8976 Wellington Road
Manassas, VA 20109

February 15, 2019

R. Scott Deyette
New York State Department of Environmental Conservation
Division of Environmental Remediation, Remedial Bureau C
625 Broadway, 11th Floor
Albany, New York 12233-7014

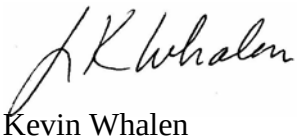
Re: Work Plan for Subslab Depressurization System Shutdown Testing
Former IBM Leased Building 982 (Neptune Commerce Center)
Poughkeepsie, Dutchess County, New York
NYSDEC Site No. 314076

Dear Mr. Deyette:

The enclosed document presents a work plan to evaluate the termination of subslab depressurization system operations associated with soil vapor intrusion mitigation at the former IBM leased Building 982 located at the Neptune Commerce Center on Neptune Road, Poughkeepsie, New York. This work plan has been updated to address your February 15, 2019 comment letter on the previous version of this work plan dated February 12, 2019. To implement the work plan in the current heating season, we request your review and comment at your earliest convenience.

If you have any questions, please contact me at (540) 535-8993.

Sincerely,
International Business Machines Corporation



Kevin Whalen
Program Manager, Corporate Environmental Affairs

Enclosure: Work Plan

cc: T. Perretta (NYSDOH)
D. Kaminski (NCI)

SANBORN HEAD ENGINEERING

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Work Plan for

Subslab Depressurization System Shutdown Testing

Former IBM Leased Building 982 – Neptune Commerce Center
Poughkeepsie, NY
NYSDEC Site No. 314076

"I, David Shea, certify that I am currently a NYS registered professional engineer and that this Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10)."

Prepared for IBM Corporation
File No. 3304.02
February 2019

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20 Foundry Street
Concord, NH 03301

Kevin Whalen
IBM Corporation
8976 Wellington Road
Manassas, VA 20109

February 15, 2019
File No. 3304.02

Re: Work Plan for Subslab Depressurization System Shutdown Testing
Former IBM Leased Building 982 (Neptune Commerce Center)
Poughkeepsie, Dutchess County, New York
NYSDEC Site No. 314076

Dear Mr. Whalen:

This letter presents a work plan to evaluate potential termination of subslab depressurization system (SSDS) operations at the former IBM leased Building 982 located at the Neptune Commerce Center in Poughkeepsie, New York (the site). IBM elected to install the SSD system as a pro-active, pre-emptive mitigation measure to address potential soil vapor intrusion. Although IBM is not the owner of the site, IBM is conducting the remediation activities for the site. We understand this work plan will be submitted to the New York State Department of Environmental Conservation (NYSDEC) and the Department of Health (NYSDOH) (the Agencies) for review and comment. This work plan has been updated to address the Agencies' February 15, 2019 comment letter on the previous version of this work plan dated February 12, 2019.

BACKGROUND

The former IBM leased Building 982 was redeveloped in 2013-2014 by its current owner, Neptune Capital Investors, LLC. It houses a commercial indoor trampoline recreational facility in the western half of the building and a commercial gymnasium in the eastern half of the building.

The SSD system for the building was installed in the fall of 2013, put into operation on December 13, 2013, and has operated continuously since then. The SSD system installation and start-up was completed in accordance with IBM's 2013 SSDS Work Plan[1] and 2013 SSDS Design Report[2] for these activities. The start-up and performance testing of the SSDS

[1] *Subslab Depressurization System (SSDS) Design Work Plan, Former Building 982 – Neptune Road, Poughkeepsie, New York, NYSDEC Site No. 314076*, IBM Corporation and Sanborn, Head Engineering P.C., September 26, 2013.

[2] *Subslab Depressurization System (SSDS) Design Report, Former Building 982 – Neptune Road, Poughkeepsie, New York, NYSDEC Site No. 314076*, IBM Corporation and Sanborn, Head Engineering P.C., September 24, 2013.

was documented in a February 2014 report (SSDS Startup Report)[3], which was approved by the Agencies in an April 25, 2014 letter to IBM.

