Soil Remedial Action Plan
Block E
Citizens' Guide

October 2019

This Citizens' Guide summarizes Lockheed Martin's proposed plan for soil cleanup in Tax Block E at the Middle River Complex in Middle River, MD, and is designed to help the community understand the plan. The plan was presented to the Maryland Department of the Environment (MDE) in March 2019.

BACKGROUND

The Middle River Complex is located at 2323 Eastern Boulevard in Middle River, MD. The approximately 160-acre complex is part of Chesapeake Industrial Park. Originally the home of the Glenn L. Martin Company, the site today includes 12 main buildings, an active industrial area and yard, perimeter parking lots, an athletic field, a concrete-covered vacant lot, a trailer and parts storage lot, and various grassy spaces along its perimeter. The site is bordered basically on the north by Eastern Boulevard, the east by Martin State Airport, the south by Dark Head Cove, and the west by Cow Pen Creek.

In the late 1990s, Lockheed Martin began environmental testing at both the Middle River Complex and Martin State Airport to assess impacts from former industrial operations and disposal practices that were commonplace in industry more than a half-century ago. Since then, Lockheed Martin has actively investigated groundwater, soil, sediment, and surface water at both locations. The company is now in different stages of planning and cleanup in the Middle River Complex remediation effort. The Complex consists of Tax Blocks A (two parcels), B, D, D Panhandle, E (two parcels), F, G, H, and I. Cleanup in Block B was completed in 2010, followed by receipt of a Maryland Department of the Environment (MDE) No Further Action letter. Block A does not require remediation as documented in an MDE-issued No Further Action Determination in 2013. The company completed soil cleanups in Blocks D, D Panhandle, F, G,

continued on page 2

Lockheed Martin Invites the Community to an Information Session on Block E Soil Remedial Action Plans for the Middle River Complex

Date: Wednesday, November 20, 2019

Location: The Marshy Point Nature Center
7130 Marshy Point Road

Times: 5 to 7 p.m. – There will be a greet-and-visit and an informal poster session where you can get your questions answered personally by representatives from Lockheed Martin.

7 p.m. – A formal PowerPoint presentation explaining the proposed path forward for the Block E soil cleanup. The presentation will be followed by a question and answer session.

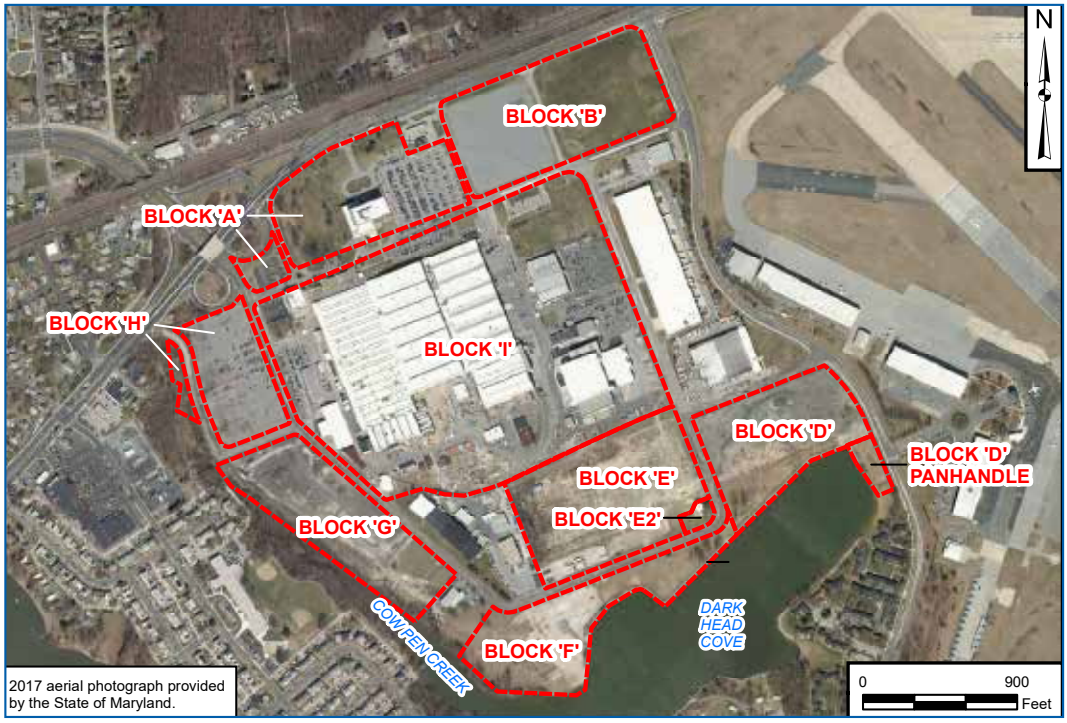
Light refreshments will be served. You are invited to attend either or both sessions. This presentation is part of an ongoing program to keep the community informed of environmental cleanup proposed at the Lockheed Martin Middle River Complex and Martin State Airport. Updates on work at both sites will be available.

The Draft Block E Soil Remedial Action Plan can be downloaded from the Lockheed Martin website at: www.lockheedmartin.com/middleriver and is available in hard copy at the Essex Public Library, located at 1110 Eastern Boulevard, Essex, MD, 21221, open Mon-Thurs. 9 am-9pm; Fri-Sat 9 am-5:30 pm, Sunday 1 pm-5 pm.

A public comment period will be available from November 20 through December 20, 2019.

To make comments, please send by December 20th to: Lockheed Martin, c/o Kay Armstrong, 455 Hillside Trail, Eddyville, KY 42038; phone: 270.853.9450; email: darrylkay@aol.com

continued from page 1



The Middle River Complex consists of Tax Blocks A, B, D, D Panhandle, E, F, G, H, and I.

and H in 2016, and in 2017 received "No Further Action" letters for these parcels from the Maryland Department of the Environment. Further investigation and remediation for Block I has been deferred since it includes ongoing industrial activities.

Block E includes a main parcel of 15.4 acres and a smaller lot at its southeastern corner, Block E2, of 1/2 acre. Block E is the site of former Building D, which was built in the early 1940s and used primarily for aircraft design, assembly, and testing. Later, the western and southwestern portions of the building's basement housed offices, laboratories, and manufacturing spaces for research, development, assembly, and testing of nuclear-powered auxiliary generators. Building D was demolished in 1971; today only the basement slab remains (at ground surface level). With respect to radiological activities, Building D was decontaminated in 1970 under the authority of the Atomic Energy Commission (predecessor of the Nuclear Regulatory Commission [NRC] and the United States Department of Energy) and was determined to be suitable for unrestricted use. In 1982 the NRC reviewed the post-decontamination survey and concluded that the site met NRC's criteria for unrestricted use. During a 1995 inspection, NRC and state personnel surveyed Building C and the area of former Building D, paying attention to drains, clean-outs, and holes in the pad, and the facility was again deemed suitable for unrestricted use. Nonetheless, these approvals did allow some level of radioactive materials to remain in sealed floor drains below ground surface. To properly handle any remaining radioactive materials, Lockheed Martin will take appropriate precautions during remediation of Block E.

