

CITIZENS' GUIDE

Proposed soil cleanup plans for Lockheed Martin's Middle River Complex

Fall 2013

Introduction

What is a Remedial Action Plan? Why is Lockheed Martin filing one for cleanup of the soil in five of the Tax Block areas at the Lockheed Martin Middle River Complex? What do the Remedial Action Plans mean to the community?

This Citizens' Guide is designed to help Middle River, Md., residents and other interested parties better understand the proposed soil cleanup plans for Lockheed Martin's Middle River Complex. Soil Remedial Action Plans are being submitted for five Tax Blocks, with two for Tax Block D, which has been divided into two sections.

In recent years Lockheed Martin has been actively investigating groundwater, soil and sediment conditions at the Middle River Complex and nearby Martin State Airport. These investigations have culminated in the development

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of Remedial Action Plans that present an evaluation of the preferred alternatives for cleaning up those conditions. This guide addresses the process that was used to select the alternatives, the schedule for the soil cleanup plans, and the

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process and plan for Tax Block F specifically. Additional information will be developed for how soil cleanup will be addressed at each of the other tax blocks.

The Middle River Complex comprises eight parcels of land, called tax blocks, identified separately by the letters A through I. Block I is an active industrial parcel, so is not being cleaned up at this time. Investigations have been conducted either by tax block (e.g., for soil) or by site-wide medium (sediment, groundwater, or indoor air). Soils in Tax Blocks D, E, F, G, and H continue to require cleanup. Blocks A and B are complete and have received No Further Action letters from the Maryland Department of the Environment. Tax Block C is no longer owned by Lockheed Martin.

Lockheed Martin originally began conducting its cleanup process at the Middle River Complex under the auspices of the Maryland Department of the Environment's (MDE) Voluntary Cleanup Program (VCP). Later, the MDE suggested, and Lockheed Martin agreed, that it would be best to consolidate the soil, groundwater and sediment projects at the Middle River Complex under the Controlled Hazardous Substance (CHS) program. Since the Voluntary Cleanup Program requires the responsible party, in this case Lockheed Martin, to own the property in question, it could not be used for the sediments cleanup in Cow Pen Creek and Dark Head Cove, neither of which Lockheed Martin owns, nor Martin State Airport, which Lockheed Martin sold to the state of Maryland in the mid-1970s. All the cleanup initiatives at the Middle River Complex and Martin State Airport are now under one regulatory program—the Controlled Hazardous Substance (CHS) program.

Operating under the Controlled Hazardous Substance (CHS) program makes sense for other reasons. It provides the flexibility to clean up portions of tax blocks to different standards that are in line with current or future property use.

Lockheed Martin intends to clean up the tax blocks to the point where no further action is necessary for the land under current conditions and use of the site. Requirements will be put in place to maintain site use as industrial and to require that any soils exposed during future construction be further sampled to ensure site workers remain protected. This would be recognized by the Maryland Department of the Environment in a No Further Action letter. Future development for residential, commercial or recreational use would not be prohibited, but could result in additional soil cleanup action before changing the use from industrial to those other potential uses.

The Remedial Action Plan for Block F will be presented at a public information meeting on October 9, 2013; the

other Blocks will be presented in early 2014. The final soil Remedial Action Plan for Tax Block E may be presented separately because Tax Block E contains polychlorinated biphenyls (PCBs) at levels requiring additional oversight by the U.S. Environmental Protection Agency (USEPA).

Over the past several years, the Lockheed Martin team has collected more than 5100 samples from more than 1200 soil-boring locations at the Middle River Complex, performing over 11,400 analytical tests on the samples. Some of the chemicals detected are known to have been used during former industrial operations at the site. While site soils are currently under asphalt paving or covered by grass and therefore unavailable for contact, the concentrations of some detected chemicals are such that soil cleanup is necessary due to potential health risks that could occur if the soils were exposed. Soil cleanup will lower overall concentrations to allowable levels that are consistent with site use.

Lockheed Martin, its technical contractors and a specially formed strategic evaluation team have assessed the soil contamination, extensively evaluated the cleanup alternatives, and developed a proposed plan for safely and effectively cleaning up the contamination.

Drafts of the Soil Remedial Action Plans for each of the Tax Blocks are first shared with the state and the public; cleanup will begin after comments from the public and the Maryland Department of the Environment—the state agency responsible for oversight of environmental matters—are incorporated into the final plans.

