to groundwater. The COCs and COPECs identified at FT002 have been present since approximately 1943, when FTA-1 was in use, but they have not migrated to groundwater; therefore, these constituents are unlikely to do so. The RI concluded that FT002 is not a source of contamination to groundwater (Weston, 1995a). Therefore, no soil action is needed to protect groundwater.

5.3.3 Fire Training Area 2 (FT003)

Site Description—FT003, in the northeastern portion of the EIOU, is the former Fire Training Area 2 (FTA-2). The site was used for fire training exercises between 1950 and 1952. Waste fuels, oils, and solvents were dumped at the site and burned during fire training exercises. The site is predominantly open field. Approximately 20% of the site is paved, consisting of a concrete helicopter pad and paved access road. The open field is mowed regularly. Additional investigation was performed in 2001 to further delineate the lateral and vertical extent of PAH and PCB contamination at the site. This summary presents information on contaminants in the soil at FT003.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils with concentrations of PAHs and PCBs that pose a potential human health risk. Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of PAHs or PCBs remaining in soil after excavation do not allow for unlimited use and unrestricted exposure. Based on RI data, all excavated soil should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated soil that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

Evaluations performed in the Eco Tech Memo determined most of the identified COPECs (metals, PCBs, pesticides, or dioxins) do not pose a significant risk to ecological receptors. Although PAHs were found to pose an unacceptable level of risk to small mammals, soil cleanup levels protective of humans are lower than those protective of small mammals. Therefore, remedial actions taken to protect human receptors will also protect small mammals.

The Groundwater Protection Tech Memo determined no soil remedial action is necessary to protect groundwater.

Table II-5-5 presents the soil cleanup levels for the COCs at the site.

The Air Force will excavate the PAH- and PCB-contaminated soil based on soil cleanup levels in Table II-5-5. Confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete and land use controls will be necessary. The estimated excavation areas for FT003 are shown on Figure II-5-4. The estimated volume of soil to be excavated is approximately 1,080 cubic yards. The excavation will be backfilled with clean soil. The estimated costs for the alternatives evaluated for FT003 are summarized in Table II-5-6. Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents.

Table II-5-5
Cleanup Levels for Soil COCs at FT003 (Fire Training Area 2)
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10^{-6} Cancer Risk	Chronic HI=1	10^{-6} Cancer Risk	Chronic HI=1		
Aroclor-1248	0.74	0.22	NE	0.74	NE	NA	No
Benzo(a)anthracene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(a)pyrene	0.21	0.062	NE	0.21	NE	NA	No
Benzo(b)fluoranthene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(k)fluoranthene	21	6.2	NE	21	NE	NA	No
Dibenzo(a,h)anthracene	0.21	0.062	NE	0.21	NE	NA	No
Indeno(1,2,3-c,d)pyrene	2.1	0.62	NE	2.1	NE	NA	No

COC = contaminant of concern
HI = hazard index
mg/kg = milligrams per kilogram
NA = not applicable
NE = a value has not been established
NEWIOU = North/East/West Industrial Operable Unit
ROD = record of decision
TQ = toxicity quotient

Table II-5-6
Estimated Cost of Remedial Alternatives Evaluated for FT003 (Fire Training Area 2)
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost ($)
17 (Land Use Controls)	112,706 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	147,770 (from the Remedial Design)
19 (Capping)	765,900[a]
20 (Excavation /Thermal Treatment)	648,000[b]

[a] Capping cost estimated based on 85,100 square feet of cap at $9/square foot.
[b] Thermal treatment cost estimated based on treating 1,080 cubic yards of soil at $600/cubic yard. This includes the cost of soil excavation.

NEWIOU = North/East/West Industrial Operable Unit
ROD = record of decision

The following paragraphs provide additional details supporting the decision for excavation of PAH- and PCB-contaminated soil that pose a potential risk to human receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix C of the Human Health Tech Memo.

During the RI, the potential COCs identified for FT003 included PCBs, PAHs, metals, TPH, and dioxins. However, only cleanup of soil contaminated with PAHs and PCBs (that pose a potential risk to human receptors) is considered necessary for the protection of human receptors. Although dioxins, metals, and TPH were identified as potential COCs for human

health during the RI, these compounds will not be remediation drivers for the site. Dioxins were detected in soil at the site but with a low detection frequency and low concentration. (Note: Dioxins/furans exist in a number of different forms [congeners].) Each of these congeners is more or less toxic than the others. To simplify reporting, all of the different congeners are converted into an equivalent amount of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) using toxicity equivalence factors developed by U.S. EPA, and the total amount of dioxins/furans is reported as 2,3,7,8-TCDD(eq). All 2,3,7,8-TCDD(eq) were less than the industrial PRG, and no action is considered necessary for this compound. Arsenic concentrations detected were similar to background levels and were considered to pose an acceptable risk to human receptors. The maximum reported concentration of TPH-E (660 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg).

Protection of Ecological Receptors—Evaluations performed in the Eco Tech Memo determined that of the identified COPECs (metals, PCBs, pesticides, dioxins, or PAHs), only PAHs pose a significant risk to ecological receptors. However, remedial actions implemented to protect human receptors will adequately protect ecological receptors, and no further action for ecological receptors is necessary. Metals concentrations detected were similar to background levels, and no action is considered necessary for PCBs, pesticides, and dioxins. Additional details on the ERA are provided in Section 7.3 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 4.0 of the Groundwater Protection Tech Memo.

Soil contamination reported at FT003 during the RI was primarily in surface soil. Because the contaminants have not leached to the subsurface during the time since 1952, when FT003 was last used as a fire training area, the contaminants are unlikely to migrate to groundwater. Any TPH-E that remains in surface soil is unlikely to migrate to groundwater before being naturally attenuated in the soil. It was concluded in the RI that soil at FT003 is not a source of groundwater contamination. Therefore, no soil remedial action is necessary to protect groundwater.

5.3.4 Fire Training Area 3 (FT004)

Site Description—FT004 covers approximately 30 acres in the northeastern portion of the EIOU and is the former Fire Training Area 3 (FTA-3). The site was used for fire training exercises from 1953 until 1962. Approximately 25 55-gallon drums of waste fuels, oils, and solvents were delivered to the site weekly. The drums were emptied, and the contents were ignited and subsequently extinguished. The site is now an unused open field with less than 10% paved area. This summary presents information on contaminants in the soil at FT004.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils with concentrations of dioxins that pose a potential human health risk and for soils with concentrations of lead above 77 mg/kg that pose a threat to ecological receptors. Alternative 17 (Land Use Controls) is the selected contingency remedial action if dioxin concentrations remaining in soil after excavation do not allow for unlimited use and unrestricted exposure. Based on RI data, all excavated soil should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated soil that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

The Groundwater Protection Tech Memo determined that a current groundwater extraction system is capturing contaminated groundwater and that no soil remedial action is necessary to protect groundwater.

