

# Groundwater Containment at Site FT-01, Pope AFB

## Site Background

This section focuses on the groundwater containment system located at FT-01, Pope AFB. A site map for FT-01 is included as Figure 37.

### Contaminants in Soil

- TPH concentrations detected up to 44,000 ppm.
- In September 1993, 3,175 tons of contaminated soil were removed from the site.

### Contaminants in Groundwater

- The areal extent of JP-4 fuel contamination was estimated at 1.5 acres.
- As much as 24,000 gallons of free product are floating on top of the groundwater.

### Lithology

- Fine- to medium-grained sands to 25 feet bgs; hard silty clay from a depth of 26 feet bgs to 70 feet bgs.

- Groundwater is encountered between 2 and 5 feet bgs.

### Groundwater Containment System Details

- Free floating product recovery system.
- The system consists of four recovery wells (RW-1, RW-2, RW-3, and MW-2) and one trench.
- JP-4 is recovered by a pneumatic skimmer pump and stored in a product recovery tank.

### Operation Period

- The system began operation in November 1993 and may operate until 2001.

### Total Capital Costs

- \$289,000 for initial capital investment.

### Total O&M Costs

- Total cumulative O&M costs from November 1993 through November 1996 were \$66,600.

## Cost and Performance of Groundwater Containment at Site FT-01

### Groundwater Containment with Free Product Source Removal Operational Objectives

The objective of free product source removal is typically to remove liquid-phase contamination as quickly and cost-effectively as possible to prevent continued contamination of surrounding soil and groundwater. The emphasis for free product removal is that the mass of contaminants is cost effectively removed.

### Cost for Operation

Figure 38 illustrates curves of the O&M costs for the groundwater containment system at Site FT-01. Accurate month to month data were not available. The monthly O&M costs average

\$1,800. Total O&M costs after three years of operation were \$66,600.

### Contaminant Removal

Figure 39 illustrates curves of the removal rates of JP-4 product at the groundwater containment system at Site FT-01. Monthly removal rates of JP-4 product ranged from 1 to 650 gallons. Total contaminant removal after three years of operation was 5,163 gallons of JP-4 product. In November 1996, the curve representing the cumulative removal rate had not flattened, indicating that the removal rate was still adequate for this system's performance and it was meeting its operational objectives.

