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To: Max Shahbazian, San Francisco Bay Regional Water Quality Control Board

CC: Melanie Morash, United States Environmental Protection Agency
Hector Vargas, Texas Instruments
Shaun Moore, Advanced Micro Devices

From: Joshua Graber, Senior Project Manager
Annie Lee, PE, Project Engineer

Date: 9 February 2016

Re: Addendum to Work Plan for Off-Property Vapor Intrusion Assessment
Building SU3-2
Sunnyvale, California
Langan Project No.: 750620720

This addendum presents proposed indoor, pathway, and ambient air sample locations and summarizes building-specific information obtained during the building survey and inventory performed for the building identified as SU3-2 in our *Work Plan for Off-Property Vapor Intrusion Assessment, National Semiconductor and Monolithic Memories Superfund Sites, Operable Unit 1, Subunits 1 and 3* dated 28 August 2014 (Work Plan).

BUILDING AND AREA DESCRIPTION

Building SU3-2 is zoned in a commercial/industrial area of Sunnyvale, California (Figure 1). The single-story building is constructed with a slab-on-grade and is approximately 16,300 square feet in area. The building is occupied by BMI Imaging Systems. The building consists of employee offices, storage rooms, conference rooms, restrooms, an employee break/lunch room, and processing rooms (some of which require federal security clearance) surrounded by an asphalt parking lot. Groundwater is expected to be present at approximately 11 feet below ground surface with trichloroethene (TCE) concentrations beneath the buildings likely ranging from 100 to 200 micrograms/liter ($\mu\text{g/L}$).

BUILDING SURVEY AND INVENTORY

A building survey and inventory was completed at Building SU3-2 on 14 November 2015 by Langan personnel in the presence of United States Environmental Protection Agency (USEPA) representative Melanie Morash. The building survey and inventory was completed to identify potential preferential pathways for vapor migration and appropriate indoor, pathway, and ambient air sample locations. The surveys consisted of evaluating all accessible areas using a photoionization detector (PID) capable of measuring volatile organic vapors down to part per billion (ppb) levels. During the survey, the PID was used to assess background indoor air concentrations and possible preferential pathways for soil vapor migration such as gaps and cracks in building foundations, slab penetrations (such as piping and utility lines), floor drains, fire suppression lines, and sanitary sewer cleanouts.

Addendum

A survey questionnaire of building condition, heating, ventilation, and air conditioning (HVAC) systems, use, and chemicals present was completed for Building SU3-2 by the owner's representative. The completed Indoor Air Building Survey and Sampling Form is included as Attachment A to this Addendum.

Interior Building Observations

Langan personnel surveyed the interior of the building noting the presence and use of chemicals, slab penetrations (including floor drains), and the general condition of the building's concrete slab (where visible). The building survey results are summarized below.

Chemical use and storage

The chemicals stored and used in the building consist of general cleaning supplies, air fresheners, paints, primers, wood finish, wood stain, and flooring adhesive. All chemicals were stored in the Janitorial/Storage room, with the exception of air fresheners in the women's restroom. None of the chemicals present in groundwater appear to be in use at the facility.

Presence of floor drains

A total of four floor drains and clean-outs were observed in the building, as shown on Figure 2 and listed below.

- Three floor drains in the processing room in the north-eastern portion of the building;
- One floor drain in the women's restroom in the southern portion of the building.

Concrete slab conditions

The slab is partially covered with carpet and floor tile in the office and cubicle areas of the building and therefore, the condition of the slab could not be directly observed. The slab in the storage area in the northern portion of the building had been sealed and appeared to be in good condition with very minor cracking.

Potential Preferential Pathways for Soil Vapor Migration

The potential preferential pathways identified include the floor drains and cleanouts identified above. The drains and cleanouts were evaluated with the PID during the building survey and no increase in concentration was noted, relative to background. No conduits requiring sealing were noted penetrating the slab. The fire riser associated with this building enters the building via the southern exterior wall and does not penetrate the slab.

