DEPARTMENT OF THE ARMY
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DRAFT

FORMER COMMUNICATIONS SITE SUB-SLAB DEPRESSURIZATION PILOT STUDY REPORT

FORT WAINWRIGHT, ALASKA
JUNE 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 07

Prepared by
Jacobs Engineering Group Inc.
4300 B Street, Suite 600
Anchorage, Alaska 99503

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ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
CH	core hole (for example, CH08)
DoD	Department of Defense
EPA	U.S. Environmental Protection Agency
FCS	former communication site
ft	feet
HDPE	high density polyethylene
in	inch
ITRC	Interstate Technology Research Council
Jacobs	Jacobs Engineering Group Inc.
m	meter
mm	millimeter
Pa	pascal
ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
RTH	remote test hole
SF_6	sulfur hexafluoride
SFH	single-family home
SSD	sub-slab depressurization
USACE	U.S. Army Corps of Engineers
VI	vapor intrusion
VOC	volatile organic compound

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1.0 INTRODUCTION

A pilot scale study of sub-slab depressurization (SSD) systems was conducted in four duplexes to determine if an SSD system could prevent potential future volatile organic compounds (VOCs) from entering a housing duplex via vapor intrusion (VI) at Taku Gardens located on the Former Communication Site (FCS) in Fort Wainwright, Alaska (Figure A-1). Jacobs Engineering Group Inc. (Jacobs) conducted this study on behalf of the U.S. Army Engineer District, Alaska (USAED) under the Environmental Remediation Services Contract W911KB-06-D-0006, Task Order No. 07.

The pilot scale study was conducted from January to March 2011 to determine the effectiveness and feasibility of installing an SSD system in all of the Taku Gardens duplexes to prevent VI, should it ever be deemed appropriate in the future. The testing was conducted in the winter months, as these represent the worst-case environmental and building conditions for VI potential. The frozen winter ground increases the tendency of vapor phase contaminants to accumulate under building footprints, as they move from high pressure (frozen ground) to low pressure (aggregate in a building foundation). If a home is less pressurized than the ambient and subsurface conditions, a negative pressure differential can be created between the interior of the house (lower pressure) and the sub-slab material and surrounding soils (higher pressure). This could induce the transport of contaminated vapors toward and into the structure. If this were to occur, vapors could permeate through the foundation slab of the housing units, where building occupants could come in contact with them.

This report was prepared to present the pilot scale test results, and recommendations for site wide installation of SSD systems, should it ever become necessary at the FCS.

1.1 SUB-SLAB DEPRESSURIZATION SYSTEMS

The principal mechanisms that cause VOCs in soil vapor to migrate through the soil and into buildings are diffusion and advection of vapors. Diffusion is the mechanism by which soil gas moves from an area of high to low concentration due to an attempt to achieve equilibrium, usually induced by concentration gradient. Grain size and moisture content have an impact on

the rate of diffusion; high moisture content prohibits air movement and VOC migration and small, compact grains typically have slower diffusion rates than larger, looser grains such as sandy and gravely soil. Advective transport is the actual movement of the VOC vapors due to differences in pressure. The advective properties of vapor cause it to move more easily through routes of least resistance (i.e., preferential pathways) such as those created by coarser materials used for sub-base materials, pipe beddings, or French drains.

The general principle of an SSD system is to remove volatile compounds that may be present in soil gas before they can enter the home. It works by creating a pressure differential between the interior of the building and the sub-slab environment, forcing air movement directly to the suction point via advective transport. Active SSD involves inserting one or more suction pipes into the aggregate or soil beneath a concrete slab, either vertically down through the slab from the space above, or horizontally through a foundation wall below slab level from outdoors. Suction is created in these pipes using a fan and then vented outdoors through the roof of the building. A typical schematic of the system is presented in Figure A-9, Detail 2.

As proposed in the *Former Communications Site Active Sub-Slab Depressurization Pilot Test Work Plan* (USAED 2010), SSD systems were installed and tested by measuring pressure differentials and tracer gas concentrations using remote testing holes (RTH) in four duplexes on the FCS. Interstate Technology Regulatory Council's (ITRC) *Technical and Regulatory Guidance - Vapor Intrusion Pathway: A Practical Guidance* (ITRC 2007) states that a pressure differential of about 4 pascal (Pa) over the entire slab will prevent vapor intrusion. However, a pressure differential of less than 4 Pa does not necessarily indicate that VI would occur. Therefore, in addition to monitoring pressure, in accordance with the United States Environmental Protection Agency (EPA) *Technical Guidance (Third Edition) for Active Soil Depressurization Systems* (EPA 1993) and the Department of Defense *VI Intrusion Handbook* (DoD 2009) an inert tracer gas, sulfur hexafluoride (SF_6), was introduced sub-slab in the second phase of testing, and concentrations were monitored to demonstrate the system's ability to remove sub-slab gases. As stated in the DoD VI Guidance, "using tracer gases for evaluating contaminant migration pathways is a subsequent step after using techniques such as air current

tube test and pressure mapping; data from these initial techniques are needed to assist in interpretation of tracer gas testing results."

A system that maintained an adequate pressure differential (4 Pa) across the slab was considered an effective system. However, if the SF_6 was actively removed during the tracer gas test, the system was considered effective even if a pressure differential was not observed in all areas of a slab (DoD 2009).

1.2 FOUNDATION CONSTRUCTION

The FCS duplexes are constructed using a slab on grade foundation. The slabs of the interior portion of the duplexes were poured as a single slab with the garages being poured afterwards. The slabs are approximately 4 inches thick with up to 4 feet of engineering aggregate beneath. In addition to the standard slab, grade beams exist under each foundation. These beams consist of a thickened slab, up to 10 inches, and are placed to support the second floor of the duplexes. Each foundation plan has different grade beam placements with Unit E having the most and Unit D having none. Utility lines, such water pipes and glycol lines, also exist under the slab within the aggregate base. The floor plans with utility lines and grade beams are presented in Figures A-4 through A-7.

1.3 PROJECT OBJECTIVES

The overall objective of the pilot test was to determine if an SSD system could prevent potential future VOCs from entering a housing duplex via VI. The activities supporting the primary objective include:

- Install the SSD systems in the selected duplexes in Taku Gardens using two different configurations (Figure A-2). Each system included one or two suction points and approximately 20 RTHs per duplex.
- Perform baseline and active pressure differential testing in each test duplex. Data obtained from these tests was used to determine if the system could effectively depressurize the entire slab.
- Perform baseline and active tracer gas (SF_6) testing in each test duplex. Data obtained from these tests was used to determine if the system was able to effectively remove sub-slab gases.

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2.0 SUB-SLAB DEPRESSURIZATION SYSTEM INSTALLATION

There are many factors that can influence the number and positioning of SSD suction pipes needed to effectively mitigate the potential for VI (EPA 1993). These factors include, but are not limited to:

- The type of aggregate beneath the slab – finer soils with less aggregate may require more suction points.
- Slab size – larger slabs may require more suction points.
- Building floor plans – suction pipes should be installed in unfinished areas or concealed areas outside of normal traffic patterns to be less intrusive.
- Observed or reported slab utilities which could limit where penetrations could be made.
- Exterior driveways, patios, and walkways which would affect where below-grade penetrations might be made from outdoors.
- Apparent entry routes through the slab including areas of extensive cracking; a block structure toward the interior of the slab, which penetrates the slab and rests on footings underneath; and perimeter block foundation wall that extends the deepest below grade in a walk-out basement.
- Observed or reported sub-slab obstructions which divide the slab into segments, such as interior footings.

Many of these factors, including separate garage slabs, interior footings, differing aggregates, building floor plans, below-grade exterior and interior piping, and extensive cracking were observed in the test duplexes. As discussed below, these factors did have an influence on how the SSD systems were designed and their ability to maintain pressure differentials and remove potential vapors.

Construction of the six SSD systems and associated RTHs in the four different duplexes (#1, #17, #24, #48) (Figure A-2) occurred in February 2011. As presented in the Pilot Test Work Plan and summarized in Table 2-1, these buildings were chosen because they best represent the configuration of single-family homes (SFH) within the duplex units built on the FCS and would enable evaluation of different SSD system configurations.

Table 2-1
Pilot Test Duplexes

Duplex #	Basic Layout	Footprint Size (ft^2)	Pilot Test Configuration	Remaining Debris under slab
1	One single-story SFH and one 2-story SFH	5,100	Single system originally with a second system added after initial testing	Suspected
17	Two 2-story SFHs	3,600	Single system	Yes- visually identified during previous excavations
24	Two 2-story SFHs	3,600	Two systems, one per SFH + Overlap Measurements	Yes- visually identified during previous excavations
48	Two 2-story SFHs	3,600	Two systems, one per SFH	Yes- visually identified during previous excavations

The design of the SSD systems is included in the *Former Communications Site Active Sub-Slab Depressurization Pilot Test Work Plan* (USAED 2010). However, due to variables in field conditions and testing equipment, there were deviations from the Pilot Test Work Plan and testing approach. The exact installation of the systems and testing methodology is described in detail below.

2.1 SYSTEM COMPONENTS

Each SSD pilot test system consists of one suction point, system piping, and associated RTHs. The system piping, comprised of suction point piping and exhaust system piping, consisted of perforated and solid 4-inch polyvinyl chloride (PVC) piping, one factory sealed radon fan, dryer vent flex pipe, and high density polyethylene (HDPE) piping. Since these systems were temporarily installed for the purpose of the pilot scale testing program, the dryer vent and HDPE piping were attached to the fan and used as an exhaust system to vent the sub-slab air outside via the garage. Should these systems be permanently installed, the exhaust system components and design would be different and likely vent through the roof.

2.1.1 Collection Void Installation

A total of six suction points were installed initially for each SSD system pilot test. Prior to core drilling, a concrete investigation using ground penetrating radar was performed to check each

core location for utilities, rebar, and other hazards. The final location for each suction point and potential nearby hazards were marked.

A 6-inch wet concrete core drill was used to core through the foundation slab to create the suction point. The slab at each point ranged from 3 to 7 inches thick. After the core was drilled, a collection void was created by using a shop vacuum to remove the excess aggregate. The initial collection voids were 10 inches deep, however after initial vacuum tests were conducted the void was deepened to increase potential sub-slab communication. The finished voids measured approximately 12 inches in diameter and extended 24 inches below the bottom of the slab. The sub-slab material observed in each collection void varied in composition (large round cobbles with some fines to mostly fines with small rounded cobbles) (Appendix B, Photos No. 2, 4, and 13) and compaction. Some voids were easily made (e.g., the soils naturally sloughed into the hole) while others took more effort, including the use of breaker bars to loosen prior to removal. Observations while digging collection voids indicated that the aggregate tends to be more compact in the garage storage room than those in the middle of the duplexes.

2.1.2 System Piping and Exhaust

After the void was made the piping for the suction point was installed. The piping consisted of a 10-inch piece of perforated 4-inch PVC, attached to a solid piece of 4-inch PVC with PVC cement. Additional holes were drilled in the perforated section to increase the surface area of the suction opening, thus reducing the pressure drop through the opening. Finally, a solid cap was cemented to the perforated end and the piping was placed in the bottom of the void.

To seal the piping into the slab, foam was first placed around the piping and pushed to the bottom of the slab to ensure that grout and sealant would not leak into the void and clog any of the porous space (Appendix B, Photo No. 5). Once the foam was firmly in place and the piping was level, a loose mixture of self-leveling grout was hand-placed around the suction pipe. Finally, a sealant (Sikaflex®) was used to create an air tight seal between the slab and suction piping (Appendix B, Photo No. 6). The suction point was allowed to set and dry for a minimum of 24 hours prior to attaching a fan or vacuum.

Exhaust systems were constructed for each suction point to ensure that the sub-slab air and injected SF_6 did not become an indoor air hazard. Dryer vent flex piping was attached to the suction piping and routed towards a section of HDPE piping on the floor of the garage door (Appendix B, Photo No. 15 and Photo No. 19). The piping was then attached to a heating vent and sealed under the partially open garage. Sub-slab air from Duplex #17, where the suction point is located in the middle of the living room against the party wall, was vented through a nearby window. The window was partially opened to allow the HDPE piping to run through and blue board insulation was used to seal the window from the open air. A simple stand was made to hold piping off the ground and allow for a better seal in the window (Appendix B, Photo No. 15).

2.1.3 Remote Test Hole Installation

RTHs used for diagnostic purposes were evenly spaced across each duplex. Locations for each RTH were selected based on the distance from the suction point and location in the living space. They were drilled directly through to the bottom of the slab using a "roto-hammer" drill with a ¼-inch bit. Care was taken to not drill past the bottom of the slab as drilling into the sub-slab material would have created a preferential pathway for SF_6 and could have altered the results. Once drilled, poly tubing was sealed in the holes using hot glue and a waterproof sealant (Seal-All®). After the glue and sealant dried, the poly tubing was cut to measure 14 inches from the top of the slab and a 5-inch piece of silicon tubing was added to the end. A stopper was then inserted into the tubing of each RTH to ensure no air leakage during testing (Appendix B, Photo No. 10).

2.2 WASTE MANAGEMENT

A total of approximately 14 cubic feet of backfill material removed from under the duplexes as part of construction activities was left on site. Used construction materials, personal protective equipment (e.g., gloves, paper towels, etc.), and other investigation derived waste was disposed of at the Fairbanks North Star Borough landfill.

3.0 PILOT SCALE TEST PROCEDURES

In order to determine if the SSD systems would be effective at reducing potential VI, the SSD pilot testing field activities included pressure differential and tracer gas testing, as described below.

3.1 PRESSURE DIFFERENTIAL TESTING

The pressure differential test (communication test) is a diagnostic test used to evaluate the potential effectiveness of an SSD system by applying a vacuum beneath the slab and measuring the pressure differential at various locations across the slab. Three phases of pressure tests were conducted after construction was completed:

1. A baseline test, without a fan connected, was used for comparison between natural sub-slab conditions and conditions when the system was activated.
2. A shop vacuum, which is able to produce over 1000 Pa of suction, was connected to the piping to check the initial sub-slab pressure field extension potentially induced by a system over the slab from the suction point.
3. A radon fan, which is able to produce over 100 Pa of suction, was used to assess whether an adequate pressure differential could be maintained across the entire slab.

All pressure communication tests were conducted using a TSI VELOCICALC® Multi-Function Ventilation Test Instrument (a digital manometer) with pressures measured in Pa. A complete discussion of these testing phases is provided below.

3.1.1 Baseline Tests

Prior to starting the communication tests, a baseline pressure differential check was performed. The heat recovery ventilation systems were turned off for testing, and all of the RTHs were checked to make sure they were properly sealed. Checking one RTH at a time, the stoppers were removed and the micromanometer was attached (Appendix B, Photo No. 20). This meter was allowed to sit for one minute while readings stabilized before the pressure differential was measured.

3.1.2 Shop Vacuum Tests

A shop vacuum has the potential to produce a pressure differential ten times greater than the proposed radon fan. If there was little to no change in pressure seen with the shop vacuum, the next phase of testing with the radon fans would have been pointless.

A pressure field extension test was conducted in each SFH by connecting the shop vacuum to the suction point via an airtight rubber connection. After the shop vacuum had been running long enough to allow for a consistent influence across the slab (approximately 10 minutes), pressure differential measurements were taken by the method used during baseline testing.

3.1.3 Fan Tests

Once the shop vacuum test determined that an adequate amount of pressure communication existed under the slab, a fan test was performed. The fan test was completed by using a RadonAway™ GP501 fan—the fan proposed for the final system. The data collected from this test was used to determine if the system was able to maintain an adequate pressure differential across the entire slab.

To run this test, the fans were hooked to the systems and turned on. After ten minutes, pressure differential measurements were collected. The fan was left running for 7 days and pressures were checked periodically to determine if the pressure differential induced by the system varied or if the effect immediately seen once the fan was turned on was the true radius of influence.

Overlap fan tests were also performed in Duplexes #1 and #24. During the overlap test one fan was turned on at a time and pressure differentials measured across the slab. After the measurements were taken with only one fan running at a time, both fans were turned on and another set of pressure readings were taken. These tests were used to determine the effect at the middle of the duplex when both systems were operating.

3.2 TRACER GAS TESTING

To gain a better understanding of sub-slab air movement, an inert tracer gas (SF_6) was injected at several points within the duplexes to measure the rate of removal with and without the SSD system running. To determine if the system was pulling outside air or if the system simply had no effect at that location, points where there was little to no pressure change observed during pressure field fan and vacuum tests were selected for SF_6 injection.

3.2.1 Injection Methods

To perform the test, a small amount of tracer gas was injected into one point for one minute at a pressure of one pound per square inch (psi). The concentration of sub-slab SF_6 was measured in parts per million (ppm) with a SF_6 leak detector attached to the RTH tubing; readings were allowed to stabilize for five minutes prior to recording. Initial and subsequent measurements over a three-hour time period indicated levels too high (over 999.9 ppm) for the SF_6 meter to read. Therefore, the injection was changed to a "burst" method to inject SF_6 into the RTHs. This method entailed attaching the gas to the RTH tubing, turning the regulator on to 1 psi, and applying the gas to the hole for five seconds. The Pilot Test Work Plan dictated that the tracer gas concentration would be checked and recorded every 30 seconds for three days. However, the concentration of SF_6 using this method was still above the instrument measurement range for at least a few hours due to the purity (99.9%) of the SF_6 gas. Therefore, the gas was injected at least 12 hours (overnight) prior to the first measurements and the time between measurements was modified to approximately 30 minutes.

3.2.2 Active Tracer Testing

Active tracer gas testing was used to determine if the system was able to actively remove SF_6 from various points across the slab. Prior to injecting the gas, the radon fans were turned on and allowed to run for at least 20 minutes. Tracer gas was then injected using the burst method in two RTHs per SFH and the gas was left in the RTHs overnight with the systems turned on. After this overnight active removal period, the SF_6 concentrations from the RTHs were measured. If concentrations were above the detection limit of the meter (999.9 ppm) the concentrations were monitored every hour until the concentrations were within range. Once the gas concentration was

within detection range the SF_6 levels were checked every 30 minutes. In the cases where the SF_6 was entirely removed in the 12 hour overnight active removal period the RTHs were re-injected in the morning and monitored throughout the day. If the SF_6 concentrations showed a significant decrease in the RTHs within 30 minutes, as was observed in the RTHs closer to the suction point, the SF_6 measurement time increments were decreased.

3.2.3 Baseline Tracer Testing

After the active tracer gas tests were completed, the fans were removed and a baseline tracer gas test was performed within each SFH. The results from these tests were used to determine the air movement in natural sub-slab conditions. SF_6 was injected using the burst method and then concentrations were checked in the morning. Due to the slow natural dissipation, baseline concentrations were measured every twelve hours until 7 days after the initial injections or the concentrations reached 100 ppm, whichever was shorter.

4.0 EVALUATION OF PILOT TEST RESULTS

As discussed below, a positive pressure differential was maintained at the interior points of each duplex. At locations where the target pressure differential was not obtained (e.g., external wall RTHs), the SF_6 measurements indicated that operation of an SSD system could remove vapors from under the slab at those locations within 24 hours. As discussed below and presented in Appendices A and C, the pressure differential tests indicated that there were many factors that influenced the sub-slab communication including type of sub-slab material, location of utility chases, and other building features.

4.1 INFLUENCING FACTORS

The radius of influence can be greatly affected by the type of sub-slab material. The soils used as fill under the duplexes varied from a very coarse aggregate with large round stones (Appendix B, Photo No. 2) to a pit run material consisting of mostly fines and some rounded aggregate stone (Appendix B, Photo No. 4). Also, as is typical for laying utility lines, the pipe beds are lined with a finer bedding material. These materials, which have more void spaces than native material or other more loam sub-base materials, enable a larger radius of influence to be created by operation of the SSD system and create preferential pathways.

At times a greater radius of influence was observed due to the presence of other preferential pathways (e.g., pipe chases, porous material surrounding internal footings, French drains). Other than the French drains, which surround each of the duplexes tested, these potential preferential pathways are shown in Figures A-4–A-7. Additionally, if a less porous material was present (e.g., finer soils, foundation walls) the preferential pathway may be impeded and the radius of influence decreased. Common pressure communication trends can be seen in similar building foundation plans. Three types of SFHs were tested during the pilot test including Units C, D, and E. In general, more grade beams in a foundation plan made the direct radius of influence less but increased the number of preferential pathways under the slab. These grade beams will play an important role in designing a final SSD system should one ever become necessary in the future.

Examples of the trends produced by preferential pathways are presented in Table 4-1, which compares the test results and specific information obtained from six RTHs and are summarized below. The six RTHs presented in Table 4-1 are all located in similar locations within the duplexes, with at least one point from each foundation plan, and were used to compare the differences between the foundation plans and duplexes. A complete data set of all tests and results is located in Appendix C.

In general, RTH distances between 20 and 35 feet from the suction point produced very low active pressure differentials near 0.0 Pa. However, the active tracer gas tests indicated that SF_6 was removed from the RTHs in less than 24 hours in all instances although the exact rates varied. Rationale for differences between the SF_6 removal rates and the low pressures seen in these RTHs is discussed in detail below.

4.1.1 Pressure Differentials

As shown in Table 4-1, overall, the pressure differentials obtained in the compared RTHs were very low, indicating that the fan had little to no effect depressurizing the slab at these locations. Negative pressure differentials indicate that the sub-slab was more positively pressurized than the interior. These consistently low pressure differentials indicate that there are likely no preferential pathways to these points that are located in corners away from the suction point and other sub-slab utility lines. Increased pressure differentials, seen in other RTHs, were due to co-location with utility chases and interior grade beams which were creating preferential pathways. Additionally, the low pressures measured in points located on the exterior walls indicate that the French drain is affecting the ability of the system to fully depressurize the slab. As compared to native soil, the cobbles in French drains are a much more porous material and thus a complete seal around the foundation walls and building slab cannot be made. Rather, the French drain creates a pressure sink towards which the vapors would migrate. To determine if the SSD could induce sufficient air flow under the slab at these external points, these RTHs were chosen for tracer gas evaluation (SF_6 injection).

Table 4-1
Examples of Influencing Factors

Building		48			1	17	24
Unit Type		E		C	D	E	E
Remote Test Hole		CH04	CH54	CH08	CH43	CH37	CH16
Pressure Differential (Pa)[1]	Baseline	-2.9	-1.8	-5.4	-1.1	-1	-1
	Active	1.4	0.6	0.4	2.4	1.1	-0.4
Time Elapsed - 200 ppm SF_6 concentration (hours)[2]	Baseline	23.8	99.0	128.6	72.6	37.6	55.8
	Active	13.0	19.9	6.2	15.1	12.8	21.5
Sub-Base Material[3]		• Poorly sorted aggregate with small rounded stones. • Approximately 80% fines.			• Coarse aggregate with large sub-rounded stones. • Very little fines.	• Well sorted aggregate with medium rounded stones. • Approximately 50% fines.	• Poorly sorted aggregate with small rounded stones. • Approximately 80% fines.
Other Features		• Suction point enclosed by interior grade beams. • Located on an exterior wall near French drain.	• Suction point enclosed by interior grade beams. • Located next to party wall.	• Suction point was not completely enclosed by grade beams. • Located on an exterior wall near French drain.	• Near garage. • Located on interior of building.	• Suction point enclosed by interior grade beams. • Located on an exterior wall near French drain.	• Suction point enclosed by interior grade beams. • Located on an exterior wall near French drain.
Rationale		• Small SSD effect. • Direct communication with French drain. • Exterior point on south side of the building.	• RTH on interior grade beam. • No influence from French drain for natural removal.	• Air flow through sub-slab material only (no internal "barriers").	• RTH on opposite side of garage from suction point. • More compact under aggregate effecting active removal.	• More porous aggregate. • Point on north side of building. • Complete seal of French drain with snow.	• More fines in aggregate. • Point on north side of building but protected. • Partial seal of French drain.

Notes:
[1] Pressure Differential = interior pressure minus sub-slab pressure (Pa).
[2] Time elapsed (in hours) to 200 ppm calculated by equations of trendlines produced by graph.
[3] Soil type based on sub-base material removed from suction point in each duplex.

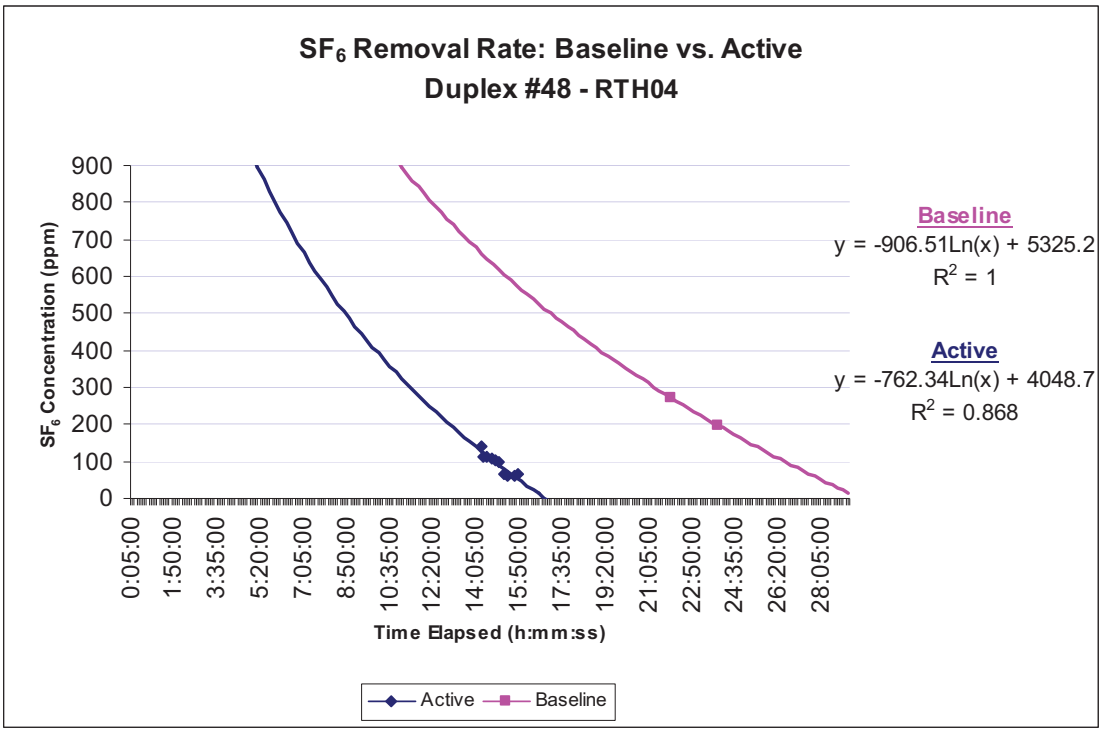
4.1.1.1 Effect of French Drain

In general, under natural conditions, the SF_6 completely dissipated during baseline tests in a minimum of 3 days. However, SF_6 dissipated from RTH-CH04, which is located on the south side of Duplex #48 in the corner of the right family room, after only 25 hours in baseline tests. During the active fan testing at this hole, the tracer gas was removed in approximately half the time as compared to the baseline tests even though the pressure tests showed that very little pressure differential (0.1 Pa) was induced at this point. This active removal rate is similar to RTHs in the same location in different duplexes however the baseline removal rate was 3 times faster than similarly placed RTHs. This indicates that not only was SF_6 being actively removed by the SSD system but it was directly interacting with outside air via the French drain (Appendix B, Photo No. 16). Based on the laws of diffusion and advection, vapors would move directly outwards towards the path of least resistance. Although French drains surround all of the buildings on Taku Gardens this was the only duplex tested where the south facing French drain was completely free of snow and ice creating a direct pathway with the outside air. This trend seen in RTH-CH04 may be similar to what can be seen in the summer months when the ground is thawed and there is no snow or ice. In this case, although the SSD system does not create an adequate pressure differential at this building corner, the potential for VI throughout the entire building does not exist because the vapors would likely migrate out from under the building into the ambient (outside) air.

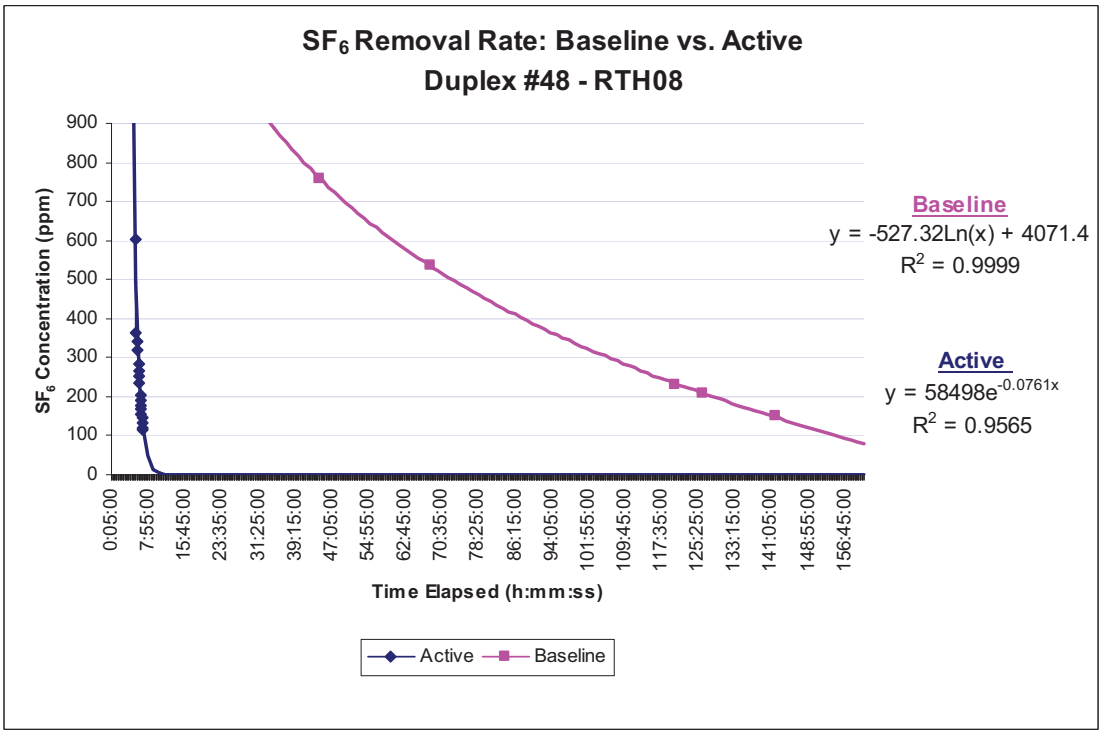
4.1.2 Tracer Gas Test Results

To gain a better understanding of sub-slab air movement, baseline and active tracer gas tests were compared for these six RTHs. As shown in Graphs 4-1–4-6, the use of the SSD system significantly increased the SF_6 removal rates in all six cases. Measurements during the active test indicated that the SF_6 was removed up to 20 times faster when the system was active as compared to baseline measurements when the system was off. With this increased removal rate tracer gas was completely removed in less than 24 hours whereas, when injected for baseline measurements a minimum of 3 days was needed before the tracer gas was completely dissipated.

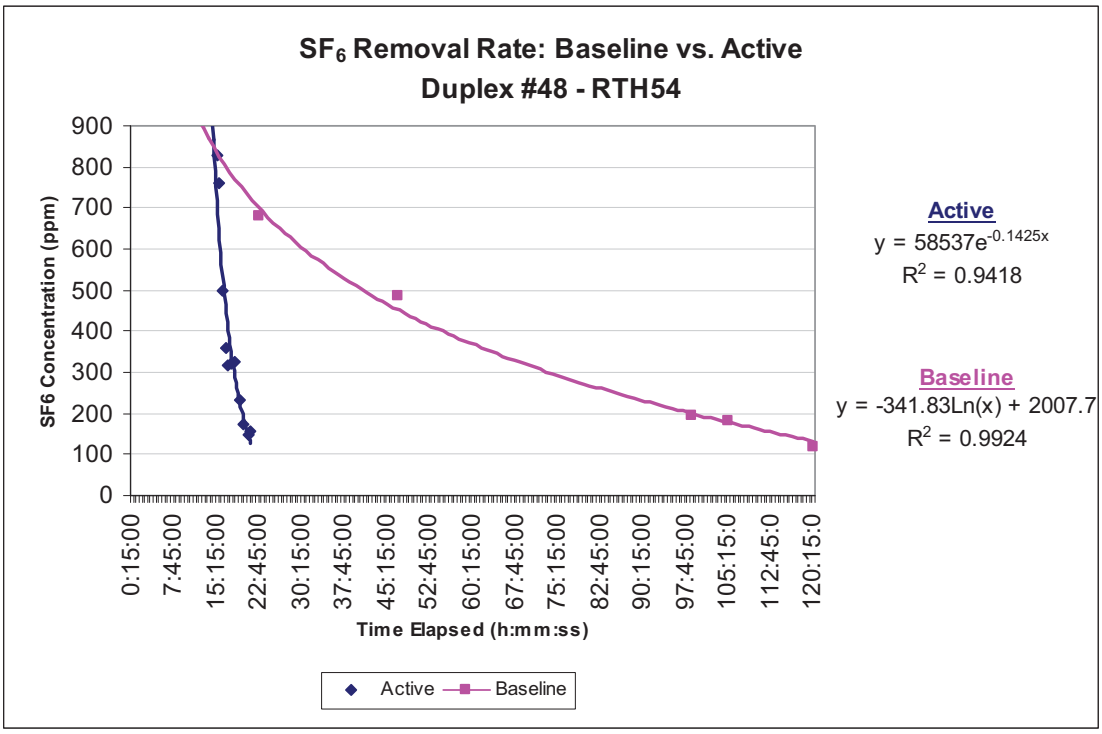
Graph 4-1
SF_6 Removal Rate – RTH04



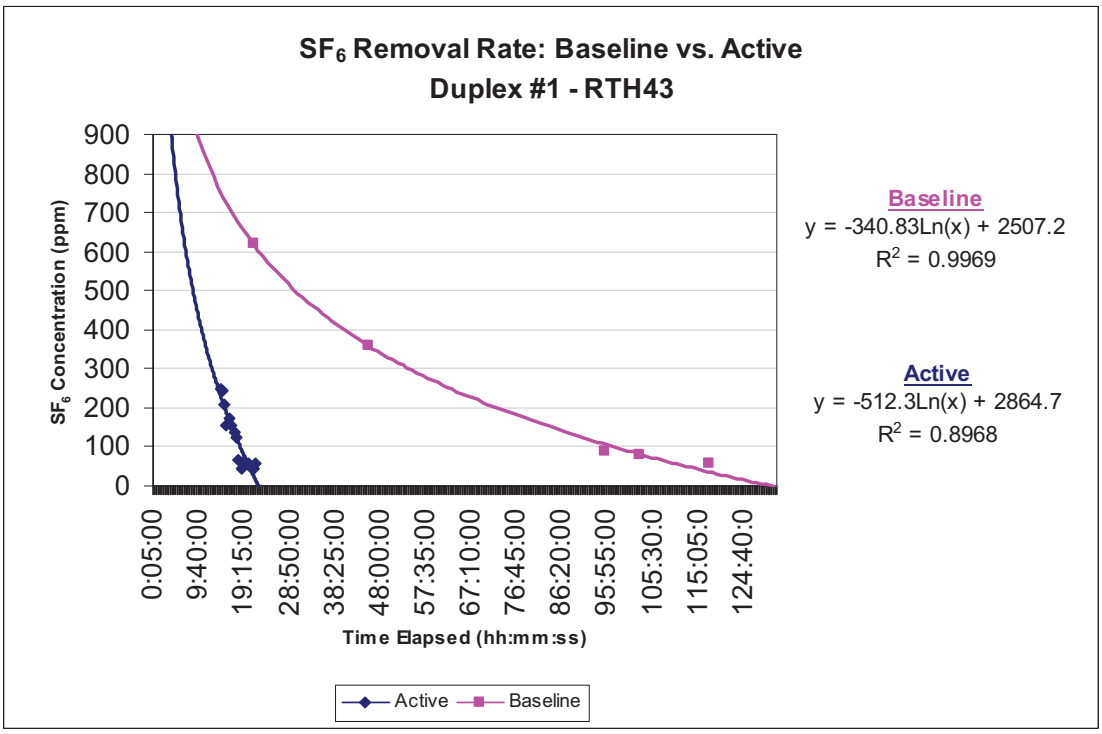
Graph 4-2
SF_6 Removal Rate – RTH08



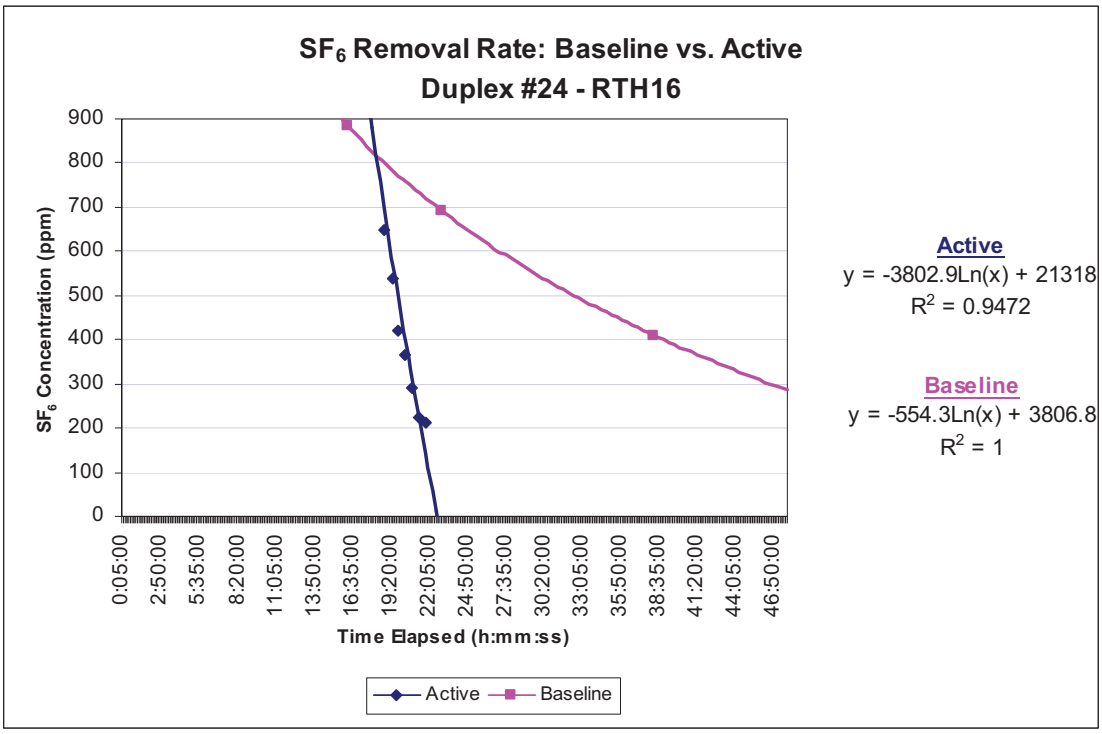
Graph 4-3
SF_6 Removal Rate – RTH54



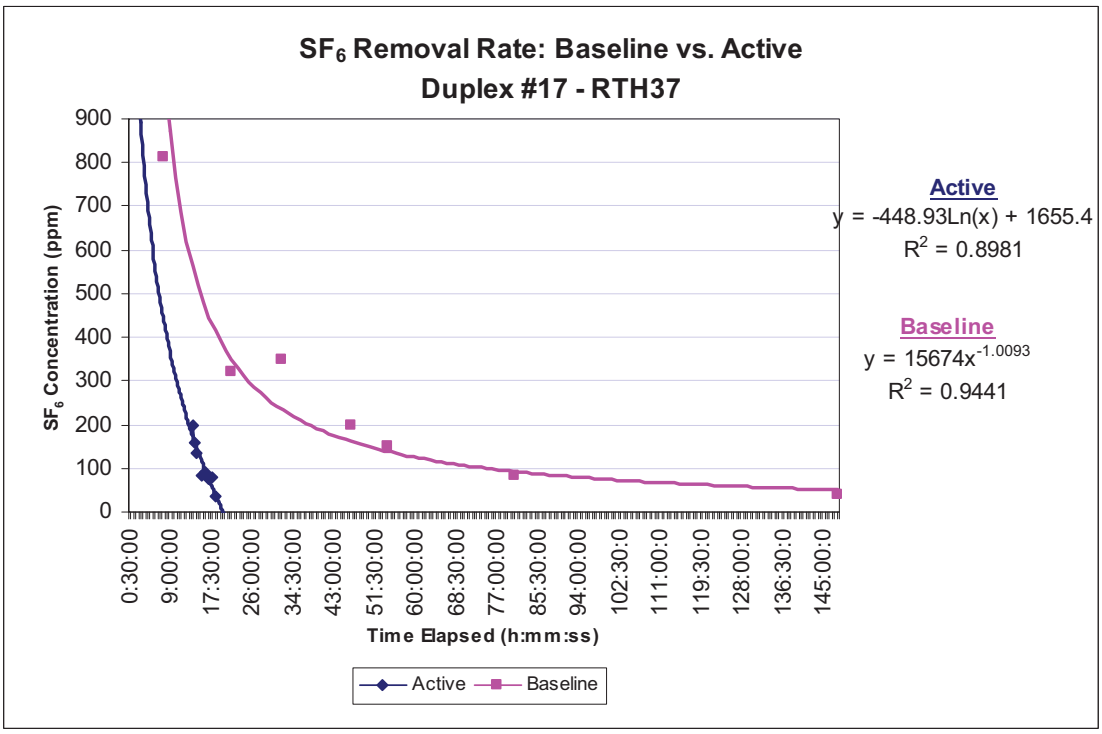
Graph 4-4
SF_6 Removal Rate – RTH43



Graph 4-5
SF_6 Removal Rate – RTH16



Graph 4-6
SF_6 Removal Rate – RTH37



Pressure differential measurements from the RTHs compared in Table 4-1 were all similar (0.0–2.4 Pa) indicating there were no unexpected preferential pathways to these locations; however there was still variability within the tracer gas removal rates. To determine which factors were the driving forces behind these removal rates, test results obtained at similar building location RTHs were compared. To enable true comparisons, the removal rate trendline equations generated at each RTH were used to calculate the time it took for the concentration of SF_6 to decrease to 200 ppm in that RTH. The following controlling factors were identified:

- Sub-Base Material: The results of the SF_6 testing at RTH-CH37 in Duplex #17 and RTH-CH16 in Duplex #24 were compared to determine if the sub-base material influenced the removal rate. Both RTHs are located in Unit Type E. It took approximately 13 hours for tracer gas concentrations to reach 200 ppm in RTH-CH37 and 21.5 hours for RTH-CH16. RTH-CH37 is further from the suction point than RTH-CH16 indicating that there is another factor causing variation among active SF_6 removal rates outside of distance and preferential pathways. When the sub-base material removed from the suction core in Duplex #17 was compared to that from Duplex #24, observations indicated that the sub-base material under Duplex #17 contained more cobbles and aggregate than fines; the sub-base material in Duplex #24 had more fines and was slightly more compact than un Duplex #17 leaving less pore space for the SF_6 to migrate through. Less pore space in soils would result in a slower rate of diffusion, as seen by this comparison.
- Interior Grade Beams: In order to determine how much influence the interior grade beams had on the removal rate of SF_6, test results from RTH-CH04 and RTH-CH08 were compared. These points are located in opposite sides of Duplex #48 in the corner of each family room; RTH-CH04 is in Unit E and RTH-CH08 in Unit C. It took approximately 13 hours for SF_6 concentration in RTH-CH04 to reach 200 ppm and 6 hours in RTH-CH08. As can be seen in Figure A-7, the suction point in Unit E is completely enclosed by interior grade beams whereas the suction point in Unit C only has one grade beam nearby. These grade beams, comprised of slabs thickened to approximately 10 inches, can slow and reduce the effect of the fan by impeding its draw and pressure induced through the system.

