Bay West
Customer-Focused Environmental & Industrial Solutions

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June 30, 2014

Mr. Edward Olson
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155

RE: Vapor Intrusion Mitigation System Field Audit
General Mills/Henkel Corp. Superfund Site Vapor Intrusion Assessment
1092 22nd Avenue Southeast
Minneapolis, Minnesota

Dear Mr. Olson:

On May 16, 2014, Bay West LLC (Bay West), at the request of the Minnesota Pollution Control Agency (MPCA), conducted a field audit of the vapor intrusion mitigation system (VIMS) installed by General Mills for the residential property located at 1092 22nd Avenue Southeast in Minneapolis, Minnesota. The purpose of the field audit was to confirm that the VIMS was installed and operational per the MPCA approved Final Sub-Slab Sampling and Building Mitigation Work Plan prepared by Barr Engineering Company (Barr) on behalf of General Mills dated February 2014.

Bay West was not on-site on a full-time basis during the installation of the VIMS or during the initial VIMS design meeting. Bay West was contacted by Barr when the VIMS installation was complete and ready for final pressure field extension (PFE) diagnostic testing across the basement floor slab. The results of the VIMS field audit are discussed in the following sections.

Vapor Intrusion Mitigation System Field Audit Observations

Bay West was on-site at the above referenced property on May 16, 2014, to observe the visible components of the installed VIMS. A total of four suction points were installed through the basement floor slab for the VIMS. The locations of the suction points are illustrated in Section 11 (Floor Plan) of the Vapor Intrusion Mitigation System Inspection Checklist included as **Attachment A**. Bay West also observed the U-tube manometer on the system to document the air pressure differential between the soil directly beneath the basement floor slab and the indoor air. The U-tube manometer reading indicated a pressure differential of 1.8 inches of water at the time of the field audit indicating the VIMS was operating.

Site photographs illustrating visible components of the VIMS collected during the field audit are included in **Attachment B**.

Pressure Field Extension Diagnostic Testing

Barr installed a total of three PFE test points (TP-1 through TP-3) through the basement floor slab on May 16, 2014, to evaluate the pressure differential between the soil directly beneath the basement floor slab and the indoor air across the floor slab. The locations of the PFE test points are illustrated in Section 11 (Floor Plan) of the Vapor Intrusion Mitigation System Inspection Checklist included as **Attachment A**. Bay West observed and documented the pressure readings collected by Barr at the three PFE test points. The pressure readings obtained by Barr at the PFE test points exceeded 3 Pascal. Based on the MPCA Vapor Intrusion Technical Support Document (August 2010) the pressure differential between sub-slab and indoor air achieved by the VIMS should be a minimum of 3 Pascal. Site photographs of the handheld manometer readings collected at selected PFE test points are included in **Attachment B**.

The results of the PFE test point pressure readings are recorded on the Vapor Intrusion Mitigation System Inspection Checklist **(Attachment A)** and are summarized on the following table.

PFE Test Point Location ID	Sub-Slab Pressure Differential (-inches of H2O)	Sub-Slab Pressure Differential (Pascal)	Date	Time
TP-1	-0.076	-18.924	5-16-14	1006
TP-2	-0.128	-31.872	5-16-14	1010
TP-3	-0.132	-32.868	5-16-14	1014

Based on the results of the VIMS field audit and observations of the PFE diagnostic testing results, the VIMS was operational at the time of the field audit and appears to have been installed in general conformance with the MPCA approved Final Sub-Slab Sampling and Building Mitigation Work Plan prepared by Barr Engineering Company (Barr) on behalf of General Mills dated February 2014.

Please contact Tim Grape of Bay West at 651-291-3408 or tgrape@baywest.com if you have any questions regarding the information provided.