Potential Indoor Contaminant Sources

Potential indoor contaminant sources that are typically found in commercial buildings were identified during the building survey and inventory. They include: office products, cleaning products, building materials, use of outside dry-cleaning services, paints, and adhesives.

HVAC Systems

There are twelve HVAC units associated with the building. The HVAC operation areas are depicted on Figure 2. HVAC Area 2 and 5 operate continuously for computer server cooling purposes and HVAC Area 9 is an exhaust only system associated with three of the four bathrooms. Due to the high number of distinct HVAC operational areas with similar operating parameters, samples have been proposed to spatially cover the footprint of the building.

PROPOSED SAMPLE LOCATIONS

Indoor air and pathway samples were selected in consultation with the USEPA representative during the building survey on 14 November 2015 as illustrated on Figure 2. Indoor air sampling locations (identified in Figure 2 with an 'IA' in the sample designation) are proposed in areas normally occupied over the course of a typical business day (i.e. offices, work cubicles and production areas). Pathway sample locations (identified in Figure 2 with a 'PS' in the sample designation) are proposed to evaluate potential vapor intrusion in areas that are either not accessed by workers or are not normally occupied for a full work day (i.e., 8-hour period), such as bathrooms or areas adjacent to preferential pathways. Indoor air and pathway sample locations were based upon the PID readings, the presence of potential preferential pathways, and to provide spatial coverage of the building footprint.

Based on the results of the building survey, sample locations were identified and are summarized in Table 1 and Figure 2. A total of four indoor air samples and two pathway air samples are proposed.

Due to the multitude of influences on indoor air quality, an ambient air sample is also proposed to evaluate potential non-groundwater sources of chemicals in outside air. The ambient sample will be collected on the roof near the HVAC unit air intakes, if accessible. Duplicate samples will be collected at a frequency of 10%, or one per laboratory submittal, whichever is greater, for quality control purposes.

DEVIATIONS FROM WORK PLAN

The following are deviations to the sampling methodology presented in the Work Plan:

- Indoor air, pathway, and ambient air samples will be collected in summa canisters over an 8-hour period (rather than over a 10-hour period), which more accurately reflects the typical workday hours at this property.

Addendum

Addendum to Work Plan for Off-Property Vapor Intrusion Assessment
Building SU3-2
Sunnyvale, California
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SCHEDULE

We are working with the tenant to schedule and perform the sampling in early March 2016. Sample results will be compared to criteria identified in the Work Plan. If screening level criteria are exceeded, the Water Board and USEPA will be notified within one week of the receipt of laboratory results. If no screening levels are exceeded, a summary of the sampling results will be prepared and transmitted to you within six weeks of receiving analytical results from the laboratory.

Attachments:

