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June 1, 2017

VIA PRIVATE CARRIER

Mr. James R. Carroll
Program Administrator
Land Restoration Program
Land Management Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 625
Baltimore, Maryland 21230

Subject: Transmittal of the 100% Design Sub-Slab Depressurization System
Third Phase Expansion – Building A
Lockheed Martin Corporation; Middle River Complex
2323 Eastern Boulevard, Middle River, Baltimore County, Maryland

Dear Mr. Carroll

Please let me know if you have any questions. My office phone is (301) 548-2227.

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100% Design
Sub-Slab Depressurization System
Third-Phase Expansion – Building A
Lockheed Martin Middle River Complex
2323 Eastern Boulevard
Middle River, Maryland

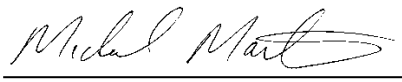
Prepared for:

Lockheed Martin Corporation

Prepared by:

Tetra Tech, Inc.

May 2017



Michael Martin, P.G.
Regional Manager

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Principal Engineer

TABLE OF CONTENTS

TABLE

ACRONYMS

g/m^3	micrograms per cubic meter
%	Percent
cis	

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Section 1

Introduction

Tetra Tech, Inc. (Tetra Tech) has prepared this 100% design on behalf of Lockheed Martin Corporation (Lockheed Martin) to describe the proposed third-

extraction trenches; refer to Figure 1). The filters are continuously operated to address trichloroethene (TCE) concentrations possibly above screening level in indoor air.

A second-phase system expansion completed in April 2016 included replacement of the original blower skid, and installation of five new extraction and vapor monitoring points to address areas along the eastern side of Building A (near VMPs 136-A, 179-A, and 117A), where elevated concentrations of volatile organic compounds were detected in the subslab in 2014-2015. More recently,

Section 2

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Section 3

100-Percent Design

The third-phase expansion for the sub-slab depressurization (SSD) system includes the following:

- Installing one vertical, sub-slab vapor extraction point (SSD-39-A) in the eastern target area of Building A
- Installing one vapor monitoring point (VMP) (169-A) near the new vapor extractions point
- Using four-inch-diameter Schedule 40 polyvinyl chloride (PVC) pipe to connect the new extraction point to the SSD system
- Using four-inch-diameter Schedule 40 PVC pipe the SSD system header will be extended in the Building A basement to the southern portion for potential future use in extraction from ducts, sumps, or sidewall extraction points
- Installing a second moisture separator on the outlet side of the SSD system blower to remove any remaining extracted condensate droplets in the vapor stream before being treated
- Improving GAC pipe and hose connections to minimize low points and allow improved condensate collection

Drawings showing the items listed above are in Appendix A. The design of each expansion component is discussed below.

3.1 VAPOR EXTRACTION POINT

The proposed vapor extraction point location was reviewed with Bob Kuhn of Middle River Aircraft Systems (MRAS) on April 17, 2017. Tetra Tech, Inc. (Tetra Tech) will retain Enviroscan, Inc. to clear the agreed upon location via a geophysical utility investigation. (The utility clearance report will be included in Appendix B once it is completed.)

with clean pea gravel and a two-inch thick bentonite grout seal will be placed above the screen and gravel to prevent short-circuiting (extracting indoor air).

The extraction point will be located as close to a wall or column as possible,

pipe markers. Wherever the header piping is 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.

Most of the planned pipe runs will be in areas where pipe runs can use existing racks and supports as coordinated with the facility. If pipe runs in the loading dock area may potentially disturb lead-based paint, the material will be contained, removed, and disposed of per all requirements. If pipe runs may potentially disturb asbestos-containing materials, the pipe will be rerouted, where possible, or work will stop and the facility will be contacted to coordinate abatement. No new wall penetrations will be needed to complete the third-phase expansion.

3.3 MODIFICATIONS TO EXISTING SSD SYSTEM

Required modifications to the main system are

- Installing a second moisture separator
- Improving GAC pipe and hose connections

The new moisture separator will be installed on the outlet side of the SSD system blower (post-blower and post-heat exchanger) to remove any remaining extracted condensate droplets in the vapor stream before being treated. This will minimize pressure buildup in the GAC drum<e. This

Table 3-

facilities plan details the temporary facilities required for advance work and the best management practices that will be used to limit impact to Building A tenants and operations. The HASP includes procedures used to protect workers and the public from potential hazards during construction and system OM&M. The emergency response plan, included in the HASP, outlines emergency procedures.