Background Information

Where is the Middle River Complex?

The Middle River Complex is located at 2323 Eastern Boulevard in Middle River, Md. The 160-acre complex is part of the Chesapeake Industrial Park and today includes 12 significant 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 green spaces along its perimeter.

Is Lockheed Martin conducting other environmental cleanups at the Middle River Complex?

Lockheed Martin's plan for cleaning up groundwater at the Middle River Complex was approved by the Maryland Department of the Environment in September 2012 and construction of the groundwater remedy is underway. Construction should be complete in early 2014. A feasibility study for remediation of contaminated sediments near the shores of Dark Head Cove and Cow Pen Creek was submitted to the Maryland Department of the Environment and the U. S. Environmental Protection Agency in December 2012, and comments have been received,

to which Lockheed Martin has responded. Planning is underway for design of the sediments remedy to proceed during 2014.

Assessing Soil Contaminants

What has Lockheed Martin's environmental testing involved?

Investigations have been conducted since 2003 and include review of historical records, discussions with Middle River Complex personnel, geophysical surveys, and soil and groundwater sampling. Over time, more than 1200 soil borings have been taken, providing more than 5100 surface and subsurface samples that were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, and total petroleum hydrocarbons (TPH)-gasoline-range organics (GRO) and -diesel-range organics (DRO). Electromagnetic (EM) and ground-penetrating radar (GPR) were used to identify possible waste disposal areas or buried metallic debris.

Evaluating Possible Cleanup Methods

Did Lockheed Martin follow a specific process to evaluate alternatives?

Lockheed Martin followed the requirements of the state of Maryland, which are consistent with federal guidelines, to develop its preferred alternatives for cleaning up the various tax blocks in the Middle River Complex. This common sense, multi-step process results in the recommendation of the most sensible alternative for cleaning up a site. The first steps required development of current and historical data derived from soil investigations. These investigations proceeded for a number of years. The second step consisted of conducting a human health risk assessment to determine whether chemicals were present in sufficiently elevated concentrations to potentially cause health risks to humans living or working at the site. Soil must be cleaned to a level where human exposure does not exceed a one in 100,000 increased risk of cancer over a lifetime for industrial workers, the risk level set by the Maryland Department of the Environment. The process next considered current and anticipated land use, concluding that industrial use is most likely, with the exception of the Block D Panhandle, which is anticipated to be used for recreation. Knowing the location and extent of contamination, the potential health risks, and the anticipated land use made it possible to conduct a residual-risk analysis, which identified what areas needed to be cleaned up to ensure that human exposure does not exceed the Maryland Department of the Environment risk

benchmark. This analysis was used to set the Remedial Action Objectives, the achievement of which should result in a letter from the Maryland Department of the Environment stating that No Further Action is required.

Once the Remedial Action Objectives were established, alternatives for cleaning up the soil were considered. These alternatives fell generally into seven categories: no action; limited action; containment; removal; *in situ* treatment; *ex situ* treatment; and disposal. (*In situ* and *ex situ* refer to treatment either 'in place,' or 'away from the site.')

Alternatives were evaluated in detail using criteria that provide a framework for assessing risks, costs and benefits.

The threshold criteria used to evaluate the alternatives address overall protection of human health and the environment, and comply with applicable or appropriate and relevant requirements, which means the state or federal statutes or regulations that pertain to the protection of human life and the environment that must be met when addressing specific conditions, or using a particular technology at a site. The other criteria, which are considered balancing criteria in that they weigh the scores achieved by alternatives when compared against each other, include the long-term effectiveness and permanence of the alternative; reduction in toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; environmental impacts; and costs. The criteria were then used to compare the alternatives to each other qualitatively and quantitatively.

Cleanup alternatives MUST meet Threshold Criteria in order to be considered further.

Balancing Criteria weigh the scores cleanup alternatives achieve when compared against each other.

For Lockheed Martin, selection of the proposed remedial action is also based on a number of additional factors: how well the proposed action recognizes and fulfills Lockheed Martin's commitment to protection of the environment, to a safe workplace, to stewardship of scarce natural resources, and to our customers and shareholders.

Assessing Tax Block F

What features are of concern in Tax Block F?