Table 1 - Sample Summary

Figure 1 - Site Location Map

Figure 2 - Proposed Sampling Locations

Attachment A – Indoor Air Building Survey and Sampling Form

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TABLE

**Table 1
Sample Summary
Building SU3-2
Sunnyvale, CA**

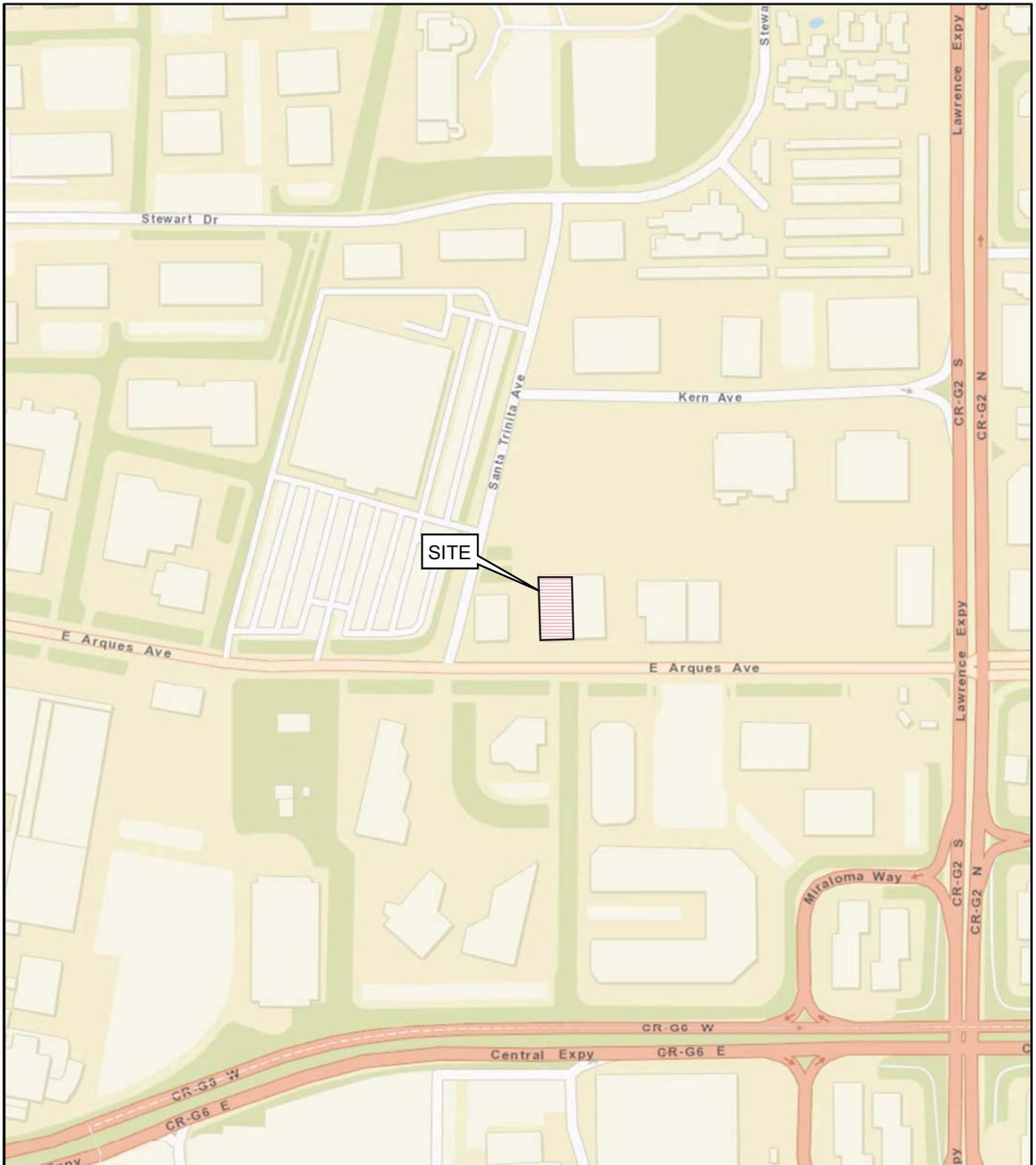
Langan Project: 750620720
February 2016

Sample ID	Location Notes	HVAC On	HVAC Off
Indoor Air Samples			
SU3-2-IA1-2015-XX-XX	Workstation/Storage Area on the north side of the building	X	X
SU3-2-IA2-2015-XX-XX	Cubicals and Work Stations on the north-west side of the building	X	X
SU3-2-IA3-2015-XX-XX	Cubicals on the east side of the building	X	X
SU3-2-IA4-2015-XX-XX	Office area on the south-west side of building	X	X
SU3-2-DUP1-2015-XX-XX	TBD	X	X
Pathway Samples			
SU3-2-PS1-2015-XX-XX	Break Room	X	X
SU3-2-PS2-2015-XX-XX	Ladies room on the south side of the building	X	X
Ambient Samples			
SU3-2-AA1-2015-XX-XX	On roof near HVAC intakes	X	X
Subtotal		8	8
Total		16	

Notes:

TBD: to be determined during sampling event
HVAC - heating, ventilation, and air conditioning

FIGURES



NOTES:

World street basemap is provided through Langan's Esri ArcGIS software licensing and ArcGIS online.
Credits: Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, IPC, NRCAN.



