**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**

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|---|---|
| **Facility Name:** | ATK Elkton, LLC |
| **Facility Address:** | P.O. Box 241, 55 Thiokol Road Elkton, Maryland 21922-0241 |
| **Facility EPA ID #:** | MDD003067121 |

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?

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

   ____ If no - re-evaluate existing data, or

   If data are not available skip to #6 and enter "IN" (more information needed) status code.

## BACKGROUND

### 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).

2. 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?

_X_ 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):**

This assessment focuses on the SWMUs that are not listed as "No Further Action" (NFA) or "Clean Closure." A description of all site SWMUs is contained on Table 1.

**TCE Area SWMU (E1)**
The TCE Area SWMU contains elevated levels of volatile organic compounds (VOCs) such as TCE, 1,1-DCE, and 1,1,2.2-TCA. Concentration of these constituents in groundwater exceeds either the USEPA Region III Tap Water RBCs or the USEPA MCL within the site boundary and at off-site locations. In addition to VOCs, perchlorate was detected at elevated levels in groundwater. Table 2 contains a summary of analytical data used to delineate the plumes. Additionally, residential drinking water wells in the vicinity of the SWMU were investigated and sampled (Table 3.)

**A-Area SWMU (E2)**
Southern portions of the A-Area SWMU are actually within the area of the TCE Area SWMU. Monitoring wells that bound the A-Area include GM-1, GM-15, and GM-24. Analytical results for these wells are shown in Table2. These Wells contain elevated levels of TCE and perchlorate. TCE levels in GM-1B and GM-24 are above the USEPA MCL.

**Still Bottoms SWMU (E3)**
Recent groundwater sampling at the Still Bottoms SWMU indicates that there are elevated levels of chlorobenzene, TCE, and various pesticides (aldrin, alpha-BHC, and beta-BHC) as indicated on Table 4. The levels of these compounds exceed either the USEPA Region III Tap Water RBC or the USEPA MCl. It should be noted that chlorobenzene levels are significantly reduced since the last sampling event in 1994 and only one well, GM-18S, contains significant chlorobenzene. This well is located along the downgradient edge of the SWMU and is nearest to the previously buried waste. The buried waste was removed and disposed of off-site in November 2005. The observed pesticide concentrations in groundwater (total and dissolved) were less than 0.05 ug/L and were below their respective State of Maryland Cleanup Standards for Groundwater (0.08 ug/L) for each compound detected.

**Beryllium SWMU (E4)**
The Beryllium SWMU is located adjacent to Little Elk Creek and only impacts the shallow groundwater flow system. Hydraulic data for the wells in the vicinity and analytical results demonstrate that the groundwater at the SWMU is flowing (slowly) towards Little Elk Creek. Analytical results from the first quarter of 2004 indicate the presence of VOCs, metals, and perchlorate in shallow groundwater. Detected concentrations included perchlorate (1,260 ug/L), 1,1,1-TCA (6,630 ug/L), and sodium (5,000 ug/L). A complete summary of the analytical results are shown in Table 5.

**Closed Incinerator Feed Surface Impoundment SWMU (E5)**
This SWMU is managed under the Maryland Department of Environment RCRA post closure care permit. The information provided in this document is obtained form document prepare in accordance wit this

program and for use in evaluating the site wide conditions. Recent investigations and quarterly monitoring at the SWMU have shown elevated levels of VOCs, predominately PCE, TCE, 1,1,1-TCA, 1,2-DCE and

perchlorate (ATK Annual Report, ARCADIS 1999.) These VOCs are present in groundwater at concentrations greater than either the USEPA Region III Tap Water RBCs or the USEPA MCL. Perchlorate is generally more prevalent at this SWMU because the rubber liner of the incinerator feed surface impoundment failed in 1985, the impoundment was used to store waste ammonium perchlorate (AP) in a water solution before being disposed of in a liquid injection incinerator. An open burning/open detonation (OBOD) area just down gradient was also used to open burn AP containing propellants. Prior to 1992 the propellants were not burned in pans and they were in direct contact with the ground. The maximum concentrations of perchlorate are found in groundwater in the vicinity of the open burning area range from 22,000 to 230,000 ug/L.

**Pesticide Area SWMU AOC (E6)**

Pesticide concentrations detected in groundwater are low, in the sub-ppb to low ppb range. Groundwater data collected in May 2004 showed exceedances of Maryland Groundwater Cleanup Standards for alpha-BHC, beta-BHC, delta-BHC and dieldrin in groundwater in the Pesticide Area SWMU AOC. Data are reported in the Interim Site-Wide Investigation Technical Report and Work Plan, and in the current Site Investigation Report (ARCADIS, June 19, 2003, Table 10; ARCADIS, 2004, Table 6).

