

Appendix 13
Standard Operating Procedures for HVAC Fumigation

Appendix 13
HART SENATE BUILDING
HVAC (AH A/B RETURN) FUMIGATION

ADDENDUM 4

CHLORINE DIOXIDE FUMIGATION
OPERATION PLAN MODIFICATIONS

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ACRONYMS AND ABBREVIATIONS

anthrax	Bacillus anthracis
AH	Air handling
AHU	Air handling unit
AH A	Air handling system number A
AH B	Air handling system number B
B. st.	Bacillus stearothermophilus
B. s.	Bacillus subtilis
ClO ₂	Chlorine dioxide
Daschle Design	Senator Daschle Office Suite Hart Senate Building, HVAC (AH A/B Return) Fumigation, Remediation Design, prepared by USEPA, Region 3, dated December 6, 2001
DMS	Data management station
F	Fahrenheit
HSOB	Hart Senate Office Building
HVAC	Heating, ventilation, and air conditioning.
NAU	Negative air unit(s)
NC	Negative control
PC	Personal computer
RH	Relative humidity
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Bacillus anthracis (anthrax) was released in the Hart Senate Office Building (HSOB) on October 15, 2001. The anthrax spores were specifically released in Senator Daschle's Office Suite (Daschle) and spores entered the return air handling system (AH A/B) servicing the office suite. The spores traveled through air return pickup vents and their lateral ducts to the vertical duct to the 9th floor duct system. The spores did not pass through the filter bank. The supply-side of the AH A/B systems are not known to be contaminated and are not addressed by this action. Decontamination of the heating, ventilation, and air conditioning (HVAC), return system is necessary to ensure the protection of human health. The remedial design calls for the introduction of chlorine dioxide (ClO₂) gas in concentrations and under humidity and temperature conditions documented to kill bacillus spores (Brentwood 2001, Daschle 2001).

A remedial design document entitled "Hart Senate Building, HVAC (AH A/B Return) Fumigation, Remediation Design", prepared by USEPA, Region 3, dated December 6, 2001, (Design) (USEPA 2001a) was prepared to address the application of chlorine dioxide (ClO₂) gas for the remediation of the HVAC system described in the Design document. Addenda have been or will be prepared to describe the installation of equipment and the operation plans execute the Design.

Addendum 1 to the Design; "Hart Senate Building, HVAC (AH A/B Return) Fumigation, Addendum 1, Return Air Grate and Duct Isolation, Steam and ClO₂ Fumigant Supply, and Monitoring Points and Sample Lines Installation Work Plan", prepared by USEPA, Region 3, dated December 8, 2001, (USEPA 2001b) was prepared to address operational tasks necessary to isolate the vertical return air ducts of the AH A/B system from the return air ducts in office suites not documented to be contaminated. Addendum 1 also addressed the installation of steam and ClO₂ gas feed lines required to fumigant the AH A/B system at the 2nd floor, in the Daschle suite return air ducts on the 5th and 6th floors, and in the return air plenum legs behind the filters located on the 9th floor. In addition, Addendum 1 addressed the installation of the lines required to convey sample air from specific monitoring points to a central manifold location and provided temperature and humidity monitoring access ports. Addendum 1 also included the placement of confirmatory spore sample strips in locations designed to document the efficacy of the fumigation.

Addendum 2 to the design, “Hart Senate Building, HVAC (AH A/B Return) Fumigation, Final Addendum 2, Chlorine Dioxide Fumigation, Operation Plan”, prepared by USEPA, Region 3, dated December 14, 2001, (USEPA 2001c) was prepared to address equipment installation and detail the operations necessary to conduct a preliminary operational test of the systems and to conduct the ClO₂ Fumigation, including air monitoring. Air monitoring in Addendum 2 included the operations necessary for monitoring:

1. The ambient air inside the HSOB
2. The air inside the AH A/B HVAC system.
3. The ambient air outside of the HSOB.

Addendum 3 to the Design, “Hart Senate Office Building, HVAC (AH A/B Return) Fumigation, Addendum 3, Change In Operations Of Chlorine Dioxide Stripper Temperature, and Establishment of Temperature Action Level”, prepared by USEPA Region 3 dated December 16, 2001, (USEPA 2001d) was prepared to address a modification in operating temperatures detailed in Section 3.3 of Addendum 2 regarding the ClO₂ stripper units. The maximum operating temperature of the ClO₂ stripper units originally planned at 85° Fahrenheit (F) has been increased to 100° F.

Addendum 3 also established a temperature “Action Level” of the ClO₂ fluid used in the ClO₂ strippers. If the operating temperature of the ClO₂ fluid used in the ClO₂ strippers exceeds 110° F, the steam feed to the tank will be immediately reduced by adjusting the steam supply valves to bring the fluid temperature below 110° F.

2.0 PURPOSE OF ADDENDUM 4

Addendum 4 was prepared to document operational changes and or modifications required to execute the ClO₂ fumigation of the HSOB return HVAC system as detailed in the Design.

3.0 OPERATIONAL MODIFICATIONS

This section describes modifications required to complete and meet the Design objectives.