LONG TERM GOAL

Environmental stewardship is an important aspect of Lockheed Martin's commitment to the communities in which it operates. The long-term goal for the Block E Remedial Action Plan and its related remedial actions at the Middle River Complex is to appropriately address the environmental impacts within Block E and receive No Further Action letters from the MDE under the "industrial future land use and restriction" category. The industrial use category means that the remediation proposed by Lockheed Martin targets this use. This does not prohibit Block E from being developed for residential, commercial, or recreational use in the future, although such development could require additional remediation. In addition to MDE, the United States Environmental Protection Agency (U.S. EPA) will be involved in oversight of the cleanup of polychlorinated biphenyls (PCBs) at Block E.

SITE INVESTIGATIONS

During site investigation, three "recognized environmental conditions" (RECs) were identified in Block E (see graphic page 3): (1) the area occupied by former Building D; (2) the remaining 1300 feet of a two-inch-diameter pipe running underground across Block E that was once used to carry fuel oil from a former 500,000-gallon, above-ground storage tank, to the Middle River Complex power plant in Block I; and (3) the land around the former aboveground storage tank. PCBs were detected at elevated concentrations in concrete and soils in REC #1 under former electrical transformer rooms, so remediation will be performed in accordance with the federal Toxic Substances Control Act "Risk-Based Disposal Approval" process. Because of this, the Block E remedial action plan consists of two documents—the remedial action plan discussed here, which has been submitted to the MDE, and a Risk-Based Disposal Approval Application, which will require

approval by the United States Environmental Protection Agency. The final Risk-Based Disposal Approval Application will be submitted in 2020 along with the final remedial action design.

Lockheed Martin's investigations indicate that PCBs and polycyclic hydrocarbons (PAHs) in REC#1 are located at depths as great as 20 feet below the soil surface. The PAHs in Block E might be associated with fill material placed historically at the site, and are a common contaminant at the Middle River Complex.

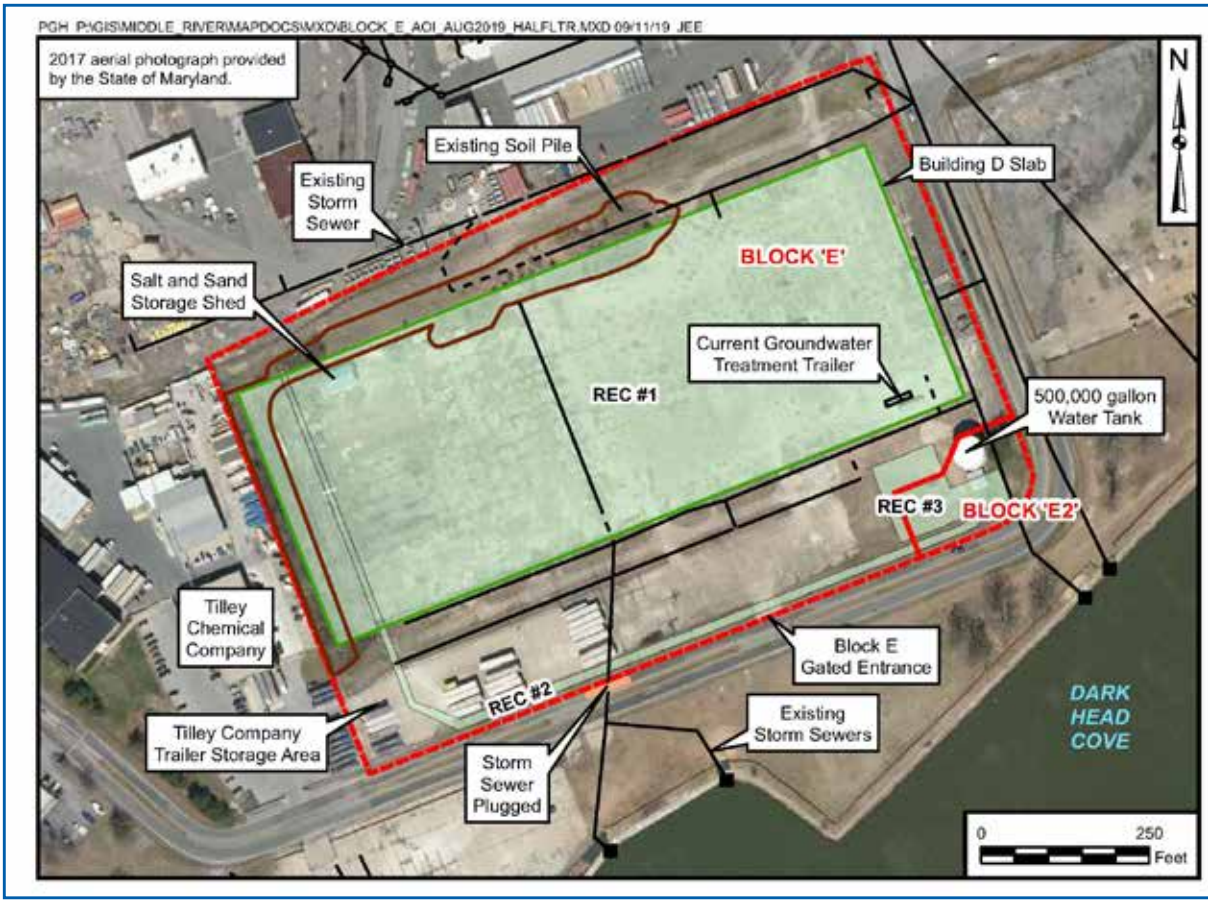
Some PCBs have moved off Block E, although this movement appears to be limited to sediment transported through the Block E stormwater drain system and into Dark Head Cove and also along the median of Cheasapeake Park Plaza. Lockheed Martin removed contaminated sediment from the storm drains and inlets in 2011, and in 2014-15 removed PCB-contaminated sediment from the lower portions of the Outfall 005 stormwater drain system. Portions of the Outfall 006 and 008 systems were cleaned and additional sediments were dredged from Dark Head Cove in 2016-2017 as part of the full sediment remedy for Cow Pen Creek and Dark Head Cove. Lockheed Martin plugged the upland drain system which runs to Outfall 005 near Block E in 2015 to prevent contaminant movement until Block E can be fully remedied.

IDENTIFYING AND EVALUATING POSSIBLE CLEANUP METHODS

Lockheed Martin followed the process recommended by the state of Maryland, which is consistent with federal guidelines, to develop its preferred alternatives for cleaning up Block E. This multi-step process resulted in recommendation of the most sensible alternative for cleaning up the site.

Since 1998, the comprehensive sampling program for the Block E remedial investigation (RI) included collecting 69 concrete samples, more than 1,000 surface soil samples, more than 600 subsurface soil samples, and groundwater samples from 74 monitoring wells and 42 temporary well points to locate and characterize any chemical contaminants remaining in the soil, groundwater, and sediments.

Following the data collection, Lockheed Martin conducted a human health risk assessment to determine whether concentrations of chemicals in Block E were so high that they could potentially be a health risk to humans working at the site. The company used the risk level set by the Maryland Department of the Environment for an industrial site, which means that Block E must be cleaned to a point where human exposure to contaminants does not exceed a one in 100,000 increased theoretical risk of cancer over a lifetime for industrial or construction workers. Through further analysis, Lockheed Martin pin-pointed those areas that needed to be remediated to ensure



The proposed soil cleanup will occur in Tax Block E.

continued on page 4

continued from page 3

that human exposure will not exceed the Maryland Department of the Environment's risk level. This analysis was used to set the Remedial Action Objectives for Block E, the achievement of which should result in a "No Further Action" designation.

