Proposed Plan
Commodity Credit Corporation Former Grain Storage Facility
Nevada, Missouri

May 2025 (Final)

THE PROPOSED PLAN

This Proposed Plan has been prepared by the U.S. Army Corps of Engineers (USACE) for the U.S. Department of Agriculture (USDA) to present the preferred remedy for the Commodity Credit Corporation former Grain Storage Facility at Nevada, Missouri. This document summarizes the preferred remedy, the basis for this recommendation, and solicits public input. USDA requests that input be provided in writing during the public comment period.

PUBLIC COMMENT PERIOD
June 9, 2025 – July 11, 2025

Written comments may be submitted during the public comment period to the address provided below.

Send written comments post-marked by July 11, 2025, to:

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Administrative Record:
The Proposed Plan and other documents are available electronically by contacting:

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INTRODUCTION

An acronym list, glossary, and defining terms that may be unfamiliar to the general public are provided at the end of this document. Terms that are included in the glossary are shown in ***bold and italicized*** text when introduced.

This ***Proposed Plan*** (PP) is prepared by USACE for the Commodity Credit Corporation (CCC) former Grain Storage Facility near Nevada, Vernon County, Missouri (herein referred to as the Nevada site) in accordance with the ***Comprehensive Environmental Response, Compensation, and Liability Act of 1980*** (CERCLA) and the ***National Oil and Hazardous Substances Pollution Contingency Plan*** (NCP). This Nevada site PP solicits public participation as required by CERCLA and the NCP.

This PP summarizes Nevada site background and characteristics, human health risks, ***Remedial Action Objectives*** (RAOs), and remedial alternatives considered during the ***Feasibility Study*** (FS). The PP provides the basis for USDA's preferred alternative.

OPPORTUNITIES FOR PUBLIC INVOLVEMENT

USDA will consider comments submitted during the 30-day public comment period. After consideration, USDA will select the final remedy. USDA, in consultation with USACE and the Missouri Department of Natural Resources (MDNR), may modify the preferred alternative or select another alternative presented in this plan based on new information or public comments; therefore, the public is encouraged to review and comment on all alternatives presented in this PP. If requested, a public meeting may be held to present the alternatives and provide an opportunity for further discussion and public comments.

The ***Decision Document*** (DD) will have a "Responsiveness Summary" attachment that presents the responses to public comments and the final selected remedy for the site.

More detailed information regarding the CCC former Grain Storage Facility at the Nevada site, including the FS report (USACE 2024), is available in the site ***Administrative Record*** file, available electronically by contacting Mr. Kale Horton, USDA. The public is encouraged to review the information.

SITE BACKGROUND

The Nevada site is in an industrial setting southeast of the city of Nevada on property that is currently owned and occupied by a manufacturing plant for 3M's commercial graphics products (Figure 1).

The former Grain Storage Facility at Nevada was one of many temporary facilities used by CCC for storing surplus grain as part of a grain bin program that began in the 1940s. During storage, it was sometimes necessary to fumigate the grain to control destructive pests. The most common fumigant at that time was a mixture of 80% carbon tetrachloride (CTC) and 20% carbon disulfide. The mixture was applied directly onto the grain from the top of the storage bin and allowed to disperse throughout the bin. The grain bin program was terminated by the early 1970s, at which time CCC sold all existing grain storage bins and equipment. At the Nevada site, one Quonset hut on private property was leased to CCC from 1950 to 1966 through five-year leases with the property owners. According to historical documents, no other grain storage bins were located at the property, which was a farmstead (Consultech 2021).

SITE CHARACTERISTICS

The 3M property, including the Nevada site, is in the Ozark Plateau physiographic region, situated on a topographic high where drainage flows west toward Willow Branch Creek and south to Birch Branch Creek. Ground surface at the Nevada site in the vicinity of the former Quonset hut slopes gently to the west, with ground surface elevations ranging from 881 to 890 feet (ft) above mean sea level (amsl) (Consultech 2021).

3M previously operated a landfill in the southwestern portion of the property (Figure 2). During monitoring well installation and sampling in September, 1993, to support landfill operations, CTC was detected above the ***Maximum Contaminant Level (MCL)*** of 5 micrograms per liter (µg/L) in MW-2011, a monitoring well that was installed adjacent to the former Quonset hut and upgradient of the landfill. 3M indicated that CTC has never been used in processes at the manufacturing plant (Consultech 2021).

In 2021, a soil and groundwater investigation was completed in the area around the former Quonset hut and MW-2011. The results of the investigation were presented in the Initial Site Characterization Report (Consultech 2021). In 2024, vapor intrusion sampling was conducted in the storage building near the former Quonset hut at the request of 3M. The results of these investigations have been screened against the site **screening levels** (see "Site Screening Level" text box) and described in the following sections.

Site Screening Levels

To see whether there are harmful effects to human health, chemical concentrations in soil, groundwater, and indoor air were compared to screening levels published by the U.S. Environmental Protection Agency (USEPA). Screening levels are risk-based concentrations of chemicals, below which daily exposures in residential or industrial settings are acceptable.

Screening levels for soil were obtained from USEPA's soil Regional Screening Levels (RSLs). Screening levels for groundwater are USEPA MCLs when available and USEPA tap water RSLs when MCLs are unavailable. Screening levels for indoor air were obtained from USEPA Vapor Intrusion Screening Levels (VISLs). When contaminants are present in groundwater, vaporization into living air space could occur, and the groundwater-based VISL can be used to evaluate human health risks.

Screening levels for known and suspected carcinogens reflect an extra 1-in-1-million chance of developing cancer from site exposures. This is in addition to a person's background chance of developing cancer unrelated to the site (currently one in two for men and one in three for women [American Cancer Society 2024]). The extra chance of developing cancer is termed an ***Incremental Lifetime Cancer Risk*** (ILCR).

Non-cancer hazard is evaluated using ***Hazard Quotients***. The sum of the Hazard Quotient for each contaminant of potential concern (COPC) is the ***Hazard Index***. A Hazard Index of 1 corresponds to the lowest level of chemicals that may cause harmful noncancer health effects. Screening levels for non-carcinogens reflect a concentration that is 10 times lower than the level at which noncancer health effects are expected (termed a Hazard Index of 0.1).

Soil

In 2021, 13 soil borings were advanced using ***membrane interface hydraulic profiling tool (MiHPT)*** technology. The MiHPT technology includes an electron capture detector, a halogen specific detector, a photoionization detector, and a flame ionization detector. Responses from the detectors can indicate presence of a variety of chemicals, including chlorinated compounds such as CTC and chloroform (CF), a degradation product of CTC.

The borings were advanced until refusal, which was at depths ranging from 5.84 to 13.40 ft below ground surface (bgs). One sample was collected from each borehole at a depth chosen based on the detector response versus depth logs. Table 1 shows the detector responses and analytical results of the sampling. CTC and CF were not detected in any of the samples except for MIP-3 at a depth of 12.35 ft bgs. CTC has been detected at a concentration of 0.142 milligrams per

kilogram (mg/kg), exceeding the USEPA protection of groundwater screening level of 0.0019 mg/kg. MIP-3 was located immediately south of the former Quonset hut (Figure 3).

Groundwater

Before installing permanent monitoring wells, Consultech collected groundwater grab samples from temporary wells installed in boreholes MIP-1 and MIP-3, which were the two closest boreholes to the former Quonset hut, the suspected source area. Two temporary wells were also installed (Figure 3).

Table 2 summarizes the analytical results for CTC and CF concentrations in the grab groundwater samples. In the sample from MIP-1, CTC has been detected at a concentration of 14.5 µg/L, greater than the MCL of 5 µg/L. CF has also been detected at MIP-1 at a concentration of 29.6 µg/L, less than its MCL (80 µg/L). In the other temporary wells, CTC and CF, were either not detected (< 1 µg/L) or were detected at concentrations less than 2 µg/L.

In 2021, 12 monitoring wells were installed in the area of the former Quonset hut. MW-1 to MW-7 were installed in February 2021. Groundwater samples were collected on February 28, and March 1, 2021, from the installed wells and from selected existing monitoring wells. Based on analysis of samples from these wells, additional wells MW-8 to MW-12 were installed to further delineate the CTC plume. A second sampling was conducted in the period of May 10-13, 2021. Table 3 summarizes the CTC and CF concentrations in the samples from the monitoring wells. CTC was detected at concentrations ranging from 1.71 to 42.6 µg/L and CF was detected at concentrations ranging from 1.17 to 102 µg/L. In multiple sampling wells, CTC and CF have exceeded their MCLs, respectively.