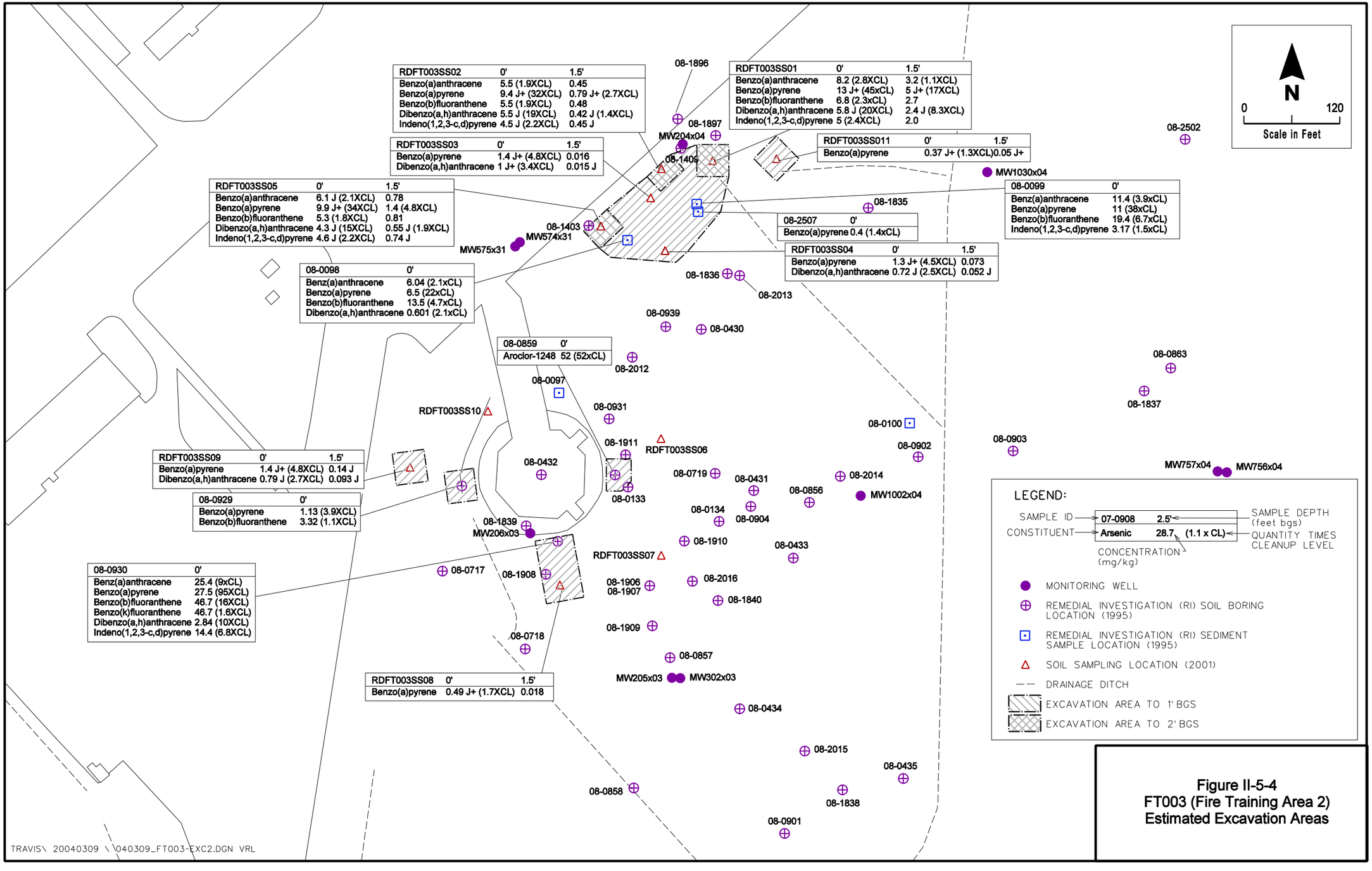

Figure II-5-4
FT003 (Fire Training Area 2)
Estimated Excavation Areas

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Table II-5-7 presents the soil cleanup levels for the COC and COEC at the site.

The Air Force will excavate the dioxin- and lead-contaminated soil based on the soil cleanup levels in Table II-5-7. Confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete and whether land use controls will be necessary. The estimated excavation area for FT004 is shown on Figure II-5-5.

Table II-5-7
Cleanup Levels for Soil COC and COEC at FT004 (Fire Training Area 3)
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern/ Contaminant of Ecological Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Ground-water Impact?
		10^{-6} Cancer Risk	Chronic HI=1	10^{-6} Cancer Risk	Chronic HI=1		
Lead	77 [a]	NE	400 150 [b]	NE	800	77 [a]	No
2,3,7,8-TCDD(eq) [c]	0.000016 [c]	0.0000039	NE	0.000016 [c]	NE	NA	No

[a] The cleanup level is based on the evaluation performed in the Eco Tech Memo and risk management negotiations with the agencies and was determined to be the cleanup goal.
[b] California Modified PRG.
[c] Equivalency factors for the maximum reported concentration and cleanup level listed for 2,3,7,8-TCCD equivalency address the human risk equivalency.

COC = contaminant of concern
COEC = contaminant of ecological concern
HI = hazard index
mg/kg = milligrams per kilogram
NA = not applicable
NE = a value has not been established
NEWIOU = North/East/West Industrial Operable Unit
PRG = preliminary remediation goal
ROD = record of decision
TCDD(eq) = tetrachlorodibenzo-p-dioxin equivalent
TQ = toxicity quotient

The estimated volume of soil to be excavated is approximately 1,940 cubic yards. The excavation will be backfilled with clean soil. The estimated costs for the alternatives evaluated for FT004 are summarized in Table II-5-8. Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents and current ecological receptors.

The following paragraphs provide additional details supporting the decision for excavation of dioxin-contaminated soils that pose a potential risk to human receptors and lead-contaminated soils that pose a risk to ecological receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix D of the Human Health Tech Memo.