Respectfully,

Timothy J. Grape, P.G.
Project Manager
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tgrape@baywest.com

Donovan Hannu, P.E.
Project Engineer
651-707-3682
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Enclosures
Attachment A: Vapor Intrusion Mitigation System Inspection Checklist
Attachment B: Photographic Log

BWJ #130701

Attachment A

Vapor Intrusion Mitigation System Inspection Checklist

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987 / 388

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Vapor Intrusion Mitigation System Inspection Checklist

Property Owner: ~~DIANE~~ Pederson (TBS) Joshua Wong

Address Inspected: 1092 22nd Ave SE

City: Mpls State: MN Zip: 55414

Inspector: Barry Lindsay

Date of Inspection: 5-16-14 Time of Inspection From: 10:00 To: 10:40

Installer Name(s): Standard Water Control Systems NRPP RMT#: 103992

Make and Model of Fan: RP-145 Date System Installed: 5-13-14

Vent Size: 3 & 4" Number of Points: 4

1.0 Systems Installation and Interior Piping Requirements

1.1 Are all manifold and suction point piping solid, rigid pipe not less than 3 in. inside diameter? ~~Yes~~ No NA

1.2 Vent pipe and fittings are Schedule 40 PVC, appear to be air tight and properly joined / sealed. ~~Yes~~ No NA

1.3 Are all pipe interior joints and connections in mitigation systems sealed permanently? (Exceptions include installation of fans and sump covers) ~~Yes~~ No NA

1.4 Does the system piping avoid attachment to or support by existing pipes, ducts, conduits or any kind of equipment? ~~Yes~~ No NA

1.5 Does the system piping avoid blocking window and doors or access to installed equipment? ~~Yes~~ No NA

1.6 Are supports for system piping installed at least every six (6) feet on horizontal runs? ~~Yes~~ No NA

1.7 Are vertical runs secured above or below the points of penetration through floors, ceilings and roofs, or at least every (8) feet on runs that do not penetrate floors, ceilings or roofs? ~~Yes~~ No NA

1.8 Are suction point pipes supported and secured in a permanent manner that prevents their downward movement to the bottom of suction pits or sump pits, or into the soil beneath a soil-gas-retarder membrane? ~~Yes~~ No NA

1.9 Vent pipes are installed in a configuration that ensures that any rain water or condensation drains downward into the ground beneath the slab or soil gas retarder membrane. ~~Yes~~ No NA

1.10 A fire collar is installed around piping that penetrates a firewall. Yes No ~~NA~~

1.11 A ½" by ½" rodent screen installed? Yes ~~No~~ NA

2.0 General Sealing Requirements

2.1 Are openings around the suction point piping penetrations of the slab properly sealed using methods and materials that are permanent \ durable and pass the smoke stick check? No Pipe to Test ~~Yes~~ No ~~NA~~

2.2 Are accessible openings around utility penetrations of the foundation walls and slab, test holes, wells and other openings in slabs properly sealed using methods and materials that are permanent / durable and pass the smoke stick check? ~~Yes~~ No NA

2.3 Are openings / cracks sealed where the slab meets the foundation wall (if appropriate)? Yes No ~~NA~~

2.4 At the point where vent pipe and electric conduit exits the building, is urethane caulk or equivalent material used, and when the joint is greater than ½ inch in width, is a foam backer rod or other comparable filler material inserted into the joint before the application of the sealant (principally from the outside)? ~~Yes~~ No NA

2.5 When installing baseboard-type suction systems, are all baseboard sealed to walls and floors with adhesives also designed and recommended for such installations? Yes No ~~NA~~

2.6 Are all utility and other penetrations through a soil-gas-retarder membrane sealed? No membrane Yes No ~~NA~~

2.7 Did all cracks or openings in the slab or wall pass the smoke test? If not, identify the location of failed cracks or openings in the Notes & Comments Section below. Not Pressure Tested Yes No ~~NA~~

2.8 Was there a pressure field extension (PFE) to the furthest point away from the fan of at least 3 Pascal (0.012 inches of water column)? ● Yes ○ No ○ NA