LOCKHEED MARTIN'S THREE REMEDIAL ACTION OBJECTIVES

Lockheed Martin set three remedial action objectives for Block E:

1) reduce site-related chemicals of concern to a cumulative risk of cancer for industrial and construction workers to 1 in 100,000 and reduce non-cancer risk to a health index of 1;

2) to the extent practicable, prevent the transfer of PCBs from Block E surface soil and storm drains to discharged stormwater at concentrations that would impact the sediment remedy already in place in Dark Head Cove; and

3) to the extent practicable, prevent leaching of PCBs from soil to groundwater at concentrations that would impact Dark Head Cove.

Four areas in Block E were pinpointed for cleanup because of their high PCB concentrations. They are the areas beneath the former locations of three transformer rooms on the Building D slab, and the grassy field just west of the existing 500,000-gallon water tank, where a 500,000-gallon diesel fuel oil tank was once located. To achieve these goals, Lockheed Martin will clean up the areas of affected soil to different chemical concentrations depending on their depth, with shallower surface soil (from zero to two feet below soil surface) being cleaned up more than deeper soil (located from two to 20 feet below the surface).

IDENTIFYING REMEDIAL ACTION ALTERNATIVES

After identifying the remedial action objectives, Lockheed Martin considered various remediation technologies and process options. These were separated subsequently into seven categories: (1) no action (required as a baseline point of comparison); (2) limited action; (3) containment; (4) removal; (5) *in situ* treatment (meaning treatment in place); (6) *ex situ* treatment (meaning treatment away from the place where contaminants were originally found); and (7) excavation and disposal.

OVERALL CRITERIA
Cleanup alternatives MUST meet Threshold Criteria to be considered further.
Balancing Criteria are used to compare cleanup alternatives against each other.
Modifying Criteria are the state and local acceptance of the cleanup alternative.

COMPARING THE ALTERNATIVES

Lockheed Martin compared the technologies and process options with respect to their effectiveness, implementability, and relative cost. The alternatives were then evaluated according to overall criteria. To be considered viable, an alternative must meet the two threshold criteria of (1) overall protection of human health and the environment and (2) compliance with applicable or relevant and appropriate statutory and regulatory requirements. The alternatives that met these threshold criteria were then rated according to balancing criteria: (1) long-term effectiveness and performance; (2) short-term effectiveness; (3) environmental impacts; (4) reduction of toxicity, mobility, or volume through treatment; (5) implementability; (6) costs; and (7) sustainability. Finally, the two modifying criteria of state and local acceptance will be evaluated.

ALTERNATIVES

Lockheed Martin developed eight alternative approaches for cleaning up Block E, of which five were selected for final evaluation:

Alternative 1: No action. This alternative is required as a baseline point of comparison.

Alternative 3: Excavate the impacted surface and subsurface soil (that is, soil exceeding the cumulative health-risk level) using conventional construction equipment, such as is used at building or road construction sites. Dispose of soil at an approved off-site location. Apply institutional controls (such as deed restrictions or fencing) regarding future use of the site.

Alternative 4: Excavate impacted surface soil using conventional methods and remove impacted subsurface soil using large-diameter augers. The same areas and volumes of soil would be excavated as in Alternative 3. Dispose of soil off-site at an approved location. Apply institutional controls regarding future use of the site.

Alternative 7: Excavate impacted surface soil using conventional methods and dispose of soil at an approved off-site location. Use *in situ* thermal desorption to treat subsurface soil. (In *in situ* thermal desorption, the soil is heated in place and a slight vacuum is applied to extract soil vapors.) Apply institutional controls regarding future use of the site.

Alternative 8: Excavate impacted surface and subsurface soil using conventional methods and treat excavated soil using thermal desorption *ex situ* (accomplished on-site away from the excavated area). Treated soil would then be used as backfill. Apply institutional controls regarding future use of the site.

ELEMENTS COMMON TO ALL ALTERNATIVES

Several activities are common to Alternatives 3, 4, 7, and 8:

- Remove the soil piles on top of the Building D foundation slab to access the entire slab.
- Install a temporary retaining wall on the western side of the Building D foundation to provide access to the slab and stabilize the adjacent Tilley Chemical Company property.
- Demolish and reuse onsite as fill in the excavation hole the Building D foundation slab and footings and other Block E concrete surfaces and asphalt.
- Remove the abandoned pipeline that was used to move fuel oil to Block I.
- Remove and dispose of the contaminated storm-drain system and associated contaminated soil from within Block E, moving through Block F approaching the Outfall 005 discharge structures.
- Design and construct a new stormwater-management system.
- Backfill and restore the Block E surface, placing soil, topsoil, and seed over disturbed areas.
- Remove and dispose of any radiological materials found beneath former Building D.

PROPOSED REMEDIAL ACTION

For Lockheed Martin, success is a measure of how well the company recognizes and fulfills its responsibilities to protect the environment, provide a safe workplace, protect neighboring communities, ensure stewardship of natural resources, and answers to employees, customers, and shareholders. All this was considered in selecting Alternative 3 for cleaning up the Block E soil, which will:

- Remove all soil from zero to two-feet below the surface of the ground (or beneath the underside of the slab) necessary to achieve less than the cumulative human-health cancer and non-cancer risk levels for industrial workers, and, as an added safety factor, remove all soil in the area, zero to two feet below the surface of the ground where PCB contamination is greater than 25 parts per million (ppm).
- Remove all soil from two to 20-feet below the surface of the ground necessary to achieve less than the cumulative human-health cancer and non-cancer risks levels for construction workers, and, as an added safety factor, all soil in the area two to 20-feet below the surface of the ground where PCB contamination is greater than 100 ppm.

Removing the impacted soil will meet all remedial action objectives. Regarding the replacement of the stormwater management system, Lockheed Martin will carefully sequence stormwater management in conjunction with storm-drain replacement, to meet Remedial Action Objective 2 (to prevent contaminant transfer to Dark Head Cove) while Alternative 3 is being implemented. After work is complete, Lockheed Martin will seek a "No Further Action" letter from the Maryland Department of the Environment. In that letter, the Maryland Department of the Environment is expected to establish restrictions for Block E use to prevent potential exposure to contaminants that might remain after cleanup, as well as prohibit the use of groundwater for any purpose. Although this plan proposes cleanup to an industrial standard, the site could still be used for residential, commercial, or recreational purposes; however, to do so might require additional remediation.

SCHEDULE

Major activities are anticipated to occur according to the following schedule:

2019—Final remedial action plan and draft risk-based disposal approval application submitted.

2020—Final risk-based disposal approval application submittal.

2021—Perform remedial actions.

2022-2023—Post-cleanup monitoring (may take longer).

continued on page 6

continued from page 5

FREQUENTLY ASKED QUESTIONS

Do I need to be concerned about Block E PCBs affecting me?

Block E is an industrial site; public access is restricted and will continue to be so during and after remediation. Also, the PCBs at the site are located mainly beneath the Building D slab and are not accessible to the public or workers onsite.

Besides PCBs and PAHs, what other chemicals of concern were found in Block E?

The commonly used industrial volatile solvent trichloroethene (TCE) appears to have leaked from an underground storage tank discovered in Block E in 2013. The tank was located along the Building D foundation in the southeastern portion of the site near the water tower. A significant amount of this TCE in Block E soil and groundwater was removed using a multi-phase extraction system. Enhanced bioremediation wells and piping have been installed, and a hydraulic containment system and a permeable reactive barrier are currently in design as part of the groundwater remedial action plan (a Citizens Guide, which explains this work, is available at www.lockheedmartin.com/middleriver). Another TCE plume originates north of Block E in the area of Building C in Block I, passes through the center of Block E and moves towards the southeast. This plume has been treated and is now being assessed under the groundwater monitoring program.

