Proposed Plan for
SPILL SITE 045 (SS045)
WHITEMAN AIR FORCE BASE, MISSOURI

Department of the Air Force

Air Force Announces Proposed Plan

The United States Air Force (USAF) invites the public to review and comment on this Proposed Plan (PP) for Spill Site 045 (SS045; Site) at Whiteman Air Force Base (WAFB), Knob Noster, Missouri (Figure 1). The purpose of this PP is to present to the community and interested stakeholders the preferred remedial alternative for managing potential risks associated with groundwater contamination at SS045.

This PP summarizes cleanup alternatives that were evaluated for use at SS045 and describes the basis for identifying the Preferred Alternative, Alternative 2 (G2) shown in Table 3, which is a combination of additional land use controls (LUCs) and monitored natural attenuation (MNA), in accordance with requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 117(a) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) § 300.430(f)(2).

This PP is issued by the USAF, the lead agency for site activities, to fulfill the public participation responsibilities under Section 117 (a) of CERCLA, 42 USC § 9617(a) and Section 300.430 (f)(3) of the NCP. The USAF, in consultation with the Missouri Department of Natural Resources (MoDNR), will select a final remedy for SS045 after reviewing and considering all information submitted during the 30-day public comment period. The USAF may modify the Preferred Alternative or select another alternative presented in this PP based on new information or public comments. The final remedy will be documented in a Record of Decision (ROD) document for SS045.

COMMUNITY INVOLVEMENT OPPORTUNITIES

PUBLIC COMMENT PERIOD:
19 June 2026 through 21 July 2026
The USAF will accept written comments on the PP during the public comment period. Comment letters must be postmarked by **21 July 2026** and should be submitted to:
509th Bomb Wing Public Affairs
509 Spirit Blvd., Suite 116
Whiteman AFB Base, MO 65305

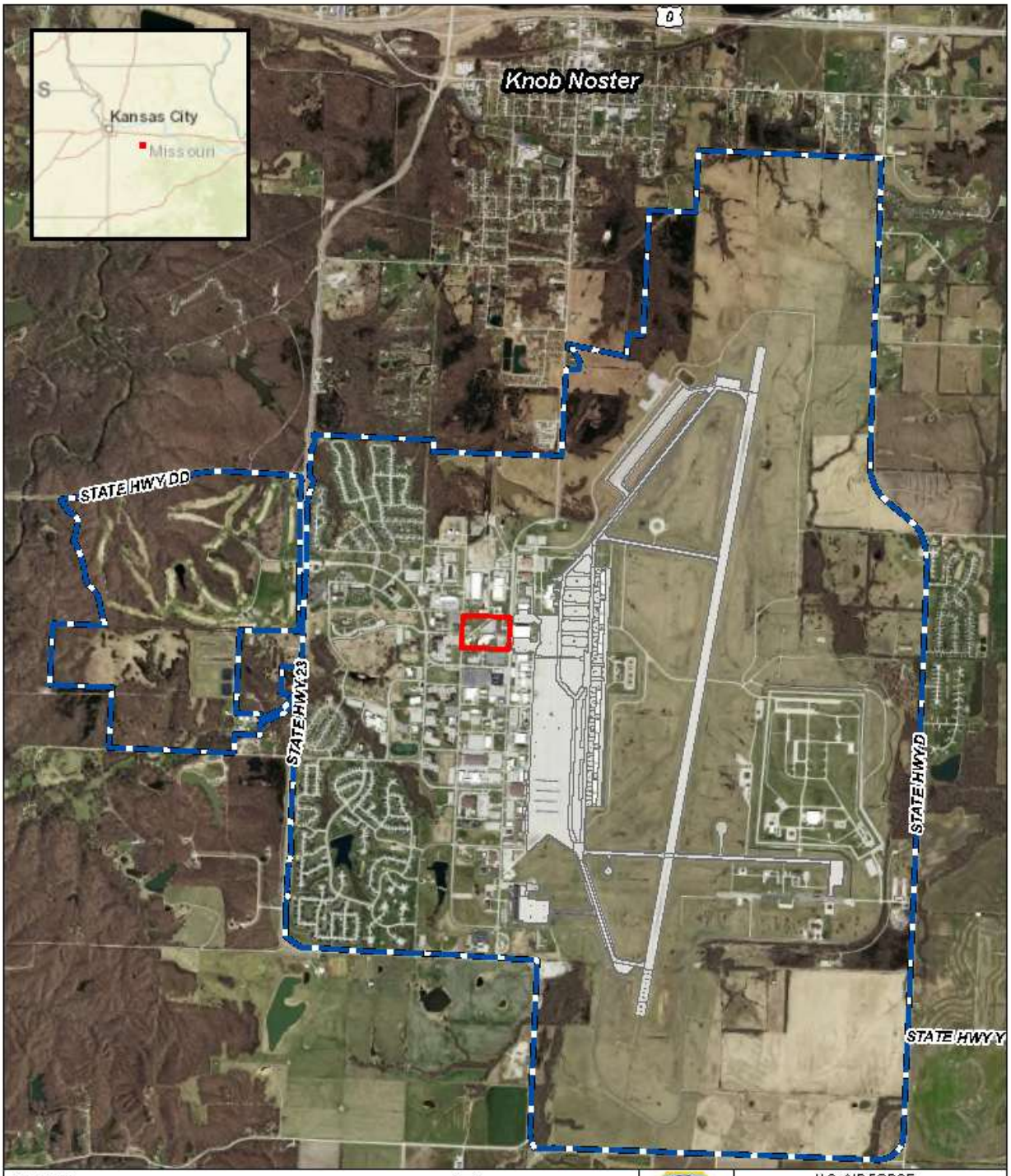
Email: **509bw.publicaffairs@us.af.mil**
Phone: **660-687-5727**

To ask for an extension of the public comment period send a request in writing to **Joanna Bachtel** by 5:00PM **21 July 2026**.

