A.5 SITE SS015 (SOLVENT SPILL AREA AND FACILITIES 550 AND 552)

A.5.1 Site Background

Site SS015 is located in the northwestern part of the EIOU, covers approximately 3.5 acres, and is comprised of the Solvent Spill Area (SSA) and Facilities 550 and 552. The SSA covers approximately 1.4 acres east of Facility 550 in an area previously used for stripping paint from aircraft. Use of this area is not well documented prior to 1981; however, stained soil, visible in historical aerial photographs indicates that the area was in use prior to 1970. Solvent spills were reported to have occurred in the area east of Facility 550, however actual dates the spills occurred is unknown (Weston, 1995a). Approximately 100 to 150 gallons per month of either methyl ethyl ketone (MEK), toluene, or tetraethylene glycol dimethyl ether (tetraglyme) were reported to have leaked from or splashed out of work trays used for collecting stripping wastes during operations at the site.

Facility 550, constructed in 1952, houses a corrosion control shop, a metals processing shop, a fiberglass shop, and nondestructive inspection operations. Past practices at the corrosion control shop included discharging wastes to a floor drain that was connected to a sanitary sewer (Weston, 1995a). Wastes generated included paints, thinners, methyl ethyl ketone, acids, and stripping wastes.

Facility 552 consists of a fenced, bermed concrete pad constructed in 1964 and currently used as a temporary hazardous waste collection point. Radomes were chemically stripped of paint near Facility 552 from 1964 to 1980. Stored wastes include paint, chromic acid, and solvents generated during aircraft maintenance operations at Facility 550. No documentation of past spills occurring at the site has been found (Weston, 1995a).

The Air Force conducted nine sampling rounds at sites within the EIOU during the RI. Results from Rounds 1 through 6 were used for preliminary screening of sites and data. Results from Rounds 7 through 9 were used for risk assessments based on comments from agencies.

Sampling efforts are described in Section 2.0 of the EIOU RI (Weston, 1995a). Summary tables 2.2-1 through 2.2-3 and Appendix A of the RI indicate that nine groundwater samples were collected from the SSA during Rounds 7 through 9 of the RI. Samples were analyzed for VOCs, SVOCs, petroleum products, and inorganic constituents.

In addition to groundwater samples, subsurface soil samples were collected from five locations in the SSA, two locations near Facility 550, and four locations near Facility 552. Surface soil samples were collected from five locations in the SSA and from two locations near Facility 552. Sampling locations, constituents analyzed, and results can be obtained in the EIOU RI (Weston, 1995a).

Classes of COCs detected in the groundwater at the site during the RI included various VOCs, one SVOC, and one metal. VOCs include TCE, cis-1,2-DCE, vinyl chloride, 1,4-dichlorobenzene, 1,2-DCA, and PCE. Bis(2-ethylhexyl)phthalate (a SVOC) and nickel (a metal) were identified as COCs. TPH at concentrations up to 4,300 µg/L has also been detected in the groundwater during periodic monitoring well sampling efforts conducted at the site. Some solvents, such as MEK, which were reportedly spilled at SS015 were sampled for in the RI but not detected, or were detected at levels which did not cause human health risks greater than one in one million. Figure A-7 presents site location, contaminant concentration in the groundwater, and a conceptual site model. Contamination detected in the soils at the site included PAHs and metals (molybdenum, antimony, cadmium, chromium, copper, lead, zinc, mercury, and silver).

A.5.2 Feasibility Study

The alternatives evaluated in the FS for SS015 were Alternative 1 (no action), Alternative 2 (natural attenuation and monitoring), Alternative 3 (extraction, air stripper/catalytic oxidation, ion exchange, activated carbon, and discharge), Alternative 5 (extraction, UV-OX, ion exchange, activated carbon, and discharge), and Alternative 7 (extraction, ion exchange, activated carbon, and discharge). As evaluated in the FS, Alternative 1 had the lowest cost, but

also the lowest total score. Alternative 2 had a capital cost of $18,600, a first year O&M cost of $72,000, and a score of 16. Alternatives 3, 5, and 7 had similar scores ranging from 27 to 31. Capital and first year O&M costs for these three alternatives were $750,000 capital with $120,000 O&M for Alternative 3; $850,000 capital with $160,000 O&M for Alternative 5; and $990,000 capital with $520,000 O&M for Alternative 7.

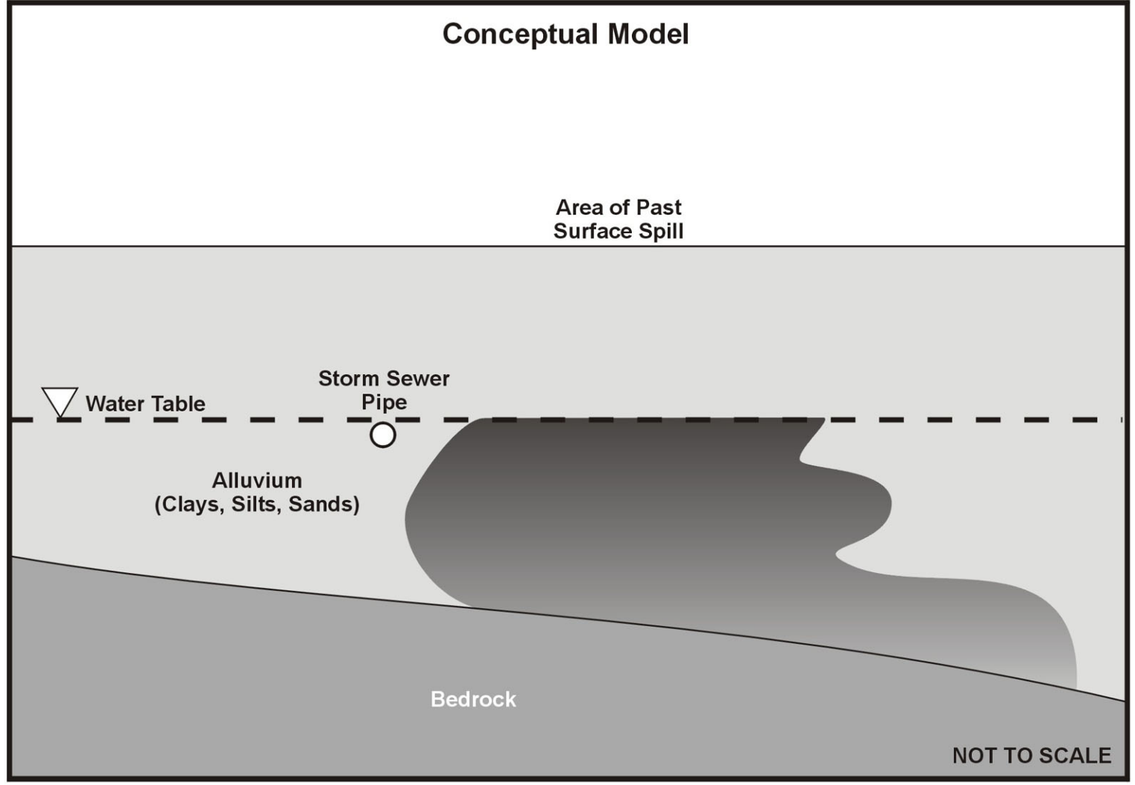
A.5.3 Selected Interim Remedial Actions/Objectives