1,2,4-Trichlorobenzene (1,2,4-TCB), typically used as a solvent or chemical stabilizer, was found near the location of PCBs, and was likely used in the insulating fluid in transformers and underground electric lines. Chlorobenzenes in Block E are in the soil and groundwater around the location of former transformer rooms 2, 3, and 4. These chemicals will be removed when PCB-contaminated soil is removed. Additional study is underway with respect to groundwater.

How will remediation construction proceed?

Generally speaking, impacted surface soil will be excavated using conventional methods. For subsurface soil excavation, both sheet pile and sloped side walls will be considered. In the former, sheet piles would be driven around the excavation area, and the soil excavated. The exposed area would be backfilled after excavation and the sheet pile removed. In the latter, excavation side walls would be sloped or terraced to create safe side walls. Soil samples would be taken from the side walls and bottom of soil excavations to confirm that any remaining contaminants are within acceptable requirements. Because Block E is next to Dark Head Cove, the water table is high and water-saturated soil will be drained before or during excavation. Containment areas for draining soil will be set up on the Building D slab; extracted groundwater will be treated before discharge to a sanitary sewer. If discharge to Dark Head Cove is appropriate, an application would be submitted for a National Pollutant Discharge Elimination System (NPDES) permit.

Deep soil excavation will use either sheet piles pictured above or sloped side walls pictured below.

Lockheed Martin will be moving an estimated 22,000 cubic yards (or 1,700 truckloads) of impacted soil, 300 truckloads of demolished concrete which will be reused mostly onsite, and 3,000 truckloads of backfill. Trucks will likely operate 10 hours a day, five days a week. All trucks will be decontaminated before leaving the site. Tires will be washed; trucks screened for radioactivity and affixed with appropriate signage; loads will be secured with tarps; and truck safety systems will be checked before leaving the site. Excavated soil will be disposed at approved locations appropriate for the contaminants identified.

Block E remediation will likely take approximately six to eight months to accomplish, weather dependent.

How will removal of the Building D slab be handled?

All concrete in Block E (an estimated 24,000 tons, some 300 truckloads) will be removed although concrete tested and verified to be clean may be crushed and reused as backfill in the excavations. Work will proceed in stages: after slab removal in one area, soil excavation and confirmation sampling will be completed, and backfilling will begin while slab removal and excavation begins in another area. This will minimize the area of impacted soil exposed to stormwater and reduce the volume of water to be treated.

The concrete slab will be removed in manageable sections to facilitate radiological screening and sampling of the concrete and underlying floor drains. Concrete with radiological levels above Nuclear Regulatory Commission Regulatory Guidelines will be segregated from non-impacted material. Results from radiation and contamination surveys of exposed areas of the drain system and surrounding soil will determine if conditions are safe before proceeding to remove the next section of concrete. If an area of elevated radiological activity is found in the soil after slab removal, the area will be covered and secured to prevent the spread of contamination, and barricaded to prevent the entry of unauthorized personnel. Results of radiological surveys will determine how materials should be packaged and removed for disposal at an appropriately licensed facility.

Handling Radioactive Materials

- Radiological monitoring of construction activities will be performed for the duration of the project.
- In areas where known or suspected radioactive material is located, enhanced radiological controls will be implemented to ensure that radioactive materials are properly excavated, handled, packaged, and stored in accordance with Maryland Department of the Environment (MDE) and Nuclear Regulatory Commission (NRC) regulations.
- Soils will be sampled during excavation operations and analyzed either in a small onsite mobile laboratory or offsite fixed-based laboratory.
- Radiologically contaminated soils will be placed in approved shipping containers (i.e., steel B-25 boxes), stored, and monitored during the construction process.
- Radioactive material (e.g, floor drain piping, concrete) will be sealed and packaged to contain the radioactive contamination, and stored in intermodal containers awaiting shipment to an approved disposal facility.
- Radioactive waste storage areas will be monitored routinely to ensure that all waste is properly contained and that radiation levels on waste packages/containers are within acceptable levels.
- Waste disposal activities will be coordinated by a certified waste broker to ensure that all radioactive wastes are properly packaged, labeled, manifested, and transported by qualified transport to an approved disposal facility.
- All radioactive waste shipments will be performed in accordance with MDE, NRC, and U.S. Department of Transportation (DOT) regulations.

Will remediation construction be risky to the community?

Risk to the community and to onsite workers from the cleanup will be insignificant. During removal of impacted soil, airborne dust will be monitored, and dust-suppression methods (such as wetting down dry areas) will be used as appropriate.

GLOSSARY

Bioremediation—Nutrients (e.g., sugars) are injected to encourage the growth of naturally occurring bacteria in soil and water under the ground. These bacteria break down contaminants into non-hazardous substances. Bioremediation may also include injections of additional bacteria to increase those already present.

Carcinogen—A substance that can cause cancer.

Chemical(s) of concern (COC)—Chemicals that might cause unacceptable adverse effects to human health or ecological receptors.

Chlorobenzene—Chlorobenzene is a colorless, aromatic, and flammable organic compound widely used as a solvent, an industrial degreaser, and in the manufacture of other compounds such as herbicides, dyes, and rubber.

Cleanup—Actions to address a release or threat of release of a hazardous substance that could adversely affect humans or the environment. The term "cleanup" is sometimes used interchangeably with the terms remediation, remedial action, removal action, response action, or corrective action.

ex situ—Away from the original location or place where pollutants are found.

Impacted soil—Soil having concentrations of chemical(s) of concern (COC) associated with an incremental excess lifetime cancer risk greater than one-in-100,000 or a non-cancer risk greater than a hazard index of 1.

continued on page 8

continued from page 7

in situ—In place; commonly used to describe soil treatment and cleanup that is done in its original location, rather than treating after moving it.

Institutional controls—Administrative measures to limit exposure to contaminants, such as deed restrictions, to prevent use of groundwater as drinking water, or that otherwise limit the use of property.

MDE — Maryland Department of the Environment

Middle River Complex (MRC)—The site in Baltimore County, MD, of Lockheed Martin's Rotary and Mission Systems (RMS), and Singapore Engineering Technologies' MRA Systems, LLC, subsidiary (MRAS).

Polychlorinated biphenyls (PCBs)—PCBs are manmade organic chemicals used in construction materials and electrical products. PCB toxicity ranges from carcinogenic to non-carcinogenic. The manufacture of PCBs was banned in the U.S. in 1979.

Polycyclic aromatic hydrocarbons (PAHs)—Semi-volatile organic chemicals created when products such as coal, oil, gas, and garbage are burned incompletely. Also found in the environment as a result of natural processes such as wildfires. PAHs do not degrade readily. A subset of PAHs is considered possibly carcinogenic.

Remediation—The process of correcting or cleaning up environmental contamination, governed by various federal and state laws, regulations, and other requirements.

Remedial Action Plan (RAP)—Remedial Action Plans provide background, supporting documentation, and the decision-making framework for cleanup of contamination.

Risk Assessment—A qualitative or quantitative evaluation of the risk posed to human health or the environment by the actual or potential presence or release of hazardous substances, pollutants, or contaminants.

