

CityChlor Transnational Workshop
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Innovative Techniques and Integrated Approach in the USA

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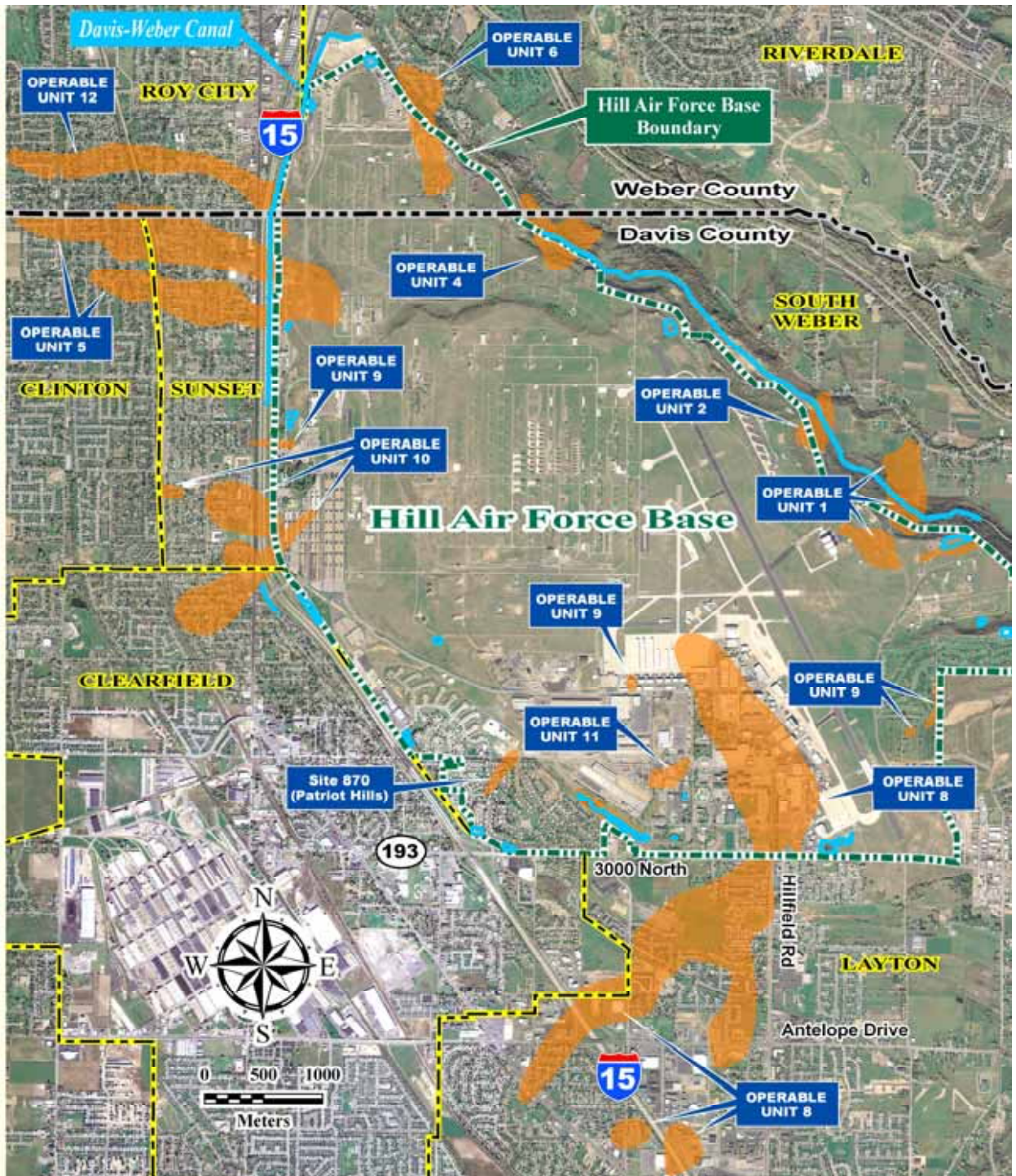


BUILDING A BETTER WORLD



EXPLANATION

 Groundwater contaminant concentration above Utah water quality standards or US EPA Maximum Contaminant Levels (MCLs)



Site Management Team and Stakeholders

United States Air Force (Hill AFB and AFCEE)

Environmental Consulting Firms (e.g., MWH, CH2M Hill, URS)

Subcontractors (drilling companies, analytical laboratories, remediation)