3.1 Relocation of Negative Air Unit on the 9th Floor

The negative air unit (NAU) on the 9th floor that was formerly located in the return air plenum of the HVAC return air system is moved to AH A. (See Figure 1) The new location provides better distribution and circulation of gas.

3.2 Additional Spore Strip Array Included on the 5th Floor

An additional spore strip array is added to the locations described in Section 3.1.7.2 of Addendum

2. The new array will be installed in the horizontal return duct leading from the Daschle Suite on the 5th floor. The locations of all spore strips including the new location are:

1. The 2nd floor vertical return ducts AH A/B.
2. The 4th floor vertical return ducts AH A/B.
3. The 8th floor vertical return ducts AH A/B.
4. 9th floor mixing box
5. 9th floor AH A/B plenum vertical return duct.
6. 6th floor horizontal return duct.
7. 5th floor horizontal return duct.

3.3 Spore Strip Sequence and Composition

The spore strip array sequence and composition have modified.

Composition of the spore strip arrays are detailed below:

9th Floor:
Mixing Box

8th Floor:
VR A (south), VR B (north)

6th Floor:
HR A (south), HR B (north)

Each Array:

2- B. st. steri charts

6- B. st.

6- B. s.

4-NC

1 B. st. steri chart (tyvek)

1-B. st. (tyvek)

1-B. s. (tyvek)

B. st. = Bacillus stearothermophilus

B. s. = Bacillus subtilis

NC = negative control

4th Floor:
VR A (south), VR B (north)

2nd Floor:
VR A (south), VR B (north)

Each Array:

2- B. st. steri charts

6- B. st.

6- B. s.

4-NC

1- B. st. steri chart (tyvek)*

1 B. st (tyvek)

6- B. s. (tyvek)

* 4th floor only

B. st = Bacillus stearothermophilus

B. s = Bacillus subtilis

NC = negative control

3.4 Addition of Telephone Company Corrosion Coupons in AH A/B

Corrosion coupons consisting of materials used in the manufacture of telephone handsets and switching equipment have been installed in AH A and AH B. These coupons will be removed from AH A/B and returned to the telephone company upon completion of the fumigation operations.

3.5 Temperature and Relative Humidity Probe Locations

Operational temperature and relative humidity (RH) sampling probe locations have been modified to include new locations. Probes have been installed within the treatment zone using IAQ-CALc™ Indoor Air Quality Meters, Model 8760/8762. Data cables have been run to the data management station (DMS) near the Garage Station where they will be connected to a personal computer (PC) for monitoring during fumigation operations.

The operational temperature and RH IAQ-CALc™ probe locations are:

1. The horizontal duct on the 6th floor.
2. The horizontal duct on the 5th floor.
3. The south HVAC vertical duct just before the plenum on the 9th floor.
4. The north HVAC vertical duct just before the plenum on the 9th floor.
5. The plenum on the 9th floor.
6. AHUA
7. AHU B

3.6 AH A/B Fumigation Operational Air Monitoring Locations.

Operational air monitoring locations has been added to AHU A and AHU B. Operational monitoring locations are:

1. The south vertical duct on the 2nd floor.
2. The north vertical duct on the 2nd floor.
3. The horizontal duct on the 5th floor.
4. The horizontal duct on the 6th floor.
5. The south HVAC vertical duct just before the plenum on the 9th floor.
6. The north HVAC vertical duct just before the plenum on the 9th floor.
7. The plenum on the 9th floor.
8. AHU A
9. AHU B

3.7 Final Placement of Auxiliary Fan

An auxiliary fan has been placed in the horizontal duct leading to the south HVAC vertical duct. The fan will help move and mix gas from the 5th floor horizontal duct with that of the south vertical duct.

REFERENCES

Brentwood 2001, Brentwood Postal Facility, Brentwood, Washington D.C., Chlorine Dioxide (ClO₂) Testing Facility, under direction of United States Environmental Protection Agency (USEPA) Emergency Response Team (ERT), October 2001.

Daschle 2001, Daschle Suite Fumigation Remediation Project, Washington D.C, under direction of USEPA Incident Commander, Dr. Douglas Stutz, November 2001.

USEPA 2001a, Hart Senate Building, HVAC (AH A/B Return) Fumigation, Remediation Design, prepared by USEPA, Region 3, dated December 6, 2001.

USEPA 2001b, Hart Senate Building, HVAC (AH A/B Return) Fumigation, Addendum 1, Return Air Grate and Duct Isolation, Steam and ClO₂ Fumigant Supply, and Monitoring Points and Sample Lines Installation Work Plan, prepared by USEPA, Region 3, dated December 8, 2001.

USEPA 2001c, Hart Senate Building, HVAC (AH A/B Return) Fumigation, Final Addendum 2, Chlorine Dioxide Fumigation, Operation Plan, prepared by USEPA, Region 3, dated December 14, 2001.

USEPA 2001d, Hart Senate Office Building, HVAC (AH A/B Return) Fumigation, Addendum 3, Change In Operations Of Chlorine Dioxide Stripper Temperature, and Establishment of Temperature Action Level, prepared by USEPA Region 3 dated December 16, 2001.