DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
Interim Final 2/5/99
RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: **Former Lorton Correctional Complex**
Facility Address: **Lorton, Virginia 22079**
Facility EPA ID #: **VAD980830988**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

☒ If yes - check here and continue with #2 below.

☐ If no - re-evaluate existing data, or

☐ If data are not available, skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

The Former Lorton Correctional Complex site was located at 8515 Silverbrook Road in Lorton, Fairfax County, Virginia and consists of approximately 2,700 acres (note that this was the address of the facility when it was active; since the property has been divided for several uses, this address no longer applies). The DC Department of Corrections site was assembled from 11individual parcels of land with acquisitions taking place between 1910 and 1954. Prior to development as the Lorton Correctional Complex, the site was rural with farmland, woodland, and rural residential properties. The Lorton Correctional Complex was established circa 1911 and included dormitories, cell blocks, residences, maintenance facilities, a large oil and coal-fired boiler house (steam plants), industrial facilities such as furniture manufacturing and repair facilities, vehicle repair centers, a hog farm, a dairy farm, a water treatment plant, and wastewater treatment plants. In October 2008, the EPA and DEQ conducted a site visit and identified 26 solid waste management units (SWMUs). SWMUs include drum storage areas, satellite accumulation areas, underground storage tanks (USTs), aboveground storage tanks (ASTs), non-permitted landfill, laundry wastewater clarifier, tear gas and firing ranges, buried drum area, central facilities industries shops, vehicle maintenance facilities, agricultural areas, facilities management PCB storage shed, former NIKE missile complex, central facilities boiler house and Occoquan facilities boiler house and coal piles, wastewater and water treatment plants, former and current landfills, and dumping areas. These areas were cleaned up in accordance with the Virginia Hazardous Waste Management and Petroleum Underground Storage Tank (UST) Regulations.

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

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1. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

☐ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

☒ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Since June 2000, shallow groundwater beneath the facility has been investigated under several regulatory cleanup programs including RCRA closure, UST Program, and RCRA Corrective Action. SWMUs #8, #9, #11, #12, #14, and #21 make up what used to be the Former Non-Permitted Landfill, Former Drum Dumping Area, Former Occoquan Blacksmith/Tractor Repair Shop, Central Facilities, Former Firing Ranges, and Former Occoquan Greenhouse Storage.

SWMU # 8, the former Non-Permitted Landfill was an approximately 20-acre area located northeast and east of the Silverbrook Road Firing Range that was used for the storage and possible disposal of vehicles and equipment. Based on reviews of aerial photographs, activity began earlier than 1953 and was significant by 1960. These storage and disposal activities appeared to peak between 1972 and 1984. SWMU No. 9 – Former Drum Dumping Area, was investigated in conjunction with SWMU #8 due to their close proximity. Groundwater samples were collected from four locations during closure of the unit. Similar to the soil results, VOCs and SVOCs were below detection limits. Two of the four groundwater samples exhibited elevated metals detections. Antimony was detected in one sample at 140 micrograms per liter (ug/l) and lead was detected in two samples at concentrations of 100 ug/l and 530 ug/l. The US EPA drinking water maximum contaminant levels for these two constituents are 6 ug/l and 15 ug/l, respectively. Following removal of waste from the Non-Permitted Landfill, four quarters of post-closure groundwater monitoring was completed. Quarterly Monitoring Report #4, Final Monitoring Event was submitted on July 12, 2002, and recommended no groundwater remediation and discontinuation of the groundwater monitoring.

SWMU No. 11 is the Former Occoquan Blacksmith / Tractor Repair Shop. The Occoquan Blacksmith/Tractor Repair Shop is an L-shaped building with a tractor bay, storage shed, and an access road. As part of the Phase II ESA, the Occoquan Blacksmith/Tractor Repair Shop was assessed for potential impacts to soil and groundwater from prior operations. Suspected contaminants included petroleum products, solvents, PCBs, and metals. Therefore, soil and groundwater samples were collected from this area and analyzed for VOCs, SVOCs, PCBs, TPH, pesticides, and priority pollutant metals. Groundwater concentrations in the Occoquan Blacksmith/Tractor Repair Shop were generally below maximum contaminant levels and Regional Screening Levelsrinking water standards. The exceptions were lead at a concentration of 84 µg/l and selenium at a concentration of 140 µg/l. Based on the lack of apparent source and the slightly elevated nature of these detections, they are not considered significant and are likely due to poor sample quality caused by high turbidity.