Regulatory Agencies (U.S. EPA, Utah Dept. of Environmental Quality)

Public (Landowners, residents, concerned citizens and citizen groups)

Local Governments and Public Utilities

Restoration Advisory Board (RAB)

- RAB is comprised of appointed citizens and representatives of surrounding communities to provide structured citizen review of the restoration program

Innovative Techniques for Rapid Delineation of Large Groundwater Contaminant Plumes

1998



1999



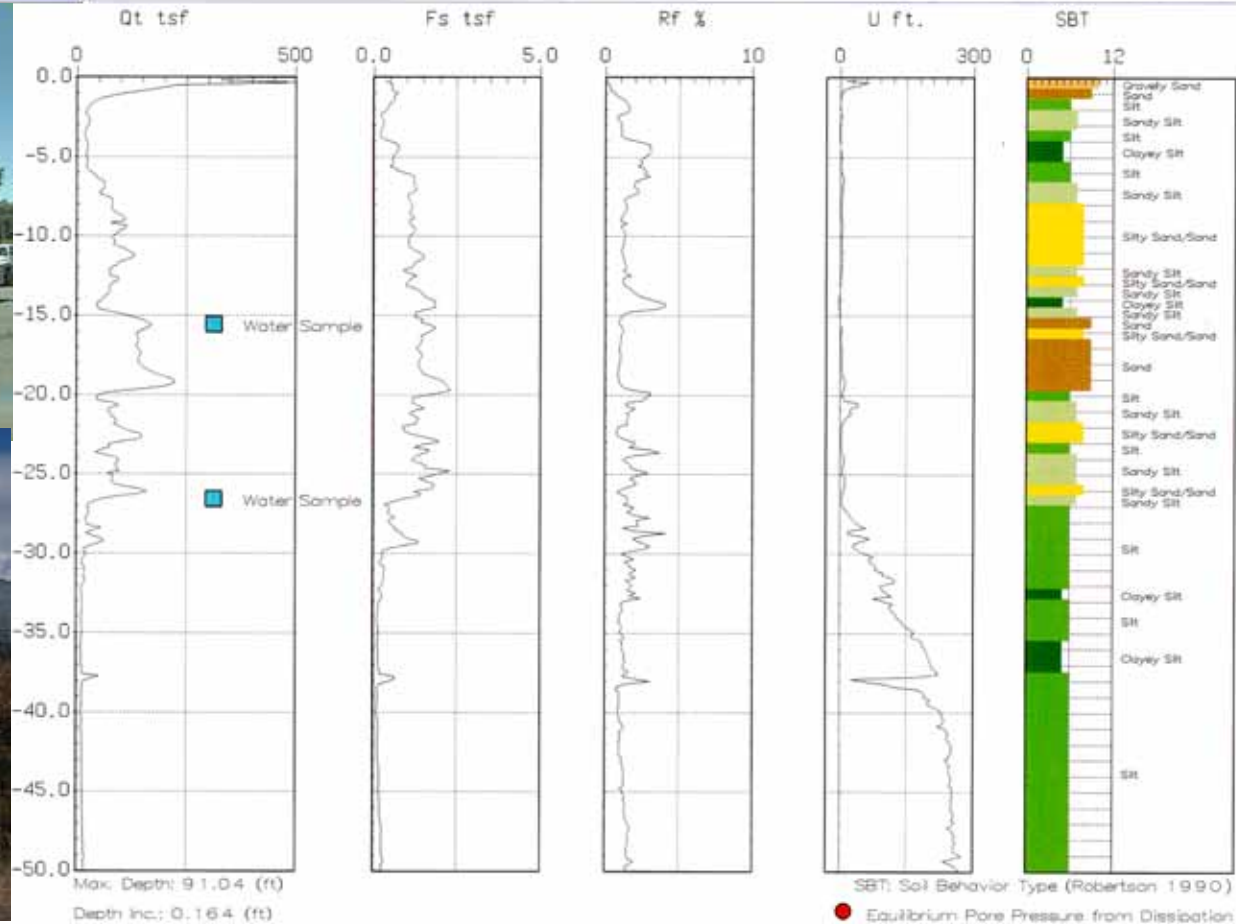
CPT Rigs and Example CPT Log



MWH Americas, Inc.