3M had existing monitoring wells in place from their landfill operations. There were no volatile organic compounds (VOCs) detected in the 3M monitoring wells west of the former Quonset hut (Figure 4). The 3M monitoring wells are screened between 850 and 870 ft amsl, at elevations comparable to and deeper than the Nevada site monitoring wells which are screened from 860 to 870 ft amsl. Figure 5 shows the monitoring wells in the vicinity of the former Quonset hut with CTC and CF analytical results from both the February 28-March 1, 2021 and the May 10-13, 2021 sampling events. Figure 5 also shows an approximate 5 µg/L iso-concentration contour for CTC, which is well defined to the north, east, and northwest, but is less defined to the south and southwest. However, given the overall westerly groundwater flow across the 3M property, the non-detections shown in Figure 4 indicate that the extent of the CTC/CF plume at the Nevada site has been bounded. The known extent of the plume is approximately 300 ft perpendicular to groundwater flow by 150 ft parallel to groundwater flow (about an acre in areal extent).

Indoor Air

In February 2024, vapor intrusion sampling was completed at the 3M storage building located west of the former Quonset hut (Figure 6). Five sub-slab soil gas and five indoor air samples were collected inside the building, and one ambient air sample was collected outside and upwind of the building. The ambient air sample served as a baseline for comparison of the indoor samples to the typical environmental conditions. The sub-slab soil gas (sample ID NEVADA-SS-01-0224) and indoor air (NEVADA-IA-01-0224) samples were co-located.

There were two CTC detections in the sub-slab samples (Table 4): at 0.36 J (estimated) micrograms per cubic meter (µg/m^3) in NEVADA-SS-01-0224 and 0.32 J µg/m^3 in NEVADA-SS-05-0224. Neither detection has exceeded the residential VISL of 15.6 µg/m^3 or the commercial VISL of 68.1 µg/m^3. CF was not detected in the sub-slab samples.

Both CTC and CF were detected in the indoor and ambient air samples. The ambient air sample was collected from upwind of the storage building. The sample had a CTC concentration of 0.46 µg/m^3 and a CF concentration of 0.074 J µg/m^3. Most of the indoor air sample results were similar to these concentrations, which represent the baseline CTC and CF levels in the air, unaffected by former CCC operations. However, there were two samples that have exceeded the residential VISL of 0.468 µg/m^3 for CTC: NEVADA-IA-02-0224 (0.53 µg/m^3) and NEVADA-IA-QC-0224 (0.47 µg/m^3). Neither of these results has exceeded the commercial VISL of 2.04 µg/m^3. The results were compared to residential VISLs as a conservative estimate; however, the commercial VISLs are more appropriate for the exposure scenario. The storage building is not accessible to the public and is only visited periodically by 3M employees, limiting exposure to the indoor air. Additionally, CF was not detected in sub-slab soil gas samples and CTC was not detected in four of the six sub-slab soil gas samples. The only two detections of CTC in sub-slab soil gas were at concentrations lower than CTC detected in the indoor air. Therefore, it is likely that CF and CTC detected in indoor air are from a source other than the soil and groundwater contamination at the site.

SCOPE AND ROLE OF RESPONSE ACTION

In the FS (USACE 2024) viable remedial alternatives for the Nevada site were identified and evaluated to select the preferred alternative. The preferred alternative consists of ***Long-Term Monitoring (LTM)*** including vapor intrusion monitoring and installation of a vapor mitigation system (if required). The technologies used in the preferred alternative are described in the following sections.

Implementation of remedies will comply with ***applicable or relevant and appropriate requirements (ARARs)*** and achieve the RAOs for the site (See Remedial Action Objectives Section). The proposed action will be the final action for the site.

SUMMARY OF SITE RISKS

USEPA identifies risk thresholds to provide a framework for determining whether a site, or a specific chemical or individual exposure pathway at a site, poses unacceptable risk to human health in the ***baseline risk assessment***. USEPA's acceptable range for total receptor ILCR (from all chemicals and exposure pathways) is 1 in 10,000 (denoted as 10^{-4}) to 1 in 1,000,000 (denoted as 10^{-6}), as codified in the NCP, 40 Code of Federal Regulations (CFR) 300.430. Acceptable levels of noncancer hazard are defined by USEPA as a Hazard Index of 1 or less.

The human health risk assessment includes an analysis of cancer risks and noncancer hazards from exposure to chemicals in groundwater and indoor air for future on-site residents, current and future off-site residents, and future commercial/utility/excavation workers.

Groundwater

There are potentially complete exposure pathways for tap water use and vapor intrusion. Since the impacted groundwater at the Nevada site is in a poorly producing siltstone layer, it is unlikely to be used as a groundwater resource. Furthermore, the active water supply wells closest to the Nevada site are approximately one mile away and are more than 400 ft deep. The city of Nevada public water supply is serviced by 4 wells within the city, approximately 1.5 miles from the site (MDNR 2024).

Cancer risks and non-cancer hazards were calculated using the CTC and CF monitoring well data from Consultech (2021). The cancer risk and non-cancer hazard are greater than 10^{-4} and 1 if groundwater in MW-4 and MW-5 are used as tap water sources and are below these thresholds in the other monitoring wells. A 10^{-4} risk level corresponds to the upper end of USEPA's acceptable cancer risk range of 10^{-6} to 10^{-4}. A target hazard of 1 is generally used as a threshold for remedial action although a hazard of 3 is considered reasonable (USEPA 2024a).

Indoor Air

Vapor intrusion risk was evaluated by comparing measured groundwater concentrations against residential and commercial VISLs calculated for CTC and CF using the USEPA VISL calculator (USEPA 2024c). The screening levels were calculated using a target cancer risk of 10^{-5} and target hazard of 1, which are the same values used to derive Default Target Levels under Missouri's Risk-Based Corrective Action program (MDNR 2006). Figure 7 shows the monitoring wells where CTC and CF concentrations exceeded residential and commercial screening levels. Most of the locations with exceedances are greater than 100 ft from any existing building, except for MW-9. This location is within 50 ft of a building. It should be noted that the low-permeability siltstone and overlying clay at the site likely slows down the upward movement of CTC and CF and migration into indoor spaces.

Additionally, gas samples collected in February 2024 at the storage building near MW-9 indicated that CTC was detected in two sub-slab samples at concentrations less than the residential and commercial VISLs (15.6 and 68.1 µg/m^3, respectively) and CF was not detected in any of the sub-slab samples. Neither CTC nor CF concentrations have exceeded the commercial screening levels of 2.04 µg/m^3 and 0.533 µg/m^3, respectively, in indoor air samples. Indoor CTC and CF concentrations in general were similar to the ambient air sample (NEVADA-AA-01-0224, Table 4). Therefore, CTC and CF in indoor air appear to be related to ambient conditions rather than contaminant migration from groundwater.

Utility/excavation worker exposure to CTC and CF can occur through vapor intrusion into an excavation trench. Utility/excavation worker screening levels for CTC and CF were calculated using the Virginia Unified Risk Assessment Model, trench model (VDEQ 2022). The CTC and CF construction worker screening levels (2100 and 9600 µg/L, respectively) are significantly higher than measured concentrations in groundwater at the Nevada site. Therefore, there are no unacceptable cancer risks and non-cancer hazards from utility worker exposure to groundwater at the Nevada site.

REMEDIAL ACTION OBJECTIVES

RAOs specify the COPCs, media of interest, and exposure pathways. Typically, RAOs are developed based on the exposure pathways found to pose potentially unacceptable risks according to the results of the risk assessment and to satisfy ARARs. The following RAOs were developed for the Nevada site to mitigate future potential exposure risks to hypothetical residents:

- Mitigate the potential for exposure to contamination from potable use of groundwater containing CTC and CF above the groundwater remediation goals (RGs). RGs for this site are set at the MCLs as follows:
    - CTC 5 µg/L
    - CF 80 µg/L

- Mitigate the potential for exposure to indoor air containing CTC and CF at concentrations that would pose unacceptable risks or hazards to human health. Indoor air RGs for the site are set to the VISLs (target risk of 10^{-5}) as follows:
    - CTC 20.4 µg/m^3
    - CF 5.33 µg/m^3

SUMMARY OF ALTERNATIVES

Remedial alternatives were developed using the RAOs. Three alternatives were retained for detailed evaluation in the FS (USACE 2024). The alternatives, including major components and total cost, are described in the following subsections.

Alternative 1: No Action

The NCP requires Alternative 1, the No Action alternative, to establish a baseline set of conditions that other remedial actions may be compared. The total cost of the Alternative is $0.

Alternative 2: Long-Term Monitoring including vapor intrusion monitoring and installation of a vapor mitigation system (if required)

This alternative includes monitoring the migration and attenuation of the CTC/CF plume via LTM, vapor intrusion monitoring, and a vapor mitigation system, if required.

LTM will involve regular VOC sampling of monitoring wells at the Nevada site. In addition, field and water quality parameters (dissolved oxygen, oxidation-reduction potential, methane, anions, total and ferrous iron) would be collected to assess geochemical conditions for degradation. Two additional perimeter monitoring wells will be added to define the south/southwestern extent of the CTC plume. Some monitoring wells may be abandoned if needed during remedial design to finalize the monitoring well network. Abandonment is not included in the cost estimate and would be an additional expense. Five-Year Reviews of the remedial action will be conducted. This alternative will include a notice to the property owner regarding the contaminated groundwater and a recommendation to implement a groundwater use restriction as part of their property management plan. The area will also be periodically monitored by visual inspection and searching the MDNR well database to verify that no new wells have been installed near the contaminated plume.

