January 4, 2008

VAPOR INTRUSION EVALUATION WORK PLAN

333 Smith Street
Farmingdale, New York
Site #V001521

Prepared for

RECKSON ASSOCIATES REALTY CORPORATION
225 Broadhollow Road
Melville, New York 11747

ROUX ASSOCIATES, INC.

Environmental Consulting & Management

209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

TABLE OF CONTENTS

FIGURE

1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates) has prepared the following scope of work to complete a vapor intrusion evaluation for the 333 Smith Street property located in Farmingdale, New York (the Site). The property is occupied by a two-story 164,000 square foot building. The usage of the property is primarily office space for Arrow Electronics, Inc. The property has been the site of extensive vapor evaluations over the past five years. The goal of this investigation is to assess and confirm vapor intrusion characteristics associated with the property.

Scope of Work

The purpose of this vapor survey will be to identify vapor concentrations in and under the building slab using the October 2006 New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York.

Tasks to be completed include:

- Task 1: Pre-Sampling Inspection, Location Stakeout and Utility Clearance Activities
- Task 2: Verify the Operation of Existing Sub-Slab Ventilation System
- Task 3: Collection and Analysis of Sub-Slab Vapor Samples
- Task 4: Collection and Analysis of Ambient Indoor and Outdoor Background Air Sample
- Task 5: Report Preparation

2.0 SCOPE OF WORK

The detailed scope of work is set out below.

Task 1 – Pre-Sampling Inspection, Location Stakeout and Utility Clearance Activities

A pre-sampling inspection will be performed prior to the proposed sampling event to identify and minimize conditions that may interfere with the proposed testing. The inspection will seek to evaluate any changes to known conditions within the building. This information, along with information on sources of potential indoor air contamination, will be identified on a building inventory form.

Items to be included in the building inventory include the following:

a. construction characteristics, slab type, occupancy type, including foundation cracks and utility penetrations, ceiling construction and firewall separations, windows, or other openings that may serve as preferential pathways for vapor intrusion;

b. recent renovations or maintenance to the building (e.g., fresh paint, new carpet, or furniture);

c. mechanical equipment that can affect pressure gradients (e.g., heating systems or exhaust fans);

d. condition of epoxy coating on the concrete slab in the locations where the slab is exposed;

e. use or storage of petroleum products (e.g., fuel containers, gasoline operated equipment and unvented kerosene heaters); and

f. recent use of petroleum-based finishes or products containing volatile chemicals.

Potential interference from products or activities releasing volatile chemicals may need to be controlled prior to sampling within the building. Removing the source from the indoor environment prior to testing is the most effective means of reducing interference. Ensuring that containers are tightly sealed may be sufficient.

Once any interfering conditions are corrected (if applicable), ventilation may be needed prior to sampling to eliminate residual contamination in the indoor air. If ventilation is appropriate, it will be completed 24 hours or more prior to the scheduled sampling time. Where applicable,

ventilation can be accomplished by operating the building's HVAC system to maximize outside air intake.

In general, the building's HVAC system will be operating under normal conditions. Unnecessary building ventilation will be avoided within 24 hours prior to and during sampling.

To avoid potential interferences and dilution effects, every effort will be made to avoid the following for 24 hours prior to sampling:

a. opening any windows, fireplace dampers, openings, or vents;

b. operating ventilation fans unless special arrangements are made;

c. smoking in the building;

d. painting;

e. using a wood stove, fireplace, or other auxiliary heating equipment (e.g., kerosene heater);

f. allowing containers of gasoline or oil to remain within the building, except for fuel oil tanks;

g. cleaning, waxing, or polishing furniture, floors or other woodwork with petroleum- or oil-based products;

h. using air fresheners, scented candles or odor eliminators;

i. engaging in any activities that use materials containing volatile chemicals;

j. using cosmetics including hairspray, nail polish, nail polish removers, perfume/cologne, etc.;

k. lawn mowing, paving with asphalt, or snow blowing;

l. applying pesticides; and

m. using building repair or maintenance products, such as caulk or roofing tar.