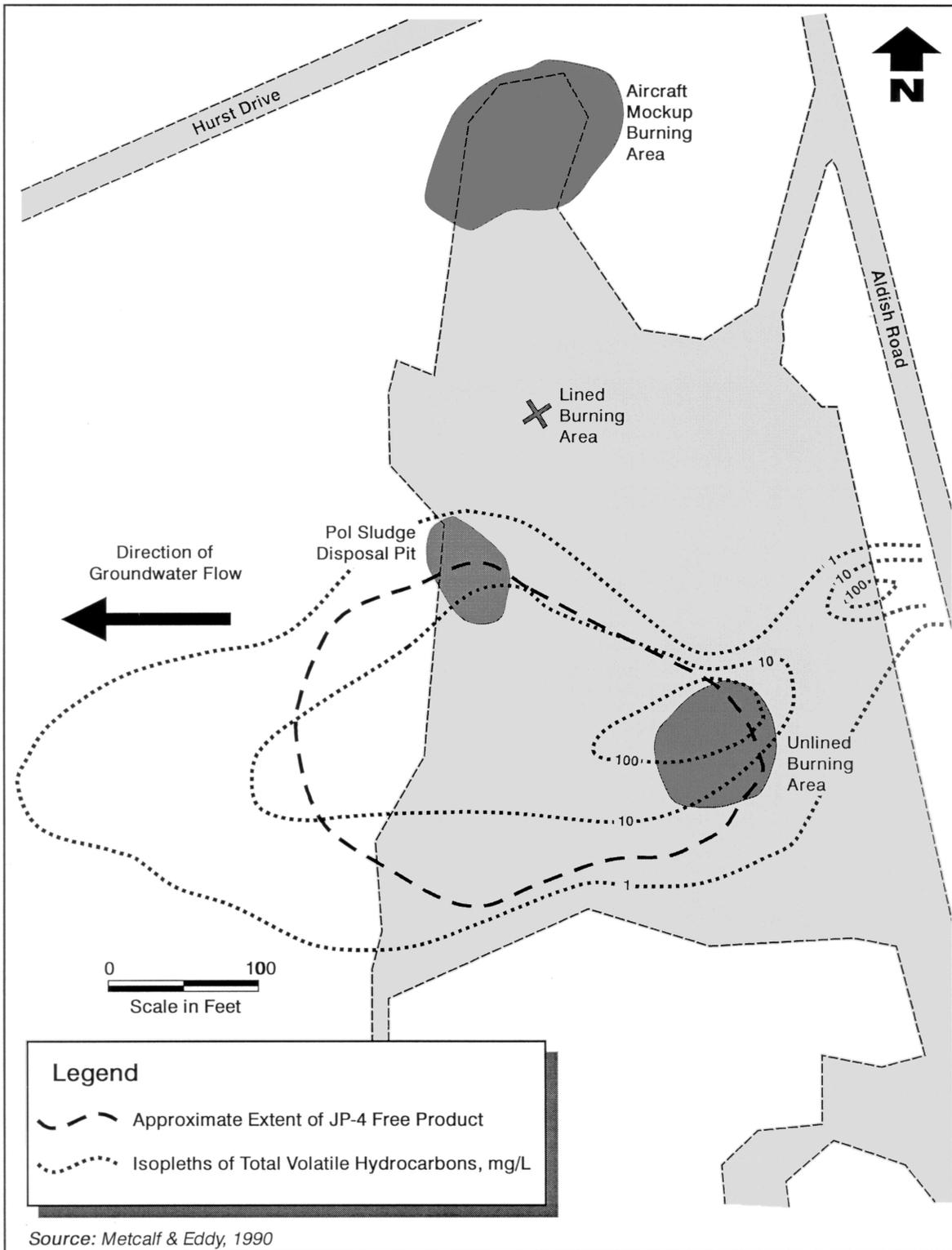
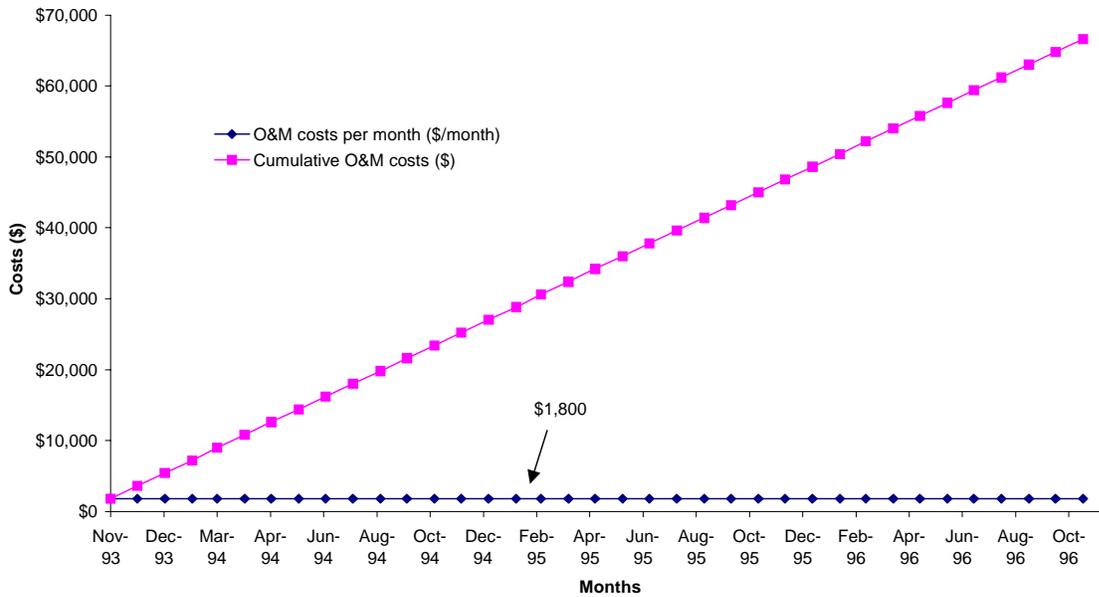


