PROPOSED PLAN

OPERABLE UNIT NUMBER 3 (OU-3) REGIONAL GROUNDWATER

ENVIRONMENTAL RESTORATION PROGRAM MOUNTAIN HOME AIR FORCE BASE, IDAHO

INTRODUCTION

Mountain Home Air Force Base (MHAFB) is seeking public comment on this Proposed Plan for Operable Unit Number 3 (OU-3). The United States Air Force (Air Force) is the lead agency, while the United States Environmental Protection Agency (EPA) and Idaho Department of Environmental Quality (DEQ) are supporting agencies in this matter. The Air Force and the EPA will co-select the remedy for OU-3. This Proposed Plan is prepared in accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and 40 Code of Federal Regulations (CFR) Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), which require opportunities for public input in the site cleanup decision-making process.

MHAFB is located on 5,800 acres in Elmore County, Idaho, southwest of the City of Mountain Home, Idaho. MHAFB was established in 1943 as a training base for several bombardment groups during World War II. During the 1950s, the 9th Bombardment Wing, various air re-supply and communications wings, psychological warfare, covert operations, and unconventional warfare groups were stationed at MHAFB. In the 1960s, the 569th Strategic Missile Squadron and the 67th Tactical Reconnaissance Wing were residents at MHAFB. From 1970 to 2002, various tactical and composite air wings were stationed at MHAFB. From 2002 to the present, the 366th Fighter Wing supporting F-16C, F-15E, and F-15C aircraft and the Air Control Squadron have been stationed at MHAFB. Currently, the wing supports only the F-15E aircraft.

In August 1990, MHAFB was listed on the EPA National Priorities List. A Federal Facility Agreement (FFA) was signed on 16 January 1992 among the Air Force, EPA Region 10, and the Idaho Department of Health and Welfare - Division of Environmental Quality (now the DEQ). The FFA established respective roles and responsibilities for the Air Force, EPA, and DEQ. For site management purposes, MHAFB has been divided into six

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
5 September, 2012- 5 October, 2012

MHAFB will accept written comments on the proposed plan during the public comment period.

PUBLIC MEETING:
18 September, 2012

MHAFB will host a public meeting to explain the Proposed Plan, including all of the alternatives presented in the Feasibility Study for OU-3. Oral and written comments will also be accepted at the meeting. The meeting will be held at Mountain Home City Hall, 160 South 3rd East Street, Mountain Home, ID at 4:00 p.m.

Operable Units (OUs) to address known and suspected contaminants. OU-3, the subject of this Proposed Plan, includes regional groundwater, perched groundwater, and fractured vadose zone bedrock at MHAFB. It also includes contamination within these media beyond the Base boundary only if the contamination originated on-Base. Regional groundwater is present at a depth of about 375 feet below ground surface (bgs) and is a valuable resource at MHAFB since it is used as the sole source of potable water for the Base.

This Proposed Plan summarizes cleanup alternatives evaluated in the OU-3 Feasibility Study (FS) and identifies the preferred alternative as vapor extraction (VE) and institutional controls (ICs) with long-term monitoring (LTM). VE and ICs with LTM, collectively, is expected to be the most feasible, efficient, and cost effective cleanup alternative for reducing the threat to regional groundwater quality from contamination that is present in fractured basalt bedrock of OU-3. Other remedial alternatives considered included: (1) no action and (2) ICs with LTM (no active remediation). Descriptions of these alternatives are provided later in this Proposed Plan. The OU-3 FS Report and other documents pertaining to OU-3, including this Proposed Plan, are available for public review in the MHAFB information repository, the MHAFB Library, and the City of

Mountain Home Public Library (see page 10 for locations and hours). This Proposed Plan is also available for viewing on the MHAFB website at: http://www.mountainhome.af.mil/shared/media/document/AFD-120817-025.pdf. The public is invited to review these documents and comment on the preferred cleanup alternative, the other alternatives considered, and the process that led to the preferred alternative. Public participation is an important part of the remedial alternative selection process and can lead to changes in the preferred alternative.

MHAFB will host a public meeting on 18 September, 2012 to discuss the preferred alternative and other alternatives presented in this Proposed Plan. Community members are invited to comment on the plan from 29 August, 2012 through 28 September, 2012. After considering all public comments, the Air Force will document its selection in a Record of Decision (ROD) amendment. Although EPA and DEQ have expressed initial concurrence with the preferred alternative, they will have an opportunity to concur with or dispute the selected remedy after considering public comments. The selected remedy may be the same as the preferred alternative or may be modified based on new information or public comment. Your comments are important to us, and we invite you to review and comment on all of the alternatives in the Proposed Plan.

SITE BACKGROUND

General Information

Regional groundwater at MHAFB, part of OU-3, has been impacted by trichloroethene (TCE), as demonstrated through groundwater monitoring conducted over the past several years. TCE concentrations exceeded the Safe Drinking Water Act maximum contaminant level (MCL) of 5 micrograms TCE per liter (µg/L) at three monitoring wells in the vicinity of Site SD-24, the original soil solvent contamination source area located near Bldg. 1340. The leaking underground tank has been removed and the soils at this location have been remediated and returned to unrestricted use. TCE concentrations in bedrock vapor continue to be elevated. Other sites at MHAFB have been identified as having chemical releases. However, these sites have been determined to not pose a risk to regional groundwater or are currently being remediated under another Record of Decision.

The primary source of contamination, for the purposes of this action, is Site SD-24 which is located in the northwest corner of MHAFB (**Figure 1**) at the intersection of Liberator Street and Cedar Street and just south of Building 1340. Building 1340 was originally constructed between 1960 and 1961 as a liquid oxygen (LOX) production and loading plant. LOX facilities commonly used TCE (a solvent) to flush and clean lines and equipment. The building became the Base Auto Hobby Shop in 1965 and the Munitions Trailer Maintenance Shop in 1982. Solvent degreasers and petroleum products were reportedly used at both shops. The facility was equipped with a below ground structure southeast of Building 1340 identified as a liquid effluent (waste) collection box. The box was constructed of steel reinforced concrete, with the inlet and outlet pipes located about 3 feet bgs. The structure received liquid wastes from floor drains in Building 1340 throughout much of its early history. The outlet from the box discharged to MHAFB's main storm drainage ditch located about 260 feet south of the site. The box was found to be a source of solvent release during its removal in 1997. Although some wells used to supply Base drinking water are close to the area of impacted groundwater, the Base drinking water supply is monitored regularly and has not exceeded MCLs.

Previous Investigations/Activities - General

The following are summaries of previous work efforts, results, and contaminant conditions known at the time the work was conducted. The understanding of site conditions has evolved as more data have been generated over the years. As such, the description of site conditions known at various times in the past may not necessarily be consistent with site conditions known currently. Recent construction and operation of a deep vapor extraction well is effectively removing contaminants.

Previous OU-3 Investigations/Activities

OU-3 Remedial Investigation and Record of Decision (1995) - Regional groundwater was initially evaluated as part of the OU-3 Remedial Investigation (RI) with the ROD signed for the OU in 1995.

Regional groundwater was sampled at various Base production wells, Base monitoring wells, and off-Base irrigation wells as part of the RI. Analyses for organic and inorganic chemical parameters indicated TCE was the only parameter exceeding a MCL. The exceedance occurred at one base production well in 1991; however, the sample was not collected under an approved quality control program, the result was questionable, and subsequent monitoring of production wells did not detect TCE above its MCL. Modeling for organic and inorganic parameters that could potentially impact regional groundwater indicated two metals and TCE having the potential to impact regional groundwater at concentrations slightly exceeding MCLs. However, risk modeling using measured parameters in on-site media did not indicate unacceptable human health risks from exposure to regional groundwater. The ROD established No Action with LTM as the remedy to address conditions of regional groundwater known at that time.