Dioxins and TPH were identified as potential COCs for FT004. However, only cleanup of soil contaminated with dioxins (which pose a potential risk to human receptors) is considered

Table II-5-8
Estimated Cost of Remedial Alternatives Evaluated for FT004 (Fire Training Area 3)
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost ($)
17 (Land Use Controls)	113,166 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	291,000[a]
19 (Capping)	456,300[b]
20 (Excavation /Thermal Treatment)	1,164,000[c]

[a] Cost estimated based on the excavation of 1,940 cubic yards of soil at $150/cubic yard, with all soils meeting CAMU acceptance criteria.
[b] Capping cost estimated based on 50,700 square feet of cap at $9/square foot.
[c] Thermal treatment cost estimated based on treating 1,940 cubic yards of soil at $600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit
NEWIOU = North/East/West Industrial Operable Unit
ROD = record of decision

necessary for the protection of human receptors (for the industrial scenario). Dioxin concentrations in 7 of the 11 RI soil samples collected exceeded residential PRGs, and concentrations in 5 of the 11 soil samples exceeded industrial PRGs, posing an unacceptable potential risk to site workers and future residents. No action is necessary for TPH contamination. The maximum reported concentration of TPH-E (980 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg).

Protection of Ecological Receptors—Evaluations performed in the Eco Tech Memo determined that concentrations of lead at locations 02-1854, 02-1855, 02-0905, 02-0906, and 02-0907 were above the site-specific background level of 61 mg/kg, which is greater than the lowest Tier 1 CTV (calculated for the ornate shrew). Therefore, the background level multiplied times a 25% margin of error (77 mg/kg) was identified as the cleanup level to protect the most sensitive ecological receptors. Remediation is warranted at the five locations with concentrations above the selected cleanup level. The evaluation also determined dioxin concentrations in soil and small mammal tissues pose an unacceptable level of risk to ecological receptors. However, remedial actions implemented to protect human receptors will adequately protect ecological receptors, and no further action is necessary to protect ecological receptors potentially exposed to dioxins at FT004. Additional details regarding the results of the ERA for FT004 are provided in Section 7.4 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 5.0 of the Groundwater Protection Tech Memo.

The RI concluded that, while VOCs in soil may have been a source of VOC groundwater contamination at FT004 in the past, they are not currently a source. The RI also concluded that contamination in soil was not a source of metals concentrations in groundwater. Dioxins were reported primarily in surface soil, at depths above 1 foot bgs, and have not leached to the subsurface since approximately 1962, when FT004 was in use as a fire training area. Thus, dioxins are unlikely to migrate to groundwater in the future.

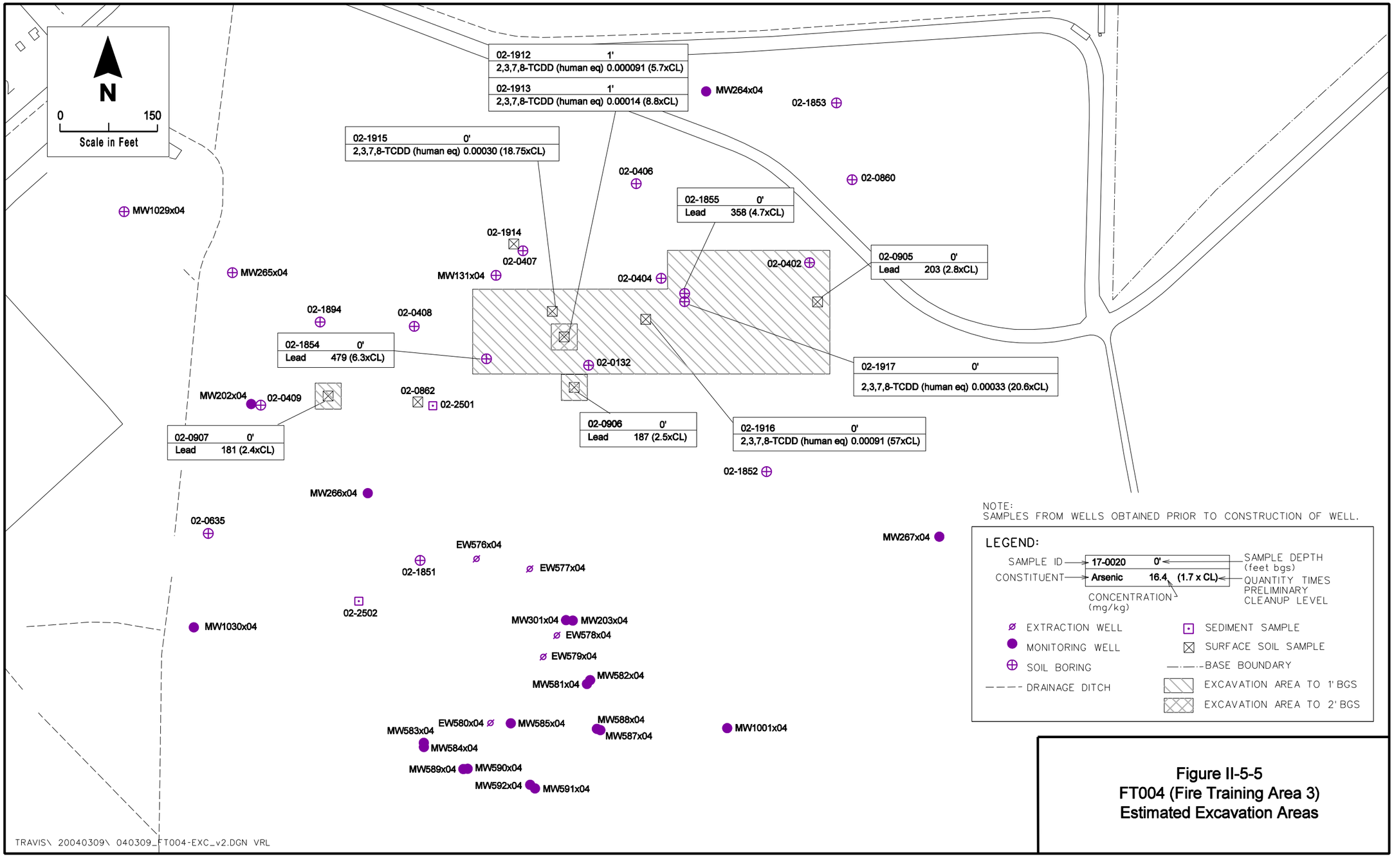

Figure II-5-5
FT004 (Fire Training Area 3)
Estimated Excavation Areas

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The FT004 extraction well system is currently extracting groundwater contaminated with VOCs. Eight FT004 extraction wells are capturing all groundwater with VOC concentrations that exceed MCLs. TPH that remains in soil is likely to naturally attenuate before reaching groundwater. In addition, if TPH were to migrate to groundwater, it would be captured by the existing extraction system. These factors indicate that the groundwater at FT004 is protected; thus, no soil remedial action is necessary to protect groundwater.

