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December 15, 2010

Mr. Bryan Wong
Region 2 Division of Environmental Remediation
NYS Department of Environmental Conservation
47-40 21st Street
Long Island City, NY 11101

Re: Feasibility Study Addendum
2350 Fifth Avenue, New York, NY
NYSDEC Site #231004

Dear Mr. Wong:

The *Draft Feasibility Study* for 2350 Fifth Avenue, New York, NY (Site #231004) was prepared by AKRF, Inc. (AKRF) in June 2010 and submitted to the New York State Department of Environmental Conservation (NYSDEC) and Department of Health (NYSDOH) for review and comment. As discussed at our December 1, 2010 meeting at your offices, we are presenting this Feasibility Study (FS) Addendum to revise Alternative 4 and the Preferred Alternative to include partial removal for the sub-slab insulation material. We understand that the recommended remedial approaches to the other media (soil, groundwater and soil vapor) are acceptable to NYSDEC.

Response to Comments

Comments to the *Draft Feasibility Study* consisted of NYSDEC correspondence dated September 1, 2010, and emails from NYSDEC on September 20 and 23, 2010. NYSDEC requested this FS Addendum be prepared rather than reissuing the full FS. As such, we are addressing the comments in this addendum to the extent possible following each comment. The following comments were provided in a September 1, 2010 letter from NYSDEC:

1. *In accordance with Section 1.5 of the Department's Technical Guidance for Site Investigation and Remediation (DER-10) dated May 2010, the FS report must be prepared and certified by a New York State licensed professional engineer.*

   A professional engineer certification page related to the June 2010 Draft Feasibility Study and this FS Addendum is provided in Appendix A.

2. *Under Section 5.4.2 (discussion of the positive-pressure HVAC system), the FS indicates that there is an existing air handling unit for the building. Does the existing air handling unit*

provide positive pressure for the entire building? Were all the existing indoor air samples collected with the air handling unit in operation? Were all the indoor air sample locations within the influence of the existing air handling unit?

The air handling units capable of providing positive pressure encompass the majority of the building where the school space was constructed. The air handling system would be expanded to encompass the remaining portion of the building if this alternative was selected. As part of an initial interim action, the air handling units were adjusted to provide positive pressure. The current status of the HVAC system is not confirmed, including the operation during collection of the quarterly indoor air samples. If this remedial alternative were selected, the HVAC system would be evaluated and adjusted, as needed.

3. *Figure 5 indicates that the portion of the site where contaminated insulation material and subsurface soil contain tetrachloroethene (PCE) above the SCO (1.3 ppm) are proposed for no further action based on the soil vapor intrusion evaluation. The Department disagrees with this conclusion. As presented in Figure 15 of the Remedial Investigation Report dated June 2010, PCE is present in sub-slab vapor at concentrations above 1000 $\mu g/m^3$ around the northwest portion of the site. With the sub-slab concentration of 1000 $\mu g/m^3$ or above the NYSDOH matrix for PCE recommends mitigation.*

   Sub-slab depressurization is a commonly used technique for mitigation of sub-slab vapors. Under the Preferred Alternative, a sub-slab depressurization system is proposed for the entire building, including areas with "no further action" recommendation.

4. *Per our conversation, you indicated that the cost estimates in the FS contain minor calculation errors. Please provide the revised cost estimates.*

   The attached estimate of remediation costs includes corrections to costs for Alternatives 2 and 3.

5. *Section 5.6 indicates that the preferred alternative is Alternative 4, which consists of in-situ soil and groundwater treatment including an SVE system to address soil and an SSDS to address soil vapor and insulation material. The Department disagrees, and recommends that source removal to the extent practical, including excavation and off-site disposal of the contaminated soil and insulation material, be included in the selected remedy.*

   This comment was amended to consist of only insulation removal in a September 20, 2010 email (see Comment #6 below). As discussed in a meeting with NYSDEC on December 1, 2010, and outlined below, a targeted insulation area is being defined as within an area with the highest PCE concentrations based upon recent sub-slab insulation material sampling. The area encompasses a maximum 1,200-square foot area, where insulation material will be removed to the extent practicable; that area may be reduced based upon additional sampling, structural limitations of the building, and other considerations during remedial design.

The following comment was provided in a September 20, 2010 email from Bryan Wong of NYSDEC:

6. *The department is considering the proposed treatment option plus the removal of the insulation material to the extent practical.*

   Insulation removal in a maximum area of 1,200 square feet is proposed in this FS Addendum as outlined in the Revised Alternative 4 section below.

The following comments were provided in a September 23, 2010 email from Bryan Wong of NYSDEC (forwarding NYSDOH comments):

7. *NYSDOH guidance for PCE and trichloroethene (TCE) are for "air" and not "indoor air".*

This comment is accepted and will be clarified in future documents, as appropriate.

8. *It would be appropriate to mention somewhere in the document that the circumstances in this building are more complicated than simple soil vapor intrusion. Mere comparison of indoor air to sub-slab soil vapor does not provide a full picture of the circumstances in this building since the primary source area is within the foundation's structure itself.*

   The building is complicated by construction in multiple phases over time, the presence of multiple floor slabs, and the presence of the insulation embedded below one or more of these slabs in a portion of the building. The physical properties of the insulation are different from soil and other media. One such difference is that its absorptive capacity and permeability are relatively low. Notwithstanding, insulation contaminated with the highest PCE concentrations were observed in an isolated area of the site. The revised Preferred Alternative, as outlined in this FS Addendum, includes partial removal, treatment, and/or mitigation of all affected media, inclusive of soil, soil vapor, insulation, and groundwater. The Preferred Alternative also addresses all potential exposure pathways to be protective of human health and the environment.