LTM will also include vapor intrusion monitoring. Indoor air samples will be collected from the 3M storage building located near the CTC/CF plume (Figure 5). Samples will be collected twice in the first year to assess seasonal variation, then annually after that. If indoor air RGs are exceeded in two or more periods, a vapor mitigation system may be installed. During the Five-Year Reviews, the vapor intrusion monitoring frequency will be assessed and adjusted as required, based on previous data.

Monitoring will continue until RAOs are reached. Since there are no site-specific data that can be used to derive natural attenuation rates for CTC and CF, the remediation timeframe for Alternative 2 was assumed to be 30 years. The maximum concentration of CTC (42.6 µg/L) is within a factor of 10 of the groundwater RG (5 µg/L), while CF is above the groundwater RG (80 µg/L) at only one location (102 µg/L). Vapor intrusion monitoring will be proposed for termination when indoor air concentrations remain below indoor air RGs within a five-year monitoring period.

Alternative 3: In Situ Treatment with LTM including vapor intrusion monitoring and installation of a vapor mitigation system (if required)

Alternative 3 involves the implementation of either ***enhanced in situ bioremediation*** (EISB) or ***in situ chemical reduction*** (ISCR) in the contaminated siltstone aquifer at the Nevada site where CTC and CF concentrations are highest. The target treatment areas are shown in Figure 8. In situ treatment with EISB will involve the injection of slow-release substrates such as HRC® and 3-DMicroemulsion that have been demonstrated to successfully degrade CTC in full-scale tests (Regenesis 2023a, 2023b). In situ treatment via ISCR will involve the injection of slow-release substrates combined with ZVI such as EHC®, which was used previously at other former grain silo sites (Alvarado et al 2010, ANL 2016, Consultech 2021). It should be noted that adequate dispersal of injected substrates may be difficult but possible to achieve in the low-permeability siltstone at the Nevada site. The injection of ISCR amendments may be more challenging when compared to EISB because ISCR amendments include micron-sized ZVI particles. If adequate substrate dispersal is achieved, either EISB or ISCR would accelerate the reductive dechlorination of CTC and CF at the Nevada site.

Following injections, contaminant concentrations will be monitored for reduction of CTC and CF. Priority metals will also be measured since metals can potentially be mobilized due to changes in groundwater chemistry induced by ISCR and EISB. Performance monitoring will be used to evaluate the effects of the in-situ treatment on groundwater concentrations of CTC, CF, and other degradation products such as methylene chloride. For estimating costs, a remediation timeframe of 10 years was assumed.

Under this alternative, two additional wells will be added to better define the south/southwestern extent of the CTC plume. The new wells and the current monitoring well(s) will be used to monitor treatment performance. Five-Year Reviews of the remedial action will be conducted. This alternative will include a notice to the property owner(s) regarding the contaminated groundwater. The area will also be periodically monitored both visually and by reviewing the MDNR well database to verify that no new wells have

been installed near the CTC plume. The same vapor intrusion monitoring plan as Alternative 2 will be implemented.

EVALUATION OF ALTERNATIVES

Alternatives were evaluated using NCP evaluation criteria (shown in the "NCP Evaluation Criteria" text box). The first two criteria are the minimum requirements that must be met. The remaining balancing criteria provide additional means of evaluating alternatives.

In the following subsections the comparison of alternatives is summarized using seven of the nine criteria. The last two criteria, state agency acceptance and community acceptance, are best evaluated after comments are received from the community regarding this PP. Additional information about the detailed analysis of alternatives is provided in the FS report (USACE 2024).

1) Overall Protection of Human Health and the Environment
   a) Alternative 1 does not meet this criterion.
   b) Alternative 2 meets this criterion. This alternative monitors the CTC/CF concentration at the site for changes. The alternative also includes periodic visual inspection and search of the MDNR well database to verify that no new wells have been installed near the plume.
   c) Alternative 3 meets this criterion. This alternative may reduce the concentration of CTC/CF at the locations where they were highest.
2) Compliance with ARARs as detailed in the FS report (USACE 2024)
   a) Alternative 1 does not meet this criterion.
   b) Alternative 2 meets this criterion and complies with ARARs. Groundwater monitoring results will determine if ARARs (MCLs) are being met. Vapor intrusion monitoring will determine if indoor air concentrations remain at or below VISLs.
   c) Alternative 3 meets this criterion and complies with ARARs. Groundwater treatment followed by monitoring will continue to determine if ARARs (MCLs) are being met. Vapor intrusion monitoring will determine if indoor air concentrations remain at or below VISLs.
3) Short-Term Effectiveness
   a) This criterion is not relevant for Alternative 1.
   b) Alternative 2 meets this criterion. Adverse effects and risks to human health during the remedial phase are low.
   c) Alternative 3 meets this criterion. During the implementation of in situ treatment and groundwater sampling, temporary measures will be applied to protect the community, worker health, and environment.
4) Long-Term Effectiveness and Permanence
   a) This criterion is not relevant for Alternative 1.
   b) Alternative 2 meets this criterion by monitoring natural degradation of contamination to ensure potential receptors are not being affected.
   c) Alternative 3 meets this criterion by using active treatment. The in situ remediation technology can result in contaminant degradation and mass reduction, and the continued monitoring activities would ensure that potential receptors are not being affected. However,

NCP Evaluation Criteria

1. Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled.
2. Compliance with ARARs addresses whether or not a remedy will meet all applicable federal and state environmental laws and/or provide grounds for a waiver.
3. Short-Term Effectiveness addresses the period of time needed to complete the remedy and any adverse effects to human health and the environment that may be caused during the construction and implementation of the remedy.
4. Long-Term Effectiveness and Permanence refers to the ability of a remedy to provide reliable protection of human health and the environment over time.
5. Reduction of Toxicity, Mobility, or Volume Through Treatment refers to the preference for a remedy that reduces health hazards, the movement of contaminants, or the quantity of contaminants at the site through treatment.
6. Implementability refers to the technical and administrative feasibility of the remedy, including the availability of materials; services needed to carry out the remedy; and coordination of federal, state, and local governments to work together to clean up the site.
7. Cost evaluates the estimated ***capital costs*** and ***operation and maintenance costs*** of each alternative in comparison to other equally protective measures.
8. State agency acceptance indicates whether the state agrees with, opposes, or has no comment on the preferred alternative. Final acceptance by MDNR of the preferred alternative will be evaluated after the public comment period ends and will be described in the DD for this action.
9. Community acceptance includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the DD for this action.

contaminated groundwater at the Nevada site exists in a low-permeability siltstone. In-situ treatments are more suitable for sites with a homogeneous, permeable aquifer. Therefore, reagent delivery may be challenging, imparting uncertainties to the effectiveness of Alternative 3 at reducing CTC and CF concentrations in site groundwater.

5) Reduction of Mobility, Volume, Toxicity Through Treatment
   a) This criterion is not relevant for Alternative 1.
   b) Alternative 2 does not meet this criterion. Alternative 2 does not provide active treatment; however, Alternative 2 would determine whether conditions are favorable for natural degradation processes to reduce the toxicity and mobility of the contaminants, or volume of groundwater contamination. The contaminant concentration is expected to decrease over time due to physical non-destructive means such as dispersion and dilution of contamination in the aquifer.
   c) Alternative 3 meets this criterion. However, Alternative 3 depends on the ability to deliver treatment reagents into the subsurface. This alternative uses an injection strategy that may not optimally distribute the injected amendment.
6) Implementability
   a) This criterion is not relevant for Alternative 1.
   b) Alternative 2 meets this criterion. Alternative 2 can be easily implemented since there is already an existing monitoring well network.
   c) Alternative 3 meets this criterion. Alternative 3 can be implemented by direct injection using drilling equipment that can drill through siltstone.
7) Cost
   a) This criterion is not relevant for Alternative 1.
   b) Alternative 2 has a total estimated cost of $910,900 for sampling, analysis, and reporting of the groundwater conditions for 30 years. The cost also includes installing two additional monitoring wells, monitoring vapor intrusion, and installing a vapor mitigation system at the 3M storage building. The present value cost for Alternative 2 was calculated at $876,000, using a 0.5% discount factor (OMB 2023).
   c) Alternative 3 has a total cost of $2,256,200, assuming a 10-year period to reach RGs. The present value cost is estimated to be $2,244,400, assuming a 2% discount factor (OMB 2023). The cost estimates include implementation of in situ treatment, performance monitoring, repeating treatment (if needed), MNA monitoring, off-site gas mitigation, annual and Five-Year Reviews reporting for the next 10 years following the initial treatment. Given the limited groundwater data post-ISCR, the time period for remediation has uncertainty. The cost also includes the additional monitoring well installation, vapor mitigation system installation, and vapor intrusion monitoring.