5.3.5 Fire Training Area 4 (FT005)

Site Description—FT005 covers approximately 30 acres in the southeastern portion of the EIOU. The site includes the former Fire Training Area 4 (FTA-4) used for fire training exercises from 1962 through approximately 1987. Aerial photographs indicate that the area may have been used for munitions storage prior to 1958. From 1962 until the early 1970s, waste fuels, oils, and solvents were burned at the site during training exercises. From the early 1970s until 1987, only waste fuels were burned at the site. A 25,000-gallon AST was installed in 1976 to hold the waste fuels, and it is still located at the site. From 1990 to 1994, the northern portion of the area was used as a dump site for miscellaneous waste, such as concrete, fencing, and street sweepings. Additional investigation was performed in 2001 to further delineate the lateral and vertical extent of PAH and PCB contamination at the site. This summary presents information on contaminants in the soil at FT005.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils with concentrations of PAHs that pose a potential human health risk. Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of PAHs, PCBs, TPH, or dioxins remaining in soil after excavation do not allow for unlimited use and unrestricted exposure. Based on RI data, all excavated soil should meet CAMU acceptance criteria and, if so, will be placed in the CAMU. Any of the excavated soil that does not meet the CAMU acceptance criteria will be sent to an appropriate off-base landfill.

Evaluations performed in the Eco Tech Memo determined PAHs were found to pose an unacceptable level of risk to small mammals. However, soil cleanup levels protective of humans are lower than those protective of small mammals. Therefore, remedial actions taken to protect human receptors will also protect small mammals. The Groundwater Protection Tech Memo determined that no soil remedial action is necessary to protect groundwater.

Table II-5-9 presents the soil cleanup levels for the COCs at the site.

The Air Force will excavate the PAH-contaminated soil based on the soil cleanup levels in Table II-5-9. Confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. Once cleanup levels have been achieved, the procedure described in Section 5.4.2 will be used to determine whether the remedial action is complete and whether land use controls will be necessary. The estimated excavation areas for FT005 are shown on Figure II-5-6. The estimated volume of soil to be excavated is approximately 2,490 cubic yards. The excavation will be backfilled with clean soil. The estimated costs for the alternatives evaluated for FT005 are summarized in Table II-5-10. Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents and current ecological receptors.

Table II-5-9
Cleanup Levels for Soil COCs at FT005 (Fire Training Area 4)
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10^{-6} Cancer Risk	Chronic HI=1	10^{-6} Cancer Risk	Chronic HI=1		
Benzo(a)anthracene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(a)pyrene	0.21	0.062	NE	0.21	NE	NA	No
Benzo(b)fluoranthene	2.1	0.62	NE	2.1	NE	NA	No
Benzo(k)fluoranthene	21	6.2	NE	21	NE	NA	No
Dibenzo(a,h)anthracene	0.21	0.062	NE	0.21	NE	NA	No
Indeno(1,2,3-c,d)pyrene	2.1	0.62	NE	2.1	NE	NA	No

COC = contaminant of concern
HI = hazard index
mg/kg = milligrams per kilogram
NA = not applicable
NE = a value has not been established
NEWIOU = North/East/West Industrial Operable Unit
ROD = record of decision
TQ = toxicity quotient

Table II-5-10
Estimated Cost of Remedial Alternatives Evaluated for FT005 (Fire Training Area 4)
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost ($)
17 (Land Use Controls)	139,740 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	373,500[a]
19 (Capping)	1,555,200[b]
20 (Excavation /Thermal Treatment)	1,494,000[c]

[a] Cost estimated based on the excavation of 2,490 cubic yards of soil at $150/cubic yard, with all soils meeting CAMU acceptance criteria.
[b] Capping cost estimated based on 172,800 square feet of cap at $9/square foot.
[c] Thermal treatment cost estimated based on treating 2,490 cubic yards of soil at $600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit
NEWIOU = North/East/West Industrial Operable Unit
ROD = record of decision

The following paragraphs provide additional details supporting the decision for excavation of PAH-contaminated soil that poses a potential risk to human receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix E of the Human Health Tech Memo.

During the RI, the potential COCs identified for FT005 included: PAHs, PCBs, dioxins, metals, VOCs, and TPH. However, only cleanup of soil contaminated with PAHs (which pose a potential human health risk) is considered necessary for the protection of human receptors. Although PCBs, dioxins, metals, and VOCs were identified as potential COCs for human health during the RI, these compounds will not be remediation drivers for the site. Alternative 17