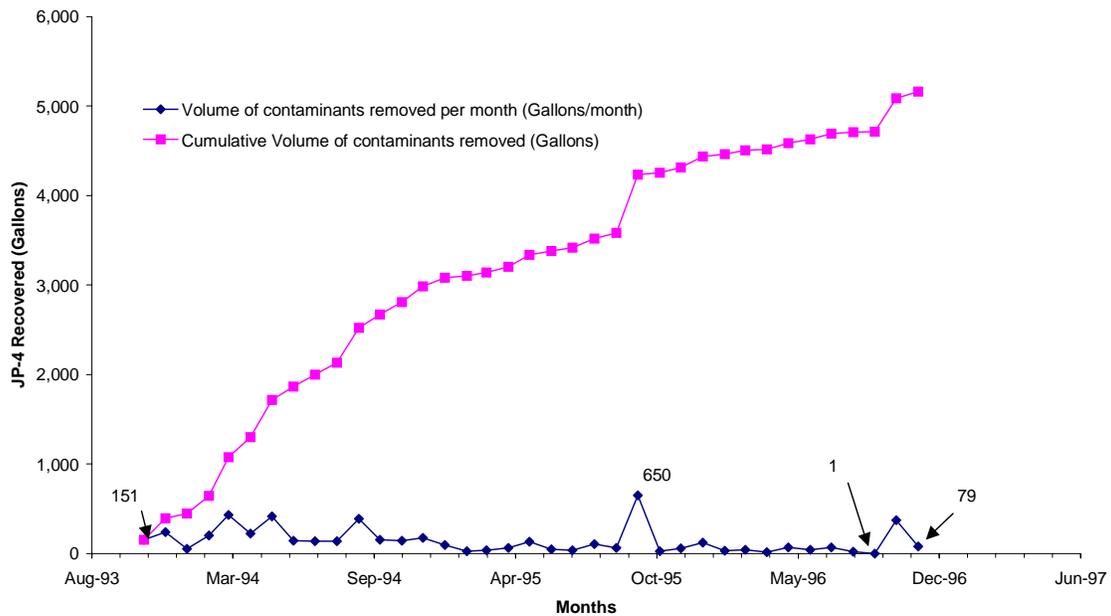
Figure 37. Extent of JP-4 Free Product and Total VOCs in Groundwater, Site FT-01, Pope AFB

**Figure 38**  
**Monthly and Cumulative O&M Costs vs. Time**  
**JP-4 Free Product**  
**Site FT-01, Pope AFB**



Rawft01.xls; O&M costs

**Figure 39**  
**Monthly & Cumulative JP-4 Product Recovery vs. Time**  
**Site FT-01, Pope AFB**



Rawft01.xls; Volume

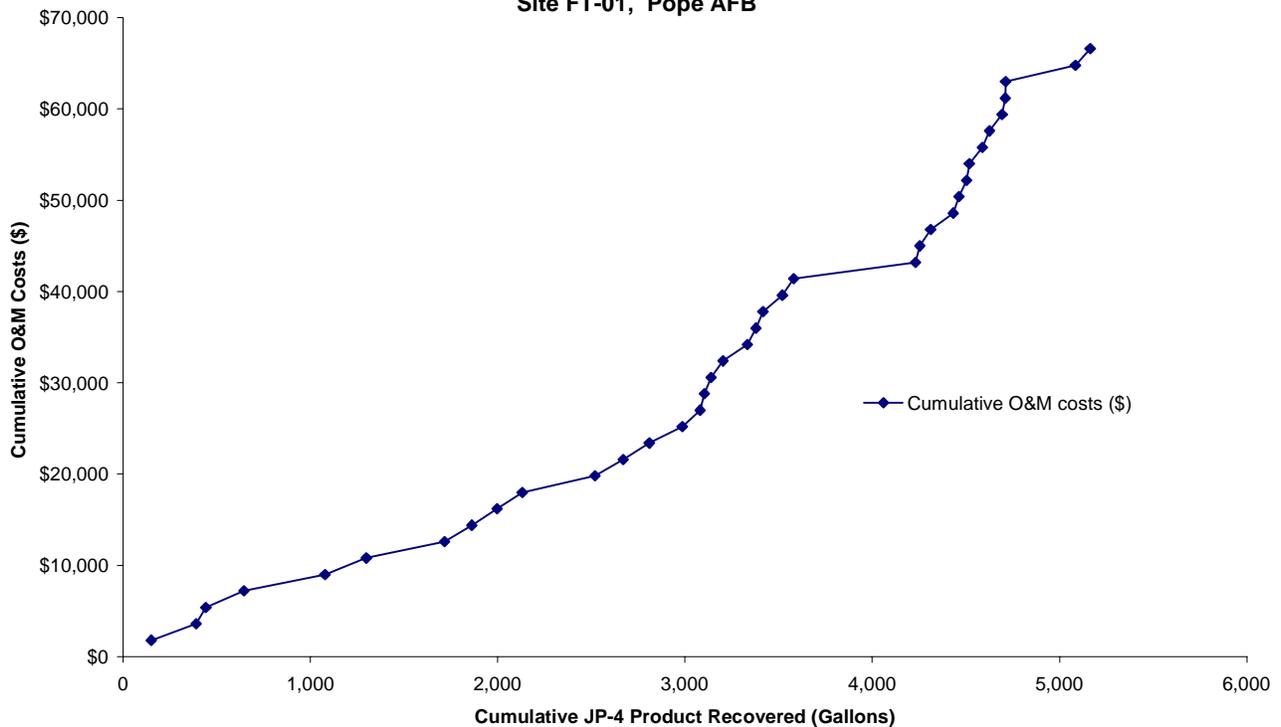
**Correlation of Costs and Contaminant Removal**