4.2 OTHER OBSERVATIONS

Although the baseline tracer gas tests indicated that in natural sub-slab conditions the SF_6 would take a minimum of 4 days to completely dissipate from RTH-CH44, which is approximately 25 feet away from the suction point in Duplex #1 - Unit D, the active tracer gas test indicated that SF_6 was completely removed from the RTH in 45 minutes. Due to this abnormally fast rate of removal, it was thought that there was a preferential pathway to the outside of the duplex; however, if this preferential pathway existed baseline test results would have shown similar removal rates as the active test. Another explanation for the high SF_6 removal rate is a

preferential pathway between the suction point and the RTH. However pressure differential measurements indicated that the slab was depressurized to 6.4 Pa. This is a typical pressure differential shown in other RTHs with no known preferential pathways and similar distances from suction points. Therefore, although an average pressure differential was induced with operation of the SSD system, it is not known why the SF_6 dissipated so quickly from the sub-slab under these conditions.

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5.0 CONCLUSIONS

The results of the pilot test indicated that an SSD system can be an effective mitigation strategy to prevent VI into each SFH should it ever become necessary.

The SSD system works by creating a positive preferential between the sub-slab and interior and providing a preferential path for vapors to through under the house. In general, although each type of building foundation plan responded differently, an adequate pressure differential (about 4 Pa) was achieved at the interior points when a GP501 fan was installed in each SFH. This positive pressure differential will prevent the advective transport of gases into the home by making the sub-slab less pressurized than the interior of the house.

Tracer gas tests indicated that SF6 could be removed from far corners of the duplex in less than 24 hours with the system active, even in areas where pressure differentials were not maintained. This active removal was 2 to 20 times fasters than the natural dissipation of the tracer gas that took place when the system was turned off. This generated advective transport will allow for sub-slab gases to be removed prior to entering the building protecting future residents from vapor intrusion should it ever become necessary in the future.

Each system tested proved to be effective at creating a positive pressure differential and removing sub-slab gases. However due to the heterogeneous nature of soils located on the site and unknown sub-slab conditions, a “one-size-fits-all” SSD system is not able to be designed and implemented in all the duplexes. The double suction point SSD system designs tested during this pilot scale program can be used as an initial design for each SFH but its effectiveness will need to be tested and potentially modified prior to completion and operation.

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6.0 DESIGN RECOMMENDATIONS

Should it be determined that an SSD system is an appropriate solution to prevent the potential for VI into these buildings, it is recommended that the initial system be designed with the suction point located in the garage storage room of each SFH. Although not centrally located, placing the suction points in the garage storage rooms will ensure the fans are not directly in the living space, as dictated by EPA guidance, where they could be tampered with by residents and create a nuisance. Additionally, pilot test results indicated that an adequate pressure differential could be created when fans were placed in the garage storage room (Duplexes #24 and #48). As shown by this pilot test study, at least a 24-inch deep void should be created by removing soil from each hole. The SSD piping (4-inch PVC) would then be installed into the void space and attached to the GP501 radon fan. Completion of the exhaust system should be in accordance with the American Society for Testing and Materials (ASTM) Method E2121-09, as opposed to what was done during the pilot scale tests. In particular,

"The discharge from the vent stack pipes shall be:

1. Vertical and upward, outside the structure, at least 10 ft (3 m) above the ground level, above the edge of the roof, and shall also meet the separation requirements of (2) and (3). Whenever practicable, they shall be above the highest roof of the building and above the highest ridge.
2. Ten feet (3 m) or more away from any window, door, or other opening into conditioned or otherwise occupied spaces of the structure, if the radon discharge point is not at least 2 ft (0.6 m) above the top of such openings.
3. Ten feet (3 m) or more away from any opening into the conditioned or other occupiable spaces of an adjacent building. Chimney flues shall be considered openings into conditions otherwise occupied space.
4. For vent stack pipes that penetrate the roof, the point of discharge shall be at least 12 in. (0.3 m) above the surface of the roof. For vent stack pipes attached to or penetrating the sides of buildings, the point of discharge shall be vertical and a minimum of 6 in. (150 mm) above the edge of the roof and in such a position that it can neither be filled with water from the roof or an overflowing gutter. In areas where it snows the point of discharge shall be 12 in. (0.3 m) above the surface of the roof.
5. When a horizontal run of vent stack pipe penetrates the gable end walls, the piping outside the structure shall be routed to a vertical position so that the discharge point meets the requirements of (1), (2), (3), and (4).
6. Points of discharge that are not in a direct line of sight from openings into conditioned or otherwise occupiable space because of intervening objects, such as dormers, chimneys,

windows around the corner, etc. shall meet the separation requirements of (1), (2), (3), (4), and (5)." (ASTM Method E2121-09)

In addition, as indicated by the pilot test results, the following factors should be considered when designing and installing the final systems:

- Operation of the SSD system (when the air beneath the building was drawn into the SSD piping) resulted in water vapor condensing and pooling in the system piping. This was due to the building construction and location of sub-slab utilities (e.g., hot water lines) which made the sub-slab air temperature greater than the indoor air temperature. Therefore, collection and removal of condensate should be considered.
- Exposure to the elements (e.g., snow, wind) and amount of sun influences the SSD system's ability to induce a negative pressure throughout the entire slab. As indicated by RTH37 and RTH04, when the French drain is completely sealed (Duplex #17, RTH37) with snow the pressure differential is greatest; the French drain around Duplex #48 was never completely sealed and as such a pressure differential was not able to be induced via an SSD system. Therefore, surface sealing of the French drains should be considered to reduce the external advective forces.

Once the system is installed and operated for at least ten minutes, the radius of influence should be checked by monitoring the pressure differential achieved at the corners of the SFH. If an adequate pressure differential (at least 4 Pa) is achieved, the system will be determined effective and no further testing will be necessary. If an adequate pressure differential is not obtained, a tracer gas test (using the burst method) should be used to determine whether the system will be effective. If neither test indicates system effectiveness, building conditions (e.g., cracks) should be evaluated and sealed as applicable. If the pressure field extension test or tracer gas test still does not indicate that the SSD system using one suction point per SFH will be effective, the system should be enhanced by using a larger fan and/or adding another suction hole and manifolding the system piping together.

7.0 REFERENCES

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DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT

DRAFT

FORMER COMMUNICATIONS SITE SUB-SLAB DEPRESSURIZATION PILOT STUDY REPORT
Appendix A: Figures

FORT WAINWRIGHT, ALASKA
JUNE 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 07

JACOBS

Prepared by
Jacobs Engineering Group Inc.
4300 B Street, Suite 600
Anchorage, Alaska 99503

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Figure A-9: System Installation Details
Figure A-10: Typical Footing Details an Soil Vent System

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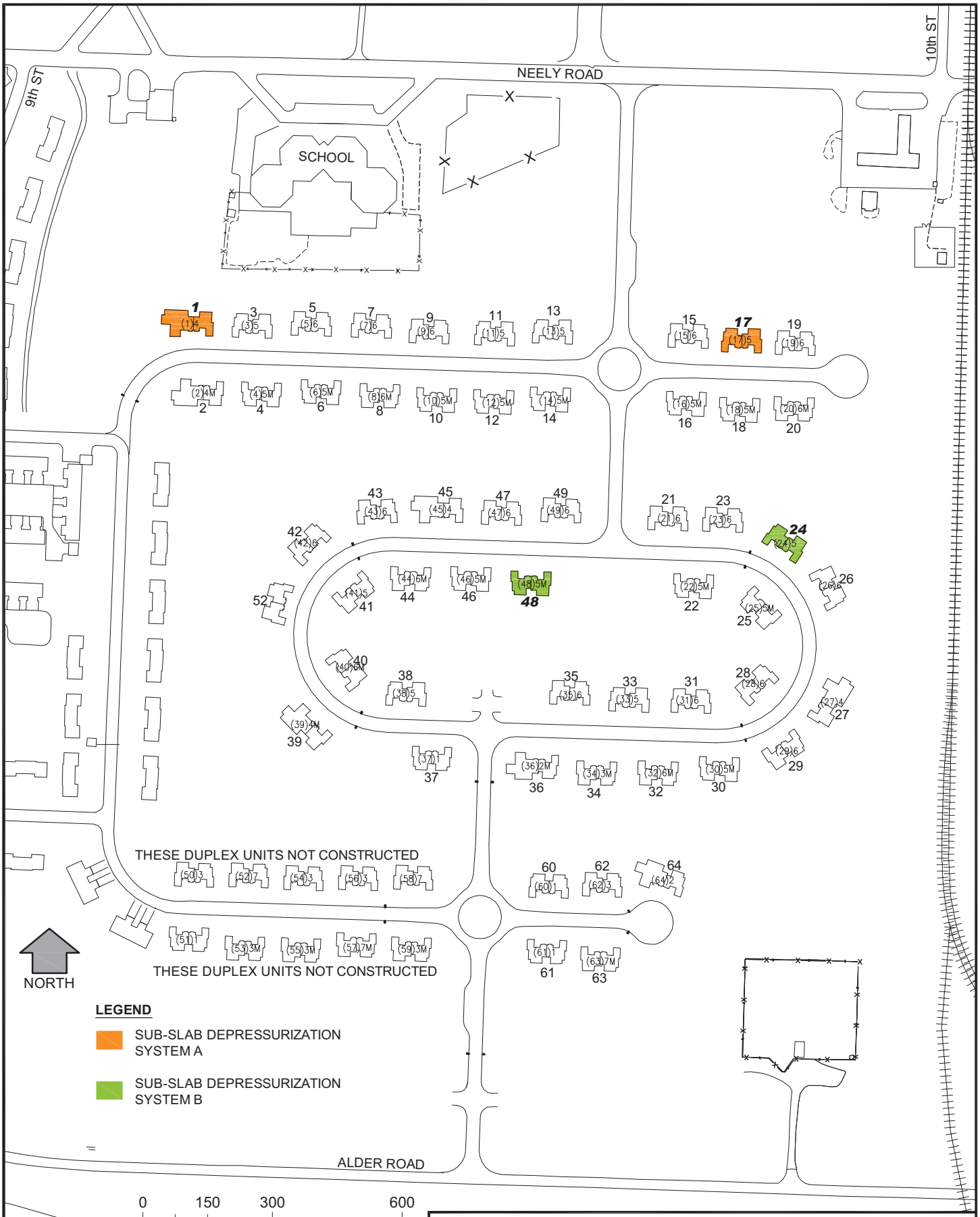


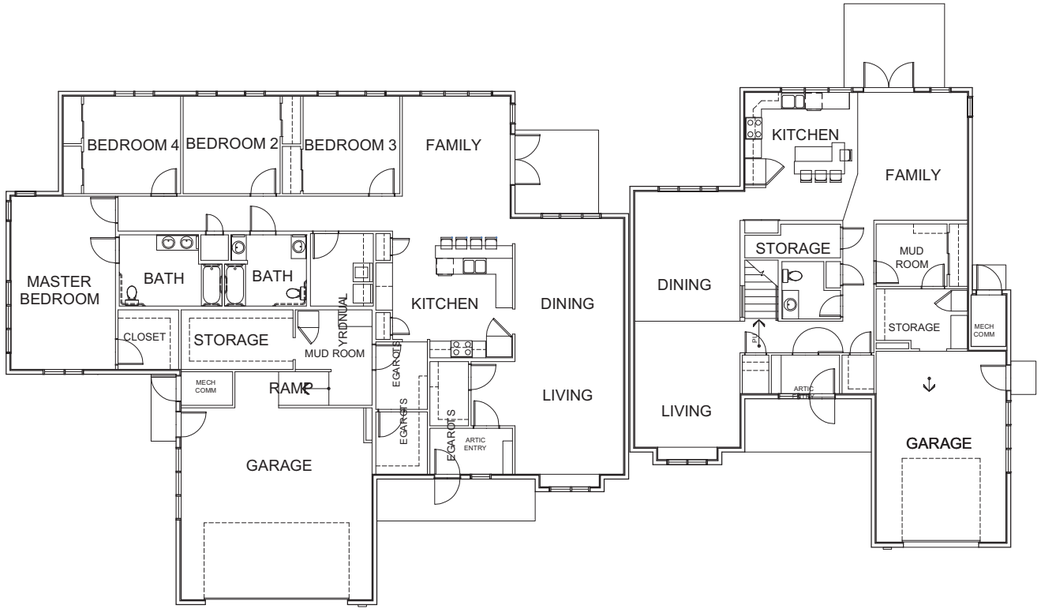
SUB-SLAB DEPRESSURIZATION PILOT TEST
FORMER COMMUNICATIONS SITE MAP

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 27 April 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: A-2

I:\ERS-UR\TO07-Taku Gardens RA\CAD\2010 Taku\2010 Pilot Test WP\Fig A-2 Site Map.dwg Apr 27,2011 -tiedemam

DUPLEX 1 - FLOOR PLAN

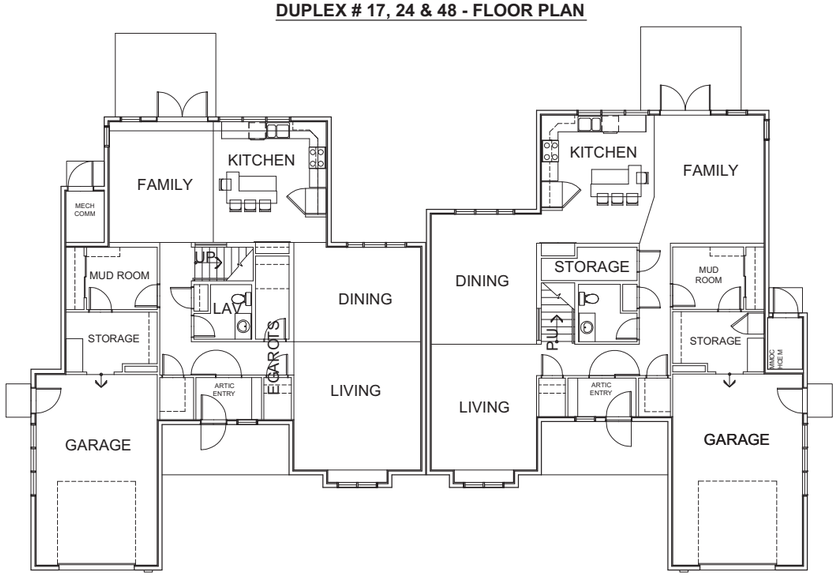


NORTH

UNIT D UNIT C(R)

DUPLEX 1 - ELEVATION VIEW

DUPLEX # 17, 24 & 48 - FLOOR PLAN



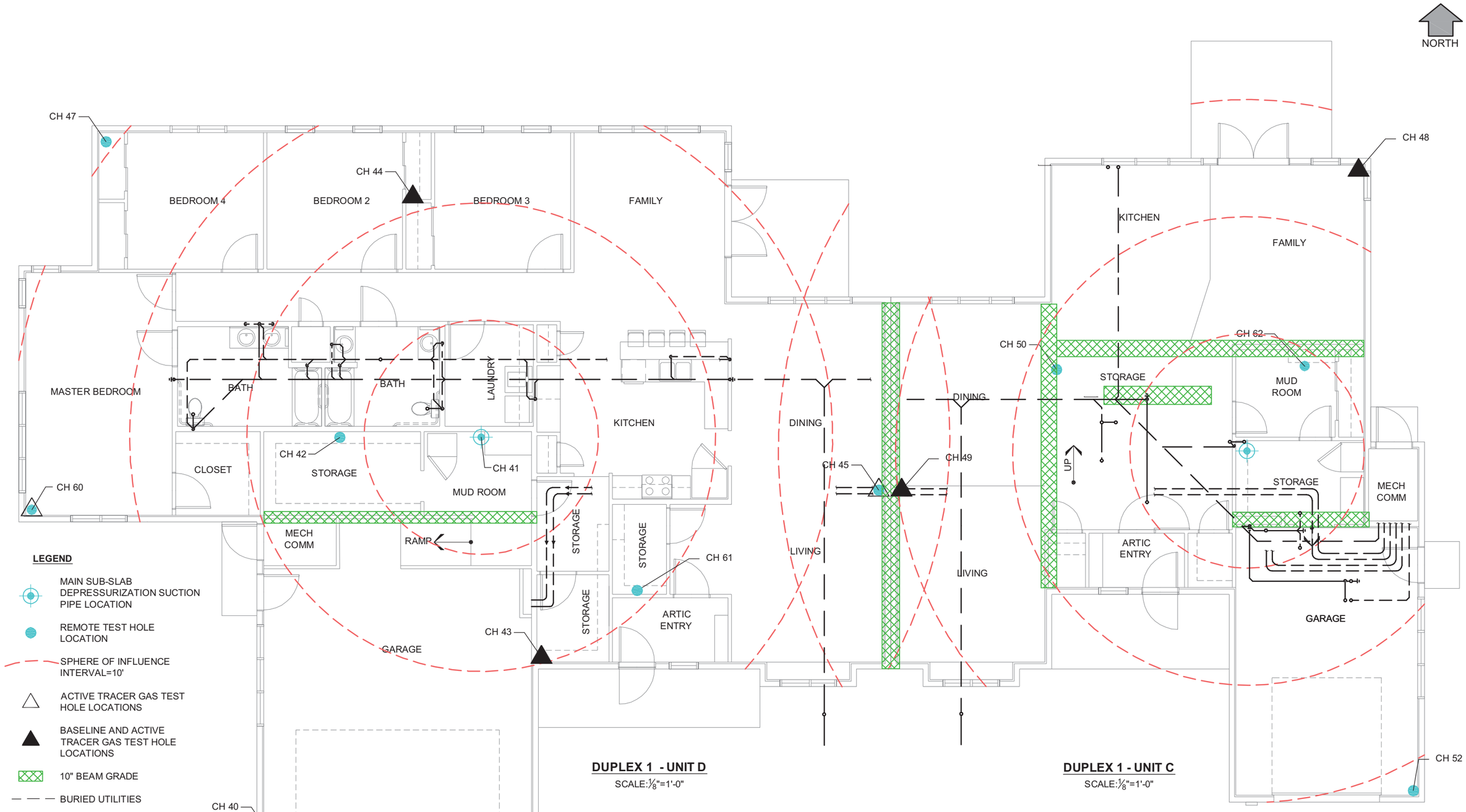
UNIT E UNIT C(R)

DUPLEX #17, 24, & 48 - ELEVATION VIEW

DUPLEX FLOOR PLAN AND ELEVATION

FT. WAINWRIGHT, FAIRBANKS, ALASKA

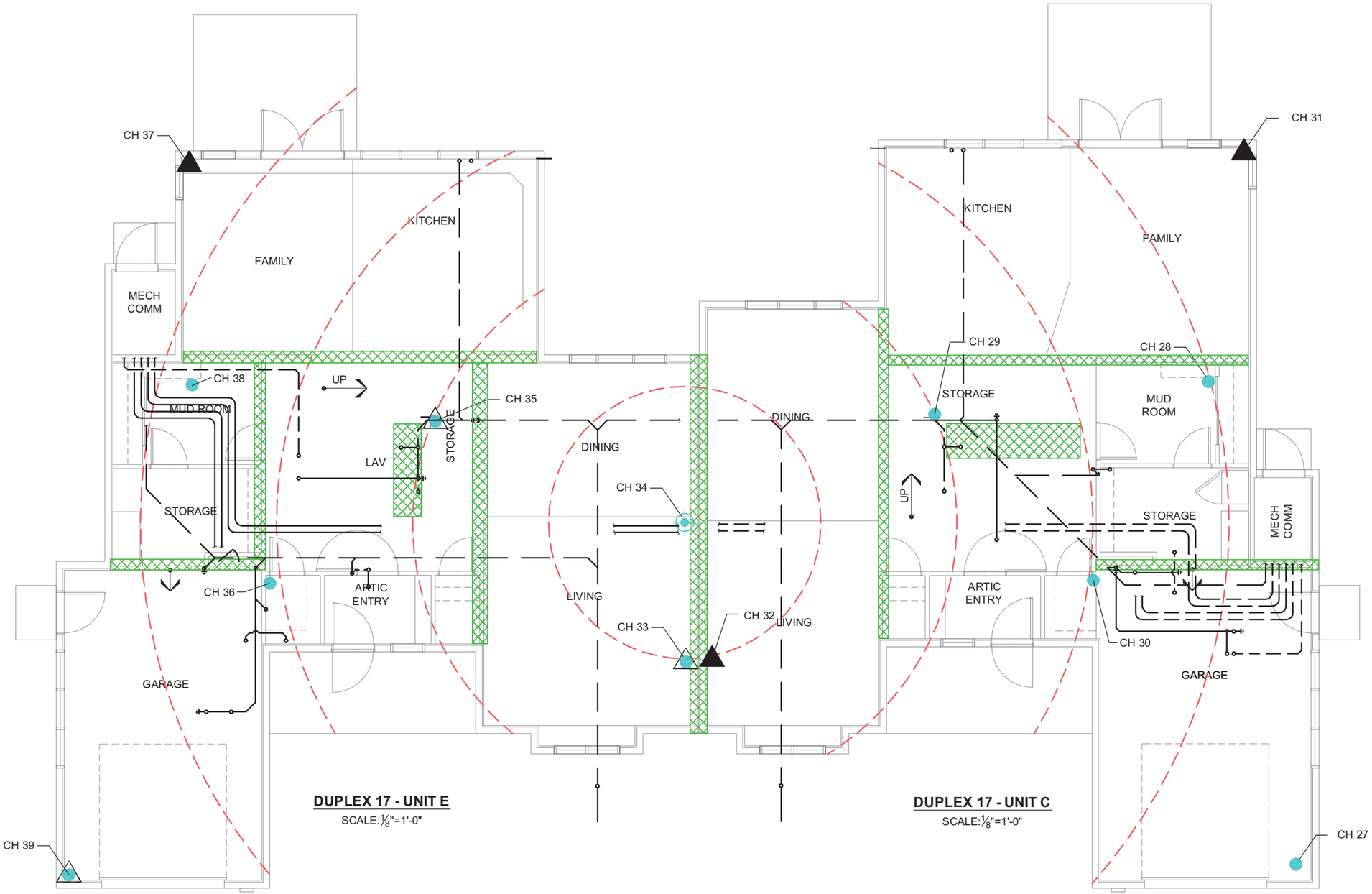
JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO. :



FINAL DRILLING LOCATIONS
SUB-SLAB DEPRESSURIZATION PILOT TEST
DUPLEX 1
FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 25 April 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: A-4

I:\ERS-UR\T007-Taku Gardens RA\CAD\2011 Pilot Test Report\Fig A-4 Duplex 1.dwg May 02,2011 tiedemann



DUPLEX 17 - UNIT E

SCALE:⅛"=1'-0"

DUPLEX 17 - UNIT C

SCALE:⅛"=1'-0"

LEGEND

- MAIN SUB-SLAB DEPRESSURIZATION SUCTION PIPE LOCATION
- REMOTE TEST HOLE LOCATION
- SPHERE OF INFLUENCE INTERVAL=10'
- ACTIVE TRACER GAS TEST HOLE LOCATION
- BASELINE AND ACTIVE TRACER GAS TEST HOLE LOCATION
- 10' GRADE BEAM
- BURIED UTILITIES

NOTE:

1. ALL EXTERIOR WALLS ARE 24" GRADE BEAM WITH EXTERNAL PERIMETER FRENCH DRAIN.
2. ALL SSD SYSTEM HOLE LOCATIONS ARE APPROXIMATE

NORTH

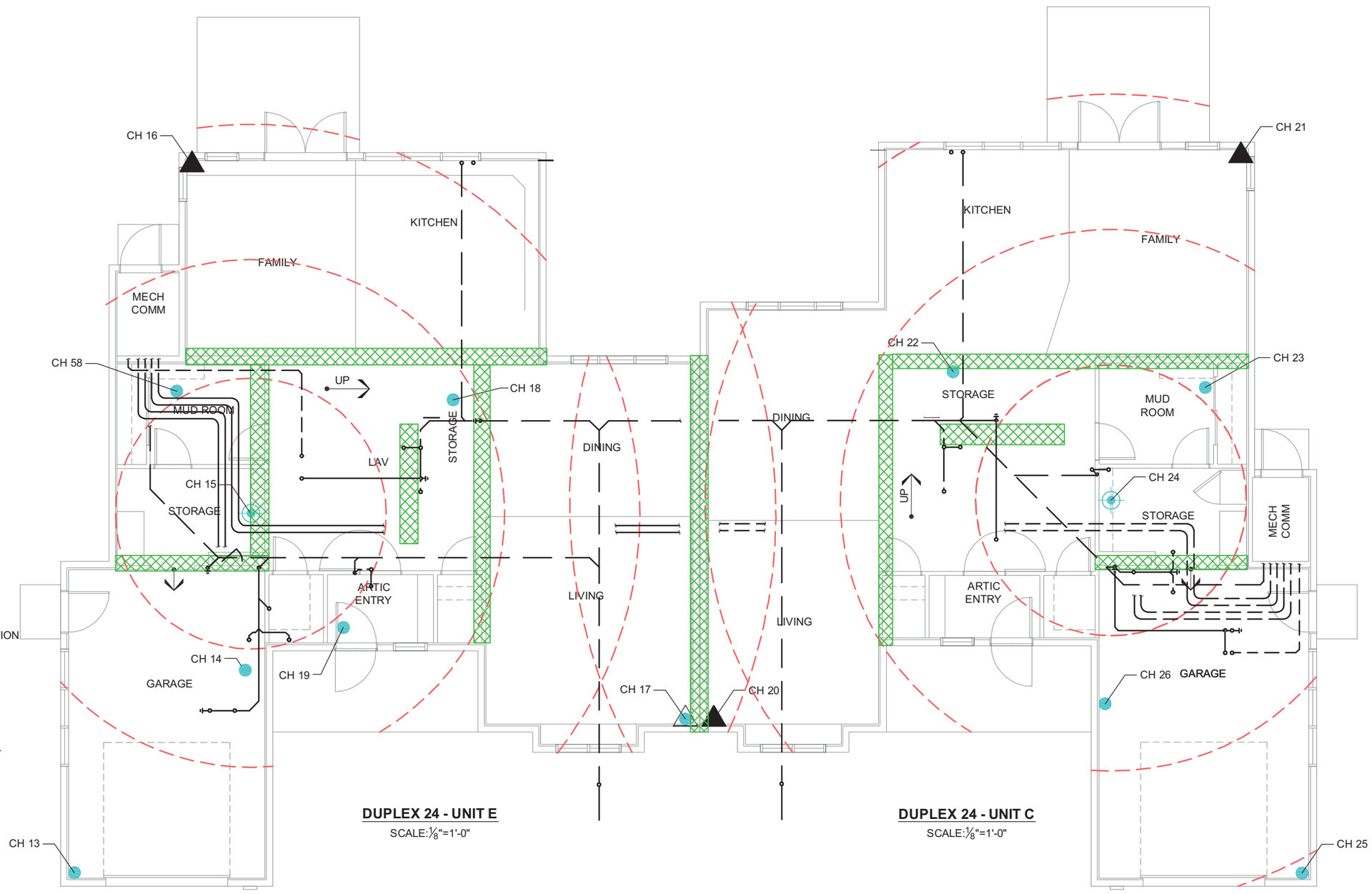
4 0 2 4

SCALE IN FEET

FINAL DRILLING LOCATIONS
SUB-SLAB DEPRESSURIZATION PILOT TEST
DUPLEX 17
FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 21 April 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: A-5

I:\ERS-JRT\007-Taku Gardens RA\CAD\2011 Pilot Test Report\Fig A-5 Duplex 17.dwg May 02,2011 tiedemann



LEGEND

- MAIN SUB-SLAB DEPRESSURIZATION SUCTION PIPE LOCATION
- REMOTE TEST HOLE LOCATION
- SPHERE OF INFLUENCE INTERVAL=10'
- ACTIVE TRACER GAS TEST HOLE LOCATION
- BASELINE AND ACTIVE TRACER GAS TEST HOLE LOCATION
- 10"' BEAM GRADE
- BURIED UTILITIES

NOTE:

1. ALL EXTERIOR WALLS ARE 24" GRADE BEAM WITH EXTERNAL PERIMETER FRENCH DRAIN.
2. AKK SSD SYSTEM TEST HOLE LOATIONS ARE APPROXIMATE.

4 0 2 4
SCALE IN FEET

FINAL DRILLING LOCATIONS
SUB-SLAB DEPRESSURIZATION PILOT TEST
DUPLEX 24 FIRST FLOOR PLAN - SYSTEM B
FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 19 April 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: A-6

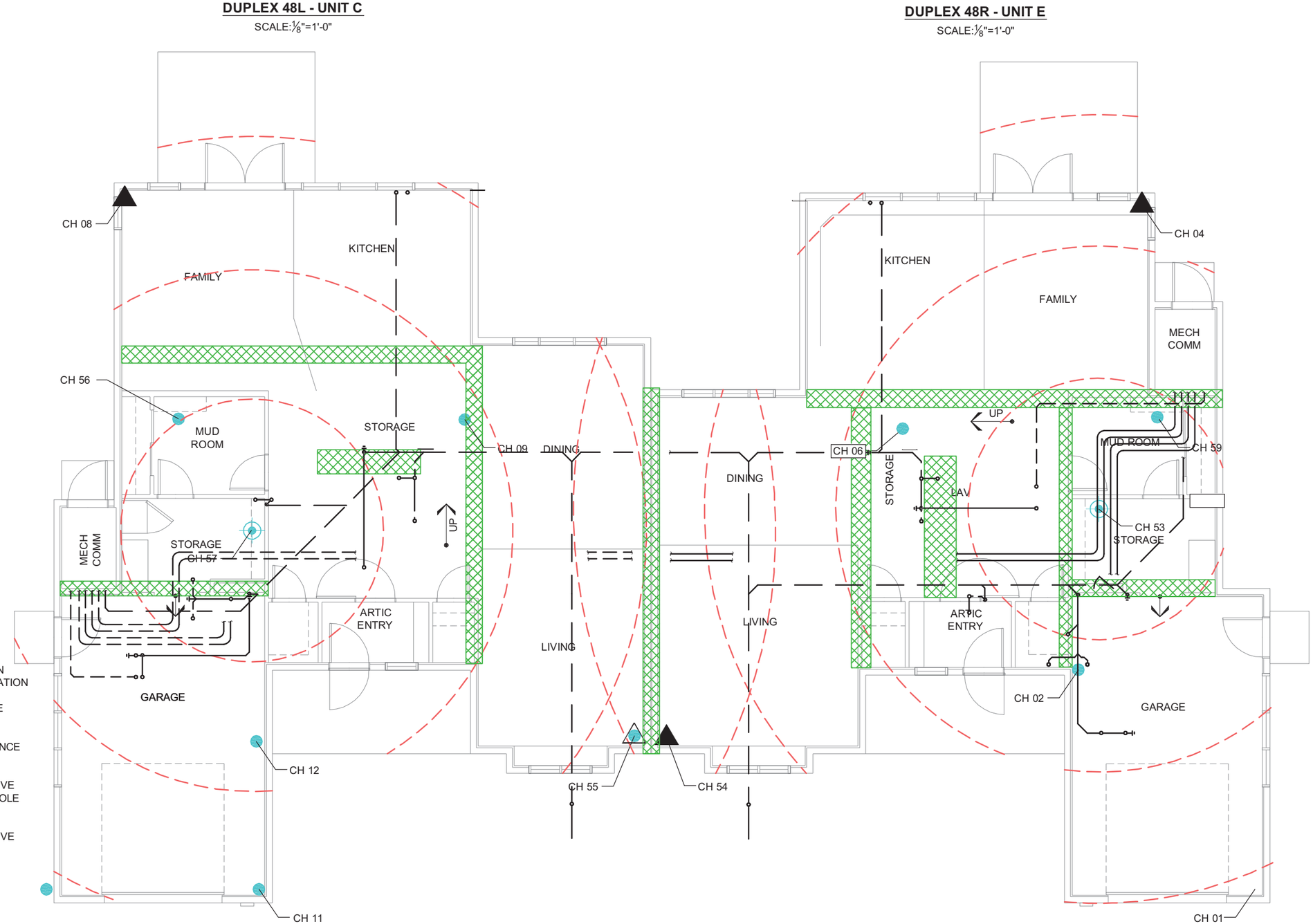
I:\ERS-URT\07-Taku Gardens RA\CAD\2011 Pilot Test Report\Fig A-6 Duplex 24.dwg May 02,2011 -kiedemann

DUPLEX 48L - UNIT C

SCALE:⅛"=1'-0"

DUPLEX 48R - UNIT E

SCALE:⅛"=1'-0"



LEGEND

- MAIN SUB-SLAB DEPRESSURIZATION SUCTION PIPE LOCATION
- REMOTE TEST HOLE LOCATION
- SPHERE OF INFLUENCE INTERVAL=10'
- BASELINE AND ACTIVE TRACE GAS TEST HOLE LOCATION
- BASELINE AND ACTIVE TRACER GAS TEST
- 10" GRADE BEAM
- BURIED UTILITIES

NOTE:

1. ALL EXTERIOR WALLS ARE 24" GRADE BEAM WITH EXTERNAL PERIMETER FRENCH DRAIN.
2. ALL SSD SYSTEM TEST HOLE LOCATIONS ARE APPROXIMATE.

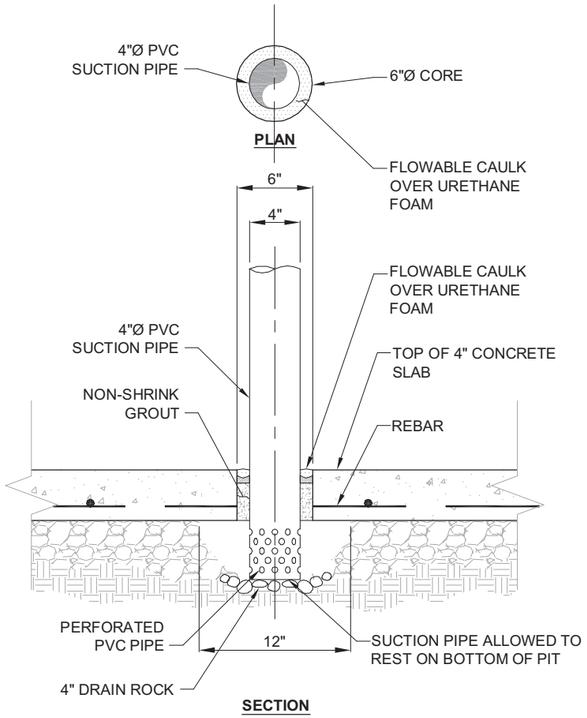
4 0 2 4
SCALE IN FEET

FINAL DRILLING LOCATIONS
SUB-SLAB DEPRESSURIZATION PILOT TEST
DUPLEX 48 FIRST FLOOR - SYSTEM B

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 29 April 2011	PROJECT MANAGER: T. Heikkila	FIGURE NO.: A-7

I:\ERS-UR\TO07-Taku Gardens RA\CAD\2011 Pilot Test Report\Fig A-7 Duplex 48.dwg May 02,2011 -tiedemam



1 / A-7 CONCRETE SLAB PENETRATION DETAIL

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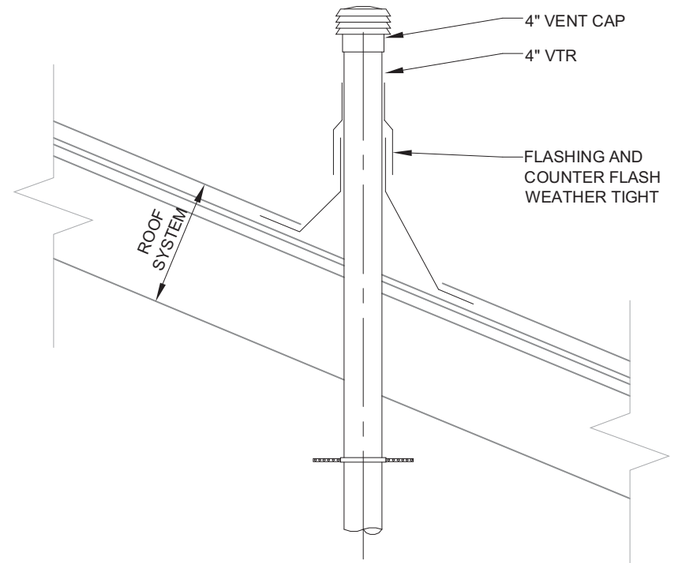

3 / A-7 FINAL ATTIC INSTALLATION DETAIL

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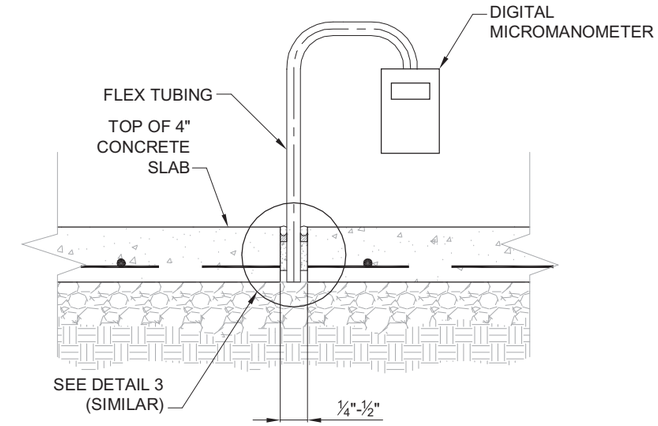

5 / A-7 REMOTE TEST HOLE CONCRETE SLAB PENETRATION DETAIL

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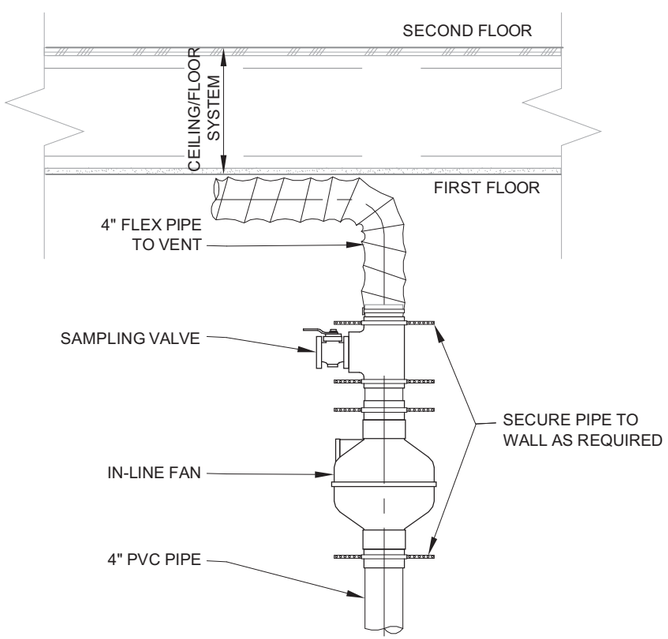

2 / A-7 INITIAL INSTALLATION DETAIL

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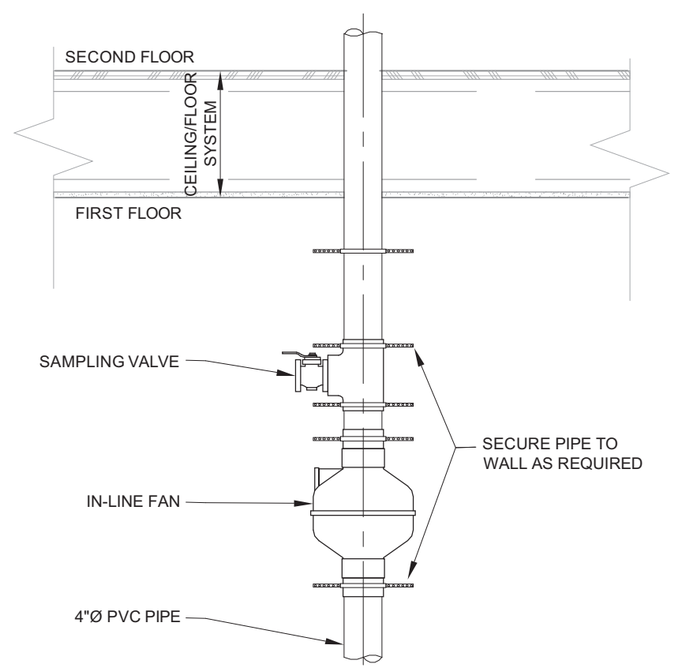
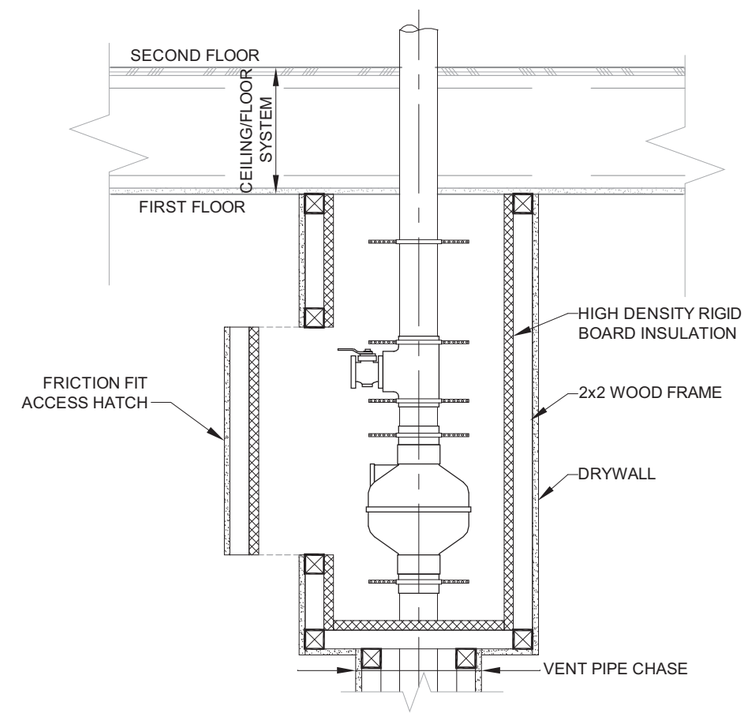


4 / A-7 FINAL 1st FLOOR CEILING INSTALLATION DETAIL

SCALE:¾"=1'-0"



6 / A-7 SAMPLING VALVE / INLINE FAN ENCLOSURE

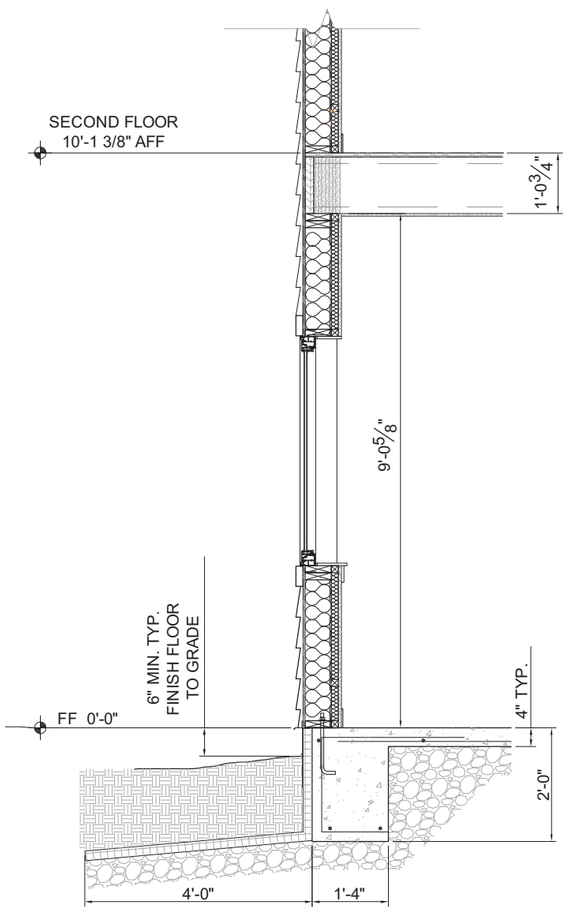
SCALE:¾"=1'-0"

SUB-SLAB DEPRESSURIZATION PILOT TEST
SYSTEM INSTALLATION DETAILS

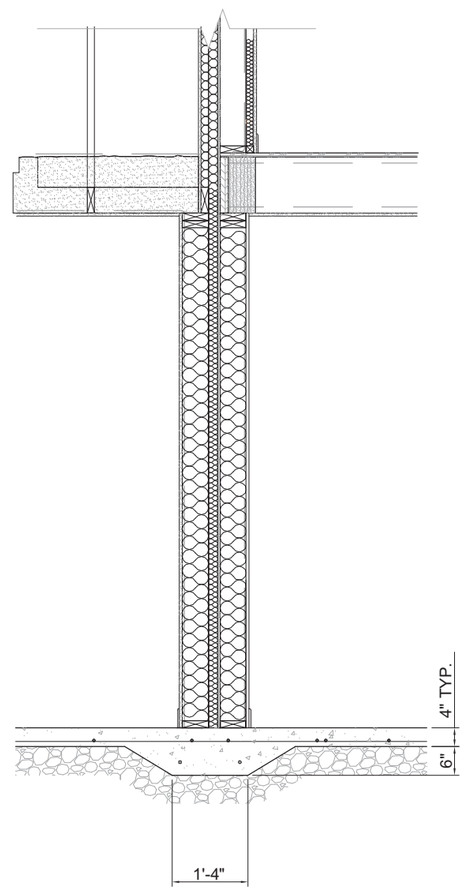
FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 December 2010	PROJECT MANAGER: S. Belway	FIGURE NO.: A-8

I:\ERS-JR\TO07-Taku Gardens RA\CAD\2010 Taku\2010 Pilot Test WP\Fig A-9 Misc Details.dwg Dec 02,2010 -avakarcs



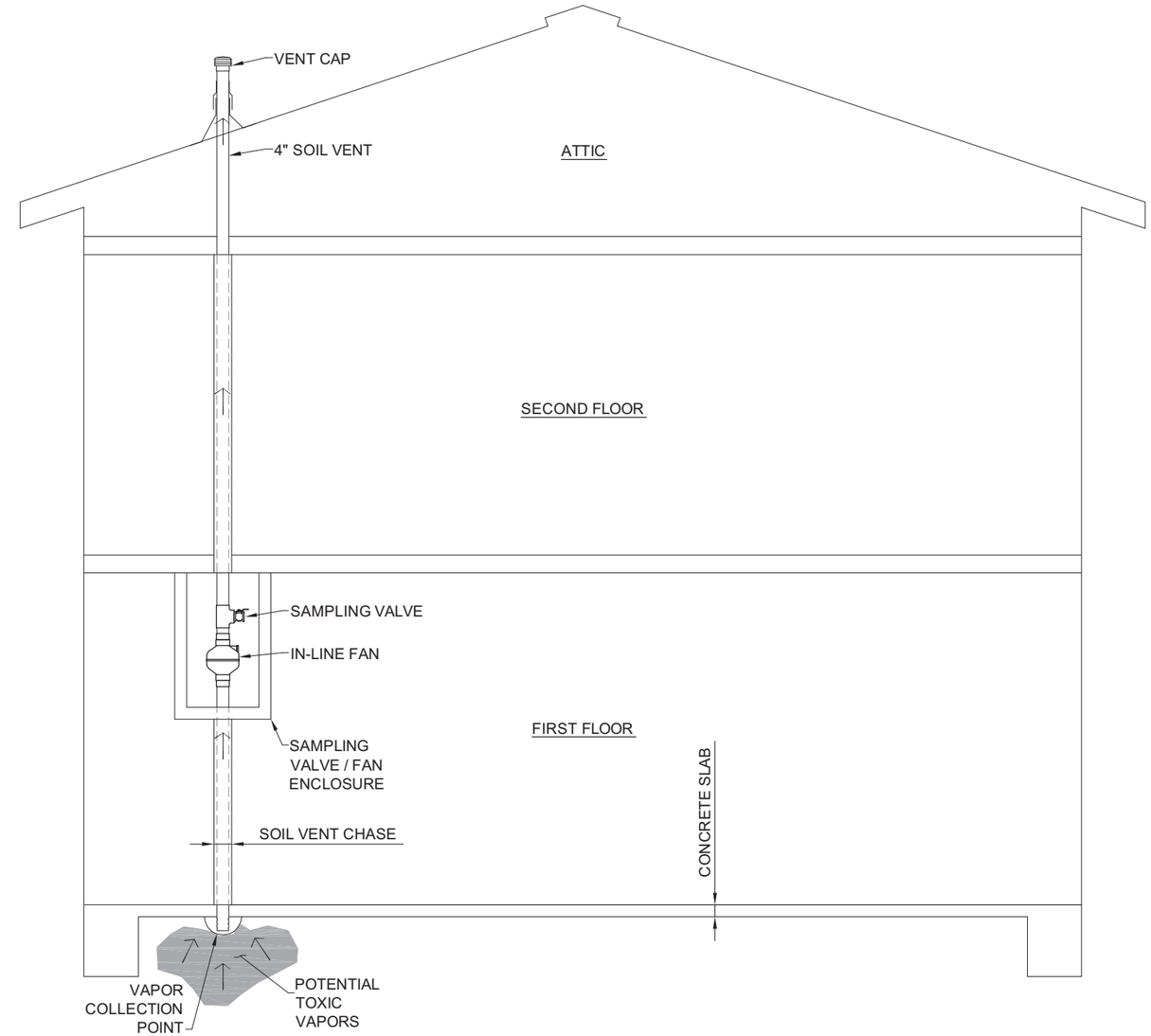
EXTERIOR WALL



INTERIOR WALL

1 / A-8 **TYPICAL FOOTING DETAILS**

NOT TO SCALE



2 / A-8 **TYPICAL SYSTEM SCHEMATIC DIAGRAM**

NOT TO SCALE

SUB-SLAB DEPRESSURIZATION PILOT TEST
TYPICAL FOOTING DETAILS AND SOIL VENT SYSTEM

FT. WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 13 December 2010	PROJECT MANAGER: S. Belway	FIGURE NO.: A-9

I:\ERS-UR\TO07-Taku Gardens RA\CAD\2010 Taku\2010 Pilot Test WP\Fig A-10 Misc Details.dwg Dec 02,2010 -avakarcs

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT

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FORMER COMMUNICATIONS SITE SUB-SLAB DEPRESSURIZATION PILOT STUDY REPORT

Appendix B: Photograph Log

FORT WAINWRIGHT, ALASKA
JUNE 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 07

Prepared by
Jacobs Engineering Group Inc.
4300 B Street, Suite 600
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Photo No. 16: The aggregate French drain on south side of Duplex #48. ....B-8

Photo No. 17: Jacobs employee preparing to inject the sulfur hexafluoride in the remote test hole of Duplex #17L. B-9

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Photo No. 21: All suction points were capped tightly to ensure until the summer testing phase occurs or the systems are removed. B-11

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Photo No. 1:
The subcontractor using a concrete core drill to drill the core for the suction point in Duplex #1.

