



German Autocraft 301 E. 14th Street, San Leandro;
RO0000302, July 21, 2010 Meeting

Thursday, July 22, 2010
10:30 AM - 12 ~~PM~~ Noon

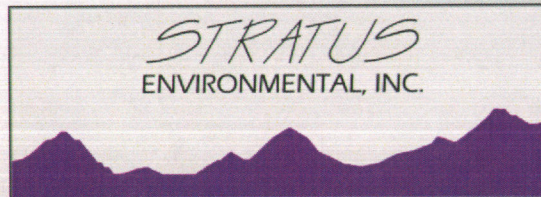
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Ms. Seung Lee's
German Autocraft, 301 E. 14th St., San Leandro

Project Status Update

Presentation prepared for::
Alameda County Environmental Health Services (ACEHS)

July 22, 2010



Meeting Agenda

- **Overview of Project**
 - Site Description / Sensitive Receptors
 - Assessment Completed to Date
 - Remediation Completed to Date
 - Geology / Hydrogeology
 - Impact to Groundwater
 - Conceptual Site Model
 - Vapor Intrusion Risk Assessment
- **Recommended Additional Work**
 - Work Plan for DPE Testing and Remediation Well Installation
 - CAP Preparation (full scale DPE system)
 - CAP Implementation / Schedule
 - Outstanding Issues (Oct 2009 letter)



Project Overview

SITE INFORMATION / DESCRIPTION

- Mr. Lee wholly owns and operates at the property
- Site in in San Leandro, high-density, highly urbanized mixed residential/commercial
- Located ~1mile east of I880, ~1 mile west of I580
- Property has long history of use as automotive repair facility, continuing today
- Southern property boundary is commercial buildings (7-11)
- Western property boundary is residential (with small vacant lot between)
- 6 USTs (150g waste oil, 550 gal regular gasoline, 2-1,000 gal, 2-2,000 gal unleaded gasoline) on northern corner of site; 1 fuel island along 14th -- removed in 1990; USTs single wall steel, had holes.

SENSITIVE RECEPTORS

- Groundwater
 - Numerous shallow (<100 ft) private domestic wells used for seasonal irrigation
 - EBMUD has provided back-flow prevention devices to owners where such wells have plumbed connections to the main house supply, but there is no certainty that all such situations have been addressed.
- Human Health
 - Apartments and single family residences overly highly impacted groundwater plume.
 - Some homes may have basements
 - Residential vapor intrusion is a potential issue
- Surface Water / Ecological
 - No surface water bodies present in near downgradient locations; no ecological receptors IDed

Project Overview

ASSESSMENT COMPLETED TO DATE:

- October 1990 - USTs removed from site (no over-ex, no USTs reinstalled)
- December 1990 - three onsite soil borings (B-1, B-2, B-3) drilled
- December 1991 - 45 ft deep exploration boring drilled (converted to MW-1)
- December 1994 - Wells MW-2 and -3 installed on-site; 2 borings CE-1, CE-2 drilled
- August 1995 - Well MW-4 (onsite) installed
- Nov 1995 / Mar 96 - Geoprobe investigation; soil borings EMT-1 thru -40
- May 1997 - Well MW-1A (far offsite) installed
- August 1998 - Well MW-5 (onsite) and wells MW-6, MW-8, MW-9, MW-10, MW-11 (offsite) installed
- January 2001 - Wells MW-12, MW-13, and MW-14 installed (offsite)
- January 2009 - Eight dual-depth soil vapor points installed (shallow set at 4-5 ft bgs, deeper set at 12-14 ft bgs); sampled only once, then destroyed; also drilled and continuously cored adjacent borings for grab water sampling.



TABLE 2
WELL CONSTRUCTION DETAILS
German Autocraft, 301 E. 14th Street, San Leandro, California



Boring/Well I.D.	Date	Boring Depth (feet)	Boring Diameter (inches)	Well Diameter (inches)	Well Depth (feet)	Screen Interval (feet bgs)	Slot Size (inches)	Drilling Method	Consultant
Groundwater Monitoring Wells									
MW-1	12/17/91	45	8	2	45	25-45	0.020	HSA	Environmental Const. Co.
MW-2	12/12/94	38	8	2	34	24-34	0.010	HSA	Chemist Enterprises
MW-3	12/12/94	38	8	2	35.5	25.5-35.5	0.010	HSA	Chemist Enterprises
MW-4	08/31/95	36.5	8	2	34	24-34	0.010	HSA	Chemist Enterprises
MW-1A	05/21/97	35	8	2	35	20-35	0.010	HSA	ALLCAL Prop. Serv. Inc.
MW-5	08/28/98	31.5	8	2	30	20-30	0.020	HSA	Env. Testing & Mgmt.
MW-6	08/27/98	36.5	8	2	35	20-35	0.020	HSA	Env. Testing & Mgmt.
MW-8	08/27/98	31.5	8	2	30	20-30	0.020	HSA	Env. Testing & Mgmt.
MW-9	08/31/98	36.5	8	2	35	20-35	0.020	HSA	Env. Testing & Mgmt.
MW-10	08/28/98	41.5	8	2	40	20-40	0.020	HSA	Env. Testing & Mgmt.
MW-11	08/28/98	36.5	8	2	35	20-35	0.020	HSA	Env. Testing & Mgmt.
MW-12	01/30/01	39.5	8	2	38	23-38	0.020	HSA	Env. Testing & Mgmt.
MW-13	01/30/01	38	8	2	38	23-38	0.020	HSA	Env. Testing & Mgmt.
MW-14	01/31/01	31.5	8	2	30	20-30	0.020	HSA	Env. Testing & Mgmt.
141 Farrelly	Prior to 1949	--	--	6	65	25-65	unknown	unknown	
Soil Borings									
B-1	12/11/90	36	8	--	--	--	--	HSA	Environmental Const. Co.
B-2	12/10/90	35	8	--	--	--	--	HSA	Environmental Const. Co.
B-3	12/10/90	35	8	--	--	--	--	HSA	Environmental Const. Co.
CE-1	12/13/94	30	8	--	--	--	--	HSA	Chemist Enterprises
CE-2	12/13/94	24.5	8	--	--	--	--	HSA	Chemist Enterprises
ETM-1	11/28/95	37	1	--	--	--	--	Geoprobe	Env. Testing & Mgmt.
ETM-2	11/28/95	30	1	--	--	--	--	Geoprobe	Env. Testing & Mgmt.
ETM-5	11/28-29/95	27	1	--	--	--	--	Geoprobe	Env. Testing & Mgmt.
ETM-6	11/29/95	29	1	--	--	--	--	Geoprobe	Env. Testing & Mgmt.
ETM-7	11/29/95	28	1	--	--	--	--	Geoprobe	Env. Testing & Mgmt.
ETM-10	11/30/95	27.3	1.5	--	--	--	--	Pneumatic	Env. Testing & Mgmt.
ETM-11	11/30/95	27.3	1.5	--	--	--	--	Pneumatic	Env. Testing & Mgmt.
ETM-17	03/25/96	30	1.5	--	--	--	--	Pneumatic	Env. Testing & Mgmt.
ETM-19	03/25/96	30	1.5	--	--	--	--	Pneumatic	Env. Testing & Mgmt.
ETM-21	03/26/96	24.5	1.5	--	--	--	--	Pneumatic	Env. Testing & Mgmt.
ETM-22	03/26/96	24.5	1.5	--	--	--	--	Pneumatic	Env. Testing & Mgmt.

Project Overview

REMEDIATION COMPLETED TO DATE:

- November 2007 – CAP submitted; provided technical and cost effectiveness evaluations of MNA, excavation, DPE, and bioremediation. Recommended 5-day AS/DPE pilot test
- Feb/Mar 2009 – performed approved 5-day HVDPE test; submitted report that stated that testing failed, too much water, not enough vapor flow, concluded that only horizontal DPE wells would be appropriate.
- October 2009 – ACDEH reviews DPE test report, requested work plan to install wells properly
- January 2010 – submitted work plan (ACDEH has not yet responded)



Project Overview

GEOLOGY

- Investigated subsurface with about 60 vertical soil borings, logged by an array of different geologists over the past 15+ years. Most logged on 5 ft intervals.
- In general, conditions are typical of alluvial deposits along the bay margin
- From surface to about 25 feet bgs, clayey sediments (lean clays to fat clays, and sandy clays) of low permeability (CL, ML)
- From 25 to 35 feet bgs (ranging from 3 to 13 feet in apparent thickness), a sandy unit of relatively higher permeability is present. This sandy layer is where groundwater is first encountered, and is generally clayey and silty sands (SM) with some clean sands (SP, SM)
- Beneath the sandy water-bearing unit, additional fine-grained soils are logged (max depth explored ~45 ft bgs)
- The sandy water-bearing unit appears to thicken and coarsen to the northwest of site (offsite, downgradient)
- Most recently, eight soil borings (SV-1 to SV-8) were continuously cored to depths of about 30 ft bgs.
 - Notably, within the thick upper section of vadose zone clays, an approximate 1-foot thick sand, clay with sand, clayey gravel or gravelly clay was encountered between 11 and 14 feet bgs (targeted in deep soil gas sample locations)