Figures 40 and 41 illustrate the relationship between the O&M costs and the removal rates for the groundwater containment system at Site FT-01.

Figure 40 illustrates the cumulative O&M cost over the cumulative contaminant removal. As of November 1996, this curve had not steepened. In November 1996, this groundwater containment system was operating efficiently for this system's performance and was meeting its operational objectives.

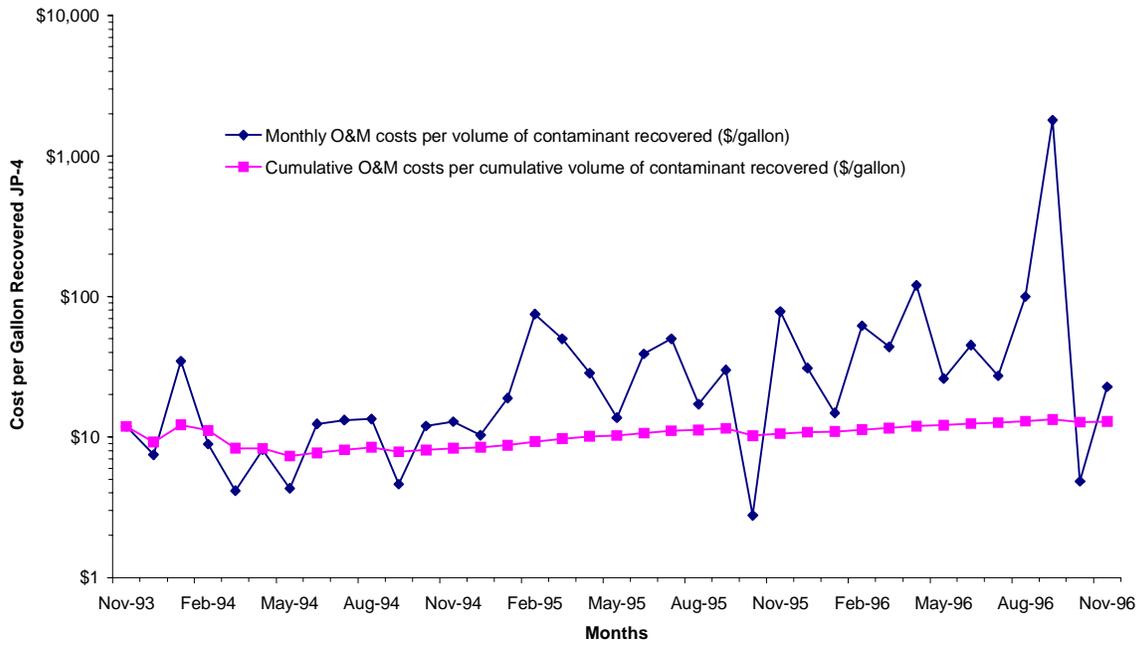
Figure 41 illustrates curves of the monthly and cumulative cost per unit of contaminant removal over the operation time of the technology. The monthly curve illustrates the cost per gallon of JP-4 product removal in each month. The cumulative curve illustrates that the average cost per unit of contaminant removal was \$12.90/gallon of JP-4 product after three years of operation time.