BUILDING SU3-2
Santa Clara, California

SITE LOCATION MAP

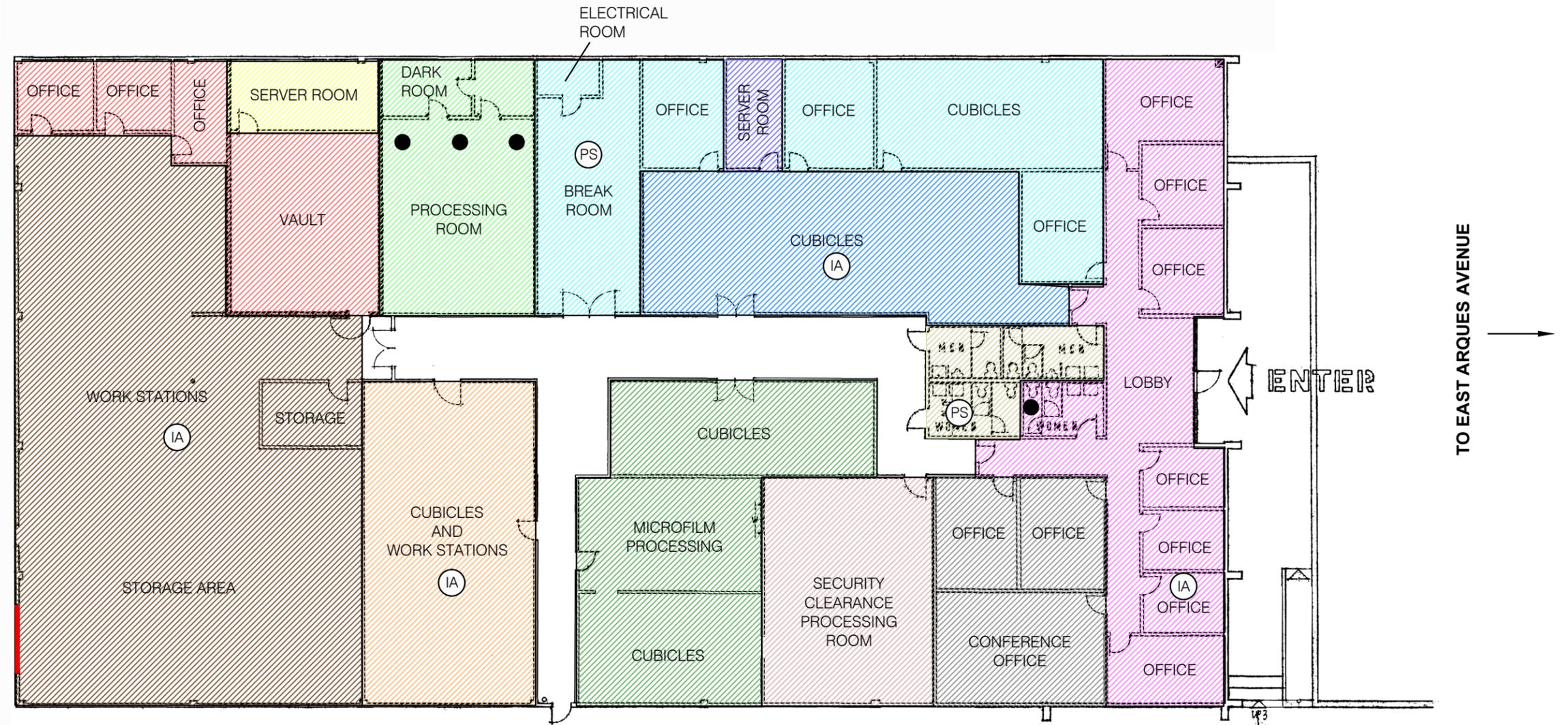
LANGAN TREADWELL ROLLO

Date 12/22/15

Project No. 750620720

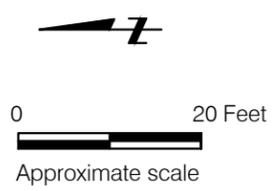
Figure 1

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EXPLANATION

- | | | |
|-------------------------------|---------------------------|--------------------------------|
| HVAC Area 1 | HVAC Area 7 | Heat only, no fresh air intake |
| HVAC Area 2, 24 hr. operation | HVAC Area 8 | Indoor air sample location |
| HVAC Area 3 | HVAC Area 9, exhaust only | Pathway sample location |
| HVAC Area 4 | HVAC Area 10 | Cleanout/Floor drain |
| HVAC Area 5, 24 hr. operation | HVAC Area 11 | Roll-up door |
| HVAC Area 6 | HVAC Area 12 | |



BUILDING SU3-2 Santa Clara, California		
PROPOSED SAMPLING LOCATIONS		
Date 12/22/15	Project No. 750620720	Figure 2
LANGAN TREADWELL ROLLO		

Reference: Base map from a drawing titled "Ground Floor Plan," by Neville T. Lawrence, R.I.R.A., dated 11/13/86.

**ATTACHMENT A
INDOOR AIR BUILDING SURVEY AND SAMPLING FORM**

Indoor Air Building Survey and Sampling Form

Preparer's name: Joshua Graber Date: 24 November 2015
Preparer's affiliation: Langan, Project Manager Phone #: (415) 254 8774
Site Name: 001, 503 Building #: SJ3-2

PART I - OCCUPANTS

Building Address: _____
Property Contact: Kevin Pouders Owner/Renter/Other: Bill Whitney
