



**ABC STORE #123 NORTHERN, CA.
INSPECTION REPORT #9900**

INSPECTION REPORT

COMMISSIONED BY		TEST SITE	INSPECTION NO: 9900		
Name:	XYZ Const. Inc.	Name:	ABC Store #123	Report Date:	6/24/99
Address:	123 W. XXX Ave.	Address:	123 XXX Rd.	P.O. #:	123456
City:	XXX, CA 9XXXX	City:	XXX, CA 9XXXX	Authorized By:	John Doe
Phone:	(800) 123-4567	Phone:	(111) 123-4567	Terms:	N-10

INSPECTOR'S COMMENTS:

The property is located in the in Northern California. The site is relatively flat and is approximately 25 ft. above sea level.

The surrounding grounds and building appear to be well-maintained. The shopping mall was built in the mid nineteen sixties and consists of individual stores constructed on a flat lot, over a below grade concrete slab. The building being inspected has three levels. The foot print of the building is rectangular in shape and is approximately 86,000 sq. ft. in size. The lower level is below-grade.

The commissioner stated that there is evidence of a flooring problem in some areas of the lower level; i.e. tiles are peaking and cracking along the joints.

We have been commissioned to conduct a comprehensive inspection, including the moisture and alkalinity testing of existing floors on the lower level and to evaluate the floor conditions in these areas.

There are three types of resilient flooring throughout the lower level of the building:

1. FRITZTILE 11.92" x 11.92 x 3/16" in size, ... Custom 1000 Series Per-Cast Marble Aggregate Tile, installed over existing (presumed to be) Vinyl Asbestos Tile (VAT) that is installed with a black cut back adhesive.
2. ARMSTRONG Vinyl Composition Tile, 12" x 12" x 1/8" in size, installed over existing (presumed to be) VAT.
3. WALLEYWOOD 36" x 4" x 1/8" in size, resilient strip flooring, installed over existing (presumed to be) VAT

We performed a series of moisture and alkalinity tests throughout the lower level to quantitatively determine whether the moisture vapor emissions and the associated alkalinity in the concrete substrate are in compliance with the manufacturer's recommended levels for these products and corresponding adhesives. (See Moisture Test Report and maps for details).

Based on the moisture and alkalinity test results compared to the floor covering manufacturer's installation guides and RMA, RFCI, WFCMA, and ASTM Designation: E 1907-97 and F 1869-98 (copies provided upon request), we have observed:

1. A relatively moderate to high Visual Distress Level of the Existing Flooring. The certified inspector will make a subjective ruling on the visual condition of the existing floor coverings at each *Data Point*. Using a scale from 1 to 5 (1 = virtually no visual distress, 5 = virtually complete visual distress). See “**Visual Distress Level of Floor Coverings**” **Test Results Mapping Diagram for details.**
2. A relatively moderate to high Static Moisture Condition. Moisture contained in concrete slab. See “**Delmhorst Meter Reading**” and “**Tramex Meter Reading**” **Test Results Mapping Diagrams for details.**
3. A relatively high Alkalinity Condition. As moisture passes through a concrete slab, efflorescence, alkaline salts and other contaminants are carried to the surface from the ground or the concrete itself. Most floor covering Manufacturers and Organizations agree that a pH reading greater than 9 is a good indication of a potential excessive concrete moisture vapor emission problem. See “**pH Meter Reading**” **Test Results Mapping Diagram for details.**
4. A relatively moderate to high Dynamic Moisture Condition. Moisture vapor is radiating from concrete slab. Most Floor Covering Manufacturers and Organizations agree that an emission rate of 3.0 pounds per 1,000 square feet per 24 hours or less (based on the Anhydrous Calcium Chloride Test) is acceptable for most floor-covering products. For a few products, emission levels as high as 5.0 pounds may be acceptable. See “**Vapor Emission Test (VET)**” **Test Results Mapping Diagram for details.**