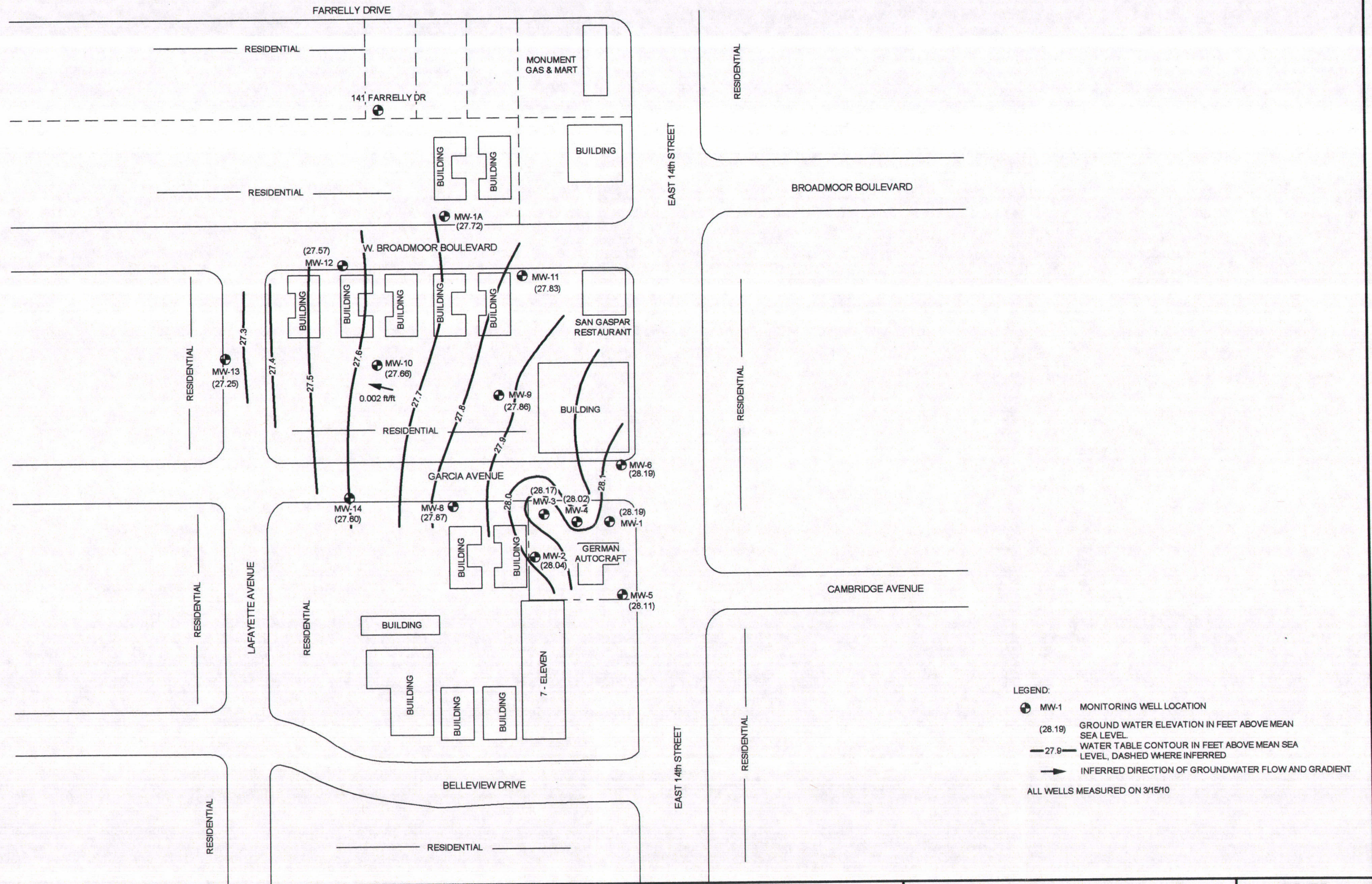
STRATUS
ENVIRONMENTAL, INC.

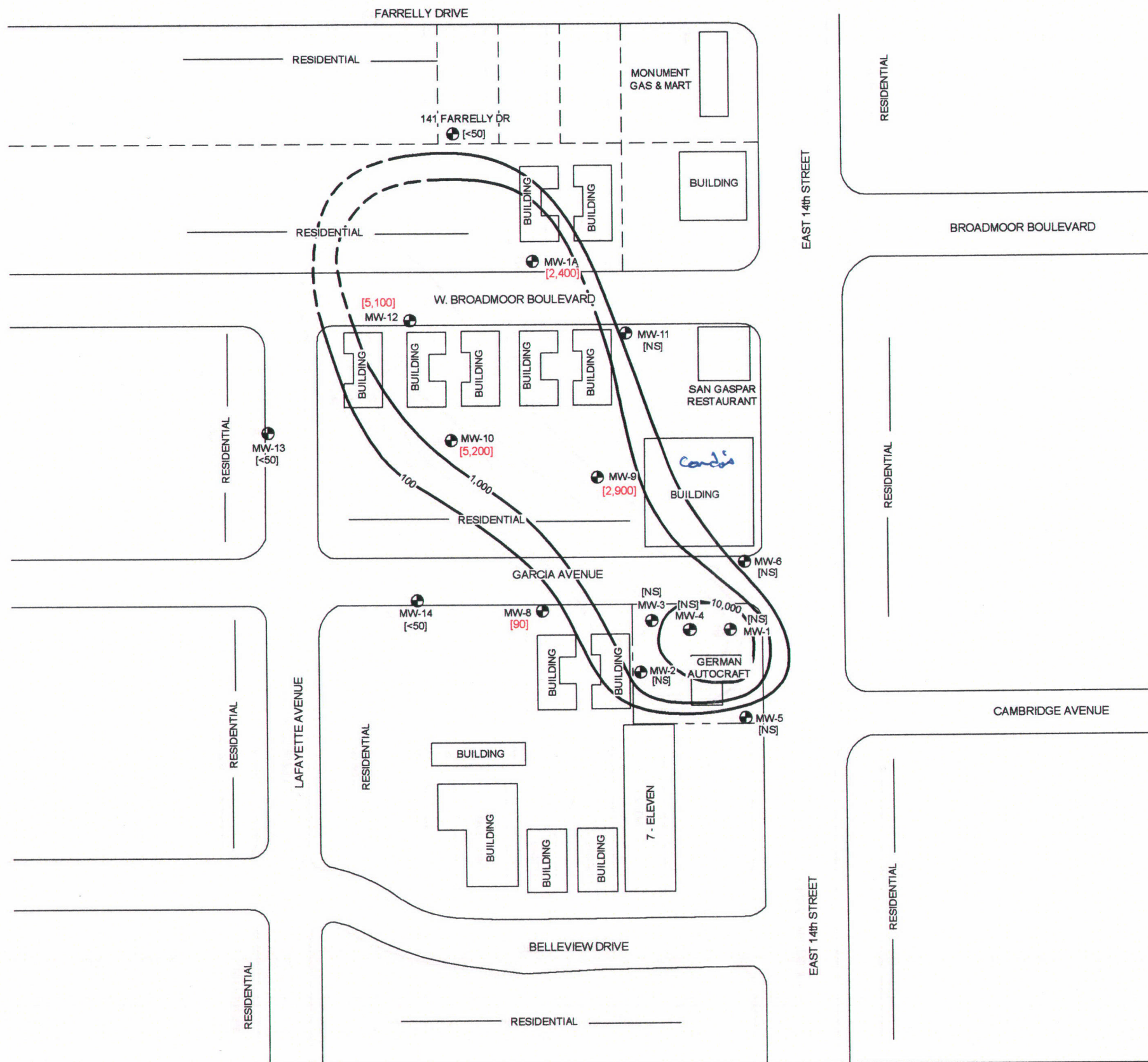
0 100 FT
SCALE

GERMAN AUTOCRAFT
301 EAST 14th STREET
SAN LEANDRO, CALIFORNIA

GROUNDWATER ELEVATION CONTOUR MAP
1st QUARTER 2010

FIGURE
2
PROJECT NO.
2076-0301-01





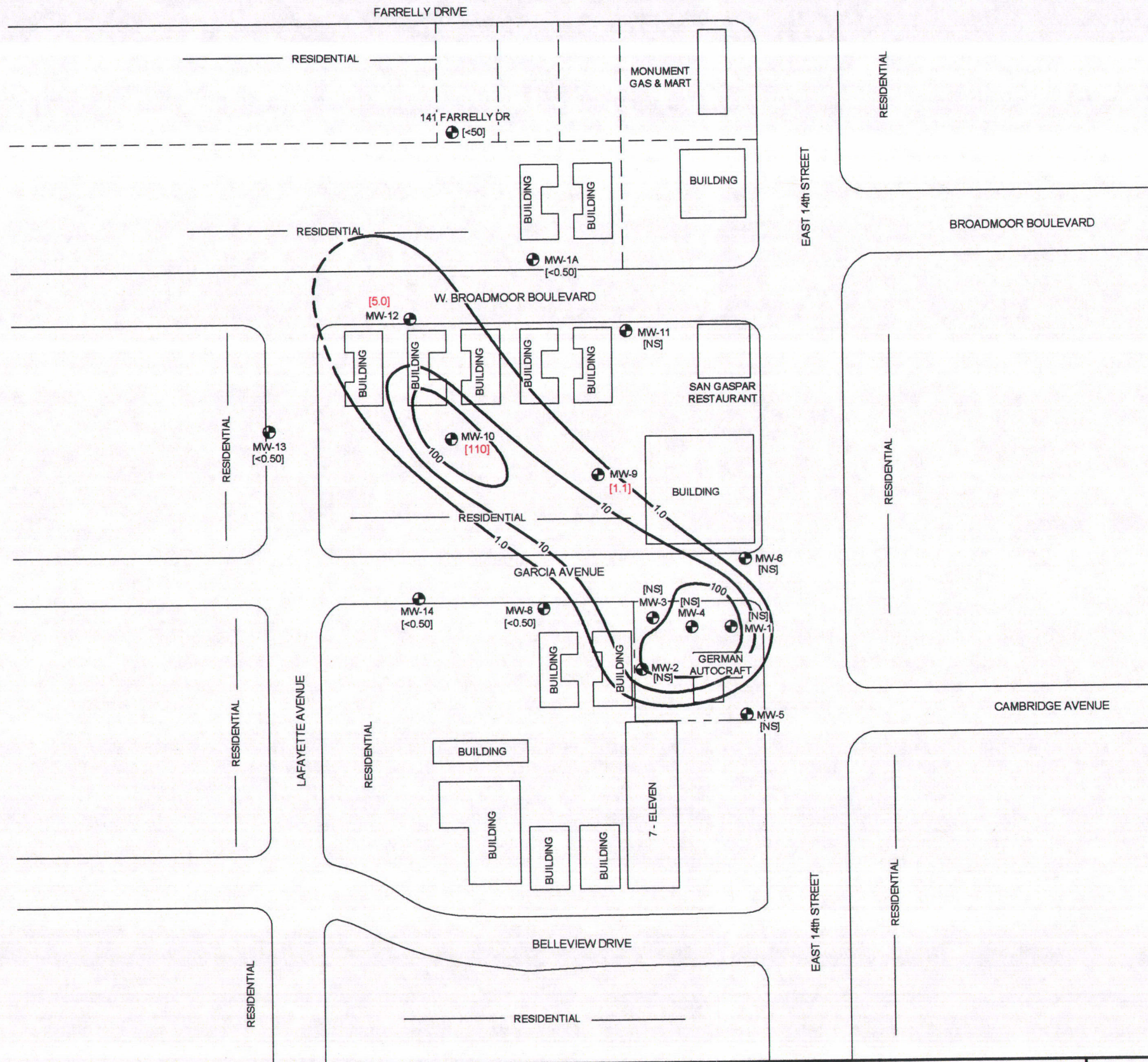
LEGEND:

- MW-1 MONITORING WELL LOCATION
- [<50] GASOLINE RANGE ORGANICS (GRO) CONCENTRATION IN µg/L
- 100 ISO-CONCENTRATION CONTOUR LINE, DASHED WHERE APPROXIMATE
- ALL WELLS SAMPLED ON 3/15/10
- GRO ANALYZED BY EPA METHOD 8015B
- [NS] = NOT SAMPLED
- ONSITE ISO-CONCENTRATION CONTOURS ESTIMATED USING LAST AVAILABLE SAMPLE RESULTS

0 100 FT
SCALE

GERMAN AUTOCRAFT
301 EAST 14th STREET
SAN LEANDRO, CALIFORNIA
GRO ISO-CONCENTRATION CONTOUR MAP
1st QUARTER 2010

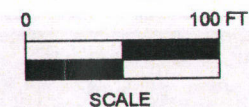
FIGURE
3
PROJECT NO.
2076-0301-01



LEGEND:

- MW-1 MONITORING WELL LOCATION
- [<0.50] BENZENE CONCENTRATION IN $\mu\text{g/L}$
- 1.0 ISO-CONCENTRATION CONTOUR LINE, DASHED WHERE APPROXIMATE

ALL WELLS SAMPLED ON 3/15/10
 BENZENE ANALYZED BY EPA METHOD 8260B
 [NS] = NOT SAMPLED
 ONSITE ISO-CONCENTRATION CONTOURS ESTIMATED USING LAST AVAILABLE SAMPLE RESULTS



GERMAN AUTOCRAFT
 301 EAST 14th STREET
 SAN LEANDRO, CALIFORNIA

BENZENE ISO-CONCENTRATION CONTOUR MAP
 1st QUARTER 2010

FIGURE
4
 PROJECT NO.
 2076-0301-01

Project Overview

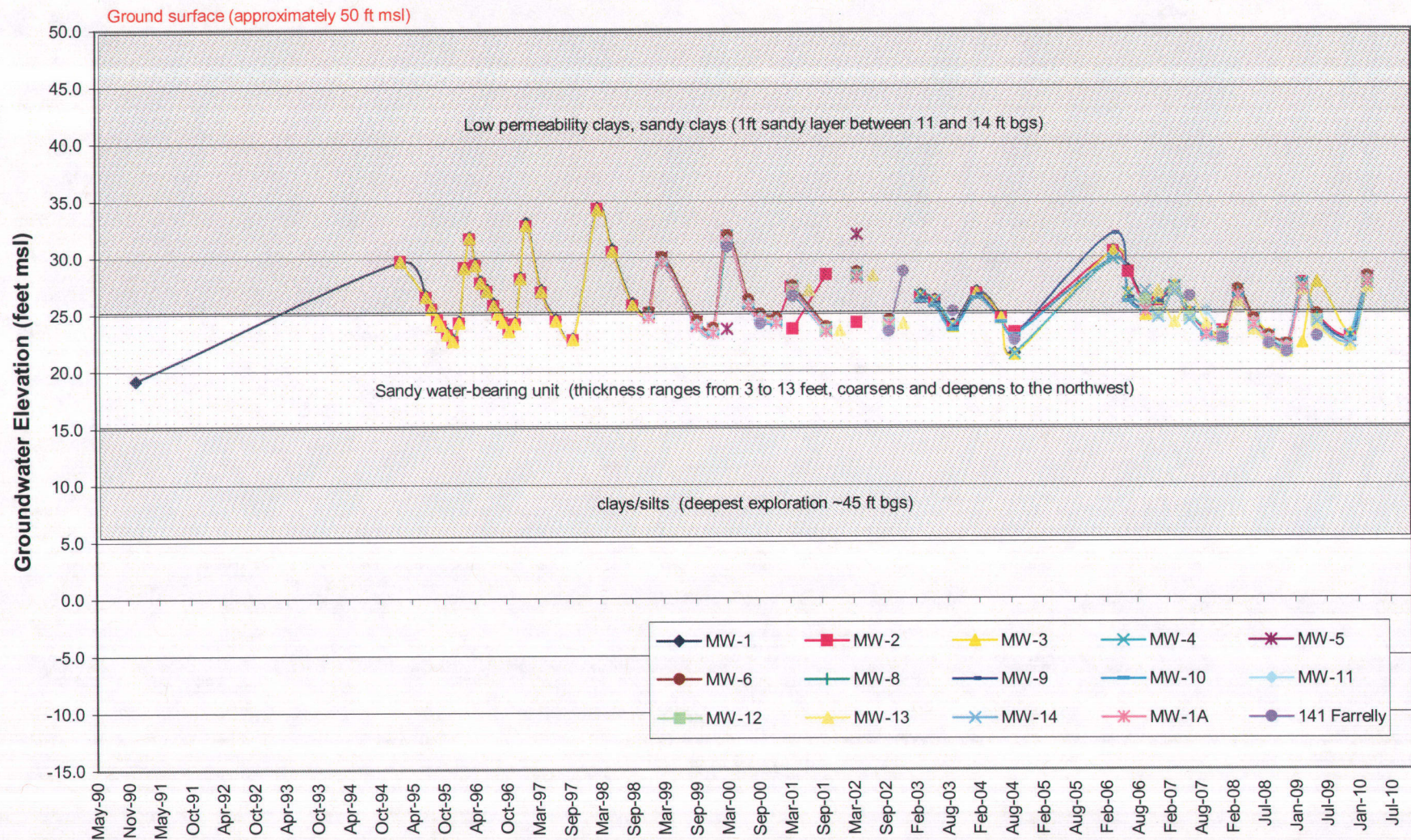
HYDROGEOLOGY

- Site about 2 miles east of SF Bay, west of Hayward Fault
- Number of wells in the area used seasonally by homeowners for irrigation purposes
- EBMUD is the local water supplier, using mainly imported or local reservoir water
- Regional groundwater flow is to the west, mimicking topography
- First encountered water beneath site in fairly continuous sandy unit at 25-35 feet bgs
- Groundwater occurrence and quality in this zone monitored by 14 wells
 - Screens generally start at about 20 feet bgs, and extend to between 30 and 40 feet bgs
- Monitoring well array includes 5 onsite wells, and 9 offsite wells spanning the entire city block west-northwest of the site, from Garcia Ave to Broadmoor Blvd
- One domestic well (141 Farrelly) –screened 25-65' bgs also incorporated into monitoring array – no detections
- DTW ranges 16 to 29 feet bgs; historic average is about 25 feet bgs
- Seasonal fluctuations of 5 to 10 feet are typical
- In the early 1990s water levels were somewhat lower (~30 feet bgs).
- During the 15 year monitoring period (1995 to 2010) groundwater elevations have generally remained consistent over time, though magnitude of annual fluctuations has decreased in last 7-8 years.
- Flow direction is consistently WNW, at relatively flat hydraulic gradient (0.00X)

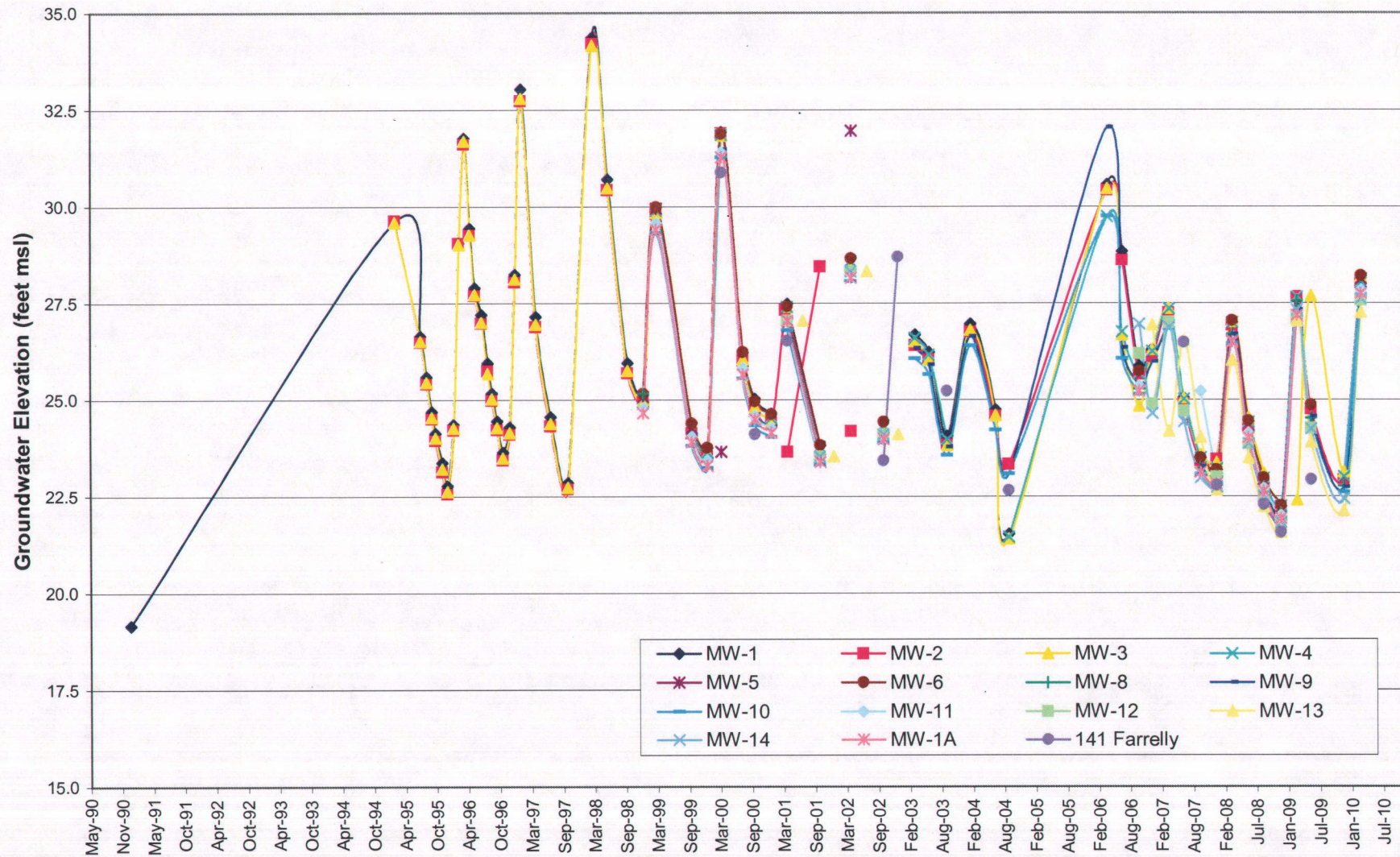


Groundwater Elevations vs. Time (Showing Conceptualized Hydrogeologic Conditions)

German Autocraft, 301 E 14th Street, San Leandro



German Autocraft, 301 E 14th Street, San Leandro



Project Overview

IMPACT TO GROUNDWATER

- Pre-1990 release – old degraded fuel
- Chemicals-of-concern are TPHg and BTEX (no MTBE)
- Onsite wells near former USTs (MW-1, -2, -3 and -4) indicate highest historic and current concentrations. Concentrations declining, but very slowly. TPHg onsite currently about 10,000 ug/L; benzene persisting around 1,000 ug/L
- Gradient is consistently WNW and COC plume axis oriented same
- Considerable migration of plume off-site across Garcia Ave (high concentrations in MW-9, -10 -12)
- Plume margins adequately defined by downgradient well 141 Farrelly and cross gradient wells MW-13, -14, -11, and -1A.
- No vertical assessment has been completed

Project Overview

CONCEPTUAL SITE MODEL

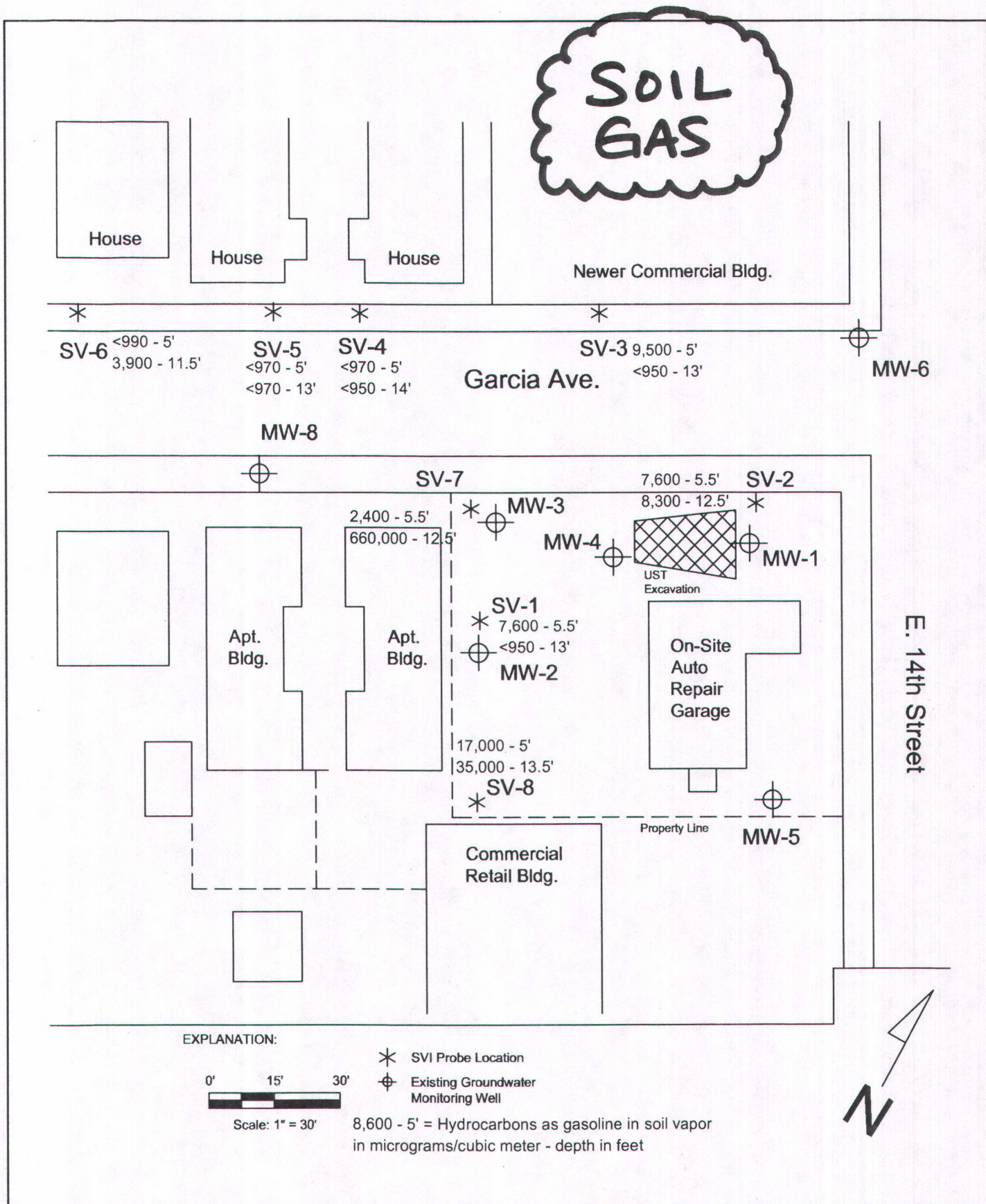
- Fairly simplistic SCM; pre-1990 fuel release at USTs
- Vadose impact near USTs (dispenser islands explored / not likely source area)
- Contamination seeped vertically through shallow clays, hit sandy water-bearing unit at 25 ft bgs
- Groundwater impact then spread laterally WNW orientation, with some radial dispersion since shallow gradient
- Groundwater fluctuations have most likely 'smeared' impact up into the lower portions of the overlying clayey material
- Since no new fuel releases since 1990, impact already reached what is expected to be its maximum extent
- In general, the plume is now experiencing natural attenuation at its edges but clearly requires active remediation at its source to remove source, accelerate attenuation, and move case to closure in reasonable timeframe.


Project Overview

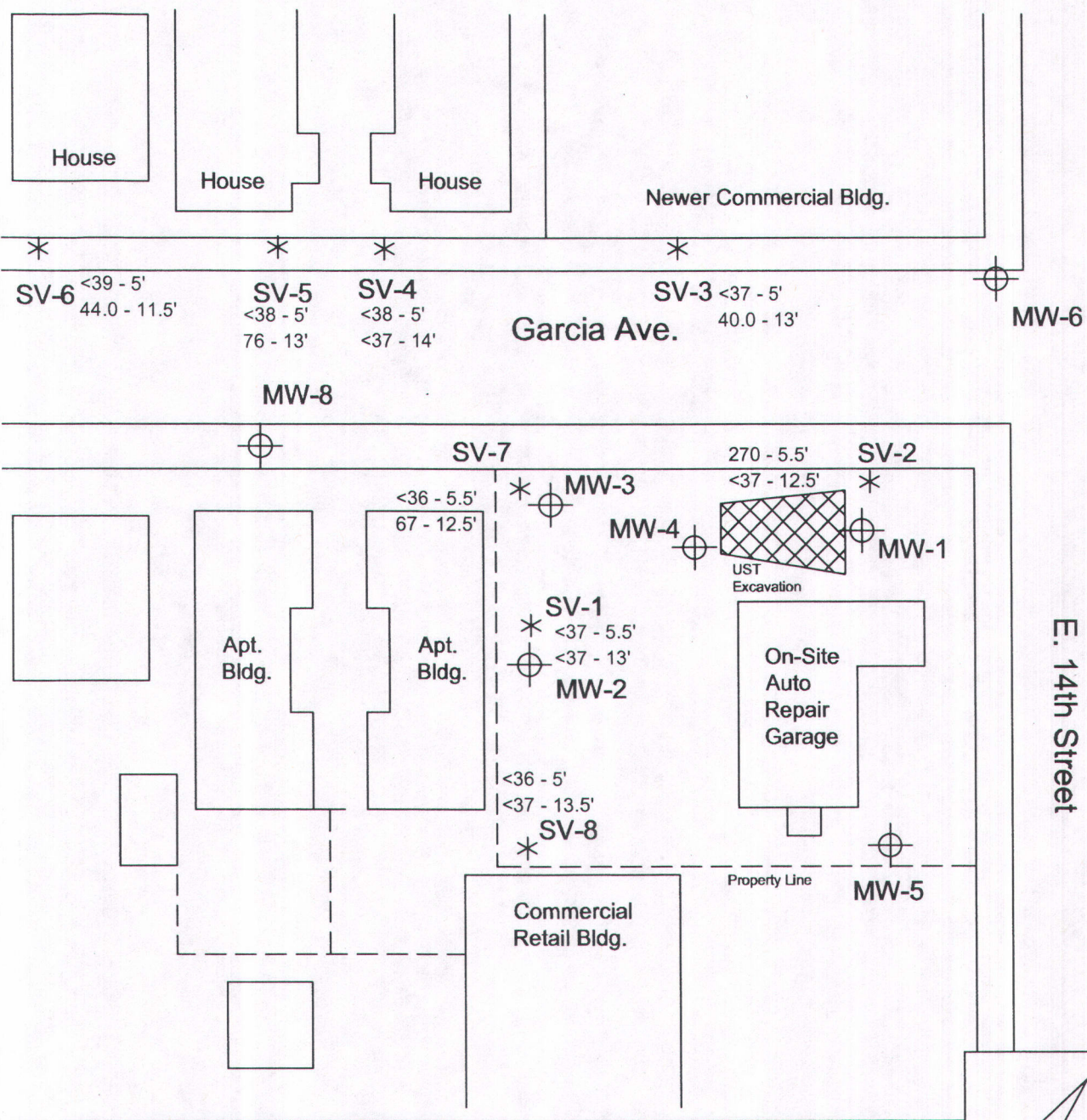
VAPOR INTRUSION RISK ASSESSMENT

- Eight dual-depth soil gas points installed/sampled January 2009
- 3 onsite along west property boundary adjoining apartments, 1 onsite near UST
- 4 offsite along north side of Garcia Blvd in front of residential
- Shallow points at about 5 feet bgs (within clays)
- Deeper points at about 12-14 feet bgs (within 1ft sandy layer IDed during cont. core)
- Results
 - In general deeper samples were more impacted (some exceptions)
 - Max TPHg (660,000 ug/m³) in deep at SV-7 (near MW-3) (shallow at same only 2,400 ug/m³)
 - Max benzene (270 ug/m³) in shallow SV-2 (near USTs)
- Conclusions
 - Significant vertical attenuation is occurring due to nature of the native soil
 - All soil gas results are below commercial ESLs (onsite) and residential ESLs (offsite), except shallow 5ft sample at SV-8 (south corner) in which TPHg = 17,000 ug/m³ (ESL is 10k)
 - Additional step out characterization at this one point not possible due to apt configuration; Stratus suggests resampling during/after some remedial efforts are taken.

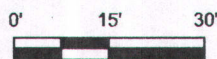




Groundwater  Cleaners Inc. <i>Cleaning California from the Groundwater Up</i> 347 Frederick Street, San Francisco, California, 94117 (415) 665-6181	German Autocraft 301 East 14th Street San Leandro, California	5
		Rev. A
	TPH-G IN SOIL VAPOR	02.02.09



EXPLANATION:

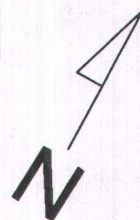


Scale: 1" = 30'

* SVI Probe Location

⊕ Existing Groundwater Monitoring Well

270 - 5' = Benzene in soil vapor in micrograms/cubic meter - depth in feet



Groundwater  **Cleaners Inc.**
Cleaning California from the Groundwater Up
347 Frederick Street, San Francisco, California, 94117
(415) 665-6181

German Autocraft
301 East 14th Street
San Leandro, California

BENZENE IN SOIL VAPOR

6

Rev. A

02.02.09

Table 2
Soil Vapor Analytical Data and Measurements

German Autocraft
301 East 14th Street, San Leandro, CA
by Modified EPA Method TO-15 using GC/MS in full scan mode

Sample Number depth (d) in feet	Date Sampled	TPH-g (µg/m³)	Benzene (µg/m³)	Toluene (µg/m³)	Ethylbenzene (µg/m³)	m,p-Xylene (µg/m³)	o-Xylene (µg/m³)	MtBE (µg/m³)	2-Propanol (µg/m³)	2-Propanol (µg/m³)	Average Measured 2-Propanol Shroud Concentration PID using CF=6 (µg/m³)	Drops of Isopropyl Alcohol in Shroud (drops)
Sub-Slab Soil Vapor											Shroud Atmosphere	
Laboratory Reported Analytical Results												
SV-1d5.5	01/13/09	7,600	<37	78	230	490	400	<42	<110	--	19,170	20
SV-1d13	01/13/09	<950	<37	<44	<50	<50	<50	<42	<110	--	33,916	20
SV-2d5.5	01/13/09	7,600	270	50	<50	<50	<50	<42	<110	--	33,916	20
SV-2d12.5	01/13/09	8,300	<37	<44	<50	<50	<50	<42	<110	--	53,086	20
SV-3d5	01/14/09	9,500	<37	<44	<50	<50	<50	<42	<110	--	126,816	10
SV-3d13	01/14/09	<950	40	67	<50	60	<50	<42	<110	--	131,240	10
QCSV-3d13	01/14/09	--	--	--	--	--	--	--	--	110,000	131,240	10
SV-4d5	01/14/09	<970	<38	<45	<52	<52	<52	<43	<120	--	42,763	12
SV-4d14	01/14/09	<950	<37	<44	<50	<50	<50	<42	<110	--	91,425	12
SV-5d5	01/14/09	<970	<38	<45	<52	<52	<52	<43	<120	--	30,967	10
SV-5d13	01/14/09	<970	76	120	<52	75	<52	<43	<120	--	33,916	10
SV-6d5	01/14/09	<990	<39	63	<52	85	<52	<44	<120	--	131,240	20
SV-6d11.5	01/14/09	3,900	44	130	<52	83	<52	<44	<120	--	106,171	10
QCSV-6d11.5	01/14/09	--	--	--	--	--	--	--	--	79,000	106,171	10
SV-7d5.5	01/13/09	2,400	<36	280	270	810	140	<41	<110	--	22,119	20
SV-7d12.5	01/13/09	660,000	67	170	440	1,200	240	<42	<110	--	70,781	20
SV-8d5	01/13/09	17,000	<36	340	530	1,800	290	<41	<110	--	10,322	10
SV-8d5(dup)	01/13/09	19,000	<36	320	500	1,600	270	<41	<110	--	10,322	10
SV-8d13.5	01/13/09	35,000	<37	<44	<50	280	250	<42	<110	--	23,594	15
Environmental Screening Level (ESL)												
Residential - Soil Gas		10,000	84	63,000	980	21,000	21,000	9,400	--			
Commercial - Soil Gas		29,000	280	180,000	3,300	58,000	58,000	31,000	--			

µg/m³ = Micrograms per cubic meter

< = Not Detected, less than laboratory reporting limit

ESL = SFRWQCB ESL (November 2007) for shallow soil gas screening level for evaluation of vapor intrusion concerns.

CF = Correction Factor for 2-propanol from isobutylene detected by PID (Literature Value = 6)

Bold = Concentration above Residential Soil Gas ESL

Bold = Concentration above Residential and Commercial Soil Gas ESL

Dup = Laboratory Duplicate Sample

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WELL CONSTRUCTION DETAILS
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<i>Soil Vapor Points</i>									
SV-1	01/06/09	30	2	0.25	6.0 13.5	5.5-6.0 13.0-13.5	-- --	Stratoprobe	Groundwater Cleaners, Inc.
SV-2	01/06/09	30	2	0.25	6.0 13.0	5.5-6.0 12.5-13.0	-- --	Stratoprobe	Groundwater Cleaners, Inc.
SV-3	01/08/09	30	2	0.25	5.5 13.5	5.0-5.5 13.0-13.5	-- --	Stratoprobe	Groundwater Cleaners, Inc.
SV-4	01/08/09	14.5	2	0.25	5.5 14.5	5.0-5.5 14.0-14.5	-- --	Stratoprobe	Groundwater Cleaners, Inc.
SV-5	01/07/09	24	2	0.25	5.5 14.0	5.0-5.5 13.5-14.0	-- --	Stratoprobe	Groundwater Cleaners, Inc.
SV-6	01/07/09	35	2	0.25	5.5 12.0	5.0-5.5 11.5-12.0	-- --	Stratoprobe	Groundwater Cleaners, Inc.
SV-7	01/06/08	30	2	0.25	6.0 13.0	5.5-6.0 12.5-13.0	-- --	Stratoprobe	Groundwater Cleaners, Inc.
SV-8	01/08/09	14	2	0.25	5.5 14.0	5.0-5.5 13.5-14.0	-- --	Stratoprobe	Groundwater Cleaners, Inc.
Notes: HSA = hollow stem auger									

Recommended Additional Work

- Pilot-scale DPE testing (or AS/SVE – need to talk about)
 - Submit Work Plan for pilot test, including dedicated extraction wells
 - Submit to ACDEH by **August 31, 2010**
 - Perform testing by end of 2010
- CAP Preparation
 - Prepare/ submit to ACDEH a final CAP for full-scale DPE
 - Will include pilot test results
 - Will include work plan for additional wells, as needed
 - Will include schedule
 - Anticipate submittal to SCDEH by **February 15, 2011**
- CAP Implementation
 - Design
 - Permitting (PG&E, EBMUD, BAAQMD, building)
 - Well Installations
 - Construction
 - Installation
 - Startup – **anticipated around September 2011**



Outstanding Issues

- In response to CGI's vapor intrusion and DPE testing early 2009 reports, ACDEH wrote a response letter in October 2009. CGI then submitted a work plan dated January 2010 (which ACDEH has not yet reviewed).
- ACDEH concern: Characterization of soil vapor plume not complete to the west of site
- Stratus response: Additional step out characterization to west is not possible due to apartment configuration; Stratus suggests resampling during/after some remedial efforts are taken.
- ACDEH concern: DPE/ AS test failed due to well diameter/spacing; premature to install horizontal wells; need new plan
- Stratus response: Agree with ACDEH; test performed inadequately, Stratus will install wells properly and perform DPE test.
- ACDEH concern: Incomplete data submittals (logs for MW-4, -7, ETM-3, -4, -8, -9, -12, -13, -14, -15, -16, -18, -20, -23 to -40; map locations for ETM-6 and -16)
- Stratus response:
 - No well MW-7 exists
 - MW-4 log included in 3Q95 environmental activities report (dated 10/2/95).
 - For ETM borings, per the *Continued Soil and Water and Offsite Investigation Report* (dated 7/12/96), ETM drilled 40 probe holes but logged only 11 of them. Logs included in their report.
 - ETM didn't provide locations of -6 or -16 (see report)



Outstanding Issues

- ACDEH concern: Discrepancies in well construction and field well measurements
- Stratus response: Our QM during 1Q10 indicates no depth discrepancies exceeding a foot, except MW-5 that appears to be silted up by ~4ft. We will redevelop.
- ACDEH concern: Future monitoring well screens limit to 5 feet
- Stratus response: While agreed that shorter screens limit dilution effects, the shortening of screens after 15+ yrs of monitoring at a site renders wells useless for overall comparison in water levels and analytical results to other wells that penetrate differently and make discerning MNA trends, or calculating first-order decay or fate modeling problematic. No new monitoring wells are likely needed, however.
- ACDEH concern: Need to investigate former pump island; drill at least 1 boring
- Stratus response: Area previously investigated in December 1990 (boring B-1). This data was included in CGI's January 2010 work plan as an appendix
- ACDEH concern: Preferential pathway study (utility and well search) needs to be conducted
- Stratus response: Formerly conducted; presented in 2007 CAP. No pathways IDed
- Other issues?
 - 141 Farrelly well owner wants to 'use' his well again - asked us during 1Q10 QM event



ICS Forms

The ICS uses a series of standard forms and supporting documents that convey directions for the accomplishment of the objectives and distributing information. Listed below are the standard ICS form titles and descriptions of each form:

Standard Form Title	Description
Incident Action Plan Cover Page ICS 200	Indicates the incident name, plan operational period, date prepared, approvals, and attachments (resources, organization, Communications Plan, Medical Plan, and other appropriate information).
Incident Briefing ICS 201	Provides the Incident Command/Unified Command and General Staffs with basic information regarding the incident situation and the resources allocated to the incident. This form also serves as a permanent record of the initial response to the incident.
Incident Objectives ICS 202	Describes the basic strategy and objectives for use during each operational period.
Organization Assignment List ICS 203	Provides information on the response organization and personnel staffing.
Field Assignment ICS 204	Used to inform personnel of assignments. After Incident Command/Unified Command approve the objectives, staff members receive the assignment information contained in this form.
Incident Communications Plan ICS 205	Provides, in one location, information on the assignments for all communications equipment for each operational period. The plan is a summary of information. Information from the Incident Communications Plan on frequency assignments can be placed on the appropriate Assignment form (ICS Form 204).
Medical Plan ICS 206	Provides information on incident medical aid stations, transportation services, hospitals, and medical emergency procedures.
Incident Status Summary ICS 209	Summarizes incident information for staff members and external parties, and provides information to the Public Information Officer for preparation of media releases.
Check-In/Out List ICS 211	Used to check in personnel and equipment arriving at or departing from the incident. Check-in/out consists of reporting specific information that is recorded on the form.
General Message ICS 213	Used by: <ul style="list-style-type: none"> Incident dispatchers to record incoming messages that cannot be orally transmitted to the intended recipients. EOC and other incident personnel to transmit messages via radio or telephone to the addressee. Incident personnel to send any message or notification that requires hard-copy delivery to other incident personnel.

ICS Forms (Continued)

Standard Form Title	Description
Unit Log ICS 214	Provides a record of unit activities. Unit Logs can provide a basic reference from which to extract information for inclusion in any after-action report.
Operational Planning Worksheet ICS 215	Documents decisions made concerning resource needs for the next operational period. The Planning Section uses this Worksheet to complete Assignment Lists, and the Logistics Section uses it for ordering resources for the incident. This form may be used as a source document for updating resource information on other ICS forms such as the ICS 209.
Incident Action Plan Safety Analysis ICS 215A	Communicates to the Operations and Planning Section Chiefs safety and health issues identified by the Safety Officer.
Air Operations Summary ICS 220	Provides information on air operations including the number, type, location, and specific assignments of helicopters and fixed-wing aircraft.
General Plan ICS 226	Addresses long-term objectives approved by Incident Command/ Unified Command. These objectives are often expressed as milestones (i.e., timeframes for the completion of all and/or portions of incident response operations). A General Plan should identify the major tasks to be carried out through to the end of emergency response operations, the duration of the tasks, and the major equipment and personnel resources needed to accomplish the tasks within the specified duration.

Command Staff

The Command Staff is assigned to carry out staff functions needed to support the Incident Commander. These functions include interagency liaison, incident safety, and public information.

Command Staff positions are established to assign responsibility for key activities not specifically identified in the General Staff functional elements. These positions may include the Public Information Officer, Safety Officer, and Liaison Officer, in addition to various others, as required and assigned by the Incident Commander.

The table on the following page summarizes the responsibilities of the Command Staff.

General Staff

The General Staff represents and is responsible for the functional aspects of the incident command structure. The General Staff typically consists of the Operations, Planning, Logistics, and Finance/Administration Sections.

General guidelines related to General Staff positions include the following:

- Only one person will be designated to lead each General Staff position.
- General Staff positions may be filled by qualified persons from any agency or jurisdiction.
- Members of the General Staff report directly to the Incident Commander. If a General Staff position is not activated, the Incident Commander will have responsibility for that functional activity.
- Deputy positions may be established for each of the General Staff positions. Deputies are individuals fully qualified to fill the primary position. Deputies can be designated from other jurisdictions or agencies, as appropriate. This is a good way to bring about greater interagency coordination.
- General Staff members may exchange information with any person within the organization. Direction takes place through the chain of command. This is an important concept in ICS.
- General Staff positions should not be combined. For example, to establish a "Planning and Logistics Section," it is better to initially create the two separate functions, and if necessary for a short time place one person in charge of both. That way, the transfer of responsibility can be made easier.

The following table summarizes the responsibilities of the Command and General Staff.

Command Staff	Responsibilities
Public Information Officer	<ul style="list-style-type: none"> ▪ Determine, according to direction from the IC, any limits on information release. ▪ Develop accurate, accessible, and timely information for use in press/media briefings. ▪ Obtain IC's approval of news releases. ▪ Conduct periodic media briefings. ▪ Arrange for tours and other interviews or briefings that may be required. ▪ Monitor and forward media information that may be useful to incident planning. ▪ Maintain current information, summaries, and/or displays on the incident. ▪ Make information about the incident available to incident personnel. ▪ Participate in the planning meeting.
Safety Officer	<ul style="list-style-type: none"> ▪ Identify and mitigate hazardous situations. ▪ Ensure safety messages and briefings are made. ▪ Exercise emergency authority to stop and prevent unsafe acts. ▪ Review the Incident Action Plan for safety implications. ▪ Assign assistants qualified to evaluate special hazards. ▪ Initiate preliminary investigation of accidents within the incident area. ▪ Review and approve the Medical Plan. ▪ Participate in planning meetings.
Liaison Officer	<ul style="list-style-type: none"> ▪ Act as a point of contact for agency representatives. ▪ Maintain a list of assisting and cooperating agencies and agency representatives. ▪ Assist in setting up and coordinating interagency contacts. ▪ Monitor incident operations to identify current or potential interorganizational problems. ▪ Participate in planning meetings, providing current resource status, including limitations and capabilities of agency resources. ▪ Provide agency-specific demobilization information and requirements.
Assistants	In the context of large or complex incidents, Command Staff members may need one or more assistants to help manage their workloads. Each Command Staff member is responsible for organizing his or her assistants for maximum efficiency.
Additional Command Staff	Additional Command Staff positions may also be necessary depending on the nature and location(s) of the incident, and/or specific requirements established by the Incident Commander. For example, a Legal Counsel may be assigned directly to the Command Staff to advise the Incident Commander on legal matters, such as emergency proclamations, legality of evacuation orders, and legal rights and restrictions pertaining to media access. Similarly, a Medical Advisor may be designated and assigned directly to the Command Staff to provide advice and recommendations to the Incident Commander in the context of incidents involving medical and mental health services, mass casualty, acute care, vector control, epidemiology, and/or mass prophylaxis considerations, particularly in the response to a bioterrorism event.

Source: NIMS

General Staff	Responsibilities
Operations Section Chief	<p>The Operations Section Chief is responsible for managing all tactical operations at an incident. The Incident Action Plan (IAP) provides the necessary guidance. The need to expand the Operations Section is generally dictated by the number of tactical resources involved and is influenced by span of control considerations.</p> <p>Major responsibilities of the Operations Section Chief are to:</p> <ul style="list-style-type: none"> ▪ Assure safety of tactical operations. ▪ Manage tactical operations. ▪ Develop the operations portion of the IAP. ▪ Supervise execution of operations portions of the IAP. ▪ Request additional resources to support tactical operations. ▪ Approve release of resources from active operational assignments. ▪ Make or approve expedient changes to the IAP. ▪ Maintain close contact with IC, subordinate Operations personnel, and other agencies involved in the incident.
Planning Section Chief	<p>The Planning Section Chief is responsible for providing planning services for the incident. Under the direction of the Planning Section Chief, the Planning Section collects situation and resources status information, evaluates it, and processes the information for use in developing action plans. Dissemination of information can be in the form of the IAP, in formal briefings, or through map and status board displays.</p> <p>Major responsibilities of the Planning Section Chief are to:</p> <ul style="list-style-type: none"> ▪ Collect and manage all incident-relevant operational data. ▪ Supervise preparation of the IAP. ▪ Provide input to the IC and Operations in preparing the IAP. ▪ Incorporate Traffic, Medical, and Communications Plans and other supporting materials into the IAP. ▪ Conduct and facilitate planning meetings. ▪ Reassign personnel within the ICS organization. ▪ Compile and display incident status information. ▪ Establish information requirements and reporting schedules for units (e.g., Resources, Situation Units). ▪ Determine need for specialized resources. ▪ Assemble and disassemble Task Forces and Strike Teams not assigned to Operations. ▪ Establish specialized data collection systems as necessary (e.g., weather). ▪ Assemble information on alternative strategies. ▪ Provide periodic predictions on incident potential. ▪ Report significant changes in incident status. ▪ Oversee preparation of the Demobilization Plan.

General Staff	Responsibilities
Logistics Section Chief	<p>The Logistics Section Chief provides all incident support needs with the exception of logistics support to air operations. The Logistics Section is responsible for providing:</p> <ul style="list-style-type: none"> ▪ Facilities. ▪ Transportation. ▪ Communications. ▪ Supplies. ▪ Equipment maintenance and fueling. ▪ Food services (for responders). ▪ Medical services (for responders). ▪ All off-incident resources. <p>Major responsibilities of the Logistics Section Chief are to:</p> <ul style="list-style-type: none"> ▪ Provide all facilities, transportation, communications, supplies, equipment maintenance and fueling, food and medical services for incident personnel, and all off-incident resources. ▪ Manage all incident logistics. ▪ Provide logistical input to the IAP. ▪ Brief Logistics Staff as needed. ▪ Identify anticipated and known incident service and support requirements. ▪ Request additional resources as needed. ▪ Ensure and oversee the development of the Communications, Medical, and Traffic Plans as required. ▪ Oversee demobilization of the Logistics Section and associated resources.
Finance/ Administration Section Chief	<p>The Finance/Administration Section Chief is responsible for managing all financial aspects of an incident. Not all incidents will require a Finance/Administration Section. Only when the involved agencies have a specific need for finance services will the Section be activated.</p> <p>Major responsibilities of the Finance/Administration Section Chief are to:</p> <ul style="list-style-type: none"> ▪ Manage all financial aspects of an incident. ▪ Provide financial and cost analysis information as requested. ▪ Ensure compensation and claims functions are being addressed relative to the incident. ▪ Gather pertinent information from briefings with responsible agencies. ▪ Develop an operating plan for the Finance/Administration Section and fill Section supply and support needs. ▪ Determine the need to set up and operate an incident commissary. ▪ Meet with assisting and cooperating agency representatives as needed. ▪ Maintain daily contact with agency(s) headquarters on finance matters. ▪ Ensure that personnel time records are completed accurately and transmitted to home agencies. ▪ Ensure that all obligation documents initiated at the incident are properly prepared and completed. ▪ Brief agency administrative personnel on all incident-related financial issues needing attention or followup. ▪ Provide input to the IAP.

Check-In: The process whereby resources first report to an incident. Check-in locations include: Incident Command Post (Resources Unit), Incident Base, Camps, Staging Areas, Helibases, Helispots, and Division Supervisors (for direct line assignments).

Command Staff: The Command Staff consists of the Public Information Officer, Safety Officer, and Liaison Officer. They report directly to the Incident Commander. They may have an Assistant or Assistants, as needed.

Compensation/Claims Unit: Functional Unit within the Finance/Administration Section responsible for financial concerns resulting from property damage, injuries, or fatalities at the incident.

Division: Divisions are used to divide an incident into geographical areas of operation. A Division is located within the ICS organization between the Branch and the Task Force/Strike Team. (See Group.) Divisions are identified by alphabetic characters for horizontal applications and, often, by floor numbers when used in buildings.

Emergency Operations Plan (EOP): The plan that each jurisdiction has and maintains for responding to appropriate hazards.

Finance/Administration Section: The Section responsible for all incident costs and financial considerations. Includes the Time Unit, Procurement Unit, Compensation/Claims Unit, and Cost Unit.

General Staff: A group of incident management personnel organized according to function and reporting to the Incident Commander. The General Staff normally consists of the Operations Section Chief, Planning Section Chief, Logistics Section Chief, and Finance/Administration Section Chief.

Incident Action Plan (IAP): An oral or written plan containing general objectives reflecting the overall strategy for managing an incident. It may include the identification of operational resources and assignments. It may also include attachments that provide direction and important information for management of the incident during one or more operational periods.

Incident Commander (IC): The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all incident operations at the incident site.

Incident Command System (ICS): A standardized on-scene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. It is used for all kinds of emergencies and is applicable to small as well as large and complex incidents. ICS is used by various jurisdictions and functional agencies, both public and private, to organize field-level incident management operations.

Incident Objectives: Statements of guidance and direction necessary for the selection of appropriate strategy(ies), and the tactical direction of resources. Incident objectives are based on realistic expectations of what can be accomplished when all allocated resources have been effectively deployed. Incident objectives must be achievable and measurable, yet flexible enough to allow for strategic and tactical alternatives.

Leader: The ICS title for an individual responsible for a Task Force, Strike Team, or functional Unit.

Liaison: A form of communication for establishing and maintaining mutual understanding and cooperation.

Liaison Officer (LNO): A member of the Command Staff responsible for coordinating with representatives from cooperating and assisting agencies. The Liaison Officer may have Assistants.

Logistics: Providing resources and other services to support incident management.

Logistics Section: The Section responsible for providing facilities, services, and materials for the incident.

Management by Objective: A management approach that involves a four-step process for achieving the incident goal. The Management by Objectives approach includes the following: establishing overarching objectives; developing and issuing assignments, plans, procedures, and protocols; establishing specific, measurable objectives for various incident management functional activities and directing efforts to fulfill them, in support of defined strategic objectives; and documenting results to measure performance and facilitate corrective action.

Medical Unit: Functional Unit within the Service Branch of the Logistics Section responsible for the development of the Medical Emergency Plan, and for providing emergency medical treatment of incident personnel.

National Incident Management System (NIMS): A system mandated by HSPD-5 that provides a consistent nationwide approach for Federal, State, local, and tribal governments; the private-sector; and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity. To provide for interoperability and compatibility among Federal, State, local, and tribal capabilities, the NIMS includes a core set of concepts, principles, and terminology. HSPD-5 identifies these as the ICS; multiagency coordination systems; training; identification and management of resources (including systems for classifying types of resources); qualification and certification; and the collection, tracking, and reporting of incident information and incident resources.

Operations Section: The Section responsible for all tactical operations at the incident. Includes Branches, Divisions and/or Groups, Task Forces, Strike Teams, Single Resources, and Staging Areas.

Planning Section: Responsible for the collection, evaluation, and dissemination of information related to the incident, and for the preparation and documentation of Incident Action Plans. The Section also maintains information on the current and forecasted situation, and on the status of

resources assigned to the incident. Includes the Situation, Resources, Documentation, and Demobilization Units, as well as Technical Specialists.

Preparedness: The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from domestic incidents. Preparedness is a continuous process. Preparedness involves efforts at all levels of government and between government and private-sector and nongovernmental organizations to identify threats, determine vulnerabilities, and identify required resources. Within the NIMS, preparedness is operationally focused on establishing guidelines, protocols, and standards for planning, training and exercises, personnel qualification and certification, equipment certification, and publication management.

Public Information Officer (PIO): A member of the Command Staff responsible for interfacing with the public and media or with other agencies with incident-related information requirements.

Safety Officer: A member of the Command Staff responsible for monitoring and assessing safety hazards or unsafe situations, and for developing measures for ensuring personnel safety. The Safety Officer may have Assistants.

Service Branch: A Branch within the Logistics Section responsible for service activities at the incident. Includes the Communication, Medical, and Food Units.

Situation Unit: Functional Unit within the Planning Section responsible for the collection, organization, and analysis of incident status information, and for analysis of the situation as it progresses. Reports to the Planning Section Chief.

Unified Command: An application of ICS used when there is more than one agency with incident jurisdiction or when incidents cross political jurisdictions. Agencies work together through the designated members of the Unified Command, often the senior person from agencies and/or disciplines participating in the Unified Command, to establish a common set of objectives and strategies and a single Incident Action Plan.

ICS Features

Standardization

- **Common Terminology:** Using common terminology helps to define organizational functions, incident facilities, resource descriptions, and position titles.

Command

- **Establishment and Transfer of Command:** The command function must be clearly established from the beginning of an incident. When command is transferred, the process must include a briefing that captures all essential information for continuing safe and effective operations.
- **Chain of Command and Unity of Command:** Chain of command refers to the orderly line of authority within the ranks of the incident management organization. Unity of command means that every individual has a designated supervisor to whom he or she reports at the scene of the incident. These principles clarify reporting relationships and eliminate the confusion caused by multiple, conflicting directives. Incident managers at all levels must be able to control the actions of all personnel under their supervision.

Planning/Organizational Structure

- **Management by Objectives:** Includes establishing overarching objectives; developing and issuing assignments, plans, procedures, and protocols; establishing specific, measurable objectives for various incident management functional activities; and directing efforts to attain the established objectives.
- **Modular Organization:** The Incident Command organizational structure develops in a top-down, modular fashion that is based on the size and complexity of the incident, as well as the specifics of the hazard environment created by the incident.
- **Incident Action Planning:** Incident Action Plans (IAPs) provide a coherent means of communicating the overall incident objectives in the contexts of both operational and support activities.
- **Manageable Span of Control:** Span of control is key to effective and efficient incident management. Within ICS, the span of control of any individual with incident management supervisory responsibility should range from three to seven subordinates.

Facilities and Resources

- **Incident Locations and Facilities:** Various types of operational locations and support facilities are established in the vicinity of an incident to accomplish a variety of purposes. Typical predesignated facilities include Incident Command Posts, Bases, Camps, Staging Areas, Mass Casualty Triage Areas, and others as required.
- **Comprehensive Resource Management:** Resource management includes processes for categorizing, ordering, dispatching, tracking, and recovering resources. It also includes processes for reimbursement for resources, as appropriate. Resources are defined as personnel, teams, equipment, supplies, and facilities available or potentially available for assignment or allocation in support of incident management and emergency response activities.

Communications/Information Management

- **Integrated Communications:** Incident communications are facilitated through the development and use of a common communications plan and interoperable communications processes and architectures.
- **Information and Intelligence Management:** The incident management organization must establish a process for gathering, sharing, and managing incident-related information and intelligence.

Professionalism

- **Accountability:** Effective accountability at all jurisdictional levels and within individual functional areas during incident operations is essential. To that end, the following principles must be adhered to:
 - **Check-In:** All responders, regardless of agency affiliation, must report in to receive an assignment in accordance with the procedures established by the Incident Commander.
 - **Incident Action Plan:** Response operations must be directed and coordinated as outlined in the IAP.
 - **Unity of Command:** Each individual involved in incident operations will be assigned to only one

supervisor.

- **Span of Control:** Supervisors must be able to adequately supervise and control their subordinates, as well as communicate with and manage all resources under their supervision.
- **Resource Tracking:** Supervisors must record and report resource status changes as they occur.
- **Dispatch/Deployment:** Personnel and equipment should respond only when requested or when dispatched by an appropriate authority.