9. *Consistently refer to "soil vapor" and not "soil gas".*

   This comment is accepted and will be amended in future documents, as appropriate.

10. *Section 4.2 Potentially Complete but Insignificant Pathways (page 8), 2nd bullet, states: 'Laboratory results were that PCE breakdown products were not detected in any samples though PCE was detected in all four indoor air samples at between 0.97 and 1.5 mg/m^3 [milligrams per cubic meter], well below the 100 mg/m^3 NYSDOH indoor air guidance value and in two of the three sub-slab samples at 1.5 and 31 mg/m^3. The NYSDOH guidance associated with these levels is no further action. Although I agree with the consultants conclusion, it is more appropriate to compare indoor air with "background" concentrations found in Appendix C to demonstrate that the indoor air of the Armory in unlikely influenced by sub-slab soil vapors.*

    This comment is accepted and will be clarified in future documents, as appropriate. The conclusion remains that no further action is warranted related to potential inhalation of vapors off-site.

11. *Section 5.2 Remedial Action Objectives (page 11), Soil Vapor, the sentence: "There are guidelines for both PCE (100 mg/m^3) and TCE (5 mg/m^3) in indoor air." should be shifted to the bottom of the paragraph and it should be clear that the NYSDOH guidance on these two chemicals is distinct from the "NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York".*

    This comment is accepted and will be clarified in future documents, as appropriate.

12. *Alternative V2 - HVAC Operation Under Positive Pressure assumes only 5 years of operation, which is unrealistic. Although this is not an element of the preferred remedy, it is still important to note the costs as accurately as possible in case we get a compelling case to choose something else.*

    The 5-year estimate was an error; 30 years of operation is the correct time-frame considered. The attached estimate of remediation costs includes corrections to costs for Alternatives 2 and 3.

The following paraphrased comment was provided in a December 2, 2010 email from Bryan Wong of NYSDEC:

13. *There is no discussion about a Fish and Wildlife Resources Impact Analysis (FWRIA) in the FS or RIR. As we have discussed today, a FWRIA is not needed for the above referenced site. Please include such a statement in the FS Addendum.*

    Section 4.2 of the FS noted that there was no significant impact on surrounding groundwater or surface water. As such, no FWRIA was performed for this project.

Revised Alternative 4

A remedial alternatives analysis was presented in the June 2010 *Draft Feasibility Study*. Revised Alternative 4 consists of the following components for soil, groundwater, soil vapor and sub-slab insulation material: S2, S3, G2, G3, V3, and Revised I2. This alternative would treat soil and groundwater in-situ. By treating contamination, the need for extensive excavation to remove contaminated soil would be avoided. Partial insulation material removal would be completed in the northwestern portion of the site. A soil vapor extraction (SVE) system is included to address treatment of soil and create negative pressure below the slab, a sub-slab depressurization system (SSDS) to address soil vapor, and a Site Management Plan (SMP) to ensure implementation of the institutional and engineering controls required for this alternative.

S2 - SVE

Vapor extraction wells would be installed throughout the affected area down to the water table. The target area for the SVE system is the soil above the water table in an approximately 8,000-square foot area located in the northwestern portion of the site where soil concentrations were greater than the Part 375 Soil Cleanup Objectives (SCOs) for Protection of Groundwater (see Figure 3 of the June 2010 *Draft Feasibility Study)*. For the purposes of the FS, 10 extraction wells (spacing of 25 to 30 feet) were assumed; however, the number and spacing of wells would be evaluated further as part of remedial design and during installation. An SVE pilot test was performed in 2009, and additional confirmatory data would be collected during system installation to confirm the observed zone of influence for each extraction well. Through a network of piping connected to a blower, a vacuum would be applied to the wells to draw off the contaminant vapors. The removed vapor would likely require further treatment, such as carbon adsorption prior to release to the atmosphere.

S3 – In-Situ Chemical Oxidation

In-situ soil treatment would be achieved through injecting a chemical oxidation product in an approximately 2,500-square foot area located in the northwestern portion of the site where soil concentrations were highest, within the area with concentrations greater than the SCOs for Protection of Groundwater (see Figure 3 of the June 2010 *Draft Feasibility Study)*. Because the injected material would react with naturally occurring organic carbon, the deeper organic clay layer would be considered when developing the injection plan during remedial design. The buried naturally occurring organics in the clay layer would be considered when selecting a product and injection volume during the remedial design; however, it is assumed that the shallow portion of the vadose zone would be flooded during each injection event. For the purposes of the FS, 25 shallow on-site injection wells were assumed at approximate 10 foot spacing with 2 injection events using a product such as Fenton's reagent; however, the number and spacing of wells would be evaluated further as part of remedial design.

