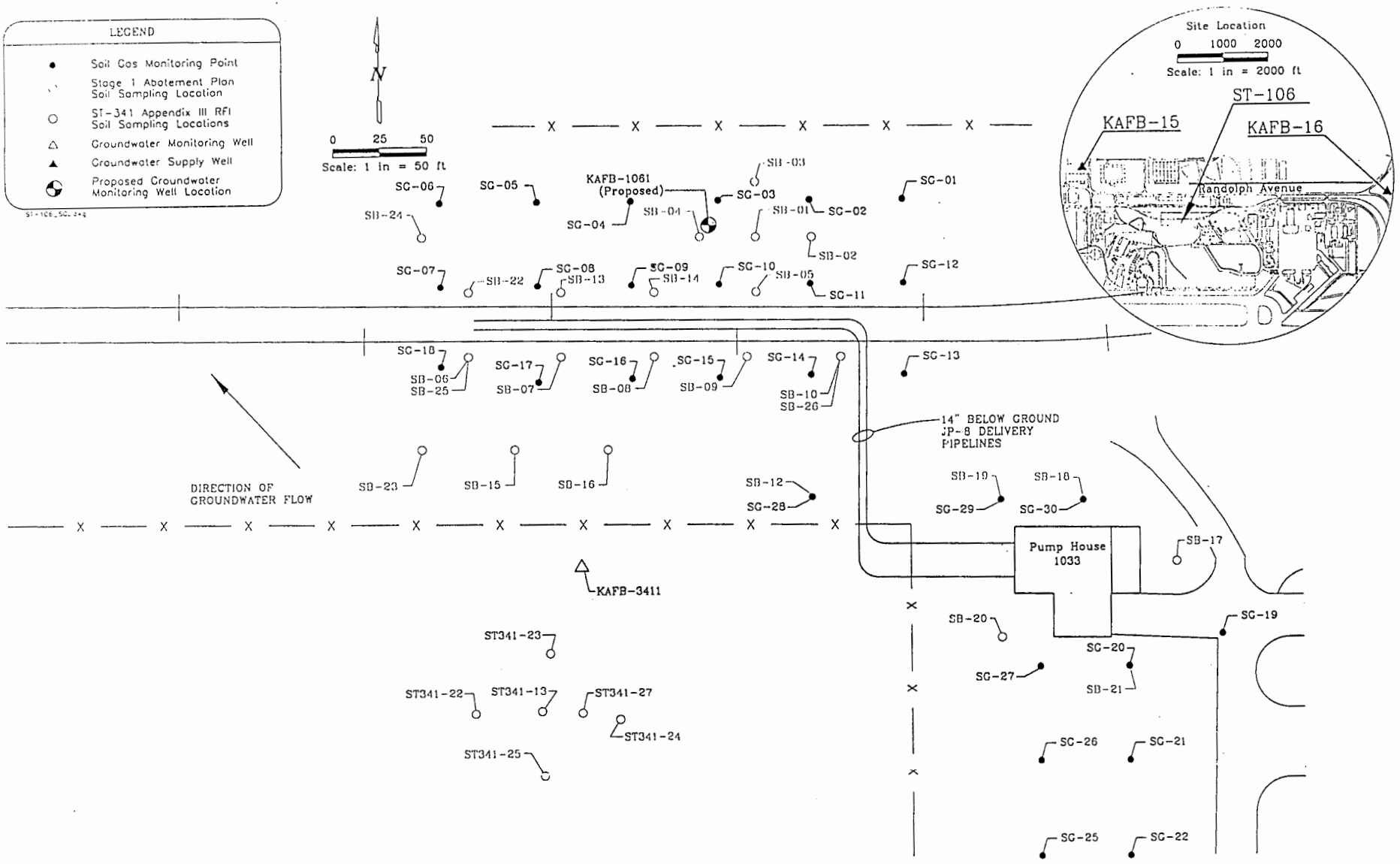

Figure 2. Soil Gas Boring Locations, KAFB Bulk Fuels Facility (ST-106)

Table 1. DRO and GRO Data for ST-106 Shallow and Deep Soil Investigations

Boring Number	Depth (ft)	GRO (ppm) [1]	DRO (ppm) [2]	TPH (ppm) [3]
SB-01	-40	0.73	25	25.73
	-55	4.1	25	29.1
SB-02	-4	0.25	25	25.25
	-62	3.5	25	28.5
SB-03	-4	0.25	25	25.25
	-30	0.25	25	25.25
SB-04	-4	0.25	25	25.25
	-35	0.25	25	25.25
SB-05	-8	0.46	25	25.46
	-40	**18,000** [4]	**19,000**	**37,000**
SB-06	-30	**5,900**	**4,800**	**10,700**
	-40	**39,000**	**12,000**	**51,000**
SB-07	-35	1.5	25	26.5
	-40	0.66	25	25.66
SB-08	-30	0.25	25	25.25
	-38	0.25	25	25.25
SB-09	-10	0.25	25	25.25
	-40	0.53	25	25.53
SB-10 [5]	-25	**16,000**	**12,000**	**28,000**
	-40	**19,000**	**30,000**	**49,000**
SB-12	-30	0.25	25	25.25
SB-13	-20	1.1	65	66.1
	-42	0.37	25	25.37
SB-14	-35	0.4	25	25.4
	-41	0.25	25	25.25
SB-16 [6]	-25	0.25	25	25.25
	-32	0.25	25	25.25
SB-17	-4	0.25	25	25.25
	-40	0.25	25	25.25
SB-18	-4	0.25	25	25.25
	-59	0.25	25	25.25
SB-19	-40	0.25	25	25.25
SB-20	-40	0.25	25	25.25
SB-21	-34	0.25	25	25.25
SB-22	-15	**1,200**	**2,600**	**3,800**
	-20	**2,300**	**3,000**	**5,300**
	-32	**20,000**	**14,000**	**34,000**
SB-23	-42	0.25	25	25.25
SB-24	-28	0.25	25	25.25
	-40	0.25	25	25.25

Table 1. DRO and GRO Data for ST-106 Shallow and Deep Soil Investigations

Boring Number	Depth (ft)	GRO (ppm) [1]	DRO (ppm) [2]	TPH (ppm) [3]
SB-25	-50	**45,000**	**7,700**	**52,700**
	-80	**7,200**	**8,000**	**15,200**
	-105	**52,000**	**29,000**	**81,000**
	-125	**4,100**	**2,200**	**6,300**
	-145	**45,000**	**12,000**	**57,000**
	-175	0.41	25	25.41
	-200	0.25	25	25.25
	-225	0.25	25	25.25
	-230	0.25	25	25.25
	-250	0.25	25	25.25
SB-26	-45	**21,000**	**23,000**	**44,000**
	-75	**25,000**	**31,000**	**56,000**
	-100	**24,000**	**22,000**	**46,000**
	-125	**25,000**	**27,000**	**52,000**
	-150	**16,000**	**5,500**	**21,500**
	-175.05	**5,000**	**3,300**	**8,300**
	-200	**14,000**	**17,000**	**31,000**
	-200.05	**14,000**	**15,000**	**29,000**
	-224	**20,000**	**17,000**	**37,000**
	-248	**30,000**	**19,000**	**49,000**
	-270	**90,000**	**24,000**	**114,000**
	-285	0.25	25	25.25
	-295	**210**	**230**	**440**
	-310	0.54	25	25.54
	-315	0.25	25	25.25

NOTES:

[1] Analytical results less than the analytical detection limit are shown at the detection limit of 0.25.