**Sand Pit Disposal Area SWMU (E7)**

No further Action (NFA) SWMU. This SWMU is not believed to be releasing contamination. No further investigation of this SWMU is planned at this time. Recent sampling for cadmium was conducted during the Supplemental Site Wide Investigation; the sample analysis did not indicate the presence of cadmium.

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).

3. 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)?

_X_ 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):**

**TCE SWMU (E1)**

Recent data indicates that the majority of the SWMU plume is moving from the site easterly toward Little Elk Creek and exist primarily in the shallow and intermediate Potomac Group aquifers. This was determined from site wide investigation in 1994, 2002/2003, and 2003/2004; and from an investigation of Little Elk Creek in 2000. (Geraghty & Miller, 1994; ARCADIS, 2003; ARCADIS, 2004; ARCADIS, 2000.) The plume width and travel direction is well known west of Little Elk Creek based upon recent information. The lowest observed contaminant concentrations are generally in the shallow and deep zones. There is evidence that the plume footprint has stabilized since there is evidence of discharge to Little Elk Creek (ARCADIS 2000.)

Substantial data exists that indicates that the bulk of the plume travels in the intermediate zone. The lateral extent of the plume in this zone is well defined. Based on an evaluation of the limited data collected in the site wide investigation during 1994, it appears that the deep zone (saprolite unit) is not significantly affected by VOC contamination. The existing data suggested that elevated levels of VOCs only occurred in the vicinity where significant levels of VOCs were also fond in the shallow and intermediate zones. Since that data was collected a recovery well (GM-14) has been operating and is believed to tend to reverse any downward gradients minimizing the ability of groundwater from the intermediate zone to continue to the deep zone. In addition, hydraulic gradients between the intermediate sand deep zones tend to become upward and increase towards Little Elk Creek because of substantial discharge to Little Elk Creek. Lithologic descriptions also support this conceptual model; the intermediate zone is characteristically more permeable with greater sand content than the shallow Potomac Group and the saprolite.

In addition, water level data has been collected from shallow and intermediate wells along the Little Elk Creek that indicates a possible upward hydraulic head near the creek. It is believed that this indicates discharge of groundwater to the creek. During 2004, data was collected from the east side of Little Elk Creek at the toe of the plume that concludes that the plume is controlled by Little Elk Creek. In addition, this investigation included well installation and data collected to delineate the shallow zone extent of the plume in offsite areas including residential area north of Route 40 and off-site areas downgradient along the axis of the plume. Resampling of northern facility wells indicated that VOC and perchlorate constituents have migrated to Little Elk Creek and that the plume extents appear stable.

dring the first quarter of 2004, further investigation was conducted in order to confirm the plume discharge to Little Elk Creek and to define the southern extent of the plume. The first phase of this investigation includes the completion of eight direct-push points (TCE GP-1 through TCE GP-8) on the east side of Little Elk Creek for the purpose of soil and groundwater sampling. The second phase involved installing two intermediate zone groundwater monitoring wells (GM-32 and GM-33) on the east side of Little Elk Creek to monitor plume migration beneath the Creek. The investigation revealed that minor amount of TCE has diffused across Little Elk Creek and that the front of the plume while on the east side of the creek is likely stable. The TCE plume is defined to below MCLs (5ppb) on the east side of Little Elk Creek by the TCE results (3/25/04) for GM-33 of <1 ug/L. Figure No. 2 shows the location of this well.

**A-Area SWMU (E2)**

Based on the location of the A-Area and sampling results from other wells in the area, it is likely that any remnant concentrations in groundwater near the A-Area SWMU would contribute to the TCE Area SWMU groundwater plume, a portion of the SWMU is also contained by the GM-14 recovery well, and a portion of SWMU groundwater may contribute to elevated perchlorate concentrations observed in GM-1M and GM-15. Groundwater in the A-Area SWMU generally flows easterly towards Little Elk Creek.