G2 – In-Situ Groundwater Treatment

Groundwater treatment would be achieved through injecting a product to enhance reductive dechlorination over an approximately 6,000-square foot area located in the northwestern portion of the site where groundwater concentrations were greater than the Class GA Standards (see Figure 6 of the June 2010 *Draft Feasibility Study)*. For the purposes of the FS, 15 on-site injection wells were assumed at approximate 20 foot spacing with 2 injection events using a product such as Hydrogen Release Compound® (HRC), molasses, vegetable oil or other organic carbon source. The product used and number and spacing of wells would be evaluated further as part of remedial design. To optimize the effectiveness of this alternative, the organic clay layer near the water table would be considered when

selecting a product and injection volume during the remedial design. If vinyl chloride is persistent following the injection program, additional treatment using Oxygen Release Compound® (ORC) or other oxygen source will be considered to promote aerobic degradation.

G3 – LNAPL Recovery

The extent of the LNAPL observed in well M-12s would be evaluated and recovery wells would be installed as appropriate. Oil-absorbent socks or similar materials will be used to remove the LNAPL from the water table surface. If the thickness of the LNAPL is adequate for pumping, skimmer pumps may be used. The LNAPL and spent oil absorbent materials will be containerized and disposed of off-site.

For the purposes of the FS, 5 recovery wells were assumed with passive recovery over the course of 5 years; however, the number and spacing of wells and LNAPL recovery methodology would be evaluated further as part of remedial design.

V3 – SSDS

The SSDS at this site would consist of sub-slab extraction points throughout the existing building. For the purposes of this FS, 14 extraction zones are assumed; however, the number and spacing of extraction points would be evaluated further as part of remedial design. The exact number and location of extraction pits would be based upon the radius of influence of negative pressure observed during testing performed during installation. The existing intra-slab system would be evaluated to confirm negative pressure and system efficiency, and to determine whether additional sub-slab extraction points in the area of the existing system are warranted. The anticipated design would consist of extraction pits below the surface floor slab connected to in-line fans to extract vapors and create negative pressure beneath the slab. The removed vapor may require further treatment, such as carbon adsorption prior to release to the atmosphere. For the purposes of the FS, it was assumed that 4 of the SSDS zones will require treatment.

Revised I2 – Partial Removal and Off-Site Disposal of Insulation Material

This FS Addendum revises Alternative 4, and specifically I2, to include partial removal of sub-slab insulation in a maximum 1,200-square foot area, to the extent practicable, in the northwestern portion of the site, as shown on the attached Revised Figure 4.

As discussed in a meeting with NYSDEC on December 1, 2010, the maximum removal area encompasses the area with the highest PCE concentrations detected in the insulation material, as shown on the attached Revised Figure 4. As the sub-slab insulation material is different from a traditional soil matrix, based upon different physical properties and being isolated with a concrete slab both above and beneath the material, the NYSDEC Soil Cleanup Objectives are not applicable. The removal of contaminated insulation from this area would result in contaminant mass reduction for this media in excess of 90%. A table summarizing the mass calculations is provided in Appendix C.

Removal of the sub-slab insulation material would entail demolition of the floor slabs and non-structural components where appropriate and practicable. Because of structural walls, foundations, ceilings and utilities that must remain in-place, not all sub-slab insulation material will be accessible for removal within the defined area.

During remedial design, additional insulation sampling would be completed to confirm the presence of insulation within the targeted area shown on Revised Figure 4 and confirmatory samples would be collected for laboratory analysis. The targeted removal area could be reduced in consultation with DEC based on this additional sampling. A structural engineer would be consulted to confirm potential demolition areas and protection of the existing building. Plumbing and electrical trades would be consulted for evaluating and disconnecting existing utilities in the removal area. If the sampling identifies significantly lower concentrations than those identified as part of the FS or significant limitations are identified due to structural concerns, utility conflicts, or other considerations, the targeted area for insulation removal may be reduced.

Preliminary work would include an asbestos survey and any abatement, as necessary. Department of Buildings permits would be required for demolition, utility disconnection/relocation, and restoration. Site restoration would include backfilling with clean fill, repair of concrete at surface grade and repair of site finishes, as necessary.

The sub-slab insulation removal would include working within containment with negative pressure via exhaust fans to control dust and vapors generated from demolition and removal activities. It is assumed that concrete could be disposed of as non-hazardous demolition debris and all other excavated material (fill/soil, cork, and styrofoam) would be handled and disposed of as hazardous waste.

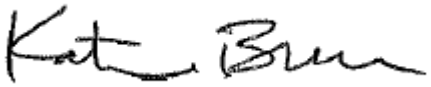
The estimated costs for implementation, operation and maintenance, and total costs associated with Revised Alternative 4 are approximately $1,371,000, $1,335,000, and $2,707,000, respectively, as shown on the attached Revised Estimated Remediation Costs.

Conclusions

The addition of limited sub-slab insulation material removal favorably changes the evaluation of Alternative 4 in the remedial alternative analysis presented in the Draft FS. Revised Alternative 4 is the preferred remedial option because it is protective of the public health and environment, effective and permanent, implementable, and the toxicity and volume of contamination would be reduced with some removal and would continue over time. Implementation of an SMP and environmental easement would prevent future exposure to residual contamination and ensure proper long-term protection of public health.

Please feel free to contact me at (646) 388-9525 with any questions or concerns.

Sincerely,
AKRF, Inc.