Hole No.: U5-2165
Location: OU-5

Cone: 20 TON A 112
Date: 12:05:01 12:53

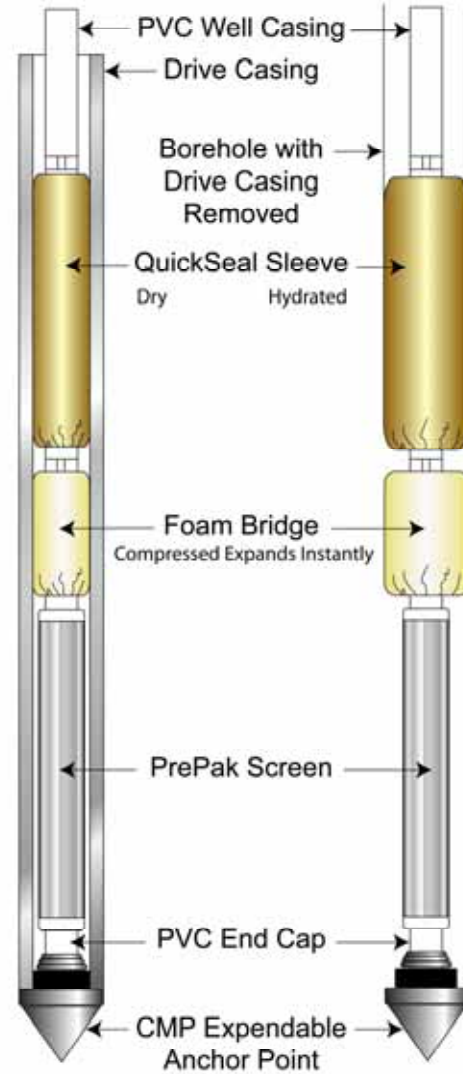


Direct-Push Microwell

**DURING
INSTALLATION
(Left)**

**AFTER RETRACTING
DRIVE CASING
(Right)**

DRIVE CASING



SURFACE COMPLETION



Investigation Results and Monitoring Network

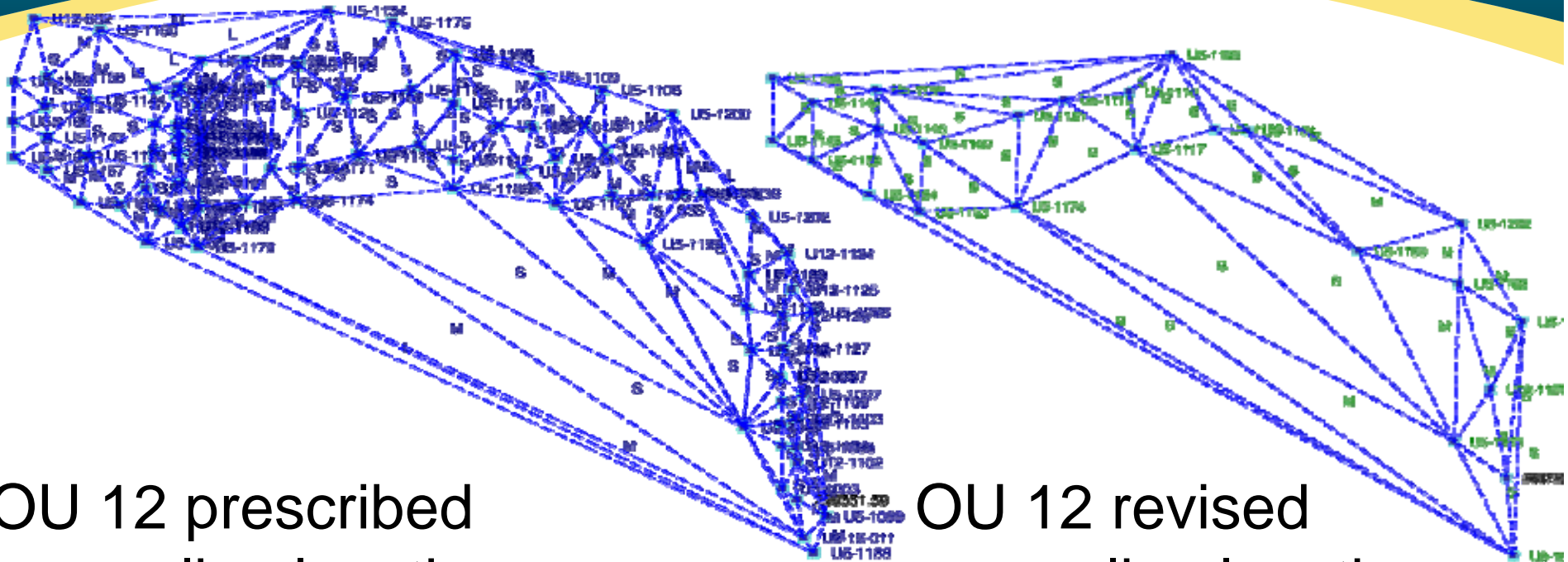
2000



2001



Optimization of Monitoring Network with MAROS or GTS for Long-Term Monitoring



OU 12 prescribed
sampling locations

Not optimized -
redundant locations
and too frequent given
historic site knowledge