[2] Analytical results less than the analytical detection limit are shown at the detection limit of 25.

[3] TPH is calculated by adding the detected GRO concentration to the DRO concentration. The minimum TPH concentration is 25.25, which is the sum of the analytical detection limits for the two analyses.

[4] Concentrations in excess of the NMED standard of 100 ppm TPH are shown in **bold**.

[5] Because of utility issues and a lack of detections in nearby samples, there was no sample SB-11.

[6] Boring SB-15 reached early refusal so no sample was collected for laboratory analysis. The PID readings for the boring were non-detects.

Subsurface petroleum fuel contamination also was identified in two deep soil borings (SB-25 and SB-26). These two borings were located on the eastern and western ends of the off-loading rack. The maximum concentrations detected were 81,000 parts per million (ppm) TPH in the 105-ft bgs sample from boring SB-25 and 114,000 ppm TPH in the 270-ft bgs sample from boring SB-26 (Tables 1 and 2). The deepest that the contamination was detected in the two borings was in the 200-ft bgs sample from boring SB-25 and the 310-ft bgs sample from boring SB-26. These samples correspond with clay layers that were detected at the site and are thought to be acting as confining layers for the contamination.

As shown in Table 2, the contaminants detected in the deep borings included the volatile organic compounds (VOCs) benzene, toluene, ethylbenzene, and xylene (BTEX). Attachment 2 contains the chemical composition of JP-4 and JP-8, the two fuels known to have been used at the loading rack. As can be seen, although JP-4 contains the BTEX compounds and other VOCs, the JP-8 does not. JP-4 is roughly a mixture of 50 percent gasoline and 50 percent kerosene and it has a hydrocarbon distribution between C4 and C16 with a predominance in the C6 range. JP-8 (also known as Jet Fuel A-1) is a heavier, less volatile mixture than JP-4. JP-8 typically has a hydrocarbon distribution between C10 and C19 with a predominance in the C13 range. The detection of these lighter hydrocarbons in the soils at ST-106 indicates that the source of the fuel contamination at the fuels facility is most likely an on-going source rather than a one-time recent occurrence since JP-4 has not been used at Kirtland for a number of years. The VOCs could also be by-products of the weathering of the JP-8, but given the arid nature of the soils at Kirtland and the lack of biological activity seen at other TPH sites at the base, it is believed that this is not the case.

Because of the high levels of VOCs detected, SB-26 will be competed using a 2-inch (in) polyvinyl chloride (PVC) screen. This will allow the boring to be used for soil-gas extraction as an interim or final corrective measure. During boring installation, some of the augers were caught up in the hole and could not be extracted. The boring will be sealed with bentonite below the top of the abandoned augers.

Table 2. VOC and SVOC Analytical Results for the Deep Soils
Investigation at ST-106, Bulk Fuels Facility

Compound Class	Analyte	HHRB Screening Level [a] or Action Level (mg/kg)		Sample Number (Concentrations given in mg/kg)								
				SB25-50'	SB25-80'	SB25-105'	SB25-125'	SB25-145'	SB25-175'	SB25-200'	SB25-225'	SB25-230'
Petroleum Hydrocarbons	DRO	100 Combined		**7,700**	**8,000**	**29,000**	**2,200**	**12,000**	ND [b]	ND	ND	ND
	GRO			**45,000**	**7,200**	**52,000**	**4,100**	**45,000**	0.41	0.25	ND	ND
		Actual	Adjusted e)									
SVOCs	Dibenzofuran	230	23	---[d]	---	4.7	---	---	ND	---	---	---
	1-methylnaphthalene			---	---	170	---	---	ND	---	---	---
	2-methylnaphthalene			---	---	180	---	---	ND	---	---	---
	Naphthalene	55	5.5	---	---	**120**	---	---	ND	---	---	---
	n-Nitroso-dimethyl-amine	0.0095		---	---	ND	---	---	ND	---	---	---
VOCs	Benzene	0.67		**14**	**9.8**	**5.6**	**2.2**	ND	ND	ND	ND	ND
	Ethylbenzene	2,300	230	180	57	62	4.2	32	ND	ND	ND	ND
	o-Xylene	280	28	**190**	**55**	**38**	12	**69**	ND	ND	ND	ND
	p/m-Xylenes	210	21	**610**	**150**	**85**	**38**	**120**	ND	ND	ND	ND
	Toluene	520	52	**220**	**110**	47	25	**84**	ND	ND	ND	ND
	1,2,4-Trimethylbenzene	52	5.2	---	**74**	**130**	**8.3**	---	ND	---	ND	---
	1,3,5-Trimethylbenzene	21	2.1	---	**24**	**42**	**6.0**	---	ND	---	ND	---
	1,2-Dibromoethane (EDB)	0.0053		---	ND	ND	ND	---	ND	---	ND	---
	2-Butanone (MEK)	7000	700	---	3.2	ND	13	---	0.19	---	ND	---
	2-Hexanone (MBK)			---	ND	ND	ND	---	0.032	---	ND	---
	4-Methyl-2-pentanone (MIBK)	760	76	---	ND	ND	ND	---	ND	---	ND	---
	Acetone	1500	150	---	7.1	ND	27	---	0.64	---	0.064	---
	Naphthalene	55	5.5	---	**7.5**	**68**	ND	---	ND	---	ND	---

Notes:

a) For TPH compounds the action level is the NMED 100 mg/kg combined DRO and GRO action level. The NMED action levels do not take into account other petroleum hydrocarbon ranges such as hydraulic ranges. The non-TPH compound screening levels are EPA Region 6 residential HHRB screening levels (October 1999). For non-carcinogenic compounds both the adjusted and unadjusted screeening levels are shown.

b) ND - non-detect

c) Concentrations shown in *italics* exceed the approved background concentration and concentrations in**bold** exceed the applicable screening level or action level.

d) Not analyzed for.

e) HHRB screening level adjusted to 10% of actual level for non-carcinogenic compounds

f) The sample from SB27-505' was a grab sample from drill cuttings and was analyzed after aproved holding times had expired.