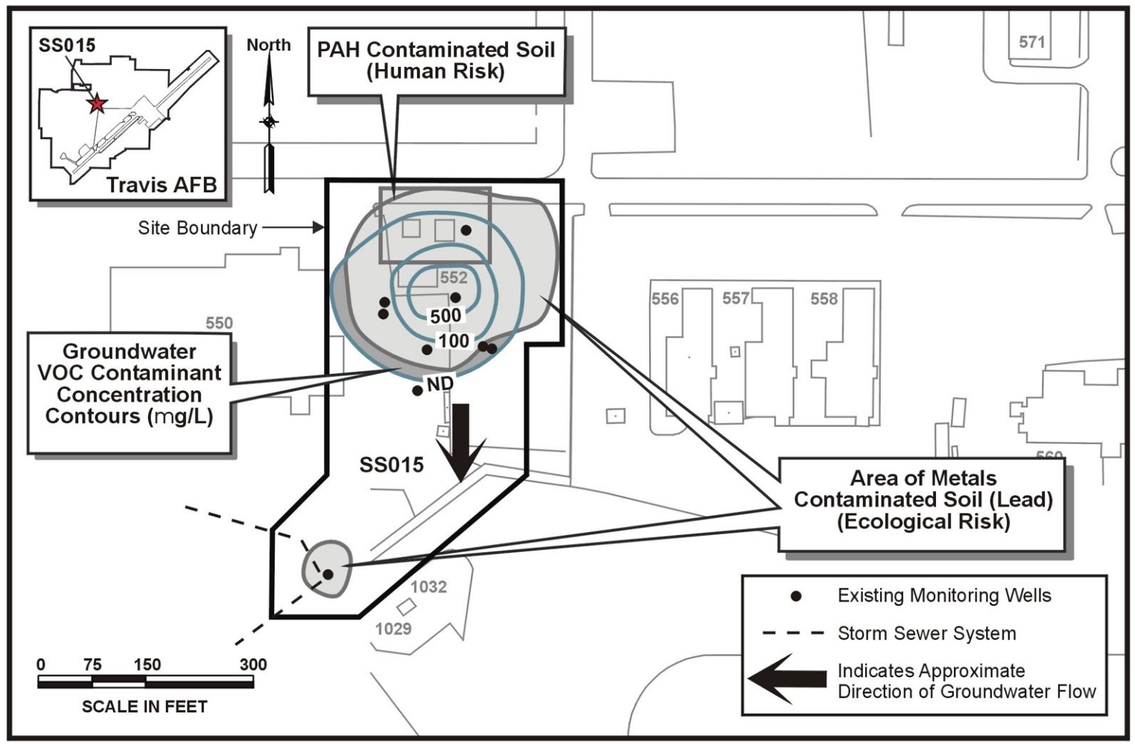
Selection of an alternative for groundwater at SS015 is deferred until the final Groundwater ROD so that additional data can be collected and evaluated to support the use of natural attenuation. Natural attenuation appears to be a viable alternative for this site because of the small areal extent of contamination, low TCE concentrations (maximum 25 µg/L), the presence of TPH for cometabolism, and TCE degradation by-products indicating natural attenuation is occurring. In addition, the site has relatively low permeability soils, low infiltration rates due to asphalt on the surface, and the plume appears stable. Additional site-specific data regarding natural attenuation will be developed for evaluation as part of the final Natural Attenuation Assessment Plan.

The interface between the storm sewer and contaminated groundwater will be investigated during the RD (see Figure 3-6). At locations where the contaminated groundwater is found to be migrating to the storm sewer or creek, an interim remedial action, such as pump and treat, will be used to control significant migration. Where pump and treat is used, the effectiveness of this action will be monitored and if it is found that the pump and treat action is not adequately controlling the migration, a contingency action, such as repair or lining of the storm sewer will be initiated.

A.5.4 Conceptual Site Model

Sources of groundwater contamination appear to be from past spills of materials used or stored at or near Facilities 552 and 550; however, no residual solvents were detected in the unsaturated zone. Surface soil contaminants identified at SS015 include PAHs and metals. These contaminants in soil have not impacted groundwater (i.e., the COC metals in the surface soil are not the same as the groundwater COC [nickel]), and any anticipated soil cleanup action is not expected to have an effect on groundwater. The source of nickel is currently being investigated.





SS015 (Solvent Spill Area and Facilities 550 and 552)

Primary Contaminants, Remediation Drivers and Affected Media

Medium	Contaminant Type	Remediation Driver	Contaminant of Concern	Maximum Reported Concentration
Groundwater	VOCs	Collective Human Risk for These Contaminants Is HR = 7.22×10^{-4}	TCE	25 mg/L
Groundwater	VOCs		cis-1,2-DCE	370 mg/L
Groundwater	VOCs		Vinyl Chloride	48 mg/L
Groundwater	VOCs		1,4-DCB	3.8 mg/L
Groundwater	VOCs		1,2-DCA	0.39 mg/L
Groundwater	VOCs		PCE	12 mg/L
Groundwater	SVOCs		bis(2-ethylhexyl)phthalate	6.68 mg/L
Groundwater	Metals		Nickel	1,500 mg/L
Groundwater	TPH	Potential Ecological Risk in Surface Water	NA	4,300 mg/L

Site Characteristics

- Approximately 50% of the area is covered by pavement and buildings
- Site located in an active area of the Base
- Estimated contaminated groundwater surface area = 50,000 ft^2, volume = 200,000 ft^3
- Estimated mass of dissolved VOCs equals 13 lb; no evidence of DNAPL or LNAPL
- Depth to groundwater — 10 feet
- Depth to bedrock — 15 to 25 feet
- Low permeability soils (clay and silt) occur up to a depth of between 15 and 25 feet bgs
- More permeable materials (sand and silt) exist at various intervals, mostly between 10 and 15 feet bgs
- Site also studied for surface and subsurface soil contamination

Selected Interim Remedial Action/Objectives

- Deferred: Site will be included in the Basewide Natural Attenuation Assessment Plan

Feasibility Study Treatment Alternatives and Associated Costs

- Alternative 2: Natural Attenuation/Monitoring: Capital Cost = $18,600; First Year O & M = $72,000
- Alternative 3: Extraction, Treatment and Discharge
  - FS Alternative 3: Air Stripper/Catalytic Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $750,000; First Year O & M = $120,000
  - FS Alternative 5: UV Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $850,000; First Year O & M = $160,000
  - FS Alternative 7: Ion Exchange, Activated Carbon: Capital Cost = $990,000; First Year O & M = $520,000
- These costs derived from FS will be refined during the remedial design phase based on combination of alternatives and site specific variables

Interim Design Assumptions

- Determine groundwater/surface water interactions and design appropriate responses

Figure A-7.
Site Summary Information
for SS015, Travis AFB

A.6 SITE SS016 (OIL SPILL AREA, FACILITIES 11, 13/14, 18, 20, 42/1941, 139/144, AND SELECTED SECTIONS OF STORM SEWER RIGHT OF WAY)

A.6.1 Site Background

Site SS016 is located in the center of the EIOU, covers approximately 210 acres, and is comprised of the Oil Spill Area (OSA) and Facilities 11, 13/14, 18, 20, 42/1941, 139/144, and sections of the Storm Sewer Right of Way (SSRW).

The OSA originally encompassed an area where waste oil had reportedly been spilled or disposed of on a grassy area which is now paved. Based on interviews with base personnel that indicated past releases from an oil/water separator (OWS) located at Facility 18, the OSA was expanded. The original area was reportedly used from the mid-1940s to the early 1950s (Weston, 1995a).

Facility 18 contains the Cleaning and Degreasing Shop which, based on historical records, once stored large quantities of various solvents. Although Facility 18 is currently still in use, the OWS holding tank has not been used since 1985.

Facility 11 is located between Hangar Avenue and the flightline, west of Second Street. Constructed in 1944, Facility 11 is currently used for servicing and repairing flightline support equipment. Small amounts of hydraulic fluids and oils are used during these activities. Past operations at the facility included a satellite accumulation point for hazardous wastes. Based on interviews with shop personnel, solvents were used during the cleaning of aircraft engines. No documentation of dates of these activities or spills that may have occurred is available (Weston, 1995a).

Facility 13/14 was an aircraft wash rack located south of Hangar Avenue between old Hangars 13 and 14. The Hangars were demolished in 1988 and Building 31 was built at the site. The wash rack was probably in use from the mid-1950s to the mid-1960s (Weston, 1995a).

Facility 20, located southeast of the intersection of second street and Hangar Avenue, is the Base Control Tower and was the site of an underground storage tank (UST) used for fuel for a backup generator. The UST was removed in 1994.

Facility 42/1941, located near Facility 11, includes a hazardous waste storage area and wash rack. The facility consists of a concrete pad, constructed in 1966, which is partially enclosed by corrugated metal walls. In addition to the wash rack, four 250-gallon above-ground storage tanks are located at the facility to hold waste oils and fuels. The wash rack is connected to the sanitary sewer through an OWS.

Facility 139/144 is comprised of two adjacent facilities, located south of Hickam Avenue and east of Broadway. Both house vehicle maintenance activities. Facility 139 was constructed in 1954 and Facility 144 was constructed in 1945. In addition to vehicle maintenance, other activities performed at the facilities include body work, painting, and radiator servicing. A leaking, 2,000-gallon solvent UST was removed from Facility 139 in 1985 (Weston, 1995a). Floor drains in the shop direct spills to two OWSs. Past practices at Facility 144 included emptying the radiator test tank onto the ground at the facility.

The SSRW includes all of the storm sewers, major surface drainage systems, and Union Creek. Portions of the SSRW in SS016 drain industrial areas in the EIOU. Miscellaneous base shops and aircraft parking aprons drain to the storm sewer system. Chemical wastes were potentially released into the system.