Block F comprises approximately 12 acres, and has four recognized environmental conditions (RECs): REC Site 4, the former boat launch area; REC Site 5, the former aviation

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fuel underground storage tanks; a portion of REC Site 6, the waterfront lot; and REC Site 13, the former boat dock area. The Block F soil remedial action plan addresses primarily a remedy for soil in REC Site 13, the former boat dock area. Soil sampling results and risk assessments indicate that REC Sites 4, 5, and 6 do not require remediation. The seven abandoned-in-place underground storage tanks in REC Site 5 will be removed even though they do not present a recognized human health risk.

What is the nature and extent of soil contamination in Block F?

The source of impacted soil in Block F appears to be fill material placed in the waterfront lot and former boat dock area. The soil is contaminated primarily with polycyclic aromatic hydrocarbons (PAHs) that are randomly distributed throughout the soil.

What are polycyclic aromatic hydrocarbons (PAHs)?

PAHs are semi-volatile organic chemicals created when products like coal, oil, gas, and garbage are burned incompletely. They do not degrade readily and are considered probable carcinogens. PAHs are generally found in many urban areas, since asphalt pavement is a common source of PAHs, among many other common petroleum product-related sources.

Where are PAHs located in Block F?

Because PAHs were introduced to the site in fill material, they are found randomly throughout the site. The map on this page notes the locations of the areas requiring remediation.

Do I need to be concerned about other contaminants in Block F?

Mercury, arsenic, cadmium, chromium, and lead were found at the Recognized Environmental Condition (REC) sites in Block F, at levels acceptable for a site designated for industrial use, but above those acceptable for a site designated for residential use. All these contaminants are subsurface and not affected by wind or water runoff. If the site were ever developed for a use other than industrial, further cleanup would likely be required.

Do I need to be concerned about Block F polycyclic aromatic hydrocarbons (PAHs) affecting me?

As an industrial site, public access to Tax Block F is restricted and will continue to be so during and after remediation. Also, the PAHs at the site are located below the surface of the ground. Removing the contaminated soil identified by the residual risk analysis evaluation at the site will lower the chemical concentrations in soil to levels that are considered acceptable by the Maryland Department of the Environment for industrial workers that could arise from activities that release or disturb the soil.



Have the underground storage tanks contaminated the soil in Tax Block F?

Some contaminants—total petroleum hydrocarbons (TPH)-gasoline-range organics (GRO) and -diesel-range organics (DRO)—were found near the underground storage tanks, at concentrations deemed acceptable by Maryland Department of the Environment (MDE) standards. Nonetheless, Lockheed Martin has decided to remove the tanks. During the removal process, soil samples will be collected from the walls and floor of the excavation and analyzed. Any soil found exceeding MDE cleanup standards will be removed. After sampling results confirm that remaining soil concentrations are below MDE industrial cleanup standards, the excavated areas will be backfilled with certified clean replacement soil.

Selecting The Best Alternative

What Remedial Action Objectives were selected for Block F?

Two Remedial Action Objectives were selected: first, reduce polycyclic aromatic hydrocarbons (PAHs) to a one in 100,000 increased risk of cancer over a lifetime for industrial workers exposed to PAH via ingestion, skin contact, and inhalation; and second, excavate and recycle or dispose offsite the seven former aviation fuel-underground storage tanks at Recognized Environmental Condition (REC) Site 5 in the tax block.

What cleanup alternatives did Lockheed Martin evaluate for Tax Block F?

- Alternative 1, take no action. This alternative provides a baseline for comparison to the other alternatives.
- Alternative 2, implement institutional controls.
- Alternative 3, excavate and dispose contaminated soils offsite; remove the underground storage tanks; and implement institutional controls, which would be required for soils that remain onsite, for groundwater, and for soils below the groundwater level. This is the Lockheed Martin recommended alternative.
- Alternative 4, excavate the top six inches of soil over the contaminated soil, covering the contaminated soil with a two-foot thick layer of topsoil and clean fill; remove the underground storage tanks; and implement the institutional controls noted in Alternative 3.
- Alternative 5, bioremediate the contaminated surface soils; remove the underground storage tanks; and implement the institutional controls noted in Alternative 3.
- Alternative 6, stabilize the contaminated surface

soils in situ (in place) downward to the groundwater table; remove the underground storage tanks; and implement the institutional controls noted in Alternative 3.