Referencing the following standards (copies provided upon request):

- Armstrong's 1999 Guaranteed Installation Systems guide:
 - Armstrong's Installation guide page 49, 6. Calcium Chloride Test, which states:
...Armstrong offers the following guidelines as maximum acceptable moisture emission levels for flooring installation: Vinyl Composition Tile, Felt-Backed Sheet Flooring is 5.0 Lbs. Per 1,000 ft Per 24 Hours...
 - Armstrong's Installation guide page 50, 7. Alkali, which states:
...When testing for alkalinity, the allowable readings for the installation of Armstrong flooring are 5 to 9 on the pH scale...
- Resilient Floor Covering Institute's 1995 manual "Addressing moisture related problems relevant to resilient floor coverings installed over concrete".
- ASTM Designation: E 1907-97 Standard Practices for Determining Moisture-Related Acceptability of Concrete Floors to Receive Moisture-Sensitive Finishes.
- ASTM Designation: F 1869-98 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- Fritztile's Basic Installation guide page 1, Moisture Testing, which states:
...Fritztile performs within the industry standard of (3) pounds per 1,000 ft per 24 hours...
- Fritztile's Basic Installation guide page 1, Substrate Preparation, which states:
...pH levels must be neutralized...

Based on the moisture and alkalinity test results, information provided by the commissioner and our close physical inspection we further observe:

The *Dynamic Moisture Condition* (vapor emission levels) and the *Alkalinity Condition* (alkaline and/or other salt) **have** exceeded the maximum acceptable levels for the **FRIZZTILE** floor covering products and adhesives.

The *Dynamic Moisture Condition* (vapor emission levels) in most of the VCT areas tested **has not** exceeded the maximum acceptable levels for the **ARMSTRONG** VCT flooring and adhesives.

The *Alkalinity Condition* (alkaline and/or other salt) **has** exceeded the maximum acceptable levels for the **ARMSTRONG** VCT flooring and adhesives.

It is noted that a ‘Tile-On’ installation may sometimes be more susceptible to moisture and alkalinity failure. However in this instance it appears not to be contributing sufficiently towards prevailing conditions. This is evidenced by the VCT and Fritztile, showing minimal distress in areas with lower moisture emission levels.

It is also noted that the pH levels appear to be relatively high throughout. This may be attributable to the ‘Tile-On’ installation, which tends to trap moisture to a higher degree and draw salts to the concrete/VAT bond line. However the potential effects of the elevated pH levels appear to be minimized by the existing solvent-based, asbestos-containing cutback adhesive (additional information available upon request).

The lower level of the building being inspected is below-grade. There is a very good chance that a *Hydrostatic Pressure Condition*, (water pressure beneath a below-grade slab) and a *Perimeter IncurSION Condition*, due to capillarity along the walls, has contributed in creating this distress problem. This condition **may** have provided a source of water that has come into contact with the concrete slab laterally as well as from underneath. Once the moisture is in contact with and migrates into the concrete slab substrate, it is in a static liquid form. The static moisture can become dynamic and move out of the slab in the form of a vapor. This process of moisture vapor emission is driven through capillaries within the concrete.

Moisture in a vapor form always migrates from a cool wet environment (concrete slab) to a warm dry environment (building interior) through evaporation. This relatively neutral moisture collects and condenses (turns from a gas to a liquid) at the adhesive bond line. Osmotic forces compel soluble salts to also move to the surface and collect at the adhesive bond line raising the pH to damaging levels. This condition ultimately causes adhesive re-emulsification and bond-failure problems due to excessive concrete moisture vapor emission and alkaline salts.

In conclusion, this is a concrete related condition **possibly** enhanced by an available water source. We recommend that a geotechnical survey be considered to determine geological strata, water table levels, as well as ground water and drainage characteristic for the site. Based on the survey’s findings, make any necessary alterations to remove or divert the water source away from the building.