The Air Force conducted nine sampling rounds at sites within the EIOU during the RI. Results from Rounds 1 through 6 were used for preliminary screening of sites and data. Results from Rounds 7 through 9 were used for risk assessments based on comments from agencies. Sampling efforts are described in Section 2.0 of the EIOU RI (Weston, 1995a). Summary tables 2.2-1 through 2.2-3 and Appendix A of the RI indicate that groundwater samples were collected

from 119 locations at SS016 in Rounds 7 through 9. Within SS016, groundwater samples were collected from the following locations:

- 31 locations along the SSRW;
- 32 locations in the OSA;
- 15 locations in the vicinity of Facility 11;
- 11 locations in the vicinity of Facilities 13/14;
- 13 locations in the vicinity of Facility 20;
- 6 locations in the vicinity of Facilities 42/1941;
- 7 locations in the vicinity of Facility 139; and
- 4 locations in the vicinity of Facility 144.

Groundwater samples were analyzed for VOCs, SVOCs, dioxins/furans, petroleum products, inorganic constituents, total dissolved solids, and total organic carbon.

In addition to groundwater samples, the following were collected:

- 14 surface soil samples, 17 surface water samples, subsurface soil samples from 7 soil borings, and 35 sediment samples from the area surrounding the SSRW;
- Subsurface soil samples from 4 soil borings and 3 surface soil samples from the OSA;
- Subsurface soil samples from 6 soil borings in the vicinity of Facility 11;
- Subsurface soil samples from 6 soil borings in the vicinity of Facilities 13/14;
- Subsurface soil samples from 6 soil borings and 3 surface soil samples from the vicinity of Facility 20;
- Subsurface soil samples from four soil borings in the vicinity of Facilities 42/1941;

- Subsurface soil samples from five soil borings and one surface sample in the vicinity of Facility 139; and
- Subsurface soil samples from four soil borings and four surface soil samples from the vicinity of Facility 144.

Sample locations, constituents analyzed, and results can be obtained in the EIOU RI (Weston, 1995a).

Results from the sampling of the Storm Sewer Right-of-Way during the RI indicated that TCE concentrations in surface water within the storm sewer remained fairly consistent between samples collected from the east end of the storm sewer and Outfall III (23 to 55 µg/L). BTEX concentrations were highest in surface water near MW-246 area.

COCs detected in the groundwater at the site during the RI consist primarily of VOCs, and also include one SVOC and one metal. VOCs include TCE, cis-1,2-DCE, vinyl chloride, benzene, chloroform, 1,4-dichlorobenzene, dichlorobromomethane, 1,2-DCA, 1,1-DCE, and PCE. Bis(2-ethylhexyl)phthalate (a SVOC) and nickel (a metal) were also identified as COCs. TPH was identified in the groundwater at concentrations up to 8,500 µg/L. Recent CPT data has detected TCE levels at SS016 up to 180,000 µg/L, but results may not be comparable to monitoring well data. Data from the RI is presented in Figure A-8. Site location, contaminant concentrations, and a conceptual site model are presented in Figure A-8. Contaminants identified in the soil at the site include PAHs and PCBs.

An ongoing removal action at SS016 is known as the Tower Area Removal Action (TARA). The TARA system includes extraction wells, a carbon treatment system, and discharge to irrigation lines or the storm sewer. TARA was designed and operated to remove high concentrations of VOCs in the groundwater and also to protect workers during construction of a hydrant system near the tower. The system has removed over 190 pounds of contaminants since the system began operation in 1995. The TARA extraction system is being expanded to include

another area of high concentrations of VOCs at the OSA. The system will extract groundwater from the OSA and link the TARA extraction well with a new treatment system.

A.6.2 Feasibility Study

The alternatives evaluated in the FS for SS016 were Alternative 1 (no action), Alternative 2 (natural attenuation and monitoring), Alternative 3 (extraction, air stripper/catalytic oxidation, ion exchange, activated carbon, and discharge), Alternative 5 (extraction, UV-OX, ion exchange, activated carbon, and discharge), and Alternative 7 (extraction, ion exchange, activated carbon, and discharge). As evaluated in the FS, Alternative 1 had the lowest cost, but also the lowest total score. These costs are for the Oil Spill portion of SS016, and do not include the "Remainder of Plume" costs which were calculated separately in the FS. Alternative 2 had a capital cost of $18,600, a first year O&M cost of $72,000, and a score of 16. Alternatives 3, 5, and 7 all had scores of 27. Capital and first year O&M costs for the three alternatives were $2.88 million capital with $274,000 O&M for Alternative 3; $3 million capital with $312,000 O&M for Alternative 5; and $7.1 million capital with $5.9 million O&M for Alternative 7.

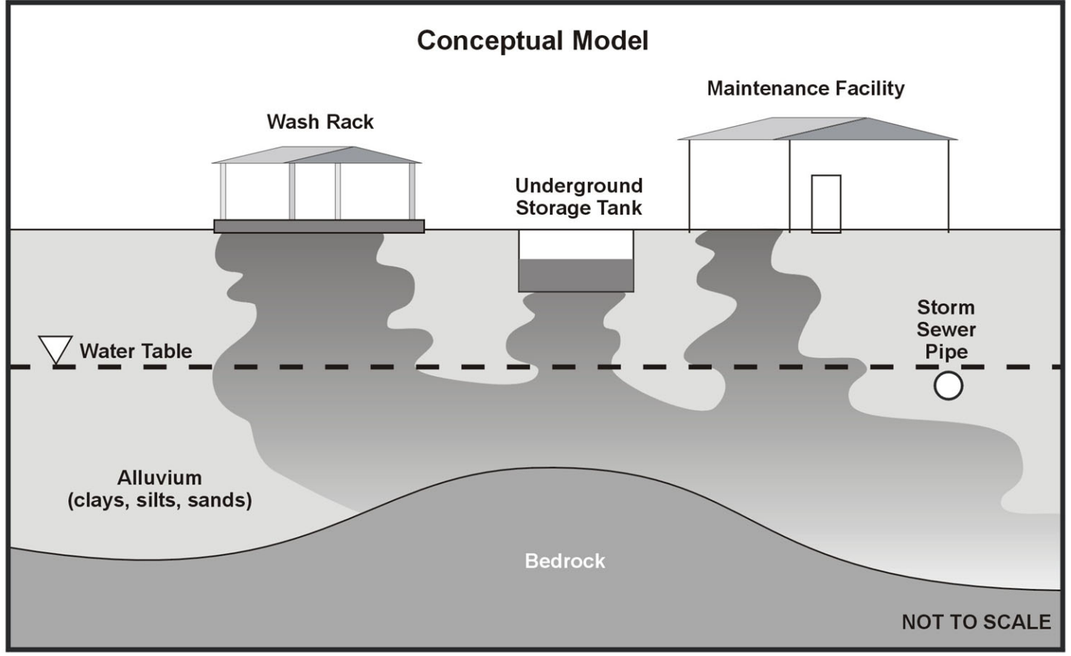
A.6.3 Selected Interim Remedial Actions/Objectives