- Alternative 7, phytoremediate the impacted area, meaning plant trees to enhance biodegradation. This alternative was rejected in the first phase of consideration because phytoremediation is only effective when the tree roots are uniformly distributed throughout the soil being treated, and this cannot be guaranteed.

TAX BLOCK F

Remedial Action Objective 1—Reduce site-related chemicals of concern (polycyclic aromatic hydrocarbons – PAHs) in Block F soils to concentrations to a one in 100,000 increased risk of cancer over a lifetime for industrial workers exposed to PAH via ingestion, skin contact and inhalation.

Remedial Action Objective 2—Excavation and offsite recycling or disposal of seven abandoned-in-place former aviation fuel underground storage tanks at Recognized Environmental Condition (REC) Site 5 in accordance with Maryland Oil Control Program Guidance and Code of Maryland Regulations Title 26 Subtitle 10 “Oil Pollution and Tank Management.”

What would the institutional controls comprise?

Institutional controls would include, at the least, restrictions on the use of groundwater; notifications for any future excavations; restrictions regarding the reuse of soil; and limitations on the future use of the property. The Maryland Department of the Environment may require that these controls be included on property deeds.

How were the alternatives compared?

To be viable for consideration, alternatives had to meet the threshold criteria of protecting human health and the environment, and compliance with applicable or appropriate and relevant requirements. They were then evaluated against six

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other criteria: long-term effectiveness and the permanence the alternative offered; short-term effectiveness; reduction of toxicity, mobility, or volume by treatment; implementability; the environmental impacts of the alternative; and cost.

What alternative was chosen for implementation?

Alternative 3 ranked highest of all those considered and is considered the most balanced solution for soils in Block F. Most importantly, it ranked highest for long-term effectiveness in reducing risk to human health and the environment. It also was chosen because it ensures that both Remedial Action Objectives for Block F are met. It will achieve Remedial Action Objective 1 by reducing concentrations in soil to levels that are acceptable for industrial workers by removing contaminated soils to a depth of two feet; the institutional controls will mitigate risk from deeper soils located below two feet that remain after remediation; and the seven abandoned underground storage tanks will be removed.

How will the land in Block F be restored?

This has not yet been determined. The specific restoration will be detailed in the permitting documents and the design documents that will follow the Remedial Action Plan.

Could the land use designation be changed?

The Maryland Department of the Environment (MDE) regards all land use controls as existing in perpetuity unless the related environmental covenants are eliminated or modified by mutual consent of the stakeholders. This

Why Alternative 3

- ***Very effective long-term elimination of risk to human health and the environment.***
- ***Very doable: Personnel and equipment to design and implement the proposed actions are readily available.***
- ***Adversely impacts the environment only during construction; impacts easily mitigated.***
- ***Costs are in line with other alternatives.***

does not prohibit Tax Block F from future development for residential, commercial, or recreational use provided additional remediation is conducted to meet the requirements pertaining to the contemplated land use.

How will Lockheed Martin handle cleanup of Block F?

Alternative 3 involves digging out soil to a depth two feet below ground surface or to the groundwater table, whichever is encountered first. Removed soil will be disposed of properly. Exposed soil on the sidewalls of removal areas will be sampled and analyzed to confirm that concentrations of polycyclic aromatic hydrocarbons (PAHs) remaining in the soil are less than the goal. Excavated soil will be loaded directly onto trucks for disposal offsite. Lockheed Martin anticipates that all the soil removed from Block F will be non-hazardous and can be disposed of at a Lockheed Martin-approved non-hazardous waste disposal facility or treated at a local facility for reuse. Lockheed Martin anticipates that approximately 1,368 tons of soil (or approximately 91 truck loads) will be removed.

Excavations may need to be dewatered. How will Lockheed Martin handle this?

Water will be contained and analyzed and disposed of at an offsite permitted treatment, storage, and disposal facility.

Will soil excavation require permits?

Yes. Lockheed Martin's grading plan and erosion and sediment control plans must be approved by Baltimore County prior to implementation of the Remedial Action Plan.

What needs to happen before cleanup begins?