As documented in the SSDS Startup Report, the results of indoor air sampling prior to the installation of the SSDS indicated that indoor air had not been affected by soil vapor intrusion; the SSDS was installed by IBM as a pre-emptive measure to facilitate building redevelopment by its owner. The SSDS Startup Report also indicated that IBM, in consultation with the Agencies, may conduct a temporary shut-down of the SSDS to evaluate the need for continued operations to mitigate potential soil vapor intrusion.

A recent evaluation of the volatile organic compound (VOC) mass captured by the SSDS, which is included as an attachment to this work plan, indicates that VOC mass capture rates have been consistently low for the past four years. The rate of VOC capture is less than thresholds that would require VOC emissions controls (the SSDS is equipped with vapor-phase granular activated carbon treatment). Furthermore, the consistently low VOC capture rate by the SSDS is such that this mass, if uncaptured and allowed to enter the building, would be unlikely to result in exceedances of indoor air concentration guidelines, as described in the attachment. Given these evaluations, and consistent with Section 4.5 of the NYSDOH document titled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" dated October 2006, IBM intends to assess potential termination of SSDS operations as described in this work plan.

WORK PLAN

The objective of this work plan is to evaluate whether the SSDS is needed to address current or potential exposures to VOCs in indoor air related to soil vapor intrusion. To meet this objective, the following work scope is planned:

- Implement a trial shut down of the SSDS;
- 30 days following the trial shut down, collect subslab vapor, indoor air, and outdoor air samples concurrently over the same 8-hr period;
- Re-start the SSDS once the sampling has been completed; and
- Evaluate the sample results to assess whether the SSDS can be shut down permanently.

Further details are as follows: IBM will coordinate with the owner to shut down the SSDS on a trial basis. Then, 30 days following SSDS shut down, IBM will conduct concurrent subslab vapor, indoor air, and outdoor air sampling within the heating season ending March 31st. The subslab vapor and indoor air samples will be collected at 6 locations previously sampled: 3 in the trampoline business on the west side of the building, and 3 in the gymnasium on the east side. The attached Figures 1 and 2 show the planned sample locations, along with the previous sample results that were reported in the 2014 SSDS Startup Report. Once the sampling is completed, the SSDS will be re-started.

[3] *Subslab Depressurization System Start-up and Performance Testing Report, Former Building 982 – Neptune Road, Poughkeepsie, New York, NYSDEC Site No. 314076*, IBM Corporation and Sanborn, Head Engineering P.C., February 2014.

Indoor Air Samples

The indoor air samples will be collected from 6 of the previously sampled locations shown on Figure 1. The indoor air samples will be collected as 8-hour time-averaged samples using individually certified-clean Summa canisters and flow controllers in accordance with the previously approved 2013 SSDS Work Plan, Appendix A.1. The samples will be collected with the HVAC system operating consistent with normal business operations.

Subslab Vapor Samples

The subslab vapor samples will be collected from 6 of the previously installed sample ports shown on Figure 2, assuming they are still accessible. If not, the closest accessible port will be sampled. The subslab vapor samples will be collected as 8-hour time-averaged samples over the same period of time as the indoor air samples using individually certified-clean Summa canisters and flow controllers in accordance with the previously approved 2013 SSDS Work Plan, Appendix A.2.

Quality Assurance/Quality Control Samples

Samples for quality control/quality assurance will include collection of an outdoor air sample during the same period as the indoor air and subslab vapor sample, one blind duplicate indoor air sample, one blind duplicate subslab vapor sample, and one field blank consisting of a sample canister filled on-site with laboratory-grade nitrogen.

All samples will be analyzed for the site-specific list of 23 VOCs identified in the 2013 SSDS Work Plan, which is based on the historical groundwater and soil vapor data, by a laboratory certified by the NYSDOH Environmental Laboratory Approval Program (ELAP) for analysis of the target VOCs by USEPA Method TO-15 in selective ion monitoring (SIM) mode.

Data Usability Summary Review, Evaluation, and Report

The laboratory data will be subject to independent, third-party review for usability consistent with the 2013 SSDS Work Plan requirements. The sample results will be compared to the NYSDOH May 2017 Matrices A and B, and a report of findings will be prepared with recommendations for next steps, including potential termination of SSDS operations, depending on the results. The sample results will also be provided to the owner for communications to its tenants consistent with the requirements of New York Environmental Conservation Law ENV Section 27-2405.

CLOSING

To implement this work plan within the current heating season, the cooperation of the site owner and timely comments from the Agencies will be requested.