Kathleen M. Brunner
Technical Director

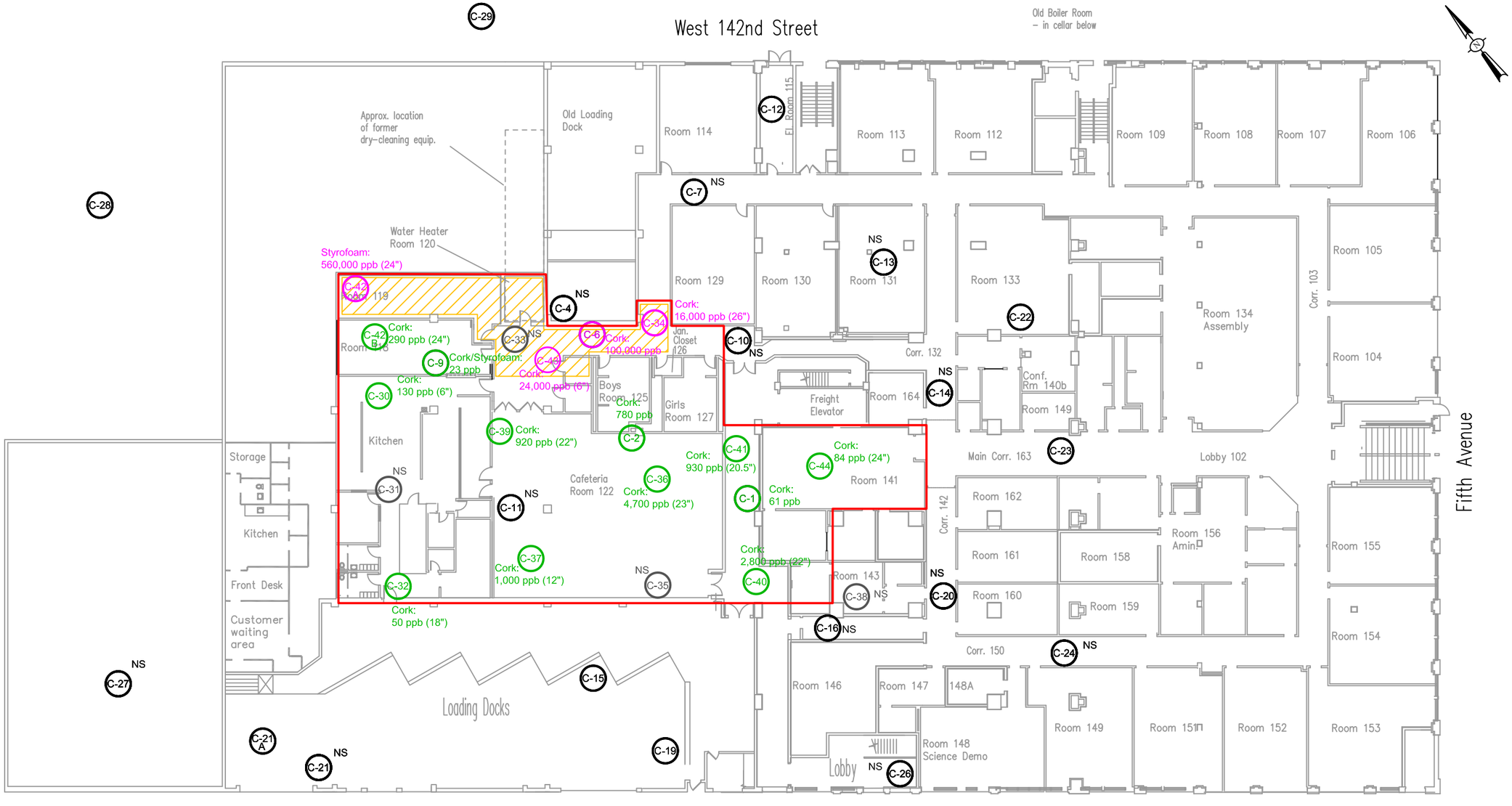
Marc S. Godick, LEP
Senior Vice President

cc: Dawn Hettrick – NYSDOH

ecc: Jane O'Connell – NYSDEC
Robert Cozzy – NYSDEC
James Harrington – NYSDEC
Joseph Karten – 2350 Fifth Avenue Corp.
J. Kevin Healy – Bryan Cave

Attachments: Appendix A – Certification Page
Appendix B – Revised Estimated Remediation Costs
Appendix C – Contaminant Mass Calculations, Sub-Slab Insulation Material
Revised Figure 4 – Sub-Slab Insulation Concentrations and Removal Plan

FIGURES



LEGEND:

- C-36 / Cork: 4,700 ppb (23") — MATERIAL TYPE; DEPTH TO TOP OF INSULATION; PCE CONCENTRATION
- C-1 — NO INSULATION
- C-1 — SUB-SLAB INSULATION WITH LOW LEVELS OF CONTAMINATION (PCE<10,000 PPB)
- C-1 — SUB-SLAB INSULATION WITH ELEVATED LEVELS OF CONTAMINATION (PCE>10,000 PPB)
- MAXIMUM EXTENT OF INSULATION MATERIAL REMOVAL
- APPROXIMATE EXTENT OF INSULATION REMAINING
- PPB = PARTS PER BILLION
- NS = NOT SAMPLED (NO CORK)