Photo No. 2:
The suction point in Duplex #1 with the concrete core removed.

The aggregate seen is mostly large rounded stone with little to no fines.

Photo No. 3:
The subcontractor using a concrete core drill to drill the core for the suction point in Duplex #17.

Photo No. 4:
The suction point in Duplex #24L.

The material seen is mostly fines with a few stones.

Photo No. 5:
The foam backer rod used to seal the suction piping system.

Photo No. 6:
A finished suction point piping system with sealant.

Photo No. 7:
Subcontractors hand-placing grout for the Duplex #1 suction point.

Photo No. 8:
Perforated PVC pieces that will be in the collection void.

Photo No. 9:
A Jacobs employee monitoring sub-slab gases with 5-gas meter.

Photo No. 10:
A finished remote test hole in Duplex #1

Photo No. 11:
A Jacobs employee using hot glue to seal tubing in a remote test hole.

Photo No. 12:
A Jacobs employee setting up for vacuum pressure testing in Duplex #17.

Photo No. 13:
The collection void in Duplex #48R.

The void depth increased to 24” below bottom of the slab and the aggregate seen consists of fines and small stones.

Photo No. 14:
The exhaust system set-up in Duplex #1.

Photo No. 15:
The Exhaust system setup in Duplex #17.

Photo No. 16:
The aggregate French drain on south side of Duplex #48.

Photo No. 17:
Jacobs employee preparing to inject the sulfur hexafluoride in the remote test hole of Duplex #17L.

Photo No. 18:
The sulfur hexafluoride detector is hooked up to the suction point in Duplex #17 to monitor concentrations coming up the pipe.

Photo No. 19:
The complete fan setup with exhaust and variable speed control in Duplex #48L.

Photo No. 20:
The ventilation meter monitoring pressure differential at a remote test hole in the mudroom of Duplex #48R.

Photo No. 21:
All suction points were capped tightly to ensure until the summer testing phase occurs or the systems are removed.

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DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT

DRAFT

FORMER COMMUNICATIONS SITE SUB-SLAB DEPRESSURIZATION PILOT STUDY REPORT
Appendix C: Data Tables

FORT WAINWRIGHT, ALASKA
JUNE 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 07

JACOBS

Prepared by
Jacobs Engineering Group Inc.
4300 B Street, Suite 600
Anchorage, Alaska 99503

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VACUUM FAN TEST: DUPLEX #1

VACUUM FAN TEST: DUPLEX #17

VACUUM FAN TEST: DUPLEX #24

VACUUM FAN TEST: DUPLEX #28

2011 TEMPERATURES AND BAROMETRIC PRESSURES DURING TEST PERIOD

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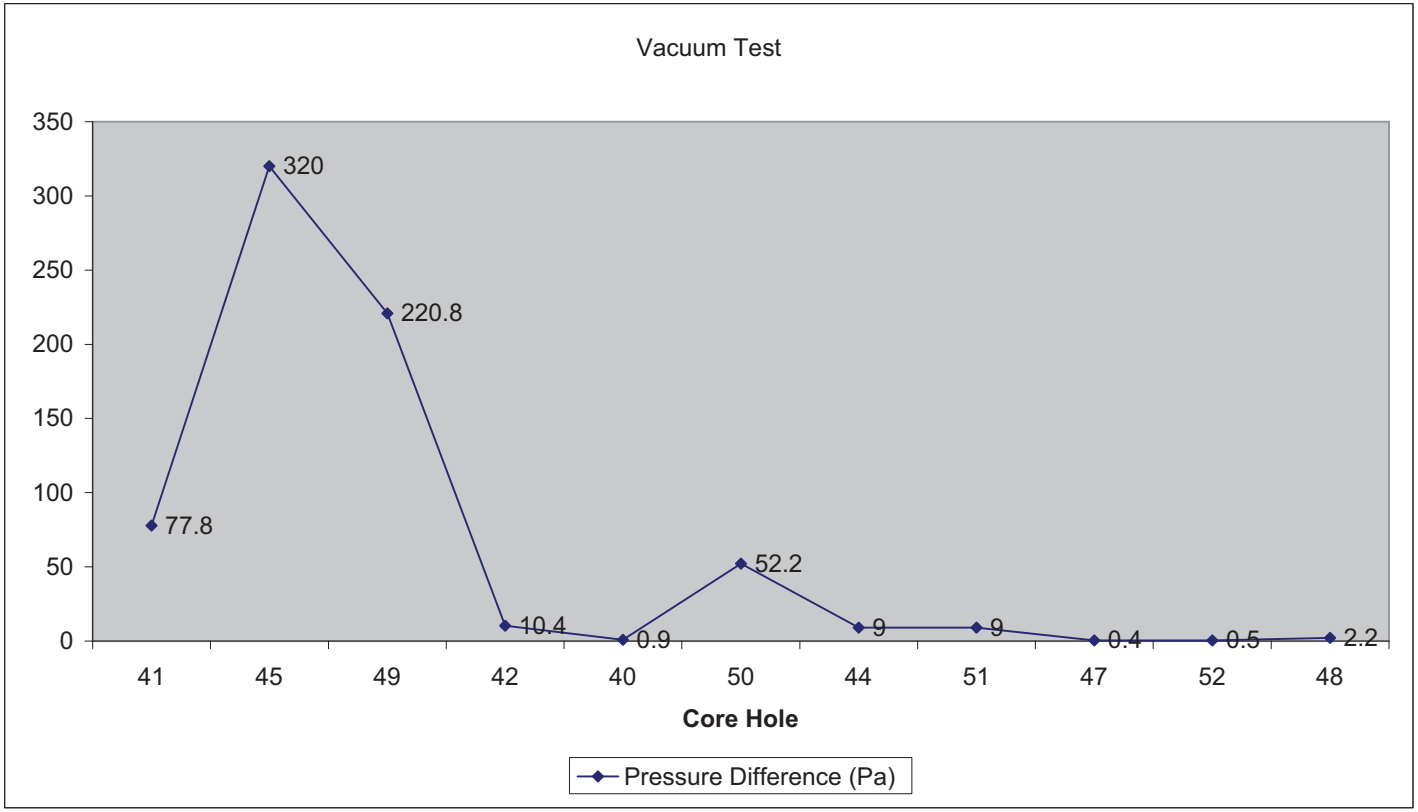
Vacuum Test with Single Suction Point -1/25/2011

Distance From SP (ft)	Core Hole	Baseline (Pa)	Suction	Pressure Difference (Pa)
20	**41**	0.1	77.9	77.8
20	**45**	1.3	321.3	320
22	**49**	-2.1	218.7	220.8
34	**42**	-0.9	9.5	10.4
38	**40**	-3.4	-2.5	0.9
40	**50**	-2.4	49.8	52.2
42	**44**	0.1	9.1	9
50	**51**	-2.5	6.5	9
62	**47**	-1.8	-1.4	0.4
68	**52**	-5.7	-5.2	0.5
70	**48**	-4.4	-2.2	2.2



Vacuum Test 1L - 24" Void - 2/8/2011

Distance From SP	Core Hole	Baseline	Suction	Pressure Difference	Notes
11	42	-1	231.8	232.8	
18	61	-0.5	57.9	58.4	
19	43	-0.9	29.2	30.1	
22	44	-1.2	89.6	90.8	
24	40	-3.7	1.2	4.9	
34	45	-0.6	45	45.6	
34	49	-3.2	26.7	29.9	
37	60	-3	-0.4	2.6	
38	47	-3.3	4.5	7.8	
48	50	-2.1	6.2	8.3	
68	62	-2.4	-1.5	0.9	
76	48	-4.7	-4.8	-0.1	

Vacuum Test Right Side-2/8/2011

Distance From SP	Core Hole	Baseline (Pa)	Suction	Pressure Difference	Notes
8	62	-2.4	830.5	832.9	
18	50	-2.1	817.4	819.5	
24	48	-4.7	152	156.7	
28	49	-3.2	225.2	228.4	
30	52	-5.8	10.5	16.3	
31	45	-0.6	161.8	162.4	
52	61	-0.5	5	5.5	
56	43	-0.9	2.3	3.2	
72	44	-1.2	-0.5	0.7	
76	42	-1	-0.6	0.4	
98	47	-3.3	-3.4	-0.1	
	40	-3.7			
	60	-3			

Overlap Test

2/22/2011

Core Hole	Baseline	1L	1R	Both	Distance from Left	Distance from Right
40	-3.6	-3.9	-	-3.3	24	
42	-0.9	26.5	-	26.3	11	76
43	-1.1	1.7	-0.7	2.4	19	56
45	-0.8	4.7	21.1	27.2	34	31
44	-0.6	7.2	-1.1	7.5	22	72
47	-4.1	-3.2	-	-3	38	98
52	-3.1		-2.6	-2.2		30
50	-1.8	-1.6	101.6	101.8	48	18
48	-4.4		14.2	14.8	76	24
49	-1.5	1	28.4	31.5	34	28
60	-4.1	-3.1	-	-3.6	37	
61	-0.3	5.4	0.3	6.1	18	52
62	-3.1		88.8	85.7	68	8

Pressure Differential **9-Mar (Prior to SF6 injections)**

Core Hole	Baseline	Suction	Change PD
40	-3.6	-3.3	0.3
42	-0.9	26.3	27.2
43	-1.1	2.4	3.5
45	-0.8	26.6	27.4
44	-0.6	6.4	7
47	-4.1	-2.7	1.4
52	-3.1	-1.8	1.3
50	-1.8	103.6	105.4
48	-4.4	13.7	18.1
49	-1.5	31.2	32.7
60	-4.1	-3.4	0.7
61	-0.3	6.1	6.4
62	-3.1	82.7	85.8

Baseline Tracer Gas Testing

CH43

Date	Time	Time Elapsed	Conc
16-Mar	1155	0	Inject
17-Mar	727	19:32	>999
18-Mar	740	43:45:00	620
19-Mar	752	67:57:00	358
21-Mar	946	117:51:00	88.3
21-Mar	1655	125:00:00	78
22-Mar	745	139:50:00	55.9

5.871149

CH44

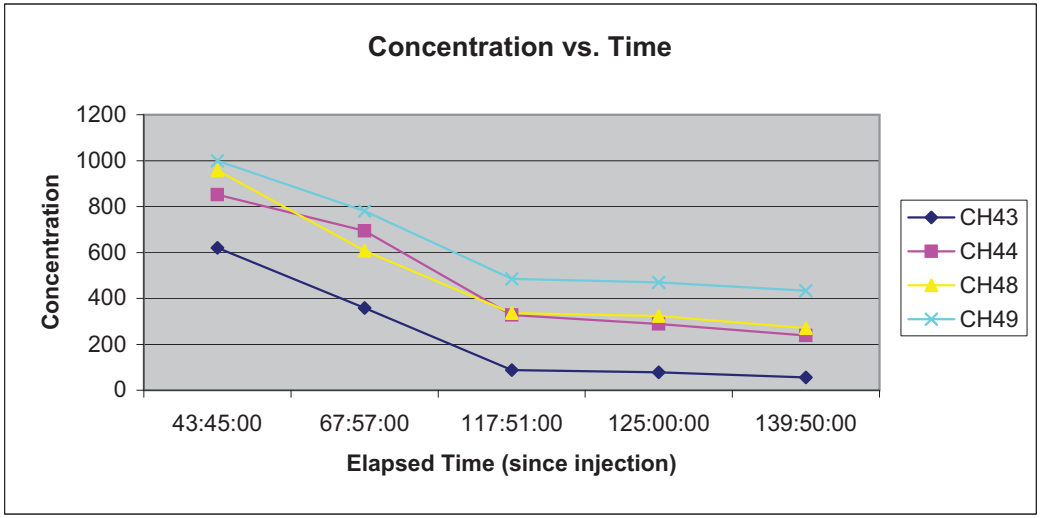
Date	Time	Time Elasped	Conc
16-Mar	1158	0	Inject
17-Mar	725	19:27	>999
18-Mar	745	43:47:00	851
19-Mar	802	68:04:00	694
21-Mar	954	117:56:00	327
21-Mar	1700	125:02:00	288
22-Mar	750	139:52:00	239

CH48

Date	Time	Time Elapsed	Conc
16-Mar	1148	0	Inject
17-Mar	730	19:42	>999
18-Mar	736	43:48:00	958
19-Mar	810	68:22:00	607
21-Mar	939	117:51:00	336
21-Mar	1707	125:05:00	324
22-Mar	738	140:12:00	270

CH49

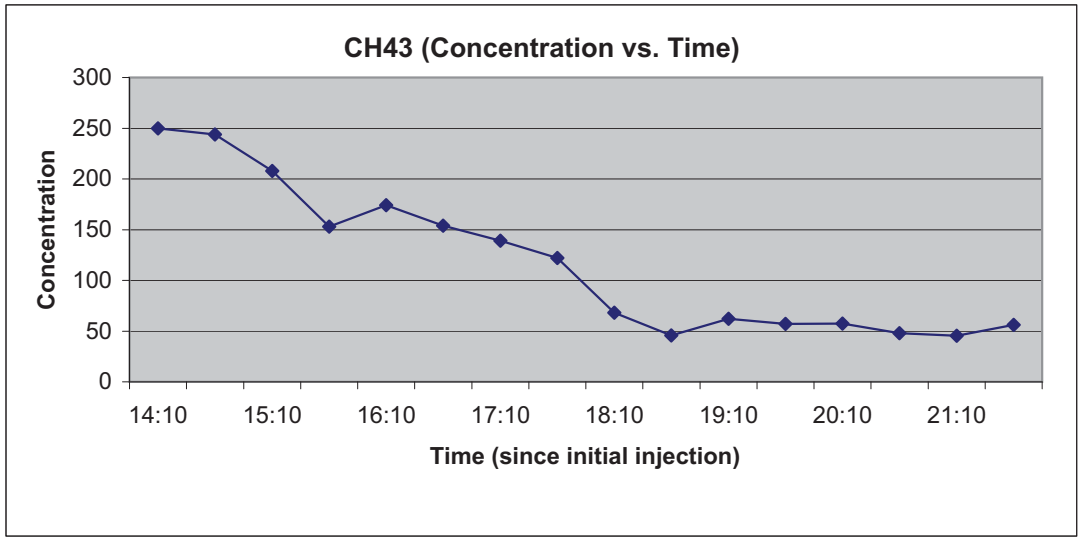
Date	Time	Time Elapsed	Conc
16-Mar	1150	0	Inject
17-Mar	732	19:42	>999
18-Mar	738	43:48:00	999
19-Mar	813	68:23:00	781
21-Mar	930	117:40:00	485
21-Mar	1710	125:00:00	470
22-Mar	734	140:14:00	433



CH 43
Initial Injection - 1735 -- 3/9

Time	Time Elapsed	Conc
745	14:10	250
815	14:40	244
845	15:10	208
910	15:35	153
945	16:10	174
1015	16:40	154
1045	17:10	139
1115	17:40	122
1145	18:10	68
1215	18:40	45.8
1245	19:10	62.1
1315	19:40	57.1
1345	20:10	57.3
1415	20:40	48.1
1445	21:10	45.3
1515	21:40	56.2

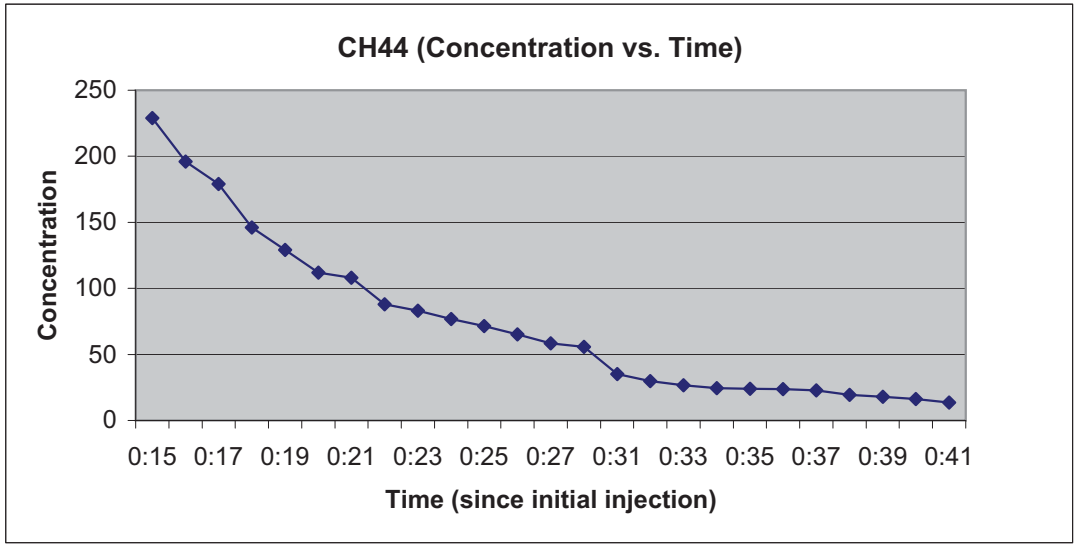
SLOPE:	25.84	per hour



CH 44
Initial Injection - 0900 -- 3/10

Time	Time Elapsed	Conc.
905	0:05	>999
915	0:15	229
916	0:16	196
917	0:17	179
918	0:18	146
919	0:19	129
920	0:20	112
921	0:21	108
922	0:22	88
923	0:23	83.2
924	0:24	76.7
925	0:25	71.4
926	0:26	65.1
927	0:27	58.3
928	0:28	55.6
931	0:31	35.1
932	0:32	29.9
933	0:33	26.6
934	0:34	24.5
935	0:35	24
936	0:36	23.8
937	0:37	22.8
938	0:38	19.5
939	0:39	18
940	0:40	16.2
941	0:41	13.6

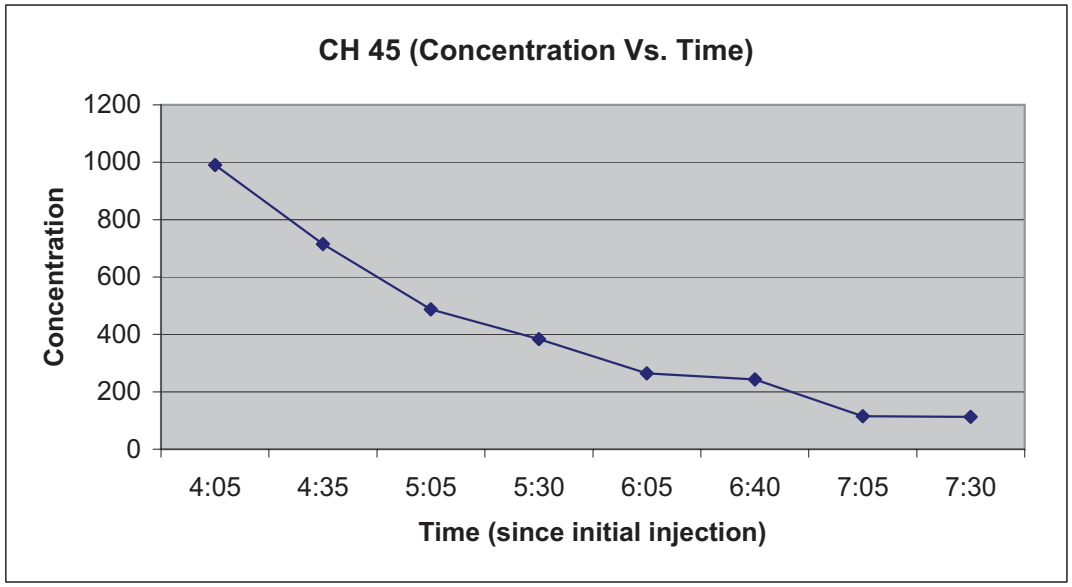
SLOPE	359.00	per hour
	5.983333333	per minute



CH45
Initial Injection - 0800 -- 3/10

Time	Time Elapsed	Conc.
900	1:00	>999
1000	2:00	>999
1100	3:00	>999
1205	4:05	990
1235	4:35	715
1305	5:05	487
1330	5:30	384
1405	6:05	264
1440	6:40	243
1505	7:05	115
1530	7:30	113

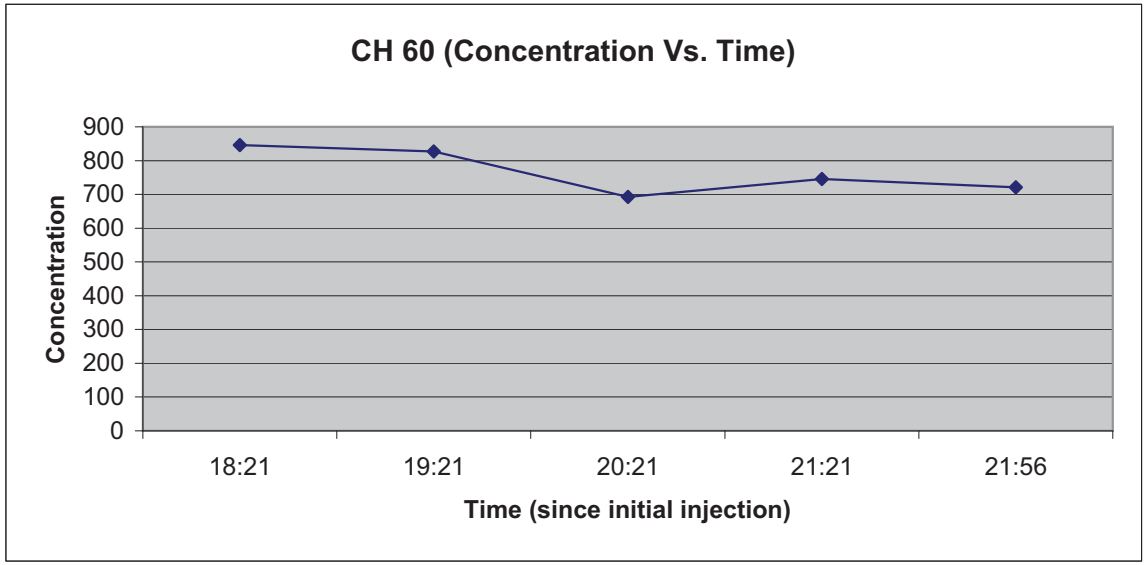
SLOPE	134.9230769	per hour



CH60
Initial Injection- 17:39 -- 3/9

Time	Time Elapsed	Conc.
8:30	14:51	>999
9:50	16:11	>999
10:50	17:11	>999
12:00	18:21	846
13:00	19:21	827
14:00	20:21	693
15:00	21:21	746
15:35	21:56	721

SLOPE	34.91620112	per hour

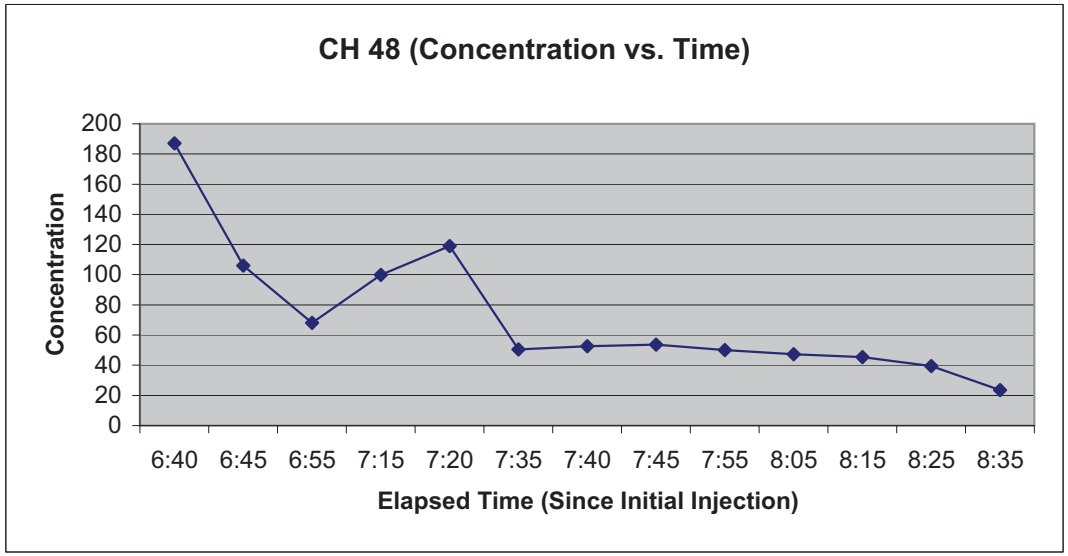


CH 48

Initial Injection- 7:50 -- 3/10

Time	Time Elapsed	Conc.
8:55:00	1:05	>999
10:30:00	2:40	>999
11:00:00	3:10	>999
11:30:00	3:40	>999
14:30:00	6:40	187
14:35:00	6:45	106
14:45:00	6:55	68
15:05:00	7:15	100
15:10:00	7:20	119
15:25:00	7:35	50.5
15:30:00	7:40	52.7
15:35:00	7:45	53.7
15:45:00	7:55	50.1
15:55:00	8:05	47.4
16:05:00	8:15	45.3
16:15:00	8:25	39.4
16:25:00	8:35	23.5

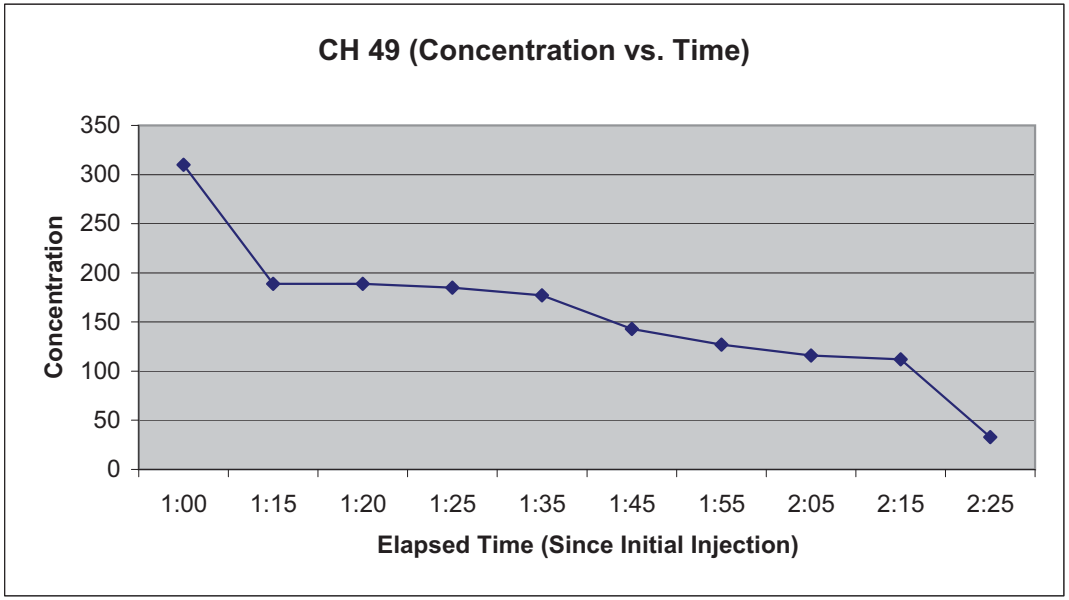
SLOPE	85.15625	per hour



CH49
Initial Injection 7:50 -- 3/11

Time	Time Elapsed	Conc.
8:50	1:00	310
9:05	1:15	189
9:10	1:20	189
9:15	1:25	185
9:25	1:35	177
9:35	1:45	143
9:45	1:55	127
9:55	2:05	116
10:05	2:15	112
10:15	2:25	33

SLOPE	195.0704225 per hour

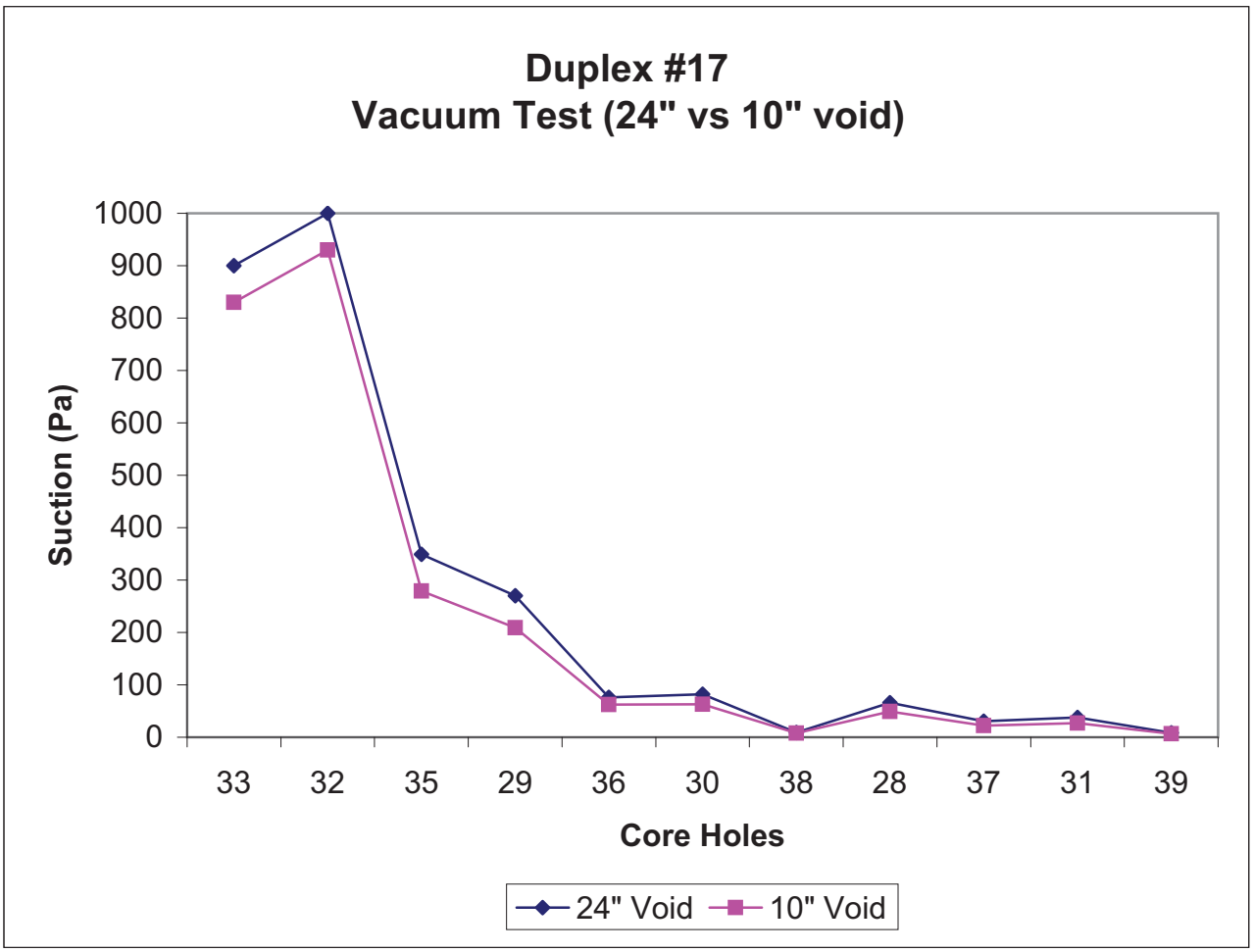


Vacuum Test 10 inch Void - 2/1/11

Distance From SP	Core Hole	Baseline	Suction	Pressure Difference	CFM
10	**33**	-3.7	830	833.7	
10	**32**	-4.4	930	934.4	
19	**35**	-1.1	278.8	279.9	
19	**29**	-8	209.2	217.2	
30	**36**	-0.2	62.2	62.4	
32	**30**	-3	63	66	
39	**38**	0.4	7.6	7.2	
39	**28**	-3.5	49.1	52.6	
43	**37**	-2.1	22.3	24.4	
48	**31**	-5.8	27	32.8	
50	**39**	-2.2	6.4	8.6	
50	**27**	-4.4	6.7	11.1	

Vacuum 24 inch Void- 2/2/2011

Distance From SP	Core Hole	Baseline	Suction	Pressure Difference	Notes
10	**33**	2.3	900	897.7	** Not exact reading. Too high for equipment
10	**32**	0.4	1000		** Not exact reading. Too high for equipment
19	**35**	-0.9	349.3	350.2	
19	**29**	-0.3	269.9	270.2	
30	**36**	-1	76.3	77.3	
32	**30**	-0.1	82.2	82.3	
39	**38**	-0.7	9.2	9.9	
39	**28**	-2.4	66.1	68.5	
43	**37**	-2.4	30.3	32.7	
48	**31**	-1.6	37.6	39.2	
50	**39**	-5.2	8.6	13.8	
50	**27**	-5.4	11.4	16.8	



Fan Test 100% Initial - Fan start time:2/2/2011 1035

Core Hole	Distance From SP	Baseline	Suction	Pressure Difference	Notes
37	43	-2.4	1.0	3.4	
38	39	-0.7	1.4	2.1	
35	19	-0.9	37.9	38.8	
36	30	-1	7.6	8.6	
39	50	-5.2	-1.0	4.2	
33	10	2.3	115.5	113.2	
27	50	-5.4	-2.1	3.3	
28	39	-2.4	7.7	10.1	
31	48	-1.6	3.0	4.6	
29	19	-0.3	35.3	35.6	
30	32	-0.1	8.7	8.8	
32	10	0.4	144.2	143.8	

3 Hours

Core Hole	Distance From SP	Baseline	Suction	Pressure Difference	Notes
37	43	-2.4	3.1	5.5	
38	39	-0.7	1.3	2	
35	19	-0.9	32.4	33.3	
36	30	-1	6.4	7.4	
39	50	-5.2	-1.4	3.8	
33	10	2.3	109.2	106.9	
27	50	-5.4	-4.9	0.5	
28	39	-2.4	0.9	3.3	
31	48	-1.6	-1.4	0.2	
29	19	-0.3	28.1	28.4	
30	32	-0.1	8.1	8.2	
32	10	0.4	140.0	139.6	

23 Hours

Core Hole	Distance From SP	Baseline	Suction	Pressure Difference	Notes
37	43	-2.4	3.0	5.4	
38	39	-0.7	1.9	2.6	
35	19	-0.9	37.8	38.7	
36	30	-1	8.6	9.6	
39	50	-5.2	-0.8	4.4	
33	10	2.3	119.7	117.4	
27	50	-5.4	-1.1	4.3	
28	39	-2.4	9.9	12.3	
31	48	-1.6	4.7	6.3	
29	19	-0.3	35.4	35.7	
30	32	-0.1	9.6	9.7	
32	10	0.4	148.3	147.9	

Fan Test 100% 2nd Trial- 4 hours Start Time: 2/4/2011 1015

Core Hole	Distance From SP	Baseline	Suction	Pressure Difference	Notes
37	43	-1	1.3	2.3	
38	39	0.1	0.5	0.4	
35	19	1.3	34.9	33.6	
36	30	0.3	7.9	7.6	
39	50	-3.1	-2.4	0.7	
33	10	1.3	120.3	119	
27	50	-4.1	-2.2	1.9	
28	39	-0.5	6.8	7.3	
31	48	-0.6	2.0	2.6	
29	19	1.3	32.7	31.4	
30	32	0.1	9.3	9.2	
32	10	-1.3	152.5	153.8	

20 Hours

Core Hole	Distance From SP	Baseline	Suction	Pressure Difference	Notes
37	43	-1	0.6	1.6	
38	39	0.1	0.3	0.2	
35	19	1.3	33.5	32.2	
36	30	0.3	7.1	6.8	
39	50	-3.1	-4.6	-1.5	
33	10	1.3	120.4	119.1	
27	50	-4.1	-5.3	-1.2	
28	39	-0.5	3.7	4.2	
31	48	-0.6	0.6	1.2	
29	19	1.3	30.2	28.9	
30	32	0.1	9.5	9.4	
32	10	-1.3	151.2	152.5	

72 Hours

Core Hole	Distance From SP	Baseline	Suction	Pressure Difference	Notes
37	43	-1	-0.8	0.2	
38	39	0.1	0.2	0.1	
35	19	1.3	31.4	30.1	
36	30	0.3	5.5	5.2	
39	50	-3.1	-4.2	-1.1	
33	10	1.3	114.6	113.3	
27	50	-4.1	-3.6	0.5	
28	39	-0.5	2.4	2.9	
31	48	-0.6	-0.4	0.2	
29	19	1.3	28.2	26.9	
30	32	0.1	7.4	7.3	
32	10	-1.3	149.0	150.3	

168 Hours

Core Hole	Distance From SP	Baseline	Suction	Pressure Difference	Notes
37	43	-1	1.2	2.2	
38	39	0.1	0.7	0.6	
35	19	1.3	29.6	28.3	
36	30	0.3	5.6	5.3	
39	50	-3.1	-4.6	-1.5	
33	10	1.3	111.7	110.4	
27	50	-4.1	-5.0	-0.9	
28	39	-0.5	1.6	2.1	
31	48	-0.6	0.0	0.6	
29	19	1.3	29.0	27.7	
30	32	0.1	8.1	8	
32	10	-1.3	145.2	146.5	