**Still Bottoms SWMU (E3)**

The extent of contaminants in groundwater from this SWMU was further investigated with direct-push groundwater samples as depicted on Drawing No.1 dated 19 Feb 2004 which indicate that contaminants of concern (Chlorobenzene, Tetrachloroethene) are above MCL in SBGP-4, -6, -7, and -11. The Tetrachloroethene has been determined to be from a source located on the adjacent Maryland Cork facility, which is being investigated separately by the Maryland Department of Environment Superfund Program. The extent of chlorobenzene in groundwater from the Still Bottoms SWMU on a larger site-wide basis is defined by other existing wells at ATK. Samples collected from other area wells, such as Beryllium SWMU well BS-1 (3/18/04), indicate that tetrachloroethene and chlorobenzene are below the MCL. Monitoring well CFMW-04 was sampled on March 31, 2003. The results are non-detected for chlorobenzene, 7.7 ug/L for Trichloroethylene, non-detected for 1,1,1-Trichloroethane. Monitoring well CFMW-03 is at the north end of the Closed Incinerator Feed Area SWMU downgradient from this Still Bottom SWMU. The results for samples taken on 3/31/03 are 17 ug/L for 1,1,1-Trichloroethane, 2.4 ug/L for trichloroethylene, and non-detected for chlorobenzene.

The results from these other existing wells at ATK appear to define the maximum extent of contaminated groundwater from the Still Bottoms SWMU, and indicate that there is no direct discharge from this SWMU into Little Elk Creek.

**Beryllium SWMU (4)**

The Beryllium SWMU is located adjacent to Little Elk Creek and only impacts the shallow groundwater flow system. Hydraulic data from the wells in the vicinity and analytical results demonstrate the groundwater at the SWMU is flowing (slowly) towards Little Elk Creek. There is virtually no potential for groundwater from the SWMU to flow beneath the creek for two reasons: 1) groundwater discharge to the creek produces the observed water levels and inferred flow directions, and 2) recharge entering the hydrogeologic flow system in areas west of the Little Elk Creek produce eastward regional flows towards Little Elk Creek. Monitoring well BS-1, downgradient of the SWMU (Figure 1), was sampled as part of the March 2004 sampling event. Analytical results for the first quarter of 2004 indicate the presence of VOCs, metals, and perchlorate in shallow groundwater. Detected concentrations included perchlorate (1,260 ug/L), 1,1,1-TCA (150 ug/L), 1,1,-DCA (95 ug/L), 1,1-DCE (13 ug/L), along with metals including calcium (6,660 ug/L), magnesium (6,630 ug/L), and sodium (5,000 ug/L.) Although contaminated ground

water does migrate into surface water, sample results indicate that the contamination is not above applicable standards for surface water adjacent to, and immediately down stream of the site.

**Closed Incinerator Feed Surface Impoundment SWMU (E5)**

The area of elevated VOC and perchlorate concentration in this portion of the site has been well defined and the relationship between groundwater and surface water has been developed. Contaminated groundwater in this area is confined to the shallow zone (about 7 feet saturated thickness). The facility is bounded to the west and south by Little Elk Creek. Groundwater flow in the shallow unconfined water-table unit is somewhat radial as groundwater flows towards Little Elk Creek. Shallow groundwater flow patterns are also influenced by a remedial system including a groundwater interceptor trench and infiltration gallery that was activated in 1993. The remedial system has resulted in containment of high VOC concentration areas and has also resulted in significant declines in VOC concentrations in the vicinity of the system. Additionally, there are virtually no potential for groundwater from the SWMU area to flow inferred flow directions, and 2) recharge entering the hydrogeologic flow system in areas west of the Little Elk Creek produces eastward regional flows towards Little Elk Creek.

**Pesticide AOC SWMU (E6)**

Low concentration of pesticides in groundwater have been detected immediately east (downgradient) of the potential source areas in the Pesticide Area SWMU AOC. Additional direct push samples were collected and reported in a letter dated February 25, 2005. Also, five domestic wells south of Nottingham Road were sampled. The results of this residential well sampling are contained in an Army Corps of Engineers report entitled: 'Final Sampling Report Residential Drinking Well Sampling Event, ATK Vicinity residences, Elkton, MD' dated January 2005. The report states that no pesticides were detected above the laboratory detection limit in any of the five primary locations. The report states that all reporting and detection limits were below applicable Maryland Soil and Groundwater Cleanup Standards for groundwater. These results, along with the direct-push wells, define and indicate that the extent of pesticides in groundwater from this SWMU is limited and does not extend to the residential drinking water wells.

[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.

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

X 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):**

**TCE SWMU (E1)**

See response to question 3. Groundwater samples were collected from beneath the stream and in surface water that indicated elevated levels of VOCs discharge to Little Elk Creek in the vicinity of Route 40.