0' 15' 30' 60'
SCALE IN FEET

AKRF Environmental Consultants
440 Park Avenue South, New York, NY 10016

2350 FIFTH AVENUE, NEW YORK, NY
SUB-SLAB INSULATION MATERIAL - PCE CONCENTRATIONS

DATE: 12.15.10
PROJECT NO.: 08010
SCALE: 1"=30'
FIGURE: revised 4

APPENDIX A

Certification Page

CERTIFICATION

I, Michelle Lapin, certify that I am currently a New York State registered Professional Engineer as defined in 6 NYCRR Part 375 and that the June 2010 Draft Feasibility Study and the December 15, 2010 Feasibility Study Addendum were 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) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

NYS Professional Engineer #073934-1

12/15/10
Date

Signature

APPENDIX B

Revised Estimated Remediation Costs

Appendix B-1
Summary of Costs for Remedial Alternatives
2350 Fifth Avenue, New York, New York

Remedial Alternatives	Description	Capital Costs	Engineering & Expenses	Operation & Maintenance Costs	Total
Alternative 1 - No Further Action					
S1	No Further Action	$0	$0	$0	$0
G1	No Further Action	$0	$0	$0	$0
I1	No Further Action	$0	$0	$0	$0
V1	No Further Action	$0	$0	$0	$0
	Total	**$0**	**$0**	**$0**	**$0**
Alternative 2 - Exposure Reduction					
S1	No Further Action	$0	$0	$0	$0
G1	No Further Action	$0	$0	$0	$0
I1	No Further Action	$0	$0	$0	$0
V2	HVAC System - Positive Pressure	$144,000	$12,000	$290,640	$446,640
	Total	**$144,000**	**$12,000**	**$290,640**	**$446,640**
Alternative 3 - Soil and Insulation Material Removal					
S4	Soil Removal	$2,641,200	$364,800	$0	$3,006,000
G1	No Further Action	$0	$0	$0	$0
I2	Insulation Removal (7,400 sf area)	$1,120,800	$182,400	$0	$1,303,200
V2	HVAC System - Positive Pressure	$144,000	$12,000	$290,640	$446,640
	Total	**$3,906,000**	**$559,200**	**$290,640**	**$4,755,840**
Rev. Alternative 4 - Treatment Plus Partial Insulation Removal					
S2	Soil Vapor Extraction	$174,000	$60,960	$221,040	$456,000
S3	Chemical Oxidation	$124,500	$39,600	$0	$164,100
G2	In-Situ Treatment	$219,000	$39,600	$133,560	$392,160
G3	NAPL Recovery	$27,000	$19,200	$154,920	$201,120
I3/V3	Subslab Depressurization System	$183,600	$55,440	$825,840	$1,064,880
Revised I2	Insulation Removal (1,200 sf area)	$327,600	$100,800	$0	$428,400
	Total	**$1,055,700**	**$315,600**	**$1,335,360**	**$2,706,660**
Alternative 5 - Soil and Insulation Material Removal Plus Treatment					
S2	Soil Vapor Extraction	$174,000	$60,960	$221,040	$456,000
S3	Chemical Oxidation	$124,500	$39,600	$0	$164,100
S4	Soil Removal	$2,641,200	$364,800	$0	$3,006,000
G2	In-Situ Treatment	$219,000	$39,600	$133,560	$392,160
G3	NAPL Recovery	$27,000	$19,200	$154,920	$201,120
I2	Insulation Removal (7,400 sf area)	$1,120,800	$182,400	$0	$1,303,200
	Total	**$4,306,500**	**$706,560**	**$509,520**	**$5,522,580**

Appendix B-2
Soil Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
S2 - Soil Vapor Extraction								
Capital Costs								
Mobilization	1	LS	10000	$10,000			$2,000	**$12,000**
Well installation	10	per well	2500	$25,000			$5,000	**$30,000**
Trenching, Piping & Restoration	1	LS	75000	$75,000			$15,000	**$90,000**
Blower Package & Carbon Units	1	LS	30000	$30,000			$6,000	**$36,000**
Electrical	1	LS	5000	$5,000			$1,000	**$6,000**
Subtotal				**$145,000**			**$29,000**	**$174,000**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	25000	$25,000			$5,000	**$30,000**
Field Oversight & Start-up	20	days	1200	$24,000			$4,800	**$28,800**
Laboratory (TO-15)	6	samples	300	$1,800			$360	**$2,160**
Subtotal				**$50,800**			**$10,160**	**$60,960**
Annual O&M Costs								
Carbon Replacement	1	LS	10000	$10,000	5	$44,500	$8,900	**$53,400**
Electricity (7.5HP blower)	49275	per KW-hr	0.15	$7,400	5	$32,900	$6,580	**$39,480**
Inspection, Maintenance & Monitoring	12	months	2000	$24,000	5	$106,800	$21,360	**$128,160**
Subtotal				**$41,400**		**$184,200**	**$36,840**	**$221,040**
				Total S2 - Soil Vapor Extraction				**$456,000**