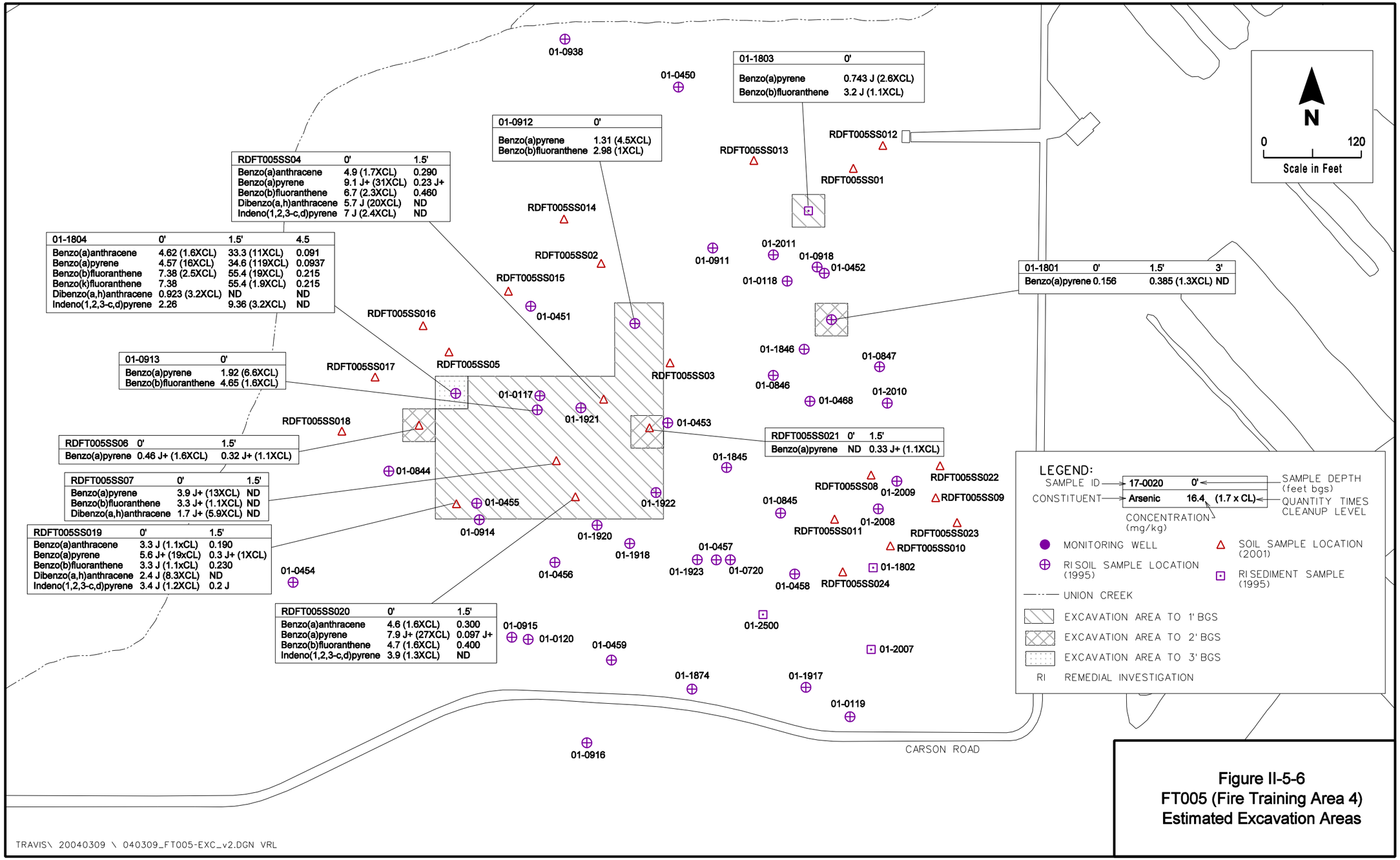

Figure II-5-6
FT005 (Fire Training Area 4)
Estimated Excavation Areas

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(Land Use Controls) is the selected contingency remedial action if concentrations of PCBs and dioxins remaining in soil after excavation exceed levels that allow for unlimited use and unrestricted exposure. PCB concentrations in only 1 of 95 RI samples (at location 01-2008) exceeded industrial PRGs (0.74 mg/kg), and residential PRGs (0.22 mg/kg) were exceeded at 2 sample locations (01-2008 and 01-1802). Dioxins were detected in RI soil samples; all 2,3,7,8-TCDD(eq) were less than industrial PRGs. However, residential PRGs were exceeded at three surface sample locations and two composite sample locations.

No action is necessary for metals because all concentrations reported (except those for selenium) could be natural variations of background. An exception may be one detected concentration of barium of 1,940 mg/kg (4.4 times background). This result, and all detected concentrations of selenium, are from locations that will be excavated during the proposed excavation of soil posing a human health risk.

No action is necessary for VOCs in soil because only 1 ethylbenzene result out of 99 and 1 total xylenes result out of 88 pose a risk to human health. In addition, these hits were detected at 12 feet bgs; therefore, exposure to these analytes is unlikely.

Alternative 17 (Land Use Controls) is the selected contingency remedial action if concentrations of TPH remaining in the soil after excavation do not allow for unlimited use and unrestricted exposure. The maximum reported concentration of TPH-E is 670 mg/kg and of TPH is 16,000 mg/kg, which exceeds the San Francisco Bay RWQCB ESL (2,300 mg/kg). However, the Air Force and regulatory agencies have agreed that the TPH-contaminated soil at FT005 will naturally attenuate, and some of the TPH-contaminated soil will be removed as a result of the proposed excavation of soil posing a human health risk. Alternative 17 will be applied unless it can be shown that post-excavation concentrations of TPH are less than the 2,300 mg/kg screening level. LUCs as a result of TPH concentrations will remain in place until concentrations attenuate to less than 2,300 mg/kg.

Protection of Ecological Receptors—Evaluations performed in the Eco Tech Memo identified PAHs as a potential risk to small mammals. However, cleanup levels protective of human receptors will also protect small mammals, and no further action is required. No other COPECs were identified for risk management at the site. Additional details regarding the results of the ERA for FT005 are provided in Section 7.5 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 6.0 of the Groundwater Protection Tech Memo.

During the RI, the soil was tested for VOCs, but none was detected. Therefore, any past VOC mass from soil has most likely migrated to groundwater and/or volatilized into the air. No action is necessary for VOCs in soil to protect groundwater.

TPH that remains in vadose zone soil probably will naturally attenuate. In addition, a groundwater extraction system that captures contaminated groundwater flowing from FT005 is active at the site. Therefore, no action for TPH in soil is necessary to protect groundwater.

Metal, PAH, and PCB concentrations in soil that pose a threat to human health were not detected in groundwater in 1995, when the RI was performed; therefore, the metals, PAHs, and PCBs are unlikely to migrate to groundwater in the future. In addition, if any contaminants

were to migrate to groundwater, they would be captured by the groundwater extraction system. Therefore, no soil remedial action is necessary to protect groundwater.

5.3.6 Landfill 2, Areas B, C, D, E, and G (LF007)

Site Description—LF007, at Landfill 2, occupies approximately 73 acres in the NOU. The landfill was operated in a trench-and-cover manner beginning in the early 1950s, following the closure of Landfill 1. The landfill was used primarily for the disposal of general refuse, such as wood, glass, and construction debris. Small amounts of industrial wastes and fuel sludge from tank cleaning operations also were reported to have been disposed of at Landfill 2 (Radian, 1995). The use of Landfill 2 ceased in 1974. From the early 1950s until 1964, a portion of the eastern part of the landfill was used to store excess and waste materials, including oils, hydraulic fluid, and solvents, for resale or disposal. As determined by aerial photographs, a skeet range also was located at the site in approximately 1953; however, the exact dates of operation are not known (Radian, 1995). Current operations at the site are limited to those conducted at Buildings 1360, 1365, 1370, and the CAMU. Building 1360 is the Affiliate Radio System; Building 1365 is used for hazardous waste storage; and Building 1370 houses the Small Arms Range.

During the NOU RI, soil contamination was found in four areas of the site, which are referred to as Areas B, D, E, and G (see Figure II-5-7). Groundwater contamination was identified in these areas and in Area C. Landfill and backfill material occur to 15 feet bgs in Areas B and D. Layers of clay and silt are present from the surface to bedrock. Bedrock occurs at a depth of 0 to 40 feet bgs, depending on the location in LF007. Groundwater is encountered between 1 and 25 feet bgs and flows radially from the site. This summary presents information on contaminants in the soil at LF007.

Selected Remedial Alternative(s)—Alternative 18 (Excavation) is the selected remedial action for soils in Area E, with concentrations of PCBs (Aroclor-1260) that pose a potential human health risk and a potential ecological risk. In addition, Alternative 17 (Land Use Controls) is the selected remedial action for LF007 for sample location E19, the CAMU cover, CAMU-associated features, and the Landfill 2 cover and associated buried wastes.

The Groundwater Protection Tech Memo determined that no soil remedial action is necessary to protect groundwater.

Table II-5-11 presents the soil cleanup level for the COC and COEC at the site.