To correct the concrete slab condition and create a suitable and stable substrate to enhance long term installation success, and receive full product and installation warranties, we recommend the use of ..., ten-year warranted system ... vapor emission compliance treatment.

The existing flooring and adhesive will need to be removed. The concrete will need to be shot blasted, in addition to the joints and cracks repaired using a non-rigid joint filler system. The concrete will also need to be brought into compliance by the application of a penetrant to control soluble salts and a moisture suppressing coating to reduce vapor emissions down to the flooring manufacturer's specified levels prior to the new floor covering installation.

... Inc. is a qualified Vapor Emission Compliance contracting company serving the United States. ... is a certified ... applicator with a great deal of experience in this area. You may contact ... at (800) 123-4567. Although these recommendations are based on successful past experiences, they do not constitute any guarantee or liability on end results.

INDEPENDENT FLOOR TESTING & INSPECTION, INC.

Laboratory & Consultants

MOISTURE TEST REPORT

COMMISSIONED BY

TEST SITE

INSPECTION NO: 9900

Name: XYZ Const. Inc.
Address: 123 W. XXX Ave.
City: XXX, CA 9XXXX
Phone: (800) 123-4567

Name: ABC Store #123
Address: 123 XXX Rd.
City: XXX, CA 9XXXX
Phone: (111) 123-4567

Report Date: 6/24/99
P.O. #: 123456
Authorized By: John Doe
Terms: N-10

TEST DEPLOYMENT PARAMETERS

	Date	Time	Temperature	Humidity	Dew Point	Other
START:	18-Jun-99	1:30 PM	73 *F	43% RH	50 *F	Demo & Prep 6-17-99
FINISH:	21-Jun-99	10:30 AM	72 *F	49% RH	51 *F	Temp & RH @ Site # 3
MAXIMUM:			81 *F	52% RH		
MINIMUM:			72 *F	41% RH		

MOISTURE TESTING

Moisture *conditions* for concrete fall into two categories: static & dynamic. A static moisture condition is a function of how wet the internal structure of the concrete presently is. A dynamic moisture condition is a function of how much moisture is currently evaporating from the surface. While some manufacturers recognize limitations on moisture as a static measure, usually expressed by percentage, the vast majority of manufacturers recognize limitations as a dynamic function. Moisture *testing* for concrete also falls into two categories: subjective & objective. A subjective, qualitative moisture test relies upon the person testing to make an opinion as to whether or not they think it is safe to install the flooring. An objective test quantifies the moisture condition in terms of percentage or pounds of emission. Consequently, the most meaningful moisture test is one that quantitatively produces an objective test result from measuring a dynamic condition.