PREFERRED ALTERNATIVE

Based on the site characterization and remediation activities (Consultech 2021), FS (USACE 2024) and a review of available data, USDA recommends that Alternative 2 be the preferred alternative. This involves LTM to monitor concentrations of CTC and CF at the site. Additional monitoring wells may be added to the existing network to ensure that there is no further expansion of the CTC plume to the south/southwest. Some monitoring wells may be abandoned during remedial design to finalize the monitoring well network. Vapor intrusion monitoring will also be performed twice in the first year, then annually.

The alternative includes a notice to the property owner regarding the contaminated groundwater and a recommendation to implement a groundwater use restriction as part of their property management plan.

Alternative 2 is protective of human health, effective in both the short- and long-term, a permanent solution, easily implementable, and has a lower cost than Alternative 3. Alternative 2 does not meet the preference for treatment; however, it was selected over Alternative 3 because of uncertainties in successfully implementing active treatment in the low-permeability siltstone at the Nevada site.

USDA is the lead federal agency, and MDNR is the lead regulatory agency. Based on the information currently available, Alternative 2 meets the threshold criteria and provides the best balance or tradeoffs of all alternatives with respect to the balancing and modifying criteria without potentially detrimental impacts on the environment. USACE and USDA expect the preferred alternative to satisfy the statutory requirements of CERCLA S 121(b):

1) Be protective of human health and the environment.
2) Comply with ARARs (or justify a waiver).
3) Be cost-effective.
4) Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
5) Satisfy the preference for treatment as a principle element or explain why the preference for treatment will not be met.

COMMUNITY PARTICIPATION

Written comments on this PP may be sent to Jacob Allen no later than 30 days from the PP announcement. After public comments are received, USACE and USDA, in consultation with MDNR, will develop a responsiveness summary and make its final remedy selection. The responsiveness summary and decision will be published in a DD.

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

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KEY SUPPORTING DOCUMENTS

Alvarado, J., Rose, C. and LaFrenier, L. 2010. Degradation of carbon tetrachloride in the presence of zero valent iron, Journal of Environmental Monitoring, 12, 1524-1530.

American Cancer Society 2024. Lifetime Risk of Developing or Dying from Cancer. Accessed June 13, 2024 at https://www.cancer.org/cancer/risk-prevention/understanding-cancer-risk/lifetime-probability-of-developing-or-dying-from-cancer.html

Argonne National Laboratory (ANL), 2016. Phase II Investigation at the Former CCC/USDA Grain Storage Facility in Montgomery City, Missouri, ANL/EVS/AGEM/TR-16-03, March.

Consultech ERC JV, LLC (Consultech). 2021. Initial Site Characterization Report, Former CCC/USDA Grain Storage Facility, 2120 East Austin Boulevard, Nevada, Vernon County, Missouri, October.

Missouri Department of Natural Resources (MDNR) 2006. Missouri Risk-Based Corrective Action Technical Guidance: Section 5 – Initial Site Characterization and Comparison with Default Target Levels and Water Quality Criteria. April.

Missouri Department of Natural Resources (MDNR) 2024. 2023 Annual Water Quality Report, Nevada PWS. April. Accessed at https://dnr.mo.gov/ccr/MO5010562.pdf

Office of Management and Budget (OMB) 2022. Discount Rates for Cost-Effectiveness, Lease Purchase, and Related Analyses. OMB Circular No. A-94, Appendix C, March.

Regenesis. 2023a. Successful Bioremediation at a Former Air Force Base Fire Training Area. Accessed online February 1, 2023, https://regenesis.com/en/project/successful-bioremediation-former-air-force-base-fire-training-area-2/

Regenesis. 2023b. DOD Treatability Study Documents Successful Carbon Tetrachloride Remediation using HRC®. Accessed online February 1, 2023, https://regenesis.com/en/project/dod-treatability-study-documents-successful-carbon-tetrachloride-remediation-using-hrc/

USACE (U.S. Army Corps of Engineers) 2024. *Final Feasibility Study Report, Former CCC/USDA Grain Storage Facility, Nevada, Missouri.* December.

USEPA (U.S. Environmental Protection Agency) 2024a. Regional Removal Management Levels User's Guide. November.

USEPA (U.S. Environmental Protection Agency) 2024b. Regional Screening Levels (RSLs) – Tables as of November 2024.

USEPA (U.S. Environmental Protection Agency) 2024c. Vapor Intrusion Screening Level Calculator. Accessed online December 2024, https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator

VDEQ (Virginia Department of Environmental Quality) 2022. Virginia Unified Risk Assessment Model-VURAM User's Guide for Risk Assessors.

ACRONYMS

amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
CCC	Commodity Credit Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CF	chloroform
COPC	contaminant of potential concern
CTC	carbon tetrachloride
DD	Decision Document
FS	Feasibility Study
ft	feet
ILCR	Incremental Lifetime Cancer Risk
ISCR	in situ chemical reduction
J	Appears following a number, it signifies that the number is an estimated value
LTM	Long-Term Monitoring
MCL	Maximum Contaminant Level
MDNR	Missouri Department of Natural Resources
MiHPT	membrane interface hydraulic profiling tool
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PP	Proposed Plan
RAO	Remedial Action Objective
RG	remediation goal
RSL	Regional Screening Level
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
VISL	Vapor Intrusion Screening Level
VOC	volatile organic compound
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter

GLOSSARY

Administrative Record: The body of documents USACE/USDA uses to form the basis for selection of a response.

applicable or relevant and appropriate requirements (ARARs): Federal and state requirements for cleanup, control, and environmental protection that a selected remedy for a site will meet.

baseline risk assessment: A baseline risk assessment is conducted to determine the current and future effects of contaminants on human health and the environment.

capital costs: Expenses related to the labor, equipment, and material costs of construction.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA): CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party can be identified.

Decision Document (DD): The Decision Document presents the remedy selection decision and remedial action plan. It describes the technical parameters of the remedy, methods selected to protect human health and the environment, Institutional Controls, and cleanup levels.

Enhanced in situ bioremediation (EISB): involves the delivery of substrates such as sodium lactate and emulsified vegetable oil to the subsurface to promote biodegradation of contaminants.

Feasibility Study (FS): Identifies and evaluates the most appropriate technical approaches to address contamination problems at a CERCLA site.

Hazard Index: The sum of hazard quotients for chemicals that affect the same target organ or organ system. Because different chemicals can cause similar adverse health effects, combining hazard quotients from different chemicals is often appropriate. A hazard index of 1 or lower means chemicals are unlikely to cause adverse noncancer health effects over a lifetime of exposure. However, an HI greater than 1 doesn't necessarily mean adverse effects will occur from exposure, it merely indicates that site-related exposures may present a hazard to human health.

Hazard Quotient: The ratio of the potential exposure to a substance and the level at which no adverse effects are expected (calculated as the exposure divided by the appropriate chronic or acute value). A hazard quotient of 1 or lower means adverse noncancer effects are unlikely, and thus can be considered to have negligible hazard.

In situ chemical reduction (ISCR): Injection of a chemical reductant into the subsurface to contact and chemically convert contamination to nonhazardous or less toxic compounds that are more stable, less mobile, or inert.

Incremental Lifetime Cancer Risk (ILCR): The incremental probability of an individual developing cancer over a lifetime as a result of site-related exposure to potential carcinogens.

Long-Term Monitoring (LTM): The process of observing concentrations of contaminants over an extended period of time.

Maximum Contaminant Levels (MCLs): The highest level of a contaminant that is allowed in drinking water.

membrane interface hydraulic profiling tool (MiHPT): A probe system used during subsurface investigations with an electron capture detector, a photoionization detector, a flame ionization detector, and a halogen-specific detector. Detector responses are a semi-qualitative indication of volatile organic compound concentrations.