PUBLIC MEETING: The USAF will provide a public meeting on **9 July 2026** to explain the PP and the alternatives presented in the FS Report. Oral and written comments will be accepted at the meeting.

For more information, see the AFCEC Administrative Record at the following link: https://ar.cce.af.mil Search the Installation List for **"Whiteman AFB, MO"** and Sites for **"SS- 45."**

This PP summarizes information that is presented in the *Remedial Investigation at Site SS045 Final Report Whiteman Air Force Base*, *Missouri*, dated February 2020 (RI Report), the *Feasibility Study at Site SS045 Revised Final Report Whiteman Air Force Base*, *Missouri*, dated November 2021 (FS Report), and other site documents available in the Administrative Record for SS045 (https://ar.cce.af.mil). Public comment is an important part of the remedy selection process. The USAF and MoDNR encourage the public to review these documents to gain a better understanding of the Site, and remedial activities that have been conducted at the Site.



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Site History and Background

WAFB is located in west-central Missouri, in Johnson County, about 2 miles south of Knob Noster, 9 miles east of Warrensburg, 22 miles west of Sedalia, and 70 miles southeast of Kansas City. WAFB was chosen as the fourth Minuteman Intercontinental Ballistic Missile wing in 1961 and has supported B-2 bombers since 1995.

SS045 is in the industrial portion of WAFB, northeast of Building 140 (Heat Plant), near the flight simulator buildings. A former fuel oil tank farm release site (TA501) is within the SS045 boundary. TA501 includes three 100,000-gallon aboveground storage tanks (ASTs). One tank was placed out of service and two of the 100,000-gallon tanks are used for back-up fuel for the heat plant.

Several neighboring installation restoration program sites (sites where USAF conducts environmental investigation and cleanup activities) have achieved "unlimited use/ unrestricted exposure" determinations after being remediated and were formally closed before January 2020. These remediated sites are located upgradient and downgradient of SS045 and were impacted by various contaminants of concern (COCs) including petroleum and chlorinated compounds in soil and groundwater. None of these sites were found to have impacted SS045.

In the early 2000s, up to 2,000 gallons of fuel were spilled at TA501. Cleanup efforts recovered some of the spilled fuel, but an unknown amount remained underground. In 2014, USAF initiated a site investigation (SI) to determine the extent of fuel remaining in soil and groundwater. The SI identified an isolated area of soil with fuel-related contaminants (polynuclear aromatic hydrocarbons) at concentrations that were below MoDNR target levels (SS045 FS Report).

Additional groundwater samples were taken at TA501 in 2014. Chemicals related to industrial activities, including carbon tetrachloride, chloroform, and trichloroethene (TCE) were detected in groundwater samples from former monitoring well TA501-MW3 (see Figure 2). The detection of these non-fuel related chlorinated volatile organic compounds at TA501 led to the creation of Site SS045. The TA501 fuel spill investigation was closed out in January 2020.

The Remedial Investigation (RI) for Site SS045 involved air/vapor, soil, and groundwater sampling to evaluate the nature and extent of contamination and identify potential exposure and contaminant migration pathways. Using data from the RI, a human health risk assessment (HHRA) was conducted as a baseline assessment following U.S. Environmental Protection Agency (EPA) Risk Assessment Guidance. Because the HHRA conducted during the RI did not include evaluation of future potential residential receptors, a supplemental HHRA was conducted to evaluate potential health risks for future hypothetical residential land use, to inform remedial decisions. A screening level ecological risk assessment was initiated, but no contaminants of potential ecological concern were identified. Contaminants of concern (COCs) at the Site were identified based on the results of the risk assessments.

The information gathered during the RI was used to evaluate cleanup goals and identify remedial technologies in the FS Report. The Feasibility Study (FS) identified and evaluated remedial alternatives for addressing COCs present at SS045.

There has been no remedial activity at SS045 other than the initial cleanup of the fuel oil spill at TA501.

Use of shallow groundwater for potable purposes is prohibited by basewide institutional control/LUCs and is not a current risk to the community. This PP is the first community outreach activity associated with SS045.

Copies of site documents are available for review in the AFCEC Administrative Record, which is linked on the front page of this PP. This PP can be accessed on the Whiteman AFB website at https://www.whiteman.af.mil/environment/

Site Characteristics

SS045 is located within an industrial portion of WAFB – a major, active military installation. Use

of the Site and surrounding area will most likely remain industrial. No near future construction is planned, and residential development is unlikely. The nearest residential area, base housing, is approximately 2,200 feet northwest of the Site. SS045 is near the restricted flightline and aircraft hangars. The Site is mostly manicured grass with several trees, an asphalt parking area, and three buildings including the Steam Plant. SS045 also includes a tank farm that was associated with the now-closed TA501 fuel release site discussed earlier. No surface water bodies are present on the Site.

The subsurface soils have a high clay content, resulting in low hydraulic conductivity. In addition, the hydraulic gradient in the central portion of SS045 is approximately 0.001 ft/ft, meaning the potential for groundwater migration is low. Groundwater recharge at WAFB is primarily from precipitation infiltrating the soil. As reported in the RI Report, the depth to groundwater at the Site ranges from 27.5 feet to 34 feet below the ground surface and local groundwater flow is generally to the south. A shale aquitard that confines shallow groundwater is generally at 35 feet below ground surface and is 70 to 140 feet thick.

Contaminants of Concern (COCs)

Contaminants of potential concern (COPCs) were identified for SS045 by comparing chemical concentrations in air, soil, and groundwater samples collected during RI activities to EPA Regional Screening Levels[1] (RSLs) and drinking water Maximum Contaminant Levels (MCLs). Then the COCs for SS045 were determined during the human health and ecological risk assessments.