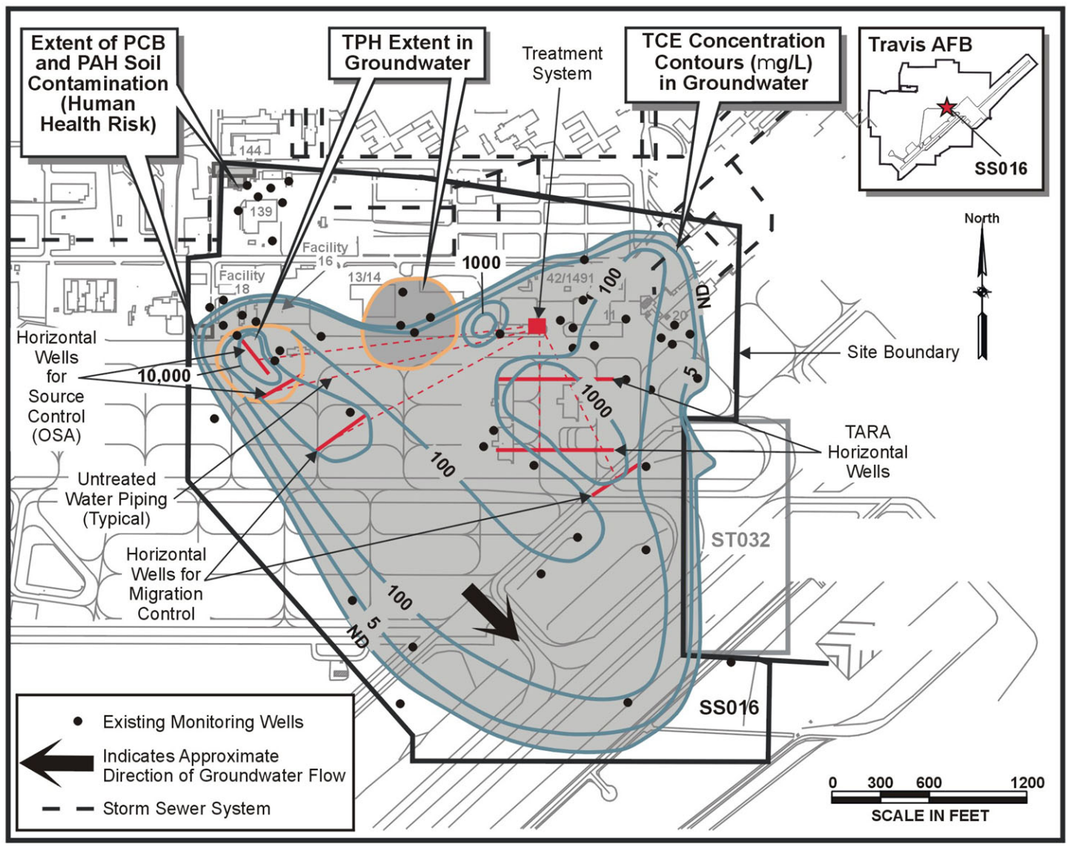
The selected interim action for SS016 is extraction, treatment, and discharge for source and migration control. Source control is selected for SS016 because TCE concentrations are greater than or equal to 3,000 µg/L and DNAPL is suspected in the OSA area. Migration control is necessary in distinct areas with high VOC concentrations. Extraction will control contaminant migration by creating a reversal in both flow and concentration gradients. Monitoring will confirm effectiveness of source and migration control. Additional extraction wells will be installed if required to ensure the plume is stable. Design installation, operation, and maintenance of the wells will take into consideration the fact that portions of the plume are under active runways and taxiways.

The interface between the storm sewer and contaminated groundwater will be investigated during the RD (see Figure 3-6). At locations where the contaminated groundwater is found to be migrating to the storm sewer or creek, an interim remedial action, such as pump and treat, will be used to control significant migration. Where pump and treat is used, the effectiveness of this action will be monitored and if it is found that the pump and treat action is not adequately controlling the migration, a contingency action, such as repair or lining of the storm sewer will be initiated.

A.6.4 Conceptual Site Model

Groundwater contamination in SS016 is extensive with several areas of higher (greater than 1,000 µg/L) TCE concentrations. There is an area of potential interaction between contaminated groundwater and storm sewers in the southern portion of the site (see Figure 3-6) (Weston, 1995a). Soil contamination, including PAHs and PCBs, was found in a small area of site SS016. These contaminants in soil have not impacted groundwater, and any anticipated soil cleanup action is not expected to have an affect on groundwater.





SS016 (Oil Spill Area, Facilities 11, 13/14, 18, 20, 42/1941, 139/144, and Selected Sections of Storm Sewer Right of Way)

Primary Contaminants, Remediation Drivers and Affected Media

Medium	Contaminant Type	Remediation Driver	Contaminant of Concern	Maximum Reported Concentration
Groundwater	VOCs	Collective Human Risk for These Contaminants Is HR = 1.11 x 10^{-2}	TCE	32,000 mg/L
Groundwater	VOCs		cis-1,2-DCE	4,600 mg/L
Groundwater	VOCs		Vinyl Chloride	56 mg/L
Groundwater	VOCs		Benzene	6.4 mg/L
Groundwater	VOCs		Chloroform	4.7 mg/L
Groundwater	VOCs		1,4-DCB	8.6 mg/L
Groundwater	VOCs		Dichlorobromomethane	0.9 mg/L
Groundwater	VOCs		1,2-DCA	3.97 mg/L
Groundwater	VOCs		1,1-DCE	5.4 mg/L
Groundwater	VOCs		PCE	220 mg/L
Groundwater	SVOCs		bis(2-ethylhexyl)phthalate	67.3 mg/L
Groundwater	Metals		Nickel	460 mg/L

Site Characteristics

- Approximately 100% of the area is covered by pavement and buildings
- Site located in an active area of Travis AFB (maintenance facilities and aircraft parking apron)
- TCE in groundwater in northwest portion of site — 10,000 mg/L average, 32,000 mg/L maximum
- TCE in groundwater in the rest of the plume — 600 mg/L average, 5,000 mg/L maximum
- Estimated contaminated groundwater surface area = 7,500,000 ft^2, volume = 29,800,000 ft^3
- Estimated mass of dissolved VOCs equals 1,200 lb; DNAPL may be present
- Cd, Cr, Cu, Pb, Ag, and Zn were measured at concentrations greater than NPDES discharge limits in some monitoring wells
- Depth to groundwater — 10 feet; depth to bedrock — 30 feet
- Low permeability soils (clay and silt) to a depth of between 15 and 25 feet bgs
- More permeable material (sands and silts) below 15 to 25 feet bgs
- Site also studied for surface and subsurface soil contamination
- Storm sewer is a potential groundwater/surface water pathway

Selected Interim Remedial Action/Objectives

- Alternative 3: Extraction, Treatment and Discharge
  - Source Control for TCE (OSA)
  - Migration Control for VOCs and potentially groundwater/surface water interactions

Feasibility Study Treatment Alternatives and Associated Costs

- Alternative 2: Natural Attenuation/Monitoring: Capital Cost = $18,600; First Year O & M = $72,000
- Alternative 3: Extraction, Treatment and Discharge
  - FS Alternative 3: Air Stripper/Catalytic Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $2,880,000; First Year O & M = $274,000
  - FS Alternative 5: UV Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $3,000,000; First Year O & M = $312,000
  - FS Alternative 7: Ion Exchange, Activated Carbon: Capital Cost = $7,100,000; First Year O & M = $5,900,000
- These costs derived from the FS are for the most contaminated portion of the plume and will be refined during the remedial design phase based on combination of alternatives and site specific variables

Interim Design Assumptions

- 4 horizontal wells, 300 feet in screened length (NOTE: Location and number of wells will be determined during remedial design phase)
- Extraction rate 60 gpm total, 15 gpm from each well
- 7,000 feet of untreated water piping (from wells to treatment system) — 1 inch ID, sch 80 PVC
- 50 feet of discharge piping (to existing irrigation system) — 3 inch ID, sch 80 PVC
- 10 feet from treatment system to existing power line
- Determine surface/groundwater interactions; design appropriate response

Figure A-8.
Site Summary Information for SS016, Travis AFB

5SS016.CDR - VMG 8/19/97 SAC 1

A.7 SITE SS029 (MW-329 AREA)

A.7.1 Site Background

Site SS029 consists of approximately 5.5 acres around Monitoring Well (MW) 329 in the southern part of the EIOU just south of the runway. The monitoring well was installed at the request of the Air Force Center for Environmental Excellence (AFCEE) to evaluate the source of the TCE plume identified at MW-269 (Weston, 1995a). Historical aerial photographs show aircraft parked in the area; however, activity appears limited and no source for the plume has been identified.

The Air Force conducted nine sampling rounds at sites within the EIOU during the RI. Results from Rounds 1 through 6 were used for preliminary screening of sites and data. Results from Rounds 7 through 9 were used for risk assessments based on comments from agencies. Sampling efforts are described in Section 2.0 of the EIOU RI (Weston, 1995a). Summary tables 2.2-1 through 2.2-3 and Appendix A of the RI indicate that groundwater samples from Rounds 7 through 9 were collected from three monitoring wells and eight CPT locations at SS029. Samples were analyzed for VOCs, SVOCs, inorganic constituents, and petroleum products. In addition to groundwater sampling, subsurface soil samples were collected from three soil borings at SS029. Sampling locations, constituents analyzed, and results are presented in the EIOU RI (Weston, 1995a).

All COCs identified in the groundwater during the RI were VOCs. They include TCE, 1,2-DCA, cis-1,2-DCE, benzene, chloroform, 1,1-DCE, and vinyl chloride. Site location, contaminant concentrations, and a conceptual site model are presented in Figure A-9. Additional contaminants including VOCs, SVOCs, PAHs, and metals were identified in the soils at the site.

A.7.2 Feasibility Study

The alternatives evaluated in the FS for SS029 were Alternative 1 (no action), Alternative 2 (natural attenuation and monitoring), Alternative 4 (extraction, air stripper/catalytic oxidation, activated carbon, and discharge), Alternative 6 (extraction, UV-OX, activated carbon, and discharge), and Alternative 8 (extraction, activated carbon, and discharge). As evaluated, Alternative 1 had the lowest cost, but also the lowest total score. Alternative 2 had a capital cost of $18,600, a first year O&M cost of $72,000, and a score of 16. Alternatives 4, 6, and 8 had similar scores ranging from 27 to 29. Capital and first year O&M costs for these three alternatives were $1.6 million capital with $170,000 O&M for Alternative 4; $1.7 million capital with $210,000 O&M for Alternative 6; and $1.75 million capital with $660,000 O&M for Alternative 8.