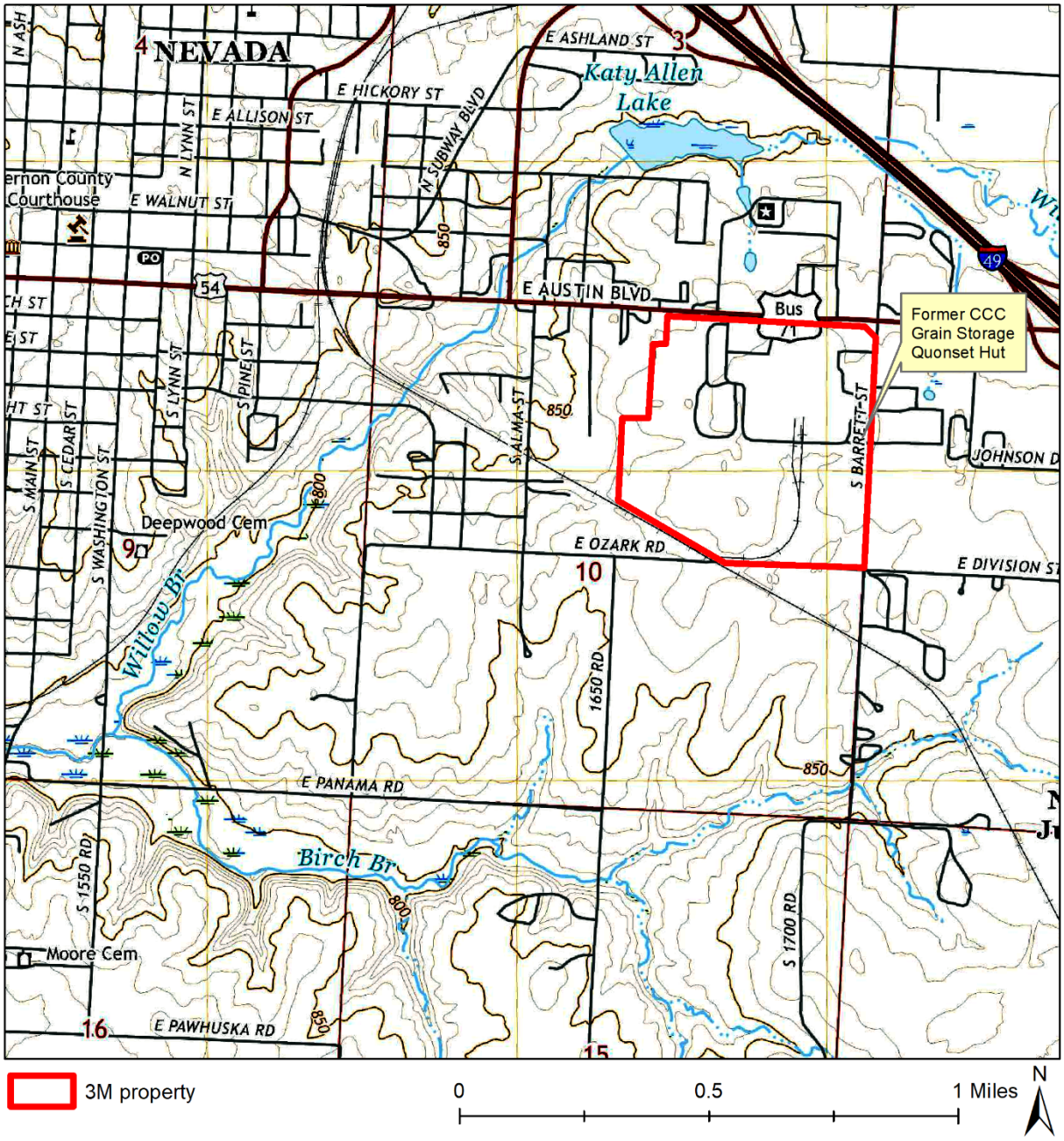
National Oil and Hazardous Substances Pollution Contingency Plan (NCP): USEPA's regulations governing all cleanups under the Superfund program.

operation and maintenance cost: The cost and timeframe of operating labor, maintenance, materials, energy, disposal, and administrative components of the remedy.

Proposed Plan (PP): A document that summarizes cleanup alternatives studied in the Feasibility Study and highlights the recommended cleanup method.

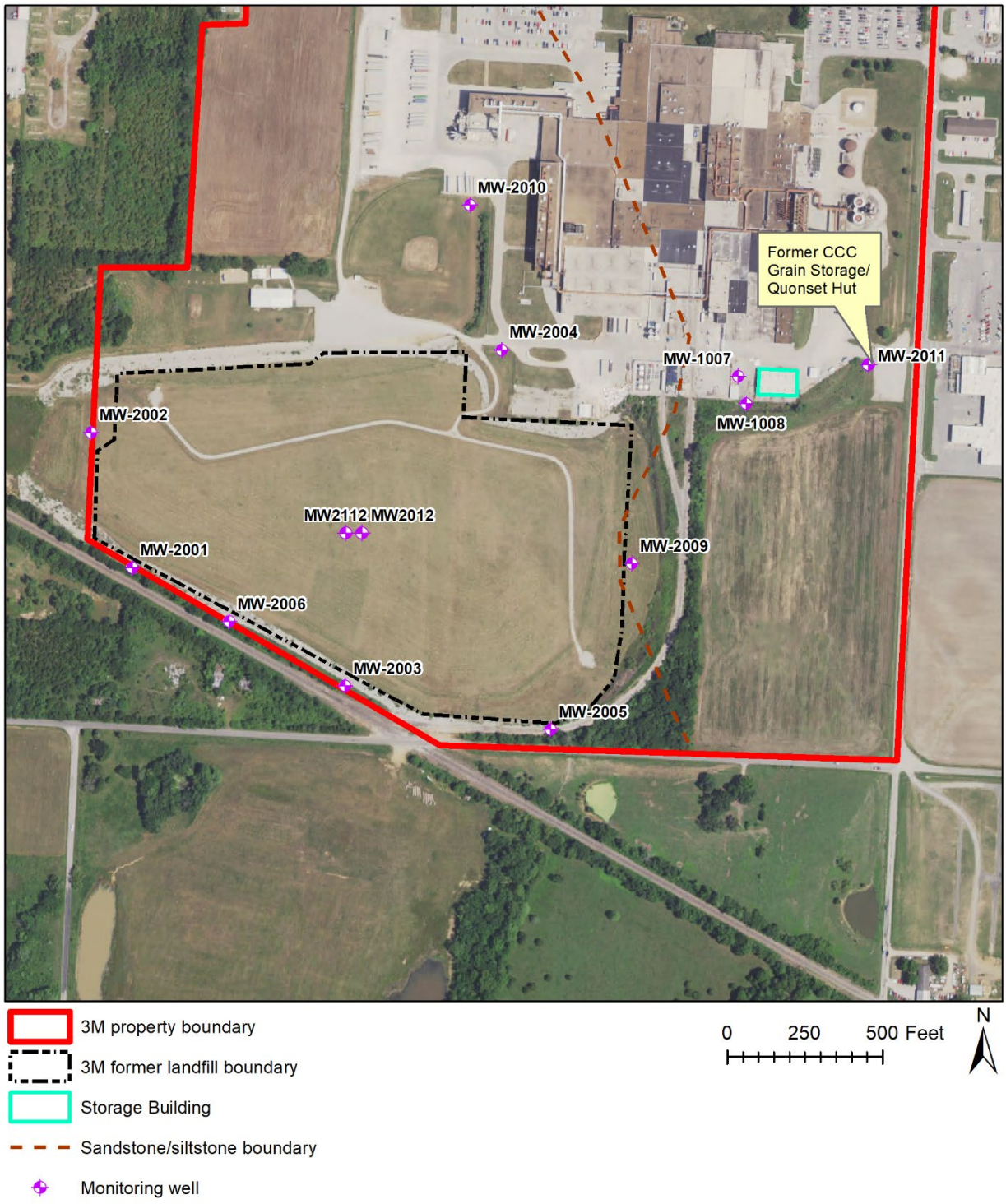
Remedial Action Objective (RAO): A specific goal to be achieved by the selected remedy.

Screening Level: A concentration of a chemical of potential concern, at which potential human health risks could occur if exposed.



Note: Base map: U.S. Geological Survey topographic map, Nevada Quadrangle, 2021.