The primary objective of the product inventory is to identify potential air sampling interference by characterizing the occurrence and use of chemicals and products throughout the building, keeping in mind the goal of the investigation and site-specific contaminants of concern.

Products in the buildings will be inventoried prior to testing to provide an accurate assessment of the potential contribution of volatile chemicals. If available, chemical ingredients of interest (e.g., analyte list) will be recorded for each product. If the ingredients are not listed on the label, the product's exact and full name, and the manufacturer's name, addresses and telephone number will be recorded, if available.

All proposed sample locations will be located in the field prior to the commencement of the vapor investigation in order to avoid potential subsurface structures and/or utilities. The building superintendent will provide information regarding the location of utilities in the locations that are to be sampled. The locations will be biased towards points of entry. The proposed locations are shown on Figure 1.

Task 2 – Verify the Operation of Existing Sub-Slab Ventilation System

During this Task, the operation of the existing sub-slab ventilation system will be confirmed and subtasks to be completed include:

- Check the existing wind driven fan located on the roof of the building for proper operation;
- Inspect the existing slab for modifications that may effect vapor intrusion;
- Obtain Photoionization Detector (PID) measurements at each of the two SVE extraction wells from the sampling ports on the roof while the fan is in operation; and
- Obtain a pressure and PID measurement from the radius of influence (ROI) well in the loading dock on the western side of the building while the roof fan is in operation.

Task 3 – Collection and Analysis of Sub-Slab and Vent System Vapor Samples

A total of six (6) sub-slab samples will be collected to characterize the nature and extent of soil vapor contamination beneath the building (slab-on-grade) at the Site. One additional sample from each of the two venting wells will also be collected. Sample locations have been selected to provide representative coverage of the building and to obtain representation of the footprint of the building. The sampling is proposed to be completed within the heating season (November 1 – March 31st).

The representative locations, as shown on Figure 1, will allow for characterization of the buildings under various conditions. It is not the intent of this work plan to take samples in each room. Sample locations may be moved depending on field conditions.

Sub-slab vapor samples will be collected using the following procedural steps:

1 An electric drill with a 1-inch diameter drill bit will be advanced approximately three (3) to six (6) inches into the slab to create an opening into the subsurface below. The drilling and placement of the slab opening may occur 24-48 hours prior to Sampling, along with the placement of the temporary probe constructed of Teflon-lined tubing no further than two inches into the sub-slab material. The holes will be sealed with clay, concrete, or bentonite until sampling occurs. The tubing will be sealed to the surface using modeling clay.

2. To ensure that ambient air is not diluting the soil vapor samples, a tracer gas will be used to test the borehole seal. Plastic sheeting will be placed on the ground surface around the slab penetration. A bucket will be inverted over the boring and helium (tracer gas) will be used to enrich the atmosphere immediately around the connection of the tubing and the ground surface. A Tedlar bag will be attached to the pump and filled with the purge vapor as the tracer gas is added to the bucket. Both the purged volume from the sample tubing and the helium-enriched air with the bucket will then be screened for the tracer gas. A Gas Check 3000 meter will be used to screen for the tracer gas. If the screening results indicate that the amount of helium detected in the sample tubing is greater than 20% of that in the helium enriched cylinder, the seals around the sampling equipment will be reset and the sample tube purged again. This process of resetting the seal and purging will continue until the tracer gas detected in the sample tube is no longer detected at levels greater than 20% of the enriched area around the borehole.

3. Prior to sample collection, the tubing will be purged of minimum once and a maximum of three times the volume of the sampling tube, ensuring that the samples are representative of the sub-slab material. Flow rate for the purge will be kept below 0.2 liters/minute.

4. After the purge is completed, the tubing will be attached to a 6-Liter Summa® canister fitted with an 8-hour flow regulator. Prior to sample collection, the initial pressure (vacuum readings) will be recorded. After two hours, the canister will be closed and the end pressure recorded.

In addition, one sample from the outlet of the existing two vapor venting systems will be collected. These samples will be collected from the vent pipe by inserting a Photo Ionization detector (PID) probe into each when the wind driven fan is operating.