Appendix B-2
Soil Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
S3 - Chemical Oxidation								
Capital Costs								
Mobilization	1	LS	10000	$10,000			$2,000	**$12,000**
Well Installation	25	per well	750	$18,750			$3,750	**$22,500**
Chemical injection	1	LS	60000	$75,000			$15,000	**$90,000**
Subtotal				**$103,750**			**$20,750**	**$124,500**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	15000	$15,000			$3,000	**$18,000**
Field Oversight & Start-up	15	days	1200	$18,000			$3,600	**$21,600**
Subtotal				**$33,000**			**$6,600**	**$39,600**
Annual O&M Costs								
Subtotal				**$0**	**0**	**$0**	**$0**	**$0**
				Subtotal S3 - Chemical Oxidation				**$164,100**

Appendix B-2
Soil Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
S4 - Soil Removal								
Capital Costs								
Mobilization & General Conditions	1	LS	150000	$150,000			$30,000	**$180,000**
Asbestos Abatement	1	LS	100000	$100,000			$20,000	**$120,000**
Utility Relocation/Repair/Protection	1	LS	50000	$50,000			$10,000	**$60,000**
Demolition	1	LS	125000	$125,000			$25,000	**$150,000**
Underpinning	1	LS	250000	$250,000			$50,000	**$300,000**
Shoring & Excavation	1100	CY	500	$550,000			$110,000	**$660,000**
Backfill & Compaction	1100	CY	60	$66,000			$13,200	**$79,200**
Containment/HVAC	1	LS	200000	$200,000			$40,000	**$240,000**
Soil Loading & Disposal	1700	tons	300	$510,000			$102,000	**$612,000**
Restoration	1	LS	200000	$200,000			$40,000	**$240,000**
Subtotal				**$2,201,000**			**$440,200**	**$2,641,200**
Engineering & Expenses								
Geotechnical/Structural Design	1	LS	10000	$10,000			$2,000	**$12,000**
Remedial Design, Coordination & Reporting	1	LS	100000	$100,000			$20,000	**$120,000**
Air Monitoring Equipment	6	months	10000	$60,000			$12,000	**$72,000**
Field Oversight	120	days	1200	$144,000			$28,800	**$172,800**
Laboratory	1	LS	10000	$10,000			$2,000	**$12,000**
Subtotal				**$324,000**			**$60,800**	**$364,800**
Annual O&M Costs								
Subtotal				**$0**	**0**	**$0**	**$0**	**$0**
						Subtotal S4 - Soil Removal		**$3,006,000**

Notes:
Total O&M Costs based upon specified years of O&M and discount rate of 4%
Electricity consumption based on $0.15 per kw-hr

Appendix B-3
Groundwater Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
G2 - Groundwater In-Situ Treatment (Reductive Dechlorination & Supplemental Aerobic Treatment)								
Capital Costs								
Mobilization	4	LS	5000	$20,000			$4,000	**$24,000**
Well Installation	15	wells	1500	$22,500			$4,500	**$27,000**
Chemical injection	2	events	50000	$100,000			$20,000	**$120,000**
ORC injection	2	events	20000	$40,000			$8,000	**$48,000**
Subtotal				**$182,500**			**$36,500**	**$219,000**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	15000	$15,000			$3,000	**$18,000**
Field Oversight & Start-up	15	days	1200	$18,000			$3,600	**$21,600**
Subtotal				**$33,000**			**$6,600**	**$39,600**
Annual O&M Costs								
Groundwater Monitoring	1	LS	20000	$20,000	5	$89,000	$17,800	**$106,800**
Reporting	1	LS	5000	$5,000	5	$22,300	$4,460	**$26,760**
Subtotal				**$25,000**		**$111,300**	**$22,260**	**$133,560**
				Subtotal G2 - Groundwater In-Situ Treatment				**$392,160**

Appendix B-3
Groundwater Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
G3 - NAPL Recovery								
Capital Costs								
Mobilization	1	LS	2500	$2,500			$500	**$3,000**
Well Installation	5	wells	4000	$20,000			$4,000	**$24,000**
Subtotal				**$22,500**			**$4,500**	**$27,000**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	10000	$10,000			$2,000	**$12,000**
Field Oversight & Start-up	5	days	1200	$6,000			$1,200	**$7,200**
Subtotal				**$16,000**			**$3,200**	**$19,200**
Annual O&M Costs								
Well Gauging & Product Recovery	12	months	2000	$24,000	5	$106,800	$21,360	**$128,160**
Reporting	1	LS	5000	$5,000	5	$22,300	$4,460	**$26,760**
Subtotal				**$29,000**		**$129,100**	**$25,820**	**$154,920**
					Subtotal G3 - NAPL Recovery			**$201,120**