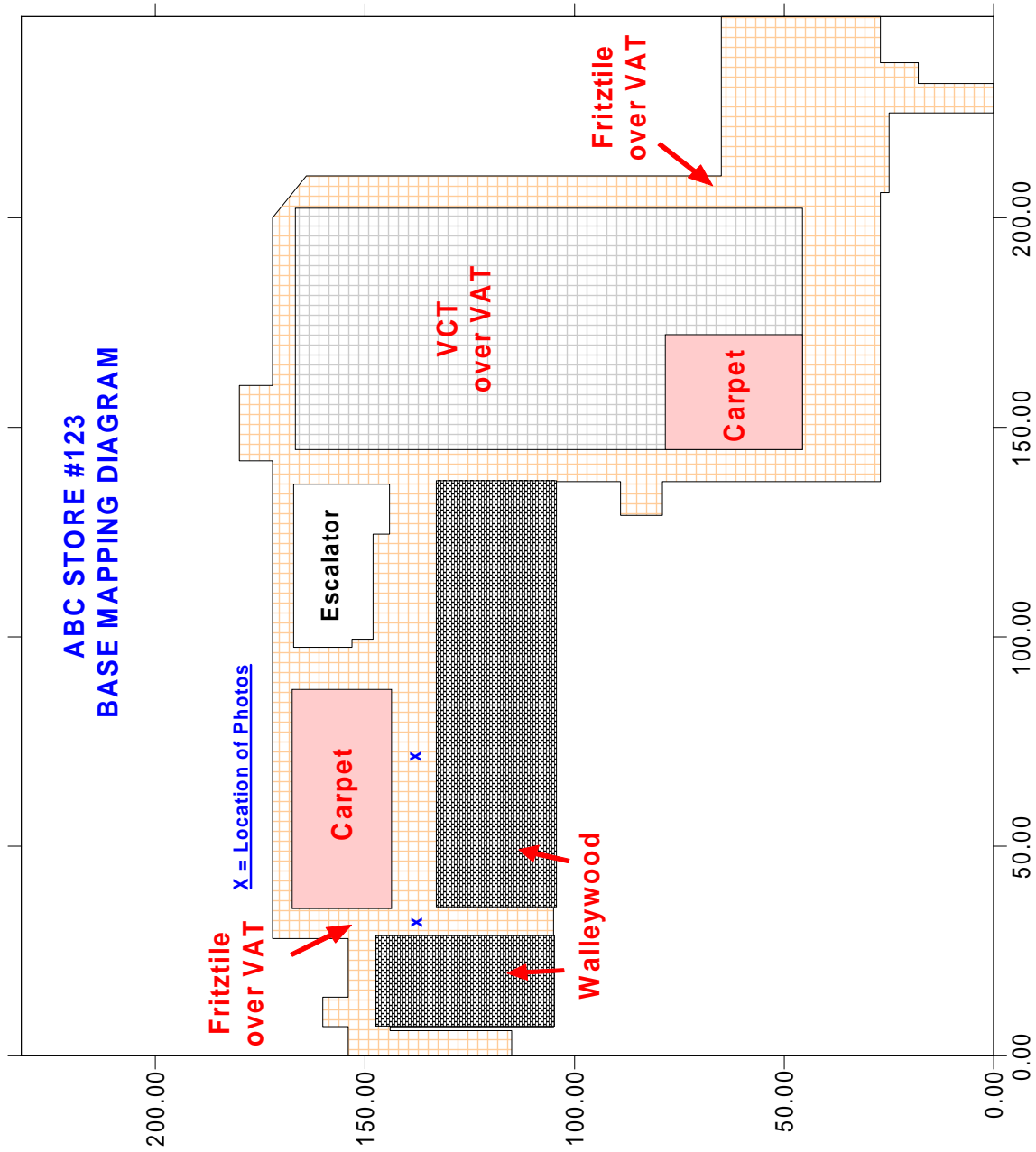
TEST RESULTS

Test Locations				Static Moisture Condition (moisture contained in concrete slab)						Dynamic Moisture Condition (moisture vapor radiating from concrete slab)				
				Subjective Testing		Objective Testing				Subjective Testing		Objective Testing		
				Visual Appearance of Concrete Color	Concrete Slab Age Month/Years	Delmhorst Meter Reading 1 to 100	Tramex Meter Reading 2-6%	pH Paper Reading 0 to 13	pH Meter Reading -1 to 15	Mat Test Pass/Fail	Bond Test Pass/Fail	Calcium Chloride Test VET		
Area	No.	Visual Distress Level of Floor Coverings 1 to 5	Surface Temperature of Concrete *F								Unit No.	Exposure Time/hrs	Lbs/1000 SqFu/24hrs	
Sales	1	5.0	72.1	Grey	+/- 35 Years	65	5.6	12	11.9	N/A	N/A	1	69.00	8.7
Sales	2	2.0	70.0	Grey	+/- 35 Years	80	5.6	12	11.8	N/A	N/A	2	68.75	7.6
Sales	3	3.0	70.9	Grey	+/- 35 Years	74	5.6	11 1/2	11.5	N/A	N/A	3	68.75	5.1
Sales	3 QC		70.9		+/- 35 Years					N/A	N/A	3 QC	68.75	5.4
Sales	4	3.0	70.4	Grey	+/- 35 Years	60	5.5	12	11.8	N/A	N/A	4	68.50	6.2