Long-Term Monitoring - The LTM program serves to monitor regional groundwater, perched groundwater, and bedrock vapor throughout MHAFB. Since the 1995 ROD, LTM of regional groundwater has routinely resulted in detections of TCE above its MCL in three monitoring wells (MW25, MW33, and MW35). However, volatile organic compounds, including TCE, have not been detected above MCLs in any of the MHAFB drinking water supply wells or perimeter wells. LTM of vadose zone bedrock vapor has been conducted since September 2002 and has indicated the presence of TCE vapors in fractured bedrock above regional groundwater.

OU-3 Remedial Investigation (2008) - The OU-3 RI Report Amendment presents additional information concerning identified and potential impacts to regional groundwater at MHAFB collected since the 1995 RI. The amended RI provided a more comprehensive characterization of subsurface chemical contamination and hydrogeology. In addition, the RI amendment provided updated information regarding the status of all the Environmental Restoration Program (ERP) sites across MHAFB and their potential for chemical release adversely impacting regional groundwater. At the time of the amended RI, four sites (FT-08, ST-11, ST-13, and SD-24) were identified as potentially being sources of contamination to regional groundwater.

Five-Year Remedy Review (2011) – The 2011 Five-Year Remedy Review is the most recent document detailing whether the selected remedies for the chemical release sites across MHAFB continue to be protective of human health and the environment. Through remedial action, TCE mass has been reduced in shallow soil overlying bedrock at Sites FT-08, and SD-24 and also from shallow bedrock at Site SD-24. However, TCE continues to be present as vapor in the deeper bedrock vadose zone and as a dissolved contaminant in regional groundwater. TCE concentrations in regional groundwater have exceeded the MCL in the vicinity of Site SD-24 but not in areas proximal to Sites ST-11 and FT-08. According to the Five-Year Remedy Review, the OU-3 remedy (as stated in the 1995 ROD) of No Remedial Action (NRA) with LTM is protective of human health and the environment in the short term, but vapor concentrations in unsaturated bedrock are a potential source of TCE to groundwater, and groundwater use is not restricted in the long term. Therefore, the 1995 ROD remedy may not be protective in the long term. Further action to remove TCE mass from fractured bedrock in the vadose zone is recommended to protect regional groundwater, concurrent with institutional controls to prevent human exposure to the contaminated groundwater until the MCL for TCE is achieved.

OU-3 Feasibility Study (2012) - A FS was conducted to evaluate remedial action alternatives for addressing contamination in connection with OU-3. OU-3 encompasses regional groundwater, perched groundwater, and fractured vadose zone bedrock. Of the ERP sites at the Base, Sites FT-08, ST-11, and SD-24 were evaluated for their potential to impact OU-3 regional groundwater because of their continued contaminant conditions that pose a threat to human health and the environment. A brief discussion of each of these sites is provided below.

Shallow, unconsolidated soils at Site FT-08 are currently undergoing remediation through soil vapor extraction of fuel and chlorinated solvent compounds, in accordance with the 2009 ROD Amendment for Site FT-08 (OU-4). This effort reduces risks in conjunction with exposure to impacted soil and reduces source contamination to be protective of

groundwater. Deeper contamination in fractured vadose bedrock appears to be primarily TCE. To date, concentrations in wells in regional groundwater near site FT-08 have not exceeded the MCL for TCE.

Shallow, unconsolidated soils are undergoing remediation of fuel constituents at Site ST-11, in accordance with the 2010 ROD Amendment for Site ST-11. A VE system was installed at Site ST-11 in 2009 and 2010 and continues to remove fuel contamination from unconsolidated soils. More recently, a chemical injection process was initiated in May 2011 to oxidize/destroy fuel compounds in perched groundwater. Deeper contamination in vadose bedrock near Site ST-11 appears to be primarily TCE from other sources. TCE concentrations in vadose zone bedrock are lower than near Site SD-24, and concentrations in wells used to monitor regional groundwater near Site ST-11 have not exceeded the MCL for TCE.

Shallow, unconsolidated soil at Site SD-24 meets unlimited use/unrestricted exposure (UU/UE) criteria. However, deeper contamination (TCE vapor) in fractured vadose zone bedrock is considered a potential threat to regional groundwater.

Previous Site SD-24 Investigations/Activities

Removal of Effluent Collection Box - At Site SD-24, the subgrade effluent collection box, found to be the source of solvent releases, was removed in 1997 with further excavation and removal of impacted, unconsolidated soils down to bedrock in 2004.

SD-24 Data Report (2011) - TCE vapor concentrations in fractured vadose bedrock at SD-24 are the highest found at the base (**Figures 2, 3, and 4**). The Air Force is conducting a pilot study of VE for OU-3 in the vicinity of Site SD-24, which has significantly mitigated TCE vapors from shallow depths (within 50 feet bgs). TCE vapors at depths greater than 50 feet bgs are found at higher concentrations and appear to be contributing to TCE concentrations that exceed the MCL in nearby regional groundwater monitoring wells (**Figure 1**). Groundwater monitoring results from 2004 to the present for TCE at four monitoring wells in the vicinity of Site SD-24 are presented in **Table 1**. Values exceeding the MCL for TCE are shaded. Past vadose vapor monitoring results for TCE at monitoring well MW27 (the well closest to the Site SD-24 source release area) are presented in **Table 2**. There are currently no regulatory action levels for TCE vapor in fractured bedrock. However, as a point of reference, all of the TCE vapor concentrations in **Table 2** exceed the equilibrium vapor concentration for TCE (about 1,330 $\mu g/m^3$ [micrograms per cubic meter]) to partition into groundwater resulting in a dissolved TCE concentration in water of 5 µg/L (the MCL for TCE). For these reasons, TCE contamination in fractured bedrock in the vicinity of Site SD-24 poses a potential threat to regional groundwater of continued TCE impact above MCLs.

SITE CHARACTERISTICS

The hydrogeologic setting of OU-3 is characterized as mostly basalt bedrock covered by several feet of unconsolidated soil which forms the ground surface. Basalt bedrock contains networks of fractures which can be extensive. Thin layers of silt and volcanic ash occur sporadically within the basalt. The regional groundwater table lies at approximately 375 feet bgs.

The primary contaminant to be addressed for OU-3 is TCE. The area proximal to Site SD-24 is where TCE impact to vadose zone bedrock is greatest. While TCE is detected in groundwater in wells across the base, the area where concentrations of TCE exceed the MCL appears to be centered on Site SD-24. Beyond Site SD-24, impact to the vadose zone is less significant and TCE levels in regional groundwater do not exceed the MCL. Although the exact mechanism of contaminant transfer to regional groundwater is unknown, TCE vapors greater than 1,330 ug/m^3 in the fractured bedrock of OU-3 are viewed as a potential threat to contaminate regional groundwater, where higher concentrations of TCE have also been observed in monitoring wells (**Tables 1** and **2**).

SCOPE AND ROLE OF THE ACTION

The objective of this proposed remedial action is to remove TCE mass in bedrock and thus reduce the potential threat to basewide regional groundwater quality and ICs to prevent human exposure to groundwater until the MCL for TCE is achieved. There are no promulgated federal or state cleanup standards for organics in bedrock vapor. However, the Air Force has agreed to conduct vapor extraction

of the deep bedrock vapors for OU-3. This is a site-specific decision, and the Air Force emphasizes the decision should not be considered as precedent for remediation at other sites

MHAFB contains 33 sites, organized into six operable units. Through three RODs and subsequent changes to No Action decisions in two RODs, Air Force actions at individual sites across the base have reduced or are reducing human health risk to levels that are acceptable for uses other than groundwater use or have established controls on access and land use (at former landfills, for example). However, an area of regional groundwater that exceeds the MCL for TCE and levels of TCE remaining in bedrock fractures due to past releases continues to be of concern for groundwater protection.