Table 2. VOC and SVOC Analytical Results for the Deep Soils Investigation at ST-106, Bulk Fuels Facility

Compound Class	Analyte	HHRB Screening Level [a] or Action Level (mg/kg)		Sample Number (Concentrations given in mg/kg)								
				SB25-250'	SB26-45'	SB26-75'	SB26-100'	SB26-125'	SB26-150'	SB26-175'	SB26-175'	SB26-200'
Petroleum Hydrocarbons	DRO	100 Combined		ND	23,000	31,000	22,000	27,000	5,500	4,300	3,300	17,000
	GRO			ND	21,000	25,000	24,000	25,000	16,000	3,100	5,000	14,000
		Actual	Adjusted e)									
SVOCs	Dibenzofuran	230	23	ND	---	---	1.6	---	---	---	---	ND
	1-methylnaphthalene			ND	---	---	130	---	---	---	---	66
	2-methylnaphthalene			ND	---	---	ND	---	---	---	---	91
	Naphthalene	55	5.5	ND	---	---	100	---	---	---	---	52
	n-Nitroso-dimethyl-amine	0.0095		ND	---	---	ND	---	---	---	---	15
VOCs	Benzene	0.67		ND	ND	ND	ND	6.4	21	ND	ND	19
	Ethylbenzene	2,300	230	ND	22	42	28	58	45	2.0	33	35
	o-Xylene	280	28	ND	22	44	32	51	55	5.0	48	45
	p/m-Xylenes	210	21	ND	46	120	70	ND	160	12	160	130
	Toluene	520	52	ND	14	19	35	34	150	0.49	28	130
	1,2,4-Trimethylbenzene	52	5.2	ND	150	---	190	---	81	---	---	130
	1,3,5-Trimethylbenzene	21	2.1	ND	37	---	49	---	28	---	---	38
	1,2-Dibromoethane (EDB)	0.0053		ND	ND	---	ND	---	ND	---	---	ND
	2-Butanone (MEK)	7000	700	ND	ND	---	ND	---	ND	---	---	ND
	2-Hexanone (MBK)			ND	ND	---	ND	---	ND	---	---	ND
	4-Methyl-2-pentanone (MIBK)	760	76	ND	ND	---	ND	---	ND	---	---	ND
	Acetone	1500	150	ND	ND	---	ND	---	120	---	---	120
	Naphthalene	55	5.5	ND	59	---	78	---	ND	---	---	43

Table 2. VOC and SVOC Analytical Results for the Deep Soils Investigation at ST-106, Bulk Fuels Facility

Compound Class	Analyte	HHRB Screening Level [a] or Action Level (mg/kg)		Sample Number (Concentrations given in mg/kg)					
				SB26-200'	SB26-270'	SB26-285'	SB26-295'	SB26-310'	SB26-315'
Petroleum Hydrocarbons	DRO	100 Combined		**15,000**	**24,000**	ND	**230**	ND	ND
	GRO			**14,000**	**90,000**	ND	**210**	0.54	ND
		Actual	Adjusted e)						
SVOCs	Dibenzofuran	230	23	ND	---	---	---	---	---
	1-methylnaphthalene			66	---	---	---	---	---
	2-methylnaphthalene			92	---	---	---	---	---
	Naphthalene	55	5.5	**52**	---	---	---	---	---
	n-Nitroso-dimethyl-amine	0.0095		ND	---	---	---	---	---
VOCs	Benzene	0.67		**13**	**630**	ND	ND	ND	ND
	Ethylbenzene	2,300	230	31	**930**	ND	0.77	ND	ND
	o-Xylene	280	28	**39**	**640**	ND	1.1	ND	ND
	p/m-Xylenes	210	21	**110**	**1,900**	ND	3.9	ND	ND
	Toluene	520	52	**100**	**3,600**	ND	ND	ND	ND
	1,2,4-Trimethylbenzene	52	5.2	**120**	**560**	---	---	---	---
	1,3,5-Trimethylbenzene	21	2.1	**33**	**220**	---	---	---	---
	1,2-Dibromoethane (EDB)	0.0053		ND	ND	---	---	---	---
	2-Butanone (MEK)	7000	700	ND	ND	---	---	---	---
	2-Hexanone (MBK)			ND	ND	---	---	---	---
	4-Methyl-2-pentanone (MIBK)	760	76	ND	ND	---	---	---	---
	Acetone	1500	150	**170**	**380**	---	---	---	---
	Naphthalene	55	5.5	**36**	**72**	---	---	---	---

In summary, the shallow extent of the TPH contamination at ST-106 has been defined. The horizontal extent of contamination below 40 ft bgs is unknown and is expected to be greater than the shallow extent due to the presence of the clay layer, which may have caused lateral dispersion of the jet fuel. The vertical extent of contamination has been established in the area of the fuel off-loading rack only.

Directly to the south of ST-106 is the Condensate Tank and Evaporation Pond (CAU ST-341). Previous investigations at ST-341 include Appendix III Phase 1 and Appendix III Phase 2 RCRA Facility Investigations (RFIs) (USAF, 1995a and 1997), and a Bioventing Feasibility Site Characterization study (1997). During the RFIs, the horizontal and vertical extent of TPH contamination was well defined. The TPH contamination had not spread far beyond the limits of the pond boundary. A soil-gas survey at ST-341 showed that TPH concentrations were high under the evaporation pond but generally increased with depth and to the north and west, which is not consistent with the distribution of TPH in soil samples. The data suggest that there may be another source of TPH vapors below and to the north of the contamination associated with the evaporation pond.

Proposed Groundwater Investigation

The depth of the soil contamination has led to some concern that groundwater may be affected by the TPH contamination at ST-106. Very low levels of BTEX compounds (0.2 milligrams per liter [mg/L] benzene and 0.7 mg/L toluene, estimated concentrations, 4/26/2000) have been identified in groundwater monitoring well KAFB-3411, which is only about 100 ft south of the ST-106 site (Figure 1). Potential receptors for groundwater contamination are Kirtland AFB water supply wells KAFB-15 and KAFB-16 (Figure 1), which are north of the site.

