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Basis-of-Design Report
Sub-slab Depressurization-System Second-Phase Expansion—Building A
Lockheed Ma( )Tj-r3Fj/E0.037 Tw 0.28 0 Td (Aec

ACRONYMS

BODR	basis-of-design report
cis-1,2-DCE	*cis*-1,2-dichloroethene
COMAR	*Code of Maryland Regulations*
GAC	granular activated-carbon
HVAC	heating, ventilation, and air conditioning
in. WC	inches of water column
J	estimated value
lbs/day	pounds per day
Lockheed Martin	Lockheed Martin Corporation
MDE	Maryland Department of the Environment
µg/m^3	microgram(s) per cubic meter
ND	non-detect
PVC	polyvinyl chloride
SCFM	standard cubic feet per minute
SSD	sub-slab depressurization
TCE	trichloroethene
Tetra Tech	Tetra Tech, Inc.
TO-15	Toxic Organic Method 15
USEPA	United States Environmental Protection Agency
VMP	vapor monitoring point
VOC	volatile organic compound

the vapor-extraction trenches; refer to Drawing G2). The filters are continuously operated to address trichloroethene (TCE) concentrations possibly above its screening level in indoor air.

The proposed second-phase system expansion will address areas along the eastern side of Building A near VMPs 136-A, 079-A, and 117-A, where elevated concentrations of volatiles were detected in the sub-slab in 2014–2015. Vertical extraction points and vapor monitoring points will be installed during the second-phas

Section 2
Technical Approach

2.1 SYSTEM EXPANSION OBJECTIVE

The design objective for the second-phase expansion of the sub-slab depressurization (SSD) system is to mitigate potential vapor migration into the target areas of Building A by maintaining a constant negative pressure of at least 0.01

Relevant indoor-air monitoring results are summarized in Table 2-1; the sub-slab-vapor monitoring results are summarized in Table 2-2. Trichloroethene (TCE) was not detected in the referenced indoor air samples, but was detected in sub-slab vapor at concentrations above its screening level (293 µg/m^3)[1] at two VMPs: 136-A and 079-A.

Table 2-1

Indoor Air Sampling Results (Hits Only), February 2015
Lockheed Martin Middle River Complex, Middle River, Maryland

Chemical	Indoor air screening level* (µg/m^3)	Location		
		117-A (µg/m^3)	136-A (µg/m^3)	079-A (µg/m^3)
Benzene	16	0.64	0.94	0.570E64

Table 2-2

Sub-slab Vapor Sampling Results (Hits Only), February 2014/2015
Lockheed Martin Middle River Complex, Middle River, Maryland

Chemical	Sub-slab screening level* (µg/m^3)	Location (date) [redacted]

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Section 3
Conceptual Design

The second-phase expansion will include the following tasks:

- installation of six vertical vapor-extraction points in the eastern target area of Building A (SSD-34-A through SSD-39-A)
- installation of nine vapor-monitoring points (VMPs) near the new vapor

Each new vertical extraction point will be constructed using a 12- to 18-inch length of two-inch-diameter, 0.020-inch slot, Schedule 40 PVC pipe, and two-inch-diameter solid Schedule 40 PVC pipe (riser) in a four-inch-diameter borehole. The screen will extend from the bottom of the slab to a depth of 12–18 inches. The annular space will be filled

the loading dock to the loading dock bay door (near column D19A), through a window above the bay door, and then approximately 210 feet east along an interior wall to column B19A. From there, the header pipe will split and run south along the wall for approximately 160 feet to column D25 near VMP 079-A, then north, and then east along the ceiling for approximately 245 feet to column A14 near VMP 136-A. The header pipe will be installed at a height of 20–30 feet using wall brackets and pipe hangers placed next to existing support brackets for steel piping in the ceiling. Tetra Tech will review the proposed extraction point locations with Lockheed Martin Corporation (Lockheed Martin) and MRAS, and also discuss the potential need to inspect the loading dock area for and remove asbestos-containing materials and lead-based paint.

Header piping will be installed in high-traffic areas. Exclusion zones of appropriate size will be set up to ensure that no one can enter the work zone. Alternative routes will be available for all blocked traffic areas. Header piping will be installed as quickly as possible, without jeopardizing employee and project safety, to avoid unnecessary disruption to facility operations.

3.3 MODIFICATIONS TO EXISTING SSD SYSTEM

The second-phase expansion will require replacement*nt10(ar)1(a)-10(e)49.5-1. Exe iau be3qisns5 EMcxlqias.s6146*

expanded system operation. These estimated removal rates are based on soil-vapor concentrations in the existing system influent and VMPs, and on rates of decline observed during initial operation of the Building A and Building C SSD systems in 2008. Two 400-pound capacity GAC drums (lead and lag) will be used to adsorb the VOCs on the discharge line of the system before the treated vapors are discharged to the atmosphere. We expect to switch-out the lead 400-pound GAC drum during the first two months of operation. GAC usage is expected to decrease to about one unit every nine months thereafter.

Sub-slab-vapor samples will be collected for laboratory analysis for VOCs at each of the new vapor extraction points 24 hours after start-up of the expanded system. During the first month of operation, the system influent, mid-point, and effluent will be sampled and analyzed biweekly for VOCs; thereafter, these samples will be collected monthly. All sub-slab-vapor samples will be submitted to TestAmerica in Knoxville, Tennessee for VOC analysis by United States Environmental Protection Agency (USEPA) Toxic Organic Method 15 (TO-15).

Table 3-2 presents the estimated initial mass-extraction rates (in pounds per day) for the expanded system, based on current system-influent concentration- and sampling-results at VMPs 079-A, 11

Table 3-2

Estimated Mass-Extraction Rates
Building A SSD-System Second-Phase Expansion
Lockheed Martin Middle River Complex, Middle River, Maryland

Vapor extraction point	Estimated average flow (SCFM)	Estimated VOC concentration ($\mu g/m^3$)*	Estimated initial^ mass extraction (lbs/day)

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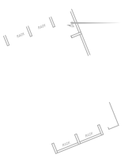
APPENDIX A—CONCEPTUAL DESIGN DRAWINGS

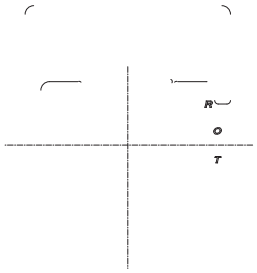


Industrial / Chemical Processing Blowers

DR 909 & CP 909

10.0 / 15.0 HP Regenerative Blower

ROTRON®



Industrial / C ssing

DR 909 & CP 909

10.0 / 15.0 HP Regenerative

460 West Gay Street
West Chester, PA 19380

GX100-DL Moisture Separator, 400 CFM Specification

100 gallon vessel with approx. 40 gallons of storage

APPENDIX C—PRESSURE-LOSS CALCULATIONS

SYSTEM COMPONENT HEAD LOSS