The proposed action is an interim action to address the mass/concentrations of volatile organic compounds (VOCs) in the vadose zone that are a likely source of TCE contamination in groundwater, reduce risks, and provide additional data in support of a final remedy. Regional groundwater is a source of drinking water on base and off-site. Samples from monitoring wells have shown TCE contamination in excess of its MCL. Elevated concentrations of TCE in the vadose zone are believed to be the primary source of the groundwater contamination.
This interim action is intended to remove vapor phase VOCs from the vadose zone and establish institutional controls for prevention of human exposure to contaminated groundwater. In addition, during the interim action, information will be obtained to support assessment of the effectiveness of the interim action, contaminant fate and transport, any additional contaminant sources to groundwater, and concentration trends.

Consistent with 40 CFR 300.430(a)(1)(ii)(B), the remedy selected by this ROD Amendment is an interim measure which will neither be inconsistent with nor preclude implementation of the final remedy that will be identified in subsequent decision documents. This interim action will contribute to and be followed by selection of a final remedy in a subsequent decision document that fully addresses site risks, compliance with applicable or relevant and appropriate requirements (ARARs), and other CERCLA and NCP requirements for final response actions.

SUMMARY OF SITE RISKS

The following is a description of the current status of risks for OU-3.

Ecological Risks

An ecological risk assessment evaluates actual and potential adverse impacts on plant and animal species from chemical releases. The 1995 OU-3 RI and Baseline Risk Assessment (BRA) Report presents findings from the investigation of the basewide regional groundwater and a basewide BRA for human and ecological receptors. As the report indicates, there are no ecological exposures to contaminated bedrock, perched or regional groundwater. For these reasons, no populations of identified plant or animal species at the Base are at risk from contaminants in conjunction with OU-3.

Human Health Risks

With exception of one questionable analytical result from a base production well groundwater sample, the 1995 OU-3 RI Report indicated chemicals of concern (COCs) in regional groundwater were below MCLs, and no unacceptable human health risks were expected due to exposure to regional groundwater. However, subsequent investigations and monitoring revealed TCE contamination in regional groundwater at concentrations exceeding the MCL of 5µg/L (**Table 1**).

VOC vapors were discovered in fractured vadose bedrock above the regional groundwater table during drilling activities for monitoring well MW20 in 2002. Based on indoor air sampling results at Building 1340, residual vapor contamination (mainly TCE) in the fractured basalt bedrock beneath the site does not appear to pose an unacceptable risk to indoor air in existing enclosed structures due to vapor intrusion. Building 1340 will be resampled prior to the 2016 Five Year Review to verify that conditions are protective. This conclusion was documented in the 2007 Vapor Intrusion to Indoor Air Sampling/Evaluation Report. However, these subsurface vapors present a potential threat to regional groundwater quality, as evidenced by the history of nearby monitoring wells exhibiting TCE concentrations above the federal MCL.

It is the Lead Agency's current judgment that the preferred alternative or one of the other ones considered in this Proposed Plan is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances to the environment.

Considering the summary of potential risks described above, site characteristics, and State and Federal regulations, the primary basis for taking action is: 1) there is an MCL exceedance in the waters of the State of Idaho, 2) contaminants in fractured vadose bedrock continue to be a potential threat to regional groundwater at the Base, and 3) as long as vadose contamination is significant, there is a potential for contaminant concentrations in regional groundwater to increase, or for the area of contamination to expand, thereby increasing risks to human health since regional groundwater is the sole source of drinking water.

REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are site-specific goals for protecting human health and the environment developed during the FS. The RAOs guide the development of remedial action alternatives. The RAOs for OU-3 focus on the exposure setting for which protection of human health and the environment will be provided. Exposure settings take into consideration the COCs, contaminated media, and exposure pathways.

RAOs for OU-3 are based on existing knowledge of the site and intended to be used as part of an interim action to remove source contamination in the bedrock vadose zone. A final remedy, if necessary, will address dissolved contaminants exceeding MCLs in regional groundwater at a later time. The RAOs for the interim action are based on existing knowledge of the site. Achieving the interim RAOs will support the objective of a final remedy of restoration of regional groundwater quality to support beneficial use of the aquifer as a drinking water source wherever practicable, fully address site risks, and comply with ARARs, consistent with CERCLA and NCP requirements for final response actions. A final ROD Amendment will address the final remedy of groundwater restoration. The RAOs for the interim action at OU-3 are

1. Prevent human exposure to Base groundwater exceeding Idaho Ground Water Quality Standards and the Federal MCL, 5 µg/L TCE in groundwater.
2. Reduce vadose zone TCE vapor concentrations to levels that are protective of groundwater.

Typically, RAOs are accompanied by chemical-specific cleanup levels the action must achieve. At MHAFB, the MCL for TCE is considered protective of groundwater. Given uncertainties in the concentration of TCE in the vadose zone that would be protective of groundwater, the chemical-specific cleanup level for vapor removal is the equilibrium vapor concentration of 1,330 ug/m^3, with provisions for FFA team decisions based on groundwater and vapor data.

SUMMARY OF REMEDIAL ALTERNATIVES

Following is a brief summary of each remedial alternative considered during the FS. Alternatives were given consideration based on the nine evaluation criteria, which include their effectiveness at meeting RAOs. The costs given were derived during the FS process using accepted costing methods. Present value cost represents the total base year costs, discounted for the anticipated future value of money based on inflation, for an alternative that has a life cycle longer than one year.

Alternative 1 – No Action
Estimated Capital Cost: $0
Estimated Annual Operation & Maintenance (O&M) Cost: $0
Estimated Periodic Costs: $0
Estimated Present Value Cost: $0
Estimated Project Duration: 0 years

Alternative 1 assumes that no remedial action would be implemented for OU-3. The NCP requires this alternative be considered since it serves as a baseline against which other alternatives are compared. Under no action, natural processes (i.e., dispersion, volatilization, adsorption, and chemical reactions) would reduce contaminant levels over a long period of time (decades). The toxicity, mobility, or volume (TMV) of the contaminants left in place would

continue to diminish gradually by virtue of these processes. TCE in fractured bedrock would remain a potential threat to regional groundwater quality. TCE concentrations in regional groundwater could increase further, and the area of MCL exceedances could expand.

Alternative 2 – Institutional Controls with Long-Term Monitoring
Estimated Capital Costs: $36,300
Estimated O&M Costs: $2,566,300 ($85,543 per year for 30 years)
Estimated Periodic Costs: $90,000
Estimated Present Value Cost: $1,937,000
Estimated Project Duration: > 30 years

Alternative 2 involves implementing ICs as long as the groundwater exceeds the MCL. Cost estimates are based on 30 years. ICs will include land use restrictions (to restrict residential land use, drilling or excavating into contaminated rock) and groundwater use restrictions (to prevent human exposure to groundwater with contaminant MCL exceedances). ICs will include the following as required by the Air Force ("*Air Force Land Use Control ROD and RCRA DD Checklist for Sites at Active Installations*"):

- Air Force's general responsibility to uphold ICs
- Air Force's responsibility to have contractors and tenants uphold ICs
- Air Force's responsibility to notify regulators of violations and/or inconsistencies with established ICs
- Air Force's responsibility to notify regulators of planned transfers of real estate affected by ICs
- Air Force's responsibility to notify regulators and obtain their approval of changes that may affect ICs
- Air Force's responsibility to monitor effectiveness of ICs
- Air Force's responsibility to periodically issue monitoring/inspection reports to regulators

Alternative 2 also involves LTM of chemical concentrations in regional groundwater and bedrock vapor. This Alternative would rely on natural processes (i.e., dispersion, volatilization, adsorption, and chemical reactions) to reduce contaminant levels over a long period of time (decades). The TMV of the contaminants left in place would continue to diminish gradually by virtue of these processes. TCE in fractured bedrock would remain a potential threat to regional groundwater quality. TCE concentrations in regional groundwater could increase further, and the area of MCL exceedances could expand.