The installation of one groundwater monitoring well (KAFB-1061) is proposed to determine if the regional aquifer has been affected by the soil contamination (Figure 1). One round of groundwater samples will be collected and analyzed for TPH, VOCs, and semi-volatile organic compounds (SVOCs) (Table 3). Groundwater well installation and sampling will follow those procedures specified in the Base-Wide Plan SOP A1.6.

Table 3. Proposed Soil and Groundwater Sampling

Data Needs	Investigative Technique	Borehole Locations	Number of Samples	Analyses	Selected Analytical Options[a]
Determine if documented releases have affected perched and/or regional groundwater.	Install one regional groundwater well (KAFB-1061) in center of area of contaminated soil. Potentially install one shallow groundwater well (KAFB-1062), if perched layer is identified during drilling of regional well. Potentially install one down-gradient regional groundwater well if groundwater is found to be contaminated.	KAFB-1061 (and possibly KAFB-1062) will be approx. 50 ft north of the fuel loading rack pipeline and approx. 70 ft west of the east end of the loading rack.	One groundwater sample from the regional aquifer. Potentially one additional ground water sample from either a perched groundwater well or a down-gradient regional groundwater wells if any.	TPH VOCs SVOCs	Level II
Determine horizontal and vertical extent of petroleum hydrocarbon contamination	Collect soil samples during the installation of KAFB-1061. Drill four boreholes with a hollow-stem auger drill rig and collect soil samples at 5-ft intervals to a depth of 300 ft bgs. Two boreholes will be located north of the 14-in belowground pipelines and two boreholes will be located south of the 14-in belowground pipelines. Analytical frequency ≈ 20%	KAFB-1061 (see above) SB-27: NW of SB-25 SB-28: SW of SB-25 SB-29: NE of SB-26 SB-30: SE of SB-26	~72 environmental soil samples ~7 duplicate soil sample ~ 4 matrix spike/matrix spike duplicate (MS/MSD) soil samples ~ 30 equipment blanks during soil sample program	TPH BTEX or VOCs SVOCs	Level II

An additional groundwater well (KAFB-1062) may be installed depending on observations made during the installation of the regional groundwater monitoring well and the analytical results. If contamination is found in the regional groundwater samples, a down-gradient regional groundwater monitoring well may be installed. The well would be located based upon the concentrations of contaminants detected in KAFB-1061 and estimated groundwater flow rates and direction with a goal of placing the well in front of the contaminant plume between ST-106 and well KAFB-15. If shallow, perched groundwater is encountered during the installation of the regional groundwater well, and the regional aquifer is not determined to be contaminated, a monitoring well may be installed to assess water quality in the shallow groundwater. The perched groundwater well would be installed adjacent to KAFB-1061. If either well is installed, it will be sampled for the same parameters proposed for KAFB-1061.

The initial groundwater well (and the perched well, if needed) will be located north of the source (the 14-in belowground pipeline) so that it is between the source and the water supply wells. The well will be located approximately 50 ft north of the pipeline, and approximately 75 ft west of the east end of the loading rack. Groundwater beneath the fuels facility is believed to flow to the northwest due to the drawdown caused by the drinking water wells. The proposed monitoring well(s) will be northwest of soil boring SB-26, the area with the highest level of TPH detected to-date, and should therefore intercept any contaminated groundwater if it is present beneath the site. The well installation and construction will conform to procedures specified in the Base-Wide Plan SOP A1.6. The well will be installed using air-rotary casing-hammer methods, have a 4- or 5-in Schedule 80 PVC casing, and 25 ft of 0.020 slot well-screen installed across the water table. During installation of the well, subsurface geology will be logged from drill cuttings and from soil samples. Soil samples will be collected every 10 ft from the surface to 100 ft bgs, every 20 ft from 100 ft bgs until field-screening with a photoionization detector (PID) indicates that the samples are not contaminated. All of the samples will be analyzed for TPH, 50 percent of the samples will be analyzed for BTEX, and 20 percent will be analyzed for VOCs and SVOCs. The 20 percent of the samples that will be analyzed for VOCs will be used for the BTEX results, so therefore only 30 percent of the samples will be analyzed for BTEX alone. The samples that will be analyzed for BTEX and VOCs/SVOCs will be selected from the samples with the highest PID readings. BTEX and VOCs/SVOCs results will be used to compare the soil concentrations to U.S. Environmental Protection Agency (EPA) Region 6 Human Health-Based Soil Screening Criteria. The SVOC data will be collected because, as shown in Table 2, the soils do contain elevated levels of SVOC compounds above the EPA Region 6 Residential Human Health Soil Screening Levels.

Proposed Soils Investigation

The results of the soil samples from the well installation (KAFB-1061), the two previous deep borings (SB-25 and SB-26), and the data from the installation of well KAFB-3411 will be used to locate four additional soil borings to delineate the horizontal extent of the deep subsurface contamination (Figure 1). Soil sample collection will follow those procedures specified in the Base-Wide Plan SOP A1.6. Sample information is summarized below:

- Four boreholes will be advanced in the JP8 off-loading rack area. Borings will be located northwest and southwest of SB-25, and northeast and southeast of the SB-26. The borings will be advanced to the depth of approximately 300 ft bgs. The goal of these initial four borings is to identify the horizontal extent of the TPH contamination. Therefore, all attempts will be made using the available data to locate the borings far enough from the loading rack so that none of the soil results exceed the New Mexico Environment Department (NMED) TPH guideline of 100 ppm or any of the EPA Region 6 risk-based human health soil screening criteria for VOCs and SVOCs while not being too far away from the loading rack to adequately constrain the horizontal extent of contamination.

- At each soil boring location soil samples will be collected at 5-ft intervals and a field-headspace analysis will be done using a PID. Borings will be advanced until three consecutive soil samples display no headspace reading (~0 ppm) within the soil strata of concern. At each boring location, 20 percent of soil samples (approximately every 25 ft bgs) will be selected for laboratory analysis. The soil samples selected for laboratory analysis will include the sample collected from the maximum depth interval of a given boring and a sample from the interval that displayed the highest headspace reading (Table 4).