A.7.3 Selected Interim Remedial Actions/Objectives

The selected interim action for SS029 is Alternative 3, Extraction, Treatment, and Discharge. Migration control is to contain the migration of contaminated groundwater. In addition, portions of the site are deferred until the final Groundwater ROD so that additional data can be collected and evaluated to support the use of natural attenuation.

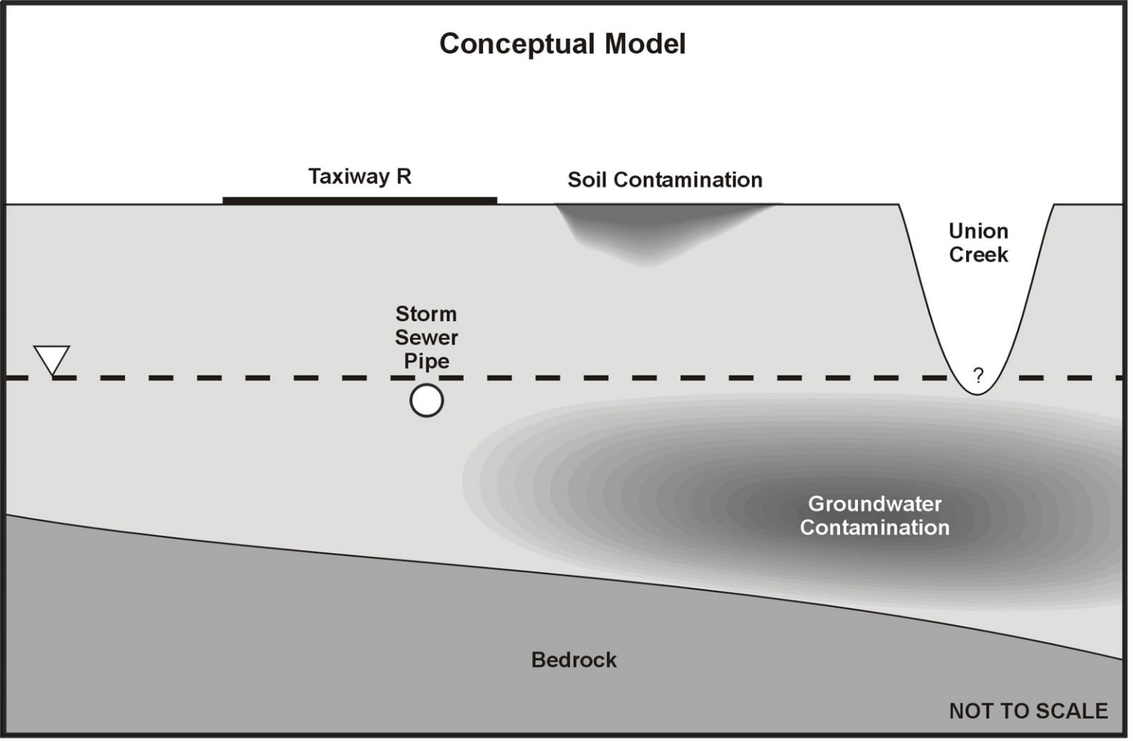
The interface between the storm sewer and contaminated groundwater will be investigated during the RD (see Figure 3-6). At locations where the contaminated groundwater is found to be migrating to the storm sewer or creek, an interim remedial action, such as pump and treat, will be used to control significant migration. Where pump and treat is used, the effectiveness of this action will be monitored and if it is found that the pump and treat action is not adequately controlling the migration, a contingency action, such as repair or lining of the storm sewer will be initiated.

A.7.4 Conceptual Site Model

A source of groundwater contamination in the area of MW-329 has not been identified; however, an aerial photograph of the area indicates that aircraft once parked at the site. Investigations were conducted at SS029 to assess the extent of TCE contamination downgradient of the SS016 plume.

Contaminants found in the soils at site SS029 include TCE, several PAHs, and metals. Based on modeling results, low soil TCE levels (0.12 mg/kg) indicate that the soil is not a source for the TCE groundwater contamination. Therefore, any soil cleanup action is not expected to have an effect on groundwater.

There is a potential for groundwater/storm sewer interaction on the western edge of the site.



SS029 (MW-329 Area)

Primary Contaminants, Remediation Drivers and Affected Media

Medium	Contaminant Type	Remediation Driver	Contaminant of Concern	Maximum Reported Concentration
Groundwater	VOCs	Collective Human Risk for These Contaminants Is HR = 4.22×10^{-4}	TCE	1,300 mg/L
Groundwater	VOCs		1,2-DCA	1.13 mg/L
Groundwater	VOCs		cis-1,2-DCE	80 mg/L
Groundwater	VOCs		Benzene	0.55 mg/L
Groundwater	VOCs		Chloroform	0.61 mg/L
Groundwater	VOCs		1,1-DCE	0.57 mg/L
Groundwater	VOCs		Vinyl Chloride	0.22 mg/L

Site Characteristics

- Open field is located between abandoned taxiway and Union Creek
- TCE in groundwater — 315 mg/L average, 1,300 mg/L maximum
- Estimated contaminated groundwater surface area = 800,000 ft^2, volume = 4,800,000 ft^3
- Estimated mass of dissolved VOCs equals 100 lb; no evidence of DNAPL or LNAPL
- Depth to groundwater — 10 feet
- Depth to bedrock — 30 feet
- Top 10 feet of saturated alluvium is composed of clays and other low permeability material
- Bottom 10 feet of saturated alluvium is composed of sands and other moderate permeability material
- Site also studied for surface soil contamination
- Storm sewer is potential groundwater/surface water pathway on western edge of site

Selected Interim Remedial Action/Objectives

- Alternative 3: Extraction, Treatment and Discharge
  - Migration Control

Feasibility Study Treatment Alternatives and Associated Costs

- Alternative 2: Natural Attenuation/Monitoring: Capital Cost = $18,600; First Year O & M = $72,000
- Alternative 3: Extraction, Treatment and Discharge
  - FS Alternative 4: Air Stripper/Catalytic Oxidation, Activated Carbon: Capital Cost = $1,600,000; First Year O & M = $170,000
  - FS Alternative 6: UV Oxidation, Activated Carbon: Capital Cost = $1,700,000; First Year O & M = $210,000
  - FS Alternative 8: Activated Carbon: Capital Cost = $1,750,000; First Year O & M = $660,000
- These costs derived from FS will be refined during the remedial design phase based on combination of alternatives and site specific variables

Interim Design Assumptions

- 2 horizontal wells, 300 feet in screened length (NOTE: Location and number of wells will be determined during the remedial design phase)
- Extraction rate 30 gpm total, 15 gpm from each well
- 1,200 feet of untreated water piping (from well to treatment system) — 1 inch ID, sch 80 PVC
- 600 feet of discharge piping (to Union Creek) — 3 inch ID, sch 80 PVC
- 350 feet from treatment system to existing power line