Baseline Tracer Gas Injections

CH33

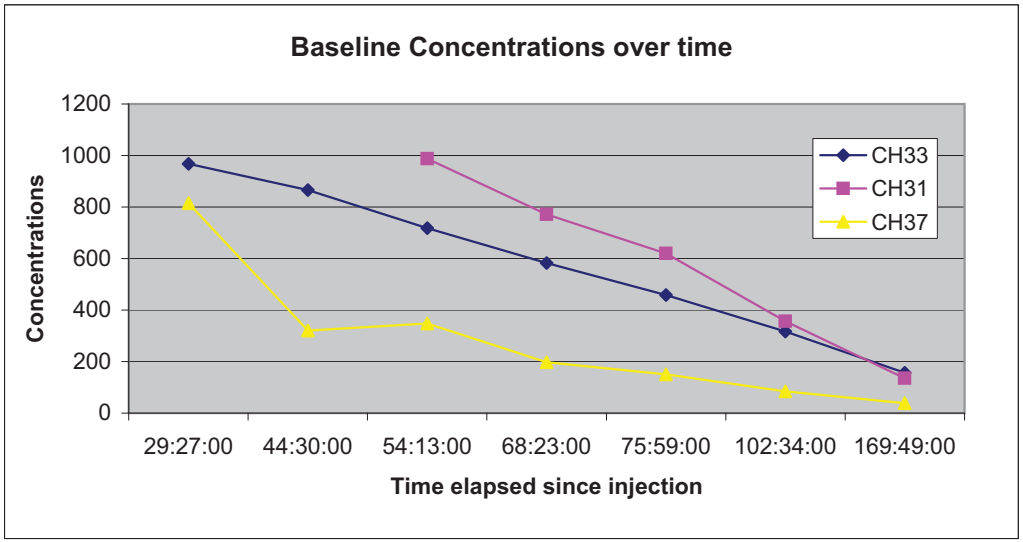
Date	Time	Time Elapsed	Conc
9-Mar	1026	0	Inject
9-Mar	1725	6:59	>999
10-Mar	717	20:25	>999
10-Mar	1619	29:27:00	968
11-Mar	722	44:30:00	866
11-Mar	1705	54:13:00	718
12-Mar	715	68:23:00	582
12-Mar	1450	75:59:00	458
13-Mar	1715	102:34:00	317
16-Mar	1130	169:49:00	156

CH31

Date	Time	Time Elapsed	Conc
9-Mar	1030	0	inject
9-Mar	1715	6:45	>999
10-Mar	710	20:14	>999
10-Mar	1615	29:19:00	>999
11-Mar	725	44:29:00	>999
11-Mar	1710	54:14:00	988
12-Mar	720	68:24:00	772
12-Mar	1452	75:57:00	620
13-Mar	1705	102:20:00	357
16-Mar	1135	169:50:00	136

CH 37

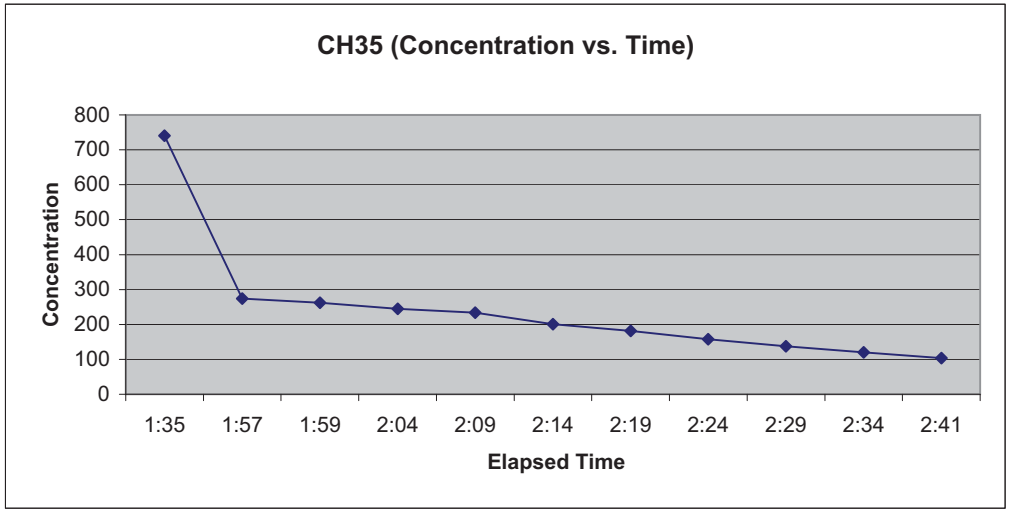
Date	Time	Time Elapsed	Conc
9-Mar	1025	0	inject
9-Mar	1720	6:55	>999
10-Mar	715	20:24	>999
10-Mar	1617	29:26:00	815
11-Mar	720	44:29:00	320
11-Mar	1700	54:09:00	348
12-Mar	710	68:19:00	198
12-Mar	1448	75:58:00	150
13-Mar	1710	102:30:00	84.2
16-Mar	1125	169:45:00	39.1



Active Tracer Gas Injections

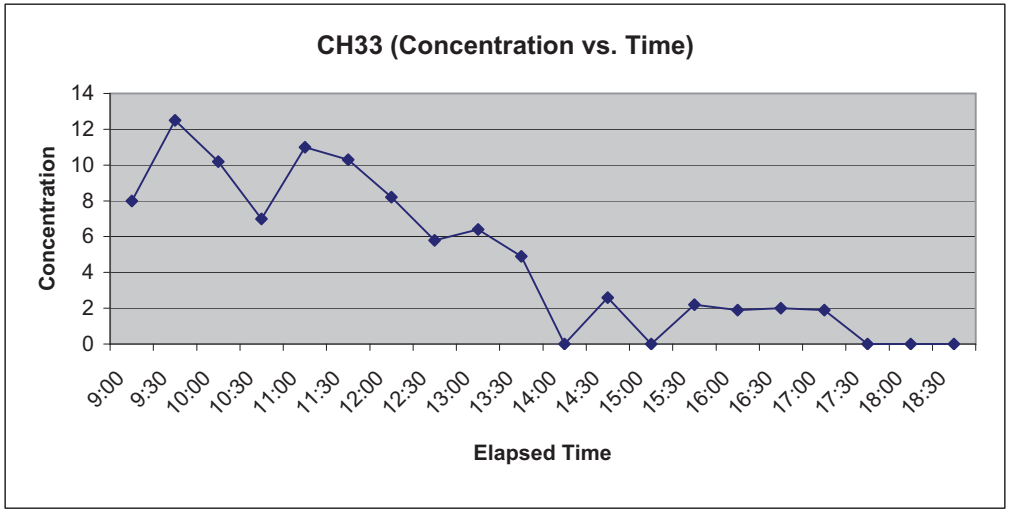
CH 35
Initial Injection: 1538 -3/5

Time Elapsed	Conc.
0:01	>999
0:05	>999
0:08	>999
0:15	>999
0:25	>999
0:32	>999
0:50	>999
1:01	>999
1:14	>999
1:35	740
1:57	274
1:59	262
2:04	245
2:09	234
2:14	201
2:19	181
2:24	158
2:29	137
2:34	120
2:41	104



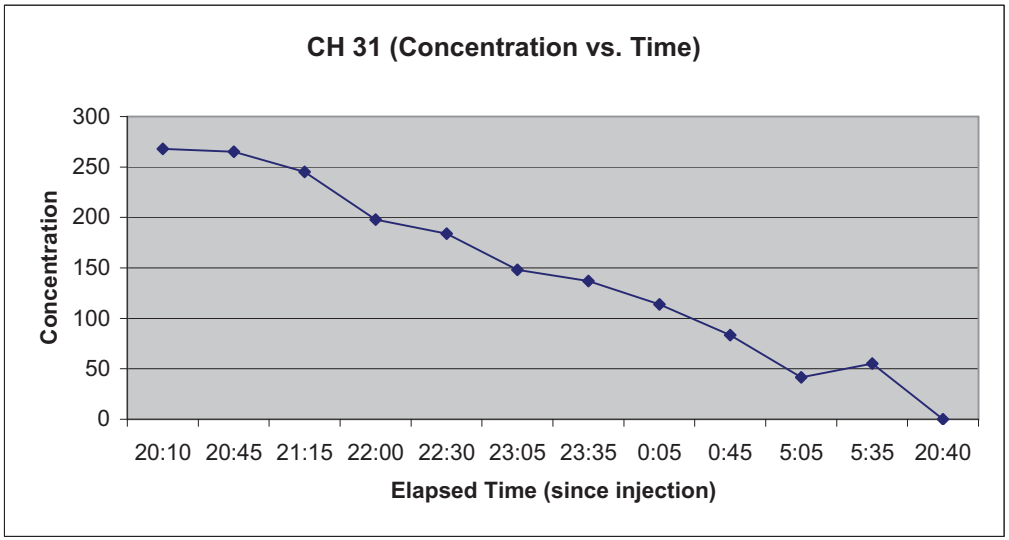
CH 33
Initial injections: 0956 3/7
(Min:Sec)

Time Elapsed	Conc.
3:30	>999
9:00	8
9:30	12.5
10:00	10.2
10:30	7
11:00	11
11:30	10.3
12:00	8.2
12:30	5.8
13:00	6.4
13:30	4.9
14:00	0
14:30	2.6
15:00	0
15:30	2.2
16:00	1.9
16:30	2
17:00	1.9
17:30	0
18:00	0
18:30	0



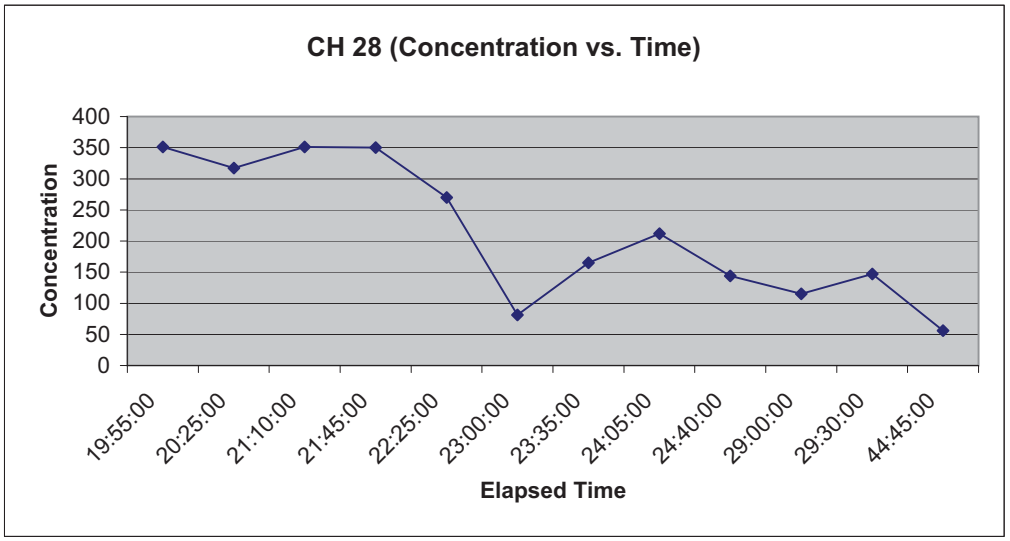
CH 31
Initial Injection- 1130 3/7

Time	Time Elapsed	Conc
1230	1:00	>999
1345	2:15	>999
1445	3:15	>999
1545	4:15	>999
1800	6:30	>999
740	20:10	268
815	20:45	265
855	21:15	245
940	22:00	198
1010	22:30	184
1045	23:05	148
1115	23:35	137
1145	0:05	114
1225	0:45	83.4
1640	5:05	41.6
1710	5:35	55.1
815	20:40	0



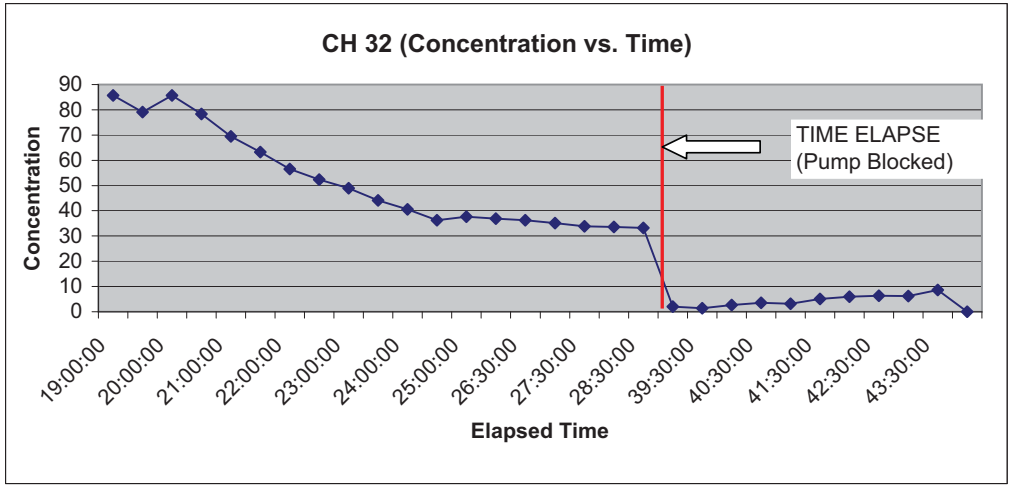
CH 28
Initial Injection- 1135 3/7

Time	Time Elapsed	Conc.
1235	1:00:00	>999
1359	2:24:00	>999
1459	3:24:00	>999
1559	4:24:00	>999
1805	6:30:00	>999
730	19:55:00	351
800	20:25:00	317
845	21:10:00	351
920	21:45:00	350
1000	22:25:00	270
1035	23:00:00	81.3
1110	23:35:00	165
1140	24:05:00	212
1215	24:40:00	144
1635	29:00:00	115
1705	29:30:00	147
820	44:45:00	56



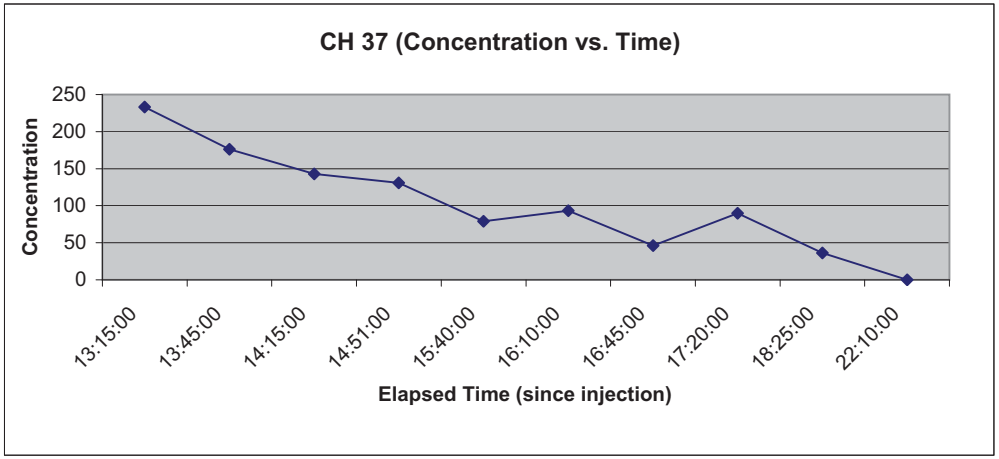
CH 32
Initial Injection- 1250 3/7 12:50
(Min:sec:nothing)

Time Elapsed	Conc.
4:00:00	>999
9:00:00	>999
19:00:00	85.7
19:30:00	79.1
20:00:00	85.7
20:30:00	78.3
21:00:00	69.5
21:30:00	63.2
22:00:00	56.5
22:30:00	52.4
23:00:00	48.9
23:30:00	44.1
24:00:00	40.6
24:30:00	36.2
25:00:00	37.7
25:30:00	36.89
26:30:00	36.3
27:00:00	35.1
27:30:00	33.9
28:00:00	33.6
28:30:00	33.2
39:00:00	2
39:30:00	1.4
40:00:00	2.7
40:30:00	3.5
41:00:00	3.2
41:30:00	5.1
42:00:00	5.9
42:30:00	6.4
43:00:00	6.2
43:30:00	8.6
54:30:00	0



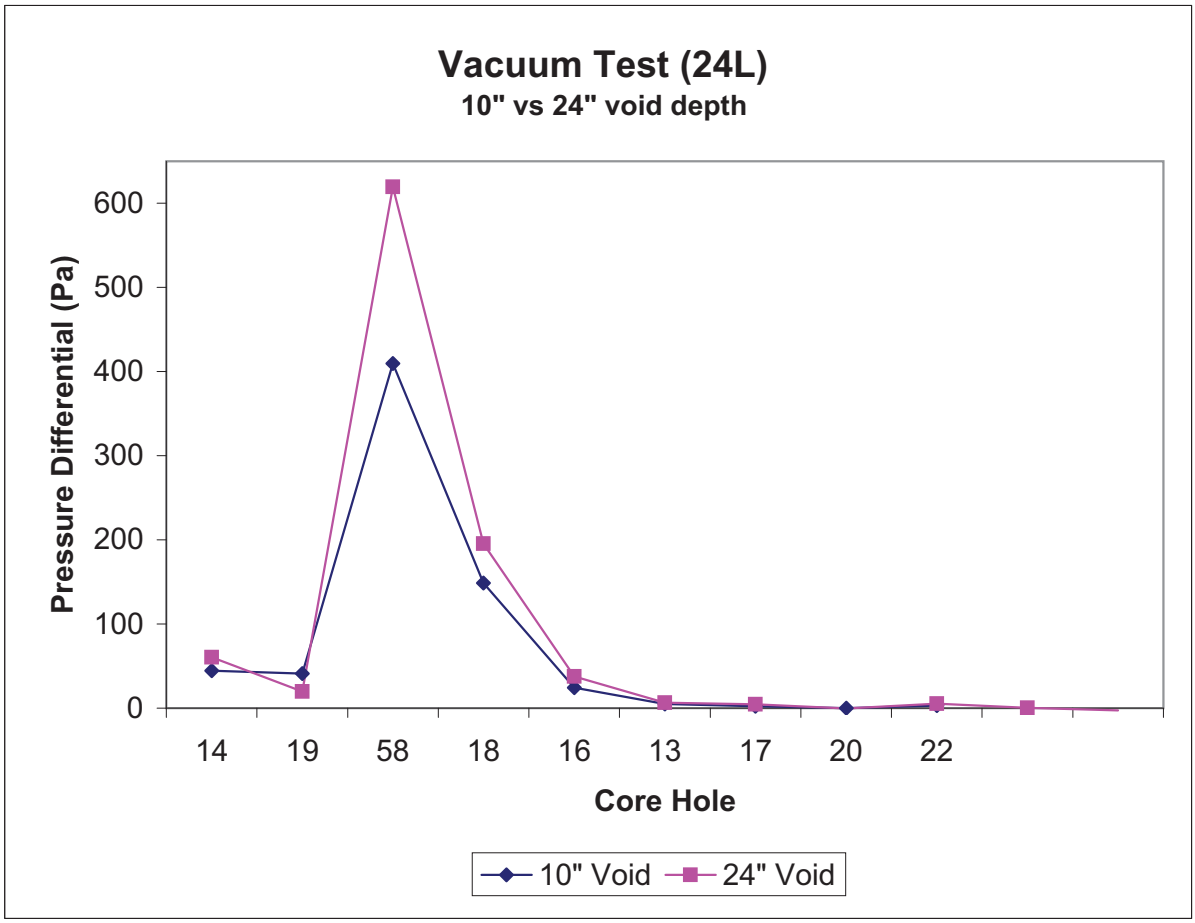
CH 37
Initial Injection 1910 - 3/7

Time	Time Elapsed	Conc.
725	13:15:00	233
755	13:45:00	176
825	14:15:00	143
901	14:51:00	131
951	15:40:00	79.2
1020	16:10:00	93.4
1055	16:45:00	46.4
1130	17:20:00	89.9
1235	18:25:00	36.3
1620	22:10:00	0



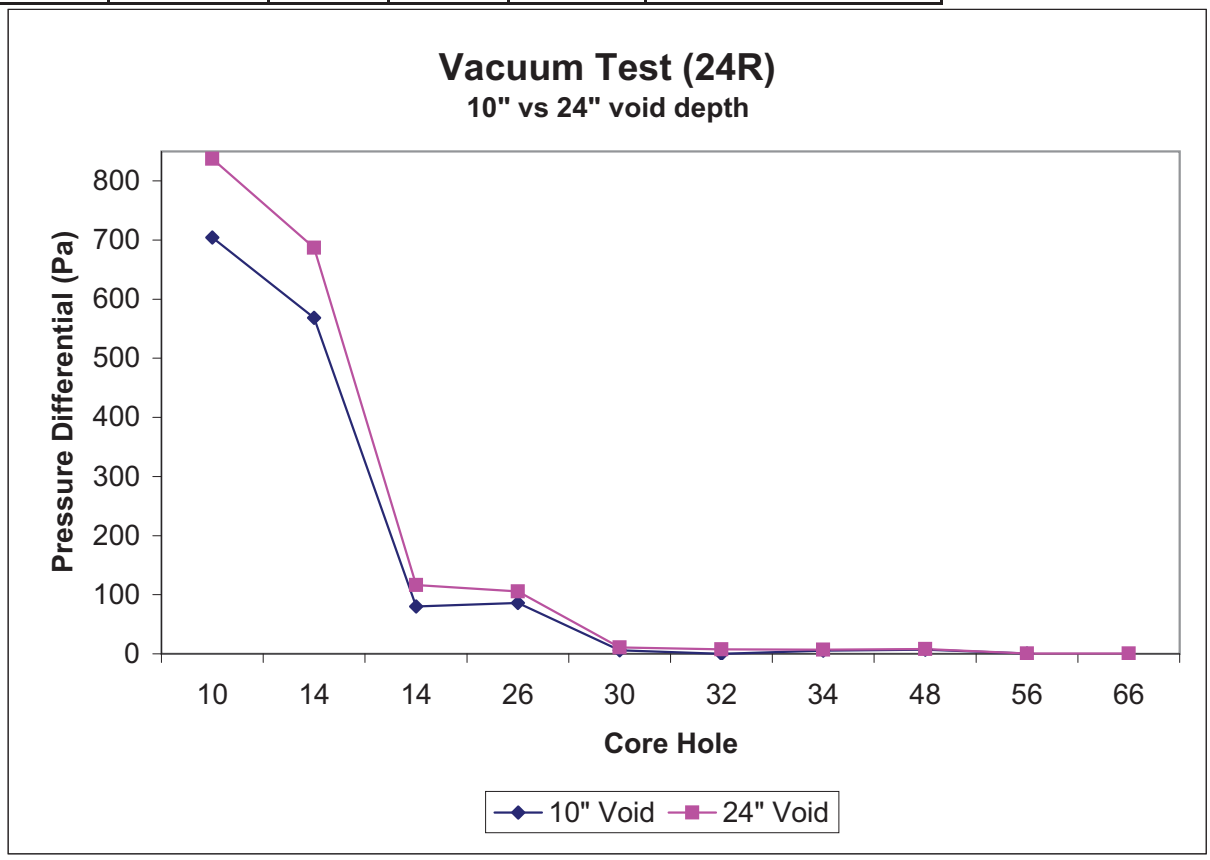
Vacuum 10 inch Void- 24L 2/1/2011

Distance From SP	Core Hole	Baseline	Suction	Pressure Difference	Notes
9	**14**	-1.7	44.6	46.3	Garage - 1 24" grade beam, more compaction
10	**19**	-0.3	40.9	41.2	Arctic entry- 1-10" grade beam, influence from outside
10	**58**	-2.2	409.8	412	Mudroom (no grade beams between SP and RTH)
16	**18**	-0.6	148.8	149.4	Interior of duplex
25	**16**	-3.0	24.3	27.3	Far corner of family room, outside influence
28	**13**	-4.7	5.1	9.8	Far corner of garage, heavy compaction
34	**17**	-3.3	2.4	5.7	24L Party wall
36	**20**	-0.1	0	0.1	24R party wall
50	**22**	-0.4	2.9	3.3	



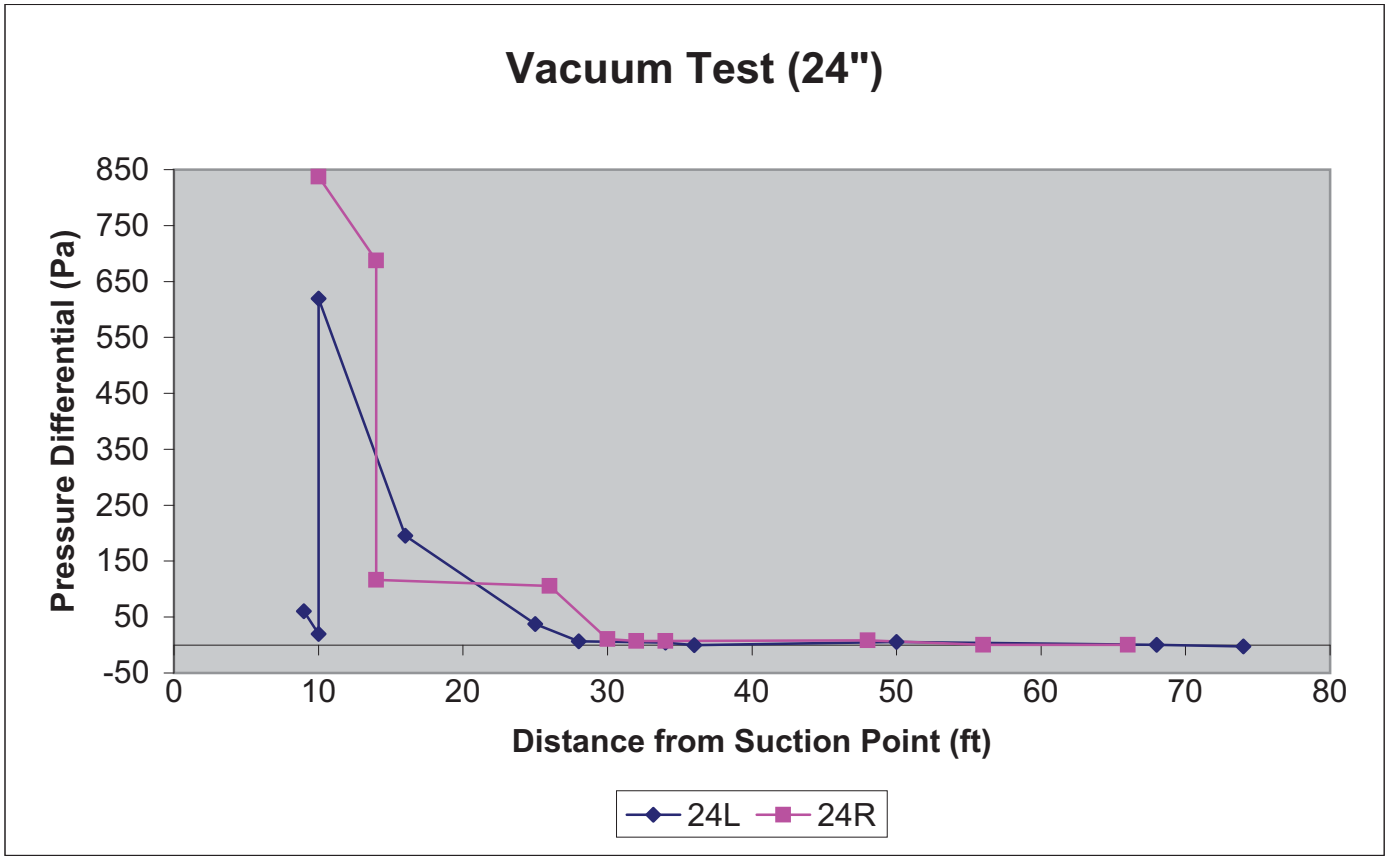
Vacuum 10 inch Void -24R - 2/1/11

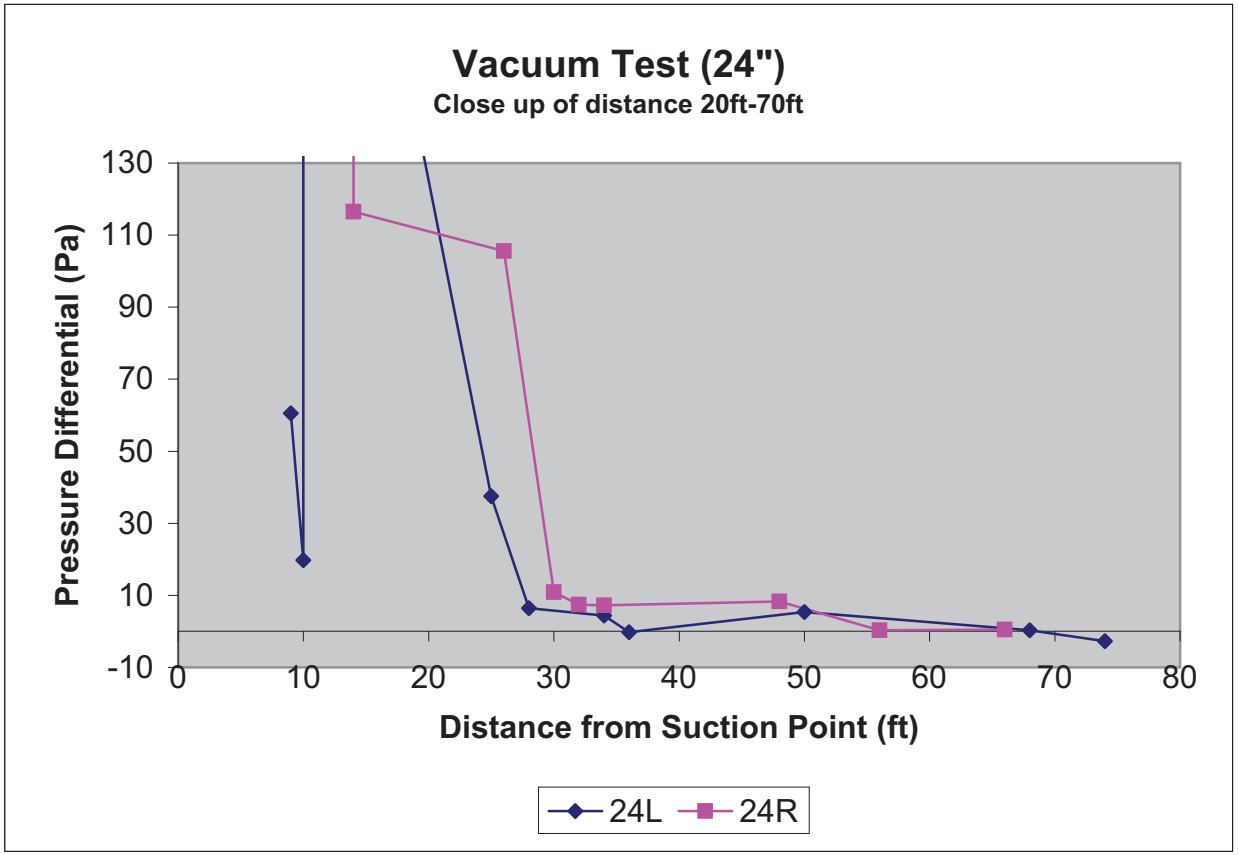
Distance From SP	Core Hole	Baseline	Suction	Pressure Difference	Notes
10	**23**	-0.6	704.3	704.9	Mudroom (no grade beams between SP and RTH)
14	**22**	-0.4	568.7	569.1	
14	**26**	-2.9	80.3	83.2	Garage - 1 24" grade beam, more compaction
26	**21**	-1.5	86.3	87.8	Northeastern corner of family room, influence from outside
30	**25**	-4.4	6	10.4	Far corner of garage
32	**20**	-0.1	0	0.1	24R Party wall
34	**17**	-3.3	5.4	8.7	24L Party wall
48	**18**	-0.6	6.9	7.5	
56	**19**	-0.3	0.4	0.7	



Vacuum 24 inch Void- 24L --2/5/2011

Distance From SP	Core Hole	Baseline	Suction	Pressure Difference	Notes
9	**14**	-0.7	60.5	61.2	Garage - 1 24" grade beam, more compaction
10	**19**	-0.5	19.8	20.3	Arctic entry- 1-10" grade beam, influence from outside
10	**58**	-3.2	619.4	622.6	Mudroom (no grade beams between SP and RTH)
16	**18**	-1.7	195.4	197.1	Interior of duplex
25	**16**	-4	37.5	41.5	Far corner of family room, outside influence
28	**13**	-3.3	6.4	9.7	Far corner of garage, heavy compaction
34	**17**	-3.8	4.4	8.2	24L Party wall
36	**20**	-1.8	-0.2	1.6	24R party wall
50	**22**	-2.2	5.4	7.6	
68	**23**	-1.7	0.3	2	
74	**21**	-3.7	-2.7	1	


Vacuum Test (24")
Pressure Differential (Pa)
850
750
650
550
450
350
250
150
50
-50
0
10
20
30
40
50
60
70
80
Distance from Suction Point (ft)
24L
24R


Vacuum Test (24")
Close up of distance 20ft-70ft
Pressure Differential (Pa)
130
110
90
70
50
30
10
-10
0
10
20
30
40
50
60
70
80
Distance from Suction Point (ft)
24L
24R

Vacuum 24 inch Void--2/5/2011

Distance From SP	Core Hole	Baseline	Suction	Pressure Difference	Notes
10	**23**	-1.7	837.4	839.1	Mudroom (no grade beams between SP and RTH)
14	**22**	-2.2	687.3	689.5	
14	**26**	-3.8	116.5	120.3	Garage - 1 24" grade beam, more compaction
26	**21**	-3.7	105.6	109.3	Northeastern corner of family room, influence from outside
30	**25**	-5.2	10.9	16.1	Far corner of garage
32	**20**	-1.8	7.4	9.2	24R Party wall
34	**17**	-3.8	7.2	11	24L Party wall
48	**18**	-1.7	8.3	10	closet effect
56	**19**	-0.5	0.3	0.8	
66	**58**	-3.2	0.5	3.7	

Overlap Fan Test -2/15/2011

Core Hole	Baseline	24L	24R	Both	Distance from Right	Distance from Left	Change Left	Change Right	Change Both
14	-6.6	-3.2	-	-2.1	63	9	3.4	-	4.5
13	-8.6	-6.9	-	-6.3	80	28	1.7	-	2.3
16	-7.7	-4.7	-	-4	71	25	3	-	3.7
18	-4.1	15.4	-2.8	15.3	48	16	19.5	1.3	19.4
17	-7.6	-7.8	-6.4	-4.9	34	34	-0.2	1.2	2.7
19	-0.2	0.4	-	0.2	56	10	0.6	-	0.4
23	-6.7	-	65.8	69.5	10	68	-	72.5	76.2
22	-5.3	-4.6	63.9	68.6	14	50	0.7	69.2	73.9
21	-6.2	-	0.8	3.6	26	74	-	7	9.8
20	-3.1	-3.1	-2.7	-1.8	32	36	0	0.4	1.3
26	-6.6	-	2	3.6	14	64	-	8.6	10.2
25	-7.7	-	-6	-5.5	30	81	-	1.7	2.2
58	-6	38.7	-	39.1	66	10	44.7	-	45.1

Fan Test Prior to SF6 Injections

Core Hole	Baseline	Suction	Pressure Differential
14	-6.6	1.3	7.9
13	-8.6	-2.4	6.2
16	-7.7	-0.4	7.3
18	-4.1	18.6	22.7
17	-7.6	-1.8	5.8
19	-0.2	0.3	0.5
23	-6.7	74.7	81.4
22	-5.3	76.3	81.6
21	-6.2	6.7	12.9
20	-3.1	-0.1	3.0
26	-6.6	8.4	15.0
25	-7.7	-1.3	6.4
58	-6	42.1	48.1

Baseline Tracer Gas Injections

CH16

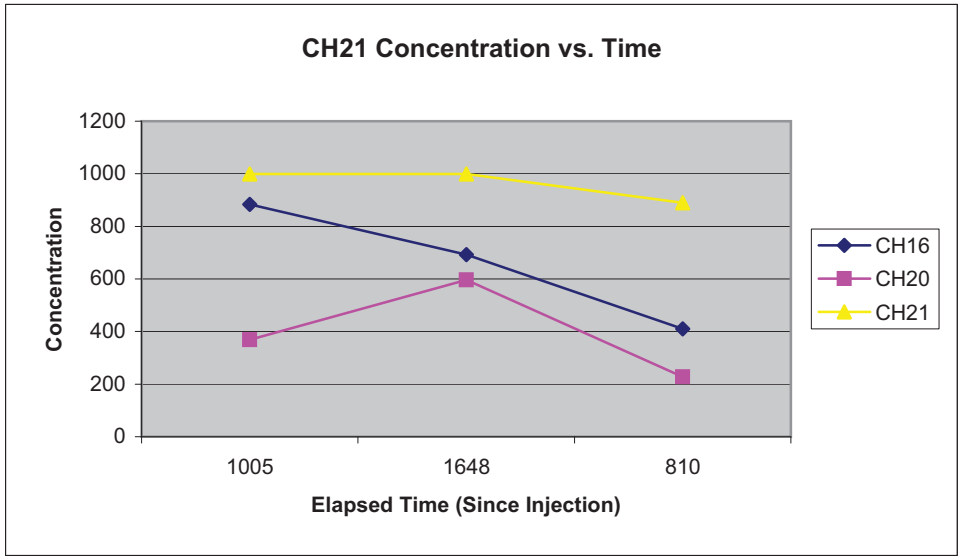
Date	Time	Time Elapsed	Conc
19-Mar	730	0	inject
21-Mar	1005	50:35:00	883
21-Mar	1648	57:18:00	693
22-Mar	810	72:30:00	410

CH20

Date	Time	Time Elapsed	Conc
19-Mar	727	0	inject
21-Mar	1015	50:48:00	369
21-Mar	1643	57:16:00	596
22-Mar	805	72:28:00	228

CH21

Date	Time	Time Elapsed	Conc
19-Mar	725	0	inject
21-Mar	1010	50:35:00	999
21-Mar	1640	57:15:00	999
22-Mar	800	72:25:00	890

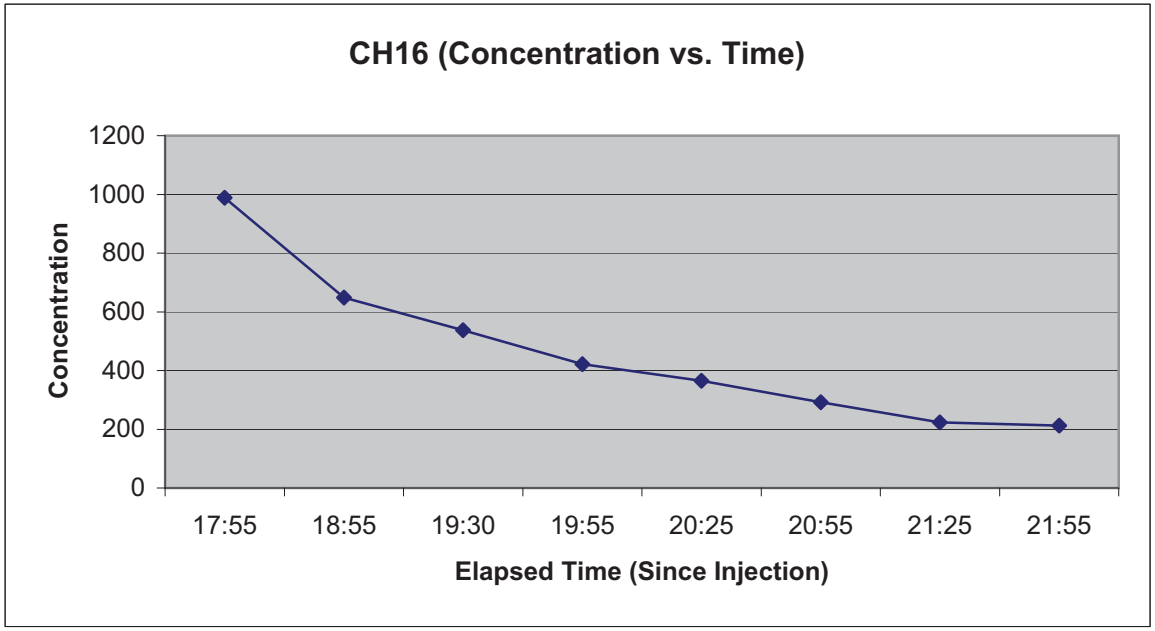


Active Tracer Gas Injections

CH16

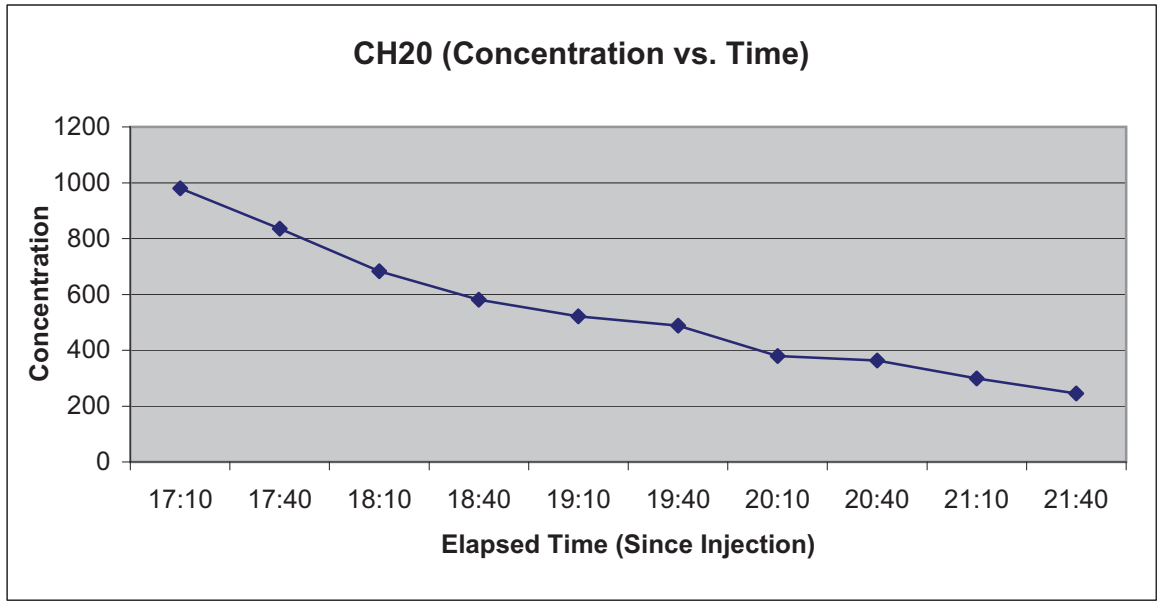
Initial Injection 17:05 -- 3/16

Time	Time Elapsed	Concentration
7:40	12:35	>999
7:45	12:40	>999
8:45	13:40	>999
9:45	14:40	>999
10:45	15:40	>999
11:00	15:55	>999
12:00	16:55	>999
13:00	17:55	989
14:00	18:55	648
14:35	19:30	537
15:00	19:55	422
15:30	20:25	365
16:00	20:55	292
16:30	21:25	223
17:00	21:55	213



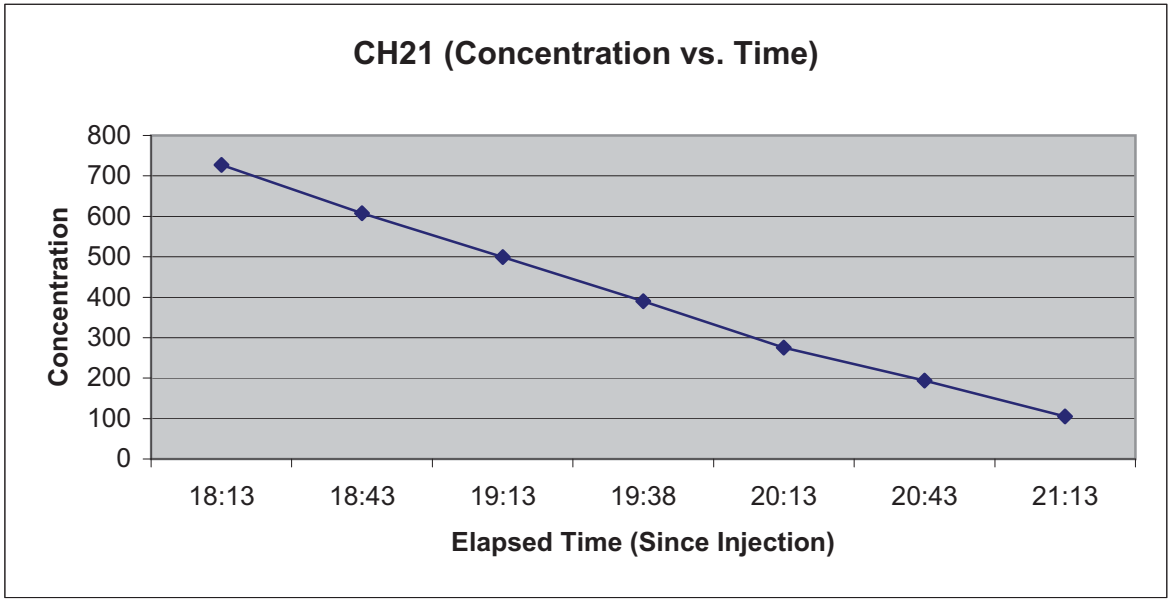
CH20
Initial Injection -- 7:20 --3/18

Time	Time Elapsed	Concentration
8:00	12:40	>999
10:30	15:10	>999
12:05	16:45	>999
12:30	17:10	980
13:00	17:40	836
13:30	18:10	683
14:00	18:40	581
14:30	19:10	521
15:00	19:40	488
15:30	20:10	379
16:00	20:40	363
16:30	21:10	299
17:00	21:40	245



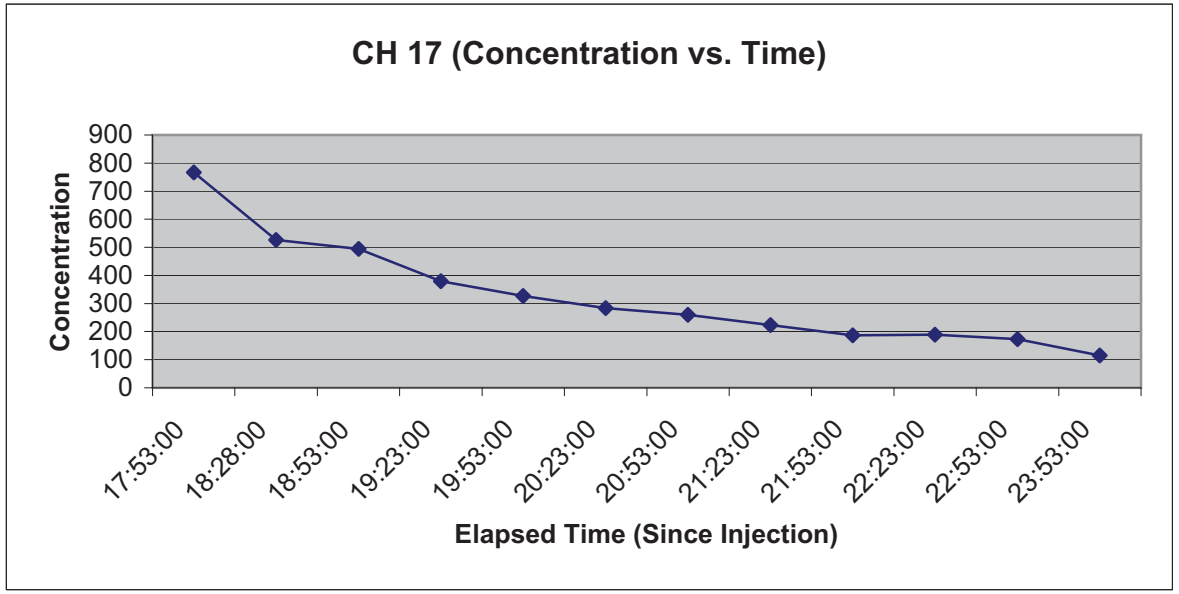
CH21
Initial Injection -- 7:20 -- 3/18

Time	Time Elapsed	Concentration
10:30	15:08	<999
10:35	15:13	<999
12:00	16:38	<999
12:35	17:13	>999
13:05	18:43	>999
13:35	18:13	727
14:05	18:43	608
14:35	19:13	499
15:00	19:38	390
15:35	20:13	275
16:05	20:43	194
16:35	21:13	105
17:05	21:43	???