Table 4. Summary of Analytical Parameters

Sample Number[a]	TPH EPA 8015 Modified	VOCs		SVOCs EPA 8270
		BTEX only EPA 8020	VOCs EPA 8260 (includes BTEX)	
Groundwater Sample				
ST106-GW-01-01	1	0	1	1
Soil Samples				
ST106-KAFB-1061-10' to –300' [b]	20	6	4	4
ST106-SB-27-5' to –300'	13	3	3	3
ST106-SB-28-5' to –300'	13	4	2	2
ST106-SB-29-5' to –300'	13	3	3	3
ST106-SB-30-5' to –300'	13	4	2	2
Soil QC Samples [c]				
Equip Rinsate (aqueous) [d]	30	14	5	5
Field Duplicate [e]	7	4	1	1
MS/MSD Samples [f]	4	2	1	1
Trip Blank (aqueous)	0	0	8	0
Total Soil Samples	83	26	16	16

[a] ***Sample Number*** denotes site designation–matrix–sample location-sampling event number; (i.e., sample number ST106-SB-01-002 would be a subsurface soil sample collected at ST-106 from boring location 01 from the nominal depth of 2 ft bgs).

[b] The depth intervals of the samples collected for laboratory analysis from each boring location will be based on the total depth of the boring and the field headspace readings.

[c] Estimated field QC samples.

[d] ***Equipment Rinsate Blanks***—Collected for each type of non-dedicated sampling equipment used and analyzed for the same parameters as the samples they are used to collect. Equipment blanks will be collected and sent to the laboratory on a daily basis. Only equipment blanks collected every other day will be analyzed.

[e] ***Field Duplicates***—A field duplicate sample is a second sample collected at the same location as the original sample and is collected simultaneously or in immediate succession. Collected at a frequency of 10% of the total number of samples for chemical analyses, or daily, whichever results in more samples, and analyzed for the same parameters as equivalent samples.

[f] ***MS/MSD*** for laboratory quality control, collected 1 in 20 samples (5 percent frequency).

- All soil samples selected for laboratory analysis will be analyzed for TPH by EPA Method 8015 Modified and 50 percent of the samples will be selected for laboratory analysis for BTEX by EPA Method 8020. In addition, 20 percent of samples selected for laboratory analysis will be analyzed for VOCs (including BTEX) by EPA Method 8260 and SVOCs by EPA Method 8270. The 20 percent of the samples that will be analyzed for VOCs will be used for the BTEX results, so therefore only 30 percent of the samples will be analyzed for BTEX alone. The samples selected for BTEX and VOC/SVOC analyses will be those with the highest PID readings. The appropriate quality assurance/quality control (QA/QC) samples as specified in the Base-Wide Plan will be collected and analyzed by the analytical laboratory selected for the project. The substitution of SW846 Update III equivalent analysis methods will be acceptable if requested by the laboratory.

- Following completion of drilling, boreholes will be properly abandoned by filling the remaining borehole space with bentonite powder or they may be fully or partially screened with a PVC screen so that the borings can be used as part of a remediation system. The horizontal location of all soil borings will be surveyed.

- Drill cuttings will be managed as outlined in the Investigation-Derived Waste Management Plan (IDWMP) section of this Abatement Plan.

Kirtland AFB will submit a draft summary report of investigation within 90 days of regulatory approval of this Addendum.

ATTACHMENT 1

Soil-Gas Sample Analytical Results

ESN Rocky Mountain
400 Corporate Cir., Suite R, Golden, CO 80401

FINAL REPORT

303-278-1911 • FAX: 303-278-0104
E-Mail: Lab@ESN-RM.com

CLIENT: CH2MHILL • CONTACT: Sharon Minshak
CLIENT PROJECT NUMBER:
SITE: Kirkland,

ESN PROJECT NUMBER: 253
CHEMIST(S): Greg Jones

VOLATILE HYDROCARBONS (EPA Method 8021M) ANALYSES OF SOIL VAPOR SAMPLES

Analysis Perfomed OnSite in ESN Rocky Mountain's "H" Laboratory with a Shimadzu 14A Gas Chromatograph & Tekmar LSC 2000 Purge and Trap.

SAMPLE COLLECTION DATE	06/06/00	06/06/00	06/06/00	Vapor	Vapor	Vapor
SAMPLE RECEIVED DATE	06/06/00	06/06/00	06/06/00	06/06/00	06/06/00	06/06/00
ANALYSIS DATE	06/06/00	06/06/00	06/06/00	06/06/00	06/06/00	06/06/00
SAMPLE IDENTIFICATION	**SG-01**	**SG-02**	**SG-03**	**SG-04**	**SG-05**	**SG-06**
MATRIX	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
SAMPLE AMOUNT	1cc	1cc	1cc	1cc	1cc	1cc
Carbon Dioxide	0.5	0.9	0.0	2.0	2.0	2.3
Oxygen	21.3	20.0	20.0	17.3	17.1	17.3
Nitrogen	81.7	77.1	78.1	79.2	77.4	80.9
Carbon Dioxide	ND	ND	ND	ND	ND	ND
Methane	ND	ND	ND	ND	ND	ND
REPORTING LIMITS	1.0	1.0	1.0	1.0	1.0	1.0
REPORTING UNITS	%	%	%	%	%	%
SAMPLE AMOUNT cc	380	380	380	380	380	380
JP-4	0.495	0.363	0.081	0.077	0.066	0.038
Bulk Jet Fuel	5.311	1.268	0.406	0.456	0.308	0.127
JP-8	0.650	1.032	0.102	0.092	4.053	0.000
TOTAL FUEL	**5.961**	**2.300**	**0.508**	**0.547**	**4.361**	**0.127**
REPORTING LIMITS	0.053	0.053	0.053	0.053	0.053	0.053
REPORTING UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SAMPLE AMOUNT cc	380	380	NA	380	380	NA
1,1-Dichloroethene	ND	ND		ND	ND	
Methylene Chloride	0.079 B	ND		ND	ND	
trans-1,2-Dichloroethene	ND	ND		ND	ND	
1,1-Dichloroethane	ND	ND		ND	ND	
2,2-Dichloropropane	ND	ND		ND	ND	
cis-1,2-Dichloroethene	ND	ND		ND	ND	
Chloroform	ND	ND		ND	ND	
1,1,1-Trichloroethane	ND	ND		ND	ND	
Carbon Tetrachloride	ND	ND		ND	ND	
1,2-Dichloroethane	ND	ND		ND	ND	
Benzene	0.141	0.142		0.139	ND	
Trichloroethene	ND	ND		ND	ND	
Toluene	0.153	0.145		0.137	0.142	
1,1,2-Trichloroethane	ND	ND		ND	ND	
Tetrachloroethene	ND	ND		ND	ND	
Chlorobenzene	ND	ND		ND	ND	
Ethylbenzene	0.129	0.137		0.116	0.121	
m&p-Xylene	0.271	0.134		0.229	0.232	
o-Xylene	0.144	0.129		0.129	0.132	
1,1,1,2-Tetrachloroethane	ND	ND		ND	ND	
1,1,2,2-Tetrachloroethane	ND	ND		ND	ND	
REPORTING LIMITS	0.053	0.053		0.053	0.053	
REPORTING UNITS	ug/L	ug/L		ug/L	ug/L	
SURROGATE RECOVERY:						
Trifluorotoluene	75%	77%		75%	76%	