The system's OM&M manual will be updated to include the new extraction points, VMP, and moisture separator. The work plans and updated OM&M manual are available under separate cover. The construction of the third-phase system expansion is expected to last three weeks.

Table 3-1

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

Vapor extraction point	Estimated average flow (SCFM)	Estimated VOC concentration (µg/m^3)	Estimated initial^ mass extraction (lbs/day)
Existing horizontal extraction trenches/laterals/vertical points			
Combined: North (former plating shop), South (former plating shop), Basement-north, Basement-south, SSD-34-A, SSD-35-A, SSD-36-A, SSD-37-A, SSD-38-A	325	1,212	0.035
SSD-39-A	25	27,419	0.062

^VOC concentrations at proposed vapor extraction points are expected to decrease up to 90% during the first month of operation
lbs/day – pounds per day
µg/m^3 – micrograms per cubic meter
SCFM – standard cubic feet per minute
SSD – sub-slab depressurization
VOC – volatile organic compounds

Mass Extraction (lbs/day) = µg/L x L/min x 1,440 min/day x 1 lb/4.54 x 10^{-8} µg
[a] Based on total VOC influent SSD system concentrations in April 2017
[b] Based on total VOC sub-slab vapor concentrations from VMP 1-63 in February 2017

Section 4

Performance Monitoring

4.1 SYSTEM STARTUP AND OPERATION

After thethird-phase system expansion

minimize carbon usage. Install lag units as lead units and install new canisters in the lag position

- Record effluent blower temperature and pressure
- Check induced vacuum at vapor monitoring points
- Empty condensate in moisture separator and sumps into properly labeled transportable drums, as needed.
- Check vacuum gauges, pressure gages, piping, and fittings for leaks and signs of heat stress.

The system checklist used to document system monitoring is provided under separate cover in the updated operation, maintenance, and monitoring (OM&M) manual.

4.3 INDUCED VACUUM MONITORING

During startup of the new extraction point, induced vacuum will be monitored at the two nearby vapor monitoring points (SSD-168-A and SSD-169-A) by collecting single, instantaneous readings with a manometer every two weeks.

Section 5

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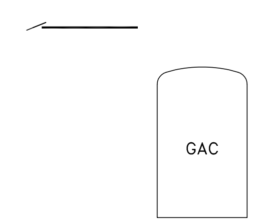
APPENDIX A—DESIGN DRAWINGS


GAC

APPENDIX B— GEOPHYSICAL UTILITY-INVESTIGATION REPORT (PENDING)

EQUIPMENT LIST AND CUT SHEET

1. Cox-Colvin and Associates, Inc.'s stainless steel Vapor Pins Œ(one)

2. Moisture separator: Gasho, Inc. model GX-100DL with level switch

3. PVC piping:
    a. 100 feet, Schedule 40, 2-inch-diameter
    b. 350 feet, Schedule 40, 4-inch-diameter
    c. Couplings, elbows, tees, caps, reducers

4. Diaphragm valves: 2-inch-diameter construction PVC, 150 pounds per square inch (PSI) rating (4)
5. Primer: PVC primer
6. Cement: heavy bodied universal cement
7. Hose quick-connect fittings, 2-inch-diameter (3)

460 West Gay Street
West Chester, PA 19380

GX100-DL Moisture Separator, 400 CFM
Specification

100 gallon vessel with approx. 40 gallons of storage
Flow Rate- 400 ICFM, Vacuum rating 28” Hg
Integral SS demister / filter media, 99.5% entrained water removal
Pressure drop through clean media = .25 IWC
Welded steel construction, reinforced for high vacuum
External Site Gauge
Level Switch Ports- (3) 1” NPT ports, 6” 150 Lb. Flange Cleanout port with clear cover
4” NPT inlet, and outlet
Standard External finish is alkyd paint, inside is left uncoated
Optional coatings available