Contact's Phone: home () _____ work: () _____ Cell: () _____
of Building occupants: Children under age 13: 0 Children age 13-18: 0 Adults: ✓

PART II - BUILDING CHARACTERISTICS

Building use: residential / multi-family residential / office / strip mall / commercial / industrial
Business Type: Information Services
Describe building: Slab on grade Year constructed: NA
Sensitive population: day care / nursing home / hospital / school / other (specify): No
Multiple Units? Yes/No Number of Units: _____
Number of floors below grade: 0 (full basement / crawl space / slab on grade) Height of each floor (ft.) —
Number of floors at or above grade: 1 Height of each floor (ft.) ~10-15
Depth of basement below grade surface: — ft. Basement size: — ft² Basement Slab thickness: — inch
Basement Condition: ~~wet dry damp moldy~~
~~Finished unfinished partially finished~~
Basement floor construction: concrete / dirt / floating / stone / other (specify): _____
Concrete floor: Unsealed/sealed with: Epoxy in some places
Are the basement walls or floor sealed with water proof paint or epoxy coatings? Yes / No
Foundation walls: Poured concrete / cinder blocks / stone / other (specify): _____

Basement sump present? Yes / No Sump pump? Yes / No Water in sump? Yes / No

Sump construction: Poured concrete / cinder blocks / stone / other (specify)): _____