Very truly yours,
SANBORN, HEAD ENGINEERING, P.C.

David Shea, P.E.
Principal Engineer

Encl. Figure 1 – Planned Indoor Air Sample Locations
Figure 2 – Planned Subslab Vapor Sample Locations
Memorandum – VOC Air Emissions Screening Model Evaluation

P:\3300s\3304.02\Source Files\Neptune RD Work Plan\Work Plan.docx

FIGURES

Figure 1

Indoor Air Sampling Results

SSDS Startup and Performance Testing Report

Former Building 982 - Neptune Road
Poughkeepsie, New York

Drawn By: E. Wright
Designed By: T. White
Reviewed By: B. Green/ D. Shea
Project No: 3623.00
Date: January 2014

Figure Narrative

This figure shows the results of indoor air sampling conducted on September 6, 2013. The samples were collected as 8-hour time weighted average samples using Summa canisters. The results for detected volatile organic compounds (VOCs) are shown in units of micrograms per cubic meter (µg/m^3).

Proposed indoor air sample location

Legend

IA-1016 ▼ Indoor air monitoring location

AA-1 ▲ Ambient (outdoor) air sampling location

All results are shown in micrograms per cubic meter (µg/m^3)

Abbreviations

CDS	Carbon Disulfide
CTET	Carbon Tetrachloride
CFC11 (TCFM)	Trichlorofluoromethane
CFC12 (DCDFM)	Dichlorodifluoromethane
CFC113	1,1,2-trichloro-1,2,2-trifluoro-ethane
1,2,4-TMB	1,2,4-Trimethylbenzene

Analyte	IA-1002
Acetone	148
CFC11 (TCFM)	1.23
CFC12 (DCDFM)	1.26
CFC113	0.537
Chloroform	0.400
CTET	0.365
Ethylbenzene	0.334
m,p-Xylene	1.48
o-Xylene	0.608
Toluene	1.15
1,2,4-TMB	0.324

Analyte	IA-1003
Acetone	147
CFC11 (TCFM)	1.25
CFC12 (DCDFM)	1.76
CFC113	0.544
Chloroform	0.171
CTET	0.371
Ethylbenzene	0.334
m,p-Xylene	1.49
o-Xylene	0.612
Toluene	1.07
1,2,4-TMB	0.324

Analyte	IA-1005
Acetone	161
CFC11 (TCFM)	1.25
CFC12 (DCDFM)	1.65
CFC113	0.544
Chloroform	0.171
CTET	0.359
Ethylbenzene	0.343
m,p-Xylene	1.55
o-Xylene	0.652
Toluene	1.20
1,2,4-TMB	0.320

Analyte	IA-1012
Acetone	75.5
CFC11 (TCFM)	1.25
CFC12 (DCDFM)	1.69
CFC113	0.552
Chloroform	0.190
CTET	0.365
Ethylbenzene	0.334
m,p-Xylene	1.48
o-Xylene	0.617
Toluene	1.06
1,2,4-TMB	0.315

Analyte	IA-1013
Acetone	137
CFC11 (TCFM)	1.24
CFC12 (DCDFM)	1.14
CFC113	0.544
Chloroform	0.181
CTET	0.346
Ethylbenzene	0.317
m,p-Xylene	1.39
o-Xylene	0.573
Toluene	1.10
1,2,4-TMB	0.305

Analyte	AA-1
Acetone	6.79
CDS	0.791
CFC11 (TCFM)	1.27
CFC12 (DCDFM)	1.60
CFC113	0.552
Chloroform	0.122
CTET	0.396
Ethylbenzene	0.096
m,p-Xylene	0.295
o-Xylene	0.117
Toluene	0.607
1,2,4-TMB	0.133

Analyte	IA-1014
Acetone	189
CFC11 (TCFM)	1.24
CFC12 (DCDFM)	1.27
CFC113	0.544
Chloroform	0.176
CTET	0.365
Ethylbenzene	0.365
m,p-Xylene	1.58
o-Xylene	0.647
Toluene	1.25
1,2,4-TMB	0.349