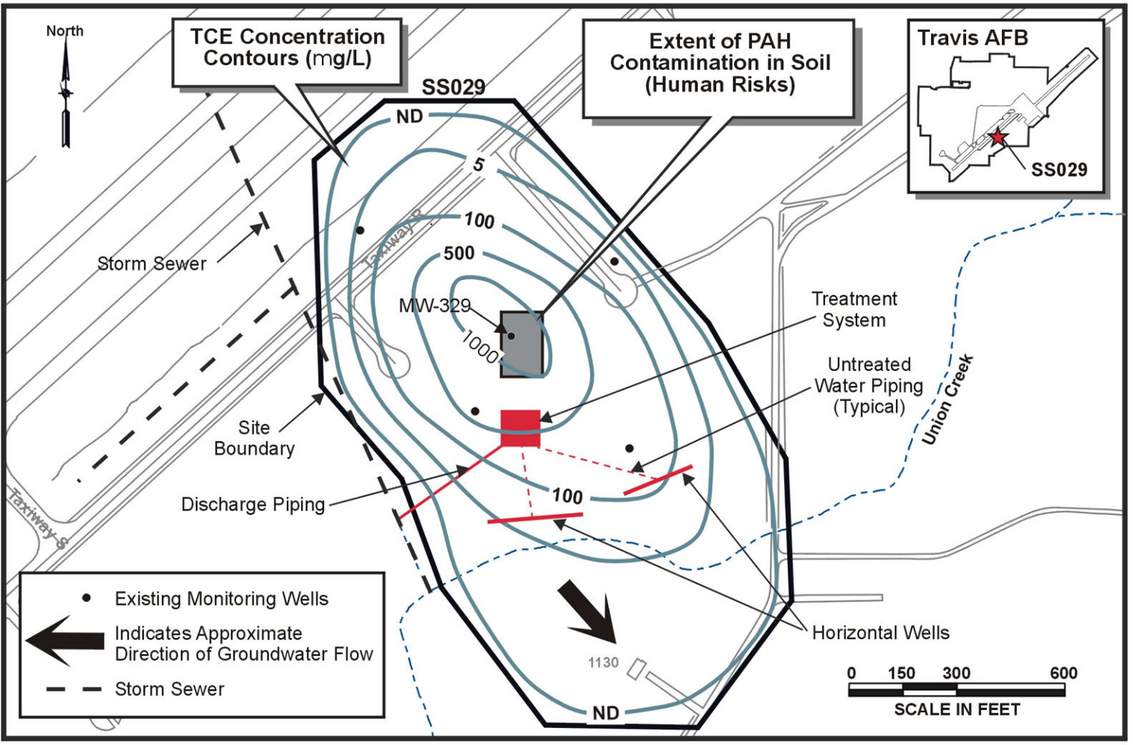


Figure A-9.
Site Summary Information for SS029, Travis AFB

A.8 SITE SS030 (MW-269 AREA)

A.8.1 Site Background

Site SS030 covers approximately 16 acres in the area around MW-269 in the southern portion of the EIOU near the south base boundary. The monitoring well was originally installed to evaluate the water quality along this base boundary (Weston, 1995a). The site is adjacent to a radar facility (Facility 1125); however, historical aerial photographs do not indicate any staining in the area, or any activities that may have been the source of the groundwater contamination at SS030.

The Air Force conducted nine sampling rounds at sites within the EIOU during the RI. Results from Rounds 1 through 6 were used for preliminary screening of sites and data. Results from Rounds 7 through 9 were used for risk assessments based on comments from agencies. Sampling efforts are described in Section 2.0 of the EIOU RI (Weston, 1995a). Summary tables 2.2-1 through 2.2-3 and Appendix A of the RI indicate that 17 groundwater samples were collected from monitoring wells and 10 groundwater samples were collected from CPT locations during final sampling rounds. Samples were analyzed for VOCs, SVOCs, PCBs, petroleum products, inorganic constituents, and total dissolved solids. In addition to groundwater sampling, subsurface soil samples were collected from five soil borings, and six surface soil samples were collected from SS030. Sampling locations, constituents analyzed, and results are presented in the EIOU RI (Weston, 1995a).

COCs detected in the groundwater at SS030 during the RI include various VOCs and one metal. VOCs identified as COCs include TCE, chloroform, dichlorobromomethane, and 1,2-DCA. Nickel was identified as a metal COC. The TCE plume extends beyond the base boundary. The maximum reported TCE concentration from the RI is 2,400 µg/L. Samples taken after the RI (November, 1995) indicate a maximum concentration of 3,860 µg/L TCE. Site location, contaminant concentrations, and a conceptual site model are presented in Figure A-10. Contamination identified in the soils at the site include low levels of several VOCs, SVOCs,

PAHs, and metals (antimony, beryllium, barium, chromium, copper, lead, nickel, selenium, and zinc). Soil contamination will be addressed separately in a soil ROD.

Early removal actions at this site included a 10-month pump and treat project conducted by Weston in 1993/94 and a week-long 2-phase extraction test conducted by Radian in 1995. The objective of these extraction tests was to develop data to design a system to remediate the groundwater. A Treatability Study is planned for SS030 to extract and treat contaminated groundwater; startup is planned for the summer of 1997.

A.8.2 Feasibility Study

The alternatives evaluated in the FS for SS030 were Alternative 1 (no action), Alternative 2 (natural attenuation and monitoring), Alternative 3 (extraction, air stripper/catalytic oxidation, ion exchange, activated carbon, and discharge), Alternative 5 (extraction, UV-OX, ion exchange, activated carbon, and discharge), and Alternative 7 (extraction, ion exchange, activated carbon, and discharge). As evaluated in the FS, Alternative 1 had the lowest cost, but also the lowest total score. Alternative 2 had a capital cost of $18,600, a first year O&M cost of $72,000, and a score of 16. Alternatives 3, 5, and 7 all had total scores of 31. Capital and first year O&M costs for these three alternatives were $660,000 capital with $106,000 O&M for Alternative 3; $730,000 capital with $131,000 O&M for Alternative 5; and $490,000 capital with $78,000 O&M for Alternative 7.

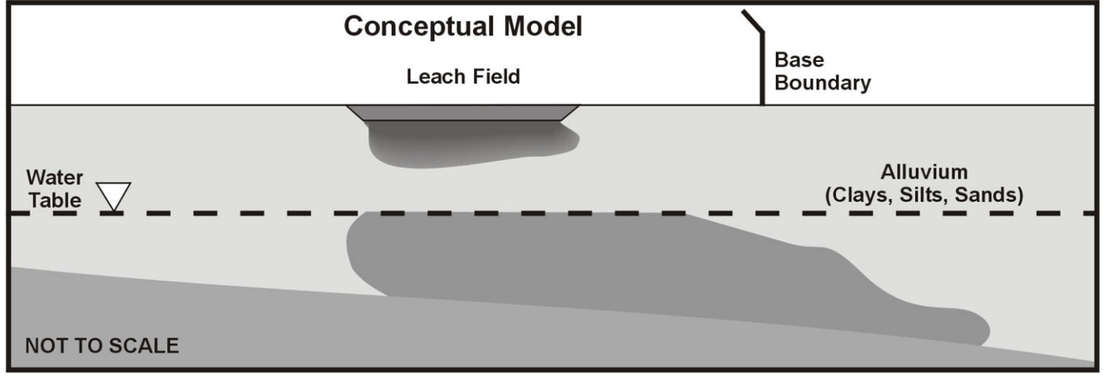
A.8.3 Selected Interim Remedial Actions/Objectives

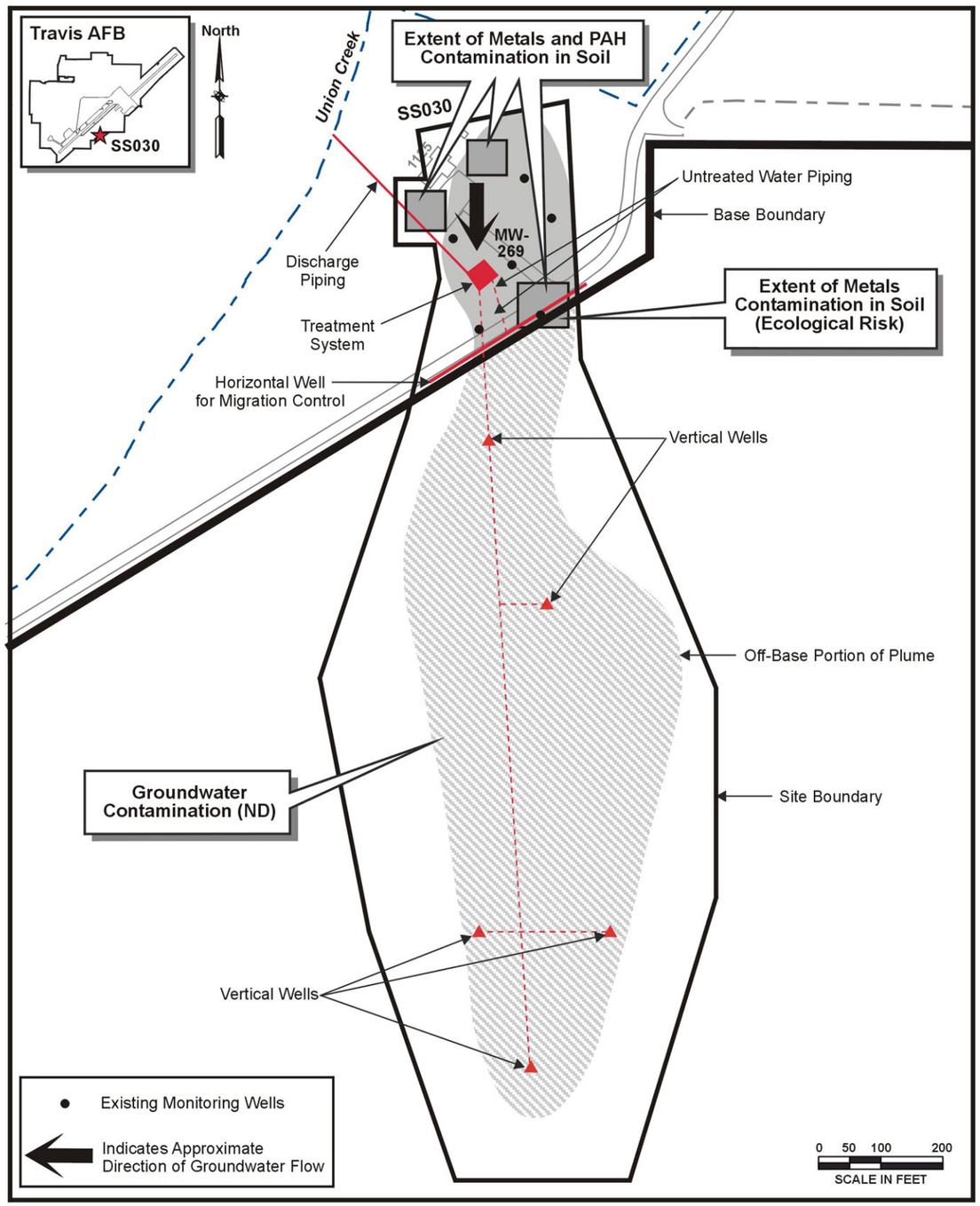
The selected interim action for SS030 is Alternative 3, Extraction, Treatment, and Discharge of the groundwater, a combination of remediation of off-base contamination, source control, and migration control. Source control is necessary to address TCE concentrations (greater than 3,000 µg/L). Migration control will ensure that further off-base contamination does not occur.