Alternative 3 –Vapor Extraction and Institutional Controls with Long-Term Monitoring (Preferred Alternative)
Estimated Capital Costs: $379,400
Estimated O&M Costs: $402,200 ($100,550 per year for four years)
Estimated Periodic Costs: $361,700
Estimated Present Value Cost: $1,143,260
Estimated Project Duration: 4 years active remediation plus 3 years post-remediation monitoring plus an additional 25 years of LTM and IC management in the event TCE vapor concentrations remain above the shut-down criteria and dissolved TCE remains above its MCL.

Alternative 3 involves applying a vacuum to the fractured bedrock vadose zone to induce the controlled flow of air through bedrock fractures. This mechanical process will physically remove volatile contaminants from the bedrock fractures and expel the vapors to the atmosphere. The costs assume that vacuum to the bedrock will be achieved through use of an existing, multi-well, VE system already operating to remove volatile vapors from shallow vadose zone bedrock and a newer single-well VE system designed to remove volatile vapors from medium and deep vadose zone depths. The wells will be used to create an air pressure gradient beginning at each well and extending across the impacted bedrock zone at the site. The bedrock located near Site SD-24 is covered by about 11 feet of fine-grained soils at the ground surface and another fine-grained layer (mudstone) resides at a depth of about 20 to 30 feet bgs. These layers will act as restrictive air flow caps to the fractured bedrock at deeper depths and will enhance the reach of vacuum-induced airflow through the bedrock. Contaminants in the air stream discharged to the atmosphere are expected to be low enough that air discharge limits will not be exceeded. Monitoring will be used to verify that treatment is not required. This will be verified during O&M.

The system would be operated until the RAOs for vapor removal are met or the FFA team determines

that further contaminant mass removal from the bedrock is impractical or not feasible. A quantitative system shutdown criterion of 1,330 µg/m^3 for TCE vapor at wells MW25, MW27, MW32, MW33, MW35, and MW37 will be used initially. This criterion may be expanded to new or existing wells where dissolved TCE concentrations exceed the MCL or exhibit increasing trends suggesting the MCL is being approached or exceeded. System shut-down could also take place if dissolved TCE concentrations fall below the MCL without the TCE vapor concentration of 1,330 µg/m^3 being achieved. During system operation, periodic site inspections and activities will be conducted to maintain remediation equipment and wells.

Similar to Alternative 2, this alternative would also include ICs during and after remediation, including land use and groundwater use restrictions. ICs would be discontinued after MCLs are achieved. In addition to the ICs, LTM of chemical concentrations in regional groundwater and bedrock vapor would be conducted following remediation to verify continued effectiveness of the remedy. Cost estimates are based on an assumed three years of monitoring after VE system shut-down. Although not part of the remedy, an OSHA-required health and safety plan would need to be prepared in the event future intrusive work is necessary (e.g., construction excavation or drilling to any depth) in areas with elevated TCE vapor concentrations in the subsurface.

TCE concentrations in groundwater may be reduced as a result of source removal actions in Alternative 3. However, there is no reliable method of predicting the direct impact of Alternative 3 on TCE concentration trends in groundwater. TCE concentrations could continue to be elevated above the MCL beyond the end of active remediation and the 3-year post remediation LTM period. ICs will remain in effect as long as TCE concentrations in groundwater remain above the MCL. If dissolved TCE concentrations remain above the MCL following system shut-down and the 3-year post remediation monitoring period, a final remedy will be implemented through a ROD amendment to reduce dissolved TCE to its MCL. Estimated costs for Alternative 3 include contingency amounts for up to 25 years of monitoring following the 3-year LTM period in the event TCE concentrations remain elevated above the MCL. If, however, a final remedy for reducing dissolved TCE in regional groundwater is implemented following the 3-year LTM period, these contingency costs would not be relevant.

EVALUATION OF REMEDIAL ALTERNATIVES

The NCP specifies the use of nine criteria to evaluate the different remedial action alternatives to help select the preferred alternative. These criteria were developed to address CERCLA requirements for cleanup of hazardous waste sites. These nine criteria are divided into three groups: threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria are requirements that each alternative must meet in order to be eligible for selection. To be considered for selection, all alternatives must satisfy the two threshold criteria (Nos. 1 and 2 below) of overall protection of human health and the environment, and compliance with ARARs. ARARs are the state and federal laws, rules, and regulations pertinent to site cleanup activities. The primary balancing criteria (Nos. 3 through 7) are used to evaluate each alternative and for comparison among the alternatives. The modifying criteria (Nos. 8 and 9) are State and community acceptance. These will be evaluated after the public has had the opportunity to review and comment on this Proposed Plan and the alternatives considered for the site.

The first seven evaluation criteria are described below, each followed by a brief description of the alternative's evaluation under each criterion. A detailed analysis of the remedial alternatives under these criteria can be found in the FS report.

1. **Overall Protection of Human Health and the Environment** *(determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through ICs, engineering controls, or treatment)*

Alternative 1 (No Action) does not meet the threshold criteria of protection of human health and the environment or compliance with ARARs. Alternative 2 provides protection of human health by limiting and restricting the groundwater exposure pathway. Alternative 3 provides removal of contaminant mass from the source area, thereby

providing increased protection of regional groundwater and the environment.

2. **Compliance with ARARs** *(evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver to these is justified)*

Alternatives 1 and 2 would not meet chemical-specific ARARs (in this case, MCLs) within a reasonable timeframe. A waiver to this requirement may not be appropriate based on the six circumstances for a waiver identified by CERCLA. Alternative 3 is expected to meet ARARs and waivers would not be required.

3. **Long-Term Effectiveness** *(considers the ability of an alternative to maintain protection of human health and the environment over time)*

Alternative 1 does not provide long-term protection of human health and the environment and would leave a lingering threat to regional groundwater quality. Alternative 2 provides effective protection from human exposure to impacted groundwater through ICs. Alternative 3 is field-proven and expected to meet remedial objectives for the long term.

4. **Reduction of Long-Term Toxicity, Mobility, or Volume Through Treatment** *(evaluates an alternative's use of treatment to reduce the harmful effects [toxicity] of principal contaminants, their ability to move in the environment [mobility], and the amount of contamination present [volume])*

Through Alternatives 1 and 2, TMV of contaminants would likely be reduced slowly through natural processes over very long periods of time. Alternative 3 will reduce the TMV of contaminants in the fractured basalt bedrock source zone by physically removing them from the site subsurface.

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)*

Alternative 1 would require no time to implement. Alternative 2 would require approximately 1 year completing the necessary documentation and apply the ICs to OU-3. Alternative 3 would require minimal time to implement since the VE system is already in place as part of a pilot study.

For Alternatives 2 and 3, workers can be protected through implementation of a site-specific health and safety plan. MHAFB personnel can be protected during construction through the use of appropriate access controls and health and safety precautions. For all alternatives, minimal risks to the community would be posed during implementation of the alternatives.

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

Alternatives 1 and 2 are technically feasible, but may not be administratively feasible unless ARAR waivers are granted. Alternative 2 would require periodic inspection and maintenance to verify that no detrimental activities have occurred at OU-3. Alternative 3 is technically and administratively feasible.

7. **Costs** *(includes estimated capital [upfront costs to implement the remedy] and annual O&M 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)*

The total present value cost is $0 for Alternative 1, $1,937,000 for Alternative 2, and $1,143,260 for Alternative 3.

8. **State/Support Agency Acceptance** *(considers whether the State agrees with the analyses and recommendations as described in the RI, FS, and Proposed Plan)*

The DEQ supports the preferred alternative.

9. **Community Acceptance** *(considers whether the local community agrees with the analyses and preferred alternative. Comments received on the*

Proposed Plan are an important indicator of community acceptance.)

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the ROD amendment for OU-3.

PREFERRED ALTERNATIVE

Based on the most current evaluation of available information and the nine evaluation criteria, the preferred remedial alternative for OU-3 is **Alternative 3 – VE and ICs with LTM**.