Elevator Present (Yes / No) # of Elevators: _____

Elevator Shaft details: depth below grade (ft.) _____

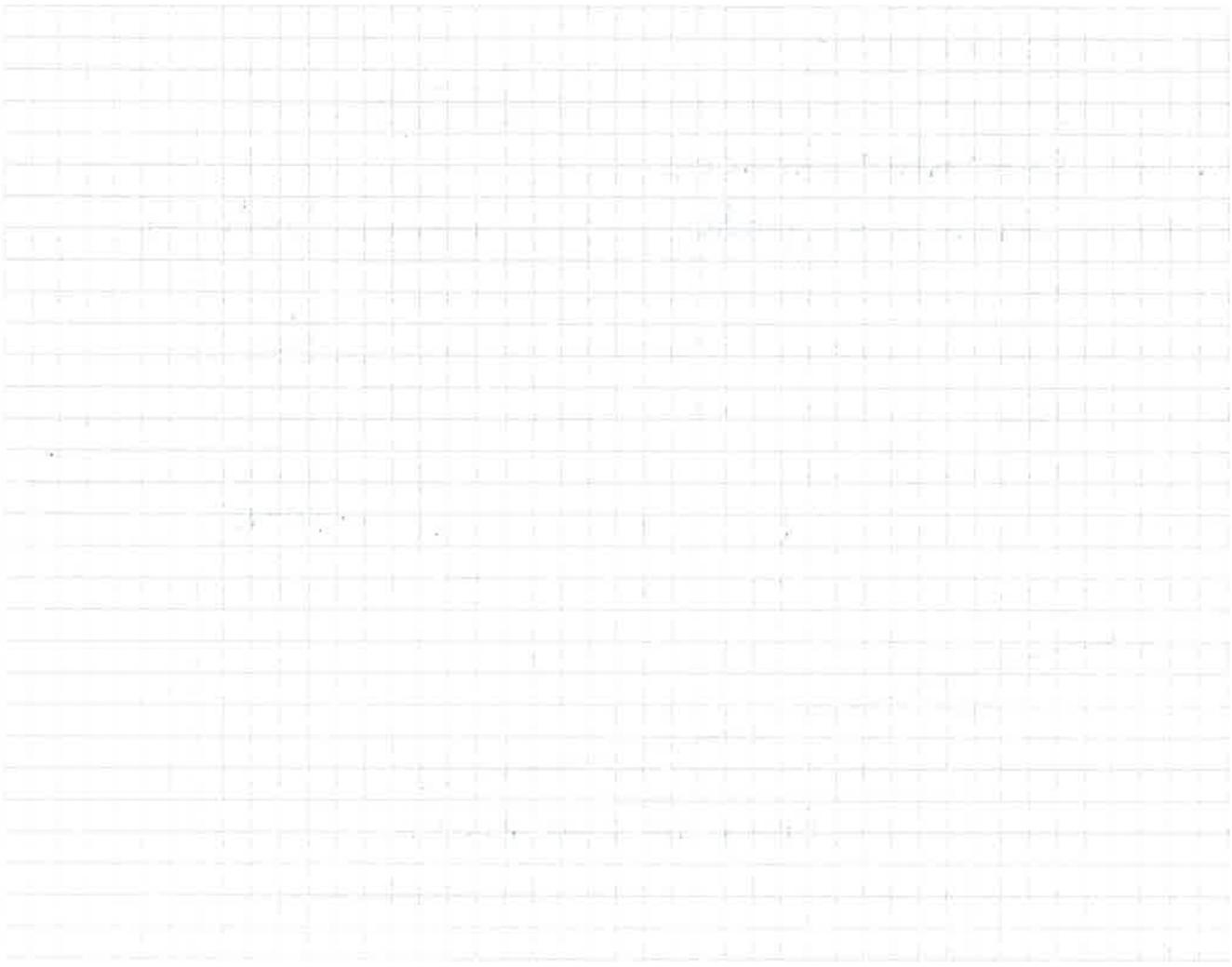
Shaft bottom construction: Poured concrete / cinder blocks / stone / other (specify): _____

Identify potential vapor entry points and approximate size (cracks, utility point, drains)

FLOOR PLANS

Attach or draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note:

Basement: *No basement*



First Floor: See plan

A large grid of graph paper, consisting of approximately 30 columns and 40 rows of small squares, intended for drawing or taking notes.

Outdoor Plot

Attach or draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.