COPCs detected in indoor air, outdoor air, and subslab vapor samples were below industrial air RSLs for industrial and construction workers. But for potential future residential exposure, carbon tetrachloride, chloroform, and trichloroethene were identified as COPCs in indoor air from groundwater via vapor intrusion. During the risk assessment process, no indoor air COCs were identified for industrial workers during the RI HHRA and no COCs were identified for media other than groundwater during the supplemental residential HHRA. Therefore, the PP does not include remedial technologies or alternatives for cleanup of soil vapor or indoor air.

Concentrations of chemicals detected in soil samples, including carbon tetrachloride and chloroform, were below the respective commercial/industrial worker RSLs. No COCs for soil were identified during the RI HHRA or supplemental residential HHRA. Therefore, the PP does not include remedial technologies or alternatives for cleanup of soil.

Groundwater samples collected from 10 groundwater monitoring wells between 2018 and 2019 contained concentrations of carbon tetrachloride, TCE, and chloroform above the RSLs or MCLs. Based on cumulative cancer risks (further discussed in the Summary of Site Risks), no COCs were identified for industrial or construction workers during the RI HHRA.

In accordance with EPA's Memorandum, *Determining Groundwater Exposure Point Concentrations, Supplemental Guidance* (EPA 2014), an evaluation of potential future adult and child residential exposure scenarios was performed, during the supplemental residential HHRA, using maximum concentrations in groundwater at the core of the plume as exposure point concentrations. The supplemental HHRA considered carbon tetrachloride, TCE, and chloroform as COCs.

However, since the maximum concentration of chloroform in groundwater at SS045 was less than the EPA Maximum Contaminant Level Goal for total trihalomethanes (sum of the concentrations of four related compounds including chloroform), chloroform was not identified as a risk and was removed from the COC list during the FS. No further action will be required for chloroform.

Despite investigation efforts, the source of the COCs at SS045, which are present in dissolved form with no pure product or non-aqueous phase, has not been identified. The COC plume in groundwater was delineated during RI

[1] https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables

activities and was approximately 150 feet by 300 feet in 2019 (Figure 2).

Table 1. Contaminants of Concern

COCs in Groundwater	Maximum Concentration (µg/L)	Cleanup Level (µg/L)
Carbon Tetrachloride	55	5
TCE	17	5

Notes:
µg/L = micrograms per liter
There are no COCs for soil or soil vapor/indoor air.
Cleanup levels for COCs in groundwater are drinking water MCLs.

Scope and Role of Proposed Response Action

Based on data collected during the RI and risk evaluations performed during the FS, the COCs identified at SS045 are isolated to the groundwater, specifically in the vicinity of wells MW8, MW9, and the former TA501-MW3 (Figure 2). No principal threat wastes are present at SS045[2]. The cleanup goal for SS045 is to reduce COC concentrations to below the MCLs and any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be Applicable or Relevant and Appropriate Requirements (ARARs). The proposed response action is intended to protect human receptors from exposure to untreated groundwater and restore groundwater to concentrations below MCLs.

Summary of Site Risks

Human Health Risks

The HHRA and supplemental HHRA conducted during the RI and FS assessed current and future occupational exposure scenarios and hypothetical future residential scenarios for adults and children, respectively. Cancer and non-cancer risks were calculated (Table 2) for potential exposure scenarios for chemicals detected in surface soil, subsurface soil, groundwater, and vapors in air from groundwater via vapor intrusion (a process where chemicals volatilize from groundwater beneath a building and migrate into indoor air).

SS045 is currently used as an industrial site and there are no anticipated changes from industrial usage for SS045 and the vicinity. The nearest residential area, base housing, is approximately 2,200 feet northwest of the Site.

Risk characterization results are presented as estimates of excess cancer risk and non-cancer hazards. Generally, when the cumulative cancer risk is at or below $1x10^{-4}$ and the non-cancer hazard index (HI, the sum of non-cancer health hazard values) is less than or equal to 1, remedial action is not warranted. Exceedances of these risk threshold limits indicate the need for corrective actions to protect human health and the environment.