All sub-slab vapor and vent samples will be analyzed for volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method TO-15. Sample results will be reported in $\mu g/m^3$ and the method detection limits shall be less than or equal to 1 $\mu g/m^3$.

When sub-slab vapor samples are collected, the following actions/conditions will be documented to aid in the interpretation of the sampling results:

a. uses or presence of volatile chemicals during building maintenance will be identified;

b. the use of heating or air conditioning systems during sampling will be noted;

c. floor plan sketches that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), and any other pertinent information should be noted;

d. if possible, photographs will accompany floor plan sketches;

e. weather conditions (e.g., wind, precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) will be reported periodically throughout the day; and

f. any pertinent observations, such as spills, floor stains, and odors will be recorded.

The field sampling team will maintain a sample log sheet summarizing the following:

a. sample identification;

b. date and time of sample collection;

c. sampling depth;

d. identity of samplers;

e. sampling methods and devices;

f. weather and wind log for the sampling day(s);

g. soil vapor purge volumes;

h. volume of soil vapor extracted;

i. vacuum of canisters before and after samples collected;

j. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone; and

k. chain of custody protocols and records used to track samples from sampling point to analysis.

Task 4 – Collection and Analysis of Ambient Indoor and Outdoor Background Air Samples

Indoor and outdoor air samples will be collected concurrently with the sub-slab sampling. Indoor air samples (a total of four [4]) will be collected at each corner of the building (NW, NE, SW, and SE corners of the building) in order to characterize exposures to air within the buildings, while outdoor air samples (a total of [1]) will serve to better define the background atmospheric conditions within the area. The samples will be collected at a height that is representative of the typical breathing zone (3 to 5 feet above the ground). The proposed sample locations are shown on Figure 1.

Six-Liter Summa® Canisters with 8-hour flow regulators will be used to collect the samples. Prior to sample collection, the initial pressure will be recorded. After 8 hours, the Summa® canisters will be closed and the final pressure will be recorded.

All indoor and outdoor air samples will be analyzed for VOCs using USEPA Method TO-15 with the reporting limit set at 0.25 $\mu g/m^3$.

The following will be documented during indoor air sampling to aid in the interpretation of the sampling results:

a. a product inventory survey will be completed;

b. the use of heating or air conditioning systems during sampling will be noted;

c. floor plan sketches that include the floor layout with sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains, and utility perforations through building foundations, HVAC system supply and return registers, compass orientation (north), and any other pertinent information will be completed;

d. if possible, photographs should accompany floor plan sketches;

e. outdoor plot sketches will be drawn that include the building site, area streets, outdoor air sample locations (if applicable), compass orientation (north), footings that create separate foundation sections, and paved areas;

f. weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) will be reported;

g. any pertinent observations, such as spills, floor stains, and odors will be recorded.

The field sampling team will maintain a sample log sheet summarizing the following:

a. sample identification;

b. date and time of sample collection;

c. sampling height;

d. identity of samplers;

e. sampling methods and devices;

f. vacuum of canisters before and after samples collected; and

g. chain of custody protocols and records used to track samples from sampling point to analysis.

Task 5 – Reporting

A formal report will be prepared documenting the sampling activities and results. The report will include all background documentation required to evaluate the sampling program.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

Appropriate Quality Assurance/Quality Control (QA/QC) will be followed for sample collection and laboratory analysis. The analysis will be completed by STL Connecticut, which is a current New York Environmental Laboratory Approval Program (ELAP) certified laboratory. The laboratory deliverable package will be New York State Department of Environmental Conservation (NYSDEC) ASP Category B following USEPA Compendium for Method TO-15. The Summa® canisters will be requested as low-level batch certified.

4.0 SCHEDULE

Roux Associates will immediately schedule this work upon the NYSDEC's approval of this work plan and availability for oversight, if warranted. It is estimated that the fieldwork (utility clearance, vapor sampling, system verification, etc.) portion will take four (4) days and report preparation will take approximately two (2) weeks after the analytical data is obtained. Validated data, as soon as it is available, will be forwarded to the NYSDEC as long as any resultant actions are discussed with the property owners prior to entering the site.