Analyte	IA-1015	Duplicate
Acetone	166	172
CFC11 (TCFM)	1.25	1.25
CFC12 (DCDFM)	1.47	1.19
CFC113	0.544	0.552
Chloroform	0.190	0.244
CTET	0.384	0.352
Ethylbenzene	0.326	0.321
m,p-Xylene	1.42	1.42
o-Xylene	0.591	0.586
PCE	<0.136	0.183
Toluene	1.06	1.07
1,2,4-TMB	0.334	0.310

Analyte	IA-1016 #3
Acetone	213
CFC11 (TCFM)	1.24
CFC12 (DCDFM)	1.25
CFC113	0.537
Chloroform	0.166
CTET	0.346
Ethylbenzene	0.304
m,p-Xylene	1.34
o-Xylene	0.565
Toluene	1.07
1,2,4-TMB	0.320

Analyte	IA-1017
Acetone	198
CFC11 (TCFM)	1.25
CFC12 (DCDFM)	1.42
CFC113	0.552
Chloroform	0.166
CTET	0.352
Ethylbenzene	0.339
m,p-Xylene	1.54
o-Xylene	0.617
Toluene	1.11
1,2,4-TMB	0.334

Analyte	IA-1025
Acetone	245
CFC11 (TCFM)	1.25
CFC12 (DCDFM)	1.32
CFC113	0.567
Chloroform	0.166
CTET	0.352
Ethylbenzene	0.321
m,p-Xylene	1.41
o-Xylene	0.586
Toluene	1.09
1,2,4-TMB	0.393

Analyte	IA-1023
Acetone	390
CFC11 (TCFM)	1.24
CFC12 (DCDFM)	1.22
CFC113	0.544
Chloroform	0.171
CTET	0.352
Ethylbenzene	0.308
m,p-Xylene	1.33
o-Xylene	0.556
Toluene	1.24
1,2,4-TMB	0.344

Feet
10' 5' 0 10' 20'

SANBORN HEAD ENGINEERING

Figure 2

Total VOCs in Subslab Vapor

SSDS Startup and Performance Testing Report

Former Building 982 - Neptune Road
Poughkeepsie, New York

Drawn By: E. Wright
Designed By: T. White
Reviewed By: B. Green/ D. Shea
Project No: 3623.00
Date: January 2014

Figure Narrative

This figure shows the results of subslab vapor sampling conducted in September 2013. The posted concentrations represent the sum of the detected VOCs at each sample location in units of micrograms per cubic meter (µg/m^3). Inferred concentration gradients below the slab are also shown.

Proposed subslab vapor sample location

Legend

SSV-1001 Subslab monitoring location

SSV-1002 Subslab vapor sampling location

1700 Total VOC concentration (µg/m^3)

- <500
- 500-1,000
- 1,000-2,000
- 2,000-3,000
- >3,000

Refer to Table 2 of the report for the individual VOC concentrations at each location

N E S W

10' 5' 0 10' 20' Feet

SANBORN HEAD ENGINEERING

MEMORANDUM

VOC AIR EMISSIONS SCREENING MODEL EVALUATION

SANBORN HEAD ENGINEERING

SANBORN HEAD ENGINEERING
Building Trust. Engineering Success.

MEMORANDUM

To: Kevin Whalen

From: David Shea, P.E.
Joe Corsello, P.E. (Sanborn, Head & Associates, Inc.)

File: 3304.02

Date: December 18, 2018

Re: VOC Air Emissions Screening Model Evaluation for
Former Building 982 – Neptune Rd Subslab Depressurization System

---

This memorandum presents the methods and results of an air emissions modeling evaluation to assess the potential need for air emissions controls (i.e., vapor phase carbon treatment) for the former Building 982 – Neptune Road (Neptune Rd) subslab depressurization (SSD) system. The Neptune Rd SSD system is located at the former IBM leased Building 982 at 2 Neptune Road in Poughkeepsie, New York. It also includes data on the volatile organic compound (VOC) concentrations and mass removed by the SSD system since its startup in December 2013.

VOC MASS REMOVAL

Total VOC concentrations, VOC mass removal rate, and cumulative VOC mass removed time series plots are shown below on Figures 1 and 2. Review of these plots indicates an exponential decay with the mass removal rate approaching an asymptote that represents the mass transfer limitations in the subsurface. These data show that the total VOC mass removal rates have been consistently low for the past four years of SSD operation and suggest that emissions controls are no longer required for the Neptune Rd SSD system.