3.0 Electrical Requirements

3.1 Is the plugged cord used to supply power to the fan no more than 6 feet in length? ● Yes ○ No ○ NA

3.2 Does the plugged cord avoid penetrating a wall or being sealed within a wall? ● Yes ○ No ○ NA

3.3 Is the power supply to the fan hard-wired with an electrical disconnect within line of sight and 4 feet of the fan? ● Yes ○ No ○ NA

3.4 Does the power supply have a seal to determine if access has occurred? ● Yes ○ No ○ NA

3.5 Is the electrical service panel labeled to indicate the circuit breaker powering the SSDS fan? ○ Yes ● No ○ NA

3.6 Have the electrical connections been installed by a certified electrician? ● Yes ○ No ○ NA

3.7 Total circuit load <80% of capacity (12 amps for 15 amp circuit, 16 for 20 amp circuit)) ○ Yes ○ No ● NA

3.8 On dedicated circuit if load is >50% of capacity (NOT present for test) ○ Yes ○ No ● NA

4.0 Sub-Membrane Depressurization Requirements

4.1 Is a sub-membrane depressurization system part of the mitigation system? ○ Yes ● No ○ NA

4.2 If yes, did the sub-membrane depressurization system pass the smoke test? ○ Yes ○ No ● NA

5.0 Sump Pit Requirements

5.1 Is there a sump pit in basement? ● Yes ○ No ○ NA

If yes:

5.2 Is the sump pit installed with an impermeable cover and sealed with O-ring or silicone caulking? ● Yes ○ No ○ NA

5.3 Is the sump pit cover designed to facilitate removal for sump pit maintenance? ● Yes ○ No ○ NA

5.4 Is there a mitigation system designed to draw soil-gas from the sump pit? ○ Yes ● No ○ NA

6.0 Monitors and Labeling Requirements

6.1 Does each suction point have a mechanism to measure vacuum? ○ Yes ● No ○ NA

6.2 Is the mechanical mitigation system's monitor, such as manometer type pressure gauges, clearly marked to indicate the initial pressure readings? ● Yes ○ No ○ NA

6.3 Is the current vacuum reading within 0.25"water of the initial reading for low vacuum fans and within 5% of the commissioned vacuum for high vacuum fans? ● Yes ○ No ○ NA

6.4 Is a system description label placed on the mitigation system or other prominent location? ● Yes ○ No ○ NA

6.5 Vent pipes are labeled on each level where pipe is visible. ● Yes ○ No ○ NA

6.6 The circuit breaker controlling the circuit on which the vent fan operates is labeled" ○ Yes ● No ○ NA

6.7 A manometer is installed and clearly marked indicating the initial system differential pressure readings. ● Yes ○ No ○ NA

6.8 Is the label legible from a distance of at least three feet and does it display the following information: Purpose of the system ("Vapor Intrusion Mitigation"), name and phone number of the contact person. ● Yes ○ No ○ NA

6.9 Does the mitigation system prevent backdrafting of combustion products into the structure? (Not present for test) ○ Yes ○ No ● NA

6.10 Was the system tested in the worst case scenario (e.g. all fans/dryers/vents, exchangers in operation? ● Yes ○ No ○ NA

6.11 CO detector present and operable? ○ Yes ● No ○ NA

6.12 Were the vacuum readings in the system stable during the backdraft test? (Not Present) ○ Yes ○ No ● NA

6.13 Does the mitigation system include an audible alarm to inform occupants of a system malfunction? ○ Yes ● No ○ NA

6.14 Is the audible alarm operational? ○ Yes ○ No ● NA

7.0 System Vent Discharge Point Requirements

7.1 Is the vent pipe vertical and upward, outside the structure, at least 10 feet above ground level, and above the edge of the roof ? (Req. A) — Yes / No / NA

7.2 Is the discharge of the vent pipe ten feet or more away from any window, door, or other opening into conditioned or otherwise occupiable spaces of the structure, if the vapor discharge point is not at least 2 feet above the top of such openings? (Req. B) — Yes / No / NA

7.3 Is the discharge of the vent pipe ten feet or more away from any opening into the conditioned or other occupiable spaces of an adjacent building? Chimney flues shall be considered openings. (Req. C) — Yes / No / NA