**Beryllium SWMU (E4)**

See response to question 3. Shallow groundwater from beneath the SWMU discharges to Little Elk Creek.

**Closed Incinerator Feed Surface Impoundment SWMU (E5)**

See response to question 3. Surface water and sediment sampling in Little Elk Creek in the vicinity of the SWMU indicated the presence of SWMU related compounds. (Little Elk Creek Investigation Report, ARCADIS 15 December 2000)

**Pesticide Area SWMU AOC (E6)**

Groundwater from the northern portion of the AOC discharges to Little Elk Creek. However, after extensive surface water collection and analyses, no pesticides were detected in surface water in Little Elk Creek adjacent to, and downstream of, the Pesticide Area SWMU AOC. (Little Elk Creek Investigation Report, ARCADIS 15 December 2000, page 19)

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.

_X_ 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):**

**TCE SWMU (E1)**

Maximum dissolved TCE concentration in groundwater measured in the vicinity of Little Elk Creek (and likely discharges to the Creek) ranges from 1,500 to 6,400 ppb (GM-22S and GM-22M). TCE concentrations drop off significantly just (within 500 feet) north, south and east of the location where the peak concentration sample was collected. Maximum dissolved 1,4-Dioxane concentrations in groundwater in the vicinity of the creek ranged from 102 to 183 ppb. Concentrations measured at GM-22S and GM-22M are the highest TCE and 1,4-Dioxane concentration currently measured in the TCE Area, therefore, loadings to Little Elk Creek are suspected to currently be at their peak. Elevated levels of 1,1,1-TCA in the intermediate Potomac aquifer within the same footprint of the TCE plume. Concentrations are lower than those found for TCE, but range from 610 to 1,000 ppb in wells near Little Elk Creek (GM-22S and GM-22M). Concentrations measured across the creek in monitoring wells GM-32 and GM-33 are three orders of magnitude lower than those on the western side and support this premise that the plume discharges and terminates at Little Elk Creek. Measured concentrations of all constituents in the upgraident portion of the plume are lower and suggest that mass loading to the creek will be lower in the future.

Perchlorate concentrations in groundwater are also elevated near the southeast corner of the plant property boundary, near the Crouse Landfill and downgradient near Little Elk Creek. The maximum concentration is 1,650 ppb at GM-2B, near the Crouse Landfill. The perchlorate plume has a similar footprint to that of the TCE plume.

1-4Dioxane concentrations in groundwater are also elevated near the southeast corner of the plant property boundary, near the Crouse Landfill and downgradient near Little Elk Creek. The maximum concentrations

are 140 and 183 ppb (GM-22M and GM-22S, respectively.)

**Beryllium SWMU (E4)**

Monitoring well BS-1 was installed during the first quarter 2004 in order to monitor potential constituent migration from the SWMU to Little Elk Creek. Analytical results from the first quarter of 2004 indicate the presence of VOCs, metals, and perchlorate in shallow groundwater at location BS-1. Detected concentrations include perchlorate (1,260 ug/L), 1,1,1-TCA (150 ug/L), 1,1-DCA (95 ug/L), 1,1-DCE (13 ug/L) along with metals including calcium (6,660 ug/L), magnesium (6,6630 ug/L, and sodium (5,000 ug/L). Complete results are included on Table 3. Surface water and sediment sampling from the Little Elk Creek Investigation did not indicate any subsurface release to the environment. Therefore, the discharge of site related constituents do not pose unacceptable impact to Little Elk Creek. It is believed that the constituents in groundwater move very slowly towards and potentially discharge to Little Elk Creek at a very low mass loading rate. It is unlikely that detectable levels of constituents will ever be detected in the Creek or in the sediment.

**Closed Incinerator Feed Surface Impoundment SWMU (E5)**

Of the predominant constituents found in the subsurface at the SWMU, only TCE is expected to discharge to the creek at levels slightly greater than the 10 times the MCL. Data trends over the past few years indicate that concentrations of all constituents at the SWMU are declining, therefore, it is expected that mass discharge to Little Elk Creek would continue to decrease. The maximum concentration of TCE measured in a monitoring well adjacent to Little Elk Creek is 316 ppb at monitoring well MW-22. Because of remedial efforts at the SWMU, the plumes are generally declining in concentration. During the Little Elk Creek investigation, surface water samples collected in the vicinity of the SWMU resulted in detections of perchlorate and VOCs. These detections in surface water samples confirmed the CSM; that groundwater from beneath the SWMU discharges to Little Elk Creek. Low levels (i.e., below screen criteria) of TCE and its daughter products, 1,1,1-trichloroethane, 1,1-dichlorethane, and 1,2-DCE (total), were first detected in the surface water samples collected at location SW3B. The highest concentration of perchlorate was observed in SW3B (45 ug/L), which correlates with elevated concentrations of perchlorate is found in groundwater (ranging from 22,000 to 230,000 ug/L) at the Closed Incinerator Feed Surface Impoundment..