Sediment—Sand, silts, and clays washed from the land into water, usually after rain or snowmelt. Sediment is found under water in storm drains, ponds, lakes, creeks, streams, rivers, and oceans.

Trichloroethene (TCE)—Tricholoroethene is a volatile organic compound (VOC) used to clean metals and in specialty adhesives. It was used commonly as a degreaser in industrial operations.

Trichlorobenzene (TCB)—1,2,4-Trichlorobenzene is an aromatic, colorless organic liquid that was used commonly as a solvent to make other organic chemicals, as an additive in wood preservatives, and as an insulating fluid in transformers.

For More Information

Address questions or comments to:

Meghan Macdonald— 800.449.4486 or
Meghan.O.Macdonald@lmco.com
Tom Blackman— 301.548.2209 or
Tom.D.Blackman@lmco.com

All documents are available at the Essex Library, 410-887-0295, or on Lockheed Martin's Website at:
www.lockheedmartin.com/middleriver or
www.lockheedmartin.com/martinstateairport

Lockheed Martin
455 Hillside Trail
Eddyville, KY 42038

continued from page 7

in situ—In place; commonly used to describe soil treatment and cleanup that is done in its original location, rather than treating after moving it.

Institutional controls—Administrative measures to limit exposure to contaminants, such as deed restrictions, to prevent use of groundwater as drinking water, or that otherwise limit the use of property.

MDE — Maryland Department of the Environment

Middle River Complex (MRC)—The site in Baltimore County, MD, of Lockheed Martin's Rotary and Mission Systems (RMS), and Singapore Engineering Technologies' MRA Systems, LLC, subsidiary (MRAS).

Polychlorinated biphenyls (PCBs)—PCBs are manmade organic chemicals used in construction materials and electrical products. PCB toxicity ranges from carcinogenic to non-carcinogenic. The manufacture of PCBs was banned in the U.S. in 1979.

Polycyclic aromatic hydrocarbons (PAHs)—Semi-volatile organic chemicals created when products such as coal, oil, gas, and garbage are burned incompletely. Also found in the environment as a result of natural processes such as wildfires. PAHs do not degrade readily. A subset of PAHs is considered possibly carcinogenic.

Remediation—The process of correcting or cleaning up environmental contamination, governed by various federal and state laws, regulations, and other requirements.

Remedial Action Plan (RAP)—Remedial Action Plans provide background, supporting documentation, and the decision-making framework for cleanup of contamination.

Risk Assessment—A qualitative or quantitative evaluation of the risk posed to human health or the environment by the actual or potential presence or release of hazardous substances, pollutants, or contaminants.

Sediment—Sand, silts, and clays washed from the land into water, usually after rain or snowmelt. Sediment is found under water in storm drains, ponds, lakes, creeks, streams, rivers, and oceans.

Trichloroethene (TCE)—Tricholoroethene is a volatile organic compound (VOC) used to clean metals and in specialty adhesives. It was used commonly as a degreaser in industrial operations.

Trichlorobenzene (TCB)—1,2,4-Trichlorobenzene is an aromatic, colorless organic liquid that was used commonly as a solvent to make other organic chemicals, as an additive in wood preservatives, and as an insulating fluid in transformers.

For More Information

Address questions or comments to:

Meghan Macdonald— 800.449.4486 or
Meghan.O.Macdonald@lmco.com
Tom Blackman— 301.548.2209 or
Tom.D.Blackman@lmco.com
All documents are available at the Essex Library, 410-887-0295, or on Lockheed Martin's Website at:
www.lockheedmartin.com/middleriver or
www.lockheedmartin.com/martinstateairport

Lockheed Martin
455 Hillside Trail
Eddyville, KY 42038

Soil Remedial Action Plan Block E Citizens' Guide

LOCKHEED MARTIN

October 2019

This Citizens' Guide summarizes Lockheed Martin's proposed plan for soil cleanup in Tax Block E at the Middle River Complex in Middle River, MD, and is designed to help the community understand the plan. The plan was presented to the Maryland Department of the Environment (MDE) in March 2019.

BACKGROUND

The Middle River Complex is located at 2323 Eastern Boulevard in Middle River, MD. The approximately 160-acre complex is part of Chesapeake Industrial Park. Originally the home of the Glenn L. Martin Company, the site today includes 12 main buildings, an active industrial area and yard, perimeter parking lots, an athletic field, a concrete-covered vacant lot, a trailer and parts storage lot, and various grassy spaces along its perimeter. The site is bordered basically on the north by Eastern Boulevard, the east by Martin State Airport, the south by Dark Head Cove, and the west by Cow Pen Creek.

In the late 1990s, Lockheed Martin began environmental testing at both the Middle River Complex and Martin State Airport to assess impacts from former industrial operations and disposal practices that were commonplace in industry more than a half-century ago. Since then, Lockheed Martin has actively investigated groundwater, soil, sediment, and surface water at both locations. The company is now in different stages of planning and cleanup in the Middle River Complex remediation effort. The Complex consists of Tax Blocks A (two parcels), B, D, D Panhandle, E (two parcels), F, G, H, and I. Cleanup in Block B was completed in 2010, followed by receipt of a Maryland Department of the Environment (MDE) No Further Action letter. Block A does not require remediation as documented in an MDE-issued No Further Action Determination in 2013. The company completed soil cleanups in Blocks D, D Panhandle, F, G,

continued on page 2

Lockheed Martin Invites the Community to an Information Session on Block E Soil Remedial Action Plans for the Middle River Complex

Date: Thursday, November 20, 2019

Location: The Marshy Point Nature Center
7130 Marshy Point Road

Times: 5 to 7 p.m. – There will be a greet-and-visit and an informal poster session where you can get your questions answered personally by representatives from Lockheed Martin.

7 p.m. – A formal PowerPoint presentation explaining the proposed path forward for the Block E soil cleanup. The presentation will be followed by a question and answer session.

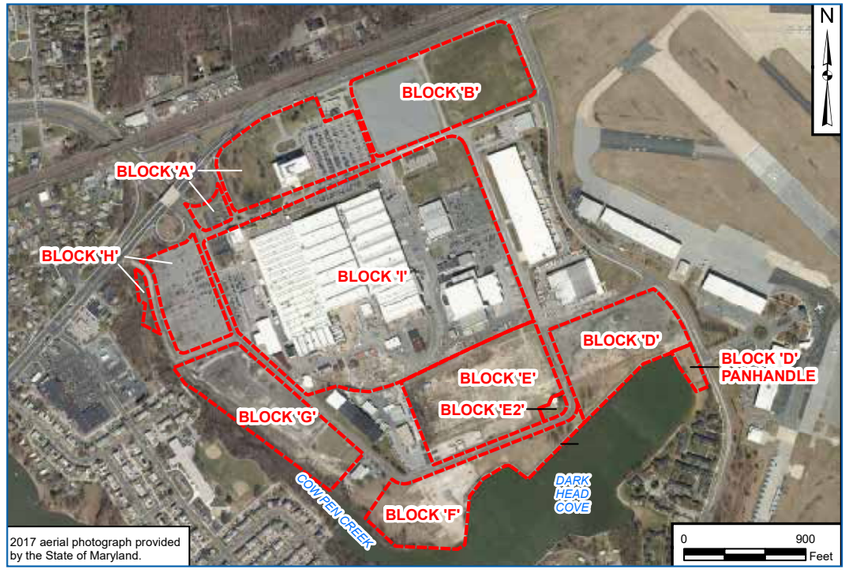
Light refreshments will be served. You are invited to attend either or both sessions. This presentation is part of an ongoing program to keep the community informed of environmental cleanup proposed at the Lockheed Martin Middle River Complex and Martin State Airport. Updates on work at both sites will be available.