The recommendation to implement Alternative 3 is based largely on the results of VE activities already being conducted within shallow bedrock at Site SD-24. System performance data indicate the following:

- Mass removal rates up to 7.3 pounds of TCE per day were observed during early vapor extraction tests. As of early 2012, this VE system has removed about 300 pounds of TCE and 75 pounds of cis-1,2-dichloroethene (cis-1,2-DCE) from vadose bedrock near MW27.
- Data on the vacuum and airflow relationship for a 50-foot deep VE well at the source area shows that the fractured bedrock produces relatively large airflow volumes and an appreciable radius of influence.
- Limited testing from a new 340-foot deep bedrock extraction well (BEW) near the source area has been conducted. Fractured bedrock in the 340-foot BEW is exposed to a long, open borehole interval that will allow for increased vapor recovery rates, relative to recovery rates in 50-foot BEWs used elsewhere for OU-3.

Uncertainties associated with the preferred alternative include the following:

- The exact amount of TCE present in the fractured bedrock at the site is unknown, although estimates have been made based on recently measured vapor concentrations.
- The ability of a VE system using a single well to remove vapor over the entire area of concern is uncertain. However, pilot studies using existing VE wells indicate that VE will likely be effective over an appreciable radius of influence.
- The ability of VE to achieve vapor concentrations protective of groundwater is uncertain. VE will, however, reduce the mass of contamination available to interact with groundwater.
- Vapor contaminant concentrations distributed throughout the fractured bedrock are inferred from monitoring conducted at vapor monitoring ports. Actual subsurface vapor conditions may vary from those depicted on vapor plume maps.

The preferred alternative (Alternative 3) was selected over other alternatives because it is expected to reduce the potential threat to regional groundwater quality from vadose bedrock contamination. Alternatives 1 and 2 are not expected to reduce this threat within a reasonable timeframe although Alternative 2 would reduce the risk of human exposure to contaminated groundwater. Furthermore, the cost of implementing the preferred alternative is less than Alternative 2. In addition, the EPA and DEQ have expressed initial concurrence with the preferred alternative. Public acceptance of this alternative will be evaluated at the end of the public comment period, which is discussed in the next section (Community Participation).

Based on the information currently available, the Air Force believes the preferred alternative meets the threshold criteria and provides the best balance of trade-offs among other alternatives with respect to balancing and modifying criteria. MHAFB expects Alternative 3 to meet the CERCLA requirements for: 1) protection of human health and the environment; 2) compliance with ARARs; 3) cost effectiveness; 4) use of permanent solutions and alternative treatment technologies to the maximum practical extent; and 5) preference for treatment as principal element of cleanup. However, the choice of a preferred alternative can change in response to public comments or new information.

Alternative 3 is a contaminant source reduction measure intended to reduce the threat to regional groundwater resource at MHAFB. There are no risk-based criteria for exposure to TCE in bedrock fractures, though TCE vapor concentrations may be a source of risk from exposure to groundwater or vapor intrusion, where risk-based criteria and ARARs apply. The primary point at which the sytem can be discontinued will be when TCE vapor concentrations

are sustained at or below the concentration of 1,330 $\mu g/m^3$ at certain wells for a reasonable period of time as determined by the FFA team, or if the FFA team determines that further mass removal is impractical or not feasible. These wells will initially be MW25, MW27, MW32, MW33, MW35, and MW37. Other existing or new wells could also be used to apply the VE system shut-down criteria. If the TCE vapor concentration of 1,330 $\mu g/m^3$ cannot be achieved, other system shut-down criteria may be agreed to by the FFA Team based on semi-quantitative goals, such as mass removal, declining TCE vapor concentrations as remediation progresses, or a reduction of dissolved TCE concentrations to below the MCL.

If TCE concentration in groundwater continues to be above the MCL or shows an increasing trend towards the MCL, even after vapor concentrations fall below 1,330 $\mu g/m^3$, the system may be continued, with FFA team concurrence. System shut down can also take place, with FFA team concurrence, if dissolved TCE concentrations fall below the MCL and remain below MCL, while vapor concentrations remain above 1,330 $\mu g/m^3$. The next five-year review will assess whether vapor removal alone is protective of human health and the environment.

COMMUNITY PARTICIPATION

The public is encouraged to participate in the remedy selection process. In order to facilitate public involvement, MHAFB has established an information repository of ERP documents and will host a public meeting on this Proposed Plan.

MHAFB also has a Restoration Advisory Board, with Mr. Richard Roller as the contact (his contact information is provided below).

Information Repository

The MHAFB information repository is located at:

1181 Desert Street, Building 1296
Mountain Home AFB, ID 83648
Phone: (208) 828-1685

A copy of this Proposed Plan is also available at:

MHAFB Library
520 Phantom Ave. Building 2427
Mountain Home AFB, ID 83648
(208) 828-2326
Library Hours:
Monday-Thursday: 11:00 a.m. to 8:00 p.m.
Friday 11:00 a.m. to 6:00 p.m.
Weekends: 12:00 p.m. to 6:00 p.m.

City of Mountain Home Public Library
790 North 10th East Street
Mountain Home, ID 83647
(208) 587-4716
Library Hours:
Monday-Friday: 10:00 a.m. to 7:00 p.m.
Saturday: 9:00 a.m. to 5:00 p.m.

Public Meeting

MHAFB will host a public meeting on the OU-3 Proposed Plan on 18 September, 2012.

Date: 18 September, 2012
Time: 4:00 p.m.
Location: Mountain Home City Hall, 160 South 3rd East Street, Mountain Home, ID at 4:00 p.m.

Public Comment Period

The public comment period for this Proposed Plan will run from 29 August 2012 through 28 September, 2012. Written comments should be sent to Mr. Richard Roller, the MHAFB ERP manager, at the address that follows.

Comments received at the public meeting and during the comment period will be considered in the selection of the final remedy. These comments will be addressed in the responsiveness summary section of the upcoming ROD Amendment that will include the decision for OU-3.

Contact for More Information

MHAFB
Mr. Richard Roller – ERP Manager – 366 CES/CEV
1100 Liberator Street, Building 1297
Mountain Home AFB, ID 83648
Phone: (208) 828-1685
Fax: (208) 828-2661
E-mail: Richard.Roller@mountainhome.af.mil

EPA Region 10
Mr. Dave Einan
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Richland, WA 99352
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E-mail: Einan.David@epa.gov

DEQ
Mr. Dean Nygard
Site Remediation Manager
Waste and Remediation Division
1410 North Hilton
Boise, ID 83706
Phone: (208) 373-0285
E-mail: Dean.Nygard@deq.idaho.gov

ACRONYMS AND ABBREVIATIONS	
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chemical of concern
DEQ	Idaho Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
FFA	Federal Facility Agreement
FS	Feasibility Study
IC	Institutional Control
LOX	liquid oxygen
LTM	long term monitoring
MCL	maximum contaminant level
µg/L	microgram per liter
MHAFB	Mountain Home Air Force Base
NCP	National Oil and Hazardous Substances Contingency Plan
NRA	no remedial action
OSHA	Occupational Safety and Health Administration
O&M	Operation and Maintenance
OU	operable unit
RAO	remedial action objectives
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
TCE	trichloroethene
TMV	toxicity, mobility, or volume
UU/UE	unlimited use/unrestricted exposure
VE	vapor extraction
VOC	volatile organic compound

PUBLIC COMMENT SHEET — OU-3 PROPOSED PLAN

Please use the space below to submit your comments on the Proposed Plan for OU-3. If you need more space for your comments, attach additional pages. After completing this comment sheet, you may submit it at the 18 September, 2012 public meeting or mail it to the following address: Mr. Richard Roller, ERP Manager, 1100 Liberator Street, Building 1297, Mountain Home AFB, ID, 83648. Comments must be postmarked by 5 October, 2012.