Figure 1. Site location map

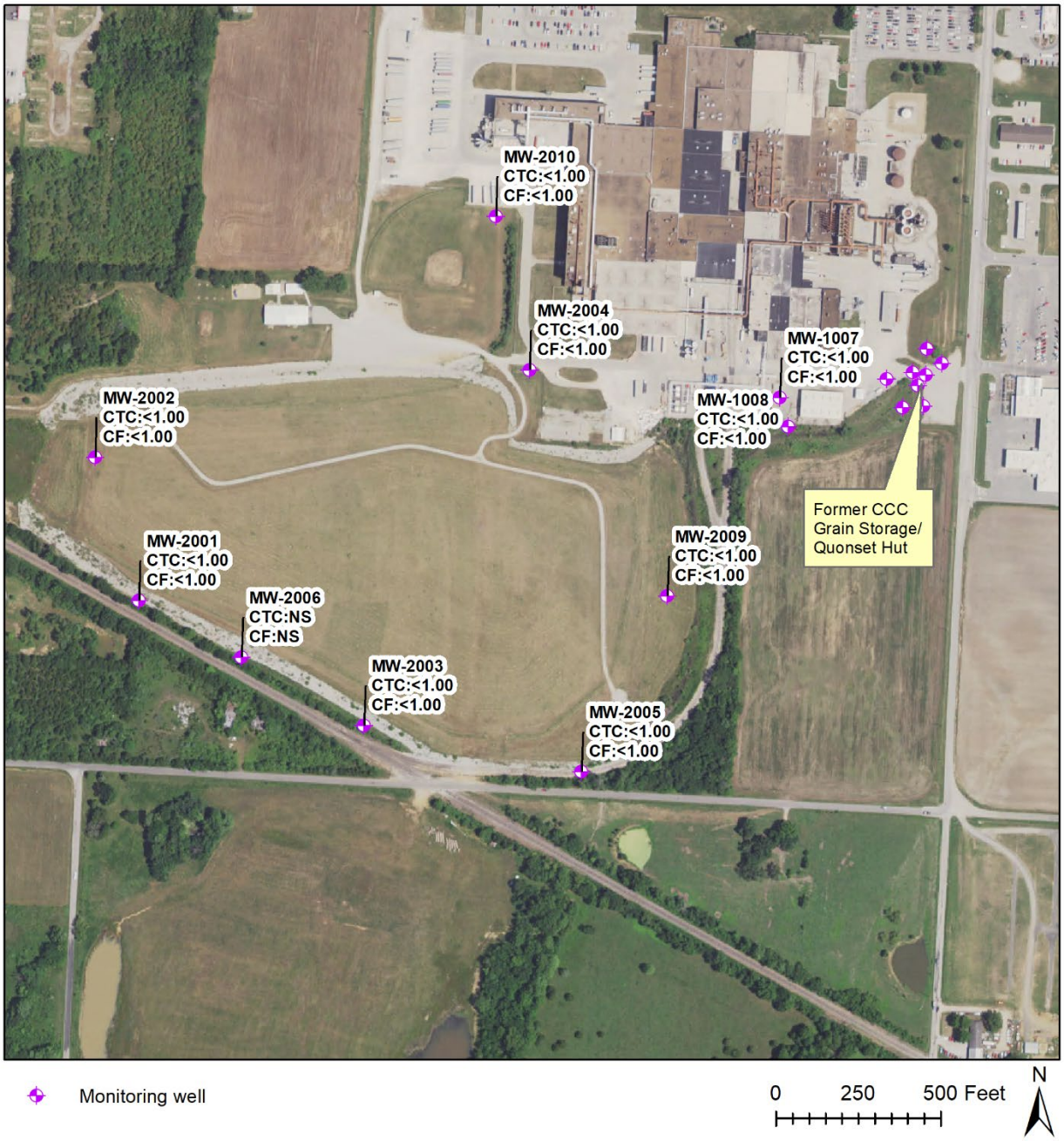


Notes:
1. Base map: National Agricultural Imagery Program, 2020.
2. Monitoring wells shown were installed by 3M prior to the Consultech (2021) investigation. The map only shows a subsect of the monitoring wells installed by 3M.

Figure 2. 3M site layout

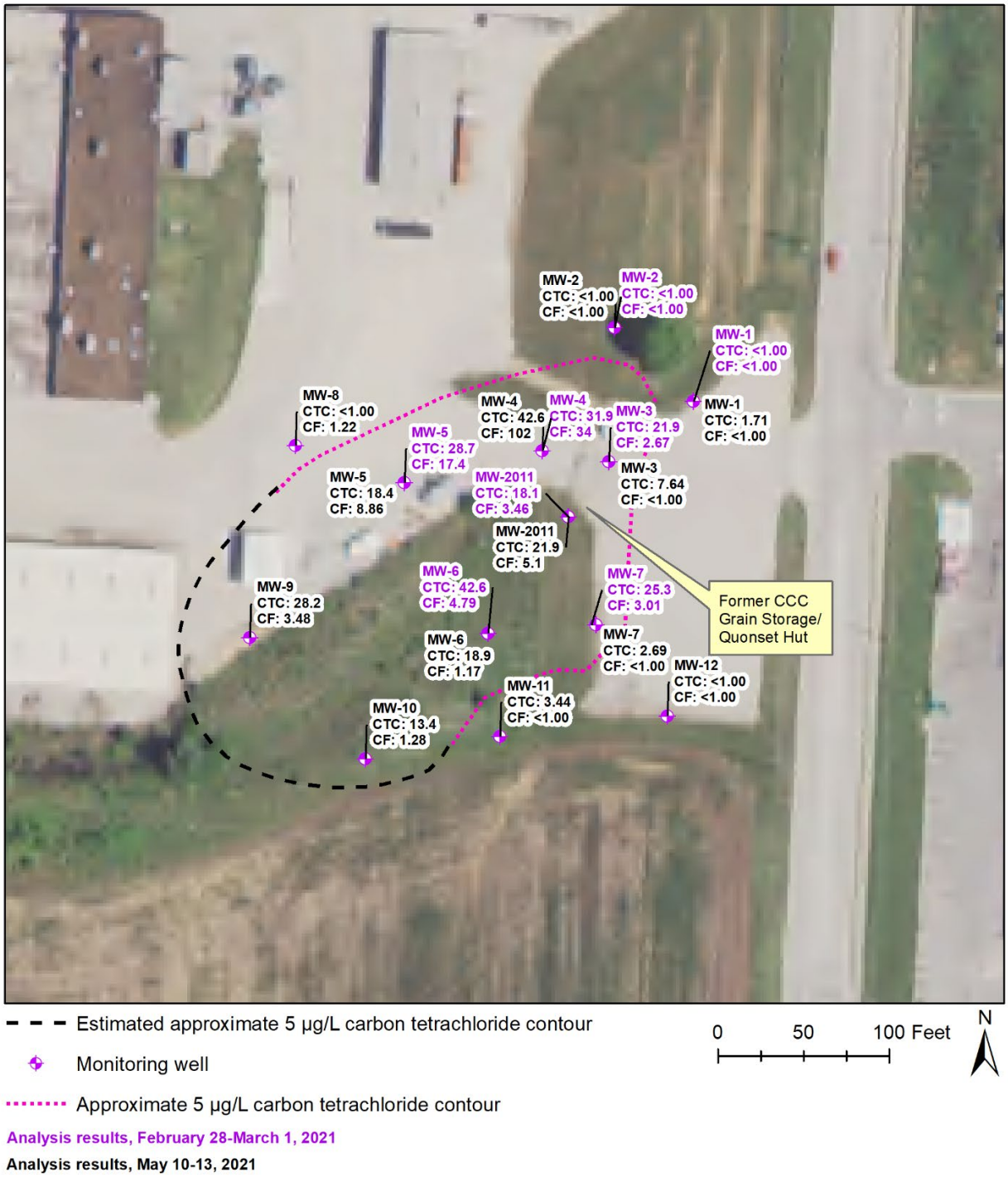
Notes:
1. Base map: National Agricultural Imagery Program, 2020.
2. Temporary wells (TW) were installed in boreholes that were completed as MW-7 and MW-3.
MiHPT: membrane interface hydraulic profiling tool

Figure 3. Locations for use of membrane interface hydraulic profiling tool (MIP-1 to MIP-13) and for monitoring wells (MW-1 to MW-12, and MW-2011)



Notes:
1. CTC: Carbon tetrachloride, CF: Chloroform; NS: Not sampled.
2. Base map: National Agricultural Imagery Program, 2020.
3. No volatile organic compounds were detected in these monitoring wells.

Figure 4. Monitoring wells owned by 3M located west of the Nevada site sampled in February 28-March 1, 2021



Notes:
1. CTC: Carbon tetrachloride, CF: Chloroform.
2. Base map: National Agricultural Imagery Program, 2020.
3. MW-8 through MW-13 were installed and sampled in May 2021.
4. The southwest boundary of the plume is estimated. Further delineation is required to determine the boundary.

Figure 5. Monitoring wells in the vicinity of the former Quonset hut showing carbon tetrachloride and chloroform analytical results from February 28-March 1, 2021 and May 10-13, 2021