The Draft Block E Soil Remedial Action Plan can be downloaded from the Lockheed Martin website at: www.lockheedmartin.com/middleriver and is available in hard copy at the Essex Public Library, located at 1110 Eastern Boulevard, Essex, MD, 21221, open Mon-Thurs. 9 am-9pm; Fri-Sat 9 am-5:30 pm, Sunday 1 pm-5 pm.

A public comment period will be available from November 20 through December 20, 2019.

To make comments, please send by December 20th to: Lockheed Martin, c/o Kay Armstrong, 455 Hillside Trail, Eddyville, KY 42038; phone: 270.853.9450; email: darrylkay@aol.com

continued from page 1



The Middle River Complex consists of Tax Blocks A, B, D, D Panhandle, E, F, G, H, and I.

and H in 2016, and in 2017 received "No Further Action" letters for these parcels from the Maryland Department of the Environment. Further investigation and remediation for Block I has been deferred since it includes ongoing industrial activities.

Block E includes a main parcel of 15.4 acres and a smaller lot at its southeastern corner, Block E2, of 1/2 acre. Block E is the site of former Building D, which was built in the early 1940s and used primarily for aircraft design, assembly, and testing. Later, the western and southwestern portions of the building's basement housed offices, laboratories, and manufacturing spaces for research, development, assembly, and testing of nuclear-powered auxiliary generators. Building D was demolished in 1971; today only the basement slab remains (at ground surface level). With respect to radiological activities, Building D was decontaminated in 1970 under the authority of the Atomic Energy Commission (predecessor of the Nuclear Regulatory Commission [NRC] and the United States Department of Energy) and was determined to be suitable for unrestricted use. In 1982 the NRC reviewed the post-decontamination survey and concluded that the site met NRC's criteria for unrestricted use. During a 1995 inspection, NRC and state personnel surveyed Building C and the area of former Building D, paying attention to drains, clean-outs, and holes in the pad, and the facility was again deemed suitable for unrestricted use. Nonetheless, these approvals did allow some level of radioactive materials to remain in sealed floor drains below ground surface. To properly handle any remaining radioactive materials, Lockheed Martin will take appropriate precautions during remediation of Block E.

LONG TERM GOAL

Environmental stewardship is an important aspect of Lockheed Martin's commitment to the communities in which it operates. The long-term goal for the Block E Remedial Action Plan and its related remedial actions at the Middle River Complex is to appropriately address the environmental impacts within Block E and receive No Further Action letters from the MDE under the "industrial future land use and restriction" category. The industrial use category means that the remediation proposed by Lockheed Martin targets this use. This does not prohibit Block E from being developed for residential, commercial, or recreational use in the future, although such development could require additional remediation. In addition to MDE, the United States Environmental Protection Agency (U.S. EPA) will be involved in oversight of the cleanup of polychlorinated biphenyls (PCBs) at Block E.

SITE INVESTIGATIONS

During site investigation, three "recognized environmental conditions" (RECs) were identified in Block E (see graphic page 3): (1) the area occupied by former Building D; (2) the remaining 1300 feet of a two-inch-diameter pipe running underground across Block E that was once used to carry fuel oil from a former 500,000-gallon, above-ground storage tank, to the Middle River Complex power plant in Block I; and (3) the land around the former aboveground storage tank. PCBs were detected at elevated concentrations in concrete and soils in REC #1 under former electrical transformer rooms, so remediation will be performed in accordance with the federal Toxic Substances Control Act "Risk-Based Disposal Approval" process. Because of this, the Block E remedial action plan consists of two documents—the remedial action plan discussed here, which has been submitted to the MDE, and a Risk-Based Disposal Approval Application, which will require

How will removal of the Building D slab be handled?

All concrete in Block E (an estimated 24,000 tons, some 300 truckloads) will be removed although concrete tested and verified to be clean may be crushed and reused as backfill in the excavations. Work will proceed in stages: after slab removal in one area, soil excavation and confirmation sampling will be completed, and backfilling will begin while slab removal and excavation begins in another area. This will minimize the area of impacted soil exposed to stormwater and reduce the volume of water to be treated.

The concrete slab will be removed in manageable sections to facilitate radiological screening and sampling of the concrete and underlying floor drains. Concrete with radiological levels above Nuclear Regulatory Commission Regulatory Guidelines will be segregated from non-impacted material. Results from radiation and contamination surveys of exposed areas of the drain system and surrounding soil will determine if conditions are safe before proceeding to remove the next section of concrete. If an area of elevated radiological activity is found in the soil after slab removal, the area will be covered and secured to prevent the spread of contamination, and barricaded to prevent the entry of unauthorized personnel. Results of radiological surveys will determine how materials should be packaged and removed for disposal at an appropriately licensed facility.

Handling Radioactive Materials

- Radiological monitoring of construction activities will be performed for the duration of the project.
- In areas where known or suspected radioactive material is located, enhanced radiological controls will be implemented to ensure that radioactive materials are properly excavated, handled, packaged, and stored in accordance with Maryland Department of the Environment (MDE) and Nuclear Regulatory Commission (NRC) regulations.
- Soils will be sampled during excavation operations and analyzed either in a small onsite mobile laboratory or offsite fixed-based laboratory.
- Radiologically contaminated soils will be placed in approved shipping containers (i.e., steel B-25 boxes), stored, and monitored during the construction process.
- Radioactive material (e.g, floor drain piping, concrete) will be sealed and packaged to contain the radioactive contamination, and stored in intermodal containers awaiting shipment to an approved disposal facility.
- Radioactive waste storage areas will be monitored routinely to ensure that all waste is properly contained and that radiation levels on waste packages/containers are within acceptable levels.
- Waste disposal activities will be coordinated by a certified waste broker to ensure that all radioactive wastes are properly packaged, labeled, manifested, and transported by qualified transport to an approved disposal facility.
- All radioactive waste shipments will be performed in accordance with MDE, NRC, and U.S. Department of Transportation (DOT) regulations.

Will remediation construction be risky to the community?

Risk to the community and to onsite workers from the cleanup will be insignificant. During removal of impacted soil, airborne dust will be monitored, and dust-suppression methods (such as wetting down dry areas) will be used as appropriate.

GLOSSARY

Bioremediation—Nutrients (e.g., sugars) are injected to encourage the growth of naturally occurring bacteria in soil and water under the ground. These bacteria break down contaminants into non-hazardous substances. Bioremediation may also include injections of additional bacteria to increase those already present.

Carcinogen—A substance that can cause cancer.

Chemical(s) of concern (COC)—Chemicals that might cause unacceptable adverse effects to human health or ecological receptors.

Chlorobenzene—Chlorobenzene is a colorless, aromatic, and flammable organic compound widely used as a solvent, an industrial degreaser, and in the manufacture of other compounds such as herbicides, dyes, and rubber.

Cleanup—Actions to address a release or threat of release of a hazardous substance that could adversely affect humans or the environment. The term "cleanup" is sometimes used interchangeably with the terms remediation, remedial action, removal action, response action, or corrective action.

ex situ—Away from the original location or place where pollutants are found.