The Air Force will excavate the PCB-contaminated soil from locations shown on Figure II-5-7 based on the soil cleanup level in Table II-5-11. Aroclor-1260 was found at elevated concentrations in several locations within vernal pools and seasonal wetlands at LF007 that reside outside of the boundary of the proposed remedial action area. However, remediation in these sensitive habitats will be avoided to the extent reasonable. Additional investigation will be performed to determine whether or not special status invertebrates are present in the pools and wetlands. Current concentrations of Aroclor-1260 in sediments of these habitats will also be measured and, if confirmed to be elevated, the capacity of the sediments to elicit adverse effects in benthic invertebrates will be assessed (i.e., toxicity tests). The additional evaluation of Aroclor-1260 at LF007 will be presented in a technical memorandum or in the remedial design for this site; it has already been determined that excavation will be the selected remedy at LF007. The extent of

Note: The extent of excavation in the wetland has not yet been determined and will be resolved through additional evaluation.

NLF02H04	0-6"
Aroclor 1260	0.675 (8.5 x CL)

NLF02S48	0'
Aroclor 1260	336 (4,253 x CL)

NLF02H05	0'
Aroclor 1260	0.122 (1.5 x CL)

NLF02S55	0'
Aroclor 1260	0.863 (10.9 x CL)

PCB 1260 ranges from 0.73 to 336 mg/kg

NLF02M0F	0'
Aroclor 1260	2.27 (28.7 x CL)

NLF02S54	0'
Aroclor 1260	1.29 (16.3 x CL)

NLF02E26	0'
Aroclor 1260	0.67 (8.5 x CL)

NLF02E6	0'
Aroclor 1260	0.18 (2.3 x CL)

NLF02E22	0'
Aroclor 1260	0.272 (3.4 x CL)

NLF02H03	0'
Aroclor 1260	0.347 (4.4 x CL)

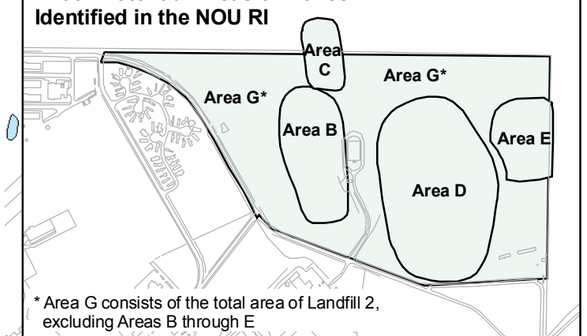
Legend

- Soil Boring
- Monitoring Well
- "Ridge" Sample
- Hand Auger
- Surface Soil Location
- Excavation Area to 1 Foot Below Ground Surface
- Base Wetland or Vernal Pool
- Limit of Earthwork Associated with LF007 Maintenance

Sample ID / Constituent: NLF02E60 0' / Aroclor 1260 0.462 (5.8 x CL)

Sample Depth (Feet BGS); Concentration (mg/kg); Quantity Concentration Exceeds Cleanup Level

LF007 Potential Areas of Concern Identified in the NOU RI



* Area G consists of the total area of Landfill 2, excluding Areas B through E

N

0 150 300

SCALE IN FEET

Figure II-5-7.
Estimated Excavation Areas
LF007 (Landfill 2)

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Table II-5-11
Cleanup Levels for Soil COC and COEC at LF007 (Base Landfill 2)
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Contaminant of Concern/ Contaminant of Ecological Concern	Soil Cleanup Level (mg/kg)	Residential (mg/kg)		Industrial (mg/kg)		TQ=1 (mg/kg)	Potential for Groundwater Impact?
		10^{-6} Cancer Risk	Chronic HI=1	10^{-6} Cancer Risk	Chronic HI=1		
Aroclor-1260	0.079	0.22 [a]	NE	0.74	NE	0.079	No

[a] For excavation areas outside the Base boundary, soil will be excavated so that the remaining contamination will not pose a risk to future residents (based on residential PRGs).

COC = contaminant of concern
COEC = contaminant of ecological concern
HI = hazard index
mg/kg = milligrams per kilogram
NE = a value has not been established
NEWIOU = North/East/West Industrial Operable Unit
PRG = preliminary remediation goal
ROD = record of decision
TQ = toxicity quotient

excavation will be established based on the results of the additional data collection and subsequent discussions with the appropriate agencies.

Following excavation, confirmation samples will be collected from the excavation to determine what contaminants, if any, remain. The Air Force will review the results with the regulatory agencies to determine whether the cleanup levels have been achieved or additional excavation is required. The estimated excavation areas are shown on Figure II-5-7. The estimated volume of soil to be excavated is approximately 9,500 cubic yards. This estimate does not include any additional soil that may be excavated from within vernal pools or the seasonal wetland at LF007. The excavation areas (excluding the areas within vernal pools or wetlands) will be backfilled with clean soil. Areas within the vernal pools will be restored in accordance with guidance from the appropriate regulatory agencies. The estimated costs for the alternatives evaluated for Area E in LF007 are summarized in Table II-5-12.

Table II-5-12
Estimated Cost of Remedial Alternatives Evaluated for LF007 (Landfill 2) Area E
North/East/West Industrial Operable Unit Soil, Sediment, and Surface Water Record of Decision, Travis AFB, California

Alternative	Estimated Cost ($)
17 (Land Use Controls)	165,600 (from the Feasibility Study and Proposed Plan)
18 (Excavation)	1,425,000[a]
19 (Capping)	2,250,000[b]
20 (Excavation /Thermal Treatment)	5,700,000[c]

[a] Cost estimated based on the excavation of 9,500 cubic yards of soil at $150/cubic yard, with all soils meeting CAMU acceptance criteria.
[b] Capping cost estimated based on 250,000 square feet of cap at $9/square foot.
[c] Thermal treatment cost estimated based on treating 9, 500 cubic yards of soil at $600/cubic yard. This includes the cost of soil excavation.

CAMU = Corrective Action Management Unit
NEWIOU = North/East/West Industrial Operable Unit
ROD = record of decision

Alternative 18 (Excavation) is the most cost-effective remedy that meets the RAO of protecting future human residents and current ecological receptors. These costs do not include the added expense of soil excavation in vernal pools or wetlands and habitat restoration.

The following paragraphs provide additional details supporting the decision for excavation of PCB-contaminated soil that poses a potential risk to human receptors in Area E and PCB-contaminated soil and sediment that pose a potential risk to ecological receptors.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix F of the Human Health Tech Memo.

During the NOU RI (Radian, 1995), the potential COCs identified for LF007 were PCBs, PAHs, metals, and TPH. Soil contamination was found in four locations (Areas B, D, E, and G). COCs in soil at Area B include PAHs and TPH; COCs in soil at Area D include PCBs, TPH, and metals; Area E COCs include PCBs, metals, and TPH; and Area G, the remaining portion of the landfill, is contaminated with metals and, in one location (E19), with PCBs. However, only cleanup of soil contaminated with PCBs (that pose a potential risk to human receptors) in Area E is considered necessary for the protection of human receptors.