See plan

PART III – HVAC CHARACTERISTICS

Type of heating system (circle all that apply):

- Hot air circulation hot air radiation wood steam radiation
- Heat pump hot water radiation kerosene heater electric baseboard

Other (specify): _____

Type of ventilation system (circle all that apply):

- Central air conditioning mechanical fans bathroom ventilation fans
- Individual air conditioning units kitchen range hood fan outside air intake

Other (specify): _____

Type of fuel utilized (circle all that apply):

- Natural gas / electric / fuel oil / wood / coal / solar / kerosene

Is there a whole house fan? Yes / No

Water Supply: Public Well Other: _____

Septic system? Yes / Yes (but not used) / No

Water Heater Fueled by: _____

Irrigation / private well? Yes / Yes (but not used) / No

Type and percent of ground cover outside of building: grass / concrete / asphalt / other (specify) _____

Existing subsurface depressurization (radon) system in place? Yes / No active / passive

Sub-slab vapor / moisture barrier in place? Yes / No

Type of barrier: _____

Air Handling Unit *See plan*

Unit identification _____ Area served: _____

Outdoor Air Intake, Mixing Plenum, and Damper

Outdoor air intake location: _____

Nearby contaminant sources? (describe): _____

Bird screen in place and unobstructed? _____

Design total cfm _____ Outdoor air (O.A.) cfm _____ Date last tested and balanced: _____

Minimum % O.A. (damper setting) _____ Minimum cft O.A. (total cfm x minimum %O.A.)/100 = _____

Current O.A. damper setting (date, time, and HVAC operating mode): _____

Damper control sequence (describe): _____

Condition of dampers and controls (note date): _____

Fans

Control sequence: _____

Condition (note date): _____

Indicated temperatures Supply air: _____ mixed air: _____ return air: _____ outdoor air: _____

Actual temperatures Supply air: _____ mixed air: _____ return air: _____ outdoor air: _____

Coils

Heating fluid discharge temperature: _____ ΔT : _____ cooling fluid discharge temperate _____ ΔT : _____

Controls (describe): _____

Condition (note date): _____

Humidifier

Type: _____ if biocide is used, note type: _____

Condition (no overflow, drains trapped, all nozzles working?): _____

No slime, visible growth, or mineral deposits? _____

Boilers

Rated Btu input _____ Condition: _____

Combustion air: is there at least one square inch free area per 2,000 Btu input? _____

Fuel or combustion odors: _____

Cooling Tower

Clean? No leaks or overflow: _____ Slime or algae growth? _____

Eliminator performance: _____

Biocide treatment working (list type of biocide): _____

Spill containment plan implemented? _____ Dirt separator working? _____

Chillers

Refrigerant leaks? _____

Evidence of condensation problems? _____

Waste oil and refrigerant properly stored and disposed of? _____

Distribution System

See plan

Zone/ Room	System Type	Supply Air		Return Air		Power Exhaust		Serves (e.g. toilet)
		Ducted/ unducted	Cfm*	Ducted/ unducted	cftm*	cfm*	Control	

Condition of distribution system and terminal equipment (note locations of problems)

Adequate access for maintenance? _____

Ducts and coils clean and obstructed? _____

Air paths unobstructed? Supply _____ return: _____ transfer: _____ exhaust: _____ make-up: _____

Note locations of blocked air paths, diffusers, or grilles: _____

Any unintentional openings into plenums? _____

Controls operating properly? _____

Air volume correct? _____

Drain pans clean? Any visible growth or odors? _____

Filters

Location	Type/Rating	Size	Date last Changed	Condition (give date)

Occupied Space

Thermostat Types: _____

Zone Room	Thermostat Location	What does Thermostat Control? (e.g. radiator, AHU-3)	Setpoints		Measured Temperature	Day/Time
			Summer	Winter		

Humidistats/Dehumidistats type: _____

Zone/Room	Humidistat/Dehumidistat Location	What Does it Control?	Setpoints (%RH)	Measured Temperature	Day/Time

Potential problems (note location): _____

Thermal comfort or air circulation (drafts, obstructed airflow, stagnant air, overcrowding, poor thermostat location):

Malfunctioning equipment: _____

Major sources of odors or contaminants (e.g. poor sanitation, incompatible uses of space)

Are there air distribution ducts present? Yes/No

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the location on the floor plan diagram.