SWMU No. 12 – Central Facilities Industries Shops consisted of several light industrial shops involved in furniture manufacturing and repair, printing, metal fabrication, and auto body work. Hazardous wastes, including waste paints, thinners, solvents, strippers, ink waste, and other chemical waste, were generated in this area. Several areas were used as temporary storage locations for hazardous wastes prior to off-site disposal. As part of the Phase II ESA, the Central Facilities Industries Shop was assessed for potential impacts to soil and groundwater from prior operations. The VDEQ had recently cited these operations for deficiencies in the management of hazardous wastes. Samples of soil and groundwater were collected and analyzed for VOCs, SVOCs, and priority pollutant metals. The sampling locations were selected, as they were known staging and temporary storage locations for 55-gallon drums. Soil results were generally found to be below detection limits for VOCs and SVOCs or within average concentrations found in the United States for metals. Groundwater concentrations in the Central Facilities Industries Shop were generally below primary and secondary drinking water standards, the exception being lead at concentrations of 42 µg/l and 130 µg/l.

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SWMU #14 – Former Firing Range Sites included several firing range sites as follows:

- **Rocky Branch Firing Range – Firing Range No. 1**
  This smallest abandoned small arms firing range was located at the end of an unpaved road northeast of Silverbrook Road, next to Rocky Branch. It was the oldest firing range, having operated prior to 1960. This area is also known as Firing Range No.1 and included railroad timbers, stacked approximately 4 feet high and 30 feet wide, with metal target frames and no backstop.

- **Silverbrook Road Firing Range – Firing Range No. 2**
  This abandoned small arms firing range was a one-acre area present in the woodlands northeast of Silverbrook Road. This range, also known as Firing Range No. 2, appeared to have operated between 1960 and 1986. It consisted of a building, gravel parking, concrete barrier wall, firing lanes, and natural soil backstop.

- **Recent Firing Range – Firing Range No. 3**
  The Recent Firing Range, also known as Firing Range No. 3, was present in the northcentral portion of the site, east of Hooes Road. This area was opened in 1988 to replace Firing Range No. 2. It had both indoor and outdoor firing areas and was used through May 1999 as a training range for small arms. This is also the location of Tear Gas Impact. The entire area is surrounded by an earthen berm and totals approximately 6.5 acres.

As part of the Phase II ESA, the three Firing Range Sites were assessed for potential impacts to soil and groundwater. The primary environmental concern at the Firing Ranges was lead. For Firing Range No. 1, the highest concentrations were found in the 30 feet by 90 feet area in front of the stacked timbers. Outside this area, lead concentrations returned to background concentrations. Lead at Firing Range No. 2 and Firing Range No. 3 appeared to be contained in the backstops and upper 6 inches of soil in the firing lanes. In addition, elevated lead concentrations were detected in samples from the backstop at the Shotgun Range. Elevated lead concentrations were also reported in groundwater samples collected from Firing Range No. 2 and Firing Range No. 3. Concentrations of lead in groundwater ranged from 280 ug/l to 1,600 ug/l beneath former firing Range No. 1 and from 24 ug/l to 1,300 ug/l beneath firing range No. 3. The area of Range No. 2 has been redeveloped into a residential area and firing range No. 3 has been redeveloped into a golf course.

SWMU No. 21 – Former Occoquan Greenhouse Storage is located immediately north of the Occoquan Facility and east of the main parking lot. Pesticides and herbicides used at the Lorton Correctional Complex were stored in the Occoquan Greenhouse Storage area. As a result, this area was included in the 1999 Phase II ESA. Soil samples were collected from this area and analyzed for pesticides, herbicides, and priority pollutant metals. In addition, a groundwater sample was collected and analyzed for TPH-GRO in addition to benzene, toluene, ethylbenzene, and xylenes (BTEX) due to this area's proximity to a UST with known contamination. Analytical results from this area were non detect for pesticides and herbicides. Detections of metals were generally below applicable standards. The one exception was lead in GW-01 (270µg//l), which exceeded the drinking water standard (15 µg/l).

The identified areas of lead groundwater contamination are not part of a contiguous plume, but localized, discreet impacts. In addition, there is no information that indicates that lead in groundwater has migrated to other areas or surface water bodies that would cause an unacceptable risk to human health or the environment. Future groundwater monitoring is not anticipated due to the low level, localized nature of the lead concentrations detected to date. Further, local County law and governing HOA documents prohibit the installation of potable drinking water wells in the area of the former Lorton Correctional RCRA facility.