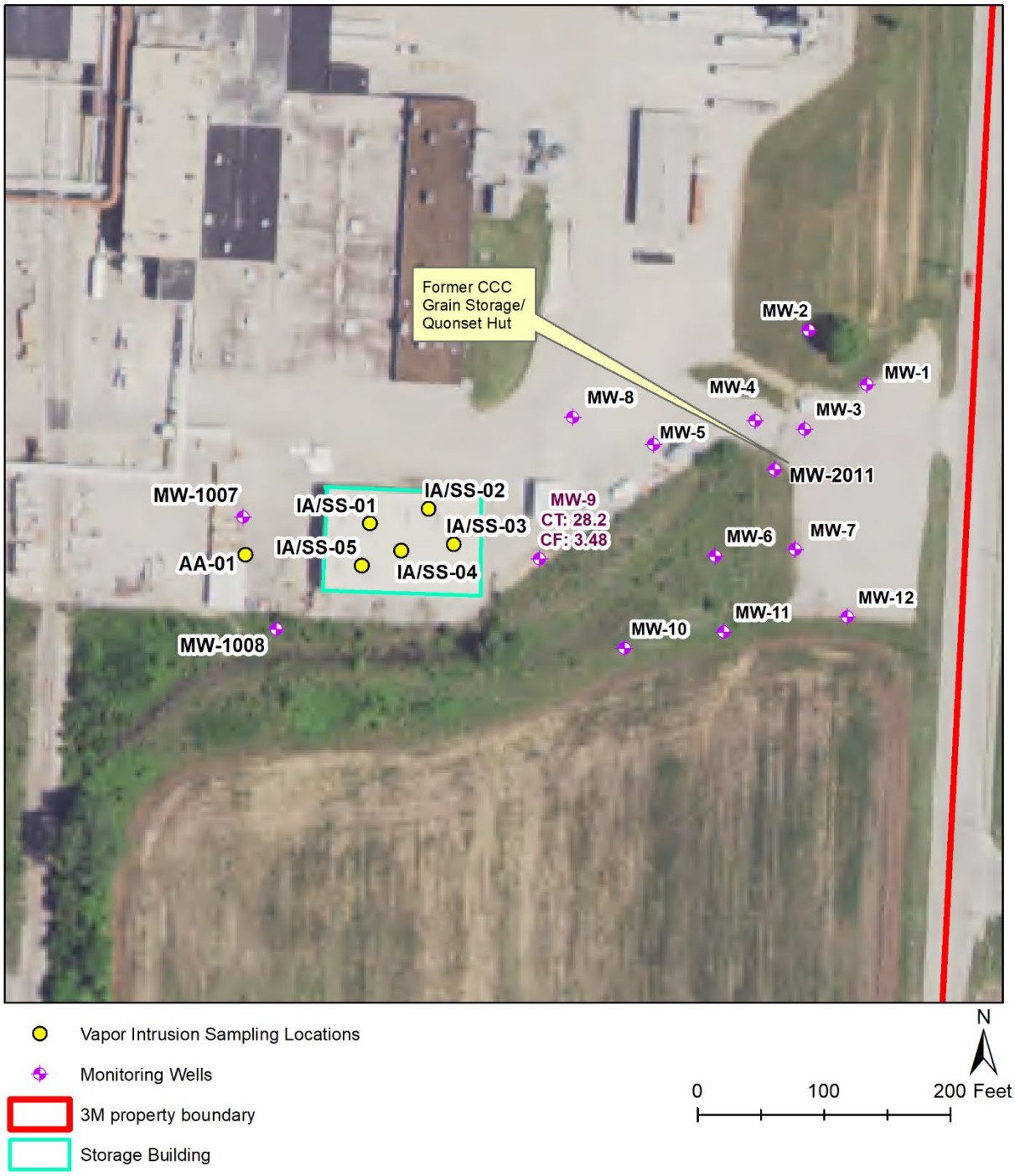
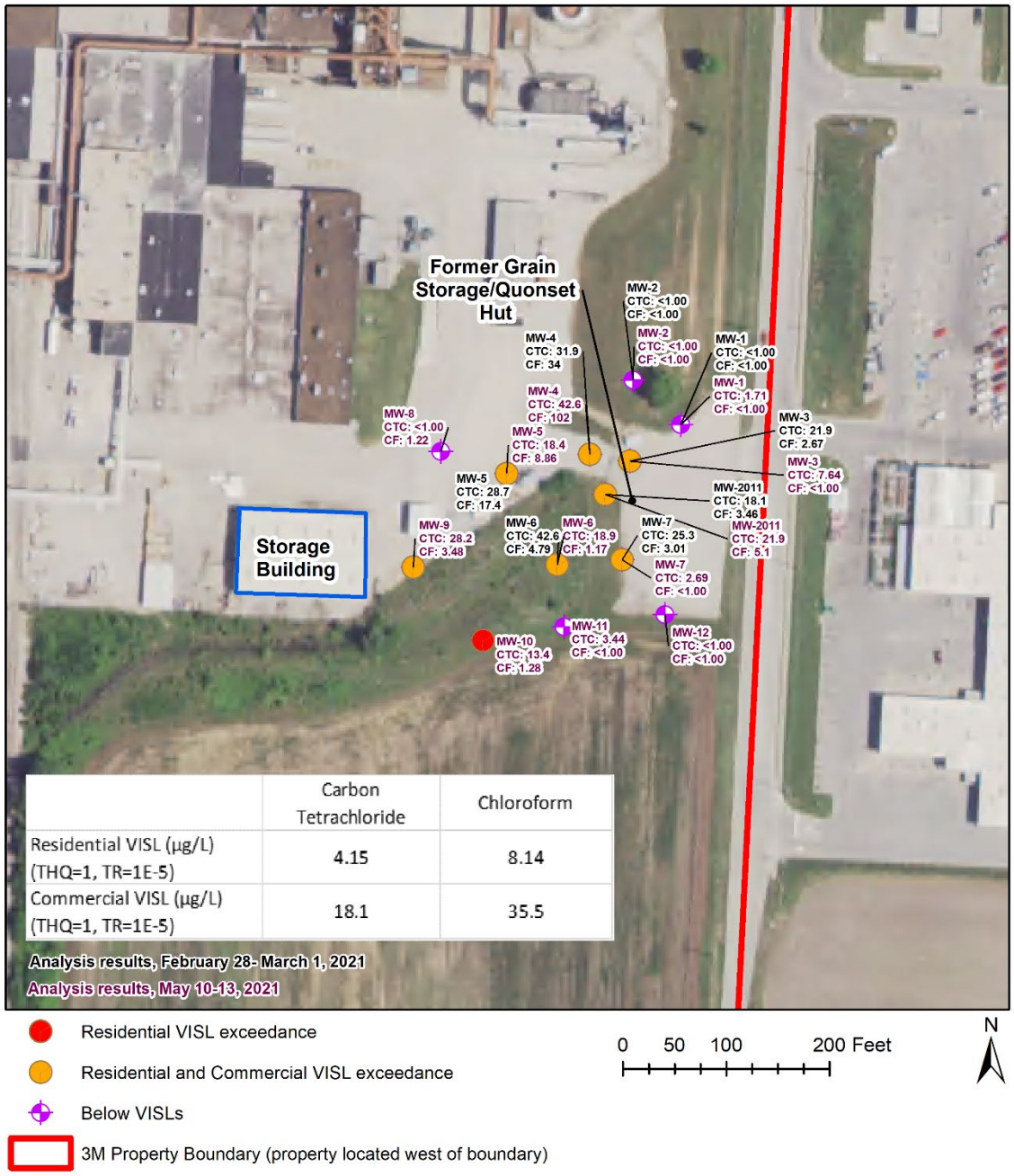
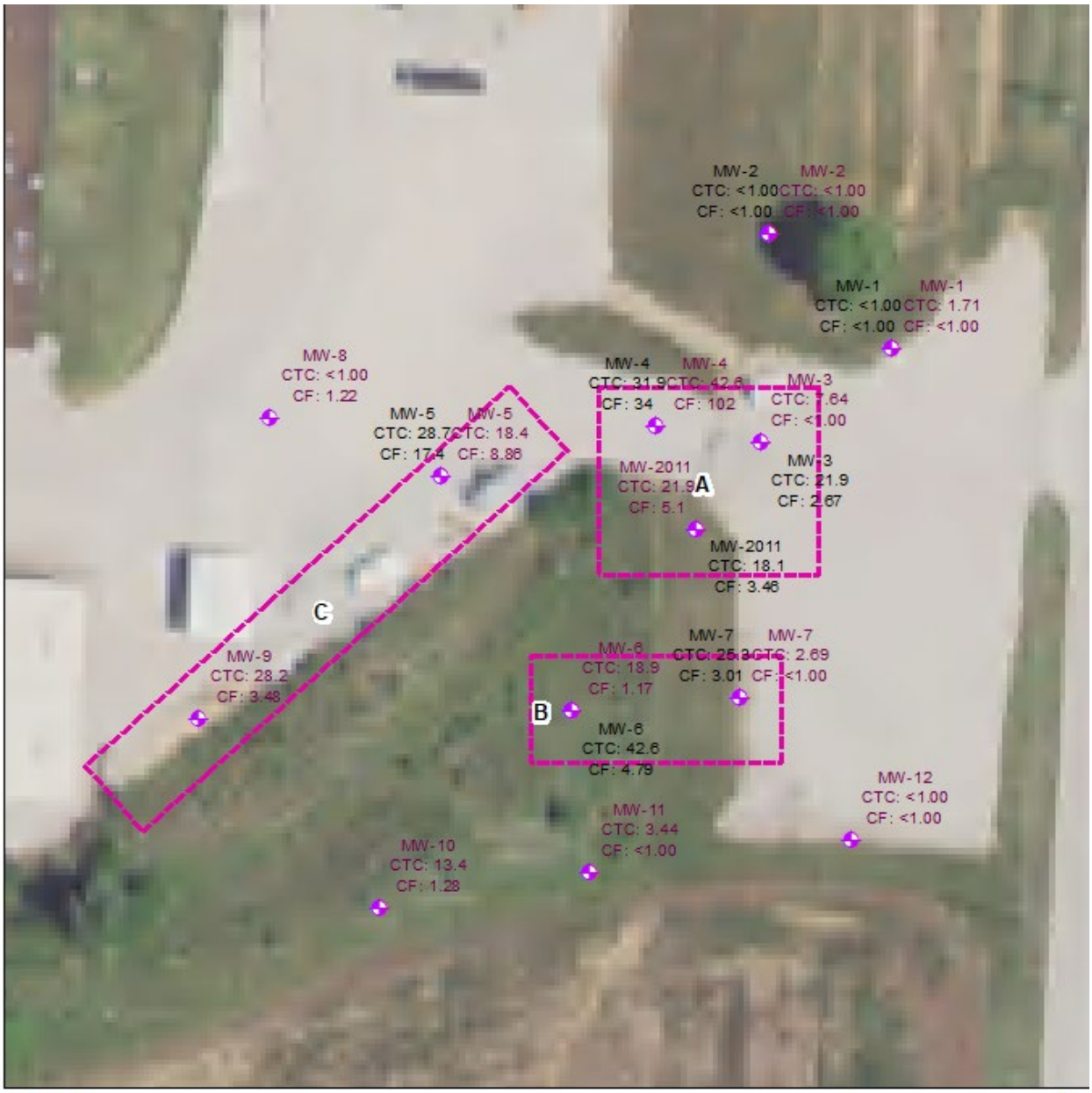


Figure 6. Locations of vapor intrusion samples collected in February 2024



Notes:
1. CTC: Carbon tetrachloride; CF: Chloroform.
2. THQ = target hazard quotient; TR = Target risk (cancer).