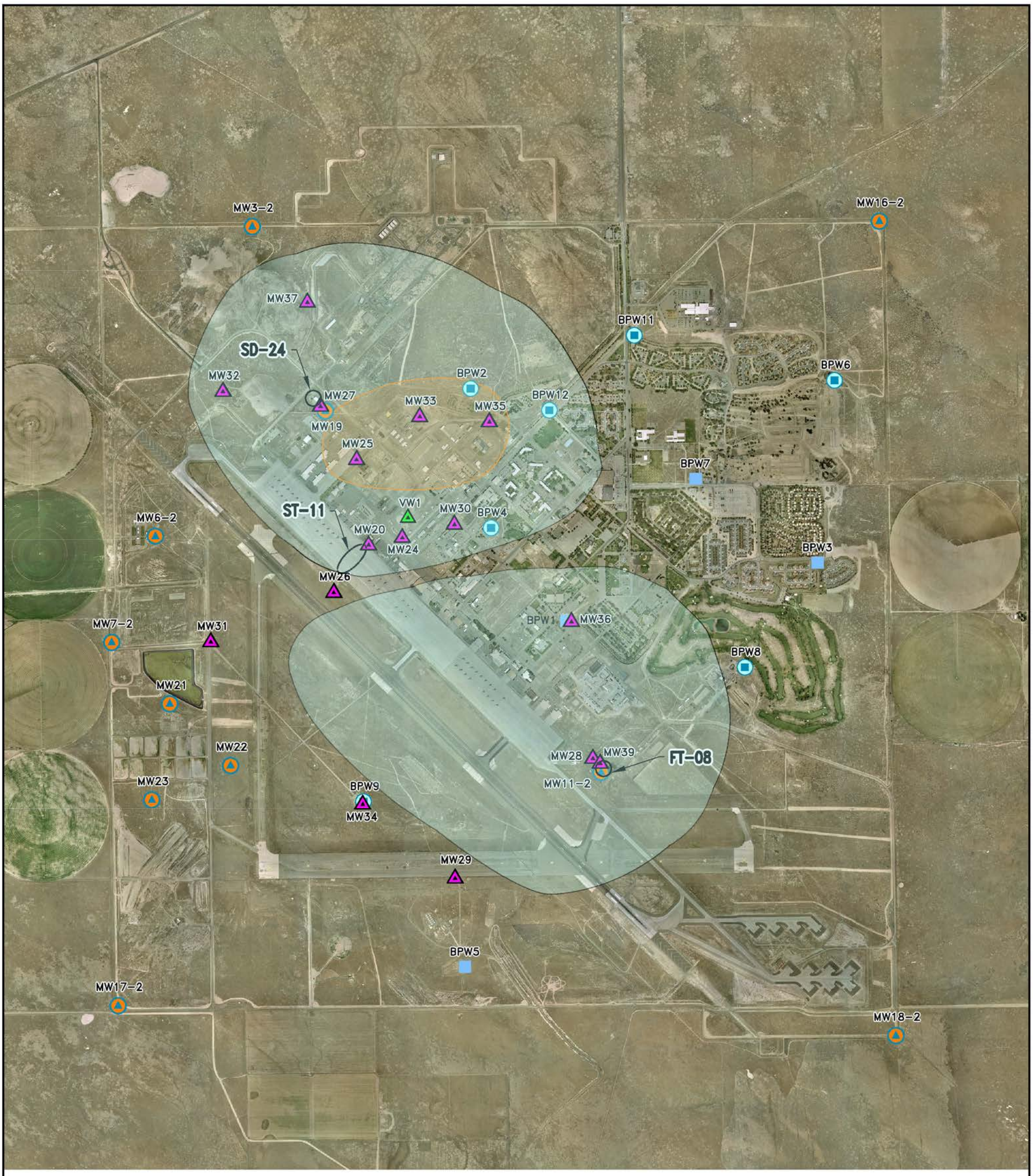
If you have any questions about the public comment period, please contact Richard Roller at (208) 828-6667.

Name _____

Address _____

City _____

State _____ Zip _____



LEGEND

- INACTIVE BASE PRODUCTION WELL
- ACTIVE BASE PRODUCTION WELL
- REGIONAL GROUNDWATER MONITORING WELL
- REGIONAL GROUNDWATER AND VAPOR MONITORING WELL
- VAPOR MONITORING WELL
- FT-08 — FIRE TRAINING AREA 8 (ADJACENT TO EXISTING FIRE TRAINING AREA)
- ST-11 — FUEL HYDRANT SYSTEM SPILL
- SD-24 — LOX LOADING PLANT
- INFERRED AREA OF GROUNDWATER EXHIBITING HISTORICAL TCE CONCENTRATIONS IN EXCESS OF THE 5 µg/L MCL
- INFERRED EXTENT OF VADOSE ZONE TCE VAPORS GREATER THAN 100 µg/m³ FOR SHALLOW, MIDDLE, AND DEEP ZONES COMBINED.

N

2000 1000 0 2000

SCALE IN FEET

SOURCE: RMC. 2005.

SITE MAP DEPICTING DISSOLVED TCE IN GROUNDWATER AND TCE VAPOR IN VADOSE ZONE
OU-3 PROPOSED PLAN
MOUNTAIN HOME AIR FORCE BASE, IDAHO

DRN. BY: TMS	DATE: 12/06/11	PROJECT NO. 16169962	FIG. NO. 1
CHK'D. BY: KAS	DATE: 12/06/11		

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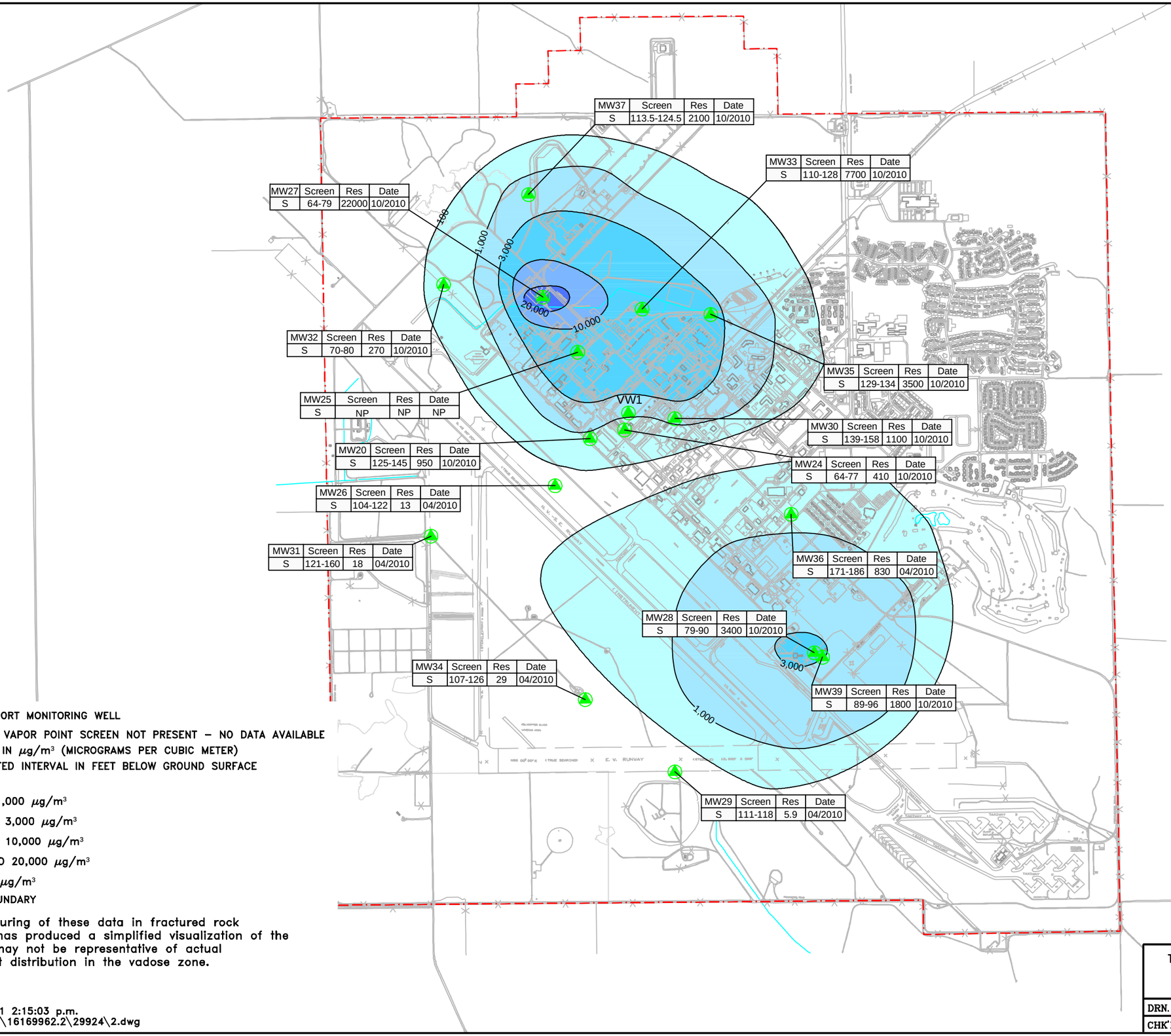