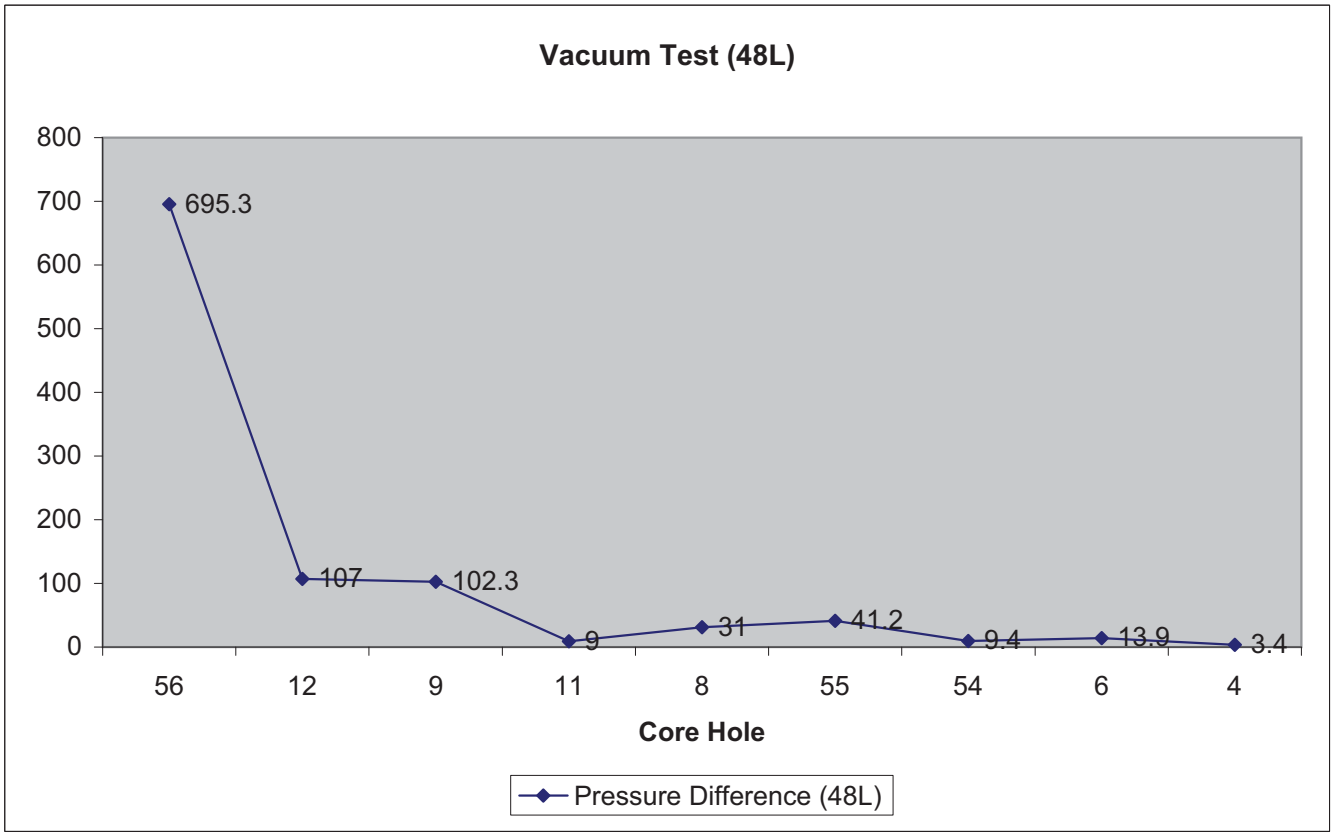
CH 17
Initial Injection 17:07 -- 3/16

Time	Elapsed Time	Concentration
8:50:00	15:43:00	>999
9:50:00	16:43:00	>999
10:50:00	17:43:00	>999
11:00:00	17:53:00	767
11:35:00	18:28:00	526
12:00:00	18:53:00	495
12:30:00	19:23:00	379
13:00:00	19:53:00	327
13:30:00	20:23:00	284
14:00:00	20:53:00	260
14:30:00	21:23:00	223
15:00:00	21:53:00	187
15:30:00	22:23:00	189
16:00:00	22:53:00	173
17:00:00	23:53:00	115



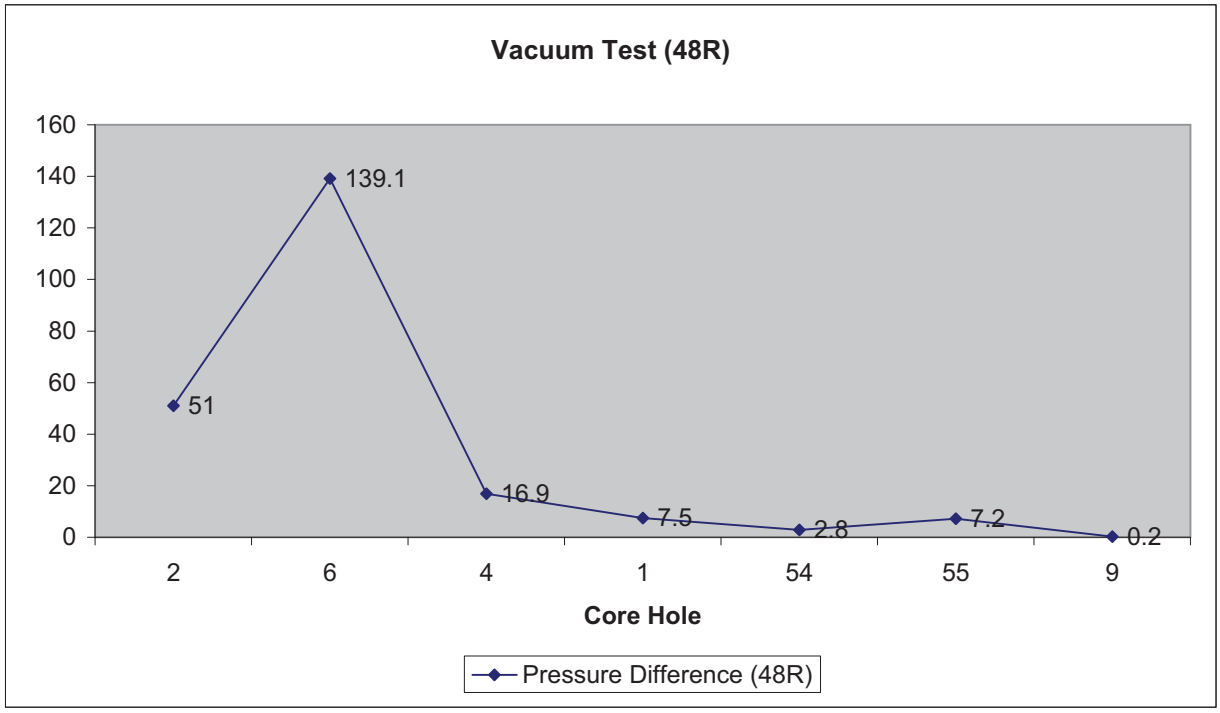
Vacuum Test 10" Void 48 L- 1/28/2011

Distance From SP	Core Hole	Baseline	Suction (48L)	Pressure Difference (48L)
8	**56**	-3	692.3	695.3
17	**12**	-5.7	101.3	107
16	**9**	-0.4	101.9	102.3
26	**11**	-6.6	2.4	9
24	**8**	-5.4	25.6	31
31	**55**	-6.4	34.8	41.2
34	**54**	-1.4	8	9.4
56	**6**	-3.4	10.5	13.9
66	**4**	-5.5	-2.1	3.4



Vacuum Test 10" Void 48 R- 1/28/2011

Distance From SP	Core Hole	Baseline	Suction (48R)	Pressure Difference (48R)
11	**2**	-5.8	45.2	51
15	**6**	-3.4	135.7	139.1
22	**4**	-5.5	11.4	16.9
28	**1**	-7	0.5	7.5
34	**54**	-1.4	1.4	2.8
36	**55**	-6.4	0.8	7.2
46	**9**	-0.4	-0.2	0.2



Vacuum Test 24" Void 48 R- 2/8/2011

Distance From SP	Core Hole	Baseline	Suction (48R)	Pressure Difference (48R)	CFM(49R)
66	**56**	-2.7	-2.4	0.3	-2.33
46	**9**	-0.3	-0.2	0.1	0.07
72	**8**	-4.7	-4.9	-0.2	-3.32
36	**55**	-6.3	4.8	11.1	3.34
28	**1**	-3.9	5.6	9.5	3.49
11	**2**	-1.4	94.2	95.6	14.85
8	**59**	-1.2	400.1	401.3	29.52
22	**4**	-4.6	21.5	26.1	6.87
15	**6**	-1.9	219.8	221.7	21.9
34	**54**	-1	2.6	3.6	2.41

Vacuum Test 24" Void 48 L- 2/8/2011

Distance From SP	Core Hole	Baseline	Suction (48L)	Pressure Difference (48L)	CFM(49L)
26	**11**	-5.2	5.1	10.3	3.33
17	**12**	-4.5	139.6	144.1	17.47
8	**56**	-2.7	927.9	930.6	44.85
16	**9**	-0.3	154.4	154.7	18.37
24	**8**	-4.7	37.5	42.2	9.08
31	**55**	-6.3	49.7	56	10.42
65	**59**	-1.2	-0.5	0.7	-1.08
66	**4**	-4.6	-3.9	0.7	-3
46	**6**	-1.9	12.4	14.3	5.24
34	**54**	-1	10.4	11.4	4.82

Dual Fan Test - 2/17/2010

Core Hole	Baseline	Suction	Pressure Difference	Notes
11	-5.6	-5	0.6	
12	-5.9	7.7	13.6	
56	-3.5	76.8	80.3	
9	-0.6	7.6	8.2	
8	-5.4	-1.6	3.8	
55	-5.7	1.7	7.4	
1	-6.1	-5.6	0.5	
2	-5.4	1.8	7.2	
59	-1.4	30.5	31.9	
4	-2.9	-3	-0.1	
6	-2.4	21.2	23.6	
54	-1.8	0.1	1.9	

Fan Test Prior to SF6 Injections- 3/11/2011

Core Hole	Baseline	Suction	Pressure Difference	Notes
11	-5.6	-3.3	2.3	
12	-5.9	8.9	14.8	
56	-3.5	74.4	77.9	
9	-0.6	7.9	8.5	
8	-5.4	0.4	5.8	
55	-5.7	3.4	9.1	
1	-6.1	-2.6	3.5	
2	-5.4	2.6	8	
59	-1.4	32.7	34.1	
4	-2.9	1.4	4.3	
6	-2.4	20.9	23.3	
54	-1.8	0.9	2.7	

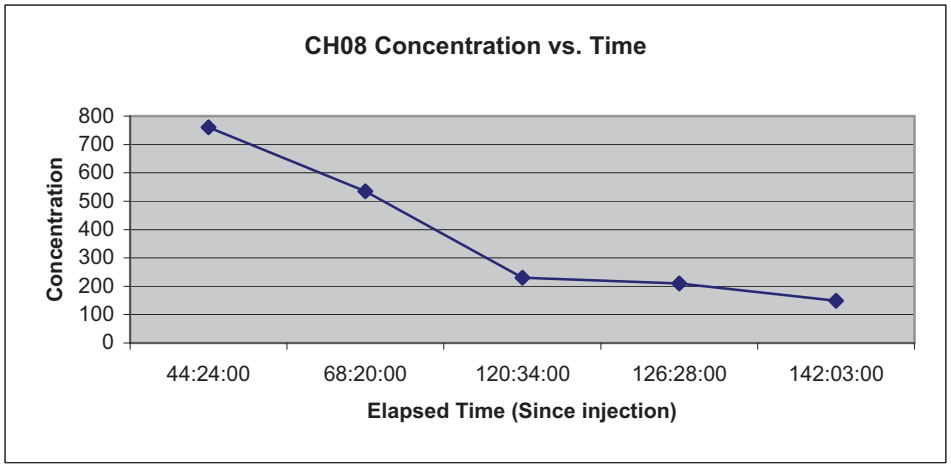
Baseline Tracer Gas Injections

CH04

Date	Time	Elapsed Time	Conc
16-Mar	1108	0	Inject
18-Mar	727	44:19:00	0
19-Mar	745	68:37:00	0
21-Mar	1034	120:34:00	0
21-Mar	1037	0:00:00	re-inject
21-Mar	1200	1:23	>999
21-Mar	1519	4:44	>999
21-Mar	1625	5:50	>999
22-Mar	830	21:55	274
22-Mar	1025	23:50	198

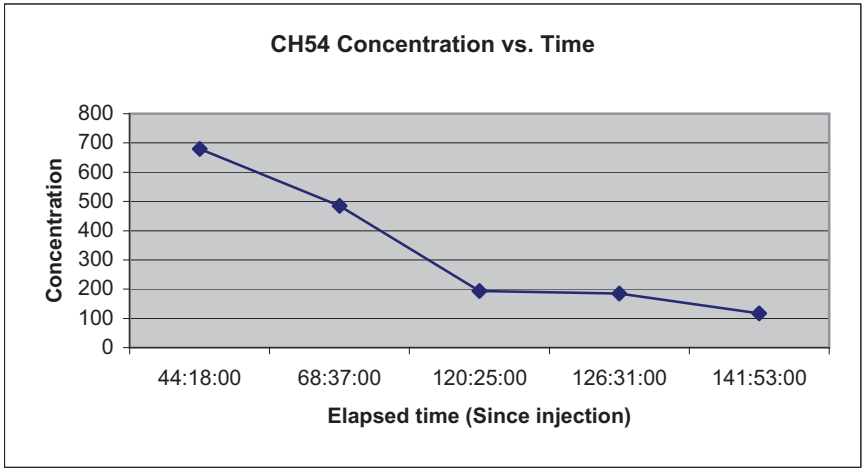
CH08

Date	Time	Elapsed Time	Conc
16-Mar	1115	0	Inject
18-Mar	725	44:24:00	760
19-Mar	735	68:20:00	535
21-Mar	1041	120:34:00	230
21-Mar	1635	126:28:00	210
22-Mar	820	142:03:00	149



CH54

Date	Time	Elapsed Time	Conc
16-Mar	1110		Inject
18-Mar	728	44:18:00	680
19-Mar	747	68:37:00	485
21-Mar	1027	120:25:00	194
21-Mar	1627	126:31:00	185
22-Mar	825	141:53:00	117

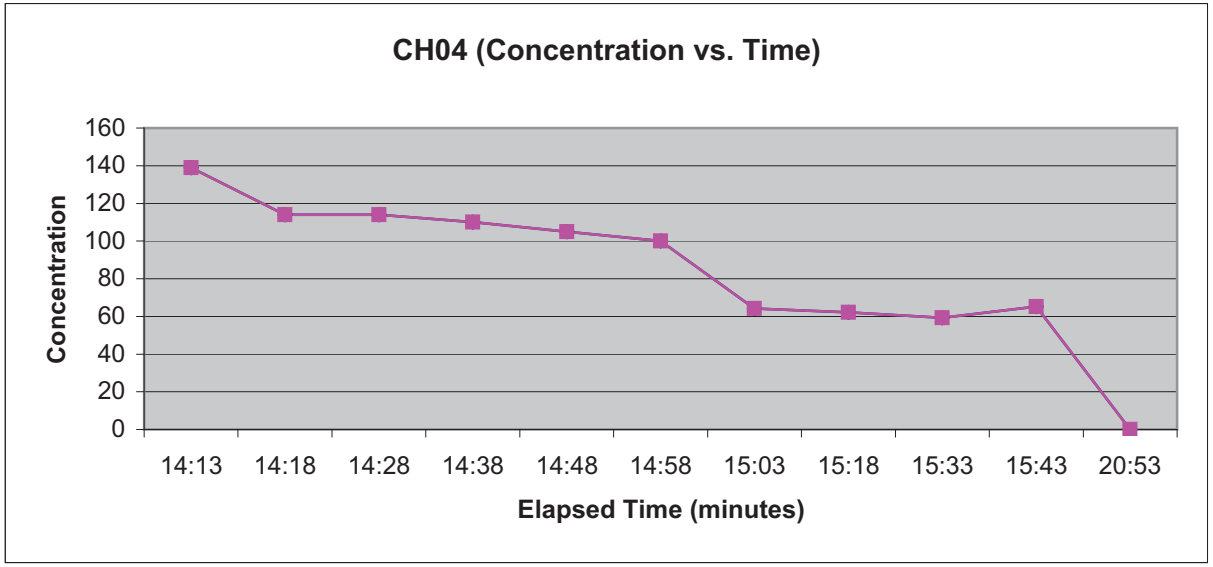


Active Tracer Gas Injections

CH04

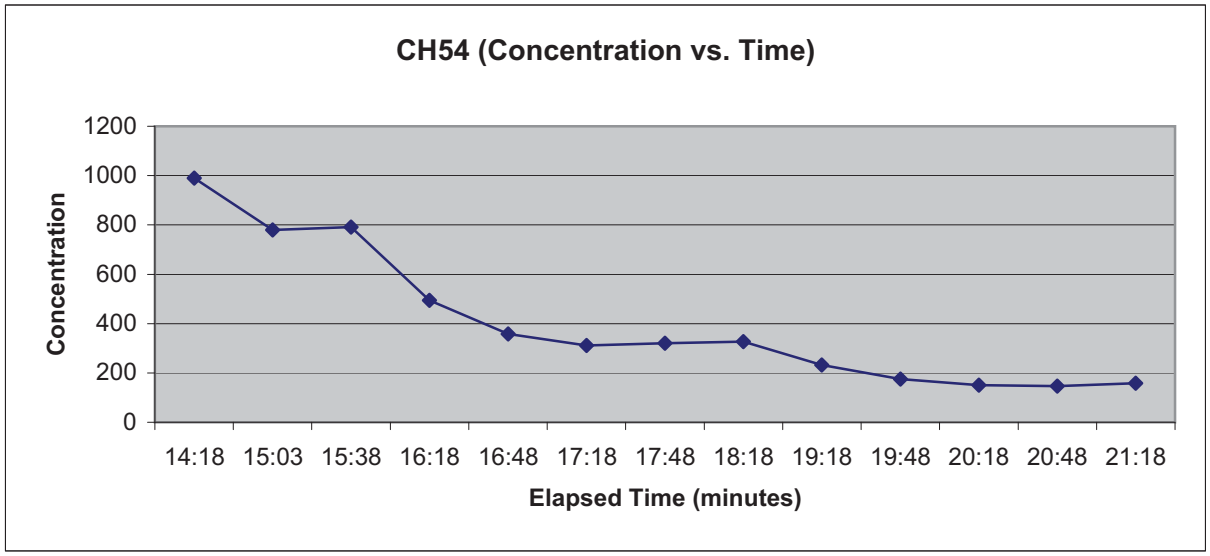
Initial Injection 17:32 -- 3/13

Time	Time Elapsed	Concentration
7:45	14:13	139
7:50	14:18	114
8:00	14:28	114
8:10	14:38	110
8:20	14:48	105
8:30	14:58	100
8:40	15:03	64.2
8:50	15:18	62.1
9:05	15:33	59.2
9:15	15:43	65.2
14:25	20:53	0



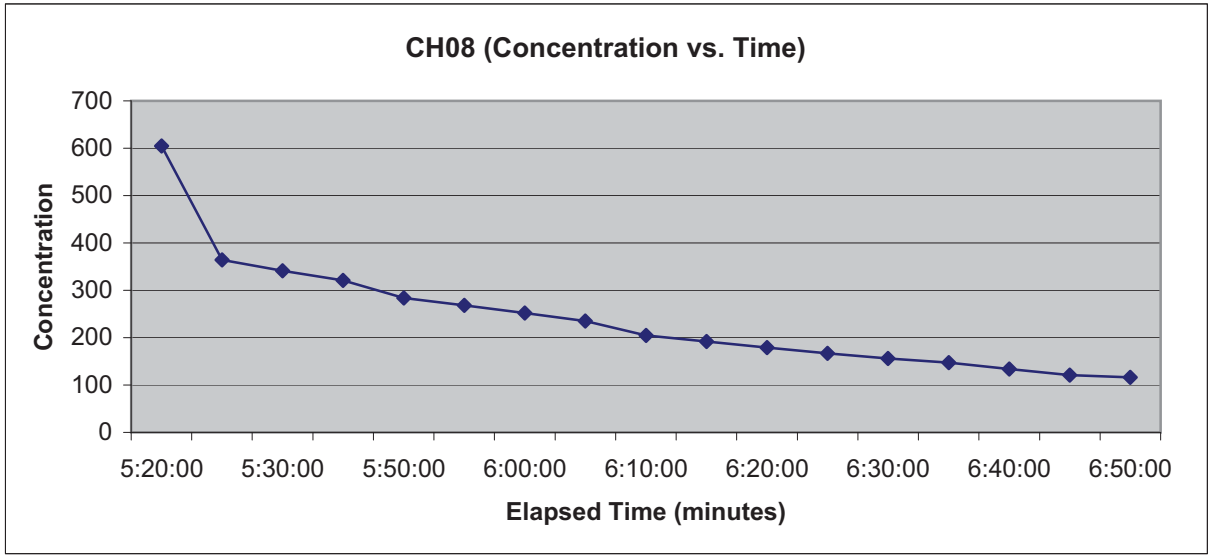
CH54
Initial Injection 17:32 -- 3/13

Time	Time Elapsed	Concentration
7:50	14:18	990
8:35	15:03	780
9:10	15:38	792
9:50	16:18	494
10:20	16:48	358
10:50	17:18	312
11:20	17:48	320
11:50	18:18	327
12:50	19:18	232
13:20	19:48	175
13:50	20:18	151
14:20	20:48	146
14:50	21:18	158



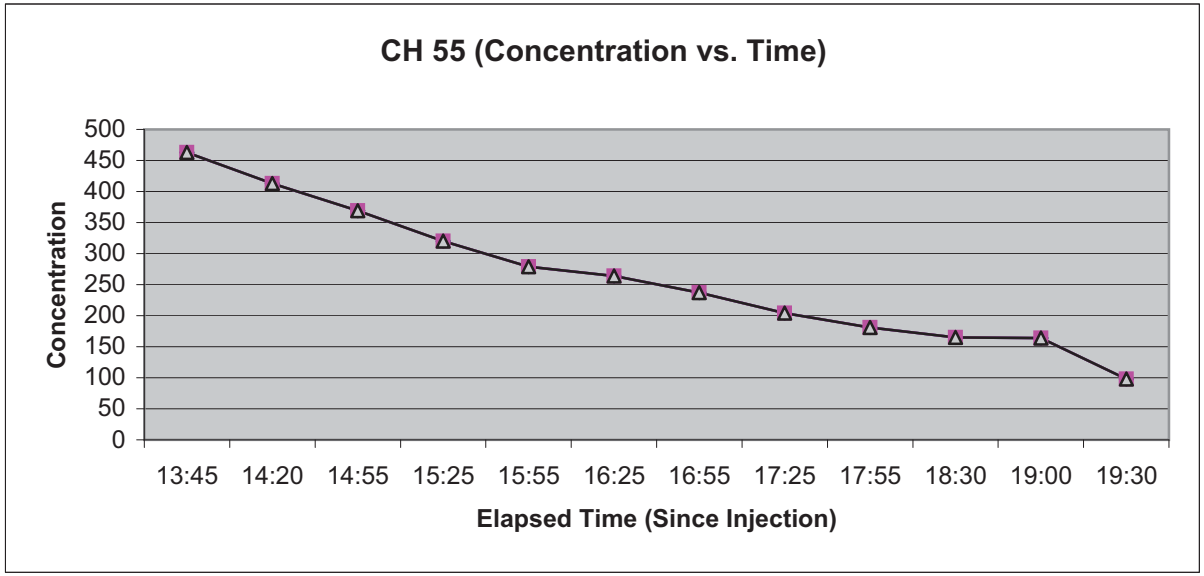
CH8
Initial Injection

Time	Time Elapsed	Concentration
7:40	0:00:00	>999
8:15	0:35:00	>999
9:15	1:35:00	>999
10:15	2:35:00	>999
11:15	3:35:00	>999
12:25	4:45:00	>999
13:00	5:20:00	605
13:05	5:25:00	364
13:10	5:30:00	341
13:15	5:35:00	321
13:30	5:50:00	284
13:35	5:55:00	268
13:40	6:00:00	252
13:45	6:05:00	235
13:50	6:10:00	205
13:55	6:15:00	192
14:00	6:20:00	179
14:05	6:25:00	167
14:10	6:30:00	156
14:15	6:35:00	147
14:20	6:40:00	134
14:25	6:45:00	121
14:30	6:50:00	116



CH55
Initial Injection 17:50 -- 3/11

Time	Time Elapsed	Concentration
7:35	13:45	463
8:10	14:20	413
8:45	14:55	369
9:15	15:25	320
9:45	15:55	279
10:15	16:25	264
10:45	16:55	237
11:15	17:25	204
11:45	17:55	181
12:20	18:30	165
12:50	19:00	164
13:20	19:30	97.8



FORT WAINWRIGHT TEMPERATURES

DATE	MEAN TEMP	MAX TEMP	Barometric Pressure (Average)
1/26/2011	-6	0	30.19
1/27/2011	0	6	30.20
1/28/2011	-6	0	30.20
1/29/2011	-3	0	29.98
1/30/2011	-5	1	30.01
1/31/2011	0	6	29.79
2/1/2011	9	15	29.36
2/2/2011	11	12	29.54
2/3/2011	12	15	29.66
2/4/2011	2	10	30.26
2/5/2011	0	5	29.93
2/7/2011	-11	-2	29.77
2/8/2011	8	15	29.94
2/11/2011	-7	-5	29.77
2/12/2011	3	9	29.89
2/14/2011	-26	-20	30.36
2/15/2011	-32	-22	30.17
2/16/2011	-27	-16	30.26
2/17/2011	-7	-6	30.14
2/18/2011	6	12	30.26
2/19/2011	7	13	29.95
2/21/2011	7	14	30.35
2/22/2011	-6	3	30.94
2/23/2011	0	10	30.82
2/24/2011	6	15	30.23
2/25/2011	28	32	30.44
2/26/2011	12	16	30.00
2/27/2011	10	16	30.23
2/28/2011	-10	-7	30.68
3/1/2011	-16	-2	30.57
3/4/2011	4	17	30.30
3/5/2011	7	16	30.15
3/7/2011	4	21	30.06
3/8/2011	8	26	30.08
3/9/2011	14	23	30.18
3/10/2011	8	21	30.06
3/11/2011	10	19	29.98
3/12/2011	10	20	30.03
3/14/2011	9	21	29.69
3/16/2011	10	21	29.54
3/17/2011	-2	14	30.16
3/18/2011	11	26	30.11
3/21/2011	10	28	29.67
3/22/2011	12	30	29.61
3/23/2011	18	39	29.67

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT

DRAFT

FORMER COMMUNICATIONS SITE SUB-SLAB DEPRESSURIZATION PILOT STUDY REPORT
Appendix D: Field Notes and Log Books

FORT WAINWRIGHT, ALASKA
JUNE 2011

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 07

JACOBS

Prepared by
Jacobs Engineering Group Inc.
4300 B Street, Suite 600
Anchorage, Alaska 99503

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PRESSURE SHEETS: DUPLEX #17

PRESSURE SHEETS: DUPLEX #24

PRESSURE SHEETS: DUPLEX #48

SSD LOGBOOK 1

SSD LOGBOOK 2

SSD LOGBOOK 3

(intentionally blank)

BASELINE - Prior to SF_6 injection

7733997

Diagnostic Testing

Duplex # 1 Date: 3/9 Barometric Pressure/Temperature: 29.79 Observer: CJ/JY

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
40L	0951	-0.1	-3.3	-2.68	
42L	0951	-0.2	26.3	7.59	*
41R					
43L	0949	-0.1	2.4	2.31	*
45L	0947	0.0	26.6	7.66	
44L	0947	-0.1	6.4	3.75	
47L	0945	-0.1	-2.7	-2.45	
52R	0954	-0.2	-1.8	-1.98	
51R					
50R	0959	-0.1	103.6	50.10	
48L	0958	-0.1	13.7	5.50	*
49R	1000	-0.1	31.2	8.28	*
60L	0945	-0.1	-3.4	-2.74	*
61L	0949	-0.1	6.1	3.67	
62R	0956	-0.2	82.7	13.49	

Dual Fan - Full Power

1R - 10.49 cfm, ~~61.0~~ 58.5°F, 81% r/h 1L - 5.74 cfm, 72.8°F, 4.8% rh

Diagnostic Testing

Duplex # 1 Date: 2/22/11 Barometric Pressure/Temperature: 30.48 Observer: CJ

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
40	1136	-0.1	-3.4	-2.77	
42	1137	-0.1	26.2	7.69	
~~41~~					
43	1138	-0.2	2.2	2.23	
45		-0.1	27.1	7.81	
44	1146	-0.2	7.3	4.04	
47	1145	-0.2	-3.2	-2.70	
52	1129	0.0	-2.2	-2.23	
~~51~~					
50	1132	-0.1	101.7	15.13	
48	1133	0.0	14.8	5.78	
49	1134	0.0	31.5	8.43	
60	1143	-0.1	-3.7	-2.88	
61	1140	-0.1	6.0	3.69	
62	1131	0.0	85.7	13.89	

Overlap testing – start time 1038

LOTS of snow around house up to windows

Diagnostic Testing

Duplex # 1 Date: 2/22/11 Barometric Pressure/Temperature: _____ Observer: _____

1L

	Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
24	40	1101	-0.2	-4.1	-3.02	
11	42	1059	-0.2	26.3	7.69	
	~~41~~					
19	43	1058	-0.1	1.6	1.88	
34	45	1053	0.0	4.7	3.26	
22	44	1057	-0.1	7.1	4.01	
38	47	1056	-0.2	-3.4	2.76	
	52					
	~~51~~					
48	50	1104	-0.2	-1.8	-2.02	
76	48					
34	49	1103	-0.3	0.7	1.28	
37	60	1055	-0.1	-3.2	-2.70	
18	61	1054	-0.1	5.3	3.46	
68	62					

Overlap Testing = start time 0958

Diagnostic Testing

Duplex # 1 Date: 2/22/11 Barometric Pressure/Temperature: B Observer: CT

1R

	Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
	40					
76	42					
	~~41~~					
56	43	1035	0.0	-0.7	-1.28	
31	45	1032	-0.1	21.0	6.88	
72	44	1036	-0.1	-1.2	-1.58	
98	47					
30	52	1024	0.0	-2.6	-2.41	
	~~51~~					
18	50	1027	-0.1	101.5	15.11	
24	48	1029	0.0	14.2	5.65	
28	49	1030	0.0	28.4	7.99	
	60					
58	61	1034	-0.2	0.1	0.16	→ hole not trough?
3	62	1026	-0.1	88.7	14.13	

BASELINE

Diagnostic Testing

Duplex # 1 Date: 2/22/11 Barometric Pressure/Temperature: 30.46 Observer: CJ

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
40	0927	0.0	-3.6	-2.84	
42	0931	-0.0	-0.9	-1.45	? Passive system ?
41					
43	0932	0.0	-1.1	-1.60	
45	0938		-0.8	-1.33	
44	0936	0.0	-0.6	-1.15	
47	0935	0.0	-4.1	-3.03	
52	0950	-0.1	-3.2	-2.67	
51					
50	0945	-0.1	-1.9	-2.08	
48	0947	-0.1	-4.5	-3.17	
49	0944	-0.1	-1.6	-1.92	
60	0934	0.0	-4.1	-3.06	
61	0940	0.0	-0.3	-0.79	
62	0948	0.0	-3.1	-2.62	

24 in void Vacuum

Start time 1308

Temp 72.7°F ~~72.7°F~~

Flow: 33.29 CFM

Diagnostic Testing

Duplex # 1 Date: 2/8/11 Barometric Pressure/Temperature: _____ Observer: CJ/DS

L 1

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
40	1321	0.0	1.2	1.61	
42	1322	-0.2	231.6	22.45	
43	1324	-0.1	29.1	7.91	
41	—				
45	1328	0.0	45.0	9.91	
44	1327	-0.1	89.5	13.96	
47	1326	-0.1	4.4	3.10	
52					
51					
50	1335	-0.2	6.0	3.61	
48	1336	0.1	-4.7	-3.21	
49	1333	-0.3	26.4	7.59	
60	1325	0.0	-0.4	-0.94	
61	1329	0.0	57.9	11.23	
62	1346	-0.2	-1.7	-1.90	

24 in void vacuum Start 1357 Temp: 58.5°F Flow: 58.99 cfm

Diagnostic Testing

Duplex # 1 Date: 2/8/11 Barometric Pressure/Temperature: Observer: CJ / DS

~~3~~ 1R

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
40					
42	1425	-0.1	-0.7	-1.24	
~~41~~					
43	1422	-0.1	2.2	2.20	
45	1420	-0.2	161.6	18.75	
44	1423	-0.2	-0.6	-1.10	
47	1424	0.0	-3.4	-2.71	
52	1412	0.0	10.5	4.77	
~~51~~					
50	1415	-0.1	817.3	42.03	
48	1416	0.0	152.0	18.19	
49	1417	0.0	225.2	22.12	
60					
61	1421	-0.1	4.9	3.28	
62	1414	0.0	830.5	42.36	

BASE LINE

Diagnostic Testing

Duplex # 1 Date: 2/8/11 Barometric Pressure/Temperature: 29.51 Observer: CJ/DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
40	~~1248~~ 1257	-0.4	-4.1	-3.00	
42	1258	-0.4	-1.4	-1.72	
~~41~~					
43	1259	-0.4	-1.3	-1.67	
45	1304	-0.4	-1.0	-1.47	inconsistent readings up + down
44	1303	-0.5	-1.7	-1.90	
47	1302	-0.5	-3.8	-2.87	
52	1248	0.0	-5.8	-3.54	
~~51~~					
50	1251	-0.1	-2.2	-2.18	
48	1252	-0.1	-4.8	-3.23	
49	1253	-0.2	-3.4	-2.71	
60	1300	-0.4	-3.4	-2.74	
61	1307	-0.6	-1.1	-1.53	
62	1250	0.0	-2.4	2.31	

Diagnostic Testing

Fan on - 1st run -10" void

Duplex # 1 Date: 1/25/10 Barometric Pressure: 29.4 Observer: CJ

Test Hole #	Time	Pressure (Pa)	Flow (cfm)	Notes
[redacted]				Initial Pressure (Pa)
CH 052	1518	-5.4	-490.14	-0.2
CH051	1519	6.4	535.90	0.1
48	1522	-2.2	-313.03	-0.0
50	1524	49.6	1500	0
49	1528	218.5	3000	-0.2
40	1530	-3.0	-366	-0.5
42	1533	9.3	644	-0.2
41	1535	77.7	1800	-0.2
47	1540	-2.1	-300	-0.7
44	1546	8.4	610	-0.7
45	1548	320.5	[redacted] 3700	-0.8

Diagnostic Testing

Duplex # Ø1 Date: 1/25/10 Barometric Pressure: 29.15 in Hg Observer: MD

Test Hole #	Time	Pressure (Pa)	Flow (cfm)	Notes
CH049	1439	-2.1	-34.20	Saved under TEST001 Saved as 1 meter reads -0.2Pa after zeroing pressure
CH048	1444	-4.4	-49.51	Saved as 2
CH050	1447	-2.4	-36.21	" 3
CH051	1450	-2.5	-36.95	" 4
CH052	1453	-5.7	-56.25	" 5

Baseline #1117571

Diagnostic Testing

Duplex # 1 Date: 1/26 Barometric Pressure: 29.16 in. Hg Observer: CJ

Test Hole #	Time	Pressure (Pa)	Flow (cfm)	Notes
040	1455	-3.5	-394.61	starting @ -0.1pa - movement of ±4pa
042	1501	-1.1	-216.16	initial - (-0.2)
041	1503	-0.3	-92.80	initial - (-0.4)
043	1504	-0.8	-183.85	initial - (-0.4)
044	1504	-0.3	-99.72	initial (-0.4)
047	1505	-2.3	-320.88	initial (-0.5)
045	1506	0.8	189.31	initial (-0.5)

Baseline measurements w/ 1041 RTT or suction holes sealed

Diagnostic Testing outside air temp. -7°F #1117570

Duplex # 1 Date: 1/28 Barometric Pressure/Temperature: 29.84 / Observer: CJ / MD

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
040	0827	0.1	-4.6	-3.18	
042	0833	0.2	-1.2	-1.59	
041	0835	0.0	-0.7	-1.20	
43	0837	0.0	-1.4	-1.73	
47	0839	-0.2	-4.4	-3.11	
44	0841	-0.2	-1.5	-1.79	
45	0844.	-0.3	-2.1	-2.13	
	clogged RTT w/ pencils - covered				suction point w/ plastic bag not totally sealed
45	0853	-0.4	-2.4	-2.31	
44	0857	-0.5	-1.6	-1.87	
47	0857	-0.5	-5.0	-3.34	
43	0904	-0.6	-1.9	-2.07	
42	0906	-0.5	-1.6	-1.89	
41	0908	-0.5	-1.0	-1.45	
40		-0.5	-5.6	-3.5	

Fan test - Full Power - 7 days running

Diagnostic Testing

Duplex # 17 Date: 2/11/1 Barometric Pressure/Temperature: 29.41 Observer: CC/DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	1121	-0.1	1.1	1.53	
38	1118	-0.1	0.6	1.14	
35	1123	-0.1	29.5	8.01	
36	1119	0.0	5.6	3.49	
39	1117	0.0	-4.6	-3.17	
33	1122	-0.1	11.7	15.57	
27	1126	-0.3	-5.3	-3.88	
28	1127	-0.2	1.4	.74	
31	1130	-0.2	-0.2	-.14	
29	1129	-0.1	28.9	7.92	
30		-0.1	8.0	4.17	
32	1132	0.0	45.2	17.75	why the flow is higher here than next to the fan?