Sales	5	3.0	70.0	Grey	+/- 35 Years	71	5.5	12	12.1	N/A	N/A	5	68.75	6.2
Sales	6	2.0	70.4	Grey	+/- 35 Years	7	4.2	12	11.8	N/A	N/A	6	68.75	3.0
Sales	7	1.0	71.0	Grey	+/- 35 Years	10	4.6	10	10.2	N/A	N/A	7	68.75	4.6
Sales	7 QC		71.0		+/- 35 Years					N/A	N/A	7 QC	68.75	4.6
Sales	8	2.0	71.0	Grey	+/- 35 Years	55	5.0	12	11.7	N/A	N/A	8	68.50	5.4
Sales	9	1.0	70.2	Grey	+/- 35 Years	75	5.2	12	12.1	N/A	N/A	9	68.50	3.5
Sales	10	1.0	69.6	Grey	+/- 35 Years	40	5.2	12	11.6	N/A	N/A	10	68.25	4.0
Sales	11	2.0	70.9	Grey	+/- 35 Years	85	5.4	12	11.7	N/A	N/A	11	68.50	5.7
Sales	12	1.0	70.5	Grey	+/- 35 Years	55	5.2	12	12.0	N/A	N/A	12	68.50	4.0
Sales	13	2.0	70.7	Grey	+/- 35 Years	56	5.1	12	12.1	N/A	N/A	13	68.50	3.0
Sales	14	3.0	70.6	Grey	+/- 35 Years	100	5.1	12	12.1	N/A	N/A	14	68.25	5.4
Sales	14 QC		70.6		+/- 35 Years					N/A	N/A	14 QC	68.25	5.9
Sales	15	1.0	70.5	Grey	+/- 35 Years	60	5.3	12	11.8	N/A	N/A	15	68.25	4.8
Sales	16	3.0	69.6	Beige	+/- 35 Years	95	5.3	10	10.3	N/A	N/A	16	68.25	12.1
Sales	17	2.0	70.2	Grey	+/- 35 Years	25	4.6	12	12.1	N/A	N/A	17	68.25	2.6