Table 2. Summary of Potential Human Health Risks

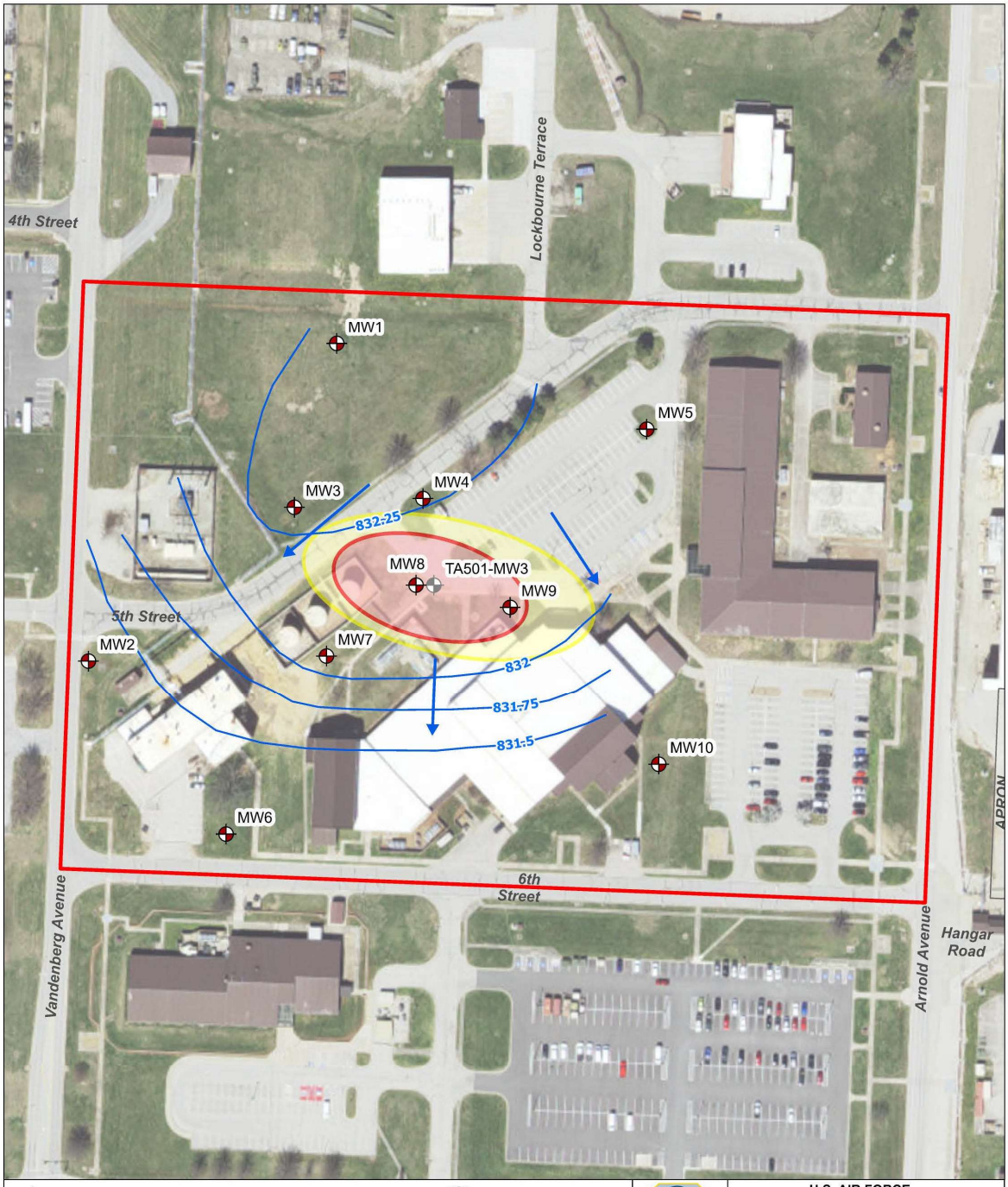
Receptor	Cancer Risk	Hazard Index
Current and Future Outdoor Commercial/Industrial Worker	NE	NE
Future Construction Worker	NE	NE
Current and Future Indoor Industrial Worker	$1x10^{-5}$	0.08
Future Adult Resident	$2x10^{-4}$	5
Future Child Resident	$5x10^{-5}$	6

Note: NE = Not evaluated because no COCs were identified for these receptors.

Ecological Risks

SS045 is in the industrial area of WAFB. There are no surface bodies of water nor vegetation growing other than grass in mowed areas and landscaped trees/bushes. This area of WAFB is not a known natural habitat for animals. The RI identified no chemicals of potential environmental concern or ecological risks at SS045; therefore, ecological risks do not need to be evaluated in this PP.

[2] Principal threat wastes are considered source materials by EPA – materials that contain hazardous substances that act as a reservoir for migration of contamination to groundwater, surface water, or as a source for direct exposure. Contaminated groundwater is generally not considered to be a source material.



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Risk Assessment Conclusion

It is the USAF's current judgment that the Preferred Alternative identified in this PP, or one of the other alternatives considered in this PP, is necessary to protect long-term public health or welfare or the environment from potential exposures to contaminants from SS045.

Remedial Action Objectives

Remedial action objectives (RAOs) are medium-specific (soil or groundwater-specific) as defined by the NCP, 40 CFR Part 300. The RAO for SS045 is to prevent direct contact with COCs (carbon tetrachloride and TCE) in groundwater at concentrations exceeding cleanup levels under a residential scenario (e.g., household tap water use).

The action, chemical, and location specific ARARs for potential future potable use of groundwater at SS045, where TCE and carbon tetrachloride contamination exists are groundwater MCLs under the National Primary Drinking Water regulations and the SWDA.

More than 20 potential ARARs for the Site were evaluated as part of the FS. MCLs under the Safe Drinking Water Act of 1974 (SWDA) and the National Primary Drinking Water Regulations were identified as an ARAR for potable use of groundwater containing TCE and carbon tetrachloride at the Site. Other federal ARARs and guidance documents to be considered (TBC) are discussed in the section evaluating Compliance with ARARs in the Evaluation of Alternatives. According to MoDNR communication referenced in the FS Report, there are instances off-base in which shallow wells have been installed and used by private property owners. While existing LUCs at WAFB prevent installation of drinking water wells on the base in the unconsolidated soils and sediments above the shale layer that acts as an aquitard, shallow groundwater may hypothetically be used as a drinking water supply. The presence of carbon tetrachloride and TCE at concentrations above the MCLs adversely impacts the future beneficial use of this water resource.

The remediation goals (RGs) for SS045 are the drinking water MCLs under the SWDA. The MCLs for both carbon tetrachloride and TCE in groundwater are 5 µg/L and were used as RGs for the remedial alternative evaluation. The RGs will be finalized as remediation levels in the Site ROD, or they may be adjusted since they are based on potable groundwater use, which would be prevented by existing and proposed LUCs.

Summary of Remedial Alternatives

As part of the FS, four general response actions (GRAs) were evaluated as remedial alternatives to address groundwater COCs (i.e., carbon tetrachloride and TCE). The GRAs considered and evaluated for restoration of SS045 groundwater were:

- No action
- Land Use Controls (LUCs)
- Monitored Natural Attenuation (MNA)
- Active groundwater remediation (including multiple active remediation methods)

Site-specific response actions were identified for each GRA and screened based on their likely site-specific effectiveness, implementability, and relative cost. The site-specific response actions retained from this screening process were combined as three remedial alternatives, as shown in Table 3.

The three remedial alternatives evaluated are described below, followed by a summary of the detailed remedial alternative analysis.

Table 3. Summary of Remedial Alternatives

Medium	RI/FS Designation	Description
Ground-water	Alternative 1 (G1)	No Action
	Alternative 2 (G2)	LUCs with MNA
	Alternative 3 (G3)	In-Situ Remediation

The preferred remedial alternative for SS045 is Alternative 2 (G2), a combination of additional LUCs and MNA, as determined through a detailed analysis.

No Action Alternative

Alternative 1 (G1): No Action

Estimated Capital Cost: None

Estimated Annual Operation and Maintenance (O&M) Cost: None

Estimated Net Present Value: None

Estimated Construction Timeframe: None

Estimated Time to Achieve RAO: Does not achieve the RAO

The No Action alternative is required by the NCP to provide a baseline against which other alternatives can be evaluated. Under the No Action alternative, no actions are taken to mitigate or remediate conditions at the Site or control exposure to receptors. The Site would remain as it currently exists. No restriction would be placed on future land use to prevent potential future exposure to carbon tetrachloride and TCE concentrations exceeding MCLs in groundwater and no groundwater monitoring would be performed.

Vapor/Air and Soil Alternatives

Since no soil or soil vapor/indoor air COCs were identified during the HHRAs, no soil or vapor/air alternatives are required.

Groundwater Alternatives

Alternative 2 (G2): Land Use Controls with Monitored Natural Attenuation

Estimated Capital Cost: $11,880

Estimated Annual O&M Cost: $13,474

Estimated Net Present Value: $237,805

Estimated Timeframe: 360 Months

Estimated Time to Achieve RAO: 360 Months (30 years)

Alternative 2 (G2) is a combined alternative implementing both LUCs and MNA. This is the preferred remedial alternative for SS045. LUCs consist of restrictions to control future land use and construction activities. MNA will include monitoring to document groundwater plume movement and COC concentrations.

LUCs to be implemented with this remedy include:

- Formal designation of the Site boundaries accompanied by a land survey
- Continued prohibition of shallow groundwater use at the Site until cleanup levels are achieved
- Registration of a land use restriction preventing future residential site use on the Whiteman AFB Comprehensive Planning Platform; land use restrictions will be enforced through the Whiteman AFB Dig Permit process.
- Procedures to ensure groundwater is properly managed during construction activities and to prevent creation of any breaches in the aquitard that separates the shallow water-bearing unit and the deeper aquifer.

Documentation of annual inspections confirming compliance with the LUCs would be required by a contractor in coordination with Air Force staff.

MNA for this remedy includes groundwater monitoring performed to:

- Document COC concentrations until they have reduced to below the RGs established in the ROD.
- Monitor processes (natural biological, chemical, and physical processes that degrade or dilute groundwater contaminants) to verify the effectiveness of MNA.

Five-year reviews will be required until natural attenuation has reduced COCs to levels that allow unlimited use and unrestricted exposure.

Provisions will be made to have the LUCs implemented in the event the ownership of the site changes per Section 3.1.1.2 of the FS.The available data is insufficient for an accurate estimate of the duration required to achieve the RGs and RAO. The FS report states that natural attenuation processes may eventually achieve this goal but, for purposes of costing, a timeframe of 30 years was estimated for achieving the RAO.

Trends observed in the data sets from SS030 and SS045, coupled with the LUCs and monitoring, indicate this alternative will be effective in the long term and will mitigate risks to human health and the environment at the Site.

Alternative 3 (G3): In-Situ Remediation

Estimated Capital Cost: $833,881

Estimated Annual O&M Cost: $32,349

Estimated Net Present Value: $866,725+

Estimated Construction Timeframe: 12 months

Estimated Time to Achieve RAO: Approx. 60-84 months (5-7 years) due to issues impacting implementability.

The in-situ remedy would treat COCs in place beneath the ground. The in-situ technologies evaluated for this alternative involve injection of chemical reagents into groundwater to reduce COC concentrations in groundwater. Depending on the appropriate reagent identified, the in-situ treatment alternative could include in-situ chemical reduction (ISCR), in-situ chemical oxidation (ISCO), and/or enhanced in-situ anaerobic bioremediation. ISCR and ISCO involve the delivery of reagents that destroy the COCs via chemical reduction or chemical oxidation pathways, respectively. Enhanced in-situ anaerobic bioremediation adds hydrogen to groundwater to increase the number and vitality of naturally-occurring microorganisms that degrade (metabolize or co-metabolize) the COCs. During the FS for SS045, reductive dichlorination was evaluated as the In-Situ Remediation alternative.

The in-situ technology selected would require complete distribution and mixing of injected reagents throughout the treatment area and establishing geochemistry conditions that are suitable for reducing COC concentrations. Based on treatability study testing at nearby Site SS030, it is estimated that 200 injection points spaced in a 7-foot grid would need to be spread across a 20,000 square foot area within SS045.

The high clay content, low permeabilities of the subsurface soil, and geochemical conditions at SS045 may prohibit effective distribution of reagents. In addition, the presence of subsurface utilities could serve as preferential pathways and short-circuit the uniform distribution of reagents.

Evaluation of Alternatives

Nine criteria are used to evaluate the different remedial alternatives individually and against each other to select a preferred remedy.

THRESHOLD CRITERIA

1. Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that are determined to be legally applicable or relevant and appropriate to the CERCLA site or action, or whether a waiver of ARARs compliance is justified.

PRIMARY BALANCING CRITERIA

3. Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. Cost includes estimated capital and annual operations and maintenance costs, as well as present value cost. Present value cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

MODIFYING CRITERIA

8. Air Force as the Lead Agency and EPA and/or State as the Support Agency(ies) Acceptance considers whether the EPA and/or State agrees with the USAF's analyses and recommendations, as described in the RI/FS and PP.