OU 12 revised
sampling locations

Optimized based
on MAROS
sufficiency and
redundancy analysis

HYDRASleeve® for Long-Term Monitoring to Reduce Sampling Costs and Carbon Footprint

- Increases number of wells sampled per day from ~3 to ~8-10
- Reduces IDW significantly (99% decrease in purge water)
- Reduces carbon footprint by 56%
- Reduces sampling costs (from ~200 Euros/well-sample to ~50 Euro/well-sample)
- Data are comparable, but VOC concentrations were biased low by ~3 ug/l on average, which does not affect management decisions



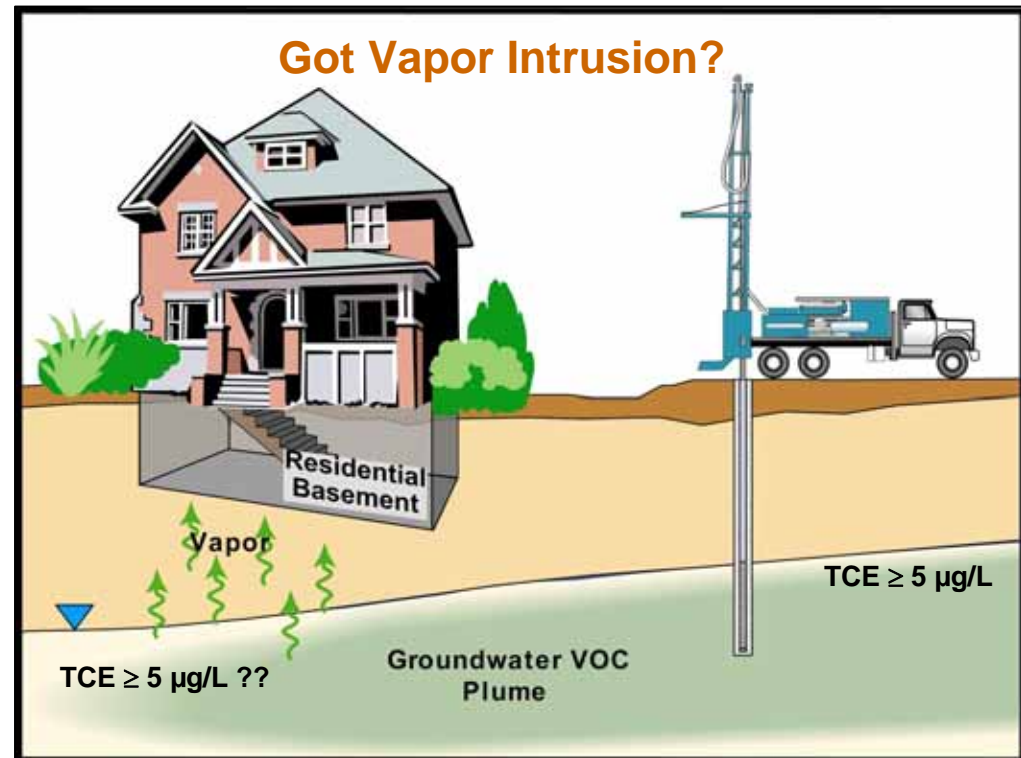
Residential Indoor Air Sampling Program

Since January 2001:

- ~1819 homes sampled
- ~7200 air samples collected
- 364 homes with detections

Vapor Removal Systems (VRS):

- 106 systems installed



Indoor Air Program - 2010 Status

- 2710 letters sent
- 633 agreed to sampling
- 630 homes sampled
- 710 samples collected
- 77 homes had detections
 - 12 above action level
 - 9 - Tetrachloroethene (PCE)
 - 1 - Trichloroethene (TCE)
 - 1 - Carbon Tetrachloride (CTCL)
 - 1 - trans-Dichloroethene (tDCE)



Community Relations

- Public Meetings

- present information and results
- provides forum to obtain public feedback

- Contact potentially impacted residents to request sampling

- use database to identify residents
- certified mailings to request sampling
- door to door solicitation of non-respondents
- schedule sampling event with residents