Impacted soil—Soil having concentrations of chemical(s) of concern (COC) associated with an incremental excess lifetime cancer risk greater than one-in-100,000 or a non-cancer risk greater than a hazard index of 1.

continued on page 8

continued from page 5

FREQUENTLY ASKED QUESTIONS

Do I need to be concerned about Block E PCBs affecting me?

Block E is an industrial site; public access is restricted and will continue to be so during and after remediation. Also, the PCBs at the site are located mainly beneath the Building D slab and are not accessible to the public or workers onsite.

Besides PCBs and PAHs, what other chemicals of concern were found in Block E?

The commonly used industrial volatile solvent trichloroethene (TCE) appears to have leaked from an underground storage tank discovered in Block E in 2013. The tank was located along the Building D foundation in the southeastern portion of the site near the water tower. A significant amount of this TCE in Block E soil and groundwater was removed using a multi-phase extraction system. Enhanced bioremediation wells and piping have been installed, and a hydraulic containment system and a permeable reactive barrier are currently in design as part of the groundwater remedial action plan (a Citizens Guide, which explains this work, is available at www.lockheedmartin.com/middleriver). Another TCE plume originates north of Block E in the area of Building C in Block I, passes through the center of Block E and moves towards the southeast. This plume has been treated and is now being assessed under the groundwater monitoring program.

1,2,4-Trichlorobenzene (1,2,4-TCB), typically used as a solvent or chemical stabilizer, was found near the location of PCBs, and was likely used in the insulating fluid in transformers and underground electric lines. Chlorobenzenes in Block E are in the soil and groundwater around the location of former transformer rooms 2, 3, and 4. These chemicals will be removed when PCB-contaminated soil is removed. Additional study is underway with respect to groundwater.

How will remediation construction proceed?

Generally speaking, impacted surface soil will be excavated using conventional methods. For subsurface soil excavation, both sheet pile and sloped side walls will be considered. In the former, sheet piles would be driven around the excavation area, and the soil excavated. The exposed area would be backfilled after excavation and the sheet pile removed. In the latter, excavation side walls would be sloped or terraced to create safe side walls. Soil samples would be taken from the side walls and bottom of soil excavations to confirm that any remaining contaminants are within acceptable requirements. Because Block E is next to Dark Head Cove, the water table is high and water-saturated soil will be drained before or during excavation. Containment areas for draining soil will be set up on the Building D slab; extracted groundwater will be treated before discharge to a sanitary sewer. If discharge to Dark Head Cove is appropriate, an application would be submitted for a National Pollutant Discharge Elimination System (NPDES) permit.

Deep soil excavation will use either sheet piles pictured above or sloped side walls pictured below.

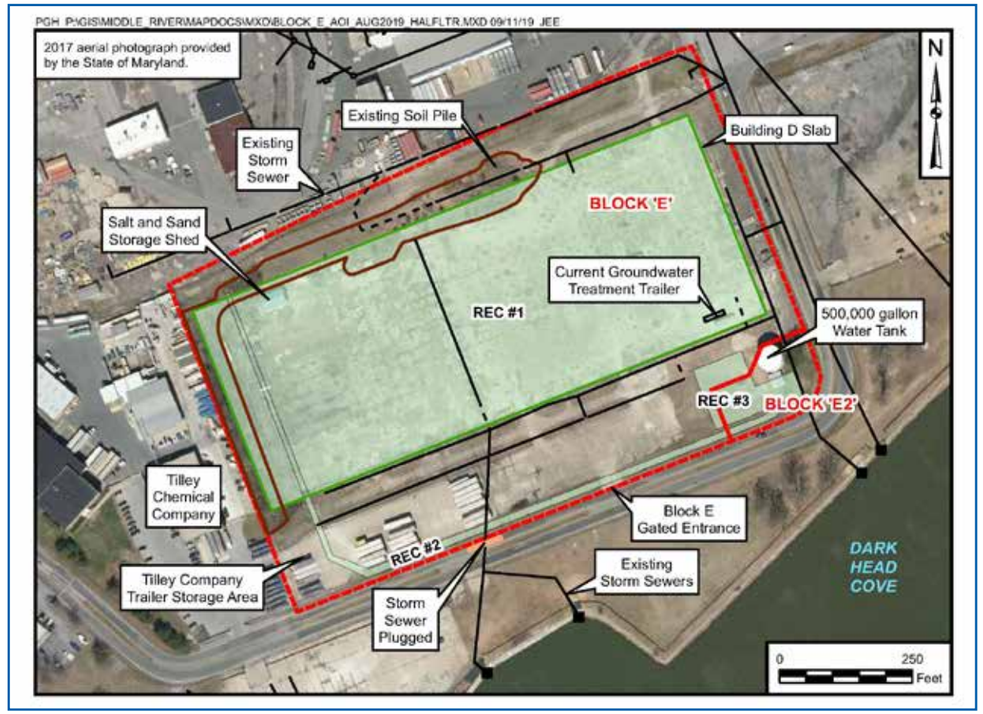
Lockheed Martin will be moving an estimated 22,000 cubic yards (or 1,700 truckloads) of impacted soil, 300 truckloads of demolished concrete which will be reused mostly onsite, and 3,000 truckloads of backfill. Trucks will likely operate 10 hours a day, five days a week. All trucks will be decontaminated before leaving the site. Tires will be washed; trucks screened for radioactivity and affixed with appropriate signage; loads will be secured with tarps; and truck safety systems will be checked before leaving the site. Excavated soil will be disposed at approved locations appropriate for the contaminants identified.

Block E remediation will likely take approximately six to eight months to accomplish, weather dependent.

approval by the United States Environmental Protection Agency. The final Risk-Based Disposal Approval Application will be submitted in 2020 along with the final remedial action design.

Lockheed Martin's investigations indicate that PCBs and polycyclic hydrocarbons (PAHs) in REC#1 are located at depths as great as 20 feet below the soil surface. The PAHs in Block E might be associated with fill material placed historically at the site, and are a common contaminant at the Middle River Complex.

Some PCBs have moved off Block E, although this movement appears to be limited to sediment transported through the Block E stormwater drain system and into Dark Head Cove and also along the median of Cheasapeake Park Plaza. Lockheed Martin removed contaminated sediment from the storm drains and inlets in 2011, and in 2014-15 removed PCB-contaminated sediment from the lower portions of the Outfall 005 stormwater drain system. Portions of the Outfall 006 and 008 systems were cleaned and additional sediments were dredged from Dark Head Cove in 2016-2017 as part of the full sediment remedy for Cow Pen Creek and Dark Head Cove. Lockheed Martin plugged the upland drain system which runs to Outfall 005 near Block E in 2015 to prevent contaminant movement until Block E can be fully remedied.



The proposed soil cleanup will occur in Tax Block E.

IDENTIFYING AND EVALUATING POSSIBLE CLEANUP METHODS

Lockheed Martin followed the process recommended by the state of Maryland, which is consistent with federal guidelines, to develop its preferred alternatives for cleaning up Block E. This multi-step process resulted in recommendation of the most sensible alternative for cleaning up the site.

Since 1998, the comprehensive sampling program for the Block E remedial investigation (RI) included collecting 69 concrete samples, more than 1,000 surface soil samples, more than 600 subsurface soil samples, and groundwater samples from 74 monitoring wells and 42 temporary well points to locate and characterize any chemical contaminants remaining in the soil, groundwater, and sediments.