Diagnostic Testing

FAN-TEST

Duplex # 17 Date: 2/7/1 Barometric Pressure/Temperature: 30.10 Observer: DS

Test Hole #	Time	Initial (Pa)		Pressure (Pa)		Flow (cfm)		Notes
		71	70	71	70	71	70	
~~37~~ 27	1030	0.0	0.2	-3.8	-3.6	-46.43	-2.82	Pressure comparison w/ 71 & 70
38 ~~28~~	1035	-0.4	-0.1	2.6	2.4		2.13	
35	1112	-2.0	-0.4	29.9	31.4		8.36	
36	1104	-1.6	-0.3	4.4	5.5		3.51	
39	1050	-2.1	-0.5	-5.7	-4.2	not recorded		1102 -0.4 / 4.6 / -3.22
33	1106	-1.7	-0.4	114.9	114.6		5.76	
~~27~~ 33	1109	-1.9	-0.3	-0.2	-0.8		-1.21	
~~28~~ 38	1100	-1.6	-0.4	-0.9	0.2		0.40	
31	1042	-1.3	-0.2	-1.7	-0.4	not recorded		1053 -0.4 / -2.4 / -2.31
29	1039	-1.0	-0.2	27.3	28.2		7.92	
30	1048	-1.8	-0.3	6.4	7.4		4.05	
32	1044	-1.7	-0.3	148.5	149.0	Not recorded		1052 -0.9 / 142.7 / 11.81

Fan test – start time [illegible]

Diagnostic Testing

Duplex # 17 Date: 2/5/11 Barometric Pressure/Temperature: 29.95 / Observer: CJ/DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	0823	0.0	0.6	1.07	
38	0822	0.0	0.3	0.69	
35	0825	0.0	33.5	8.62	
36	0826	-0.1	7.0	3.94	
39	0820	0.0	-4.6	-3.17	
33	0824	0.1	120.5	16.32	
27	0829	-0.3	-5.6	-3.51	
28	0830	-0.3	3.7	2.67	
31	0832	-0.4	0.6	.19	
29	0830	-0.3	30.2	8.17	
30	0834	-0.5	9.2	4.51	
32	0833	-0.5	150.9	18.27	

Fan Test - Full Power - Start time: 1015 2/4

Diagnostic Testing

Duplex # 17 Date: 2/4/10 Barometric Pressure/Temperature: 25.92 Observer: CJ/DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	1452	0.1	1.4	1.73	
38	1451	0.1	0.6	1.15	
35	1455	0.2	55.1	8.79	
36	1456	0.2	8.1	4.25	
39	1450	0.0	-2.4	-2.32	
33	1453	0.2	120.5	16.32	
27	1453	-0.1	-2.3	-2.25	
28	1451	0.0	6.8	3.88	
31	1501	0.1	2.0	2.05	
29	1500	0.1	32.7	8.50	
30	1503	0.4	9.5	4.57	
32	1502	0.1	152.6	18.36	

Baseline Start time 0855

Diagnostic Testing

Duplex # 17 Date: 2/4/11 Barometric Pressure/Temperature 29.73 / Observer: DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	0907	~~-0.1~~ -0.8	-1.0	-1.49	
38	0901	-0.2	-0.1	-0.23	
35	0905	-0.5	1.3	1.68	
36	0902	-0.3	0.3	0.66	
39	0859	-0.[illegible]	-3.1	-2.60	
33	0907	-0.7	1.3	1.69	
27	0912	-1.1	-4.1	-2.02	
28	0915	-1.0	-0.5	-1.07	
31	0920	-0.9	-0.6	-1.09	
29	0918	-0.9	1.3	1.69	
~~30~~ 32	0922	-0.9	0.1	0.45	
~~32~~ 30	0924	-1.0	-1.3	-1.67	

117570

Diagnostic Testing

First Run - Vacuum Test - Start time 0855
10" - VOID

Duplex # 17 Date 2/1/11 Barometric Pressure/Temperature: 28.88 Observer: CJ / DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	0908	0.0	22.3	6.90	
38	0907	-0.1	7.5	3.97	
35	0911	-0.1	278.7	24.36	
36	0909	-0.1	62.1	11.51	
39	0906	-0.1	16.3	3.65	
33	0913	-0.1	>830		- pulled manometer off - water pressure too high - not exact reading
27	0914	-0.2	16.5	3.74	
28	0915	-0.2	48.9	10.22	
31	0918	-0.2	26.8	7.56	
29	0917	-0.2	209.0	21.10	
30	0919	-0.1	62.9	11.59	
32	0920	-0.1	>930		- too high to read

Baseline - Prior to vac roll test

Diagnostic Testing

Duplex # 17 Date: 2/1/11 Barometric Pressure/Temperature: 28.88 Observer: CJ / DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	0828	0.0	-2.1	-2.11	HRV system turned off prior to monitoring
38	0830	-0.2	0.2	0.41	
35	0835	-0.2	-1.2	-1.63	
36	0834	-0.2	-0.4	-0.78	
39	0832	-0.2	-2.4	-2.29	
33	0837	-0.2	-3.9	-2.87	
27	0844	-0.4	-4.8	-3.19	
28	0846	-0.5	-3.8	-2.84	
31	0853	-0.4	-5.2	-3.64	
29	0849	-0.3	-8.3	-4.21	Pressure differential keeps increasing hole possibly not fully through slab
30	0850	-0.3	-3.3	-2.66	
32	0852	-0.3	-4.7	-3.18	

Fan Test - Full Power - Start time - 912 - 1035

Diagnostic Testing

Duplex # 17 Date: 2/3/11 Barometric Pressure/Temperature: 29.16 Observer: J

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	0907	3.0	3.0	2.56	
38	0908	-0.1	1.9	2.03	
35	0904	0.0	0.78	1.03	
36	0905	-0.1	8.6	4.30	
39	0909	-0.3	-0.8	-1.25	
33	0903	0.0	19.7	10.05	
27	0911	-0.4	-1.1	-1.36	
28	0913	-0.4	9.9	4.63	
31	0915	-0.4	4.7	3.25	
29	0914	-0.4	35.4	8.74	
30	0919	-0.5	9.6	4.55	
32	0918	-0.5	148.3	17.87	

Fan Test Full power - 2nd check - initial start time -:05

Diagnostic Testing

Duplex # 17 Date: 2/2/11 Barometric Pressure/Temperature: 29.15 Observer: CJ/DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	1320	-0.1	3.1	2.54	Heard heater turn @ 1320 in FTL
38	1322	-0.2	14.8	5.64	
35	1318 ~~1515~~	-0.1	32.4	6.36	
36	1319	0.0	6.4	3.71	
39	1325	-0.2	-1.4	-1.70	
33	1316 ~~1510~~	0.0	109.2	15.33	
27	1327	-0.5	-~~47~~ 49	-9.23	
28	1330	-0.4	0.9	1.35	
31	1332	-0.4	-1.4	-1.72	
29	1331	-0.4	26.1	7.78	
30	1335	-0.3	8.1	4.18	
32	1334	-0.3	140.0	17.35	
38	1326	-0.3	1.3	1.65	- Taken again b/c previous seemed out of place
36	1323	-0.2	2.4	8.99	Taken again after hearing heat turn on while

Fan Test - Full power Start Time: 1055

Diagnostic Testing

Duplex # 17 Date: 2/6/11 Barometric Pressure/Temperature: 29.[illegible] Observer: CT & DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	1056	0.0	1.0	1.48	
38	1057	-0.1	1.5	1.79	
35	1053	0.0	37.0	9.04	
36	1055	0.0	7.6	4.04	
39	1058	-0.1	-1.1	-1.55	
33	1051	0.0	115.5	15.77	
27	1100	-0.2	-2.5	-2.22	
28	1101	-0.3	8.6	4.14	
31	1104	-0.2	3.2	2.22	
29	1102	-0.1	35.4	8.74	
30	1106	-0.1	8.8	4.37	
32	1105	-0.2	144.4	17.63	

Baseline - vacuum hooked up - suction point not sealed

Diagnostic Testing

Duplex # 17 Date: 2/21/1 Barometric Pressure/Temperature: 20.13 Observer: CJ / DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	0925	-0.2	-2.6	-2.37	
38	0926	-0.2	-1.0	-1.45	
35	0923	-0.1	-1.0	-1.47	
36	0924	0.0	-1.0	-1.43	
39	0928	-0.2	-5.4	-3.42	
33	0922	0.0	-2.3	-2.21	
27	0930	-0.4	-5.8	-3.52	
28	0931	-0.4	-2.8	-2.47	
31	0934	-0.4	-2.0	-2.06	
29	0932	-0.4	0.7	-1.19	
30	0937	-0.4	-0.5	-0.95	
32	0936	-0.4	(+) 0.8	1.28	

Vacuum test. First run w/ 24" void Start time = 0945

Diagnostic Testing

Duplex # 7 Date: 2/2/11 Barometric Pressure/Temperature: 29.14 Observer: CJ/DJ

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
37	0955	0.1	30.4	8.10	
38	0956	0.1	9.3	4.49	
35	0953	0.0	349.3	27.38	
36	0954	0.1	46.4	12.82	
39	0957	0.1	8.7	4.31	
33	0952	0.0	>900	—	
27	0959	0.0	11.4	4.95	
28	1000	0.0	66.1	11.93	
31	1003	0.0	37.6	8.90	
29	1002	0.0	269.9	27.08	
30	1005	0.0	82.2	13.30	
32		0.0			not sampled - could feel vacuum through tube

Diagnostic Testing BASELINE

Duplex # 24 Date: 2/1/11 Barometric Pressure/Temperature: 29.00 Observer CJ / DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	1448	0.0	-1.7	-1.91	
13	1445	0.0	-1.7	-3.17	
16	1451	-0.1	-3.[illegible]	-2.56	
18	1454	0.1	0.7	-1.18	
17	14[illegible]2	-0.1	-3.4	-2.68	
19	1455	-0.1	-0.4	-.86	
23	1502	-0.2	-0.8	-1.26	inside mudroom 24R
22	1503	-0.1	-0.5	-5.97	
21	1504	-0.1	-1.6	-1.84	
20	1506	-0.1	-0.2	-0.57	something is wrong w/ CH
26	1500	-0.2	-3.1	-3.59	inside garage
25	1459	-0.3	-4.7	-3.17	
24 new	1400	0.0	-2.2	-2.17	

First Vacuum Test - Start 10:50
10" V.D

Diagnostic Testing

Duplex # 24 Date 2/1/11 Barometric Pressure/Temperature 29.03 Observer CJ, DS

242

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14					
13					
16					
18	1611	-0.1	6.9	3.83	
17	1610	-0.2	5.4	3.42	
19	1613	-0.1	0.4		
23	1603	-0.2	704.3	38.73	
22	1604	-0.2	568.7	34.83	
21	1607	-0.1	86.3	13.60	
20	1606	-0.1	0.0	2.4	- no movement (not through slab?)
26	1601	-0.2	80.3	13.12	
25	1600	-0.1	6.0	3.58	

First Run Vacuum Test start time 15:15

10" Void

Diagnostic Testing

Duplex # 24 Date. 2/1/11 Barometric Pressure/Temperature: 29.02 Observer. DS/CT

24L

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	1531	-0.0 ~~-0.1~~	44.6	9.78	
13	1529	-0.1	5.2	3.34	
16	1535	-0.1	24.4	7.23	
18	1538	0.0	148.8	17.85	
17	1537	0.0	2.4	2.26	
19	1539	-0.1	41.0	9.37	
22	1541	-0.2	2.1	2.59	
21					
20	1544	-0.1	0.0	-3.0v	something wrong
25					
24new	1554	-0.1	409.9	27.59	mushroom 24L

Baseline for 24in void

Diagnostic Testing

Duplex # 24 Date 2/4/11 Barometric Pressure/Temperature 29.90 Observer DS/CJ

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
~~14~~ 15	1345	0.0	-3.3	-2.69	
~~13~~ 14	1346	-0.1	-0.1	-1.26	
16	1347	~~-0.2~~ -0.2	-4.0	-2.99	
18	1355	-0.2	-1.7	-1.95	
17	1356	-0.1	-3.8	-2.90	
19	1350	-0.1	-0.5	-1.08	
23	1403	-0.2	-1.7	-1.93	
22	1406	-0.2	-2.2	-2.23	
21	1407	-0.2	-3.7	-2.88	
20	1423	-0.2	~~-0.5~~ -1.3	~~-.72~~ -2.01	Re-drilled CH
26	1403	-0.1	-5.8	-2.91	
25	1404	-0.2	-0.2	-3.4	
58	1347	0.0	-3.2	-2.67	

BASELINE 24 in Void ~~Vacuum Test~~ ~~[illegible]~~ → had to restart later in the day

Diagnostic Testing

Duplex # 24 Date: 2/5/11 Barometric Pressure/Temperature: 29.95/ Observer: CJ/ DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	0850	0.0	-6.1	-3.67	
13	0849	0.0	-6.4	-3.17	
16	0852	0.0	-6.3	-3.74	
18	0853	-0.1	-3.9	-2.95	
17	0853	-0.1	-6.5	-3.80	
19	0854	0.0	-0.7	-1.28	
23	0858	-0.2	0.1	0.28	
22	0900	-0.1	-0.4	0.88	
21	0901	-0.1	-3.8	-2.89	
20	0902	-0.2	-2.3	-2.23	
26	0857	-0.2	-3.5	-2.78	
25	0857	0.0	-6.2	-3.70	
58	0850	0.0	-5.5	-3.50	

24 R / 24 in. void Vacuum start 0939

Diagnostic Testing

Duplex # 24 Date: 2/5/11 Barometric Pressure/Temperature: 29.97 Observer: CJ/DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14					
13					
16					
18	1000	0.0	8.3	4.28	
17	0959	0.0	7.2	3.98	
19	1001	0.1	0.3	0.75	
23	0953	-0.1	837.4	42.69	
22	0954	0.0	687.3	38.69	
21	0956	0.1	105.6	15.27	
20	0951	0.2	7.4	4.05	
26	0951	0.1	116.5	16.05	
25	0950	0.0	10.9	4.91	
58	1002	0.1	0.5	0.98	
Outside CH					

24 in void Vacuum test start 0905

Diagnostic Testing

Duplex # 24 Date: 2/5/11 Barometric Pressure/Temperature: 28.97 Observer: CJ/DS

Vol: 24 L

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	0917	-0.1	60.5	11.58	
13	0916	0.0	6.7	3.76	
16	0920	0.0	37.5	9.12	
18	0922	0.0	195.4	20.19	
17	0921	-0.1	4.4	3.11	
19	0923	0.0	19.8	6.62	
23	0927	0.0	0.3	0.67	
22	0926 ~~0918~~ ✓	-0.2 ~~0.6~~	~~619.4~~ 5.4	~~36.93~~ 3.45	
21	0928	0.0	-2.7	-2.43	
20	0925	-0.2	-[illegible].2	-0.5[illegible]	
26					
25					
58	0918	0.0	619.4	36.93	

Overlap test

Right fan ON ; Left fan OFF

Diagnostic Testing

Duplex # 24 Date: 2/15 Barometric Pressure/Temperature: 29.81 Observer: CT

24R

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14					
13					
16					
18	1130	0.0	-2.8	-2.46	
17	1131	-0.1	-6.5	-3.77	
19					
23	1137	0.1	65.8	12.03	
22	1136	-0.2	63.9	11.86	
21	1135	-0.2	0.8	1.31	
20	1134	-0.2	-2.7	-2.42	
26	1138	-0.2	2.0	2.09	
25	1139	-0.1	-6.1	-3.66	
58					

Overlap fan test - start time 1011 5.13 cfm
Left fan ON, right fan off 66.3 °F 49% r/h

Diagnostic Testing

Duplex # 24 Date: 2/15 Barometric Pressure/Temperature: 29.81 Observer: CJ

24L

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	1027	-0.1	-3.3	-2.71	
13	1026	0.0	-6.9	-3.90	
16	1030	-0.0	-4.7	-3.23	
18	1042	-0.2	15.2	5.79	
17	1052	-0.[illegible]	-7.9	-4.17	
19	1045	-0.2	0.2	0.48	
23	..	..		....	
22	1049	-0.2	-4.8	-3.[illegible]7	
21	-	.	.	..	
20	1047	-0.2	-5.3	-2.68	
26	..	.			
25	...	..	.	...	
58	1029	0.0	38.7	9.23	

Overlap test: both fans running 24L start 1611
24R start 1653

Diagnostic Testing

Duplex # 24 Date 21.5 Barometric Pressure/Temperature: _____ Observer: _____

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	1121	0.0	-2.1	-2.15	
13	1122	0.0	-6.3	-3.43	
16	1119	-0.1	-4.0	-2.89	
18	1116	-0.1	15.3	5.80	
17	1115	0.0	-4.9	-3.29	
19	1117	0.0	0.2	0.53	
23	1110	0.0	69.5	12.37	
22	1111	0.0	68.6	12.29	
21	1112	0.1	3.6	2.81	
20	1113	0.0	-1.8	-2.00	
26	1109	0.0	3.6	2.80	
25	1108	0.0	-5.5	-3.49	
58	1120	-0.1	39.1	9.28	

Baseline Temp: -05°

Diagnostic Testing

Duplex # 24 Date: 2/15/11 Barometric Pressure/Temperature: 29.84 Observer: CJ

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	0943	0.1	-6.5	-3.79	
13	0941	0.0	-9.6	-4.36	
16	0946	0.1	-7.6	-4.10	
18	0948	0.0	-4.1	-3.01	
17	0947	0.1	-7.5	-4.05	
19	0949	0.0	-0.2	-.059	→ ? ?
23	0955	0.0	-6.7	-3.83	
22	0950	0.0	-5.3	-3.42	
21	0953	0.0	-6.2	-3.69	
20	0952	0.0	-3.1	-2.60	
26	0956	0.0	-6.6	-3.80	
25	0958	0.0	-7.7	-4.12	
58	0945	-0.1	-6.8	-3.68	

Baseline prior to SF_6 injection

Diagnostic Testing

Duplex # 24 Date: 3/16 Barometric Pressure/Temperature: 2[illegible] 12 Observer: CJ / JY

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
14	1240	0.0	1.3	1.64	24L [illegible]
13	1240	0.0	-2.4	-2.28	24L [illegible]
16	1242	0.0	-0.4	-0.94	24L DINING ROOM
18	1243	0.0	18.6	6.33	24L CLOSET
17	1243	0.0	-1.8	-1.98	24L FAMILY ROOM
19	1243	0.0	0.3	0.78	24L FRONT ENTRY WAY
23	1246	0.0	74.7	12.67	24R MUD ROOM
22	1246	0.0	76.3	12.81	24L CLOSET
21	1245	0.0	[illegible]	3.80	24R DINING ROOM
20	1245	0.0	-0.1	-0.21	24R FAMILY ~~[illegible]~~ ROOM
26	1248	0.1	8.4	4.25	24R [illegible]
25	1248	0.0	-1.3	-1.69	24R [illegible]
58	1242	0.0	42.1	9.52	24L MUD ROOM

Baseline prior to SF_6 injection

Diagnostic Testing

Duplex # 48 Date: 3/1 Barometric Pressure/Temperature: 29.57 Observer: [illegible]

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
11	1735	0.0	-3.7	-2.66	
12	1735	0.1	8.8	4.29	
56	1736	-0.2	74.4	12.71	
9	1736	-0.1	7.8	4.12	
8	1737	0.1	0.4	0.93	[illegible] INJECTION 1750
55	1737	-0.2	3.2	2.60	" " 1750
1	1743	-0.4	-3.0	-2.54	
2	1743	-0.4	3.0	2.55	
59	1742	-0.4	32.7	8.45	
4	1741	-0.3	1.4	1.70	
6	1741	-0.3	20.6	6.71	
54	1740	-0.3	0.0	0.0	

[illegible] - Baseline

Velocalc - 10

Diagnostic Testing

Duplex # 48 Date: 1/28/11 Barometric Pressure/Temperature: 29.84 / -11°F Observer: CJ/MD

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Fan velocity (fpm)	Notes
RV OFF 11	1013	0	-6.6	-3.81	-699	
12	1015	0	-5.7	-3.55	-652	
56	1016	0	-3.0	-5.8	-472	
09	1018	0	-0.4	-0.90	-165	
08	1023	0	-5.4	-3.45	-633	
55	1025	0	-6.4	-3.76	-689	
5[illegible]	1031	0	-1.4	-1.72	-316	
RV ON 06	1033	0	-3.4	-2.73	-500	
04	1037	0	-5.5	-3.47	-637	
02	1038	0.2	-5.8	-3.57	-654	
01	1040	0.1	-7.0	-3.93	-721	

~~Karen~~, first run · fan start time = 5:10 · [illegible] = 70

Diagnostic Testing

Vacuum

Duplex # 48 Date: 1/28/11 Barometric Pressure/Temperature: 29.82 / -5°F Observer: CJ/MD

Fan: 48R => 10" VOID

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
01	1215	0	0.5	0.9	zero out pressure
02	1216	-0.1	45.2	9.98	
04	1220	-0.1	11.4	5	
06	1225	-0.1	135.7	17.28	
54	1227	-0.1	1.4	.73	
55	1231	-0.3	0.8	1.32	
09	1233	-0.3	-0.2	-0.66	

~~Fan on~~, first run 1045

5 gas measurement vacuum cut hose = 17.0 O_2 [illegible] O_2 [illegible] - 7.0 & other [illegible] w/in range

Diagnostic Testing

Duplex # 48 Date: 1/28/11 Barometric Pressure/Temperature: 29.83 / -11°F Observer: C.T/MD

48L → 10" VOID

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
11	1103	0	2.4	2.31	Fan on back zero out pressure
12	1104	-0.1	101.2	14.93	distance between 12 and 11 is 15.5"
56	1109	-0.1	692.2	38.94	
9	1110	0	101.9	14.94	
8	1115	0	25.0	7.52	
55	1117	-0.1	34.8	8.76	
54	1120	-0.2	8.0	4.19	45R
06	1122	-0.1	10.5	4.81	48R
04	1127	-0.1	-2.1	-2.17	48R

Diagnostic Testing BASELINE

Duplex # 48 Date: 2/8/ Barometric Pressure/Temperature: 21.63 Observer: CJ / DS

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
11	0943	~~0.0~~ 0.0	-5.2	-2.36	
12	0945	0.0	4.5	-3.14	
56	0946	0.0	-2.7	-2.44	
9	0947	0.1	-0.4	-0.79	
8	0949	0.0	-4.7	-3.22	
55	0950	0.0	-6.3	-3.70	
1	0952	-0.1	-4.0	-2.97	
2	0953	-0.7	-1.6	-1.85	
59	0955	-0.1	-1.3	-1.66	
4	0956	0.0	-4.6	-3.16	
6	0958	0.0	-1.9	-2.05	
54	0957	0.0	-1.0	-1.48	

Diagnostic Testing 24in void Vacuum start 1054

Duplex # 48 Date: 2/8/11 Barometric Pressure/Temperature: Observer: CJ / DS

48 R

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
11					
12					
56	1118	-0.1	-2.5	-2.33	
9	1116	-0.2	0.0	0.07	
8	1117	-0.1	-5.0	-3.52	
55	1113	-0.3	5.1	3.34	
1	1116	0.0	5.6	3.49	
2	1107	-0.1	94.[illegible]	14.55	
59	1109	-0.1	400.2	29.52	
4	1110	-0.1	21.[illegible]	6.87	
6	1112	-0.1	219.9	21.90	
54	1111	0.1	2.7	2.41	

24 in Vid Vacuum START 10:24

Diagnostic Testing

Duplex # 48 Date: 2/8/11 Barometric Pressure/Temperature: _____ Observer: CJ/DS

48L

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
11	1035	0.0	5.1	3.33	
12	1036	0.0	139.6	17.47	
56	1037	-0.2	928.1	44.85	
9	1038	-0.2	154.6	18.37	
8	1039	-0.2	37.7	9.08	
55	1040	0.0	49.7	10.42	
1					
2					
59	1046	-0.1	-0.6	-1.08	
4	1045	-0.2	-4.1	-3.00	
6	1043	-0.1	12.5	5.24	
54	1043	-0.2	10.6	4.82	

Baseline E

Diagnostic Testing

Duplex # 48 Date: 4/7/11 Barometric Pressure/Temperature: 29.90 Observer: CA

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
11	0843	0.0	-5.6	-3.50	
12	0844	0.0	-5.9	-3.60	
56	0845	0.0	-3.5	-2.79	
9	0849	0.0	-0.6	-1.15	
8	0848	0.0	-5.4	-3.45	
55	0846	0.0	-5.7	-3.54	
1	0851	-0.1	-6.2	-3.71	
2	0852	-0.1	-5.5	-3.49	
59	0853	-0.2	-1.6	-1.85	
4	0855	-0.1	-3.0	-2.55	
6	0858	-0.2	-2.6	-2.38	
54	0856	-0.1	-1.9	-2.07	

Dual Fan Test: Start time 0900

24" void = both fans running

Diagnostic Testing

Duplex # 48 Date: 2/17 Barometric Pressure/Temperature: 29.86 Observer: CT

Test Hole #	Time	Initial (Pa)	Pressure (Pa)	Flow (cfm)	Notes
11	0921	0.0	-5.0	-3.31	
12	0920	0.1	7.8	4.16	
56	0919	0.0	76.8	15.02	
9	0917	0.0	7.6	4.09	
8	0916	0.1	-1.5	-1.79	
55	0915	0.0	1.7	1.93	
1	0924	0.0	-5.6	-3.53	
2	0925	-0.1	1.7	1.94	
59	0927	0.0	50.5	8.31	
4	0928	-0.1	-3.1	-2.61	
6	0930	0.0	21.2	~~0.22~~ 6.84	
54	929	0.0	0.1	0.42	

"Rite in the Rain"®
ALL-WEATHER
FIELD
No. 350

TAKU PILOT
STUDY

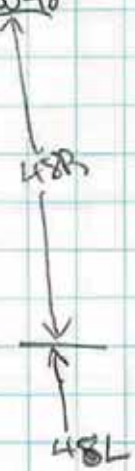
Book 1 of

AKERS·UR·USFS07·H04·0020

JAN 4 2011
TAKW GARDENS
SUBSLAB

NTM = Noel McGray
DAD = Morgan Dallaps
JY = Jess Young

730 - ON SITE
- SAFETY, JSA, PPE, ORIENTATION, EQUIP. MOB, ARRIVE ON SITE
1000 - TAKW GARDENS UNIT 0048
1130 - CH001 - GRID 001
1145 - CH002 - GRID 002
1215 - CH003 - GRID 003
LUNCH
1315 - CH004 - GRID 004
1330 - CH005 - GRID 005
1355 - CH006 - GRID 006
1430 - CH007 - GRID 007
1455 - CH008 - GRID 008
1510 - CH009 - " 009
1525 - CH010 - " 010
1540 - CH011 - " 011
1605 - CH012 - " 012



JAN 4 2011

1600 [redacted] DEMOB EQUIP FROM 48

1645 [redacted] DOWNLOAD & ARCHIVE DATA

1700 [redacted] OFFSITE

JAN 5 2011

TAKN GARDENS SUB SLAB

- 0730 ON SITE
- PREP, SAFETY, MOB EQUIP
- ~~0830~~ ARRIVE @ 24L
- 0900 SET UP
- 0910 USET FROM JY & CJ
- 0920 CH013 GARAGE
- 0950 CH014 GARAGE
- 1010 CH015 STORAGE
  - ↳ switch to concrete scan mode
- 1020 CH016

CJ = CATTLIN
JELLE

Files for CH Clearance on next page

1030 - 1330 CH017 - 026 + LUNCH
/ MOVE TO #17

1420 - CH027 - 039
1500

1500 DEMOB & OFFSITE

1/5/2011

CH	FILE	FROM	TO	REMARKED
016	001	W	E	✓
016	002	N	S	✓
017	003	N	S	✓
017	004	W	E	✓
018	005	N	S	✓
018	006	E	W	✓
019	007	S	N	✓
019	008	E	W	✓
020	009	N	S	✓
020	010	E	W	✓
021	011	S	N	✓
021	012	W	E	✓
022	013	E	W	✓
022	014	S	N	✓
023	015	S	N	✓
023	016	W	E	✓
024	017	S	N	✓
024	018	E	W	✓
025	019	W	E	✓
025	020	N	S	✓
026	021	E	W	✓
026	022	S	N	✓
027	023	N	S	✓
027	024	W	E	✓

1/5/11

CH	File	From	To	marked?
028	025	W	E	✓
028	026	S	N	✓
029	027	E	W	✓
029	028	N	S	✓
030	029	W	E	✓
030	030	N	S	✓
031	031	W	E	✓
031	032	S	N	✓
032	033	N	S	✓
032	034	E	W	✓
033	035	W	E	✓
033	036	N	S	✓
034	037	S	N	✓
034	038	W	E	✓
035	039	~~N~~S	~~S~~N	✓
035	040	~~W~~E	~~E~~W	✓
036	041	N	S	✓
036	042	E	W	✓
037	043	S	N	✓
037	044	E	W	✓
038	045	S	N	✓
038	046	E	W	✓
039	047	E~~N~~	~~E~~W	✓
039	048	~~E~~N	~~N~~S	✓

1/6/11

CH	File	From	To	ID marked?
040	49	E	W	✓
040	50	N	S	✓
041	51	S	N	✓
041	52	W	E	✓
042	53	S	N	✓
042	54	W	E	✓
043	55	W	E	✓
043	56	S	N	✓
044	57	W	E	✓
044	58	N	S	✓
045	59	W	E	✓
045	60	S	N	✓
046	61	W	E	✓
046	62	N	S	✓
047	63	N	S	✓
047	64	E	W	✓
048	65	S	N	✓
048	66	W	E	✓
049	67	S	N	✓
049	68	E	W	✓
050	69	~~E~~	~~E~~ W	✓
050	70	N	S	✓
051	71	S	N	✓
051	72	W	E	✓
052	73	N	S	✓
052	74	W	E	✓

JAN 6 2011

TAKEN SUBSLAB GEOPHYSICS

NTM, MD, CJ

0730 ON SITE

SETUP & MOB TO DUPLEX 1

0830 - CH 40-52

1200

LUNCH

1315 - 1445 @ DUPLEX 48

CH 53-57 (MOVED LOCATIONS FROM CJ)

1445 - 1645 DRUM SEARCH

GPR INVESTIGATION

1715 DEMOB TO TRAILER

730 OFFSITE

1/6/11

CH	File	From	TO	Fold or Kod?
053	75	N	S	✓
053	76	W	E	✓
054	77	S	N	✓
054	78	W	E	✓
055	79	S	N	✓
055	80	E	W	✓
056	81	N	S	✓
056	82	W	E	✓
057	83	N	S	✓
057	84	W	E	✓

1230 - Depart site for lunch

1330 - Return to #48. Adding additional RTHs & changing suction point locations in both 48R & 48L based on #24
- ~~to~~ removing marking from:
CHØ3 (48R)
CHØ5 (48R)
CHØ7 (48L)
CH10 (48L)

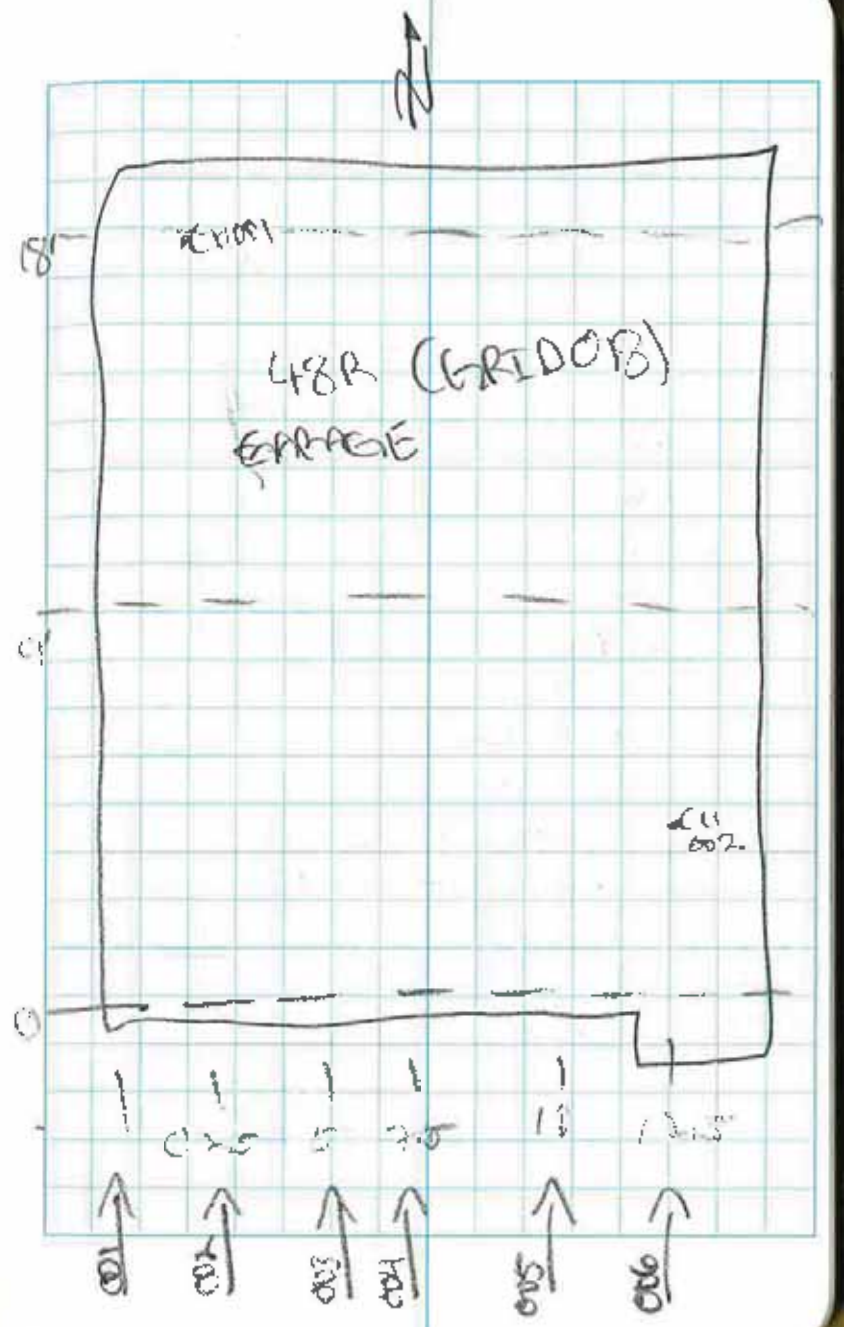
GRID 018 – GARAGE
48R

x start
stop
y start
stop
y lines spacing 25

time mode

Following
0, 9, 18 along probe
distance norm needed
to clip extra data offend

File 001 @ 0'
002 2.5'
003 5'
004 7.5'
005 10'
006 12.5'

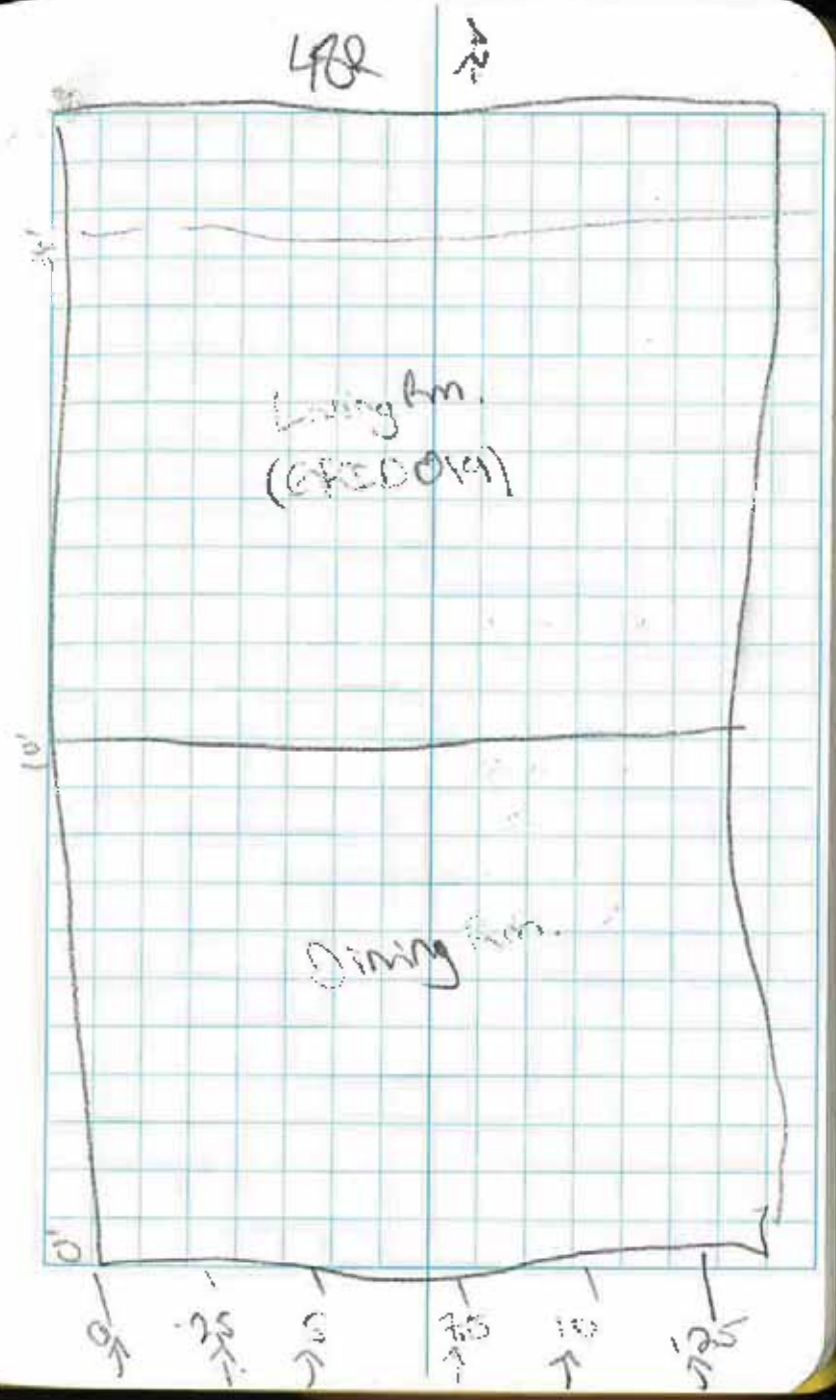


GRID 019

X lines 2.5

1	0
2	2.5
3	5
4	7.5
5	10
6	12.5

Inclusive
2 to 70
small
house foundation



GRID 020

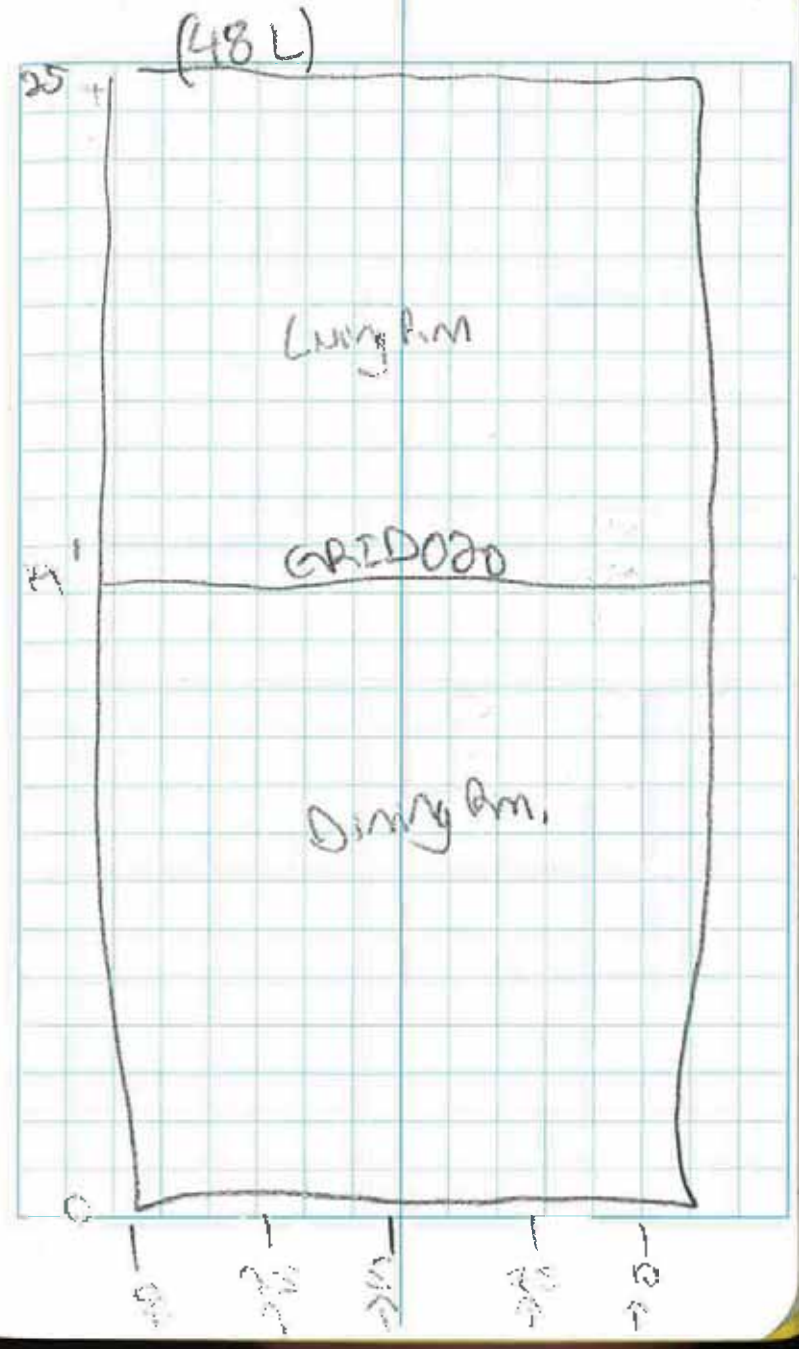
4 lines

FILE 001	0
002	2.5
003	5
004	7.5
005	10

fiducials @

0, 4, 25

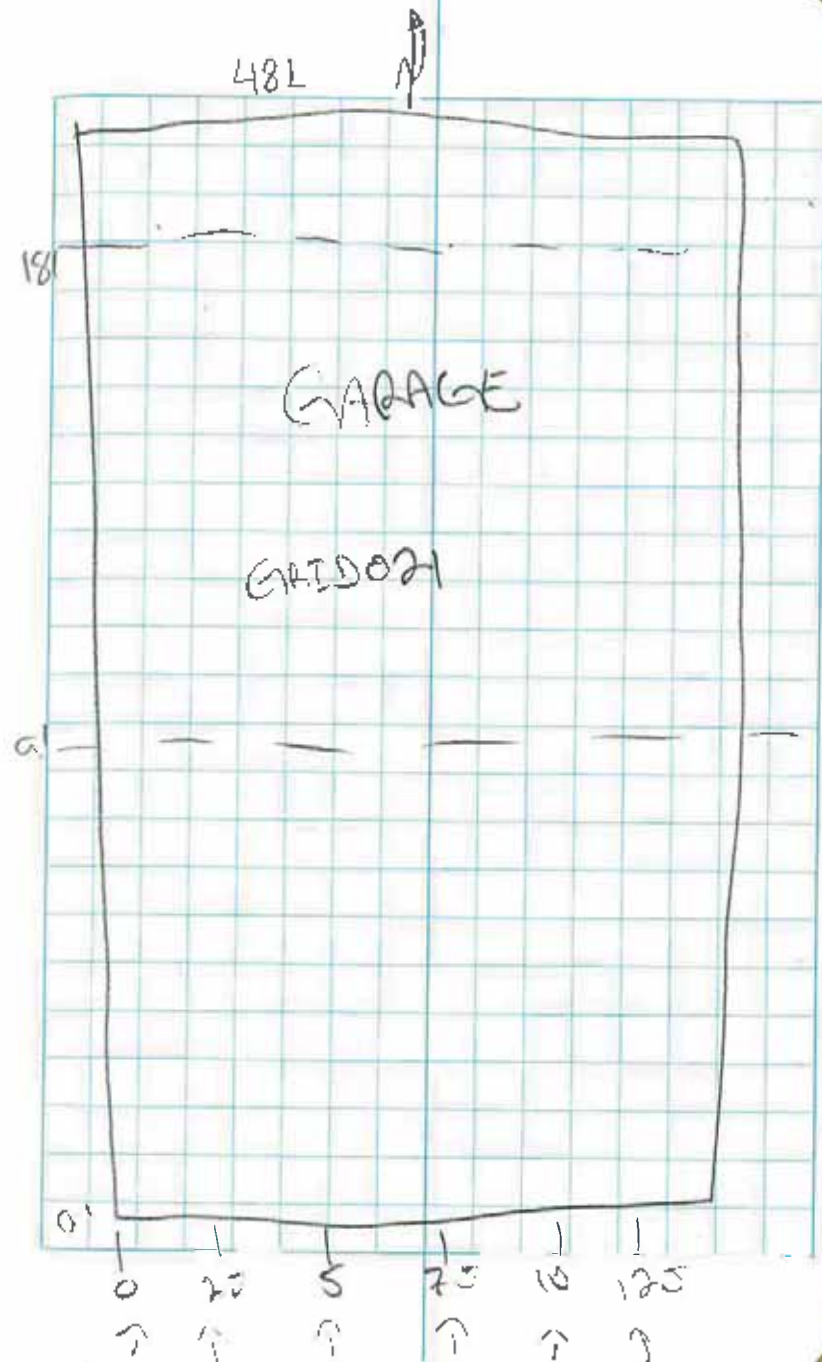
distance normalize



48L GARAGE

4 lines

Lines 001	0
002	2.5
3	5
4	7.5
5	10
6	12.5



1/7/2011

TAMW SUBSLAB GROUNDWATER

NTM, MD

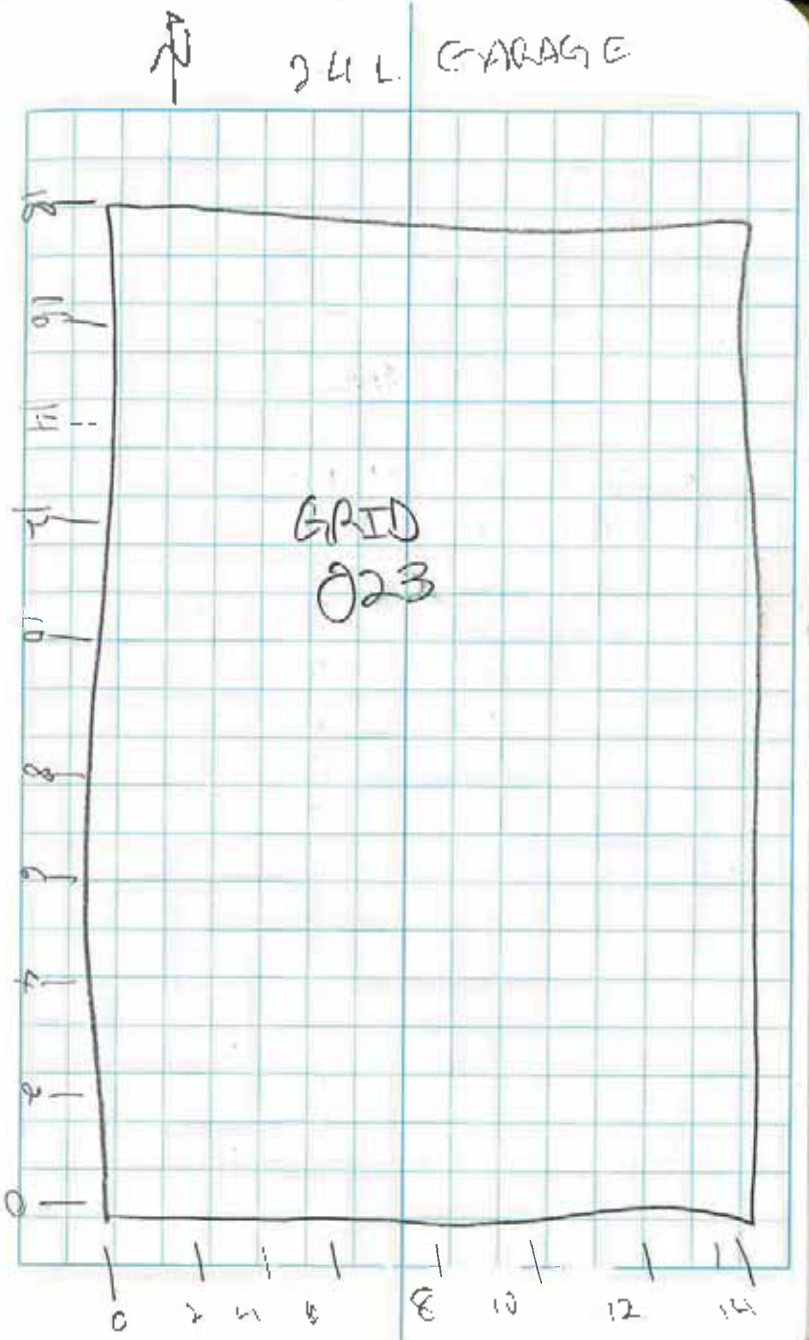
- COLLECTED GROUNDWATER @ DUPLEXES 2H & 17

- DEMOBED GRAB
- POWERWASHED RENTAL EQUIPMENT
- NTM TRAVEL BACK TO ANC-OPERATIONS

GRID 02:

24 L
GARAGE

	Rows			File
Y lines	0	11	X lines 0	
	2	12	2	2
	4	13	4	3
	6	14	6	4
	8	15	8	5
	10	16	10	6
	12	17	12	7
			14	8
			16	9
			18	10



24L

GRID 025

Dining / Living Rm

Row	0	13	0	1
	2	14	2	2
	4	15	4	3
	6	16	6	4
	8	17	8	5
	10	18	10	6
	12	19	12	7
			14	8
			16	9
			18	10
			20	11
			22	12

N

24L

Dining Rm.