In September 2013 Lockheed Martin will commence a series of meetings where the draft Soil Remedial Action Plan (RAP) for Block F is presented to community association

leadership, county leaders, and the public at large. The public presentation will occur during a 30-day review and comment period. The final RAP for Block F will be submitted in late fall 2013 and cleanup is expected to begin in late 2015 or early 2016, with completion within one year after starting the cleanup work.

Glossary

Bioremediation — Injections of nutrients to encourage the growth of naturally occurring bacteria and other microscopic-sized living things in soil and water under the ground. Bioremediation may also include injections of additional bacteria to augment those naturally present.

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

Controlled Hazardous Substance Regulations — The statutory and regulatory requirements for remediation of hazardous waste sites overseen by the Maryland Department of the Environment Controlled Hazardous Substance Division.

EPA — U.S. Environmental Protection Agency

ex situ — Away from the original location or place where pollutants are found. In the Soil Remedial Action Plans, *ex situ* means on site and at the surface, but not in their original location.

Impacted soil — Soils having concentrations of chemical(s) of concern (COC) associated with an incremental lifetime cancer risk (ILCR) greater than one in 100,000.

in situ — in place; commonly used to describe soil treatment/cleanup that is done in place, rather than treating soil after removing it out of the ground.

Institutional controls — Administrative tools 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 — The site of Lockheed Martin’s Mission Systems and Training (MST) and Applied Nanostructured Solutions (ANS) facilities and General Electric’s MRA Systems, Inc., subsidiary, known as Middle River Aircraft Systems or MRAS. The Middle River Complex is also known locally as Plant 1.

MRAS — MRA Systems, Inc, known as Middle River Aircraft Systems, a subsidiary of General Electric Company, that leases space mainly inside Buildings A, B,

and C at Middle River Complex to manufacture aircraft parts.

MST — Mission Systems and Training business unit of Lockheed Martin Corporation, that leases space mainly inside the Vertical Launching Systems building at the Middle River Complex.

Phytoremediation — The use of green plants and their associated microorganisms to stabilize or reduce contamination in soils, sludges, sediments, surface water, or ground water.

Polychlorinated Biphenyls (PCBs) — Man-made organic chemicals manufactured and used in construction materials and electrical products. PCBs toxicity ranges from carcinogenic to non-carcinogenic. The manufacture of PCBs was banned in 1979.

Polycyclic Aromatic Hydrocarbons (PAHs) — Semi-volatile organic chemicals created when products like coal, oil, gas, and garbage are burned incompletely; also found in the environment as a result of natural processes such as wild fires. PAHs do not degrade readily. A subset of PAHs are considered probable carcinogens.

RAP — Remedial Action Plan, which provides background, supporting documentation, and the decision-making framework for cleanup of contamination.

Recognized Environmental Condition (REC) — The presence or likely presence of any hazardous substances or petroleum products on a property, under conditions that indicate a potential for an existing release, a possible past release, or a threat of a release of the hazardous substances into structures or into the soil, groundwater, or surface water of the property.

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

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 — Refers to 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.

Semivolatile Organic Compound (SVOC) — An organic compound with a boiling point higher than water that may vaporize when exposed to temperatures above room temperature. Semivolatile organic compounds include phenols and polycyclic aromatic hydrocarbons.

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All documents are available at the Essex Library,
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www.lockheedmartin/middleriver
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Strategic Evaluation Team — A peer review team established by Lockheed Martin to extensively evaluate the cleanup alternatives and develop a proposed plan for safely and effectively cleaning up contamination.

Surface Water — All water bodies naturally open to the atmosphere (rivers, creeks, storm drains, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.).

Total Petroleum Hydrocarbons (TPH) — Refers to a measure of concentration or mass of petroleum hydrocarbons present in a given amount of air, soil, or water. Includes gasoline and diesel fuels.

Volatile Organic Compounds (VOCs) — A group of organic chemicals that will vaporize or evaporate into

the atmosphere at room temperature. VOCs often have a sharp smell and come from many products, including office equipment, adhesives, carpeting, upholstery, paints, petroleum products, solvents, and cleaning products.

Voluntary Cleanup Program — A Maryland Department of the Environment (MDE) program that provides state oversight for voluntary cleanups of properties contaminated with hazardous substances. The goal of the program is to increase the number of sites cleaned by streamlining the cleanup process while ensuring compliance with existing environmental regulations.