Should you have any questions about this work plan, please do not hesitate to contact us at (631) 232-2600.

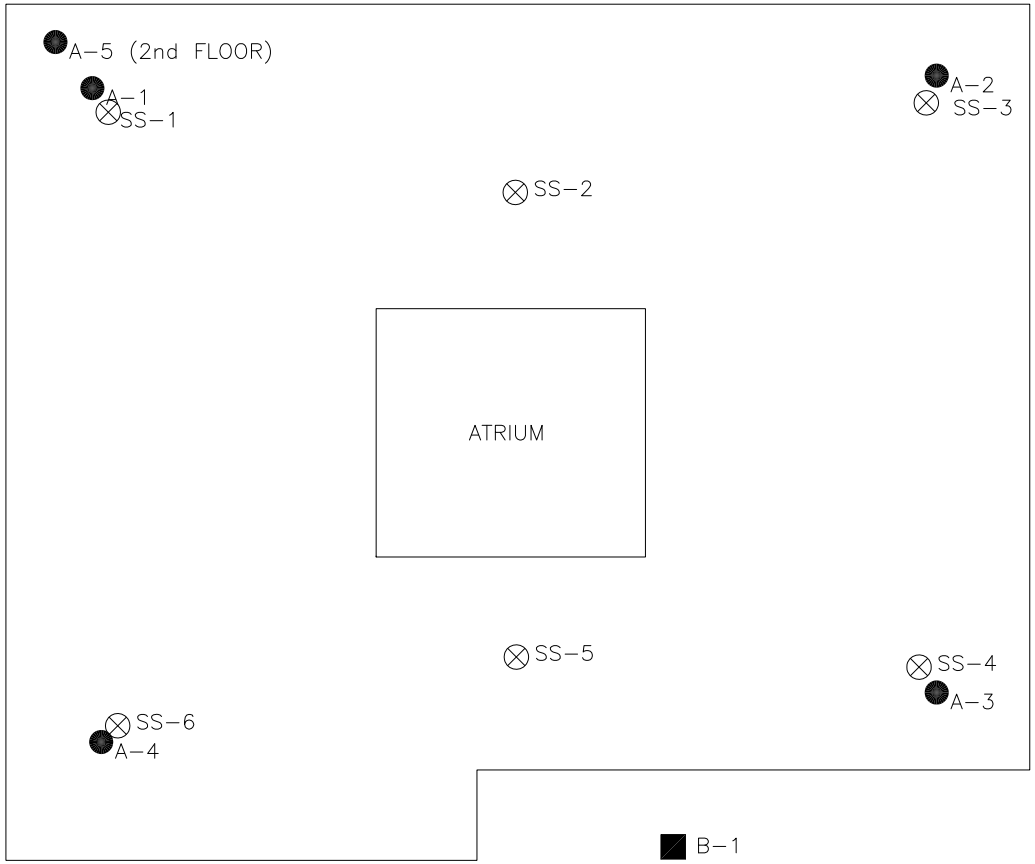
Sincerely,

ROUX ASSOCIATES, INC.

Karen G. Tyll, P.E.
Senior Engineer

Mark Elmendorf
Principal Scientist

N:\PROJECTS\REC702Y\REC06Y\100\REC0610001rev.DWG



LEGEND

⊗ SUB-SLAB SAMPLING LOCATION

● AMBIENT SAMPLING LOCATION

■ BACKGROUND SAMPLE LOCATION

NOTES:
1) SAMPLES WILL BE BIASED TOWARDS POINTS OF ENTRY.
2) BACKGROUND SAMPLE WILL BE TAKEN ON WONDWARD SIDE OF BUILDING

Title:

VAPOR SAMPLE LOCATION PLAN

Prepared For:

RECKSON ASSOCIATES REALTY CORPORATION

ROUX ASSOCIATES, INC.
Environmental Consulting & Management

Compiled by: K.T.	Date: 07JAN08	FIGURE
Prepared by: R.K.	Scale: NTS	1
Project Mgr: M.E.	Office: NY	
File No: REC0610001rev	Project: 70206Y	