LEGEND

- VAPOR PORT MONITORING WELL
- NP — SHALLOW VAPOR POINT SCREEN NOT PRESENT – NO DATA AVAILABLE
- Res — RESULTS IN $\mu g/m^3$ (MICROGRAMS PER CUBIC METER)
- Screen — PERFORATED INTERVAL IN FEET BELOW GROUND SURFACE
- S — SHALLOW
- 100 TO 1,000 $\mu g/m^3$
- 1,000 TO 3,000 $\mu g/m^3$
- 3,000 TO 10,000 $\mu g/m^3$
- 10,000 TO 20,000 $\mu g/m^3$
- 20,000+ $\mu g/m^3$
- BASE BOUNDARY

Note: Contouring of these data in fractured rock conditions has produced a simplified visualization of the data that may not be representative of actual contaminant distribution in the vadose zone.

December 09, 2011 2:15:03 p.m.
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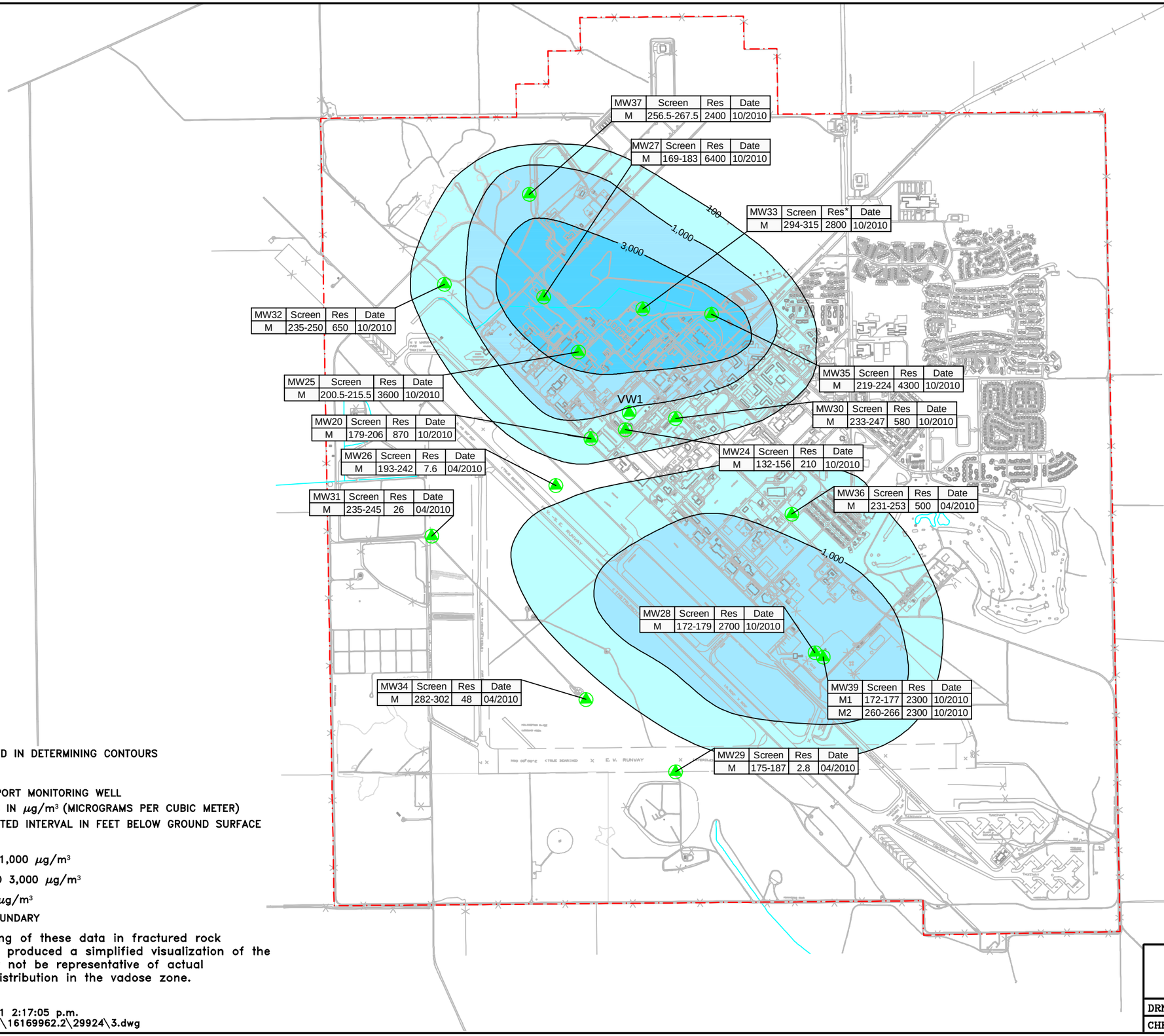
TCE CONCENTRATIONS IN SHALLOW VAPOR PORTS
OU-3 PROPOSED PLAN
MOUNTAIN HOME AIR FORCE BASE, IDAHO

DRN. BY: TMS	DATE: 12/06/11	PROJECT NO. 16169962	FIG. NO. 2
CHK'D. BY: KAS	REVISION: 0		



* NOT USED IN DETERMINING CONTOURS

LEGEND

- VAPOR PORT MONITORING WELL
- Res — RESULTS IN $\mu g/m^3$ (MICROGRAMS PER CUBIC METER)
- Screen — PERFORATED INTERVAL IN FEET BELOW GROUND SURFACE
- M — MIDDLE
- 100 TO 1,000 $\mu g/m^3$
- 1,000 TO 3,000 $\mu g/m^3$
- 3,000+ $\mu g/m^3$
- BASE BOUNDARY

Note: Contouring of these data in fractured rock conditions has produced a simplified visualization of the data that may not be representative of actual contaminant distribution in the vadose zone.