Hill AFB CIT



MWH Sampling Coordinator



Residents



MWH Sampling Team

Indoor Air Sampling Program Database Interface

Residential Sampling Inventory Interface Master Form

Microsoft Access - [Contact Info Master Form]

Name: Joe Date: 10/20/05 Location ID: 0112-0000 Area: Full 1

Address: Putnam Circle Duration (Y/M/D): Full 1

City: Pleasant City UT 122456

Phone: 801-123-4567 State: UT Zip: 122456 Area:

Other: Resident prefers to be contacted via cell phone: 801-123-4568

Residence Information:

- Occupants: HVAC/Appliances: Fans/Products:
- Construction: Vehicles/Equipment: Activities:

Year Built: 1999

Year Moved In: 1999

Approx. Square Footage: 3000

Remarks: Home has full finished basement.

Residential Communications Interface

Microsoft Access - [7 Location filterable contacts with results]

Last Name: Joe Phone: 801-123-4567 Loc_ID: 0112-0000 MWH Contact Note: Has a sump cover.

First Name: Jon Duration (Y/M/D): Full 1

Address: Holly Drive

City: Green City UT 122456

Other: Resident prefers to be contacted via cell phone: 801-123-4568

Communications:

Date: 29Mar 2005 11:05 Followup: Requested: Completed:

Medium: Phone Who: JIS Action Taken:

Reason: PM msg left with reminder of air sampling app tomorrow. Laundry reminder and cell number also given.

Notes: 9/22/2005 4:52:24 PM

Form HLL Communications

Date: 20Jan 2005 10:33 Followup: Requested: Completed:

Medium: Phone Who: JIS Action Taken:

Reason: PM

Notes: Sampler called me and said we need to reschedule this resident. Upon initial contact, the resident had many household products containing target compounds (i.e. TCE and 1,1-DCEA). He has agreed to remove them so we can come back and sample without them in the home. Left vials of both phone numbers indicating we would like to reschedule an air sampling app. Left cell number. Detailed chemical inventory conducted.

Record: 1 of 3

System: Pub Stat: EXT

Task Order: 0002 COMPLETION_DATE: 5/14/2005

Approval: 41743005 REQ_WALK_DATE: 5/14/2005

License: 41263005 INSPECTION_DATE: 5/16/2005

NOTE_DATE: 5/22/2005 3:22:43 PM Note Owner: JILL

Completed W5 OAH Inspection (5/16/2005). System intact and operating as designed. CO peak = 0 ppm. Fluoride at suction point = 30 d/m.

Record: 1 of 3

As Sampling:

Drop Off Date/Time: 25May 2005 15:05 Head Action: JPS1 20051251 10 PM

Pick Up Date/Time: 25May 2005 15:05 Head Action: JPS1

Sample Type: IS JPS etc: PS SAMPLED Duplicate: Task:

OTHER_NOTES: System okay. CO detector is 0. Resident prefers results sent to his name.

Action Alert:

Sampling Team: 1

Record: 1 of 14

Loc ID	SAMP_DATE	SAM	MA	ANAL	CHEM	CO	RESULT	UNITS
0112-0000	11/2/2004	N	AA	TO15	DCA11	0	PPBY	
0112-0000	11/2/2004	N	AA	TO15	DCA12	0	PPBY	
0112-0000	11/2/2004	N	AA	TO15	DCE11	0	PPBY	
0112-0000	11/2/2004	N	AA	TO15	DCE12	0.17	PPBY	
0112-0000	11/2/2004	N	AA	TO15	DCE13	0	PPBY	
0112-0000	11/2/2004	N	AA	TO15	TCB	3	PPBY	

Household Chemical Products Linked to Resident Record Subform

Microsoft Access - [Products Linkform]

Room Type: Three New Room + 10

Category	Manufacturer	Product Name	Class Count	First Chem	Location	Room Type
Chairs/Tables/Chairs/Tables/Park Benches	Richies	Copper Spray & Duster H	1	NONE	Ornamental	Garage
Air Filters/Blowers/Energy Blowers	Formalizer	AC coolant of refrigerator I	1	NONE	Ornamental	Garage
Refrigerators/Coolers	AC Coolant #8	Contact Adhesive	1	MTLHCL	Ornamental	Swimming
Air Filters/Blowers/Energy Blowers	Quality Heat #3	Roach, Ant & Spider Killer	1	NONE	Ornamental	Storage
Fans/Wind Control	Orthon	Keeoener	1	NONE	Basement	Living
Pumps/Blowers/Vacuums/Cooling	Arg	Champion Spray-On Paint C	1	MTLHCL	Ornamental	Garage
Cardio/Fitness/Puppy/Swimsuit	DOW Corning	Silicone sealant	1	PCBS	Ornamental	Garage