GRID

025

Living Rm.

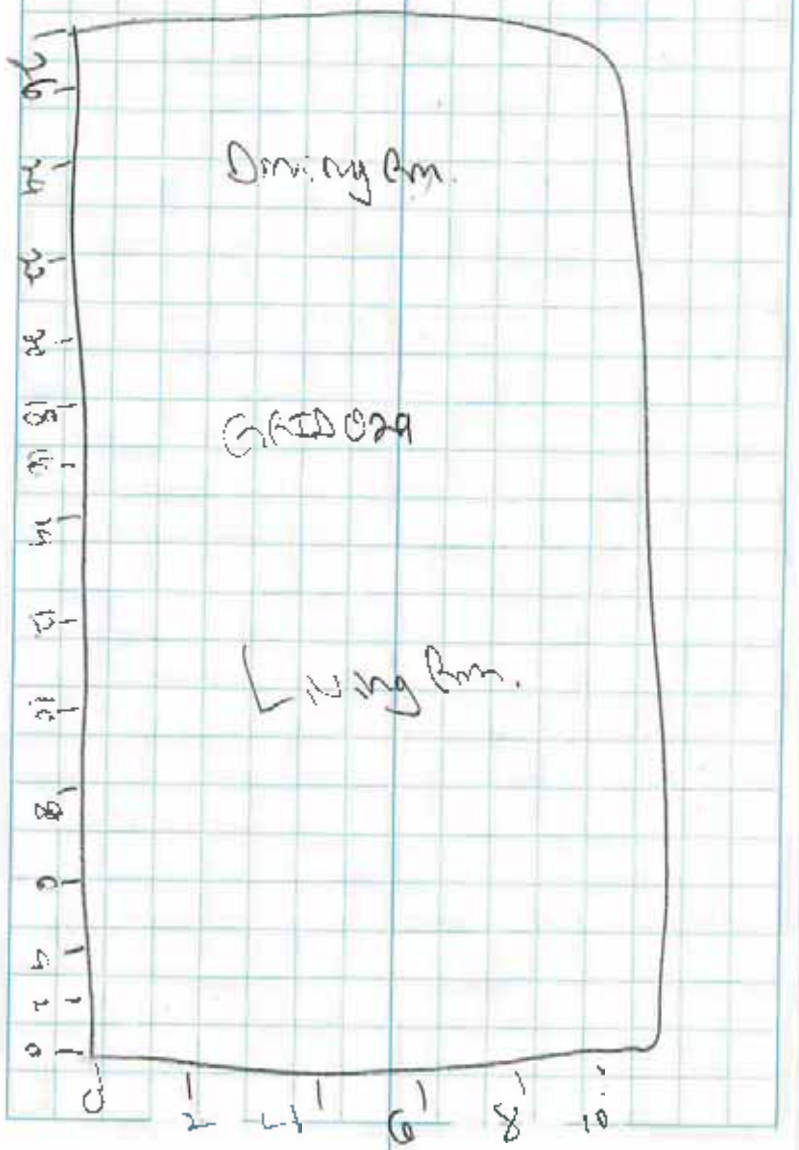
0 2 4 6 8 10 12

24R

Living Rm / Dining Rm

x line	File	y line	File
0	1	0	15
2	2	2	16
4	3	4	17
6	4	6	18
8	5	8	19
10	6	10	20
12	7		
14	8		
16	9		
18	10		
20	11		
22	12		
24	13		
26	14		

24R

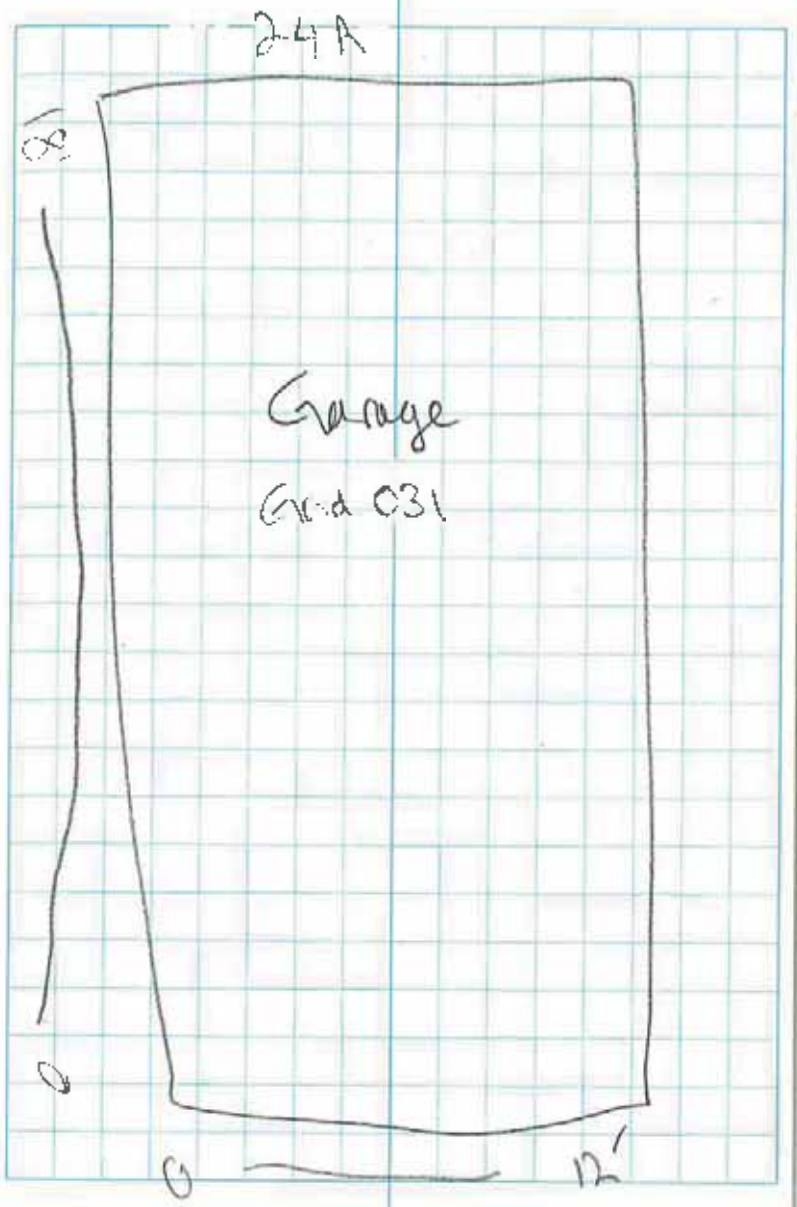


24A

Garage

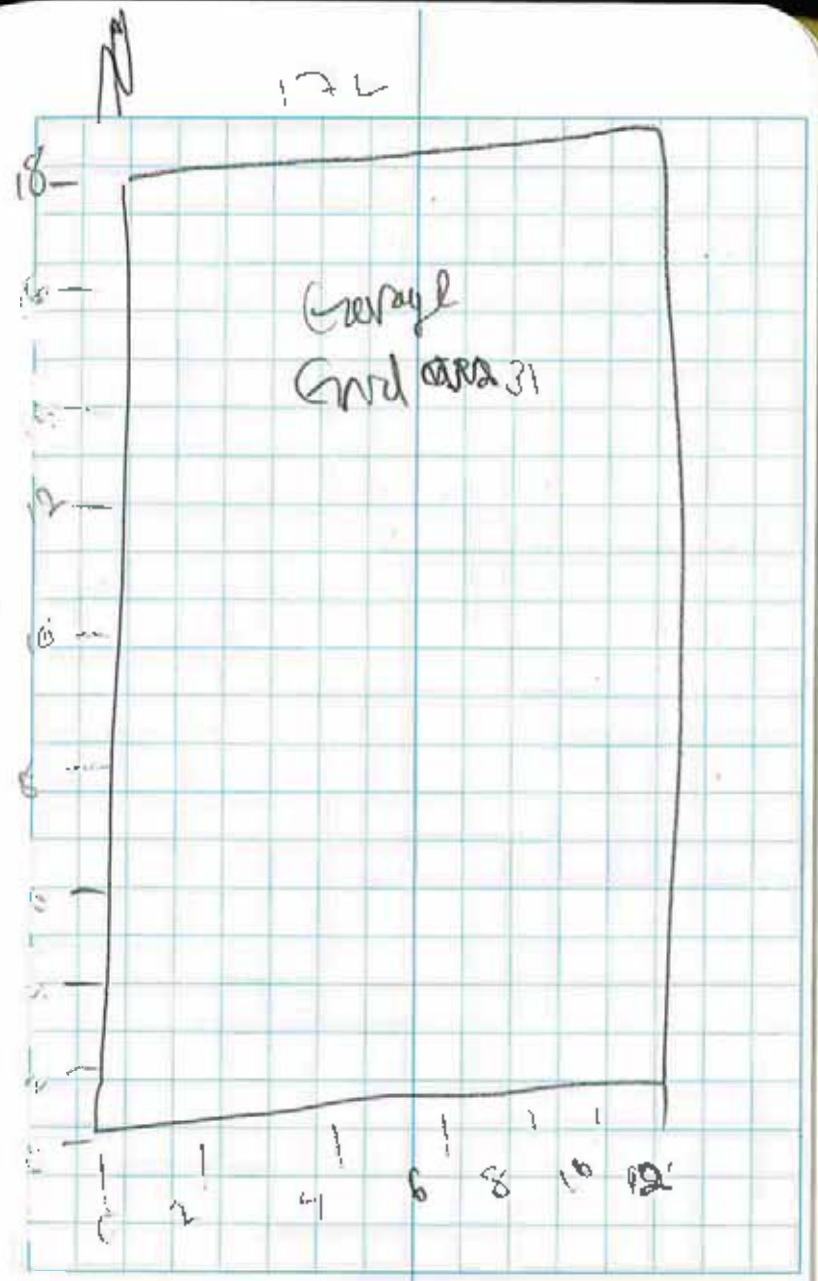
Grid 031

x line	File	y line	File
0	1	0	11
2	2	2	12
4	3	4	13
6	4	6	14
8	5	8	15
10	6	10	16
12	7	12	17
14	8		
16	9		
18	10		



GRID [illegible] 31

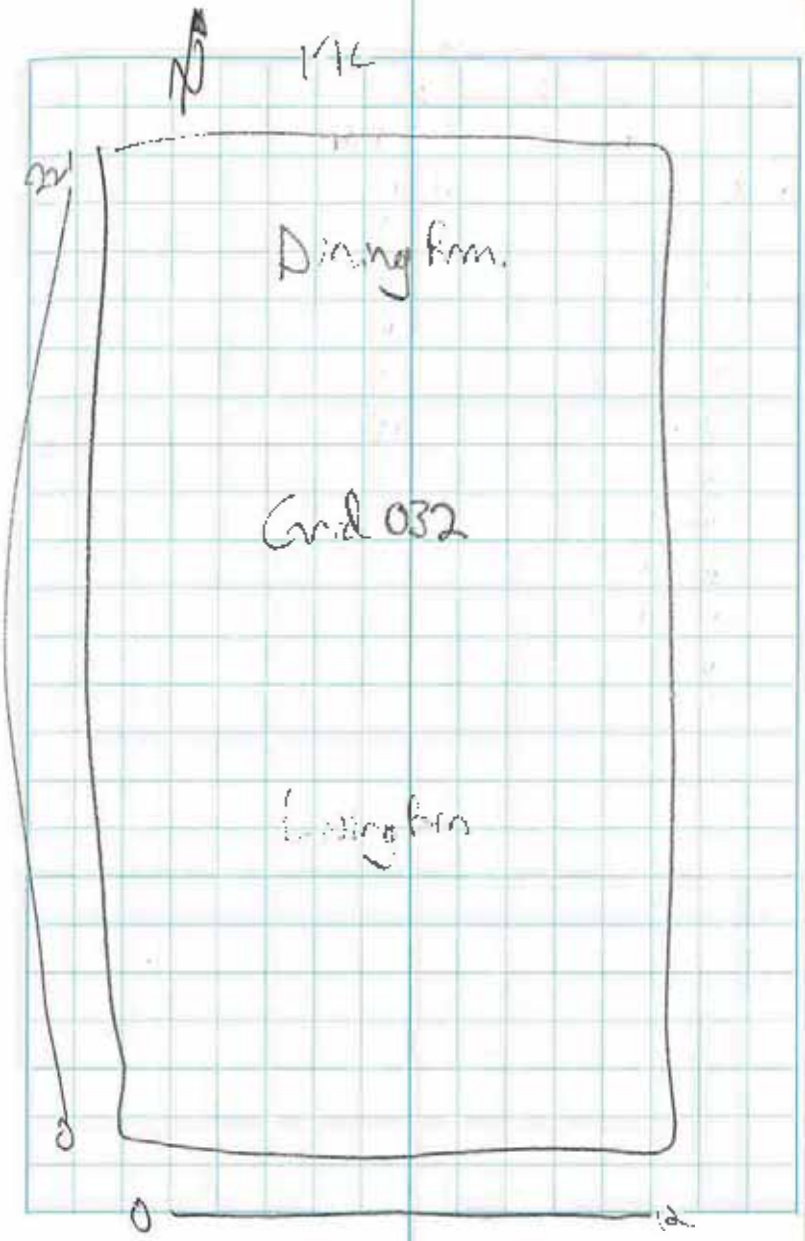
	File	From	To
X line 0	1	0	17
2	2	0	12
4	3	0	12
6	4	0	12
8	5	0	12
10	6	0	12
12	7	0	4
14	8	0	4
16	9	0	4
18	10	0	12
Y line 0	11	0	18
2	12	0	18
4	13	0	18
6	14	0	18
8	15	0	18
10	16	0	18
12	17	0	18



Grid 032

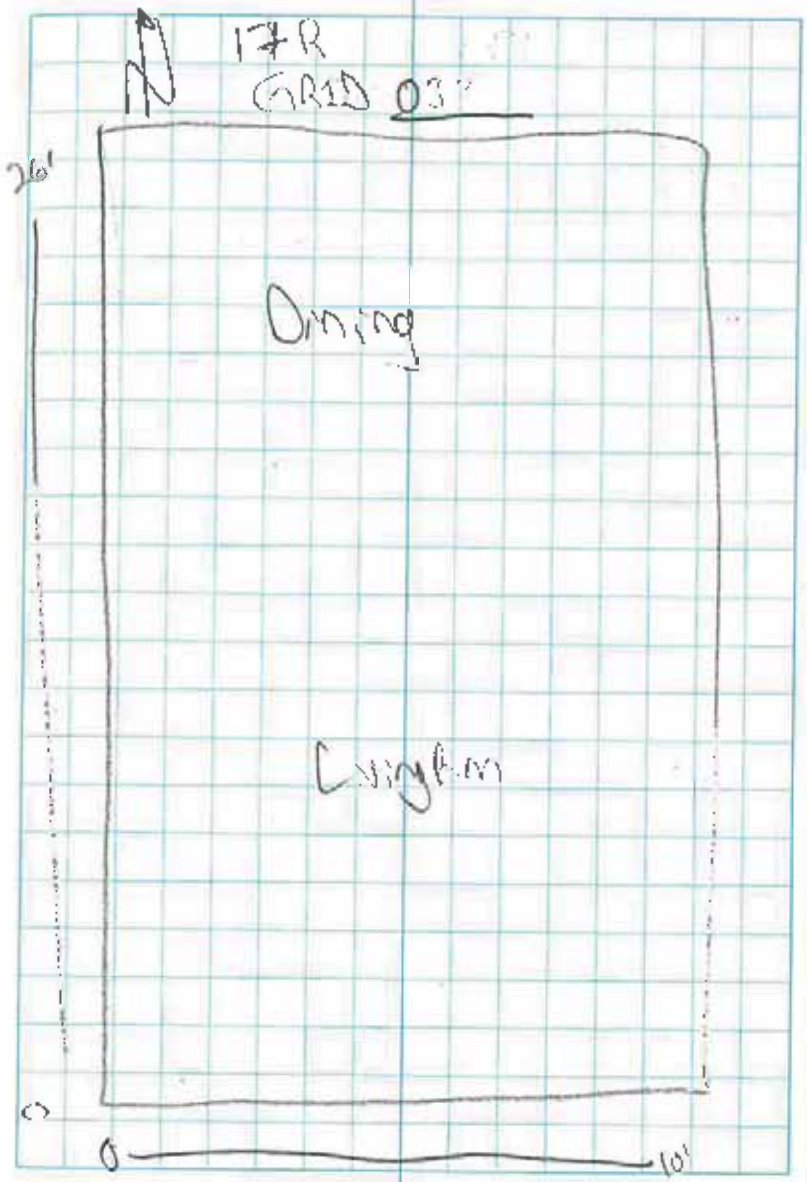
Dingyfirm.

x line		y line	
0	1	0	12
2	2	2	14
4	3	4	15
6	4	6	16
8	5	8	17
10	6	10	18
12	7	12	19
14	8		
16	9		
18	10		
20	11		
22	12		



17R
GRID 03

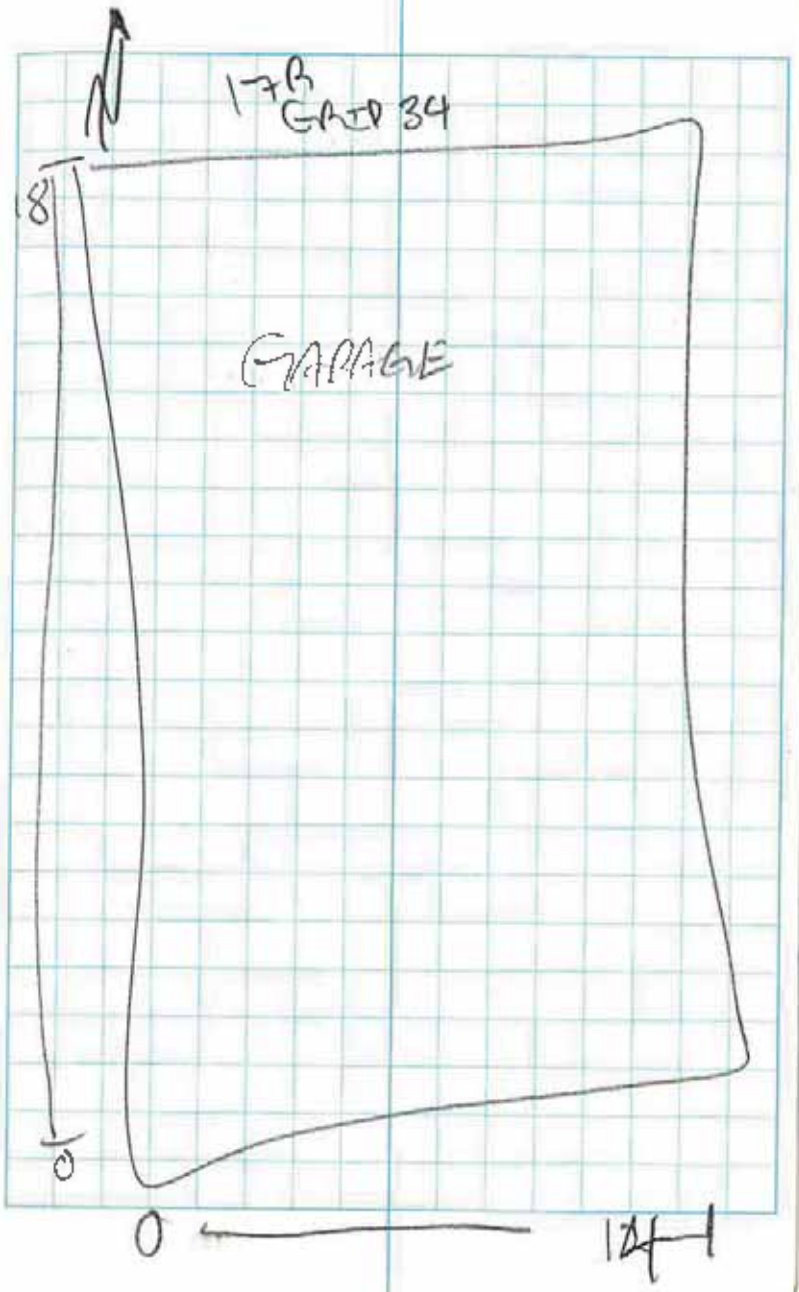
	File		File
x line 0	1	y line 0	15
2	2	2	16
4	3	4	17
6	4	6	18
8	5	8	19
10	6	10	20
12	7		
14	8		
16	9		
18	10		
20	11		
22	12		
24	13		
26	14		



17B
GRID034

xline	File
0	1
2	2
4	3
6	4
8	5
10	6
12	7
14	8
16	9
18	10

yline	File
0	11
2	12
4	13
6	14
8	15
10	16
12	17
14	18



Core Drilling 1/24

1000
Tailgate w/ Cory & Robbie from R&D & Jim & Jeremy from Concrete Coring
- SPTAs completed

1030 - Head to ~~head~~ Duplex #1
• site eval & equipment set up.
- no 5 gas yet so will not disturb aggregate under core until tomorrow when PID arrives

1061 - Begin drilling anchor point w/ ROTO Hammer for suction point
CH 46

1108 - Cory from R&D points out scratches on floor around CH45, 44, 47 where GPR car was used.

1110 - Core (6") CH46 complete
pack equipment & move to next duplex

1120 - move to duplex # 17
pull back ~~concrete~~ carpet to expose drilling location

1125 - Begin drilling CH 34

1142 - Finish drilling CH 34
pack equipment & move to next

1151 - move to duplex # 24

1202 - Begin drilling CH 15 in 24L

1210 - Finish drilling - move to 24R

1215 - Begin drilling CH 24

1233 - Finish drilling - move to last duplex.

1245 - Begin Drilling @ Duplex 48 CH 57

1300 - Finish drilling CH 57
move to 48R

1307 - Begin drilling @ 48R CH 53

1/25

0700 - Tailgate
0730 - Calibrate 5-gas

	~~Fresh air~~ LEL	CO	O_2	H_2S	VOC
Freshair:	0	0	20.9	0	0
Multi/gas:					
Isobutylene:					100

0800: Arrive @ duplex #1 w/ Robbie from R+D
Set up shop vac + line w/ contractor bag to catch aggregate from void space
- will treat agg as contaminated IDW until advised differently

0827 - Take initial reading of CH
CO: 0 VOC - 0 H_2S 0
LEL: 0 O_2: 20.9

Begin ~~dig~~ digging to create void space.

*will use shop vac to get

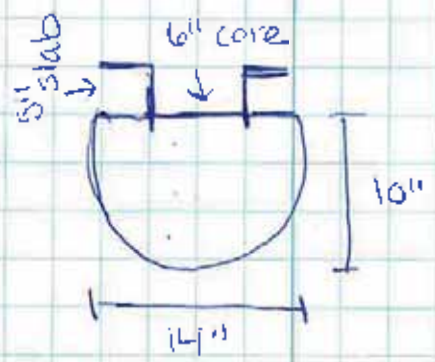
1/25

the majority + then hand dig the final pieces

0834 - Five gas reading halfway down
CO_2 - 0 VOC: 0.1 H_2S: 0
LEL - 0 O_2 - 20.9

*leaving 5-gas running during digging nearby hole

0848 - Finish digging void



Final 5-gas meter:
CO_2 - 0 VOC - 0 H_2S - 0
LEL - 0 O_2 - 20.9

8/25

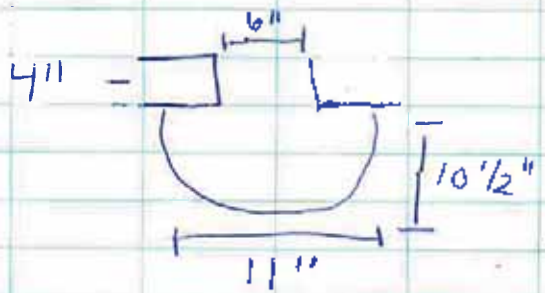
0930 · move to Duplex #48
to make collection voids
Five gas: CO 0 VOC 0 H_2S 0
LEL 0 O_2 20.9

0935 - Begin vacuuming collection
void @ CH57 - #48 L

0938 - Five gas: CO · 0 VOC · 0 H_2S 0
LEL 0 O_2 20.7

Material coming out of hole
is engineering aggregate: sand ranging
from fine to cobble

Final 5-gas: CO · 0 VOC 0 H_2S 0
LEL 0 O_2 : 20.9



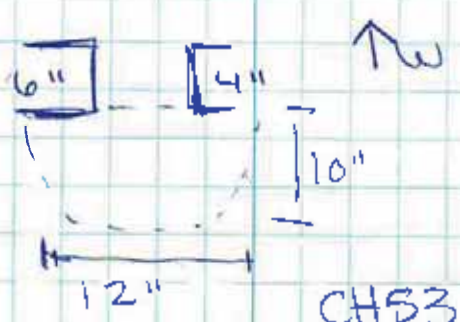
CH57 · 48L

0952 : move to 48R to
make collection void @ CH53
5-gas: CO · 0 VOC 0 H_2S 0
LEL · 0 O_2 · 20.9

1001 : 5-gas: CO · 0 VOC 0.0 H_2S 0
LEL 0 O_2 20.9

Aggregate in void more solid
than previous ones.

- Slab @ core ranges from
4" - 6" thick



CH53 · 48R

5-gas: CO · 0 VOC 0.0 H_2S · 0
LEL · 0 O_2 : 20.9

1/25

1030 - move to Duplex #24
begin making void space
under CH15 - 24L

Sgass: CO · 0 VOC 0.1 H_2S · 0
LEL 0 O_2: 20.9

1042 - more fines in aggregate
removed

CO · 0 VOC · 0.1 H_2S · 0
LEL · 0 O_2: 20.9

1100 S·gas CO·0 VOC 0.0 H_2S · 0
LEL 0 O_2 20.9
Slab thickness varies 3 3/4 - 7"

1/25

1110 · move 24R - CH024

Initial Gas: CO · 0 VOC 0.0 H_2S 0
LEL 0 O_2 20.9

using 10lb hammer chisel to
chip excess slap pieces in hole
apart to create void

1117: Shop vac shop clogged
• Large cobble in nose

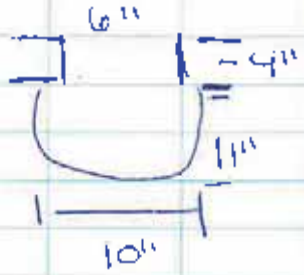
Gas: CO · 0 VOC. 0.0 H_2S · 0
LEL 0 O_2: 20.9

Talked to SB. Aggregate is considered
clean backfill. Will dump removed
dirt in Dumpster to be sent to
Fairbanks landfill

* Agg. in this void more compact
than others

Gas: CO · 0 VOC 0.1 H_2S · 0
LEL 0 O_2: 19.9

1/25



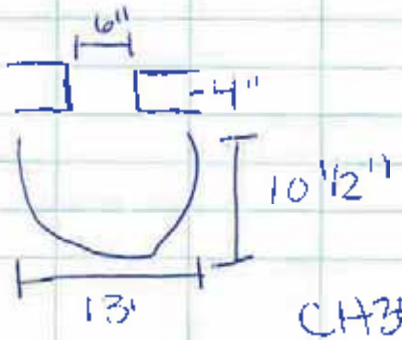
CH024 - 24R

1130 - Re-read gas levels O_2 19.1 after being open for 10 min

1140 Move to Duplex #17 to make void space CH

CO: 0 VOC: 0.0 H_2S: 0
LEL: 0 O_2: 20.9

1148 - Looses grout than other hole was collapse as sucked deeper



CH3H-17

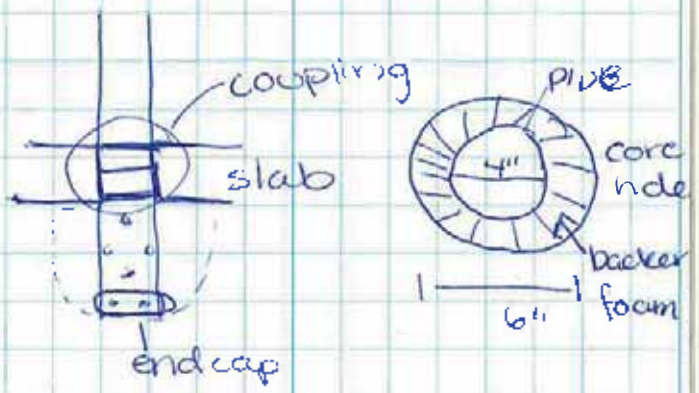
1/25

1207: Break for lunch

1245: Duplex 1

Begin installing RTH tubing + suction point piping

- Perforated 10" section w/ 10 holes attached to coupling the 4' of 4" PVC

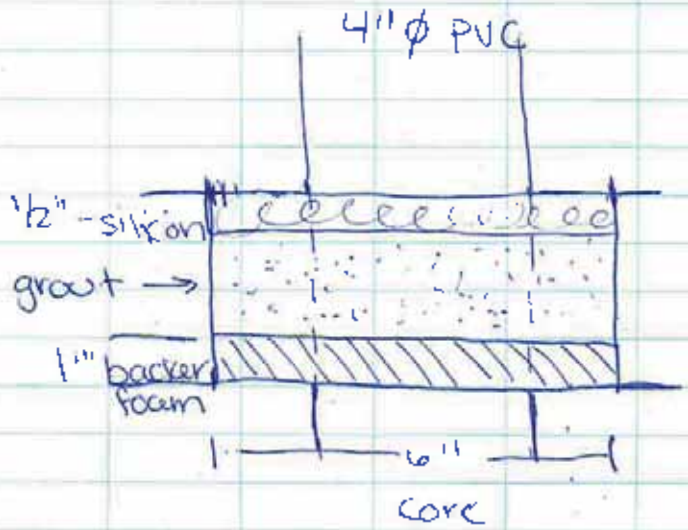


- Backer bar foam pushed between PVC + slab to ensure grout doesn't fill void space

1350 - Grout mixed + hand placed

1/25

around PVC - grout level 1/2" below surface so if system is removed can cut pipe + cover floor



- Hand drilled extra holes in perforated section

1/25

1400 - Begin sealing in 3/8" poly lined RTH sampling tube

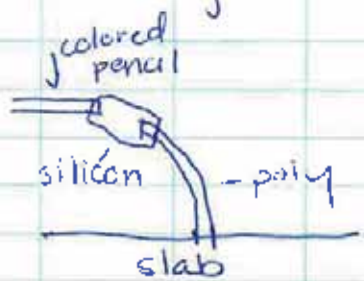
- 3 test holes with different sealant:
  - CH 40 - Seal-all
  - CH 42 - Hot glue
  - CH 41 - Hot glue inside w/ seal-all finish

CH040 did not effectively seal.
Will use hot glue w/ seal-all for the rest of the RTHs

Duplex #1 1/26

Morning spent prepping material and learning how to run ventilation meters.

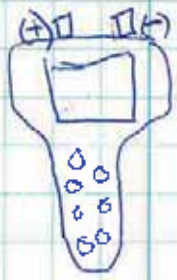
1200 · Arrive @ Duplex
Cut tubing for consistent length, add silicon tubing, and stopper w/ colored pencil
Poly tubing: 14"
Silicon tubing: 8"



All tubes remain stopper for baseline test.

Will zero meter once & take initial pressure

Duplex #1 1/26



Plug silicon into minus side let sit one minute - careful not to move meter. Take reading. All readings on secondary sheets

1400 · Run 1st full shop vac test. Pressure diff. good nearby then decrease exponentially as moved away from the suction point. No ~~dif~~ change in farthest points.
· noticed ~~pre~~ baseline pressure differential greatest @ edges of house. why?
· points only 10 feet away from each other have large difference. why?

1/27

0700 - Tailgate
R&D continuing to install
systems in #24 + #17

0800 Bump test four gas
- mixed gas:
CO: 57 ~~LEL~~ VOC: 8.8
LEL: 45 H_2S: 27 Ox: 18.7
- isobutylene
CO: 4 VOC: 76.9 H_2S: 0
LEL: 1 O_2: 20.7

- recalibrate VOC
100 ppm Iso.

fresh air:	0	0	0
	0		20.9

1000: CJ starts gluing in RTH
tubing in 48.
Super glue used for
all interior glueing

1245: Break for lunch

1/27

1330: Return to 48 - seal tubing
w/ seal-all + set up
vacuum for next test.

1500: check gluing. Not dry
will wait to run test until
tomorrow

1557 Return to trailer for data
management + daily summary

1/28

0700: Tailgate
Robbie from R+D sick today. No work w/ them

0800: MD + CJ return to Duplex #1 to take baseline pressure measurement under different conditions.

0827/. Colder outside air temp
· barometric pressure. 29.84
outside air temp: -11F°
-no tubes sealed / suction hole open

0853 2. Re-seal all tubes + cover suction point
· expecting differential to increase = more negative number
✓ - all points showed slightly ↑ differential

Duplex #48 1/28

0945: Move to Duplex #48
-Cut all tubes to same length + seal

1013: Begin taking baseline measurements across duplex #48.
Baro: 29.84 in Hg.
Temp: -11°F

1045: Start shop-vac @ suction hole #48L
· suction 48R sealed w/ duct tape

1103: Pressure difference between CH11 + 12 very different

↑ N

CH11: 2.4 Pa

CH12: 101.2

Duplex 48 1/28

How are RTH that close & have such a large difference?

1127: Suction looks to extended about halfway into 48R

1210: seal 48L w/ duct tape
Start shop-vac in [48R]

1215 - Begin taking pressure measurements

1300 - All pressure differential measurements in 48R are lower than 48L w/ same construction & same test vacuum ??
- Gravel/~~RTO~~ sub base material more compact on this side
- something stopping suction communication

1330 - Depart site for data management

1/29

1200: PP & CJ meet onsite to go over weeks results & decide next step in plan

1/31

0700 - Tailgate
Personnel PP & CJ

0900 Meeting w/ Beacon
Foundation plans show 10" & 24" grade beams. SS agrees w/ extending suction voids to 24" below slab to see if we can "suck" around the grade beams.

Carpex #17 2/01

0700 ~~Baseline~~ Tailgate

0800 ~~Tai~~ Baseline for Vacuum

Will ~~be~~ take vacuum test @ 10" void in #17 then remove suction point, extend void to 24" & redo vacuum test to see what difference it makes

0900 Begin vacuum test @ 10" void

1000 Excite from RTD on site to remove suction point & extend to 24" void
- Aggregate very loose easy to remove

1100 PVC sealed w/ grout + sycolflex to be checked tomorrow

Duplex #24 2/01

1445 - will check baseline & run vacuum on each side while void is @ 10" so we have initial readings before the suction void is extended.

1600 Reviewed results of no comm test @ Duplex #1 due to size of footprint no way for one suction point to work

- Talk w/ TH and agree need to add another suction point
- There will be one place on each side of the duplex since existing test holes to ensure we'll be able to

2/02

0900 - Tailgate
0915 Complete 5 Why report
0920 - Arrive @ Duplex #17 to take baseline prior to vacuum test w/ 24" void

1055 - After vac test attempt variable speed fan to suction point. Fan set to full power & will be monitored for a few days to see if there is a change overtime.

1100 - received go ahead to install additional suction points in DP #1 below the slab and add a suction point to Duplex #1

2/3/11

0900 - DS & CJ to Duplex #17 to check on system left running overnight. No significant changes from previous evening. Looks like system takes about 10 minutes to alternate then won't change more.

1130 - Remove PVC from suction points in 24 & 48
- Additional holes drilled in PVC to accomidate deeper holes
- PVC sealed in 24 w/ grout & sycoflex
- Holes in #48 left open to show Meseret tommorrow.

1530 - Concrete coring arrives onsite to core two new suction points in Duplex #1 - cores placed @ old RTH 41 & 51 in storage room of either garage

1630 - Depart site for data management

2/4/11

0700 Tailgate

0800 - DS out to check baseline in D24
- CJ out to check progress at suction points. System #17 turned off in preparation for site visit from Meseret Enebres/Lassie

1000 - SB & MG arrive on site for visit. Will visit #1, #17 & #48 ~~#24~~ to show diffence progress in each

1230 Depart site for lunch

1325 DS & CJ take baseline ΔP in #24 to prep for vacuum test

1415 - Prepare for vacuum test but missing cinch ring for connection. Will go to home depot & return tomorrow for testing

2/5/11

0700 Tailgate

0820 · Check ΔP @ duplex #17.
Fan has been running ≈ 24 hours.
Little to no Δ

0850 move to D 24 check baseline
ΔP to prepare for vaccum test

0905 - Start 24L vacuum w/ 24"
void "
"check ΔP

0939 - Start 24R vacuum w/ 24"
void
"measure ΔP

1005 · Turn off all equipment &
return to trailer for data
management.

2/7/11

0700 ·

1030 · check fan test ΔP in
duplex #17. Fan started on
2/4 @ 1035

· will check w/ both meters
to make sure ΔP is being
accurately recorded

· Fan in 17 installed w/ variable
speed to see if lower CFM
will provide enough ΔP

· Ordered 2nd fan to get
ready for other duplexes

2/8/11

0700 · Tailgate

0900 · Head to D48 to set up for vacuum tests

0940 · measure baseline ΔP

1020 · Start vacuum @ 48L
- will wait 10 min & check ΔP

1055 · Turn off 48L & move to 48 ~~[illegible]~~R turn on vacuum & measure ΔP

1130 · Break for lunch

1200 - move vacuum setup to ~~[illegible]~~ Duplex # 1L

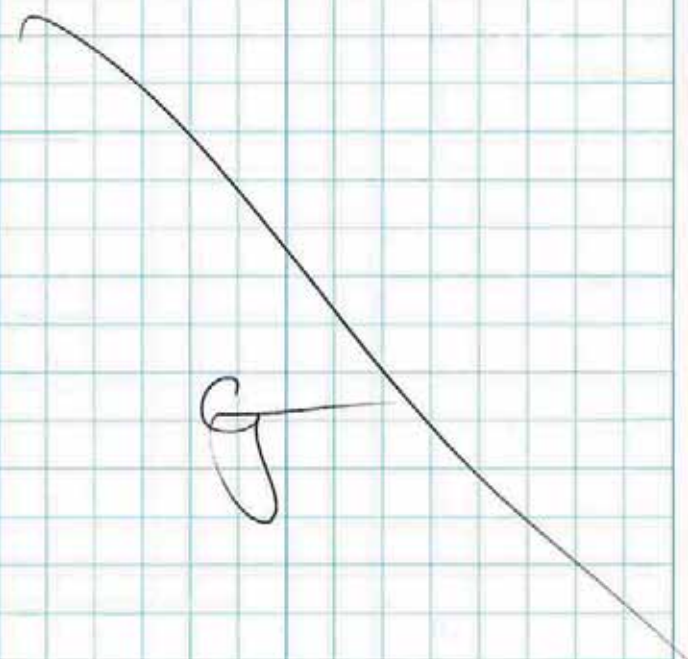
1245 - measure baseline ΔP 1

1310 - Start vacuum in ~~48~~L
· will ~~check~~ measure ΔP afer 10 min

2/8/11

1400 · Move vacuum setup to 1R & turn on
· will measure ΔP after 10 minutes

1450 · Depart site for data entry & management



2/9/11

0700 · Tailgate

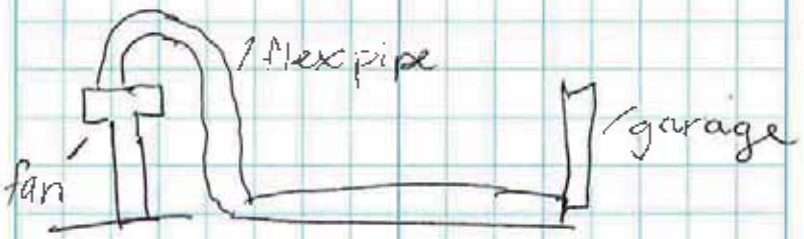
· No site work

· Data management & graph population to determine if 24" void made a difference

2/10/11

0700 · Tailgate

0900: PP & CJ visit duplexes to determine purchase amounts for exhaust systems



1300: Checked on running fan in Duplex 417.

LOTS of condensate

· Should we collect & analyze? will check w/ TH

2/11/11

0700 · Tailgate

1100 · Head to D17 to measure ΔP after 7 days running.

1200 · LOTS of water / condensate in exhaust tubing
· Guess almost 3L
why?

· moved some carpet + found really hot line running next to suction point
≈ 90°

may need to move suction point in the future

2/15/11

0700 Tailgate

0800 Got second fan in over the weekend & will start dual fan & overlap test in 24

0900 Set up fans in 24L + 24R
· measure baseline ΔP

1010 · Start 24L fan
· will check ΔP 10 minutes later

1033 · Start 24R fan leaving 24L
· will measure ΔP in 10 minutes to determine effect of both fans.