December 09, 2011 2:17:05 p.m.
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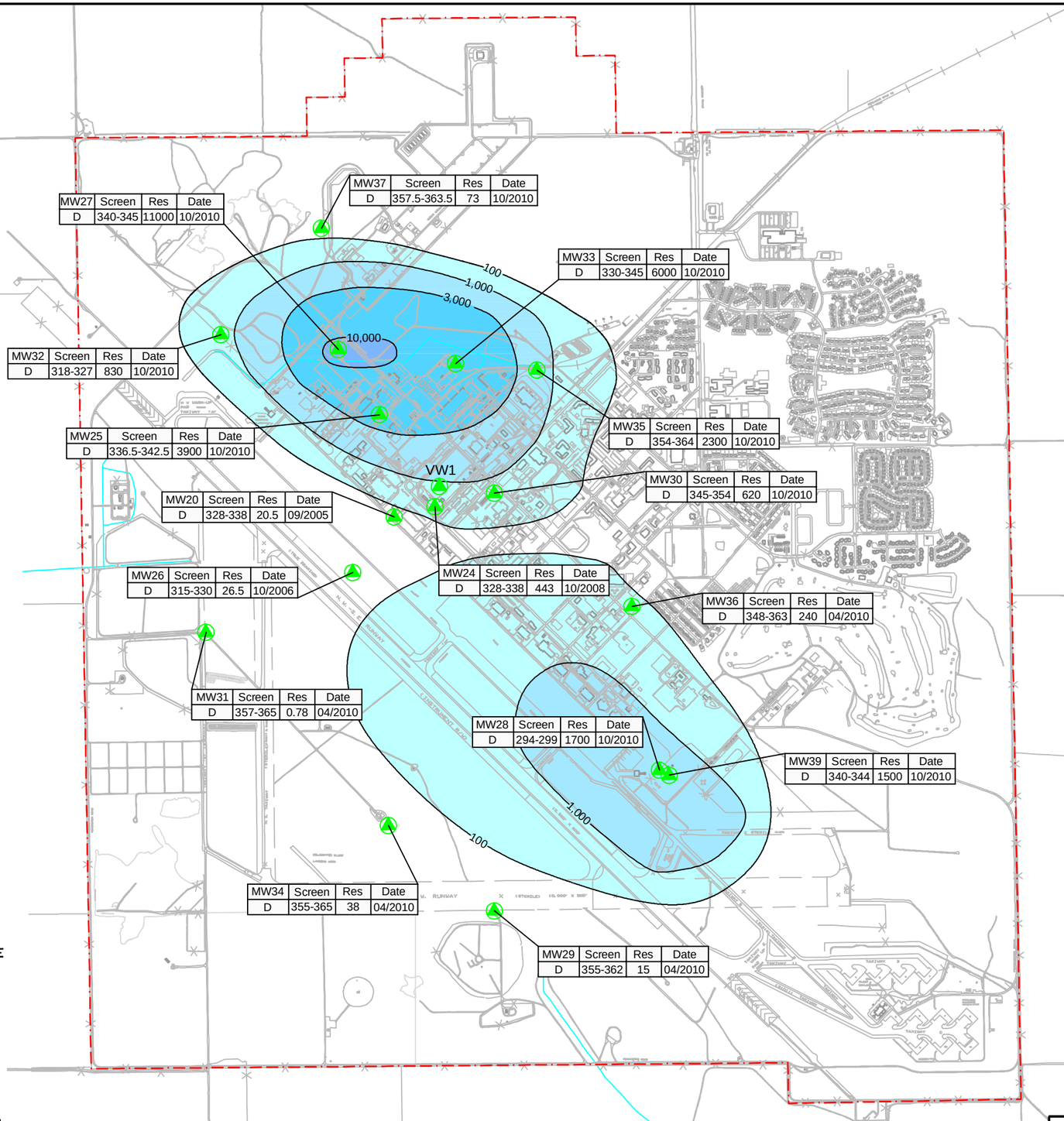
TCE CONCENTRATIONS IN MIDDLE VAPOR PORTS
OU-3 PROPOSED PLAN
MOUNTAIN HOME AIR FORCE BASE, IDAHO

DRN. BY: TMS	DATE: 12/06/11	PROJECT NO. 16169962	FIG. NO. 3
CHK'D. BY: KAS	REVISION: 0		



LEGEND

- VAPOR PORT MONITORING WELL
- Res — RESULTS IN $\mu g/m^3$ (MICROGRAMS PER CUBIC METER)
- Screen D — PERFORATED INTERVAL IN FEET BELOW GROUND SURFACE DEEP
- 100 TO 1,000 $\mu g/m^3$
- 1,000 TO 3,000 $\mu g/m^3$
- 3,000 TO 10,000 $\mu g/m^3$
- 10,000+ $\mu g/m^3$
- BASE BOUNDARY

Note: Contouring of these data in fractured rock conditions has produced a simplified visualization of the data that may not be representative of actual contaminant distribution in the vadose zone.

December 09, 2011 2:18:57 p.m.
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TCE CONCENTRATIONS IN DEEP VAPOR PORTS
OU-3 PROPOSED PLAN
MOUNTAIN HOME AIR FORCE BASE, IDAHO

DRN. BY: TMS	DATE: 12/06/11	PROJECT NO. 16169962	FIG. NO. 4
CHK'D. BY: KAS	REVISION: 0		

TABLE 1
HISTORIC REGIONAL GROUNDWATER SAMPLE RESULTS FOR TCE
OU-3, MOUNTAIN HOME AFB, IDAHO

Well	MW25	MW27	MW33	MW35
Date Sampled	**TCE (µg/L)**	**TCE (µg/L)**	**TCE (µg/L)**	**TCE (µg/L)**
Oct-2004	4.6	1.9	1.1	7.7
Apr-2005	5.1	1.6	1.2	8.7
Sep-2005	7.3	1.9	1.3	13.0
Apr-2006	5.6	1.3	1.3	11.0
Oct-2006	6.6	1.6	1.4	10.0
Apr-2007	5.6	2.2	NS	11.0
Oct-2007	6.0	1.9	1.2	8.3
Apr-2008	4.8	2.2	NS	8.5
Oct-2008	4.8	2.5F	1.1	4.4
Jan-2009	NS	NS	NS	1.8
Apr-2009	5.3	3.2	NS	NS
Jul-2009	6.5	2.9	NS	5.5
Oct-2009	5.3	2.9	7.3	5.4
Nov-2009	NS	NS	6.3	6.0
Jan-2010	5.3	2.8	2.3	3.5
Apr-2010	5.4	3.4	1.8	4.6
Jul-2010	6.0	3	0.79	4.3
Oct-2010	6.5	1.5	5.9	6.3
Feb-2011	4.7	3.5	3.5	4.9
Mar-2011	5.7	3.8	2.0	5.1
Jun-2011	7.5	3.6	2.2	4.5
Aug-2011	7.2	4.8	3.1	4.8

Notes:

F = estimated value

µg/L = micrograms per liter

NS = not sampled

TCE = trichloroethene

Shaded cells contain TCE concentrations that exceed the MCL.

TABLE 2
HISTORIC VADOSE ZONE VAPOR RESULTS FOR TCE
OU-3, MOUNTAIN HOME AFB, IDAHO

Well	MW27		
Vapor Port	**VP1**	**VP2**	**VP3**
Screen Interval (feet bgs)	**64 - 79**	**169 - 183**	**340 - 345**
Date Sampled	**TCE (µg/m^3)**	**TCE (µg/m^3)**	**TCE (µg/m^3)**
Oct-2004	70,200	7,560	14,040
Apr-2005	513,000	12,960	28,620
Sep-2005	453,600	6,480	4,806
Apr-2006	648,000	12,420	5,940
Oct-2006	513,000	11,880	5,400
Apr-2007	470,000	8,700	5,700
Start of Shallow Zone Vapor Extraction at Site SD-24 - July 2007			
Oct-2007	702,000	9,720	6,480
Apr-2008	270,000	6,800	7,600
Oct-2008	459,000	10,260	7,560
Apr-2009	85,000	12,000	7,900
Jul-2009	210,000	8,600	7,900
Oct-2009	85,000	8,200	7,000
Jan-2010	210,000	6,200	6,500
Apr-2010	30,000	7,000	9,300
Jul-2010	22,000	6,500	9,600
Oct-2010	22,000	6,400	11,000
Feb-2011	27,000	5,800	10,000
Mar-2011	16,000	6,700	6,800
Jun-2011	29,000	5,900	7,900
Aug-2011	9,500	5,700	6,000
Jan-2012	4,700	950	630

Notes:

bgs = below ground surface

µg/m^3 = micrograms per cubic meter

TCE = trichloroethene