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Supporting Documentation:

1. Hazardous Waste Management Plan, VDEQ, July 30, 1999
2. Phase I Environmental Site Assessment Report, AAS Environmental Inc., August 27, 1999
3. Phase II Environmental Site Assessment Report, AAS Environmental Inc., August 27, 1999
4. Hazardous Waste Determination Survey Report, AAS Environmental, Inc., October 12, 1999
5. Comprehensive Site Characterization and Remedial Action Plan for the Three Firing Ranges, AAS Environmental, Inc., February 25, 2000
6. Comprehensive Site Characterization and Remedial Action Plan for the Non-Permitted Landfill Areas, AAS Environmental, Inc., March 29, 2000
7. Disposal of the Lorton Correction Complex – Draft Environmental Assessment Report, Greenhorne and O'Mara Inc. and Heery International, September 2000
8. Survey Sheet for Inspection of Hazardous Waste Facilities, VDEQ, December 4, 2000
9. RCRA Inspection Report – DC Dept. of Corrections, VDEQ, January 16, 2001
10. Letter to VDEQ relating to the voluntary remediation of three firing ranges, the non-permitted landfill area, and the drum dumping area, AAS Environmental, Inc., March 21,2001
11. Firing Range Remediation Closeout Report, AAS Environmental, Inc., May 1, 2001
12. Non-Permitted Landfill Closure Report, AAS Environmental, Inc., September 15, 2001
13. Survey Sheet for Inspection of Hazardous Waste Facilities, VDEQ, October 22, 2001
14. Letter to the VDEQ indicating that the Central Facility Industries Metal Fabrication, Auto body and Paint Shops have been permanently closed, AAS Environmental, Inc., October 22, 2001
15. RCRA Inspection – DC Dept. of Corrections, VDEQ, November 9, 2001
16. Notification to the VDEQ that all requirements under the Consent Order had been satisfied, AAS Environmental, Inc., June 19, 2002
17. Submission of 2001 Hazardous Waste Report, AAS Environmental, Inc., May 13, 2002.
18. Notification to the VDEQ that all requirements under the VDEQ issued Consent Order had been satisfied, AAS Environmental, Inc., June 19, 2002
19. Quarterly Monitoring Report No. 4 – Final Monitoring Event – Closure of the Laundry Wastewater Clarifier (Ink Pit), AAS Environmental Inc., July 12, 2002
20. Letter of cancellation of Consent Order as the requirements had been met, VDEQ, July 26, 2002
21. Letter to VDEQ describing history of the area where buried drums were discovered in the Pulte Homes Area of the Lorton site, Consolidated Engineering Services, April 7,2003
22. Letter to GSA documenting the buried drum clean -up activities conducted in the Pulte Homes Area of the Lorton site, Consolidated Engineering Services, June 30, 2003

Footnotes:

1"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

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2. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

☐ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

☐ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) – skip to #8 and enter "NO" status code, after providing an explanation.

☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

3. Does "contaminated" groundwater **discharge** into **surface water** bodies?

☐ If yes - continue after identifying potentially affected surface water bodies.

☐ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

☐ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

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☐ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting:

1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and
2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

☐ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting:

1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and
2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

[3]As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

☐ If yes - continue after either:

1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater;

OR

2) providing or referencing an interim-assessment[5], appropriate to the potential for impact that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

☐ If no - (the discharge of "contaminated" groundwater can not be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

☐ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-system.

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7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

☐ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations, which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

☐ If no - enter "NO" status code in #8.

☐ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

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8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

☒ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Former Lorton Correctional Complex, EPA ID # VAD980830988, located in Lorton, VA 22079 Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater". This determination will be reevaluated when the Agency becomes aware of significant changes at the facility.

☐ NO - Unacceptable migration of contaminated groundwater is observed or expected.

☐ IN - More information is needed to make a determination.

Completed by (signature) _____ Date 09/12/2017

(print) Kurt Kochan

(title) CA Project Manager

Supervisor (signature) Brett Fisher Date 09/12/2017

(print) Brett Fisher P.G.

(title) CA Team Lead

(EPA Region or State) VA

Locations where References may be found:

US EPA Region III
Land and Chemicals Division
1650 Arch Street
Philadelphia, PA 19103

Virginia Department of Environmental Quality
Office of Remediation Programs
629 East Main Street
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