Figure 1 – Total VOC Concentrations vs Time

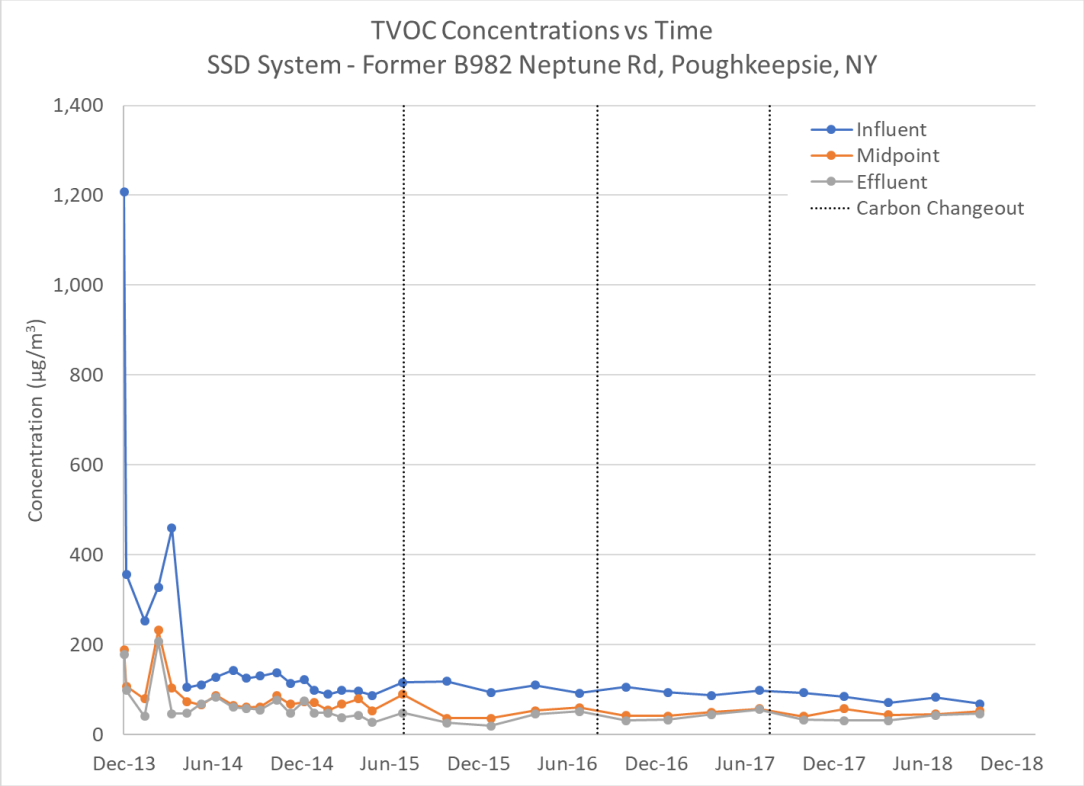
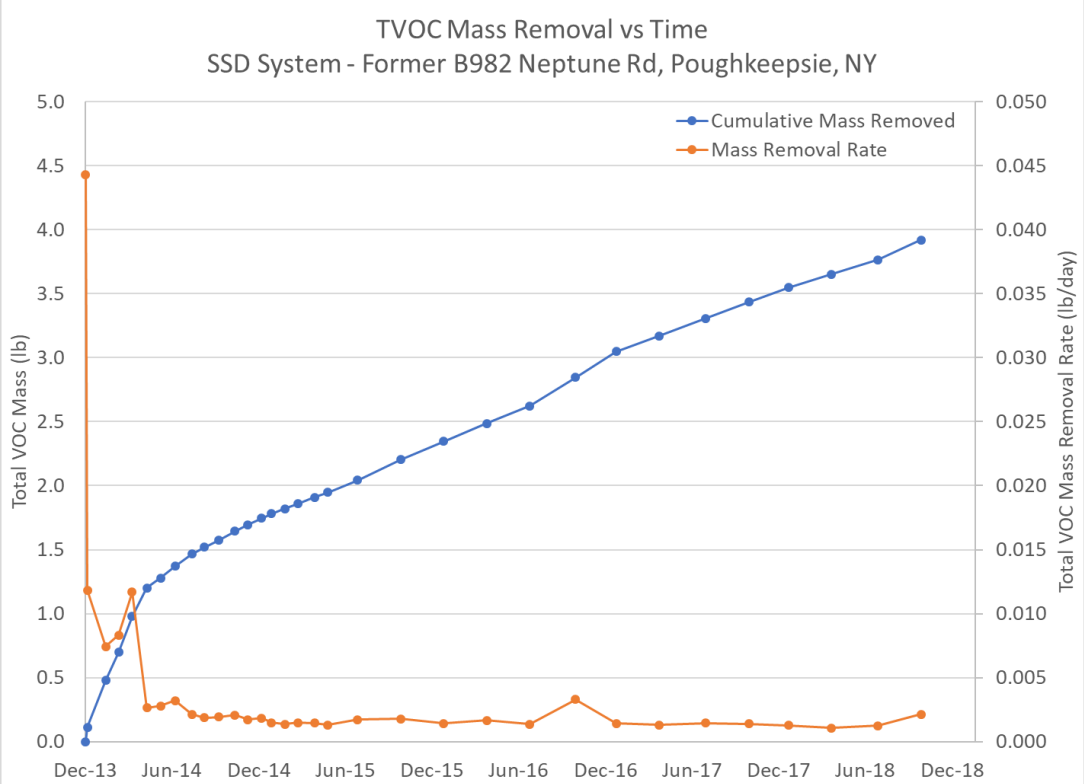