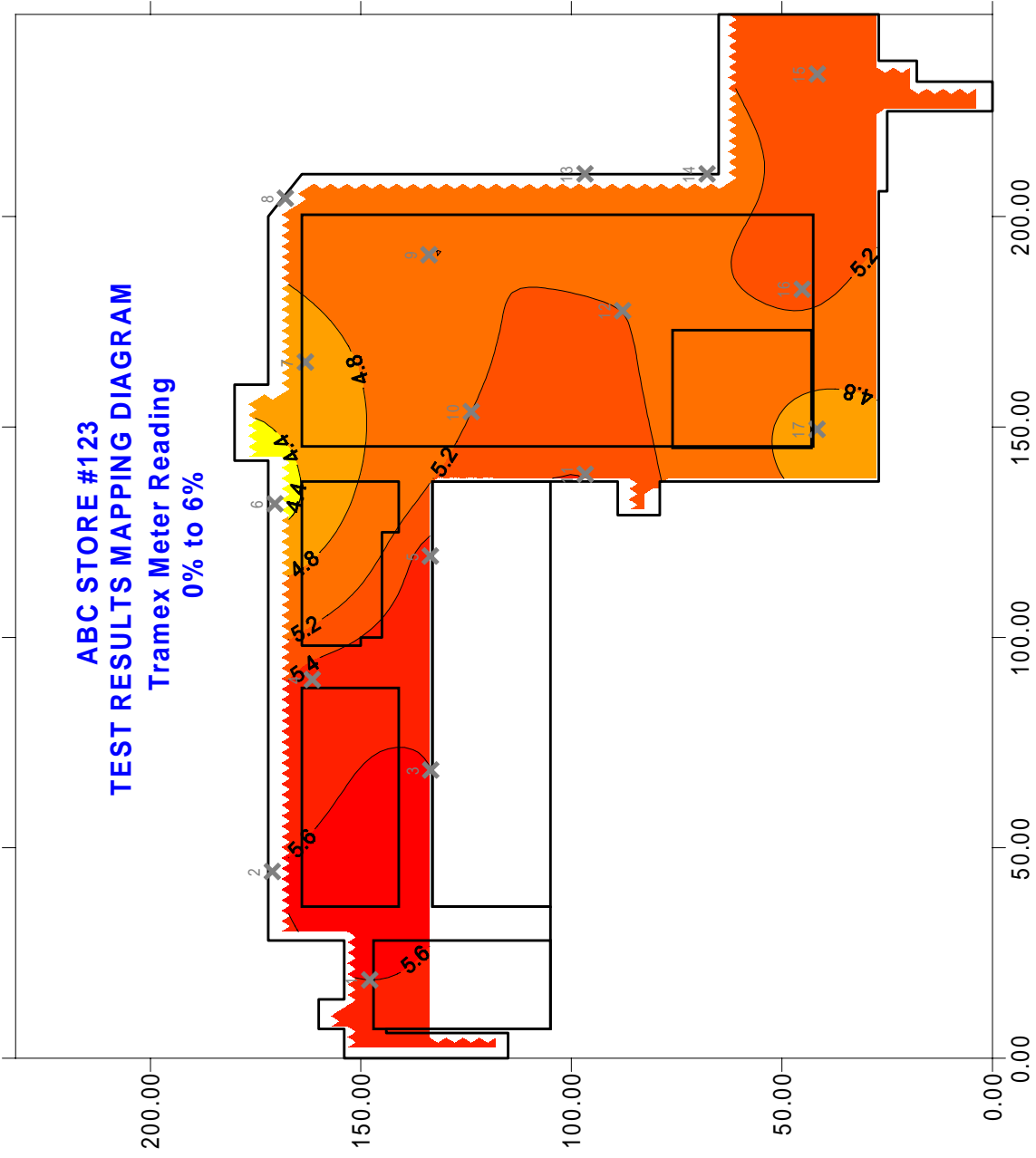
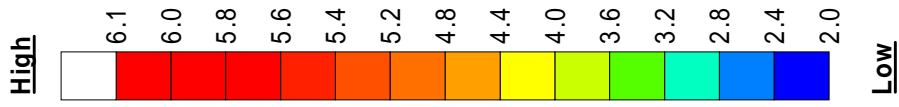
INSPECTOR: *NAME*