Sampling Event Subform

Microsoft Access - [Sample Inventory Information]

Drop Off Date/Time: 3/7/2005 7:50:00 AM Units: 25

Pick Up Date/Time: 3/8/2005 7:45:00 AM Units: 25

Location: Rosewood

Room Type: Storage

Weather for test duration:

	OPENED	CLOSED	UNETS
Cloud Cover:	5	5	20
Temperature:	37	46	65.0 F
Humidity:	None	33	None
Wind Speed:	5	5	10/15
Barometric Pressure:	30.22	30.23	30.10

Remarks on Weather: Low pressure system to north during night, but cleared before sample pick-up time.

Field Personnel:

- Field Station:
- Client:
- Client:

Sample Equipment:

- Collector: XCC30
- Flow Controller: XCF70
- Filter: F002
- Equipment Remarks: New pressure gauge from lab was used for this measurement.

Household Chemical Products Database Subform

Microsoft Access - [Product Linkform]

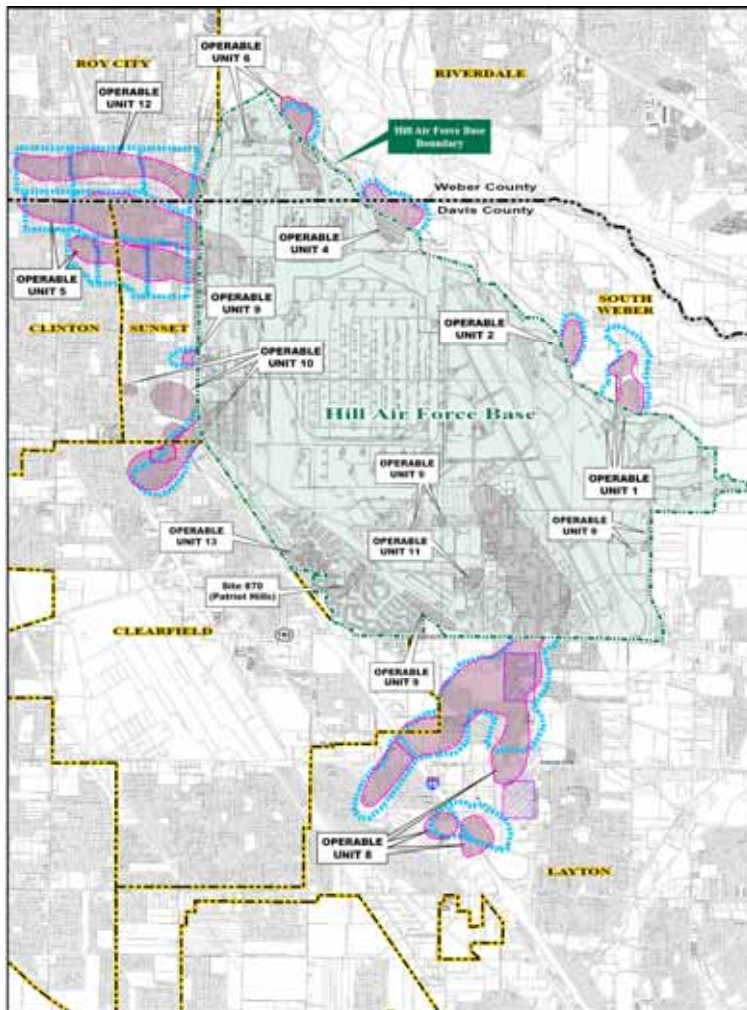
Category	Manufacturer	Name	Part Num	MSDS Web Address
Chairs/Tables/Chairs/Tables/Park Benches	Orthon	Electrical Cleaner and Lubricant	10001	http://www.orton.com/usa/

Home Construction Inventory Subform

Microsoft Access - [Construction Linkform]

CONSTRUCTION	ACTIVE_DATE	INACTIVE_DATE	REMARKS
Building, Aluminum	15-Nov-1997	21-Aug-1998	
Roofing, Vinyl	21-Aug-1998		