See Project Narrative for Data Qualifier Explanations

CLIENT: CH2MHILL • CONTACT: Sharon Minshak
CLIENT PROJECT NUMBER:
SITE: Kirkland,

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SAMPLE COLLECTION DATE	06/06/00	06/06/00	06/07/00	Vapor	Vapor	Vapor
SAMPLE RECEIVED DATE	06/06/00	06/06/00	06/07/00	06/07/00	06/07/00	06/07/00
ANALYSIS DATE	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00
SAMPLE IDENTIFICATION	**SG-07**	**SG-08**	**SG-09**	**SG-10**	**SG-11**	**SG-12**
MATRIX	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
SAMPLE AMOUNT	1cc	1cc	1cc	1cc	1cc	1cc
Carbon Dioxide	0.6	8.8	0.0	5.5	1.0	2.3
Oxygen	20.2	11.7	20.0	15.4	19.0	14.6
Nitrogen	77.7	78.2	74.7	81.3	73.1	76.9
Carbon Dioxide	ND	ND	ND	ND	ND	ND
Methane	ND	ND	ND	ND	ND	ND
REPORTING LIMITS	1.0	1.0	1.0	1.0	1.0	1.0
REPORTING UNITS	%	%	%	%	%	%
SAMPLE AMOUNT	380	380	380	380	380	380
JP-4	0.051	0.185	0.131	0.210	0.270	0.201
Bulk Jet Fuel	0.137	0.661	0.495	0.547	0.726	0.397
JP-8	0.051	0.072	0.067	0.059	0.066	0.049
TOTAL FUEL	**0.188**	**0.733**	**0.562**	**0.606**	**0.792**	**0.446**
REPORTING LIMITS	0.053	0.053	0.053	0.053	0.053	0.053
REPORTING UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SAMPLE AMOUNT	NA	380	NA	380	380	380
1,1-Dichloroethene		ND		ND	ND	ND
Methylene Chloride		0.219 B		ND	ND	ND
trans-1,2-Dichloroethene		ND		ND	ND	ND
1,1-Dichloroethane		ND		ND	ND	ND
2,2-Dichloropropane		ND		ND	ND	ND
cis-1,2-Dichloroethene		ND		ND	ND	ND
Chloroform		ND		ND	ND	ND
1,1,1-Trichloroethane		ND		ND	ND	ND
Carbon Tetrachloride		ND		ND	ND	ND
1,2-Dichloroethane		ND		ND	ND	ND
Benzene		0.139		0.139	ND	ND
Trichloroethene		ND		ND	ND	ND
Toluene		0.148		0.133	0.039	0.024
1,1,2-Trichloroethane		ND		ND	ND	ND
Tetrachloroethene		ND		ND	ND	ND
Chlorobenzene		ND		ND	ND	ND
Ethylbenzene		0.118		0.116	0.008	0.006
m&p-Xylene		0.233		0.221	0.012	0.017
o-Xylene		0.130		ND	0.005	0.005
1,1,1,2-Tetrachloroethane		ND		ND	ND	ND
1,1,2,2-Tetrachloroethane		ND		ND	ND	ND
REPORTING LIMITS		0.053		0.053	0.053	0.053
REPORTING UNITS		ug/L		ug/L	ug/L	ug/L
SURROGATE RECOVERY:						
Trifluorotoluene		74%		67%	96%	95%

See Project Narrative for Data Qualifier Explanations

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SAMPLE COLLECTION DATE	06/07/00	06/07/00	06/07/00	Vapor	Vapor	Vapor
SAMPLE RECEIVED DATE	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00
ANALYSIS DATE	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00
SAMPLE IDENTIFICATION	**SG-13**	**SG-14**	**SG-15**	**SG-16**	**SG-17**	**SG-18**
MATRIX	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
SAMPLE AMOUNT	1cc	1cc	1cc	1cc	1cc	1cc
Carbon Dioxide	3.8	5.6	4.8	3.8	0.7	5.3
Oxygen	15.4	13.3	15.7	17.6	19.3	15.8
Nitrogen	75.9	74.3	78.7	79.1	73.3	80.5
Carbon Dioxide	ND	ND	ND	ND	ND	ND
Methane	ND	ND	ND	ND	ND	ND
REPORTING LIMITS	1.0	1.0	1.0	1.0	1.0	1.0
REPORTING UNITS	%	%	%	%	%	%
SAMPLE AMOUNT	380	380	380	380	380	380
JP-4	0.036	0.118	0.314	0.597	0.290	0.518
Bulk Jet Fuel	0.612	0.812	0.924	1.759	0.907	1.279
JP-8	0.058	0.224	0.082	0.105	0.071	0.076
TOTAL FUEL	**0.669**	**1.036**	**1.005**	**1.864**	**0.978**	**1.355**
REPORTING LIMITS	0.053	0.053	0.053	0.053	0.053	0.053
REPORTING UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SAMPLE AMOUNT	NA	NA	380	380	380	380
1,1-Dichloroethene			ND	ND	ND	ND
Methylene Chloride			ND	ND	ND	ND
trans-1,2-Dichloroethene			ND	ND	ND	ND
1,1-Dichloroethane			ND	ND	ND	ND
2,2-Dichloropropane			ND	ND	ND	ND
cis-1,2-Dichloroethene			ND	ND	ND	ND
Chloroform			ND	ND	ND	ND
1,1,1-Trichloroethane			ND	ND	ND	ND
Carbon Tetrachloride			ND	ND	ND	ND
1,2-Dichloroethane			ND	ND	ND	ND
Benzene			ND	ND	ND	ND
Trichloroethene			ND	ND	ND	ND
Toluene			0.044	0.048	0.025	0.057
1,1,2-Trichloroethane			ND	ND	ND	ND
Tetrachloroethene			ND	ND	ND	ND
Chlorobenzene			ND	ND	ND	ND
Ethylbenzene			0.023	0.021	0.011	0.030
m&p-Xylene			0.019	0.020	0.016	0.026
o-Xylene			0.007	0.008	0.005	0.020
1,1,1,2-Tetrachloroethane			ND	ND	ND	ND
1,1,2,2-Tetrachloroethane			ND	ND	ND	ND
REPORTING LIMITS			0.053	0.053	0.053	0.053
REPORTING UNITS			ug/L	ug/L	ug/L	ug/L
SURROGATE RECOVERY:						
Trifluorotoluene			110%	102%	107%	110%