7.4 For vent stack pipes that penetrate the roof, is the point of discharge at least 12 in. above the surface of the roof? (Req. D) — Yes / No / NA

7.5 For vent stack pipes attached to or penetrating the sides of the buildings, is the point of discharge vertical and a minimum of 12 inches above the surface of the roof. — Yes / No / NA

7.6 Does the horizontal run of vent stack pipe penetrate the gable end walls? (Req. E) — Yes / No / NA

7.7 If yes, does the piping outside the structure routed to a vertical position so that the discharge point meets the requirements of (A), (B), (C), and (D)? — Yes / No / NA

7.8 Do 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. meet the separation requirements of (A), (B), (C), (D) and (E)? — Yes / No / NA

7.9 Is the outside vent piping fastened to the structure of the building with hangers, strapping or other supports that will secure it adequately (every 8 feet)? Could not see as covered with chase — Yes / No / NA

7.10 Is vent stack piping's ID at least as large as the largest used in the manifold piping? Manifold piping to which two or more suction points are connected shall be at least 4 inch ID. Could not see most but stack is 4" — Yes / No / NA

7.11 If system piping is installed on the exterior of a building, is piping and electric conduit sealed from the outside at point of entry to the building? — Yes / No / NA

8.0 Fan Installation Requirements

8.1 Is the fan installed in a configuration that avoids condensation buildup in the fan housing? — Yes / No / NA

8.2 The vent fan is installed in a vertical run of the vent pipe. — Yes / No / NA

8.3 The vent fan is mounted to the vent pipe with removable or flexible connections? Are the connections white if the fan is located outside? — Yes / No / NA

8.4 Is the fan is installed in the attic, in garages that are not beneath conditioned spaces or on the exterior of the building. — Yes / No / NA

8.5 Is the fan mounted on the exterior of buildings rated for outdoor use or installed in a weather proof protective housing? — Yes / No / NA

8.6 Is the fan mounted and secured in a manner that minimizes transfer of vibration to the structural framing of the building? — Yes / No / NA