A.8.4 Conceptual Site Model

No specific sources were identified for SS030; a possible source was identified as the septic system or associated leachfield. Groundwater contamination extends approximately 1,100 feet beyond the base boundary.

Contamination found in the soils at SS030 includes several VOCs, SVOCs, PAHs, and metals. Although TCE is found in both the soil and the groundwater, the relatively low levels in the soil (0.197 mg/kg) and modeling results indicate that it is not a source for the groundwater contamination. Although nickel is reported as a COC for both soil and groundwater, the actual origin of the nickel in groundwater is currently being investigated by the Air Force. Any soil cleanup action is not expected to have an effect on groundwater.





SS030 (MW-269 Area)

Primary Contaminants, Remediation Drivers and Affected Media

Medium	Contaminant Type	Remediation Driver	Contaminant of Concern	Maximum Reported Concentration
Groundwater	VOCs	Collective Human Risk for These Contaminants Is HR = 7.6×10^{-4}	TCE	2,400 mg/L
Groundwater	VOCs		Chloroform	1.2 mg/L
Groundwater	VOCs		Dichlorobromomethane	0.53 mg/L
Groundwater	VOCs		1,2-DCA	0.34 mg/L
Groundwater	Metals		Nickel	903 mg/L

Site Characteristics

- Approximately 25% of the area is covered by pavement or buildings
- TCE in groundwater — 958 mg/L average, 2,400 mg/L maximum
- Estimated contaminated groundwater surface area = 425,000 ft^2, volume = 6,375,000 ft^3
- Estimated mass of dissolved VOCs equals 18 lb; DNAPL may be present
- Se and Ag were measured at concentrations greater than NPDES discharge limits in some monitoring wells
- Mix of low permeability soils (clay and silt) and more permeable materials (sands and silts) to a depth of between 20 and 25 feet bgs
- Depth to groundwater — 10 feet
- Depth to bedrock — 20 to 25 feet
- Site also studied for surface and subsurface soil contamination

Selected Interim Remedial Action/Objectives

- Alternative 3: Extraction, Treatment and Discharge
  - Off-base Remediation
  - Source Control for TCE
  - Migration Control

Feasibility Study Treatment Alternatives and Associated Costs

- Alternative 2: Natural Attenuation/Monitoring: Capital Cost = $18,600; First Year O & M = $72,000
- Alternative 3: Extraction, Treatment and Discharge
  - FS Alternative 3: Air Stripper/Catalytic Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $660,000; First Year O & M = $106,000
  - FS Alternative 5: UV Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $730,000; First Year O & M = $131,000
  - FS Alternative 7: Ion Exchange, Activated Carbon: Capital Cost = $490,000; First Year O & M = $78,000
- These costs derived from FS will be refined during the remedial design phase based on combination of alternatives and site specific variables

Interim Design Assumptions*

- Five vertical wells and one horizontal well/extraction trench (NOTE: Location and number of wells will be determined during remedial design phase)
- Extraction rate 92 gpm total, approximately 15 gpm from each well
- 1,300 feet of untreated water piping (from well to treatment system) — 2 to 4 inch PVC or HDPE
- 300 feet of discharge piping (to Union Creek)

* Based on current Treatability Study, RD/RA will refine interim action

Figure A-10.
Site Summary Information for SS030, Travis AFB

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A.9 SITE SD031 (FACILITY 1205)

A.9.1 Site Background

Site SD031 covers approximately 5.5 acres and encompasses Facility 1205 in the northeastern part of the EIOU, southeast of Vandenberg Drive. Operations at the facility, constructed in 1957, include maintenance and repair of diesel-powered generators. A wash rack, located just south of the facility, is used to clean diesel engine parts and discharges to an OWS. Wastes generated at the facility include oils, antifreeze, and solvents. Based on interviews with base personnel, an incinerator may have been located north of the site at one time (Weston, 1995a). Historical aerial photographs taken from 1958 to 1963 indicate that the facility may have been used as an aircraft maintenance hangar during that time. Facility 1205 has handled oils, antifreeze, and solvents from 1957 to the present.

The Air Force conducted nine sampling rounds at sites within the EIOU during the RI. Results from Rounds 1 through 6 were used for preliminary screening of sites and data. Results from Rounds 7 through 9 were used for risk assessments based on comments from agencies. Sampling efforts are described in Section 2.0 of the EIOU RI (Weston, 1995a). Summary tables 2.2-1 through 2.2-3 and Appendix A of the RI indicate that 20 groundwater samples were collected from monitoring wells and 11 groundwater samples were collected from CPT locations during final sampling rounds. Samples were analyzed for VOCs, petroleum products, and inorganic constituents. In addition to groundwater sampling, subsurface soil samples were collected from seven soil borings and six surface soil samples were collected from SD031. Sample locations, constituents analyzed, and results are presented in the EIOU RI (Weston, 1995a).

Classes of COCs detected in the groundwater at SD031 during the RI include VOCs and one metal. The VOCs identified as COCs include TCE, benzene, 1,1-DCE, cis-1,2-DCE, carbon tetrachloride, chloroform, 1,2-DCA, and vinyl chloride. Nickel was identified as a metal COC. TPH at concentrations up to 7,000 µg/L was detected in the groundwater at SD031.

According to agreements with agencies during the RI, TPH was not considered a COC in the EIOU. TCA was identified in groundwater at SD031 (maximum 12,000 µg/L), but based on health risk assessments, was not considered a COC. Site location, contaminant concentrations, and a conceptual site model are presented in Figure A-11. Contamination was not found in the site soils during the RI.