Following the data collection, Lockheed Martin conducted a human health risk assessment to determine whether concentrations of chemicals in Block E were so high that they could potentially be a health risk to humans working at the site. The company used the risk level set by the Maryland Department of the Environment for an industrial site, which means that Block E must be cleaned to a point where human exposure to contaminants does not exceed a one in 100,000 increased theoretical risk of cancer over a lifetime for industrial or construction workers. Through further analysis, Lockheed Martin pin-pointed those areas that needed to be remediated to ensure

continued on page 4

continued from page 3

that human exposure will not exceed the Maryland Department of the Environment's risk level. This analysis was used to set the Remedial Action Objectives for Block E, the achievement of which should result in a "No Further Action" designation.

LOCKHEED MARTIN'S THREE REMEDIAL ACTION OBJECTIVES

Lockheed Martin set three remedial action objectives for Block E:

1) reduce site-related chemicals of concern to a cumulative risk of cancer for industrial and construction workers to 1 in 100,000 and reduce non-cancer risk to a health index of 1;

2) to the extent practicable, prevent the transfer of PCBs from Block E surface soil and storm drains to discharged stormwater at concentrations that would impact the sediment remedy already in place in Dark Head Cove; and

3) to the extent practicable, prevent leaching of PCBs from soil to groundwater at concentrations that would impact Dark Head Cove.

Four areas in Block E were pinpointed for cleanup because of their high PCB concentrations. They are the areas beneath the former locations of three transformer rooms on the Building D slab, and the grassy field just west of the existing 500,000-gallon water tank, where a 500,000-gallon diesel fuel oil tank was once located. To achieve these goals, Lockheed Martin will clean up the areas of affected soil to different chemical concentrations depending on their depth, with shallower surface soil (from zero to two feet below soil surface) being cleaned up more than deeper soil (located from two to 20 feet below the surface).

IDENTIFYING REMEDIAL ACTION ALTERNATIVES

After identifying the remedial action objectives, Lockheed Martin considered various remediation technologies and process options. These were separated subsequently into seven categories: (1) no action (required as a baseline point of comparison); (2) limited action; (3) containment; (4) removal; (5) *in situ* treatment (meaning treatment in place); (6) *ex situ* treatment (meaning treatment away from the place where contaminants were originally found); and (7) excavation and disposal.

OVERALL CRITERIA
Cleanup alternatives MUST meet Threshold Criteria to be considered further.
Balancing Criteria are used to compare cleanup alternatives against each other.
Modifying Criteria are the state and local acceptance of the cleanup alternative.

COMPARING THE ALTERNATIVES

Lockheed Martin compared the technologies and process options with respect to their effectiveness, implementability, and relative cost. The alternatives were then evaluated according to overall criteria. To be considered viable, an alternative must meet the two threshold criteria of (1) overall protection of human health and the environment and (2) compliance with applicable or relevant and appropriate statutory and regulatory requirements. The alternatives that met these threshold criteria were then rated according to balancing criteria: (1) long-term effectiveness and performance; (2) short-term effectiveness; (3) environmental impacts; (4) reduction of toxicity, mobility, or volume through treatment; (5) implementability; (6) costs; and (7) sustainability. Finally, the two modifying criteria of state and local acceptance will be evaluated.

ALTERNATIVES

Lockheed Martin developed eight alternative approaches for cleaning up Block E, of which five were selected for final evaluation:

Alternative 1: No action. This alternative is required as a baseline point of comparison.

Alternative 3: Excavate the impacted surface and subsurface soil (that is, soil exceeding the cumulative health-risk level) using conventional construction equipment, such as is used at building or road construction sites. Dispose of soil at an approved off-site location. Apply institutional controls (such as deed restrictions or fencing) regarding future use of the site.

Alternative 4: Excavate impacted surface soil using conventional methods and remove impacted subsurface soil using large-diameter augers. The same areas and volumes of soil would be excavated as in Alternative 3. Dispose of soil off-site at an approved location. Apply institutional controls regarding future use of the site.

Alternative 7: Excavate impacted surface soil using conventional methods and dispose of soil at an approved off-site location. Use *in situ* thermal desorption to treat subsurface soil. (In *in situ* thermal desorption, the soil is heated in place and a slight vacuum is applied to extract soil vapors.) Apply institutional controls regarding future use of the site.

Alternative 8: Excavate impacted surface and subsurface soil using conventional methods and treat excavated soil using thermal desorption *ex situ* (accomplished on-site away from the excavated area). Treated soil would then be used as backfill. Apply institutional controls regarding future use of the site.

ELEMENTS COMMON TO ALL ALTERNATIVES

Several activities are common to Alternatives 3, 4, 7, and 8:

- Remove the soil piles on top of the Building D foundation slab to access the entire slab.
- Install a temporary retaining wall on the western side of the Building D foundation to provide access to the slab and stabilize the adjacent Tilley Chemical Company property.
- Demolish and reuse onsite as fill in the excavation hole the Building D foundation slab and footings and other Block E concrete surfaces and asphalt.
- Remove the abandoned pipeline that was used to move fuel oil to Block I.
- Remove and dispose of the contaminated storm-drain system and associated contaminated soil from within Block E, moving through Block F approaching the Outfall 005 discharge structures.
- Design and construct a new stormwater-management system.
- Backfill and restore the Block E surface, placing soil, topsoil, and seed over disturbed areas.
- Remove and dispose of any radiological materials found beneath former Building D.

PROPOSED REMEDIAL ACTION

For Lockheed Martin, success is a measure of how well the company recognizes and fulfills its responsibilities to protect the environment, provide a safe workplace, protect neighboring communities, ensure stewardship of natural resources, and answers to employees, customers, and shareholders. All this was considered in selecting Alternative 3 for cleaning up the Block E soil, which will:

- Remove all soil from zero to two-feet below the surface of the ground (or beneath the underside of the slab) necessary to achieve less than the cumulative human-health cancer and non-cancer risk levels for industrial workers, and, as an added safety factor, remove all soil in the area, zero to two feet below the surface of the ground where PCB contamination is greater than 25 parts per million (ppm).
- Remove all soil from two to 20-feet below the surface of the ground necessary to achieve less than the cumulative human-health cancer and non-cancer risks levels for construction workers, and, as an added safety factor, all soil in the area two to 20-feet below the surface of the ground where PCB contamination is greater than 100 ppm.

Removing the impacted soil will meet all remedial action objectives. Regarding the replacement of the stormwater management system, Lockheed Martin will carefully sequence stormwater management in conjunction with storm-drain replacement, to meet Remedial Action Objective 2 (to prevent contaminant transfer to Dark Head Cove) while Alternative 3 is being implemented. After work is complete, Lockheed Martin will seek a "No Further Action" letter from the Maryland Department of the Environment. In that letter, the Maryland Department of the Environment is expected to establish restrictions for Block E use to prevent potential exposure to contaminants that might remain after cleanup, as well as prohibit the use of groundwater for any purpose. Although this plan proposes cleanup to an industrial standard, the site could still be used for residential, commercial, or recreational purposes; however, to do so might require additional remediation.

SCHEDULE

Major activities are anticipated to occur according to the following schedule:

2019—Final remedial action plan and draft risk-based disposal approval application submitted.

2020—Final risk-based disposal approval application submittal.

2021—Perform remedial actions.

2022-2023—Post-cleanup monitoring (may take longer).

continued on page 6