8.7 Does the system operate without noise or vibration above normal conditions? — Yes / No / NA

9.0 Soil Gas Retarder Requirements

9.1 A soil gas retarder membrane is installed in crawlspace areas without a concrete floor. — Yes / No / NA

9.2 The soil gas retarder membrane is a minimum of 6 mil (3 mil cross-laminated) polyethylene. — Yes / No / NA

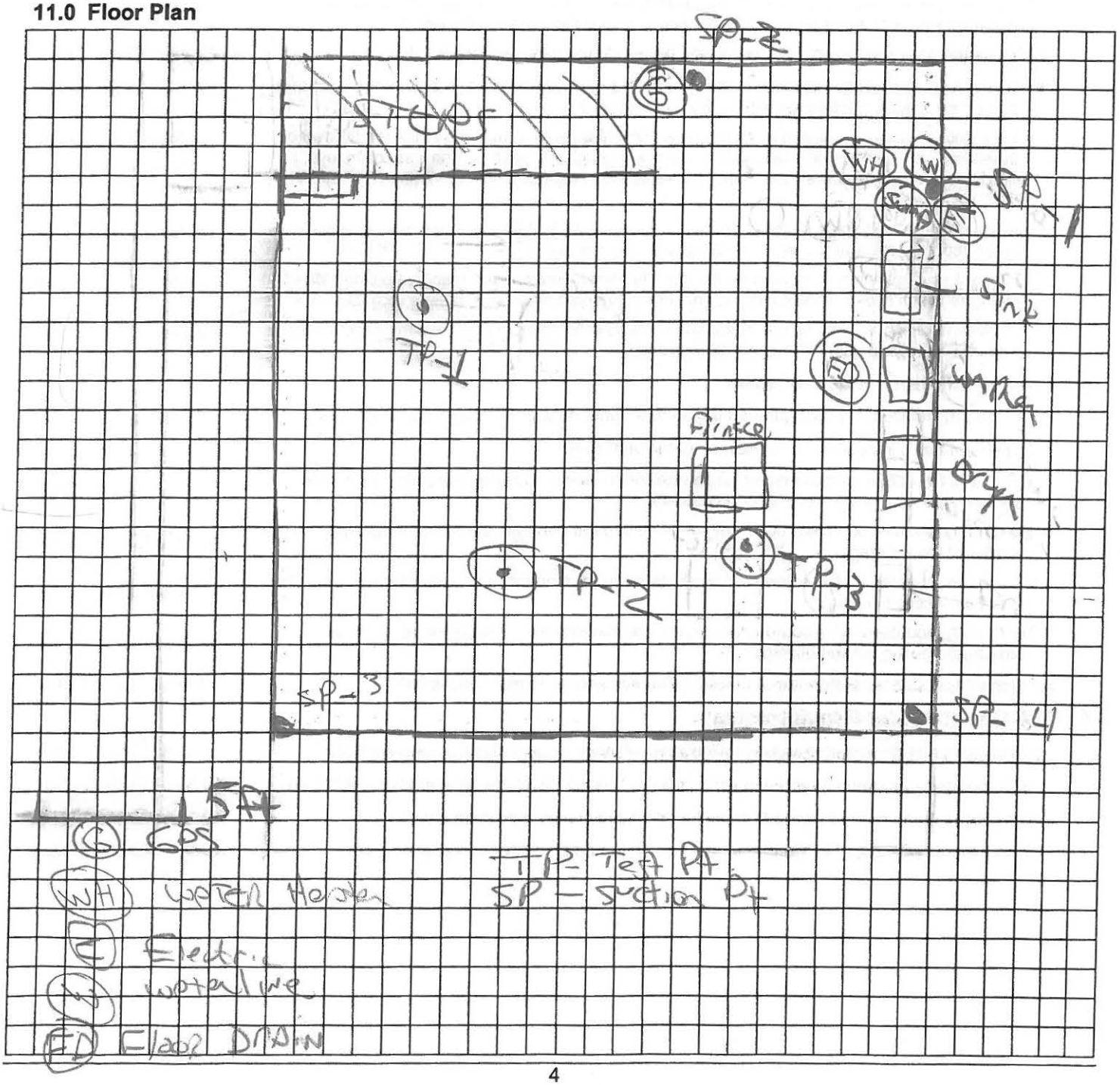
9.3 Seams are overlapped at least 12 inches and sealed using compatible glues. — Yes / No / NA

9.4 The soil gas retarder is secured to the wall using furring strips or appropriate caulks. — Yes / No / NA

10.0 Notes and Comments

Property Address: 1092 22nd Ave. SE

11.0 Floor Plan



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Vapor Intrusion Mitigation System Inspection Checklist

Brand/Type of Manometer Used: Alnor.
Property Address: 1092 22nd Ave St.