~~1055~~
1120 · Turn off 24L
· measure ΔP on 24R

2/15/11

to determine each side's effect

1200 · 24R shows much higher ΔP why?

· Return to trailer to look @ past data

1400 · Baseline ΔP higher (less (-)) than past...
Lots of new snow piled up
* really cold -35°
· maybe closing french drains keeping better closed system?

· Did see an additive effect on center wall when 2 fans ran

2/16/11

0700 Tailgate

0900 · Prepped building 48 for dual fan test w/ complete exhaust systems.

1300 · checked safety * cleanliness of all duplex for site visit scheduled tomorrow

· Talked with TH - even though slabs not maintaining 4pa @ this time will still run SF_6 tests to see whats up.

2/17/11

0700 · Tailgate

0800 · Check baseline ΔP in duplex #48

0900 · Turn on both fans measure ΔP w/ both fans running

0939 · Return to site trailer to prepare for USACE, DPW, EPA, & DEC site visit.

2/18/11

0700 · Tailgate

0835 · PP & CT head out to assemble semi-permanent exhaust systems

Rubber caps were placed on all suction points when not being test to ensure no VI while sitting

0700 · Tailgate
· R&D to clear snow around Duplex #1 first so testing can begin

0905 - Move fans to Duplex 1 & measure baseline ΔP

0958 - Start fan in 1R waiting 10 min then measure ΔP

1038 Turn off 1R & start 1L
- measuring ΔP in 10 min

1105 - Turn 1R back on

1125 · Begin dual fan ΔP measurements

1227 · Depart duplexes for data management

0700 Tailgate

0715 · Calibrate 5-gas

Multi-gas / isobutylene
CO 51 VOC 100 H2S 25

LEL 4.6 Oxy 20.9

0745: FB & CS arrive
@ Dudex 417 to set up
tracer gas injection system
· initial gas injection @ CH 39
(17L - corner of garage)

0830 · Working on attaching
regulator - first time indicated
leak w/ SF_6 leak detector
· applying teflon tape &
trying again

check 5-gas
CO · 0 VOC · 0 H_2S · 0

LEL · 0 O_2 · 20.9

900 - No leaks out of regulator

0909 - Fresh air calibrate ISM with surrounding air

Initial reading = 0.0

- will turn valve on to inject for 1 minutes

- measurements will be taken every 30 seconds unless otherwise noted

- 5 minutes after gas injection > 999.9 ppm = too much for instrument
  - waiting to try again

0932 - Turned fan on after 12 mins = no depletion prior to turning on fan

0946 - Determined silicon tubing absorbs SF6 making readings inaccurate
Trying again

Current conditions

- FAN OFF
- 1 min injection
- replace tubing after injection
- initial reading = 14 ppm

1010 - Initial readings appeared promising then jumped > 999.99
- SF6 caught in tube?
  - no, absorbed in poly tube
- turned fan on
  - suspect instrument drift rather than outside factors & fan in this corner of garage

1045 - ~~CH~~ move to 38 CH in mushroom to try injections
~~further~~

Current Conditions

FAN OFF — Inject 30 second @ 5 psi

SF_6 = 0.0 ppm

1100: > 999.9 ppm

1130: > 999.9 ppm → turn on fan to see if makes difference

1200: > 999.9 ppm

Checking other CH's to see if SF_6 anywhere else in building

CH36: 8 ppm
CH37: 1.5 ppm
CH35: 0.0 ppm

> peaks - not a consistant reading

1230: Checked fan PVC for SF_6

- not a consistant reading but SF_6 around ~~10 ppm~~ ranged from 0-45 ppm

$\boxed{= SF_6 \text{ is going from RTH to fan}}$

3/4/11

1300: Spent rest of afternoon w/ different trials to explain how instrument works and where readings coming from:

1. CH38 - no reading unless completely sealed to poly tubing w/ silicon or teflon
   - Pressure dif: 0.5 - 3.0 Pa

2. CH37: no SF_6 readings (not expected)
   - Pressure dif: -1.3 - 0.4 Pa

3. CH36 (entry closet) - some SF_6 readings but inconsistent range 0 - 8 ppm
   - pressure dif:

4. CH35 & CH33 - no SF_6 readings thought there should be b/c direct path between
   - maybe due to positive pressure Δ

5. CH38 - w/ fan off reading was easier to achieve. (- pressure Δ)

6. 99.9% pure SF_6 = lots of SF_6 subslab now
7. Rechecked fan point = NO SF_6 detection - very strange

Reasons why its still 999.9 ppm
1. There is a lot of pure SF_6 still there
2. Injected in locations that already exhibited poor pressure communication (garage)
3. Although there is pressure 5 cfm exhibit by fan is not a large flow

Duplex #17 - Tracer 3/5/11

0700 Tailgate - BPressure 29.76 inHg

0715 - KB + CJ head D17 to check (hope) for overnight disapation - FAN ON

0725 >999.9 @ CH39 - no need to seal

0730 - CH35 - PΔ: 0.8 Pa
SF_6: >999.9 ppm

Breathing zone checked:
CO: 0 VOC: 0.0 H_2S: 0
LEL 0 O_2: 20.9

0740: CH37 - Family room
PΔ: 1.9 Pa
SF_6: 0.0 ppm

0751 CH30 - Entry closet
PΔ: 4.9 Pa
SF_6: 0.0 ppm

0758: CH35 - Stair closet
PΔ = 32.1 Pa
SF_6 = 0.0 ppm

0803: CH33 - 17 L living room
PΔ = 114.8 Pa
SF_6 = 0.0 ppm

0815: Fan
Fan left on
SF_6 = 36.38 ppm
Turned fan off to see if we could get consistant reading
Peak @ 70.0 ppm after 30 min. - very slow increase in readings

0905 - Hooked up vacuum to CH39 in garage to try evacuate some SF_6
- readings indicated SF_6 > 999.9 coming from vacuum output

1000 - Beltway visits site to see how things are going

3/5/11

1100 - Hook up 2nd vacuum to suction point to get rid of gas

1130 CH38 + CH39
SF_6 > 999.9

1135 - return to trailer for lunch + thinking time
- need less concentrated gas

1230 - Return to Duplex #17 w/ both vacuums running
CH39 - 147 ppm
CH38 - 211 ppm
- going to run fan test w/ CH33 in living room "short burst method"

1311 - Start fan

1339 - Setting up header for instrument @ CH38

1340 CH33 - Come back to check concentration
Initial [ ] dropped to 42.0 ppm * could be seen dropping consistently

→ It works!!

1350 - Set up instrument holder so reader doesn't move
- will take measurements every 5 minutes to monitor

- will use Katie to help determine methodology prior to departure

1412 - After readings @ CH38 stabilized they started climbing
* Is the instrument pump strong than the fan @ this RH? If it is then just exchanging air + not really doing anything.

Duplex #17 · CH38 3/5/11

Time	SF_6 (ppm)
1400	251
1405	235
1410	265
1415	279
1420	267

* very little change switching to every 10 minutes reading

1430	294
1440	300
1450	304
1500	313

* nothing is really happening moving back to CH33 to perform another burst tes

1514: CH33 initial SF_6: 0 0

ΔP = 115.6

Injection @ 1519

peak ① 142 ② 1522

1529: 10 min after injection
SF_6 = 20.1
1529 30 sec: SF_6 - 00.0 ppm

1534: CH34 - Burst test

ΔP = 32.4 Pa initial SF_6 : 0.0

Injection @ 1538 = 5 sec. burst

time since inj	ppm	time	ppm
1:33	>999.9	2:14	201.0
5.00	>999.9	2:19	181
8:53	>999.9	2:24	158
15:05	>999.9	2:29	137
25.44	>999.9	2:34	120
32.22	>999	2:39	107.
50:01	>999	2:41	104
1:01:22	>999		
1:14:00	>999		
1:35	740		
1:57:11	274		
1:59	262		
2:04	245		
2:09	234		

Duplex #17 3/7/11

0700 - Tailgate

0730 - burnip check 5 gas
CO

910 - JY & OJ to Duplex #17
0915 - CH38 - mudroom
- FAN has been ON since friday
ΔP = 11.6
SF_6 = 100 ppm

0920 - Suction point
2.45 ppm SF_6

0920 - CH37 - living room
ΔP : 0.6 Pa
SF_6 : 0.0

Initial injection @ 0930

CH37 :

Time elapsed	ppm
0	>999
10	>999
20	>999
*switching to every 30 minutes	
~~100~~ 50	>999
120	>999
3 hrs	>999
4:30	>999 close to reading
5:30	>999 close
6:30	962
8:30	293

CONTINUED EVERY HOUR : 2 LINES

1910 RE-INJECT TO DETERMINE IF NIGHT INJECTIONS ARE MORE EFFICIENT FOR READING COLLECTION

1915 DEPART SITE

3/7

3/7/11

0956 - CH33 - next to fan

$\Delta P = 116.9$ Pa

$SF_6 = 0.0$ ppm

Time elapsed (min:sec)	ppm
~~3:30~~	>999
0900	8.0
930	12.5
1000	10.2
1030	7.0
1100	11.0
1130	10.3
12	8.2
1230	5.8
1300	6.4
1330	4.9
1400	0.0 → bubbles
1430	2.6
1500	0.0
1530	2.2
1600	1.9
1630	2.0
1700	1.9
1730	0.0
1800	0.0
1830	0.0

THESE READINGS WERE COLLECTED IN 2 MIN. INTERVALS

1120 CH251 - LIVING ROOM 1FR

Initial Injection @ 11:20

ΔP = 1.0 Pa

SF_6 = 0.0 ppm

will monitor every 1 hour until reaches reachable levels

Time stp	ppm
1 hr	>999
2:15	>999
3:15	>999
4:15	>999
06:30	>999

now change reading increments to minutes time & total time intervals

317911

1135 - CH128 - MUDROOM 1FR

INITIAL INJECTION @ 1135

ΔP = 1.7 Pa

SF_6 = 0.0 ppm

0:1[illegible] >999

1hr. [illegible]

12:24 >999

13:24 >999

14:24 >999

04:00 [illegible] >999

1250 CH32 - FAMILY ROOM 17K

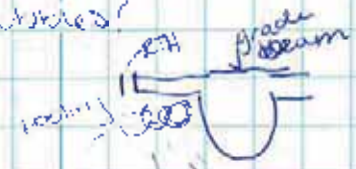
INITIAL INJECTION @ 1250

ΔP = 144.3

SF_6 = 0 ppm

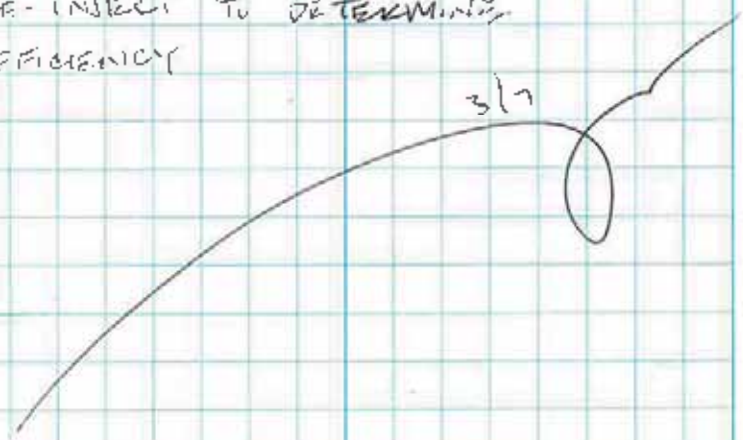
time	[illegible]			
4:00	>999		25:00	33.1
9:00	>999		25:30	33.2
19:00	85.7	PUMP BLOCKED		
19:30	79.1	[illegible]		
20:00	85.7	[illegible]		
20:30	78.3		37:00	2.0
21:00	69.5		39:30	1.4
21:30	63.2		40:00	2.7
22:00	56.5		40:30	3.5
22:30	52.4		41:00	3.2
23:00	45.9		41:30	5.1
23:30	44.1		42:00	5.9
24:00	40.6		42:30	6.9
24:30	33.2		43:00	6.2
25:00	37.7		43:30	8.6
25:30	36.9	[illegible]		
26:30	36.3	44:30	0.0	
27:00	35.1	SEE NEXT PAGE FOR		
27:30	33.9	NOTES		

1247 - SF 24 min time elapse jumping between 12 ppm + zero reading! lost bubbles!



610 Taking a while to get to a point where reading works
• inject @ night so it's ready in the morning.

1110 BASED ON SF 27 STABILIZATION
RE-INSERT TO DETERMINE
EFFICIENCY



3/5 PIPLEX #17

WEATHER - CLEAR, ~~48°F~~ 10°F

0700 TAILGATE - CHECK CH37 FIRST

0725 CH37 - FAN ON

[illegible] - 0.07 pm

[illegible] - 253 ppm

0755 - 176

0825 - 49

0901 - 151.0

0931 - 79.2

1020 - 93.4

1055 - 46.4

1125 - 31.9

1235 - 26.4

1320 - 20.0

working to move every once in a while just sweeping trace amounts left -

3/8

2/4-2/8 - FAN ON

0900 2/8 - 2/8/24

[illegible] 351.0 ppm

0800 317.0 ppm

0845 [illegible].0

0920 350.0

1000 270.0

1035 81.3

1110 140.0

1140 212.0

1215 144.0

1335 115

1405 147

accidentally left open between readings

will leave fan on & check in morning

0740 [illegible] - FANS ON
ΔP = 1.5 #pm
SF_6 = 268.0
0815 = 205.0
0855 = 245
0940 = 198
1010 = 184
1045 = 148
1115 = 137
1145 = 114
1225 = 83.4
1640 = 91.6
1710 = 55.1
* will leave fan on & check in morning

1625 - Suction point
≈ SF_6 ≈ 40 ppm still slowly climbing - most likely due to high vacuum in PVC piping

1700 - Determine plan for tomorrow
- will inject baseline in morning for Duplex #17
- set up fans in Duplex #1
- inject SF_6 in Duplex #1 in evening to be reading for reading in the morning

[illegible]

3/9

0800 TAILGATE
PLAN TO MOVE TO DUPLEX # 1
CHECK DUPLEX # 17 PRIOR TO
MOVING...
0815 CH31
SF_6 0.0 ppm
0820 CH28
SF_6 - 52.0 ppm
PLAN TO LET SHOP VAC
TO REMOVE ~~REMAINING~~ REMAINING
GAS
0830 CH37
SF_6 - 1.0
0840 CH33
SF_6 0.0
0850 [illegible] CH38
SF_6 - 4.4
[illegible] VACUUM CHECK [illegible] AND
[illegible] ~~SAFE~~ [illegible] FANS / CHECK
SF [illegible] DU 1

0920 - Consult map for injection locations
IL (ada side) check CH60

3/9

in master bedroom
· CH44 in bedroom 2 closet

Duplex #1R
· CH48 family room corner
· CH50 stairway closet

930 - CH60 · ΔP: -3.3 Pa
CH44 ΔP: 6.1 Pa
Readings higher than previously observed. Will take ΔP throughout house on separate recording sheet.

1000 BASELINE DP CHECK
COMPLETE - INJECTION POINTS
CHOSEN. RETURN TO 17
TO CHECK CH28 AND
DO BASELINE INJECTION.
1015 CH28
SF_6 31.5.
WILL NOT INJECT FOR BASELINE
DUE TO POSSIBLE INTERFERENCE
WITH CH31.
WILL INJECT CH31, CH33, & CH37

3/9
~~3/8~~

1025 INJECT CH37
1026 INJECT CH33
1030 INJECT CH31
1700 RETURN TO CHECK 17L
AND INJECT 1L
1715 CH31 >999
1720 CH37 >999
1725 CH33 >999
1730 MOVE TO 1L TO INJECT
CH44, CH60, CH43, AND CH45
1735 CH43
1736 CH45
1737 CH44
1739 CH60
1740 INJECTION OF 1L COMPLETE

3/9

3/10

0700 TALLY-HO
PERFORMED BY CJ
WEATHER — TO. FOG CLEAR.
PLAN TO CHECK 17L THEN
1L
0715 CH37 >999
0717 CH33 >999
~~0725~~
0725 MOVE TO 1L
0730 CH60 SF_6 >999
ΔP -3.2 pa
0735 CH44 SF_6 ~~0.0~~ 11.3
ΔP +4.9 pa
READ 0.0. FALSE ALARM?
MACHINE COND. PLACEMENT
POSSIBLY OFF?
0745 CH43 250 ppm
ΔP +1.4 pa
0750 ~~CH450 450 ppm~~ CH45
ΔP 24.8 0.0
0800 RE-INJECT CH44 & CH45

CH# 43

0745 - ΔP = 1.4 pa

$3F_0$ = 250 rpm

815	244
845	208
0910	153
0945	174
1015	154
1045	139
1115	122
1145	68.0
1215	44.8
1245	62.1
1315	57.1
1345	57.3
1415	48.1
1445	45.3
1515	56.2

CH# 44

3/10

0800 Initial injection - ΔP - 4.1 Pa

0850 $3F_0$ 0.0

0900 RE-INJECT AND READ IMMEDIATELY

0905	>199	0935	24.0
0915	229	0936	27.8
0916	196	0937	22.8
0917	179	0938	19.5
0918	146	0939	18.0
0919	129	0940	16.2
0920	112	0941	13.6
0921	108		
0922	88.0		
0923	83.2		
0924	76.7		
0925	~~74.1~~	71.4	
0926	65.1		
0927	58.3		
0928	55.6		
0929	PUMP CLOGGED		
0931	35.1		
0932	29.9		
0933	26.6		
0934	24.5		

CH#45 3/10/11

0800 - Initial injection ΔP = 24.8

0900 = >999

1000 = >999

1100 = >999

1205 990

1235 715

1305 487

1330 384

1405 464

~~14~~ 1440 243

~~1~~ 1505 115

1530 13

CH#60 3/11/11

0730 - ΔP: -3.9

SF_6: >999 ppm

0830 = >999

0950 = >999

1050 = >999

1200 = 846

1300 = 827

1400 = 693

1500 = 746

1535 = 121

3/10

1610 CHECK DUPLEX IT BASELINE

1615 CH31 > 999
1617 CH37 815
1619 CH33 968

1620 RETURN TO INJECT IR
1621 CH48
1622 CH49
1625 RETURN TO TRAILER
FOR END OF DAY ACTIVITIES

3/11

0715 CHECK BASELINE (DIT)
0720 CH37 320
0722 CH33 366
0725 CH31 999

0732 MOVE TO IR
0745 NO READINGS. HAS DISSIPATED. WILL RE-INJECT AND BEGIN READING IN 1 HR.
1010 APPEARS THE MESSTEKNIC ACCLIMATES AND SHOULD BE RE-CALIBRATED EVERY 30+ MIN IF DOING CONTINUOUS READINGS
1025 CHANGED SENSOR.
1630 DISCONNECT FANS TO SET UP AT 48
1700 CHECK BASELINE (DIT)
CH37 348
1705 CH33 718
1710 CH31 988
1720 RETURN TO IL TO CHECK
CH60 168

3/11

0735 CH 48 3.0
WILL RE-INJECT ΔP - 13.2 psi
0750 INITIAL INJECTION
0855 > 999
0930 > 999
1000 > 999
1030 > 999
ON TIME EDGE.
1400 330
1430 187
1435 106
1445 68
1500 READING Ø SUBJECT
PUMP ERROR. ATTEMPT TIMAL
GAS BEING DONE.
1505 100
1510 119
1525 50.5
1530 52.7
1535 53.7
1545 50.1
1555 47.4
1605 45.3
1615 39.9
1625 23.5

3/11

0710 CH 49 3.0
WILL RE-INJECT ΔP 29.0
0750 INITIAL INJECTION
~~0845~~
0850 310
0905 189
0910 189
0915 185
0925 177
0935 143
0945 127
0955 116
1005 112
~~1010~~ 1010 RE-INITIATED
THE MESSTEKNIK
1015 33-28 NOT HOLDING
STEADY. BUBBLING
1020 33.25 STILL PLUNGING.
READING - COMPLETE

~~1730 CHECK AT ⇒~~ ~~3/11~~

1730 CHECK UP @ D48 3/11

1750 INITIAL INJECTIONS

@ 48L

CH8 & CH55

1800 END OF DAY

3/12

[illegible]

CH55 3/12

AP - 1.2 pm

0735	463
0810	413
0815	369
0915	320
0945	279
1015	264
1045	237
1115	204
1145	181
1220	165
1250	134
1320	118

CH8 3/12

~~0730~~ AP - 2.0

0740	KE - INJECT
0815	>999
0915	>999
1015	>999
1115	>999
1225	999
1300	605 - DROPPING RAPIDLY
1305	~~[illegible]~~ 364
1310	341
1315	321
1320	284
1335	268
1340	252
1345	235
1350	215
1355	192
1401	179
1405	167
1410	156
1415	147
1420	134
1425	121
1430	116

3/13

1700
[illegible] TALLGATE.
PERSONNEL: JY / CJ
NEATHER: 70F
CHECK BASELINE & INJECT 18R
POSSIBLY INJECT BASELINE @ 1D
1705 CH31 - 957
1710 CH31 84.2
1715 CH33 - 917
1725 CHECK CH 20 IN 1L
CH 20 - 153
1729 DEPART 1D AND HEAD TO 4S
1730 INJECT CH 64
1732 INJECT CH 54
1740 DEPART SITE. END OF DAY

3/13

3/14

0700 TALLGATE
PERSONNEL: JY / CJ
WEATHER: 0 20F
PLAN TO READ CH 64 & CH 54 IN 18R
GO BREAK FOR LUNCH AND DELIVER DOCUMENTS TO DPW
1500 JY & CJ DEPART SITE TO CATCH FLIGHT

0404 3/14

ΔP = -1.2 Pa

0745 = 151

0750 = 114

0800 = 114

0810 = 110

0820 = 105

0830 = 100

0840 = 642

0850 = 621

0905 = 592

0915 = 565 2

1700 = 0.0

0404 3/14

ΔP = 0.4

0750 = 490

0835 = 780

0900 = 792

0950 = 494

1020 = 358

1050 = 312

1120 = 320

1150 = 327

1250 = 232

1320 = 175

1350 = 151

1420 = 146

1450 = 158

[illegible]
WEATHER [illegible]

3/16

0900 WORK IN OFFICE
1000 ARRIVE ONSITE AND TRIALMATE
1001 CHECK AB AND INJECT
PMS SL LINE. VERIFY [illegible] CH54.
CH54 [illegible]
1008 INJECT CH04
1010 INJECT CH54
1015 INJECT CH08
1020 Check Baseline @ 17
1025 CH34 39 1 ppm
1030 CH33 1560
1035 CH51 136
1040 CHECK & INJECT BASELINE
[illegible]
CH48 [illegible]
CH41 [illegible]
1145 INJECT CH48
1150 INJECT CH49
[illegible] 3E.9
CH43 [illegible]
1155 INJECT CH43
1158 INJECT CH44. INITIAL CHECK
SOME PERMANENCE ~~[illegible]~~ SINCE IT
DIS APPEARED SO FAST

CH44

3/16

1200 WESSTEKNIK NOT HOOKED
UP TO CH44. READING BOUNCE
IN ROOM. POSSIBLE LEAK
INTO HOUSE.

1205 [illegible]
[illegible] HOUSE [illegible] & GO TO CH44
[illegible] BACK [illegible] D1 TO
CHECK CH44
CH44 [illegible]
1245 DEMANDS D1 TO CHECK AT
[illegible]
1300 DEPART SITE
1700 ARRIVE ONSITE TO
INJECT 24L
1705 INJECT CH16
1707 INJECT CH17
1710 CHECK CH44 IN D#1
1712 CH44 >999

3/17

0700 [illegible]

WEATHER: -20 - +20F

PERSONNEL: 01/17

0730 CHECK BACKLINE @ D1

0735 01 41 > 999

CONCLUDING THAT THERE WAS A DIRECT PATH TO THE FAN

0737 01 43 > 999

0736 01 48 > 999

0742 01 41 > 999

0746 CHECK D18 BASELINE 3/8

0740 ARRIVE @ 24L

1730 DEPART SITE

3/17

0740 OP: -0.8 psi

0745 20.1 ppm

REINJECT

0845 > 999

0945 > 999

1045 > 999

1100 > 999

1200 > 999

1300 987

~~1400~~

1400 648

1435 537

1500 422

1530 365

1600 292

1630 223

1700 213

3/17

CH17

0746 [illegible]

0747 401

REINJECT

0847 >999

0950 >999

1050 >999

1100 767

1135 526

1200 495

1230 379

1300 327

1330 284

1400 260

1430 223

1500 187

1530 181

1600 173

1700 115

3/18

0700 THERMITE

TEMPERATURE 14 [illegible]

WEAR THICK -10 + 20F

0720 INJECT CH21 @ D24R

0722 INJECT CH20 @ D24R

0725 CHECK BASELINE @ D48

0725 CH08 - 760

0727 CH04 - 0.0

WILL REINJECT CH04

0728 CH54 - 680

0735 CHECK BASE LINE @ D1

0736 CH48 - 958

0738 CH49 - 999

0740 CH43 - 620

0745 CH44 - 851

0800 ARRIVE AT TRAILER TO WAIT FOR CONTRACTORS

DOING WALK THROUGH

10:30 HEAD BACK TO D24

1500 HEAD BACK TO TRAILER

CH 20 3/18

1800 LP - 1:2 pm
0800 SF_6 - >999
1030 >999
1105 >999
1230 980
1300 530
1330 633
1400 531
1430 521
1500 188
1530 379
1600 363
1630 299
1700 245

CH 21 3/18

1030 LP - 1:9 pm
1035 SF_6 >999
1200 >999
1205 >999
1305 >999
1335 727
1405 608
1435 999
1500 390
1535 275
1605 194
1635 105
1705 PROBLEMS WITH MESOTEMPIC
UNABLE TO READ

3/19

0700 TRAILGATE
WEATHER: 0-200'
PERSONNEL: JY / CA
0715 CHECK CH21 & CH20
PRIOR TO BASELINE INJECTION
0718 CH21 - 0.0
0720 CH20 - 0.0
0725 INJECT CH21
0727 INJECT CH20
0730 INJECT CH16
~~0731 INJECT~~
0733 CHECK BASELINE @ [P481]
0735 CH08 - 535
0745 CH04 - 0.0
0747 CH54 - 785
0750 CHECK BASELINE @ [D11]
0752 CH43 - 358
0802 CH44 - 694
0810 CH48 - 607
~~0815 HEAD BACK TO TRAILER~~
0812 CH49 - 781
0820 BACK TO TRAILER

03/21/11

0800 [illegible] ARRIVED [illegible] SITE
[illegible] + [illegible] TO [illegible] OF [illegible] MESSING WITH
FOLKS

0830 [illegible] + [illegible] [illegible]
[illegible] NORMALLY [illegible] CONDITIONS [illegible]
[illegible] PROGRESS [illegible]
SAMPLING BASELINES, MOBILIZE TO CHECK BASELINES.

0835 ARRIVE AT HOUSE 1R AND BEGIN
MEASUREMENTS AT CORE HOLE 49.
CURRENT READING = 483 ppm SF6
PRESSURE DIFFERENTIAL = -2.5 Pa

0839 TAKE MEASUREMENTS AT 1R CORE HOLE 48
CURRENT READING = 336 ppm SF6
PRESSURE DIFFERENTIAL = -3.0 Pa

0846 MOVE TO HOUSE 1L CORE HOLE 43
CURRENT READING = 208.3 ppm SF6
PRESSURE DIFFERENTIAL = -1.1 Pa

0855 [illegible] MEASUREMENT AT 1L CORE HOLE 44
CURRENT READING = 217 ppm SF6
PRESSURE DIFFERENTIAL = -0.1 Pa

[illegible]

[illegible] TAKE MEASUREMENT AT 1L CORE HOLE 20
CURRENT READING: 80.8 mm STG
PRESSURE DIFFERENTIAL: -2.5 Pa

[illegible] MOVED TO 24L CORE HOLE [illegible]
CURRENT READING: 88.5 mm STG
PRESSURE DIFFERENTIAL: -3.2 Pa

1010 TAKE MEASUREMENT AT 24R CORE HOLE [illegible]
CURRENT READING: 71.0 mm STG
PRESSURE DIFFERENTIAL: -3.0 Pa

1015 TAKE MEASUREMENT AT 24R CORE HOLE 20
CURRENT READING: 96.9 mm STG
PRESSURE DIFFERENTIAL: -1.3 Pa

1027 TAKE MEASUREMENTS AT 4BL CORE HOLE [illegible]
CURRENT READING: 114 mm STG
PRESSURE DIFFERENTIAL: -1.1 Pa

1034 TAKE MEASUREMENTS AT 4BL CORE HOLE [illegible]
CURRENT READING: [illegible] mm STG
PRESSURE DIFFERENTIAL: -2.4 Pa

[illegible] INSTALL STG [illegible]

03/21/16

1041 TAKE MEASUREMENTS AT 4BL CORE HOLE [illegible]
CURRENT READING: 235 mm STG
PRESSURE DIFFERENTIAL: -3.3 Pa

1045 RETURN TO FIELD TRAILER FOR SOME IMPROVEMENT

1100 RETURN TO 4BL CORE HOLE [illegible] AFTER [illegible]
CURRENT READING: 71.0 mm STG
PRESSURE DIFFERENTIAL: -1.4 Pa

1215 RETURN TO OFFICE TO [illegible] DATA [illegible]

1519 RETURN TO 4BR CORE HOLE [illegible] TO [illegible]
CURRENT READING: 277 mm STG
PRESSURE DIFFERENTIAL: -0.4 Pa

[illegible] RETURN TO OFFICE

1625 RETURN TO 4BL CORE HOLE [illegible]
CURRENT READING: [illegible] mm STG
PRESSURE DIFFERENTIAL: -3.5 Pa

[illegible]

1034 TAKE MEASUREMENT AT 498 [illegible] 24
CURRENT READING: 165 ppm STD
PRESSURE DIFFERENTIAL: -1.1 Pa

1035 TAKE MEASUREMENT AT 484 [illegible] 20
CURRENT READING: 210 ppm STD
PRESSURE DIFFERENTIAL: -2.5 Pa

1040 TAKE MEASUREMENT AT 243 [illegible] 21
CURRENT READING: 7771 ppm STD
PRESSURE DIFFERENTIAL: [illegible]

1045 TAKE MEASUREMENTS AT 248 [illegible] 40
CURRENT READING: 516 ppm STD
PRESSURE DIFFERENTIAL: -0.7 Pa

1045 TAKE MEASUREMENTS AT 254 [illegible] 13
CURRENT READING: 615 ppm STD
PRESSURE DIFFERENTIAL: -1.5 Pa

1055 TAKE MEASUREMENTS AT 11 [illegible] 42
CURRENT READING: 79.0 ppm STD
PRESSURE DIFFERENTIAL: [illegible]

[illegible]

1100 TAKE MEASUREMENTS AT 11 [illegible] 21
CURRENT READING: 286 ppm STD
PRESSURE DIFFERENTIAL: -0.3 Pa

1105 TAKE MEASUREMENTS AT 18 [illegible] 18
CURRENT READING: 324 ppm STD
PRESSURE DIFFERENTIAL: -1.9 Pa

1110 TAKE MEASUREMENTS AT 18 [illegible] 41
CURRENT READING: 410 ppm STD
PRESSURE DIFFERENTIAL: -1.9 Pa

[illegible] RETURN TO [illegible] FOR [illegible]
PAPER WORK, [illegible] DATA

[illegible]

AKERS-UR-05F507-H04-0021

"Rite in the Rain"™
ALL-WEATHER
UNIVERSAL
No. 373

TAKU PILOT STUDY

Book 2 of

MOUNT BASHAN TESTING (M) 03/22/11

0700 SITE SAFETY & [illegible] MEETING
DISCUSS [illegible] CONDITIONS TODAY
[illegible] OF [illegible] ASSIST

0730 MOBILIZE FOR BASELINE TESTING [illegible]
TEMP [illegible], [illegible]AR, CO/KB [illegible]

0734 TAKE MEASUREMENTS AT 1R [illegible] 49
CURRENT READING: 453 ppm SFG
PRESSURE DIFFERENTIAL: -2.9 Pa

0738 TAKE MEASUREMENTS AT 1R [illegible] 49
CURRENT READING: 440 ppm SFG
PRESSURE DIFFERENTIAL: -4.1 Pa

0745 TAKE MEASUREMENTS AT 1R [illegible] 33
CURRENT READING: 36.1 ppm SFG
PRESSURE DIFFERENTIAL: -1.1 Pa

0750 TAKE MEASUREMENTS AT 1R [illegible] 34
CURRENT READING: 234 ppm SFG
PRESSURE DIFFERENTIAL: -0.5 Pa

Scale: 1 square = _____

Scale: 1 square = _____

03/22/11 MORNING PARTICULATE TESTING (PM 2.5)

0800 TAKE MEASUREMENTS AT 24R CORE HOLE 21
CURRENT READING: 810 ppm SF6
PRESSURE DIFFERENTIAL: -2.5 Pa

0805 TAKE MEASUREMENTS AT 24R CORE HOLE 20
CURRENT READING: 228 ppm SF6
PRESSURE DIFFERENTIAL: 1.0 Pa

0810 TAKE MEASUREMENTS AT 24L CORE HOLE 16
CURRENT READING: 410 ppm SF6
PRESSURE DIFFERENTIAL: -5.8 Pa

0820 TAKE MEASUREMENTS AT 40L CORE HOLE 9
CURRENT READING: 49 ppm SF6
PRESSURE DIFFERENTIAL: -1.4 Pa

0825 TAKE MEASUREMENTS AT 48S CORE HOLE 14
CURRENT READING: 117 ppm SF6
PRESSURE DIFFERENTIAL: 1.0 Pa

0830 TAKE MEASUREMENTS AT 48S CORE HOLE 2
CURRENT READING: 274 ppm SF6
PRESSURE DIFFERENTIAL: -3.2 Pa

Scale: 1 square =

4 BASELINE TESTING 03/22

0845 RETURN TO OFFICE TRAILER TO UPDATE SITE PAPERWORK & POST MODIFICATIONS TO CROOM

1025 RETURN TO 48R CORE HOLE 21 TO CHECK MEASUREMENTS (CONFIRM DISCARDED READING)
CURRENT READING: 178 ppm SF6
PRESSURE DIFFERENTIAL: -0.5 Pa
NOTE: NOW NEAR SUN IN ROOM PAN. LAST READING CONFIRMED

1030 RETURN TO OFFICE TRAILER. CALCULATE ADJUSTMENTS TO CRP FAN OPERATION.

1100 GO TO LOWES TO PURCHASE MATERIALS FOR CRP FAN MOUNTS (CORRECTION)

1200 RETURN TO SITE & PERFORM CLEANUP OF TRAILER/TRUCK & HAULING VAC EQUIPMENT. ALSO UPDATE DATA LOGS (CALCULATED) FOR FIRST POST RUNS

1355 RETURN TO 48R CORE HOLE 21
CURRENT READING: 124 ppm SF6
PRESSURE DIFFERENTIAL: -1.9 Pa

Scale: 1 square =

03/22/11 BASELINE TESTING (48)

1400 MOBILIZE TO DUPLEX #17 TO DECONSTRUCT FAN SYSTEM

1445 FINISH DECONSTRUCTION & CLEAN UP AT DUPLEX #17.

1500 STOP INTO JOE MALENS OFFICE PER HIS REQUEST TO DISCUSS OUTCOME OF PILOT TESTING. HE WOULD LIKE TO SEE FOR INTERNAL (GCC) REVIEW A BRIEF SUMMARY OF RESULTS & DISCUSSION OF PRESSURE DIFFERENTIALS NOTICED.

1600 RETURN TO SITE AND PROCEED FOR AFTERNOON READINGS

1610 TAKE MEASUREMENTS AT 48L CORE HOLE 04
CURRENT READING: 87.9 ppm SF6
PRESSURE DIFFERENTIAL: +0.5 Pa

1615 TAKE MEASUREMENTS AT 48R CORE HOLE 51
CURRENT READING: 109 ppm SF6
PRESSURE DIFFERENTIAL: -0.7 Pa

AFTERNOON BACKUP TESTING (11.24.49) 03/22/11

1618 TAKE MEASUREMENTS AT 48L CORE HOLE 08
CURRENT READING: 124 ppm SF6
PRESSURE DIFFERENTIAL: -2.5 Pa

1625 TAKE MEASUREMENTS AT 29R CORE HOLE 21
CURRENT READING: 719 ppm SF6
PRESSURE DIFFERENTIAL: -1.8 Pa

1630 TAKE MEASUREMENTS AT 24R CORE HOLE 26
CURRENT READING: 281 ppm SF6
PRESSURE DIFFERENTIAL: -0.5 Pa

1640 TAKE MEASUREMENTS AT 24L CORE HOLE 16
CURRENT READING: 333 ppm SF6
PRESSURE DIFFERENTIAL: -2.1 Pa

1645 TAKE MEASUREMENTS AT 7L CORE HOLE 43
CURRENT READING: 411 ppm SF6
PRESSURE DIFFERENTIAL: -0.5 Pa

1650 TAKE MEASUREMENTS AT 7L CORE HOLE 44
CURRENT READING: 203 ppm SF6
PRESSURE DIFFERENTIAL: -0.25

03/22/11 AFTERNOON BASELINE (#1)

1655 TAKE MEASUREMENT AT 1R CORE HOLE 4E
CURRENT READING: 211 ppm SF6
PRESSURE DIFFERENTIAL: -1.7 Pa

1700 TAKE MEASUREMENTS AT 1R CORE HOLE 49
CURRENT READING: 386 ppm SF6
PRESSURE DIFFERENTIAL: -0.7 Pa

1715 CLEAN UP FOR DAY

03/22/11

Scale: 1 square =

MORNING BASELINE (#1) 03/23/11

0700 SITE SAFETY + TAILGATE MEETING
DISCUSSED DRIVING TOPICS

0730 MOBILIZE 10 DUPLEXES FOR FINAL READINGS
AND DISASSEMBLY

0740 TAKE MEASUREMENTS AT 1R CORE HOLE 49
CURRENT READING: 331 ppm SF6
PRESSURE DIFFERENTIAL: -2.1 Pa

0745 TAKE MEASUREMENTS AT 1R CORE HOLE 48
CURRENT READING: 132 ppm SF6
PRESSURE DIFFERENTIAL: -3.1 Pa

0750 DISASSEMBLE MAIN SYSTEM IN 1R

0805 TAKE MEASUREMENTS AT 1L CORE HOLE 4B
CURRENT READING: 29.3 ppm SF6
PRESSURE DIFFERENTIAL: -0.8 Pa

0810 TAKE MEASUREMENTS AT 1L CORE HOLE 4A
CURRENT READING: 162 ppm SF6
PRESSURE DIFFERENTIAL: -0.3 Pa

Scale: 1 square =

03/23/11 MORNING BASELINE (R48)

0815 BEGIN DISASSEMBLY OF FAN SYSTEM IN 1 L.

0830 COMPLETE DISASSEMBLY & MOBILIZE TO DUPLEX R 48

0835 TAKE MEASUREMENTS AT 48L CAR NUMBER 88
CURRENT READING: 11.9 PPM STD
PRESSURE DIFFERENTIAL: -3.6 PA

0840 BEGIN ASSEMBLY OF FAN SYSTEM IN 48L

0850 TAKE MEASUREMENTS AT 48L CAR NUMBER 89
CURRENT READING: 8.9 PPM STD
PRESSURE DIFFERENTIAL: -2.5 PA.

0855 TAKE MEASUREMENTS AT 48L CAR NUMBER 89
CURRENT READING: 41.3 PPM STD
PRESSURE DIFFERENTIAL: -0.5 PA.

0900 DISASSEMBLE FAN SYSTEM IN 48R

BEGINNING READINGS (R24) 03/23/11

0915 TAKE MEASUREMENTS AT 24L CAR NUMBER 21
CURRENT READING: 32 PPM STD
PRESSURE DIFFERENTIAL: -3.1 PA.

0920 BEGIN DISASSEMBLY OF FAN SYSTEM AT 24L.

0930 TAKE MEASUREMENTS AT 24L CAR NUMBER 21
CURRENT READING: 356 PPM STD
PRESSURE DIFFERENTIAL: -2.4 PA

0935 TAKE MEASUREMENTS AT 24L CAR NUMBER 20
CURRENT READING: 20.2 PPM STD
PRESSURE DIFFERENTIAL: -0.6 PA

0940 BEGIN DISASSEMBLY OF FAN SYSTEM AT 24R.

0955 COMPLETE DISASSEMBLY OF SYSTEM & RETURN TO FIELD OFFICE
ALL PERSONAL EQUIPMENT & PAPERWORK.

Scale: 1 square = _____

Scale: 1 square = _____

03/23/11 DEMOBILIZATION

11:00 DISCUSSIONS WITH SPECIALTY [illegible] T. MCKENNA ABOUT COMPLETION DIFFERENCES BETWEEN THE GARAGE AND REMAINDER OF DUPLEX. ANSWER QUESTIONS ON THIS MATTER RECEIVED FROM JOE KING.

UNSURE IF THESE QUESTIONS IMPACT PROJECT SCHEDULE SCOPE OF NEED TO DOCUMENT GARAGE CHANGES

12:30 BREAK FOR LUNCH

1300 CONTINUE PREPARE EQUIPMENT. PLAN TO RETURN EQUIPMENT (SHORT LOAD) AND KEEP GAS ONSITE UNTIL FINAL DETERMINATION MADE.

1530 LOAD SITE TO BEGIN SHIPPING EQUIPMENT TO VENDORS FOR RETURN

1500 PREP SIGNAGE FOR MACHINES TO REMAIN IN DUPLEX & DETERMINE PLACEMENT

03/23/11

1530 DUPLEX FOR CRACKS TO SEAL CONCRETE WHICH MAY BE USED FOR SUMMER TESTING AND CLEAN UP WORK AREA.

SIDINGS REMAIN IN DUPLEX #17 TO ALLOW FOR TEMPORARY CLOSURE OF SOME CRC HOLES NEXT WEEK.

SUPER HONEYCOMBED STORED IN DUPLEX #48 UNTIL FURTHER INFORMATION IS ISSUED ON WHAT FORMED FOR CHANGES. SECURED UPRIGHT TO PREVENT CONTAMINATION PRE & LABELED.

1730 RETURN TO OFFICE TRAILER TO FINISH PAPERWORK

1700 DEPART SITE. KB/CJ RETURN TO ANCHORAGE.

03/23/11

08/23/11 DEMOBILIZATION

11:00 DISCUSSIONS WITH SHERIFF & SMALL BUSINESS T. MCKEON ABOUT COMPLAINTS DIRECTED BEHINDERS TO GARAGE AND ROMINGER PT DUPLEX. ANSWER QUESTIONS ON THIS MATTER RECEIVED FROM JOE KING.

UNSURE IF THESE QUESTIONS IMPACT PROJECT SCHEDULE. SCHEDULE OF NEED TO DETERMINE GARAGE IMPACTS

12:30 BREAK FOR LUNCH

13:00 CONTINUE PACKING EQUIPMENT. PLAN TO RETURN EQUIPMENT (SHORELAND) AND KEEP GAS BASIC UNTIL FINAL DETERMINATION MADE.

15:30 LOAD SITE TO BEGIN SHIPPING EQUIPMENT TO OWNERS FOR RETURN

15:00 PROP SIGNAGE FOR MARKING TO REMAIN IN DUPLEX & DETERMINE PLACEMENT

08/23/11

15:30 DUMPSTER FOR CONCRETE TO SEAL CONCRETE WHICH MAY BE USED FOR SUMMER TESTING AND CLEAN UP WORK AREA.

SIGNAGE REMAIN IN DUPLEX #17 TO ALLOW FOR TERMINATION CLOSURE OF SOME CURB INLETS NEXT WEEK.

SILTAC MONITORING SITE IN DUPLEX #48 UNTIL FURTHER INFORMATION IS LEARNED ON WHAT FORWARD FOR CHANGES. SECURED UNLIKELY TO ON CONNECTION PIPE & LABELED.

17:30 RETURN TO OFFICE TRAILER TO FINISH PAPERWORK

1000 START SITE KB/CJ RETURN TO ANCHORAGE.

08/23/11