Groundwater Contamination and Potential Vapor Intrusion Risk



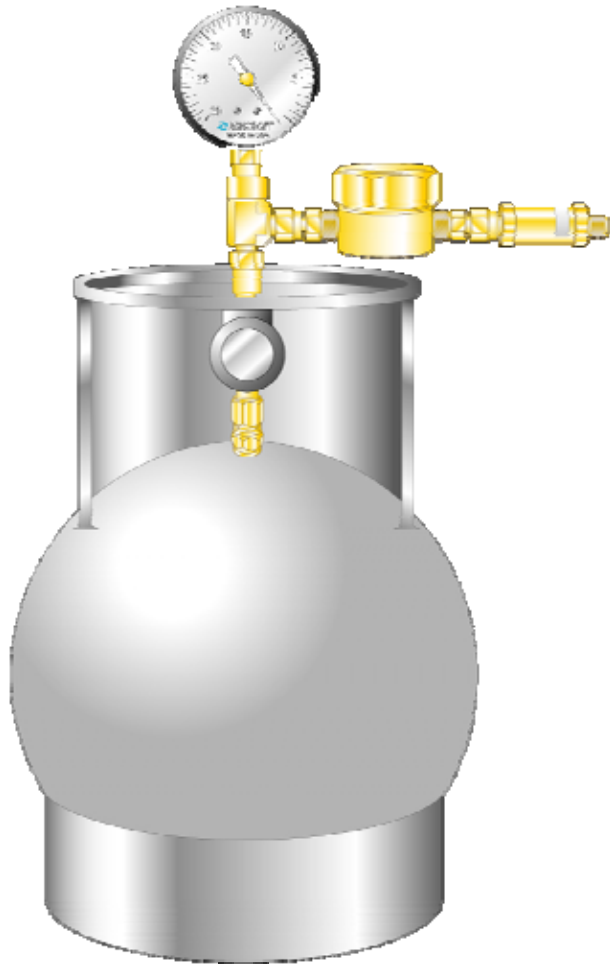
- Groundwater investigations define contaminants of concern and the areal extent of the groundwater plume and depth to groundwater
- Contaminants from groundwater have the potential to volatilize, migrate through the overlying vadose zone, and enter homes creating a potential vapor intrusion risk
- Residences contacted for inclusion in the indoor air sampling program are based on their location with respect to groundwater contamination

Interior Sources of Indoor Air Contaminants

- A detailed chemical inventory of all residences is performed prior to initiating indoor air sampling
- Database with 292 common household products identified as containing contaminants of concern (COC) that could potentially interfere with indoor air sample results
- Homeowner activities including the use of COC containing products or dry cleaning storage, can potentially impact air sample results



SUMMA[®] Canister Sampling



- Indoor air samples are collected in stainless steel 6-liter SUMMA[®] canisters equipped with a 24-hour flow-rate controller
- SUMMA[®] canisters are placed in the lowest livable room of the residence
- Indoor air samples are analyzed by U.S. EPA Method TO15 for target contaminants only
- Dedicated SUMMA[®] canisters are batch certified clean by the laboratory

INFICON HAPSITE® Portable GC/MS

- HAPSITE® is a portable GC/MS measurement tool U
- Use of the HAPSITE® allows for the real-time identification and removal of interior sources, which may not have ingredients listed (some Christmas ornaments), have an incomplete ingredients list, or are activities, such as dry cleaning or taxidermy
- Interior sources have been identified and removed from 24 of the 26 homes investigated using the HAPSITE®
- The HAPSITE® is not intended to generate lab certifiable results, but rather to be used as a screening tool in determining the presence or absence of VI in a residence



Mitigation Action Levels (MALs) / Screening Levels

TABLE 7-1

COMPARISON OF 2004 AND 2009 MITIGATION ACTION LEVELS
BASEWIDE RESIDENTIAL INDOOR AIR SAMPLING PROGRAM
HILL AIR FORCE BASE, UTAH
(Page 1 of 1)

	2004 MAL ($\mu\text{g}/\text{m}^3$)	2009 MAL/ Screening Level ($\mu\text{g}/\text{m}^3$)	2004 MAL (ppbv)	2009 MAL/ Screening Level (ppbv)
Carbon Tetrachloride	1.6	1.6	0.26	0.26
Chloroform ^(a)	NA	8.3	NA	1.7
1,1-Dichloroethane	500	15	120	3.8
1,2-Dichloroethane ^(b)	0.94	NA	0.23	NA
1,1-Dichloroethene	200	209	50	53
cis-1,2-Dichloroethene	35	63	8.8	16
trans-1,2-Dichloroethene	70	63	18	16
Tetrachloroethene	8.1	4.1	1.2	0.61
1,1,1-Trichloroethane ^(b)	2200	NA	400	NA
Trichloroethene	2.3	12	0.43	2.3
Vinyl Chloride	2.8	2.8	1.1	1.1