Part IV – Occupancy

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level General Use of Each Floor (e.g. family room, bedroom, laundry, workshop, storage)

Basement _____

1st Floor Business operations

2nd floor _____

3rd floor _____

4th floor _____

Factors that May Influence Indoor Air Quality

- a. Is there an attached garage? Y / N
- b. Does the garage have a separate heating unit? Y/ N/ NA
- c. Area petroleum-powered machines or vehicles stored in the garage (e.g. lawnmower, atv, car) Y/ NA Please specify _____
- d. Has the building ever had a fire? Y / When? _____
- e. Is a kerosene or unvented gas space heater present? Y / Where? _____
- f. Is there a workshop or hobby/craft area? Y / Where & Type? _____
- g. Is there smoking in the building? Y / How frequently? _____
- h. Have cleaning products been used recently? Y / N When & Type? General
- i. Have cosmetic products been used recently? Y / N When & Type? General
- j. Has painting/staining been done in the last 6 months? Y / Where & When? _____
- k. Is there new carpet, drapes or other textiles? Y / Where & When? _____
- l. Have air fresheners been used recently? Y / N When & Type? Bathroom
- m. Is there a kitchen exhaust fan? Y / If yes, where vented? _____
- n. Is there a bathroom exhaust fan? Y / N If yes, where vented? Unknown
- o. Is there a clothes dryer? Y / If yes, is it vented outside? Y/N
- p. Has there been a pesticide application? Y / When & Type? _____

Are there odors in the building? Y / N

If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
 (e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist)

If yes, what types of solvents are used? Potentially for cleaning, need to confirm

If yes, are there clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)
Yes, use dry-cleaning infrequently (monthly or less)
yes, work at a dry-cleaning service

No
Unknown

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____

Is the system active or passive? Active/Passive

PART V – OUTSIDE CONTAMINANT SOURCES

Known contaminated site (1,000-ft. radius): _____

Other stationary sources nearby (gas stations, emission stacks, etc.): _____

Heavy vehicular traffic nearby (or other mobile sources) and distance from building: _____

PART VI – MISCELLANEOUS ITEMS

Do any occupants of the building smoke? Yes / No How often? _____

Last time someone smoked in the building? Hours / days ago _____

Does the building have an attached garage directly connected to living space? Yes / No

If so, is a car usually parked in the garage? Yes / No

Are gas-powered equipment or cans of gasoline/fuels stored in the garage? Yes / No

Do the occupants of the building have their clothes dry cleaned? Yes / No ?

If yes, how often? Weekly / monthly / 304 times a year

Do any of the occupants use solvents in work? Yes / No

If yes, what types of solvents are used? Unknown

If yes, are their clothes washed work? Yes / No

Have any pesticides/herbicides been applied around the building or in the yard? Yes / No

If so, when and which chemicals? Unknown

Has there ever been a fire in the building? Yes / No If yes, when? Unknown

Has painting or staining been done in the building in the last 6 months? Yes / No Unknown

If yes, when _____ and where? _____

Additional Notes: _____

PART VII – INDOOR CONTAMINANT SOURCES

Identify all potential indoor sources found in the building (including attached garages), the location of the source (floor and room), and whether the item was removed from the building 48 hours prior to indoor air sampling event. Any ventilation implemented after removal of the items should be completed at least 24 hours prior to the commencement of the indoor air sampling event.

Potential Sources	Brand Name	Location(s)	Removed (yes / No / NA)
Gasoline storage cans			
Gas-powered equipment			
Kerosene storage cans			
Paints / thinners / strippers			
Cleaning solvents			
Oven cleaners			
Carpet / upholstery cleaners			
Other house cleaning products			
Moth balls			
Polishes / waxes			
Insecticides			
Furniture / floor polish			
Nail polish / polish remover			
Hairspray			
Cologne / perfume			
Air fresheners			
Fuel tank (inside building)			
Wood stove or fireplace			
New furniture / upholstery			
New carpeting / flooring			