Figure 2 – Total VOC Mass Removal & Cumulative Mass Removed vs Time



VOC EMISSIONS CONTROL ASSESSMENT

In a February 28, 2003 memorandum, the New York State Department of Environmental Conservation (NYSDEC) has taken the position that air pollution controls are required for environmental remediation systems with an emission rate potential greater than 0.5 lbs/hr of total VOCs. In addition, the emission source cannot cause air pollution, which means the emissions cannot cause ambient air VOC levels at the property line, or farther off-site, to exceed ambient guideline concentrations. The ambient air VOC guideline concentrations are published in the New York State Division of Air Resources (DAR) Guidelines for the Control of Toxic Ambient Air Contaminants (known as DAR-1). DAR-1 contains both short-term (24-hr) guideline concentrations (referred to as SGCs) and long-term (annual) guideline concentrations (referred to as AGCs).

DAR-1 indicates that ambient air concentrations resulting from an emissions source should be assessed using air dispersion modeling software, such as USEPA's AERSCREEN model. Therefore, air emissions and dispersion modeling were conducted for the Neptune Rd SSD system using AERSCREEN to assess the maximum ambient VOC concentrations for comparison to the DAR-1 SGCs and AGCs. The following sections summarize the methods and results of the AERSCREEN modeling.

Methods

Table 1 provides the system-specific input parameters that were used in the AERSCREEN analysis. Although the total VOC emissions rate for the system is less than the NYSDEC threshold of 0.5 lbs/hr that would require emissions controls, the compounds detected within the extracted vapor stream were evaluated using AERSCREEN for comparison to their respective SGCs and AGCs. The emissions rates were estimated using the most recent sampling results of the captured vapor stream and the calculated flowrate at the system blower intake.

Table 1 – AERSCREEN Input Parameters

Neptune Rd	
Emissions Rate (lbs total VOCs/hr)	4.25×10^{-5}
Emissions Rate (lbs TCE/hr)	1.76×10^{-5}
Stack height (ft)	27
Exit velocity (ft/sec)	14
Stack diameter (in)	6
Discharge temperature (°F)	90

In addition to the parameters provided in Table 1, information on the surrounding buildings and terrain, along with default AERSCREEN meteorological data were used as model inputs.

Model Results

Table 2 summarizes the AERSCREEN model predictions for the maximum ambient air concentrations resulting from the emissions estimates in Table 1 and includes the SGCs and

AGCs for comparison. As shown in Table 2, neither the SGCs or AGCs were exceeded for any compound, indicating that emissions controls are not required for the Neptune Rd SSD system.