Notes:
Total O&M Costs based upon specified years of O&M and discount rate of 4%

Appendix B-4
Insulation Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
I2 - Insulation Removal (7,400 square foot area)								
Capital Costs								
Mobilization & General Conditions	1	LS	75000	$75,000			$15,000	**$90,000**
Asbestos Abatement	1	LS	50000	$50,000			$10,000	**$60,000**
Utility Relocation/Repair	1	LS	25000	$25,000			$5,000	**$30,000**
Demolition	1	LS	100000	$100,000			$20,000	**$120,000**
Floor & Cork Removal	690	CY	500	$345,000			$69,000	**$414,000**
Backfill & Compaction	550	CY	60	$33,000			$6,600	**$39,600**
Containment/HVAC	1	LS	50000	$50,000			$10,000	**$60,000**
Loading & Disposal	520	tons	300	$156,000			$31,200	**$187,200**
Restoration	1	LS	100000	$100,000			$20,000	**$120,000**
Subtotal				**$934,000**			**$186,800**	**$1,120,800**
Engineering & Expenses								
Geotechnical/Structural Design	1	LS	10000	$10,000			$2,000	**$12,000**
Remedial Design, Coordination & Reporting	1	LS	50000	$50,000			$10,000	**$60,000**
Air Monitoring Equipment	3	months	10000	$30,000			$6,000	**$36,000**
Field Oversight & Start-up	60	days	1200	$72,000			$14,400	**$86,400**
Laboratory	1	LS	7500	$7,500			$1,500	**$9,000**
Subtotal				**$169,500**			**$30,400**	**$182,400**
Annual O&M Costs								
Subtotal				**$0**	**0**	**$0**	**$0**	**$0**
						Subtotal I2 - Insulation Removal		**$1,303,200**

Appendix B-4
Insulation Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
I3 - Subslab Depressurization System								
Capital Costs								
Mobilization	1	LS	10000	$10,000			$2,000	**$12,000**
Suction Pit Installation	14	zones	2500	$35,000			$7,000	**$42,000**
Piping & Restoration	14	zones	2500	$35,000			$7,000	**$42,000**
Blower Package (1HP)	14	zones	3500	$49,000			$9,800	**$58,800**
Carbon Units	4	zones	2500	$10,000			$2,000	**$12,000**
Electrical	14	zones	1000	$14,000			$2,800	**$16,800**
Subtotal				**$153,000**			**$30,600**	**$183,600**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	15000	$15,000			$3,000	**$18,000**
Field Oversight & Start-up	20	days	1200	$24,000			$4,800	**$28,800**
Laboratory (TO-15)	24	samples	300	$7,200			$1,440	**$8,640**
Subtotal				**$46,200**			**$9,240**	**$55,440**
Annual O&M Costs								
Carbon Replacement	2	change-outs	4000	$8,000	30	$138,300	$27,660	**$165,960**
Electricity (14 x 1.0 HP blower)	91980	per KW-hr	0.15	$13,800	30	$238,600	$47,720	**$286,320**
Inspection, Maintenance & Monitoring	12	months	1500	$18,000	30	$311,300	$62,260	**$373,560**
Subtotal				**$39,800**		**$688,200**	**$137,640**	**$825,840**
				Total I3 - Subslab Depressurization System				**$1,064,880**

Appendix B-4
Insulation Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
Revised I2 - Partial Insulation Removal (max. 1,300 square foot area)								
Capital Costs								
Mobilization & General Conditions	1	LS	50000	$50,000			$10,000	**$60,000**
Asbestos Abatement	1	LS	30000	$30,000			$6,000	**$36,000**
Utility Relocation/Repair	1	LS	10000	$10,000			$2,000	**$12,000**
Demolition	1	LS	30000	$30,000			$6,000	**$36,000**
Floor & Cork Removal	120	CY	500	$60,000			$12,000	**$72,000**
Backfill & Compaction	100	CY	60	$6,000			$1,200	**$7,200**
Containment/HVAC	1	LS	30000	$30,000			$6,000	**$36,000**
Loading & Disposal	90	tons	300	$27,000			$5,400	**$32,400**
Restoration	1	LS	30000	$30,000			$6,000	**$36,000**
Subtotal				**$273,000**			**$54,600**	**$327,600**
Engineering & Expenses								
Geotechnical/Structural Design	1	LS	5000	$5,000			$1,000	**$6,000**
Remedial Design, Coordination & Reporting	1	LS	50000	$50,000			$10,000	**$60,000**
Air Monitoring Equipment	1	month	10000	$10,000			$2,000	**$12,000**
Field Oversight & Start-up	20	days	1200	$24,000			$4,800	**$28,800**
Laboratory	1	LS	5000	$5,000			$1,000	**$6,000**
Subtotal				**$94,000**			**$16,800**	**$100,800**
Annual O&M Costs								
Subtotal				**$0**	**0**	**$0**	**$0**	**$0**
		Subtotal I4 - Partial Insulation Removal (max. 1,300 square foot area)						**$428,400**

Notes:
Total O&M Costs based upon specified years of O&M and discount rate of 4%
Electricity consumption based on $0.15 per kw-hr

Appendix B-5
Soil Gas Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
V2 - HVAC Operation Under Positive Pressure								
Capital Costs								
HVAC System								
Additions/Modifications	1	LS	100000	$100,000			$20,000	**$120,000**
HVAC System Adjustments	1	LS	20000	$20,000			$4,000	**$24,000**
Subtotal				**$120,000**			**$24,000**	**$144,000**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	10000	$10,000			$2,000	**$12,000**
Subtotal				**$10,000**			**$2,000**	**$12,000**
Annual O&M Costs								
Inspection & Monitoring	4	quarters	1000	$4,000	30	$69,200	$13,840	**$83,040**
HVAC System Adjustments	1	LS	5000	$5,000	30	$86,500	$17,300	**$103,800**
Reporting	1	LS	5000	$5,000	30	$86,500	$17,300	**$103,800**
Subtotal				**$14,000**		**$242,200**	**$48,440**	**$290,640**
Subtotal V2 - HVAC System Operation Under Positive Pressure								**$446,640**