A.9.2 Feasibility Study

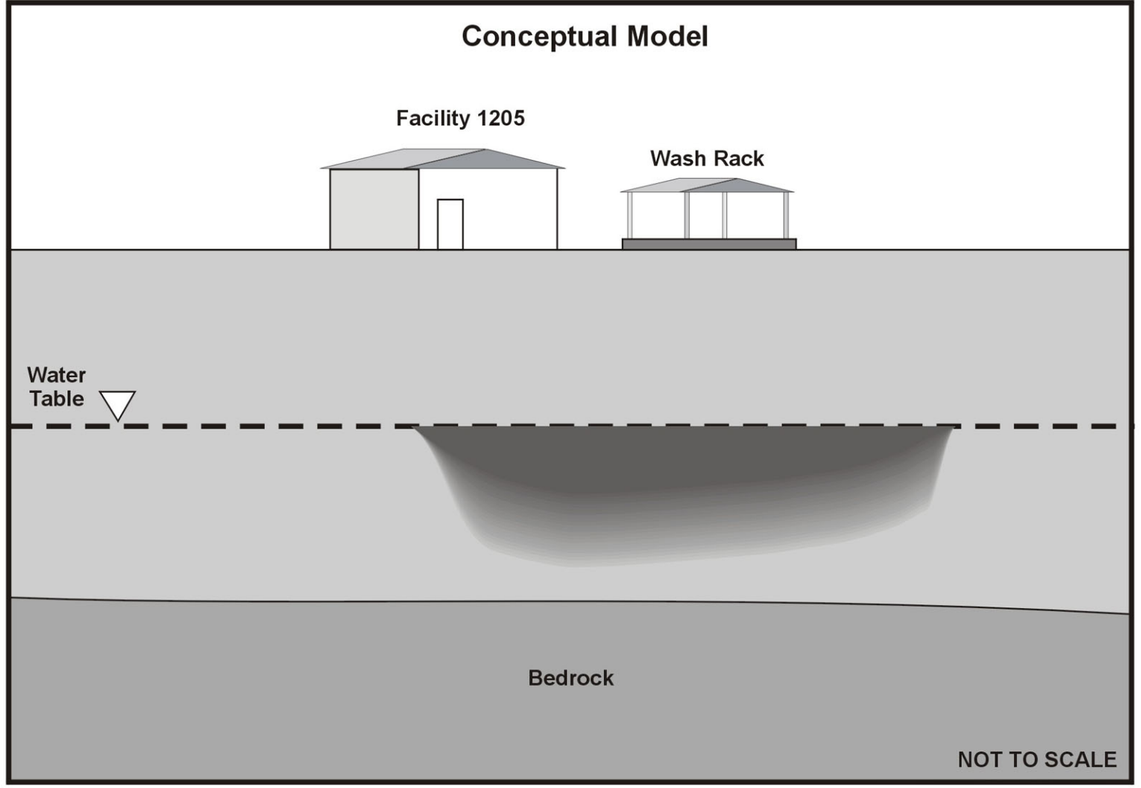
The alternatives evaluated in the FS for SD031 were Alternative 1 (no action), Alternative 2 (natural attenuation and monitoring), Alternative 3 (extraction, air stripper/catalytic oxidation, ion exchange, activated carbon, and discharge), Alternative 5 (extraction, UV-OX, ion exchange, activated carbon, and discharge), and Alternative 7 (extraction, ion exchange, activated carbon, and discharge). As evaluated in the FS, Alternative 1 had the lowest cost, but also the lowest total score. Alternative 2 had a capital cost of $18,600, a first year O&M cost of $72,000, and a score of 16. Alternatives 3, 5, and 7 had scores ranging from 27 to 29. Capital and first year O&M costs for these three alternatives were $620,000 capital with $128,000 O&M for Alternative 3; $700,000 capital with $156,000 O&M for Alternative 5; and $2.58 million capital with $2.4 million O&M for Alternative 7.

A.9.3 Selected Interim Remedial Actions/Objectives

The selected interim action for SD031 is Alternative 3, Extraction, Treatment, and Discharge of the contaminated groundwater. Concentrations of TCE (greater than 3,000 µg/L) and other VOCs indicate that DNAPL may be present. Source control will ensure that further groundwater contamination does not occur.

A.9.4 Conceptual Site Model

Generator maintenance activities at Facility 1205 may have contributed to fuel-related contamination in the subsurface. Another possible source is an incinerator which was located behind the facility in an open field. The exact location of the incinerator has not been confirmed. Disposal of burned materials from the incinerator may have released contaminants. Although subsurface contamination was detected during the RI, no COCs were identified in the soil or other media at SD031 (Weston, 1995a).



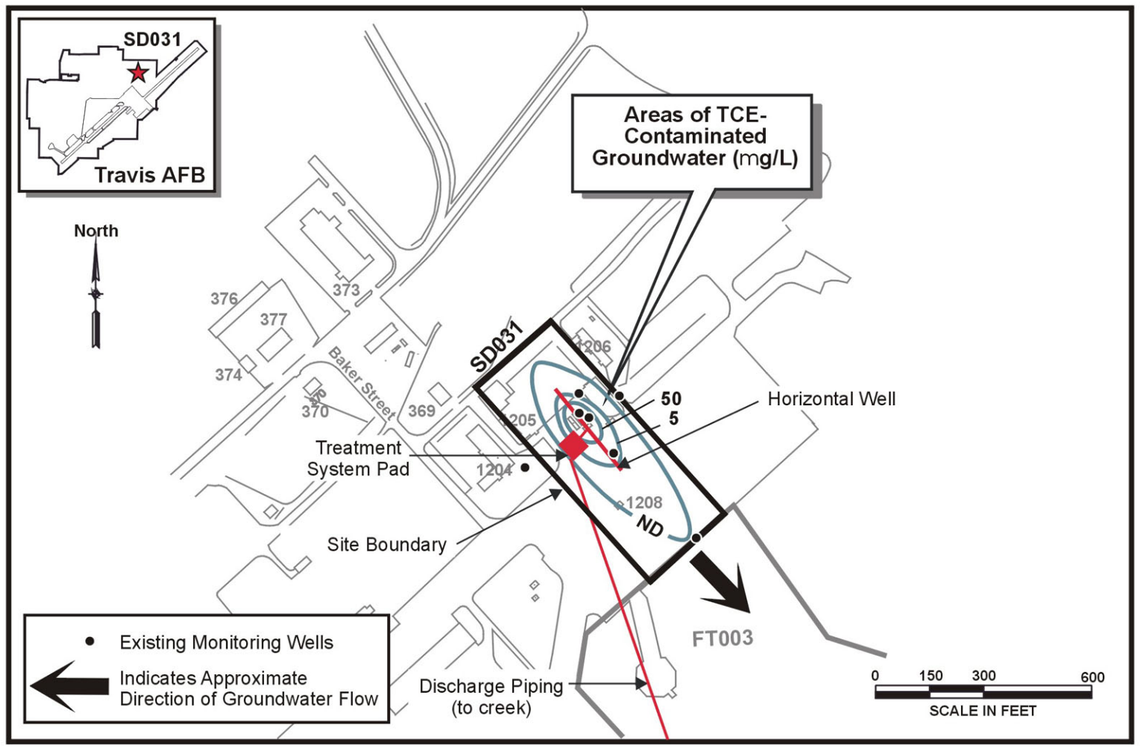
SD031 (Facility 1205)

Primary Contaminants, Remediation Drivers and Affected Media

Medium	Contaminant Type	Remediation Driver	Contaminant of Concern	Maximum Reported Concentration
Groundwater	VOCs	Collective Human Risk for These Contaminants Is HR = 5.24×10^{-2}	TCE	8,100 mg/L
Groundwater	VOCs		Benzene	6.75 mg/L
Groundwater	VOCs		1,1-DCE	7,300 mg/L
Groundwater	VOCs		cis-1,2-DCE	3,600 mg/L
Groundwater	VOCs		Carbon Tetrachloride	11 mg/L
Groundwater	VOCs		Chloroform	4.34 mg/L
Groundwater	VOCs		1,2-DCA	0.41 mg/L
Groundwater	VOCs		Vinyl Chloride	0.22 mg/L
Groundwater	Metals		Nickel	2,050 mg/L

Site Characteristics

- Active generator maintenance shop, oil/water separator, and wash racks
- Paved access road, 75% paved area
- TCE in groundwater — 422 mg/L average, 8,100 mg/L maximum
- 1,1-DCE in groundwater — 380 mg/L average, 7,300 mg/L maximum
- Estimated contaminated groundwater surface area = 110,000 ft^2, volume = 330,000 ft^3
- Estimated mass of dissolved VOCs equals 34 lb; DNAPL may be present
- Depth to groundwater — 5 to 15 feet (depending on location)
- Depth to bedrock — 25 feet
- Silt and clay to 10 feet bgs with some fill
- Silty sand with minor gravel from 10 to 25 feet bgs



Selected Interim Remedial Action/Objectives

- Alternative 3: Extraction, Treatment and Discharge
  - Source Control for TCE

Feasibility Study Treatment Alternatives and Associated Costs

- Alternative 2: Natural Attenuation/Monitoring: Capital Cost = $18,600; First Year O & M: $72,000
- Alternative 3: Extraction, Treatment and Discharge
  - FS Alternative 3: Air Stripper/Catalytic Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $620,000; First Year O & M = $128,000
  - FS Alternative 5: UV Oxidation, Ion Exchange, Activated Carbon: Capital Cost = $700,000; First Year O & M = $156,000
  - FS Alternative 7: Ion Exchange, Activated Carbon: Capital Cost = $2,580,000; First Year O & M = $2,400,000
- These costs derived from FS will be refined during the remedial design phase based on combination of alternatives and site specific variables

Interim Design Assumptions

- 1 horizontal well, 300 feet in screened length (NOTE: Location and number of wells will be determined during remedial design phase)
- Extraction rate 15 gpm total
- 50 feet of conveyance piping (from well to treatment system) — 1 inch ID, sch 80 PVC
- 800 feet of discharge piping — 1-½ inch ID, sch 80 PVC
- 150 feet from treatment system to existing power line

Figure A-11.
Site Summary Information for SD031, Travis AFB

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