Signature: *SAMPLE COPY ONLY*

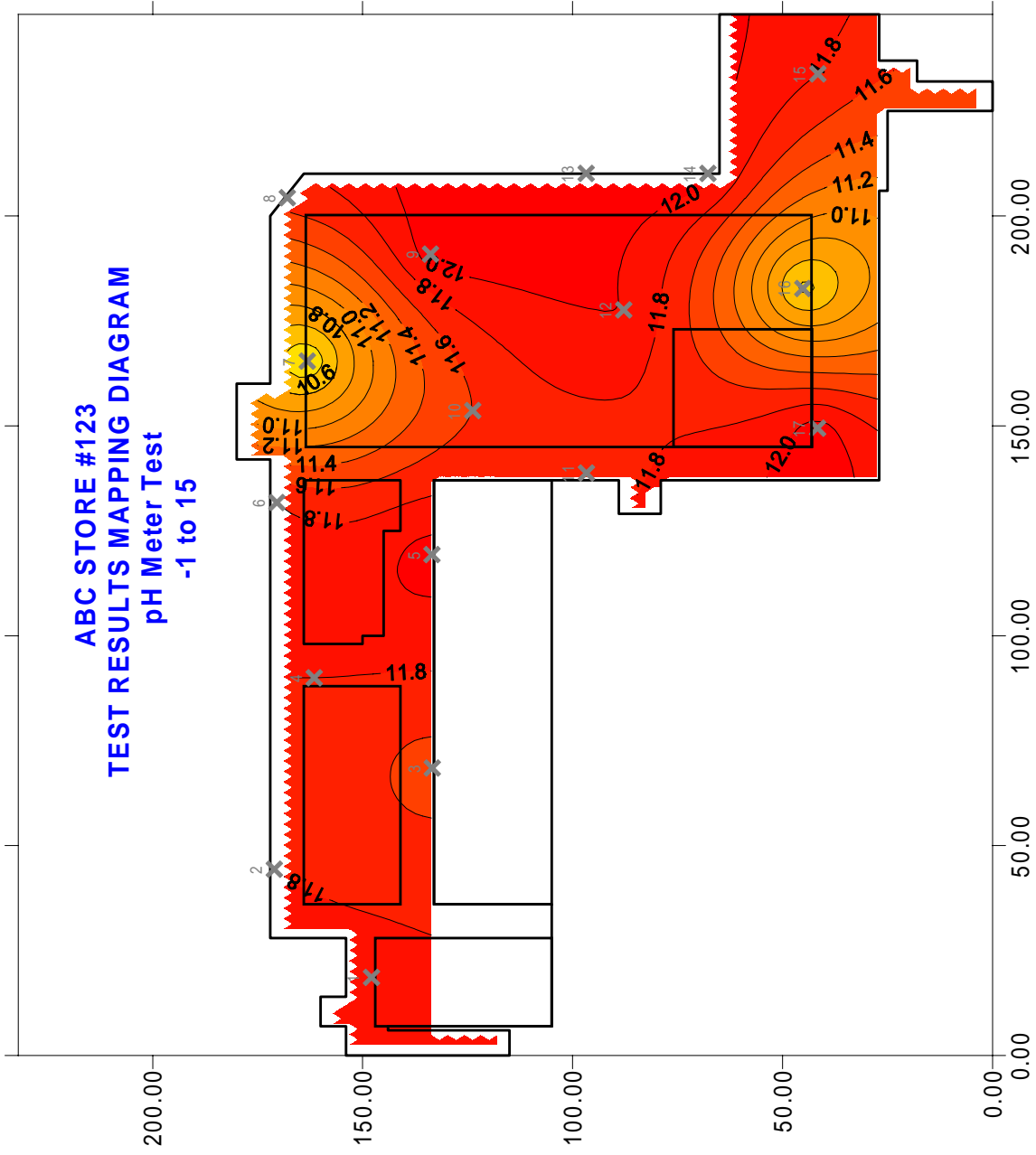
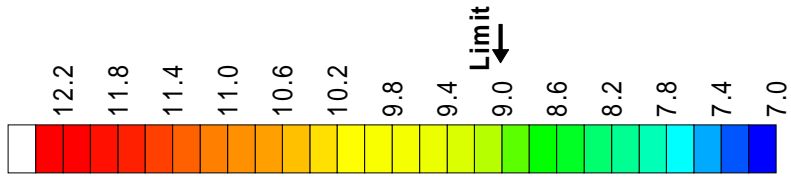
ABC STORE #123
BASE MAPPING DIAGRAM



ABC STORE #123
TEST RESULTS MAPPING DIAGRAM
Tramex Meter Reading
0% to 6%



ABC STORE #123
TEST RESULTS MAPPING DIAGRAM
pH Meter Test
-1 to 15



**ABC STORE #123
TEST RESULTS MAPPING DIAGRAM
(VET) Vapor Emission Test
Lbs. per 1000 sq. ft. per 24 hrs.**