Appendix B-5
Soil Gas Remedial Alternatives
2350 Fifth Avenue, New York, New York

Description	Quantity	Units	Unit Price	Cost	# Years	Total O&M Cost (NPV)	Contingency (20%)	Total
V3 - Subslab Depressurization System								
Capital Costs								
Mobilization	1	LS	10000	$10,000			$2,000	**$12,000**
Suction Pit Installation	14	zones	2500	$35,000			$7,000	**$42,000**
Piping & Restoration	14	zones	2500	$35,000			$7,000	**$42,000**
Blower Package (1HP)	14	zones	3500	$49,000			$9,800	**$58,800**
Carbon Units	4	zones	2500	$10,000			$2,000	**$12,000**
Electrical	14	zones	1000	$14,000			$2,800	**$16,800**
Subtotal				**$153,000**			**$30,600**	**$183,600**
Engineering & Expenses								
Design, Coordination & Reporting	1	LS	15000	$15,000			$3,000	**$18,000**
Field Oversight & Start-up	20	days	1200	$24,000			$4,800	**$28,800**
Laboratory (TO-15)	24	samples	300	$7,200			$1,440	**$8,640**
Subtotal				**$46,200**			**$9,240**	**$55,440**
Annual O&M Costs								
Carbon Replacement	2	change-outs	4000	$8,000	30	$138,300	$27,660	**$165,960**
Electricity (14 x 1.0 HP blower)	91980	per KW-hr	0.15	$13,800	30	$238,600	$47,720	**$286,320**
Inspection, Maintenance & Monitoring	12	months	1500	$18,000	30	$311,300	$62,260	**$373,560**
Subtotal				**$39,800**		**$688,200**	**$137,640**	**$825,840**
				Total V3 - Subslab Depressurization System				**$1,064,880**

Notes:
Total O&M Costs based upon specified years of O&M and discount rate of 4%
Electricity consumption based on $0.15 per kw-hr

APPENDIX C

Contaminant Mass Calculations, Sub-Slab Insulation Material

Appendix C
PCE Contaminant Mass Calculations, Sub-Slab Insulation Material
2350 Fifth Avenue, New York, New York

Sample ID	PCE (µg/Kg)	Bulk Density(ρ)		Dimensions (ft)			Area (sq ft)	Total PCE (grams)	% of PCE removed
		g/cm^3	Method	L	W	H			
C-42A(2'-2.5')	**560,000**	**0.275**	**Avg**	**11**	**36**	**0.50**	**396**	**862.92**	**80.23%**
C-43(1-2)	**24,000**	**0.275**	**Avg**	**26**	**22**	**1.04**	**572**	**111.29**	**10.35%**
C-6	**100,000**	**0.275**	**Avg**	**8**	**14**	**0.75**	**112**	**65.37**	**6.08%**
C-34(2-3)	**16,000**	**0.275**	**Avg**	**13**	**8**	**0.83**	**104**	**10.79**	**1.00%**
C-42B(2'-2.5')	290	0.275	Avg	12	35	0.79	420	0.75	0.07%
C-9	23	0.275	Avg	22	15	0.92	330	0.05	0.01%
C-30(0.5-1.5')	130	0.275	Avg	22	20	0.83	440	0.37	0.03%
C-31 - No insulation		0	NA	24	35	0.00	840	0.00	0.00%
C-32(1.5-2.5)	150	0.275	Avg	17	35	0.83	595	0.58	0.05%
C-4 - No insulation		0	NA	0	0	0.00	0	0.00	0.00%
C-33 - No insulation		0	NA	0	0	0.00	0	0.00	0.00%
C-39(1.5'-2.5')	920	0.275	Avg	23	35	0.50	805	2.88	0.27%
C-11 - No insulation		0	NA	15	30	0.00	450	0.00	0.00%
C-37(1'-2')	1,000	0.275	Avg	20	30	0.92	600	4.28	0.40%
C-2 - No insulation		0	NA	19	33	0.00	627	0.00	0.00%
C-36(1.5-2.5)	4,700	0.275	Avg	22	30	0.50	660	12.07	1.12%
C-35 - No insulation		0	NA	17	30	0.00	510	0.00	0.00%
C-10 - No insulation		0	NA	0	0	0.00	0	0.00	0.00%
C-41(1.5'-2.5')	930	0.275	Avg	15	22	0.50	330	1.19	0.11%
C-1	61	0.275	Avg	15	27	0.75	405	0.14	0.01%
C-40(1.5'-2.5')	2,800	0.09	Lab	15	35	0.58	525	2.18	0.20%
C-44(2-3)	84	0.46	Lab	23	35	0.79	805	0.70	0.06%

Notes:

The maximum sub-slab insulation removal area is represented by the first four samples: C-42A, C-43, C-6 and C-34.
Thickness of insulation layer (H) is based on observed recovery documented in the boring log.
Samples from 1997 (C-1 to C-29) and 2009 (C-30 to C-44) are given equivalent consideration.
Cores where no insulation material was found are generally given equivalent consideration (in sq. ft.) when surrounded by cores where insulation was present (C-31, C-11 and C-35).
Dimensions are averaged for irregularly shaped areas for a resulting total square footage representative of the polygon.
Contaminant mass and volume presented in RIR were based on averages, not individually characterized areas as presented above.