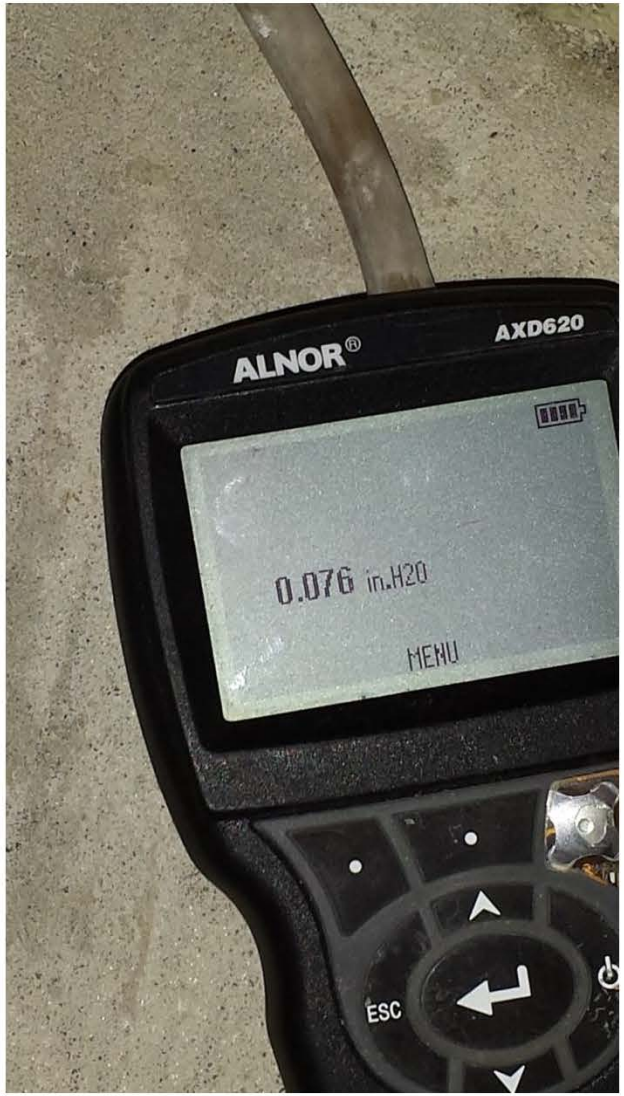
Test Location ID*	Sub-Slab Pressure (-inches of H_2O)	Sub-Slab Pressure (Pascal)	Date	Time
TP-1	-.076	-18.924	5-19-14	10:06
TP-2	-.128	-31.872	5-19-14	10:10
TP-3	-.132	-32.868	5-19-14	10:14

Notes:
Multiply inches of water by 249 to convert to Pascal.
*Must correspond with ID on Site Sketch-pg. 4

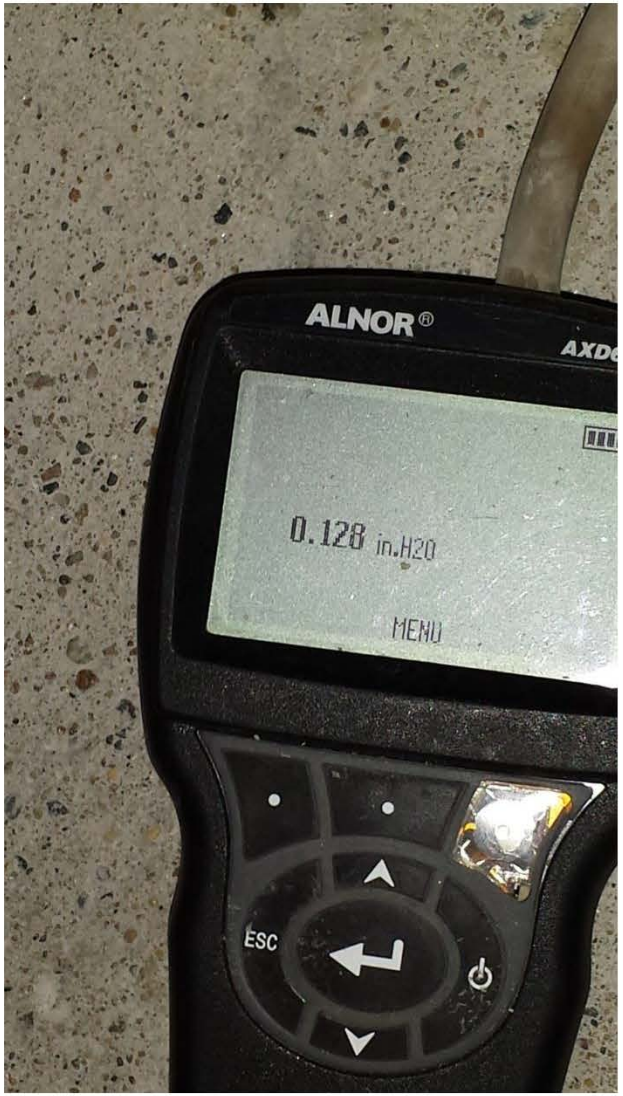
Attachment B

Photographic Log

Attachment B - Photographic Log
1092 22nd Avenue SE, Minneapolis, Minnesota
Photographs Taken on May 16, 2014