9. Community Acceptance considers whether the local community agrees with Air Force's analyses and the preferred alternative. Comments received on the PP are an important indicator of community acceptance.

This section of the Proposed Plan profiles the relative performance of each of the three remedial alternatives against the nine criteria, noting how it compares to the other alternatives under consideration.

The nine criteria fall into three groups:

- Threshold criteria are requirements that each alternative must meet to be eligible for selection.
- Primary balancing criteria are used to weigh major differences between alternatives.
- Modifying criteria may be considered to the extent that information is available during the FS, but can be fully considered only after public comment is received on the PP.

The final remedy is selected based on weighing the differences identified during analysis of the balancing criteria and any modifying criteria identified after the Proposed Plan is issued.

Evaluation of the alternatives against the nine evaluation criteria is summarized below. Scoring of each alternative against the nine evaluation criteria is provided in Table 4. A detailed analysis of alternatives is provided in the FS Report (see reference on page 1).

1. Overall Protection of Human Health and the Environment

No Action, Alternative 1 (G1), does not mitigate the identified risks to human health or the environment since no administrative control exists to prevent potable water use or maintain the current land use. Therefore, Alternative 1 (G1) does not protect human health under future hypothetical exposure scenarios and does not meet this threshold criteria. Since Alternative 1 (G1) does not meet threshold criteria, it is ineligible for selection. The NCP requires that a no action alternative be retained to provide a baseline against which other alternatives may be evaluated.

Alternative 2 (G2), LUCs with MNA, meets the criteria to protect human health and the environment. The LUCs implemented would prevent the creation of new groundwater exposure pathways, continue prohibition of shallow groundwater use, and control exposure from subsurface disturbances within the zone of contamination (i.e., the shallow aquifer)

The LUCs will be enforced throughout Air Force ownership of WAFB.

Groundwater monitoring, reporting, and five-year reviews would be performed to evaluate contaminant concentrations until natural attenuation has reduced COCs concentrations in Site groundwater to below RGs.

In-situ Remediation, Alternative 3 (G3), could potentially provide protection of human health and the environment, as this is a well-established method used to reduce groundwater concentrations. Successful injection and distribution of reagents throughout the central plume would likely reduce concentrations to the RGs.

2. Compliance with ARARs

For No Action, Alternative 1 (G1) the Federal ARAR would be the SWDA (MCLs) and EPA guidance on the Use of MNA at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (EPA OSWER Directive 9200.4-17, April 21, 1999.). While natural attenuation will likely occur and reduce concentrations of COCs, there would be no control measures in place to prevent potential future exposure to, or use of, groundwater for potable purposes. There would also be no monitoring of groundwater concentrations to confirm that natural attenuation of contaminants is occurring or that MCLs and RGs have been met.

For the preferred alternative, Alternative 2 (G2) LUCs with MNA, the Federal ARARs would be the SWDA (MCLs). State of Missouri ARARs include the Water Well Drillers Act for any wells drilled or abandoned. LUCs would be used to achieve compliance by preventing the potable use of shallow groundwater or residential use of the Site, and MNA would include monitoring progress toward achieving

compliance with MCLs and RGs. Documents TBC include EPA's Use of MNA at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (EPA OSWER Directive 9200.4-17, April 21, 1999.) and guidance on groundwater sampling, associated quality assurance plans and data quality objectives, and remediation waste.

For Alternative 3 (G3), In-Situ Remediation, the Federal ARARs would include the SWDA MCLs and Underground Injection Control Program (for any injection wells used during treatment), and relevant Occupational Safety and Health Act (OSHA) requirements during active remediation. State of Missouri ARARs include the Water Well Drillers Act for wells drilled or abandoned. Documents TBC include guidance related to remedial design, groundwater sampling, associated quality assurance plans and data quality objectives, remediation waste, and any stormwater needing management during construction.

This alternative could theoretically provide protectiveness and regulatory compliance within a shorter time frame than LUCs with MNA. However, if adequate distribution and mixing of injected reagents throughout the treatment area is unsuccessful, as was observed under similar conditions at SS030, then COC concentrations would be reduced, and compliance achieved, primarily through natural attenuation, similar to Alternative 2 (G2).

3. Long-Term Effectiveness and Permanence

No Action, Alternative 1 (G1), does not address long-term effectiveness or permanence. While it is likely that natural attenuation would degrade the COCs, the process would not be monitored to confirm this, and future risks would be unknown.

LUCs combined with MNA, Alternative 2 (G2), provides long-term effectiveness and permanence. The proposed LUCs mandate that future owners comply with the requirements of the remedy. LUCs will control current and future exposures, and monitoring will provide data to support future evaluations of the continued effectiveness of the LUCs and document contaminant concentrations in Site groundwater.

Implementation of In-Situ Remediation, Alternative 3 (G3), could potentially provide a permanent solution and long-term effectiveness. If adequate distribution and mixing of injected reagents throughout the treatment area is unsuccessful, Alternative 3 (G3) would rely on natural attenuation, similar to Alternative 2 (G2), for contaminant reduction. However, the existing LUCs are inadequate to control exposures over the longer timeframe natural attenuation requires, and monitoring under this alternative may be insufficient to evaluate the effectiveness of natural attenuation.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

A No Action response Alternative 1 (G1) may or may not reduce the toxicity, mobility, or volume of COCs in groundwater at SS045. This alternative does not include groundwater monitoring to determine whether a reduction of COCs is occurring.

MNA monitors and documents natural processes that result in reduced toxicity but does not include active treatment. Natural attenuation that occurs during implementation of LUCs with MNA, Alternative 2 (G2), may reduce the toxicity and volume of contaminated groundwater at the Site. Monitoring will be performed to measure the effectiveness and timeline to achieve RGs.