See Project Narrative for Data Qualifier Explanations

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SAMPLE COLLECTION DATE	06/07/00	06/07/00	06/07/00	Vapor	Vapor	Vapor
SAMPLE RECEIVED DATE	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00
ANALYSIS DATE	06/07/00	06/07/00	06/07/00	06/07/00	06/08/00	06/07/00
SAMPLE IDENTIFICATION	**SG-19**	**SG-20**	**SG-21**	**SG-22**	**SG-23**	**SG-24**
MATRIX	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
SAMPLE AMOUNT	1cc	1cc	1cc	1cc	1cc	1cc
Carbon Dioxide	0.3	0.4	0.6	0.5	1.5	1.0
Oxygen	19.8	19.4	20.4	20.9	19.3	19.3
Nitrogen	74.4	71.8	78.2	80.7	78.6	78.5
Carbon Dioxide	ND	ND	ND	ND	ND	ND
Methane	ND	ND	ND	ND	ND	ND
REPORTING LIMITS	1.0	1.0	1.0	1.0	1.0	1.0
REPORTING UNITS	%	%	%	%	%	%
SAMPLE AMOUNT	380	380	380	380	380	380
JP-4	0.336	0.053	0.234	0.271	0.276	0.281
Bulk Jet Fuel	0.893	0.397	0.697	0.761	1.052	1.296
JP-8	0.055	0.042	0.049	0.056	0.081	0.107
TOTAL FUEL	**0.948**	**0.439**	**0.746**	**0.816**	**1.133**	**1.403**
REPORTING LIMITS	0.053	0.053	0.053	0.053	0.053	0.053
REPORTING UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SAMPLE AMOUNT	380	NA	NA	380	380	NA
1,1-Dichloroethene	ND			ND	ND	
Methylene Chloride	ND			ND	ND	
trans-1,2-Dichloroethene	ND			ND	ND	
1,1-Dichloroethane	ND			ND	ND	
2,2-Dichloropropane	ND			ND	ND	
cis-1,2-Dichloroethene	ND			ND	ND	
Chloroform	ND			ND	ND	
1,1,1-Trichloroethane	ND			ND	ND	
Carbon Tetrachloride	ND			ND	ND	
1,2-Dichloroethane	ND			ND	ND	
Benzene	ND			ND	ND	
Trichloroethene	ND			ND	ND	
Toluene	0.039			0.041	0.073	
1,1,2-Trichloroethane	ND			ND	ND	
Tetrachloroethene	ND			ND	ND	
Chlorobenzene	ND			ND	ND	
Ethylbenzene	0.016			0.017	0.011	
m&p-Xylene	0.020			0.021	0.040	
o-Xylene	0.010			0.012	0.010	
1,1,1,2-Tetrachloroethane	ND			ND	ND	
1,1,2,2-Tetrachloroethane	ND			ND	ND	
REPORTING LIMITS	0.053			0.053	0.053	
REPORTING UNITS	ug/L			ug/L	ug/L	
SURROGATE RECOVERY:						
Trifluorotoluene	96%			100%	62%	

See Project Narrative for Data Qualifier Explanations

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Analysis Perfomed OnSite in ESN Rocky Mountain's "H" Laboratory with a Shimadzu 14A Gas Chromatograph & Tekmar LSC 2000 Purge and Trap.

SAMPLE COLLECTION DATE	06/07/00	06/07/00	06/07/00	Vapor	Vapor	Vapor
SAMPLE RECEIVED DATE	06/07/00	06/07/00	06/07/00	06/08/00	06/08/00	06/08/00
ANALYSIS DATE	06/07/00	06/08/00	06/08/00	06/08/00	06/08/00	06/08/00
SAMPLE IDENTIFICATION	**SG-25**	**SG-26**	**SG-27**	**SG-28**	**SG-29**	**SG-30**
MATRIX	Vapor	Vapor	Vapor	Vapor	Vapor	Vapor
SAMPLE AMOUNT	1cc	1cc	1cc	1cc	1cc	1cc
Carbon Dioxide	0.4	0.3	2.4	1.5	0.8	2.6
Oxygen	19.5	18.8	18.7	18.4	19.3	17.1
Nitrogen	78.3	75.2	79.1	77.8	77.6	76.3
Carbon Dioxide	ND	ND	ND	ND	ND	ND
Methane	ND	ND	ND	ND	ND	ND
REPORTING LIMITS	1.0	1.0	1.0	1.0	1.0	1.0
REPORTING UNITS	%	%	%	%	%	%
SAMPLE AMOUNT	380	380	380	380	380	380
JP-4	0.049	0.124	0.204	0.402	0.255	0.046
Bulk Jet Fuel	0.544	0.742	0.605	7.992	0.843	0.426
JP-8	0.054	0.488	0.044	0.148	0.036	0.027
TOTAL FUEL	**0.597**	**1.230**	**0.650**	**8.140**	**0.879**	**0.453**
REPORTING LIMITS	0.053	0.053	0.053	0.053	0.053	0.053
REPORTING UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SAMPLE AMOUNT	NA	380	380	380	NA	NA
1,1-Dichloroethene		ND	ND	ND		
Methylene Chloride		ND	ND	ND		
trans-1,2-Dichloroethene		ND	ND	ND		
1,1-Dichloroethane		ND	ND	ND		
2,2-Dichloropropane		ND	ND	ND		
cis-1,2-Dichloroethene		ND	ND	ND		
Chloroform		ND	ND	ND		
1,1,1-Trichloroethane		ND	ND	ND		
Carbon Tetrachloride		ND	ND	ND		
1,2-Dichloroethane		ND	ND	ND		
Benzene		ND	ND	ND		
Trichloroethene		ND	ND	ND		
Toluene		0.052	0.076	0.056		
1,1,2-Trichloroethane		ND	ND	ND		
Tetrachloroethene		ND	ND	ND		
Chlorobenzene		ND	ND	ND		
Ethylbenzene		0.025	0.023	0.030		
m&p-Xylene		0.069	0.043	0.077		
o-Xylene		0.022	0.019	0.024		
1,1,1,2-Tetrachloroethane		ND	ND	ND		
1,1,2,2-Tetrachloroethane		ND	ND	ND		
REPORTING LIMITS		0.053	0.053	0.053		
REPORTING UNITS		ug/L	ug/L	ug/L		
SURROGATE RECOVERY:						
Trifluorotoluene		76%	106%	88%		