**Pesticide Area SWMU AOC (E6)**

Some pesticides (alpha-BHC, beta-BHC, delta-BHC, and dieldrin), present at low concentration in on-site groundwater (sub-ppb to low ppb range), have been detected above Maryland Goundwater Cleanup Standards. However, after extensive surface water collection and analyses, no pesticides were detected in surface water in Little Elk Creek adjacent to, and downstream of , the Pesticide Area SWMU AOC. (Little Elk Creek Investigation Report, ARCADIS, 15 December 2000, page 19.)

[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])?

X 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):**

An investigation of Little Elk Creek was performed to (1) collect surface water sediment samples; (2) conduct an ecological risk screening of surface water and sediment associated with SWMUs on the ATK site; adjacent to the Site with upstream concentrations.

Sufficient data were gathered to characterize the potential for constituent migration from the SWMUs to Little Elk Creek. Based on the comparison of constituent concentration measured in surface water sediment samples to ecological screening criteria, there is no basis to expect any ecological impact to Little Elk Creek in the vicinity of ATK. Results in Zone 1 and Zone 2, as shown on the Site Plan, are areas along Little Elk Creek which show results below human health screening levels for TCE, and perchlorate results. Zone 6 shows the highest elevation for TCE (25 ug/L), while Zone 3 shows the hot spot (45 ug/L) for perchlorate, which steadily decreases to single digits as the water flows through the site to Zone 7. The surface water human health screening level for TCE is 25 ug/L, and the surface water human health screening level for perchlorate has not been established. Although contaminated groundwater does migrate to surface water, results are not above the established human health screening level.

The following are specific conclusions from the Little Elk Creek Investigation (ARCADIS 2000, pages 18-19):

Compounds detected in surface water include PCE, TCE, and their daughter products; several metals; and

perchlorate. Detected concentrations of these constituents did not exceed their screening levels with the exception of perchlorate, which does not have a screening level at this time. However, based on the aquatic toxicity of perchlorate, EPA is confident that the detected perchlorate concentrations in Little Elk Creek fall well below concentrations which would be associated with the impact to aquatic organisms in the creek. Compounds detected in sediment include PCE, TCE, and their daughter products; benzene, chlorobenzene; toluene; SVOCs (phenols, PAHs, and phthalates); several pesticides; and several metals. TCE and TCA were detected in one sediment sample collected from Little Elk Creek at concentrations greater than their screening criteria (Little Elk Creek sampling location SD6C.) Significantly lower concentrations of TCE and TCA were observed in sediment samples collected upgradient and downgradient of SD6C. This further supports a plume distribution with a narrow axis of elevated concentrations intersecting Little Elk Creek.

[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-systems.

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?"

_X_ 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):**
A comprehensive long term groundwater and surface water monitoring plan is being developed and consists of a significant number of existing well. Groundwater samples collected will be analyzed for specific constituents of concern. Additional sampling is planned under the current Corrective Measures Study phase of the project to evaluate final remedy alternatives for the TCE SWMU (E1), A-Area SWMU (E2), Still Bottoms SWMU (E3), Beryllium SWMU (E4), and Pesticide Area SWMU AOC (E6). The groundwater monitoring program for the Closed Incinerator Feed Surface Impoundment SWMU (E5) will continue to be implemented under the Maryland Department of Environment RCRA post-closure care permit. USEPA and the Maryland Department of Environment will continue to partner in overseeing the implementation of investigations, remediation alternatives and/or groundwater monitoring programs to ensure hydraulic control of the groundwater plume.

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).

_X_ 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 _____ _____facility , EPA ID # _____ , located at_____. 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 re-evaluated 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 | |
| | (print) | | | |
| | (title) | | | |

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|---|---|---|---|---|
| Supervisor | (signature) | | Date | |
| | (print) | | | |
| | (title) | | | |
| | (EPA Region or State) | | | |

| **Locations where References may be found:** |
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| |

**Contact telephone and e-mail numbers:**

| | |
|---|---|
| (name) | |
| (phone #) | |
| (e-mail) | |