NA Not applicable; no criteria initially developed for this compound

MAL Mitigation Action Level

$\mu\text{g}/\text{m}^3$ micrograms per cubic meter

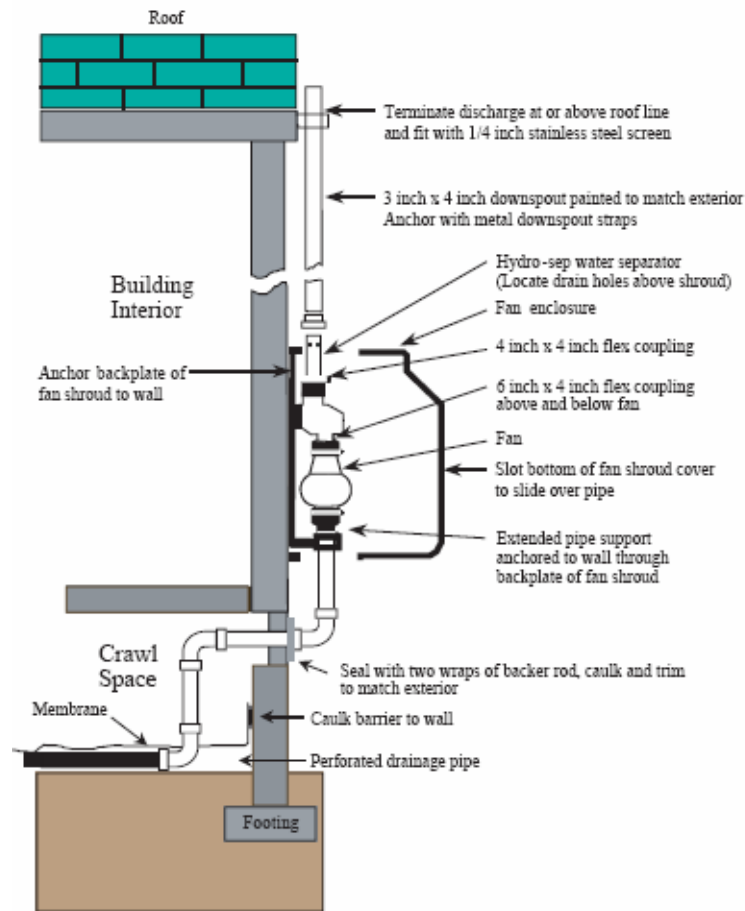
ppbv parts per billion by volume

^(a) Chloroform screening level is a proposed risk-based action level.

^(b) This analyte has been removed from the sampling program.

- The methodology for determining if vapor intrusion is a concern in a residence involves the application of MALs
- MALs for the indoor air program were established for only COCs identified in underlying groundwater
- If COCs are detected in indoor air samples at concentrations exceeding the MALs, a VRS system is recommended to the resident. Hill AFB installs systems free of charge and pays the resident a nominal fee for electricity and lease agreement

Vapor Removal System (VRS)



SOURCE:
Specifications for Soil Gas Reduction Systems
July 19, 2002 by Doug Kladder

- VRSs are installed to mitigate COCs present in indoor air as a result of confirmed vapor intrusion
- Primarily VRSs operate continuously, create negative pressure in the soil or fill material underlying the structures foundation, and do not negatively impact the use or aesthetics of the structure
- 106 VRSs have been installed to date
- Indoor air sampling continues on an annual basis to verify effective VRS operation



Indoor Air Program Costs

- Current MWH air sampling contract
~1 000 000 Euros over 18 month period
and assumes the collection of ~ 1000 air
samples
- Cost per indoor air sample is ~1000 Euros
This cost per sample includes:
 - Sample coordination / scheduling
 - Sample collection
 - Laboratory analysis
 - Data validation
 - Monthly and annual data reporting
 - Project management
 - Public meetings
 - Does not includes costs for Hill AFB project
management or the community involvement team
- VRS installation costs:
 - ~ 1500 Euros per system
(not including O&M, annual
sampling, or lease
agreement costs)



Questions?

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