In-Situ Remediation Alternative 3 (G3) could potentially reduce toxicity and volume significantly and achieve the RGs, but the low likelihood of adequate distribution of reagents indicates that natural attenuation would be necessary for contaminant reduction.

5. Short-term Effectiveness

A No Action response, Alternative 1 (G1), is effective in the short-term and under the current land use, where there is no residential land use or potable use of groundwater from the Site.

LUCs combined with MNA, Alternative 2 (G2), provides effectiveness in the short term by

placing additional provisions prohibiting land use, thereby preventing potential exposure to COCs throughout the duration of MNA.

In-Situ Remediation, Alternative 3 (G3), is effective in the short term under the current land use. This alternative would require coordination to ensure there is no interference with the Base's mission or operations during the on-site treatment phase; therefore, this alternative was assigned a slightly lower short-term effectiveness than No Action (G1) or LUCs with MNA (G2).

6. Implementability

No construction, long-term monitoring, inter-agency coordination, or other action is necessary to implement a No Action response. This remedy, Alternative 1 (G1), is easily implemented.

For Alternative 2 (G2), periodic monitoring would be required as would certain administrative actions such as defining the Site and restricting land use but neither of these would be technically difficult to implement.

The FS Report for SS045 concluded that In-Situ Remediation, Alternative 3 (G3), with reagent injection would have a low degree of implementability at SS045 due to the likelihood of inadequate reagent dispersion in the subsurface environment, low permeability soils, geochemical conditions of the soils, the presence of underground utilities that could create preferential pathways and short circuiting, and a low groundwater gradient.

The FS report described and evaluated a 2003 treatability study performed at the nearby site SS030 that was conducted to evaluate the suitability of reagent injections at 10 and 13 feet spacings to enhance biodegradation of chlorinated solvents. SS030 is approximately 2,200 feet north of SS045 and the same site COCs were being treated in groundwater (although at higher concentrations). Although some reduction of COC concentrations was observed at SS030, the method was only locally effective in reducing carbon tetrachloride and was not effective downgradient of the injection locations.

At SS030, even with an injection spacing of 10 feet, distribution of the injected reagent was limited by the low permeability soils (mostly clay). As a result, a reductive anaerobic environment (i.e., appropriate geochemical condition) was not fully achieved and biodegradation was slow to start. It was concluded conditions were not favorable for anaerobic biodegradation because reductive byproducts of TCE degradation were not observed following three post-injection sampling events. Within injection areas with higher COC concentrations, carbon tetrachloride degraded more effectively than TCE. This could be due to microbial populations that were more adapted to carbon tetrachloride than TCE, and higher concentrations of carbon tetrachloride than TCE.

While Alternative 3 (G3) could theoretically reduce the volume and/or toxicity of carbon tetrachloride through treatment, and to some extent also treat TCE in groundwater (similar to SS030), the previous studies indicate it may not be feasible at SS045.

Site SS045 has additional site conditions that would affect implementability for Alternative 3 (G3). The hydraulic gradient, an important site characteristic for achieving reagent dispersion, is lower at SS045 than at SS030, and would further reduce dispersion at SS045. The presence of underground utilities would make it difficult to achieve the tight injection spacing necessary for successful treatment of Site groundwater and create potential for short-circuiting that would interfere with effective distribution of the reagent throughout the treatment area. Geochemical conditions at SS045 are not suitable for successful anaerobic biodegradation. Therefore, In-Situ Remediation, Alternative 3 (G3), would have a low degree of implementability and low degree of effectiveness in achieving the RAOs.

7. Cost

No Action, Alternative 1 (G1), has no capital costs or annual operations and maintenance costs.

For the preferred alternative, LUCs with MNA, Alternative 2 (G2), using methods presented in *A Guide to Developing and Documenting Cost*

Estimates During the Feasibility Study (USEPA 2000), the estimated present value, over 30 years with a discount factor of 7 percent, was at $237,805. This includes capital costs (recording the site boundaries) of $11,880, annual sampling and LUC compliance certification costs of $13,474 in the base year and continuing for 30 years, periodic costs to complete Five-Year Reviews and site Close Out. The present value of the first Five-Year Review is $18,555, and six reviews were included in the cost estimate. The present value of Site Close Out is $29,760. For purposes of cost estimating, the closeout costs were incurred in year 30.

The FS Report determined that the cost of LUCs with MNA, Alternative 2 (G2), is more favorable than In-Situ Remediation, Alternative 3 (G3), which had an estimated present value of $866,725, which is more than three times Alternative 2 (G2). The cost of Alternative 3 (G3) assumes two rounds of injections, drilling and installation of 300 injection points and two monitoring wells, 10,000 lbs. of reagents, three rounds of groundwater monitoring at four wells, and site closure.

8. State/Support Agency Acceptance

This criterion will be assessed following comments to the PP.

9. Community Acceptance

This criterion will be assessed following comments to the PP.

Summary of Preferred Alternative

Based on the comparative analysis of the three remedial alternatives performed during the FS using the nine CERCLA evaluation criteria, Alternative 2 (G2), LUC with MNA, had the highest score and is the preferred alternative recommended to prevent exposure risk to current and potential future residential site users due to the presence of carbon tetrachloride and TCE in groundwater.

Based on currently available information, the USAF believes the Preferred Alternative, LUCs with MNA, Alternative 2 (G2), meets the threshold criteria and provides the best balance of tradeoffs among the evaluated alternatives with respect to the balancing and modifying criteria. The USAF anticipates that the Preferred Alternative will satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with ARARs; (3) be cost-effective; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment, through natural attenuation, as a principal element.

Community Participation

The USAF and MoDNR provide information regarding the cleanup of SS045 to the public through the Administrative Record file for the Site, and announcements published in the **Sedalia Democrat and Warrensburg Star-Journal**, Missouri. The USAF and the MoDNR encourage the public to learn about the Site and the remedial activities that have been conducted at the Site.