In Area E, concentrations of PCBs range from less than the detection limit to 336 mg/kg, which is greater than the industrial and residential PRGs and poses an ecological risk. The high levels of PCBs warrant excavation and the reduction of potential risk. Soil from this area will be excavated until there is no longer a risk to human receptors because the ecological based cleanup level is less than the residential PRG. Excavation in this area also will remove elevated levels of arsenic (33.4 mg/kg) at sample location NLF02M0F. Samples collected on the eastern Base boundary, outside of the fence, in the ditch along Meridian Road, had PCBs with concentrations ranging from 0.73 mg/kg to 3.1 mg/kg, which is greater than residential PRGs. Contaminated soil in this area will be excavated so that no unacceptable risk to future residents remains.

The CAMU has been designed and constructed at Area D; therefore, the PCB and metals contamination will be capped. In addition, LUCs have been implemented for the CAMU cover, CAMU-associated features, and the Landfill 2 cover and associated buried wastes. Land use controls also will be put in place for the PCB contamination at location E19 unless the Air Force decides to excavate this area to levels allowing unrestricted use during fieldwork. At E19, the Aroclor-1260 concentration of 1.02 mg/kg is only 1.4 times the preliminary cleanup level of 0.74 mg/kg.

The Human Health Tech Memo determined that no action is necessary for metals in soil that pose a potential risk to human receptors outside of Area E because all concentrations reported are likely natural variations of background. No action is necessary for TPH. The Air Force and regulatory agencies have agreed that the TPH-contaminated soil at LF007 will naturally attenuate. In addition, only one sample of TPH-E (4,300 mg/kg) exceeds the San Francisco Bay RWQCB ESL (2,300 mg/kg); this sample is in the area covered by the LUCs specified above for the CAMU cover, CAMU-associated features, and the Landfill 2 cover and associated buried wastes. The Human Health Tech Memo also determined that no action is necessary for PAHs because the small area of PAH contamination does not pose an unacceptable risk.

Protection of Ecological Receptors— Evaluations performed in the Eco Tech Memo determined that concentrations of Aroclor-1260 at sample locations S-48, S-54, S-55, B-46, B-47, M-0F, H-02, H-03, E-6, and E-26 pose a potential risk to the western meadowlark and should be remediated. No other COPECs were identified for risk management at the site. Additional details regarding the results of the ERA for FT005 are provided in Section 7.6 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 7.0 of the Groundwater Protection Tech Memo.

PAHs were reported at Area B in surface soil; however, PAHs were not detected in subsurface soil. Because PAHs had not leached into the vadose zone from the time the landfill was operated in the early 1950s to the time of the RI in 1994, the PAHs are not likely to migrate to groundwater. Therefore, no soil action is necessary to protect groundwater from PAH contamination at Area B.

No soil contamination was identified in Area C. The source of TCE in groundwater is unknown. Most of the mass of VOCs that migrated through soil and contaminated groundwater at Area C has probably entered soil gas, the atmosphere, or groundwater and has left little residual in soil.

Area D is the soil site in the NEWIOU that has been selected as the location for the CAMU (Radian, 2001). PCB was identified as both a soil and groundwater COC beneath Area D during the RI. However, it was detected in groundwater because PCBs were placed in landfill trenches that were dug to depths that were below the water table during the wet season, directly causing groundwater contamination. PCB concentrations reported from soil samples (0.986 mg/kg maximum) are below the estimated screening level of 6.3 mg/kg, which indicates that the PCBs in soil above the water table are unlikely to migrate to groundwater. Groundwater will continue to be monitored to ensure that PCBs below the groundwater are not migrating. PAHs were identified in soil in Area D; however, PAHs have not leached to groundwater. In addition, maximum concentrations of PAHs in soil (benzo[a]pyrene at 0.55 mg/kg, benzo[b]fluoranthene at 1.12 mg/kg, and dibenzo[a,h]anthracene at 0.03 mg/kg) are more than 2 orders of magnitude below ESLs (benzo[a]pyrene at 130 mg/kg, benzo[b]fluoranthene at 640 mg/kg, and dibenzo[a,h]anthracene at 140 mg/kg), indicating that they are unlikely to migrate to groundwater. Therefore, no soil action is necessary to protect groundwater beneath Area D.

Although concentrations of PCBs in Area E soil range from less than the detection limit to 336 mg/kg, PCBs were not detected in groundwater. Arsenic also was reported in Area E at a maximum concentration of 33.4 mg/kg, which is approximately 2.5 times the background concentration in soil (14 mg/kg). However, it was not detected in groundwater or identified as a COC. Because of the immobility of PCBs and arsenic in this location, no soil action is necessary to protect groundwater from PCB contamination at Area E.

Concentrations of metals reported in Area G (outside of Areas B, D, and E) were not identified as COCs in groundwater at LF007. Metals were detected in groundwater; however, the greater concentrations of the metals in subsurface soil do not occur in the same borings in which the greater concentrations in groundwater occur. Furthermore, the greater concentrations of the metals in surface soil do not occur in the same locations as those in subsurface soil. Aroclor-1260 was reported in only one surface soil sample in Area G at a concentration (1.02 mg/kg) that exceeds the industrial PRG of 0.74 mg/kg. Because of the limited extent, in shallow soil only,

metals or PCBs are unlikely to migrate to groundwater. No soil action for metals or PCBs is necessary at Area G to protect groundwater.

No action to protect groundwater is necessary for TPH in soil because less than 11% of the samples are above screening levels, and TPH will naturally attenuate.

5.3.7 Sludge Disposal Site (OT010)

Site Description—OT010 is a 16-acre area in an inactive area in the southeastern portion of the EIOU. Historically, the site was reportedly used for sewage sludge disposal in the fields northeast and southwest of the sewage treatment plant, though this was not confirmed, and no source area was identified. The sewage treatment plant was in use from the 1950s to the late 1970s. Currently, a sewage lift station and overflow ponds exist at the site. This summary presents information on contaminants in the soil at OT010.

Selected Remedial Alternative(s)—Alternative 16 (No Action) is the selected remedial action for this site. Evaluations described in the Human Health Tech Memo determined that soil contamination at the site does not pose a significant risk to future residents based on the residential PRGs, inorganic reference concentrations, and the San Francisco Bay RWQCB ESLs for TPH. The Eco Tech Memo determined that no COPECs at this site pose an unacceptable risk to ecological receptors. The Groundwater Protection Tech Memo determined that no soil remedial action is necessary at OT010 to protect groundwater.

The following paragraphs provide additional details supporting the decision for no soil action at OT010.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix G of the Human Health Tech Memo.