See Project Narrative for Data Qualifier Explanations

ATTACHMENT 2

Composition of JP-4 and JP-8

Individual Sample Fuel Mixture Composition Data

fuel mixture : **JP-4 Fuel Oil**

sample # : **44/JP-4**

from : **Wright Patterson Air Force Base, ,**

compound class	carbon #	compound	weight percent	number of data points	flag(s)
Alkyl-Monoaromatics	6	Benzene	4.7E-01%	106	20
	7	Toluene	1.6E+00%	106	20
	8	Ethylbenzene	6.9E-01%	10	20
	9	1-Ethyl-3-methylbenzene	5.7E-01%	105	20
Branched Alkanes	5	2-Methylbutane	5.9E-01%	106	20
	6	2,2-Dimethylbutane	1.3E-01%	95	20
	6	2-Methylpentane	1.5E+00%	106	20
	6	3-Methylpentane	1.1E+00%	106	20
	7	2,3-Dimethylpentane	6.2E-01%	106	20
	7	2-Methylhexane	1.3E+00%	106	20
	7	3,3-Dimethylpentane	9.4E-02%	106	20
	7	3-Ethylpentane	1.4E-01%	106	20
	7	3-Methylhexane	1.5E+00%	106	20
	8	2,2,3,3-Tetramethylbutane	5.8E-01%	106	20
	9	3-Ethylheptane	1.1E-01%	94	20
Cycloalkanes	6	Cyclohexane	1.2E+00%	106	20
	6	Methylcyclopentane	1.4E+00%	106	20
	7	cis-1,3-Dimethylcyclopentane	4.2E-01%	106	20
	7	Ethylcyclopentane	2.6E-01%	106	20
	7	Methylcyclohexane	2.8E+00%	106	20
	7	trans-1,2-Dimethylcyclopentane	7.4E-01%	106	20
	7	trans-1,3-Dimethylcyclopentane	4.5E-01%	106	20
n-Alkanes	4	n-Butane	1.7E-01%	92	20
	5	n-Pentane	9.2E-01%	106	20
	6	n-Hexane	2.4E+00%	106	20
	7	n-Heptane	2.8E+00%	106	20
	8	n-Octane	2.2E+00%	106	20
	9	n-Nonane	1.9E+00%	106	20
	10	n-Decane	1.6E+00%	106	20
	11	n-Undecane	1.5E+00%	106	20
	12	n-Dodecane	1.0E+00%	104	20
	13	n-Tridecane	8.2E-01%	102	20
	15	n-Pentadecane	1.9E-01%	95	20
	16	n-Hexadecane	7.3E-02%	76	20
Naphthalenes	10	Naphthalene	2.5E-01%	90	20
	11	1-Methylnaphthalene	3.3E-02%	92	20
	11	2-Methylnaphthalene	1.4E-01%	100	20

flag(s)

20 Data was converted using formula WT%=mg/mL*0.10*(1/0.8762).

Individual Sample Fuel Mixture Composition Data

fuel mixture : **JP-8 Fuel Oil**

sample # : **43/JP-8 Fuel**

from : **Smith, J.H., et.al., Department of the Air Force, Final report #ESL-TR-81-54; pp.1-50; National Technical Information Services, Springfield, VA, NTIS #AD A115949/LP, 1981**

compound class	carbon #	compound	weight percent	number of data points	flag
Alkenes	13	Tridecene	7.3E-01 %	1	21
Alkyl-Monoaromatics	8	m-Xylene	6.0E-02 %	1	21
	8	o-Xylene	6.0E-02 %	1	21
	9	1,2,3-Trimethylbenzene	2.7E-01 %	1	21
	10	1,2,3,4-Tetramethylbenzene	1.1E+00 %	1	21
	10	1,3-Dimethyl-5-ethylbenzene	6.2E-01 %	1	21
	10	1-Methyl-2-isopropylbenzene	5.6E-01 %	1	21
	12	1,2,4-Triethylbenzene	9.9E-01 %	1	21
	12	1,3,5-Triethylbenzene	6.0E-01 %	1	21
	13	n-Heptylbenzene	2.5E-01 %	1	21
	14	n-Octylbenzene	6.1E-01 %	1	21
	15	1-Ethylpropylbenzene	9.9E-01 %	1	21
Branched Alkanes	9	3-Methyloctane	4.0E-02 %	1	21
	10	2,4,6-Trimethylheptane	7.0E-02 %	1	21
	11	2-Methyldecane	4.1E-01 %	1	21
	12	2,6-Dimethyldecane	6.6E-01 %	1	21
	12	2-Methylundecane	1.2E+00 %	1	21
	13	2,6-Dimethylundecane	2.1E+00 %	1	21
Cycloalkanes	9	1,1,3-Trimethylcyclohexane	6.0E-02 %	1	21
	9	1,3,5-Trimethylcyclohexane	6.0E-02 %	1	21
	9	1-Methyl-4-ethylcyclohexane	1.0E-01 %	1	21
	9	Propylcyclohexane	1.4E-01 %	1	21
	10	n-Butylcyclohexane	7.4E-01 %	1	21
	12	Hexylcyclohexane	9.3E-01 %	1	21
	12	Phenylcyclohexane	8.7E-01 %	1	21
	13	Heptylcyclohexane	1.0E+00 %	1	21
Diaromatics (Except Naphthalenes)	12	Biphenyl	6.3E-01 %	1	21
n-Alkanes	7	n-Heptane	3.0E-02 %	1	21
	8	n-Octane	9.0E-02 %	1	21
	9	n-Nonane	3.1E-01 %	1	21
	10	n-Decane	1.3E+00 %	1	21
	11	n-Undecane	4.1E+00 %	1	21
	12	n-Dodecane	4.7E+00 %	1	21
	13	n-Tridecane	4.4E+00 %	1	21
	14	n-Tetradecane	3.0E+00 %	1	21

	15	n-Pentadecane	1.6E+00 %	1	21
	16	n-Hexadecane	4.5E-01 %	1	21
	17	n-Heptadecane	8.0E-02 %	1	21
	18	n-Octadecane	2.0E-02 %	1	21
Naphthalenes	10	Naphthalene	1.1E+00 %	1	21
	11	1-Methylnaphthalene	1.8E+00 %	1	21
Naphthalenes	11	2-Methylnaphthalene	1.5E+00 %	1	21
	12	1-Ethylnaphthalene	3.3E-01 %	1	21
	12	2,3-Dimethylnaphthalene	3.6E-01 %	1	21
	12	2,6-Dimethylnaphthalene	1.3E+00 %	1	21

flag(s)

21 no flag