The dates for the public comment period, the date, location, and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this PP.

For further information on SS045, please contact:

Paul Takacs	Joanna Bachtel
Remedial Project Manager	Community Relations, Section Chief
(636) 544-1383	(660)-687-5727

U.S. Air Force
509th Bomb Wing Public Affairs
509 Spirit Blvd., Suite 116
Whiteman AFB Base, MO 65305

Table 4. Evaluation Criteria and SS045 Groundwater Alternatives Scoring

Evaluation Criteria for CERCLA Remedial Alternatives	1 (G1) No Action	2 (G2) LUCs with MNA	3 (G3) In-Situ Remediation
THRESHOLD CRITERIA	**Scores**		
Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.	1	4	4
Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that that are determined to be legally applicable or relevant and appropriate to the CERCLA site or action, or whether a waiver of ARARs compliance is justified..	1	4	4
PRIMARY BALANCING CRITERIA	**Scores**		
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.	1	3	4
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.	1	2	3
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.	4	4	3
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.	4	4	1
Cost includes estimated capital and annual operations and maintenance costs, as well as present value cost. Present value cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.	4	3	1
MODIFYING CRITERIA	**Scores**		
Air Force as the Lead Agency and EPA and/or State as the Support Agency(ies) Acceptance considers whether the EPA and/or State agrees with the USAF's analyses and recommendations, as described in the RI/FS and PP.	TBD	TBD	TBD
Community Acceptance considers whether the local community agrees with Air Force's analyses and preferred alternative. Comments received on the PP are an important indicator of community acceptance.	TBD	TBD	TBD
Total Scores	**16**	**24**	**20**

Notes: Scoring from the FS Report is shown.
Scores: 1 = Poor, 2 = Satisfactory, 3 = Good, 4 = Excellent, TBD = to be determined

The modifying criteria *Air Force as the Lead Agency and EPA and/or State as the Support Agency(ies) Acceptance* and *Community Acceptance* will be assessed after comments are received.

Glossary of Terms

Specialized terms used in this Proposed Plan are defined below:

Applicable or Relevant and Appropriate Requirements (ARARs) – the Federal and State environmental cleanup standards and other substantive requirements, determined to be applicable or relevant and appropriate requirements for the Site or CERCLA action, that a selected remedy will meet. These requirements may vary among sites and alternatives.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), also known as Superfund, addresses emergency response, removal, remediation, and liability for land contaminated with high levels of hazardous materials.

Contaminant of Concern (COC) – Chemical substances found at the site that pose an unacceptable risk to human health or the environment. These are the substances that are addressed by cleanup actions at the site.

Contaminant plume – a body of contamination with measurable horizontal and vertical dimensions that is suspended in and moves with groundwater.

Downgradient – the direction in which groundwater flows.

Groundwater – underground water that fills pores in soil or openings in rocks to the point of saturation. Groundwater is often used as a source of drinking water via municipal or domestic wells.

Hydraulic Gradient – The slope or difference in hydraulic head (elevation or pressure) that causes groundwater to flow from an area of higher to lower hydraulic head.

In-situ - In place – (i.e., remediation performed within the contaminated media)

Maximum Contaminant Level (MCL) – The highest level of a contaminant that is allowed in drinking water in accordance with the federal Safe Drinking Water Act and EPA regulations. MCLs are enforceable standards.

Monitoring and reporting – ongoing collection of information about the environment that helps gauge the effectiveness of a clean-up action. Groundwater would be sampled annually for COCs and concentrations would be compared to RGs. Annual reports with monitoring results would be submitted to Stakeholders.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) – The NCP is an outline of procedures, organization, and responsibility for responding to spills and releases of hazardous substances and oil into the environment.

Present Value – Estimated cost in current (base) dollars that includes future spending. Determination of present value costs evaluates expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different remedial action alternatives can be compared on the basis of a single cost for each alternative.

Permeability – the ability of a porous material, like soil or rock, to allow water to flow through it.

Upgradient – a point located hydraulically above a site such that the groundwater at that site has presumed to have not been impacted by discharges from the site.

Acronyms and Abbreviations

µg/L	microgram per liter
§	Section
ARARs	Applicable or Relevant and Appropriate Requirements
AST	above ground storage tank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980. CERCLA is codified at 42 USC §§ 9601-9675.
CFR	Code of Federal Regulations
COC	contaminant of concern
EPA	United States Environmental Protection Agency
FS	feasibility study
HI	hazard index
HHRA	human health risk assessment
ISCO	In-situ Chemical Oxidation
ISCR	In-situ Chemical Reduction
LUC	Land Use Control
MCL	Maximum Contaminant Level
MoDNR	Missouri Department of Natural Resources
MNA	Monitored Natural Attenuation
MW	monitoring well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan. The NCP appears at 40 CFR Part 300.
O&M	Operation and Maintenance
PP	Proposed Plan
RAO	remedial action objective
RG	Remediation Goal
RI	remedial investigation
ROD	record of decision
RSL	Regional Screening Level
SI	site investigation
SS045	Spill Site 045
SWDA	Safe Water Drinking Act
TCE	trichloroethene
USAF	United States Air Force
USC	United States Code
WAFB	Whiteman Air Force Base

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Proposed Plan for SS045/Whiteman Air Force Base is important to the USAF. Comments provided by the public are valuable in helping the USAF select a final cleanup remedy for the Site.

You may use the space below to write your comments, then fold and mail. Comments must be postmarked by **21 July 2026**. If you have questions about the comment period, please contact **Joanna Bachtel at (660) 687-5727** or through the USAF's toll-free number. Those with access to email may submit their comments to the USAF at the following address: **509bw.publicaffairs@us.af.mil**.

Name:_____

Address:_____

City:_____

State:_____ Zip_____