Arsenic and TPH were the COCs identified at OT010. However, no action is selected for all COCs at OT010 because soil contamination at the site does not pose an unacceptable risk to site workers or future residents. The arsenic concentration in only 2 of 24 samples (25.6 mg/kg and 52.1 mg/kg) exceeds the inorganic reference concentration for surface soil of 14 mg/kg (from Table 7-1 in the WIOU RI [Radian, 1996a]). Both results were J flagged, and the 52.1 mg/kg result was from an early round of RI data that were relegated to screening level data (not to be used for risk assessment) due to quality validation issues. The maximum reported concentration of TPH-E (470 mg/kg) does not exceed the San Francisco Bay RWQCB ESL (2,300 mg/kg).

Protection of Ecological Receptors—The potential for risk to ecological receptors that may reside at OT010 was assessed in the Eco Tech Memo. Ecological receptor groups quantitatively evaluated include terrestrial plants, soil invertebrates, birds, and mammals. The findings of the ERA demonstrate that potential exposure to COPECs does not pose an unacceptable level of risk to ecological receptors that may be present. No action is necessary to address ecological issues at the site. Additional details regarding the results of the ERA for OT010 are provided in Section 7.7 of the Eco Tech Memo.

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 8.0 of the Groundwater Protection Tech Memo.

The RI concluded that contaminated soil at OT010 is not a source of groundwater contamination. TPH that remains in soil is likely to naturally attenuate before reaching groundwater. In addition, if TPH were to migrate to groundwater, it would be captured by the existing extraction system. Groundwater downgradient from OT010 is monitored as a part of the FT005 groundwater extraction system. These factors indicate that the groundwater at OT010 is protected; thus, no soil remedial action is necessary to protect groundwater.

5.3.8 Solvent Spill Area and Facilities 550 and 552 (including area at Facility 1832) (SS015)

Site Description—SS015 is in the northwestern part of the EIOU and consists of the 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. The site was an open, grassy plot adjacent to an asphalt driveway and Facility 552. Facility 552 consisted of a fenced, bermed concrete pad constructed in 1964 that was used as a temporary hazardous waste collection point. Stored wastes include paint, chromic acid, and solvents generated during aircraft maintenance operations at Facility 550 (Weston, 1995a). Facility 550 contained a corrosion control facility that treated and painted aircraft parts and support equipment. A metals-processing shop in Facility 550 used plating solutions containing cadmium. Facility 1832 is a 15,000-gallon OWS that received liquids generated at a wash rack on the aircraft parking apron. In 1992, a new hazardous waste accumulation facility was constructed at the site.

In 2004, Facilities 550 and 552 were demolished to construct a POL MILCON project consisting of an office building, a fuel truck maintenance facility, and a large concrete parking area for trucks. This summary presents information on contaminants in the soil at SS015.

Selected Remedial Alternative(s)—Alternative 17 (Land Use Controls) is the selected remedial action for SS015 because cadmium concentrations in the soil exceed levels that allow for unlimited use and unrestricted exposure. Evaluations described in the Human Health Tech Memo determined that cadmium-contaminated soil is currently not a risk to human health, but as a conservative measure, land use controls will be implemented for cadmium to protect future potential residents and workers if the cadmium-contaminated soil at SS015 beneath the parking lot is exposed in the future.

The Eco Tech Memo determined that SS015 is not an ecological habitat. The Groundwater Protection Tech Memo determined that no soil action is necessary to protect groundwater.

The following paragraphs provide additional details supporting the decision for land use controls at SS015.

Protection of Human Health—The following findings and conclusions with respect to soil contamination and the potential risks to human health were reached in Appendix H of the Human Health Tech Memo and the *Soil Removal Action Summary Report for North/East/ West Industrial Operable Unit Soil Removal Action at Site SS015, Travis Air Force Base, California* (SS015 Removal Action Summary Report) (Environmental, Inc., 2003).

During the RI, metals and PAH-contaminated soil were found that exceeded industrial PRGs. In 2003, a removal action was performed to remove the contaminated soils. Excavated soil was consolidated into the CAMU after testing confirmed that it met the CAMU acceptance levels.

Confirmation samples showed residual soil to be suitable for unlimited use and unrestricted exposure, and it was agreed that no further action was needed at the site.

However, during the 2004 demolition and excavation of Facility 550, cadmium was found in construction debris associated with the concrete flooring of the former plating shop. After disposal of the contaminated construction debris, sampling of the remaining soil/gravel indicated residual cadmium concentrations at non-detect levels at two of the four sample locations and at 39 mg/kg and 72 mg/kg at the other two locations, as shown on Figure H-1 of the Human Health Tech Memo. This soil originated from underneath the concrete flooring and had not been tested during previous investigations. The cadmium concentrations are less than the U.S. EPA industrial PRG (450 mg/kg) but exceed the U.S. EPA residential PRG (37 mg/kg). Given schedule and funding considerations, the construction project was completed, and the subject soil is now 2 feet below a concrete truck-parking area. Land use controls will be implemented for this site as long as cadmium concentrations in soil exceed levels that allow for unlimited use and unrestricted exposure.

Protection of Ecological Receptors—The Eco Tech Memo determined that SS015 is not an ecological habitat because it is an industrial area, and any grassy areas are mowed regularly and maintained to discourage wildlife from establishing a habitat (Eco Tech Memo, Section 3.3.2 and Table 3-1).

Protection of Groundwater—The following conclusions with respect to groundwater protection were reached in Section 9.0 of the Groundwater Protection Tech Memo.

The RI concluded that PAHs at Facility 1832 are not a source of contamination to groundwater at SS015 because the detectable concentrations were primarily in surface soil samples. PAHs are not migrating into the subsurface, they were not detected in groundwater beneath Facility 1832, and they are unlikely to migrate to groundwater because of their affinity for soil particles. Therefore, no action is necessary for PAHs in soil to protect groundwater.

The RI concluded that the metals identified as COCs in soil were not sources of groundwater contamination because they were either not detected or only detected in surface soil at concentrations not exceeding background. Therefore, no action is necessary for metals in soil to protect groundwater.

Results of the Gore Sorber® study indicate that VOCs are present in soil gas, but the source could not be determined (groundwater or soil) (CH2M HILL, 1998b). A treatability study was conducted at SS015 to evaluate the effectiveness of using vegetable oil to enhance the biodegradation of VOCs in groundwater. The study was completed 14 March 2003 and showed localized degradation of VOCs. The extent of groundwater contamination has not been completely defined, and an evaluation of MNA is planned for groundwater cleanup at this site. If needed, more aggressive remediation methods, such as enhanced biodegradation or extraction and treatment of groundwater, may be implemented to remediate groundwater at SS015, but no soil action (such as excavation or SVE) is necessary for VOCs in soil gas to protect groundwater.