**Figure 40  
Cumulative O&M Costs vs. Cumulative JP-4 Recovered  
Site FT-01, Pope AFB**



Rawft01.xls; \$ vs. vol

**Figure 41**  
**Monthly and Cumulative Costs per Gallon of JP-4 Recovery vs. Time**  
**Site FT-01, Pope AFB**



Rawft01.xls; monthly\$pergalovert

**APPENDIX A**

Detailed Cost and Performance Data Table

**JP-4 Free-Product Recovery Pumping  
Fire Protection Training Area No. 4 (FT-01)  
Pope AFB**

<b>Date of contamination removal</b>	<b>Volume of contaminants removed per month (Gallons/month)</b>	<b>Cumulative Volume of contaminants removed (Gallons)</b>	<b>O&amp;M costs per month (\$/month)</b>	<b>Cumulative O&amp;M costs (\$)</b>	<b>Monthly O&amp;M costs per volume of contaminant recovered (\$/gallon)</b>	<b>Cumulative O&amp;M costs per cumulative volume of contaminant recovered (\$/gallon)</b>
Nov-93	151	151	\$1,800.00	\$1,800.00	\$11.92	\$11.92
Dec-93	240	391	\$1,800.00	\$3,600.00	\$7.50	\$9.21
Jan-94	52	443	\$1,800.00	\$5,400.00	\$34.62	\$12.19
Feb-94	202	645	\$1,800.00	\$7,200.00	\$8.91	\$11.16
Mar-94	433	1,078	\$1,800.00	\$9,000.00	\$4.16	\$8.35
Apr-94	221	1,299	\$1,800.00	\$10,800.00	\$8.14	\$8.31
May-94	417	1,716	\$1,800.00	\$12,600.00	\$4.32	\$7.34
Jun-94	145	1,861	\$1,800.00	\$14,400.00	\$12.41	\$7.74
Jul-94	136	1,997	\$1,800.00	\$16,200.00	\$13.24	\$8.11
Aug-94	134	2,131	\$1,800.00	\$18,000.00	\$13.43	\$8.45
Sep-94	389	2,520	\$1,800.00	\$19,800.00	\$4.63	\$7.86
Oct-94	150	2,670	\$1,800.00	\$21,600.00	\$12.00	\$8.09
Nov-94	140	2,810	\$1,800.00	\$23,400.00	\$12.86	\$8.33
Dec-94	175	2,985	\$1,800.00	\$25,200.00	\$10.29	\$8.44
Jan-95	95	3,080	\$1,800.00	\$27,000.00	\$18.95	\$8.77
Feb-95	24	3,104	\$1,800.00	\$28,800.00	\$75.00	\$9.28
Mar-95	36	3,140	\$1,800.00	\$30,600.00	\$50.00	\$9.75
Apr-95	63	3,203	\$1,800.00	\$32,400.00	\$28.57	\$10.12
May-95	131	3,334	\$1,800.00	\$34,200.00	\$13.74	\$10.26
Jun-95	46	3,380	\$1,800.00	\$36,000.00	\$39.13	\$10.65
Jul-95	36	3,416	\$1,800.00	\$37,800.00	\$50.00	\$11.07
Aug-95	105	3,521	\$1,800.00	\$39,600.00	\$17.14	\$11.25
Sep-95	60	3,581	\$1,800.00	\$41,400.00	\$30.00	\$11.56
Oct-95	650	4,231	\$1,800.00	\$43,200.00	\$2.77	\$10.21
Nov-95	23	4,254	\$1,800.00	\$45,000.00	\$78.26	\$10.58
Dec-95	58	4,312	\$1,800.00	\$46,800.00	\$31.03	\$10.85
Jan-96	121	4,433	\$1,800.00	\$48,600.00	\$14.88	\$10.96
Feb-96	29	4,462	\$1,800.00	\$50,400.00	\$62.07	\$11.30
Mar-96	41	4,503	\$1,800.00	\$52,200.00	\$43.90	\$11.59
Apr-96	15	4,518	\$1,800.00	\$54,000.00	\$120.00	\$11.95
May-96	69	4,587	\$1,800.00	\$55,800.00	\$26.09	\$12.16
Jun-96	40	4,627	\$1,800.00	\$57,600.00	\$45.00	\$12.45
Jul-96	66	4,693	\$1,800.00	\$59,400.00	\$27.27	\$12.66
Aug-96	18	4,711	\$1,800.00	\$61,200.00	\$100.00	\$12.99
Sep-96	1	4,712	\$1,800.00	\$63,000.00	\$1,800.00	\$13.37
Oct-96	372	5,084	\$1,800.00	\$64,800.00	\$4.84	\$12.75
Nov-96	79	5,163	\$1,800.00	\$66,600.00	\$22.78	\$12.90