Table 2 – Summary of AERSCREEN Results

Compound	SGC (µg/m³)		AGC (µg/m³)	
	DAR-1 Ambient Air Guidelines	Model-Predicted Maximum Ambient Air Concentration	DAR-1 Ambient Air Guidelines	Model-Predicted Maximum Ambient Air Concentration
Trichloroethene	20	0.07	0.20	0.012
1,1,1-Trichloroethane	NA	0.02	1.4	0.003
1,1-Dichloroethene	NA	0.01	200	0.001
Freon 113	960,000	0.00	180,000	0.000
1,1-Dichloroethane	NA	0.00	0.63	0.000
cis-1,2-Dichloroethene	NA	0.00	63	0.001
Tetrachloroethene	300	0.00	4.0	0.000
Vinyl chloride	180,000	0.00	0.11	0.000
Acetone	180,000	0.01	30,000	0.002
Dichlorodifluoromethane	NA	0.01	12,000	0.001
Trichlorofluoromethane	9,000	0.00	5,000	0.001
Propylene	NA	0.00	3,000	0.001
Isopropanol	98,000	0.01	7,000	0.001
Carbon disulfide	6,200	0.00	700	0.001
2-Butanone	13,000	0.01	5,000	0.001
Chloroform	150	0.00	14.7	0.001
Carbon tetrachloride	1,900	0.00	0.17	0.000
4-Methyl-2-pentanone	31,000	0.01	3,000	0.002
Toluene	37,000	0.00	5,000	0.000
Ethylbenzene	NA	0.00	1,000	0.000
p/m-Xylene	22,000	0.00	100	0.000
o-Xylene	22,000	0.00	100	0.000
1,2,4-Trimethylbenzene	NA	0.00	6	0.000

Notes:
µg/m³ = micrograms per cubic meter.
NA = SGC or AGC not published.

POTENTIAL INDOOR AIR TCE CONCENTRATION EVALUATION

To evaluate if the Neptune Road SSD system could be shut down, indoor air TCE concentrations were estimated using the SSD system analytical data and building information. Theoretically, if the SSD system was shut down, all VOC mass captured by the SSD system could potentially enter the building. The amount of VOC mass entering the building can be approximated using the following equation:

$$Mass\ Load = Flow_{building} x\ Concentration_{building}$$

Where,

$Mass\ Load = Flow_{SSD\ system} x\ Concentration_{SSD\ system}$

$Flow_{building} = Air\ Exhance\ Rate\ x\ Volume_{building}$

Table 3 provides the input parameters used in this calculation based on the most recent set of analytical data collected from the SSD system in October 2018.

Table 3 – IA Concentration Evaluation Input Parameters

Neptune Rd	
Building footprint (sf)	43,700
Building height (ft)	20
Volume $_{building}$ (cf)	437,000*
Flow $_{SSD\ system}$ (cfm)	166
Concentration $_{SSD\ system}$ (µg TCE/m^3)	28.3
Mass Load (µg TCE/hr)	8,000

* The total building volume was divided by two to account for the interior partition wall.

The air exchange rate (AER) for the building is not known, therefore AERs ranging from 0.25 to 5 hr^{-1} were used to calculate a possible range of indoor air TCE concentrations. AERs can vary greatly between buildings and typically range from 1 to 5 depending on the building use, with lower values being more conservative. Table 4 below provides the resulting indoor air TCE concentrations based on varying AERs.

Table 4 – Calculated TCE Concentrations in Indoor Air

Air Exchange Rate (hr^{-1})	Indoor Air TCE Concentration (µg/m^3)
0.25	2.58
0.5	1.29
1	0.65
2	0.32
3	0.22
4	0.16
5	0.13

As shown in Table 4, concentrations of TCE in indoor air are expected to exceed the applicable New York State standard of 2 µg/m^3 only when an AER of 0.25 hr^{-1} is used. An AER of 0.25 hr^{-1} is at the low end of the spectrum and is therefore considered to be most conservative.

The TCE concentrations in Table 4 are likely over-estimated because the calculations assume that all TCE captured by the SSDS would enter the indoor air if the SSDS was shut down. In reality, the building floor/foundation acts as a barrier that acts to attenuate the rate of vapor

entry into the building. This attenuation factor is likely at least 0.1, which means that the concentrations in Table 4 would likely be lower by at least a factor of 10. Therefore, a test to see if the Neptune Rd SSD system could be shut down is worth attempting.

\\bosserv1\shdata\SHDATA\3600s\3623.00\Work\Vapor Extraction System\Air Modeling\201812 Neptune Rd Air Model Technical Memo.docx