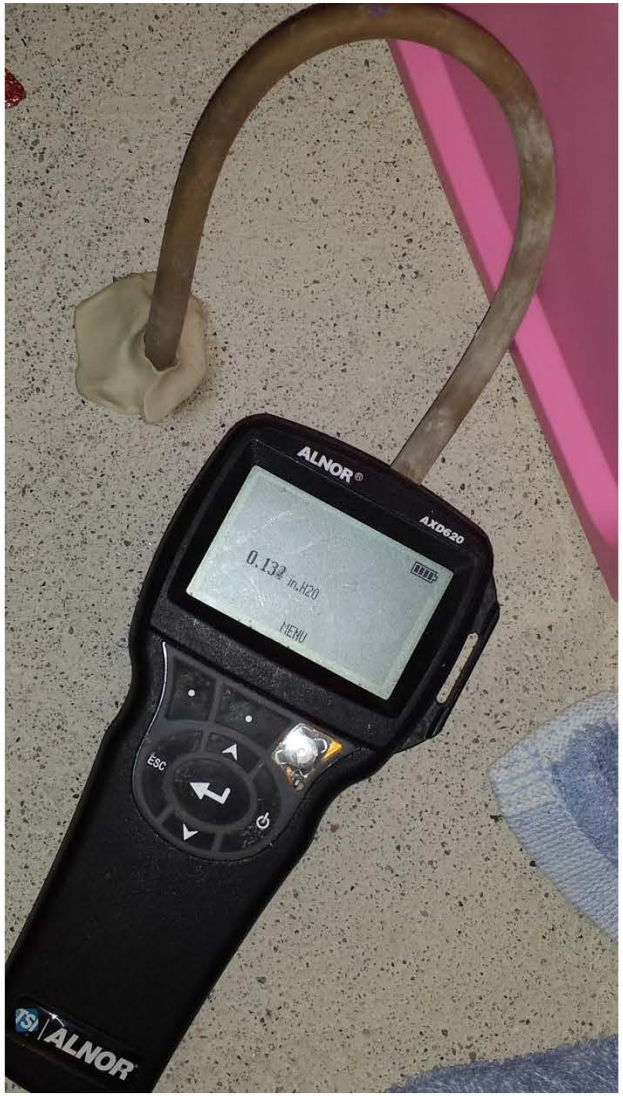


Photograph 1: Test Point, TP1, vacuum reading = -0.076 inches of water

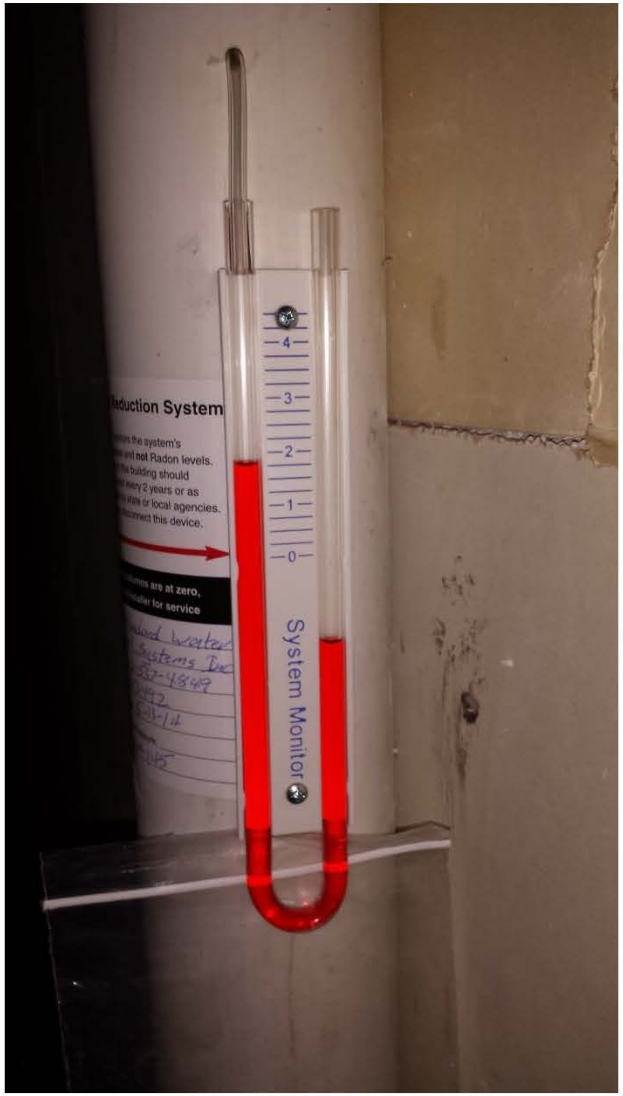


Photograph 2: Test Point, TP2, vacuum reading = -0.128 inches of water

Attachment B - Photographic Log
1092 22nd Avenue SE, Minneapolis, Minnesota
Photographs Taken on May 16, 2014



Photograph 3: Test Point, TP3, vacuum reading = -0.132 inches of water



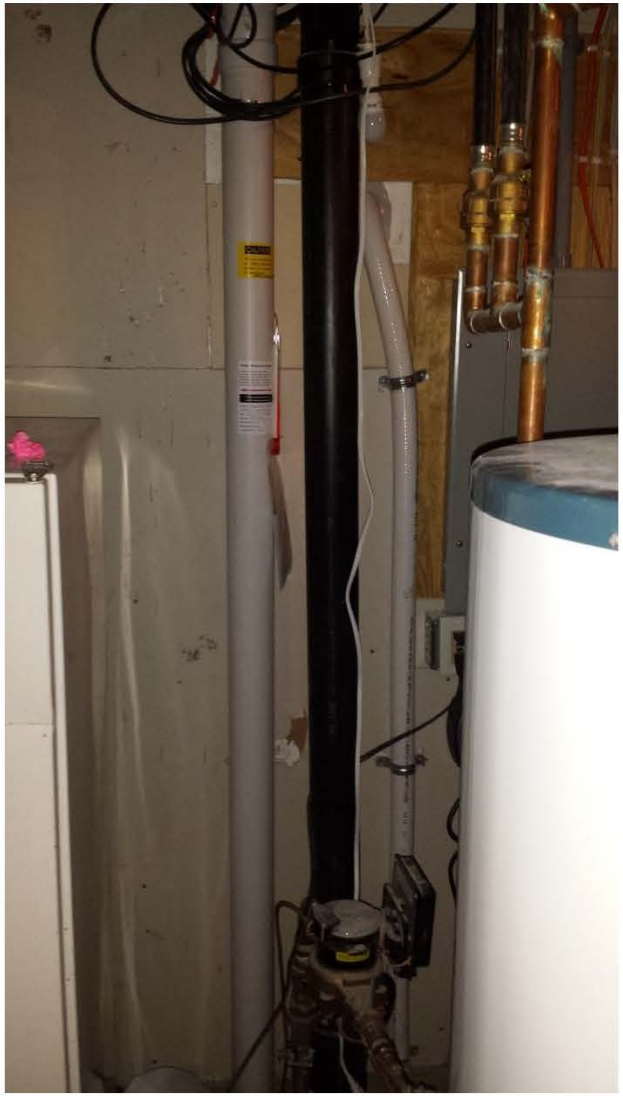
Photograph 4: U-Tube manometer reading = 1.80

Attachment B - Photographic Log
1092 22nd Avenue SE, Minneapolis, Minnesota
Photographs Taken on May 16, 2014

Photograph 5: Mitigation fan placement in outside chase

Photograph 6 :Mitigation system exhaust location

Attachment B - Photographic Log
1092 22nd Avenue SE, Minneapolis, Minnesota
Photographs Taken on May 16, 2014



Photograph 7: Suction Point, SP-1

Photograph 8 - Sump pump location