Figure 7. Monitoring well locations with residential and commercial vapor intrusion screening level (VISL) exceedances



Analysis results, February 28-March 1, 2021

Analysis results, May 10-13, 2021

Note:

1. Base map: National Agricultural Imagery Program, 2020.
2. CTC: Carbon tetrachloride; CF: Chloroform.
3. Treatment zones are labeled A, B, and C

Figure 8. Target treatment areas for Alternative 3

Table 1. Membrane interface probe and laboratory soil sample analysis results

						Analyte	Carbon Tetrachloride	Chloroform
						USEPA Protection of Groundwater Soil Screening Level [1] (mg/kg)	0.0019	0.022
Boring ID	Sample Date	Depth of Soil Sample (feet)	Maximum ECD Response (µV)	Maximum XSD Response (µV)	Maximum PID Response (µV)	Maximum FID Response (µV)	Analysis Result (mg/kg)	Analysis Result (mg/kg)
MIP-1	2/22/2021	5-7	1.6	0.9	1.25	1.3	<0.0150	<0.0100
MIP-2	2/22/2021	5-7	0.75	0.6	1.5	1.1	<0.0150	<0.0100
MIP-3	2/23/2021	9-11	1.4	1.5	1.1	1.25	<0.0150	<0.0100
MIP-3	2/26/2021	12.35	2.5	2.5	0.35	1.0	**0.142**	<0.0100
MIP-4	2/23/2021	6-8	5.2	5	1.2	1.5	<0.0150	<0.0100
MIP-5	2/23/2021	1-3	1.4	0.8	0.7	0.85	<0.0150	<0.0100
MIP-6	2/23/2021	8-10	0.65	1.1	1.6	1.25	<0.0150	<0.0100
MIP-7	2/23/2021	0-5	4.1	0.6	1.8	1.6	<0.0150	<0.0100
MIP-8	2/24/2021	5-7	0.8	0.7	0.9	1.3	<0.0150	<0.0100
MIP-9	2/24/2021	1.8	1.6	0.5	0.5	0.4	<0.0150	<0.0100
MIP-10	2/24/2021	5-6	1	0.7	0.6	0.6	<0.0150	<0.0100
MIP-11	2/24/2021	0-2	1.75	0.75	0.8	0.85	<0.0150	<0.0100
MIP-12	2/24/2021	3-7	0.65	0.7	1.25	1.5	<0.0150	<0.0100
MIP-13	2/25/2021	0-3	1.65	0.45	0.5	0.6	<0.0150	<0.0100

[1] USEPA Regional Screening Levels, November 2024 (USEPA 2024b).

Data from Consultech (2021).

ECD: electron capture detector; FID: flame ionization detector; mg/kg: milligrams per kilogram; PID: photoionization detector; USEPA: U.S. Environmental Protection Agency; XSD: halide specific detector; µV: microvolts.

MIP: membrane interface probe, also referred to as the membrane interface hydraulic profiling tool (MiHPT).

Highlighted result exceeded the USEPA protection of groundwater soil screening level.

Table 2. Analytical results for carbon tetrachloride and chloroform in groundwater grab samples from selected MIP boreholes and temporary wells

	Analyte	Carbon Tetrachloride	Chloroform
USEPA Maximum Contaminant Level (µg/L)		5	80
Location ID	**Sample Date**		
MIP-1	2/24/2021	**14.5**	**29.6**
MIP-3	2/23/2021	<1.0	<1.0
TW-3	2/25/2021	<1.0	<1.0
TW-7	2/25/2021	**1.92**	**1.41**

Data from Consultech (2021).
USEPA: U.S. Environmental Protection Agency; µg/L: micrograms per liter.
Bold font: detections.
Highlighted result: concentration greater than USEPA Maximum Contaminant Level (USEPA 2024b).

Table 3. Analytical results for carbon tetrachloride and chloroform in groundwater samples from monitoring wells

		Carbon Tetrachloride	Chloroform
USEPA Maximum Contaminant Level (µg/L)		5	80
Monitoring Well ID	**Collection Date**		
MW-1	3/1/2021	<1.00	<1.00
	5/11/2021	**1.71**	<1.00
MW-2	3/1/2021	<1.00	<1.00
	5/11/2021	<1.00	<1.00
MW-3	3/1/2021	**21.9**	**2.67**
	5/11/2021	**7.64**	<1.00
MW-4	2/28/2021	**31.9**	**34**
	5/11/2021	**42.6**	**102**
MW-5	2/28/2021	**28.7**	**17.4**
	5/11/2021	**18.4**	**8.86**
MW-6	3/1/2021	**42.6**	**4.79**
	5/10/2021	**18.9**	**1.17**
MW-7	3/1/2021	**25.3**	**3.01**
	5/10/2021	**2.69**	<1.00
MW-2011	2/27/2021	**18.1**	**3.46**
	5/10/2021	**21.9**	**5.1**
MW-8	5/12/2021	<1.00	**1.22**
MW-9	5/12/2021	**28.2**	**3.48**
MW-10	5/13/2021	**13.4**	**1.28**
MW-11	5/13/2021	**3.44**	<1.00
MW-12	5/12/2021	<1.00	<1.00
MW-1007	2/27/2021	<1.00	<1.00
MW-1008	2/27/2021	<1.00	<1.00
MW-2001	2/28/2021	<1.00	<1.00
MW-2002	2/28/2021	<1.00	<1.00
MW-2003	2/28/2021	<1.00	<1.00
MW-2004	2/27/2021	<1.00	<1.00
MW-2005	2/28/2021	<1.00	<1.00
MW-2009	2/28/2021	<1.00	<1.00
MW-2010	2/27/2021	<1.00	<1.00

Data from Consultech (2021).
USEPA: U.S. Environmental Protection Agency; µg/L: microgram per liter.
Bold font: detections.
Highlighted result: concentration greater than the USEPA Maximum Contaminant Level.

Table 4. Analytical results for carbon tetrachloride and chloroform in sub-slab soil gas, indoor air, and ambient air samples collected in February 2024

Sub-Slab Samples	Carbon Tetrachloride	Chloroform
USEPA Residential VISL (µg/m³)[1]	15.6	4.07
USEPA Commercial VISL (µg/m³)[1]	68.1	17.8
NEVADA-SS-01-0224	**0.36 J**	0.60 U
NEVADA-SS-02-0224	0.58 U	0.62 U
NEVADA-SS-03-0224	0.59 U	0.63 U
NEVADA-SS-QC-0224	0.56 U	0.60 U
NEVADA-SS-04-0224	0.59 U	0.63 U
NEVADA-SS-05-0224	**0.32 J**	0.60 U
Indoor/Ambient Air Samples		
USEPA Residential VISL (µg/m³)[1]	0.468	0.122
USEPA Commercial VISL (µg/m³)[1]	2.04	0.533
NEVADA-IA-01-0224	**0.46**	**0.075 J**
NEVADA-IA-02-0224	***0.53***	**0.085 J**
NEVADA-IA-03-0224	**0.42**	**0.076 J**
NEVADA-IA-QC-0224	***0.47***	**0.072 J**
NEVADA-IA-04-0224	**0.43**	**0.07 J**
NEVADA-IA-05-0224	**0.45**	**0.073 J**
NEVADA-AA-01-0224	**0.46**	**0.074 J**

USEPA: U.S. Environmental Protection Agency; VISL: vapor intrusion screening level, µg/m³: micrograms per cubic meter.

[1] USEPA VISL calculator, target risk: $1x10^{-6}$, target hazard quotient: 0.1.

Bold font: detections.

Bold, underlined, italicized font: result exceeds the USEPA Residential VISL.

COMMENT SHEET – Proposed Plan for the Nevada Site
(Former CCC Grain Storage Facility)

Use this space to write your comments, or to be added to the mailing list.

USDA encourages written comments on the Nevada site (former CCC Grain Storage Facility) Proposed Plan. Use the form below to send written comments. If you have questions about how to comment, please contact Mr. Jacob Allen at 816-389-3654 or email at Jacob.T.Allen@usace.army.mil.

This form is provided for your convenience. Please mail this form or additional sheets of written comments, **postmarked no later than July 11, 2025**, to the following address:

Mr. Jacob Allen
U. S. Army Corps of Engineers
601 E. 12th Street
Kansas City, Missouri 64106

Comment submitted by:

Address: