

(7/26/2007)

**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:** International Paper  
**Facility Address:** 34040 Union Camp Drive, Franklin, VA 23851  
**Facility EPA ID#:** VAD003112265

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 #8 and enter “IN” (more information needed status code.

The following reports and documents have been considered in the EI determination:

ENSR, 1996. Closure of Lime Mud Pond # 3, November 1996. ENSR 6890-083-400.

ENSR, 1997. Closure of Number Two Lime Mud Pond, October 1997. ENSR 6890-102-100.

ENSR, 1997. Human Health Risk Assessment for the Main Mill Sewer Canal, October 1997. ENSR 6890-100-100.

ENSR, 1997. Site Assessment and Investigation of the Franklin, Virginia Mill, November 1997. ENSR 6890-101.

ENSR, 2001. Closure Plan for Soil, SWMU 4 Tall Oil Impoundment Area, July 2001. ENSR 6890-266-800.

ENSR, 2001. Closure Report for Soil, SWMU 4 Tall Oil Impoundment Area, December 2001. ENSR 6890-266-910.

ENSR, 2002. Site Characterization and Risk Assessments for the Tall Oil Sludge Disposal Area (SWMU 4), June 2002. ENSR 06890-220-307.

ENSR, 2002. Site Characterization and Risk Assessments for the No. 1 Lime Mud Pond (SWMU 2a), June 2002. ENSR 06890-220-304.

ENSR, 2002. Site Characterization and Risk Assessments for the No. 3 Lime Mud Pond (SWMU 2c), May 2002. ENSR 06890-220-305.

ENSR, 2002. Site Characterization and Risk Assessments for the Waste Degreasing Solvent Disposal Area (SWMU 3), June 2002. ENSR 06890-220-306.

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ENSR, 2002. Site Characterization and Risk Assessments for the Highground Disposal Area (SWMU 5), August 2002. ENSR 06890-201-301.

ENSR, 2002. Site Characterization and Risk Assessments for the Effluent Treatment Area (SWMU 8), September 2002. ENSR 06890-220-303.

ENSR, 2002. Site Characterization and Risk Assessments for the Blackwater Riverbank Area, September 2002. ENSR 06890-220-302.

ENSR, 2002. Site Characterization and Risk Assessments for the Old Bleach Plant Ditch Area, June 2002. ENSR 06890-220-308.

ENSR, 2002. Site Characterization and Risk Assessments for the Main Mill Area, September 2002. ENSR 06890-220-309.

ENSR, 2002. Executive Summary, VRAP Site Characterization and Risk Assessments. September 2002. ENSR 06890-220-610.

ENSR, 2002. VPDES Groundwater Monitoring Plan, September 2002. ENSR 6890-280-005.

ENSR, 2006. Groundwater Evaluation and Proposal to Reduce Corrective Action Groundwater Monitoring at Franklin Mill. January. ENSR 06890-390-700.

ENSR, 2007 Facility Lead Corrective Action Groundwater Monitoring Program 2004-2006 Summary Report. February. ENSR 06890-436-700.

ENSR, 2007. Completion of Assessment at North End of the Mill US EPA Facility Lead Program. February. ENSR 06890-436-700.

ENSR, 2007. Assessment of International Paper Lumber Mill. April. ENSR 06890-505-100.

EPA, 1997. Hazardous Waste Post-Closure Care Permit for International Paper Lime Mud Pond No. 4. October.

EPA, 2003. Final Class 3 Permit Modification for Post Closure Care for International Paper Company, Franklin, VA. September 30.

**Groundwater Monitoring Programs:**

No. 4 LMP Quarterly/Semi-annual Groundwater Monitoring. Quarterly 1997-2002, Semi-annual 2003-2007. Results are summarized in semi-annual/annual reports.

Site-wide Corrective Action Quarterly/Semi-annual Groundwater Sampling. Quarterly 2004-2005, Semi-annual 2006. Results are summarized in quarterly/semi-annual letter reports, the 2006 Groundwater Evaluation and Proposal to Reduce Corrective Action Groundwater Monitoring at Franklin Mill, and the 2007 Facility Lead Corrective Action Groundwater Monitoring Program 2004 – 2006 Summary Report.

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2. Is **groundwater** known or reasonably suspected to be “**contaminated**”<sup>1</sup> 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):**

International Paper has conducted groundwater investigations at the Mill since 1997 and completed a three-year Corrective Action groundwater monitoring program under the EPA Region III Facility Lead Program in 2006. In addition, the groundwater in the No. 4 Lime Mud Pond area has been monitored since 1985 and has been monitored under a Post Closure Care Permit since 1997.

The groundwater in the shallow aquifer, which is the only aquifer impacted by the Mill, is not currently used in the area of the Mill and, therefore, there is no current exposure via drinking water. Additionally, all groundwater on site flows to the nearest adjacent surface water body and does not have the potential to impact any public or private water supply. Although established to be protective of drinking water, the appropriately protective levels are Maximum Contaminant Levels (MCLs).

Appropriately protective levels for the No. 4 Lime Mud Pond are the groundwater protection standards (GWPS) established in the Post Closure Care Permit by the Virginia Department of Environmental Quality (VDEQ).

A comparison of groundwater sampling results against the appropriately protective levels shows that the constituents of concern appear to be primarily metals which were not typically used or released at the Mill. These metals were likely mobilized into the groundwater due to the presence of organic materials and the use of high and low pH materials at the Mill.

The only non-metal exceeding an appropriately protective level is benzene. Benzene exceedances are related to historical disposal practices at SWMU 4 – Former Tall Oil Impoundments and SWMU 5 – Highground (former landfill) area. Soils at the Former Tall Oil Impoundments have been remediated by excavation and removal from the site. The Highground has been closed in accordance with Virginia Solid Waste Regulations.

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Groundwater monitoring has shown that there are six constituents that exceed appropriately protective levels and that exceedances are found in a total of six SWMUs or Areas (see the table below). The site-specific risk assessments prepared for each SWMU or Area indicate that potential exposure to groundwater does not pose unacceptable risks to human or ecological receptors.

No site-specific risk assessment was conducted for the No. 4 Lime Mud Pond. Monitoring and remedial actions are performed at this SWMU under a VDEQ Post Closure Care Permit.

<b>SWMU/Area</b>	<b>Constituents Exceeding Appropriately Protective Level <sup>(1)</sup></b>	<b>Appropriately Protective Level (ug/L)</b>	<b>Remedy Implemented</b>
SWMU 1 – Lime Mud Pond No. 4	Arsenic	10	Monitoring and remedial actions are being performed at this SWMU under a VDEQ Post Closure Care Permit.
	Chromium	100	
	Vanadium	28.1	
SWMU 2A – Lime Mud Pond No. 1	Arsenic	10	Lime mud was removed from this former impoundment in 1980. Currently, most of the area is either under the Customer Service Building or under pavement.
	Chromium	100	
	Lead	15	
SWMU 4 – Former Tall Oil Impoundments	Arsenic	10	Tall oil and soils (9,519 tons) were removed to risk-based concentrations.
	Beryllium	4	
	Benzene	5	
SWMU 5 – Highground	Arsenic	10	This former landfill was closed and capped in 1987 following the VDEQ industrial landfill closure regulations.
	Beryllium	4	
	Chromium	100	
	Benzene	5	

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SWMU 8 – Effluent Treatment System	Arsenic	10	This area is currently monitored under a VPDES permit-required plan.
	Lead	15	
Mill Process Area	Arsenic	10	
	Antimony	6	
	Chromium	100	

(1) Constituents exceeding appropriately protective levels were defined to be constituents with more than two exceedances, unless exceedances were part of an increasing trend. Appropriately protective levels for the No. 4 Lime Mud Pond are the groundwater protection standards (GWPS) established in the Post Closure Care Permit by VDEQ. For Corrective Action, the appropriately protective levels are MCLs.

SUPPORTING DOCUMENTATION: Please refer to Question 1.

Footnotes:

<sup>1</sup>“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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3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within “existing area of contaminated groundwater”<sup>2</sup> 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”<sup>2</sup>).

\_\_\_\_\_ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the existing area of groundwater contamination”<sup>2</sup>) – 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):**

As stated in Question 2, five SWMUs and one Area (SWMU 1 – No. 4 Lime Mud Pond, SWMU 2a – No. 1 Lime Mud Pond, SWMU 4 – Former Tall Oil Impoundments, SWMU 5 – Highground, SWMU 8 – Wastewater Treatment System, and the Mill Process Area) have exceedances of appropriately protective levels. These exceedances have all been delineated to locations with concentrations below appropriately protective levels (Mill Process Area) or to a receiving surface water body (No. 4 Lime Mud Pond, No. 1 Lime Mud Pond, Former Tall Oil Impoundments, Highground, and Wastewater Treatment System).

Groundwater concentrations of the constituents of concern have shown relatively consistent or declining results over the sampling period. Based on the period of record (1997 to 2006) and the frequent sampling during 2004, 2005, and 2006, the migration of contaminated groundwater is stable (or is declining) at each of these units. Additionally, the risk assessments showed no significant risk from exposure to groundwater.

Hydrogeologic studies at the site have shown that the water table aquifer is underlain by 30 to 60 feet of clay that is regionally called the Yorktown Confining Layer. This clay layer is an effective confining layer that prevents the downward migration of site-related constituents. Therefore, contaminated groundwater is not migrating vertically.

SUPPORTING DOCUMENTS: Please refer to Question 1.

<sup>2</sup>“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

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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.

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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):**

Of the six SWMUs/Areas where concentrations of constituents in groundwater are present above appropriately protective levels (SWMU 1 – No. 4 Lime Mud Pond, SWMU 2a – No. 1 Lime Mud Pond, SWMU 4 – Former Tall Oil Impoundments, SWMU 5 – Highground, SWMU 8 – Wastewater Treatment System, and the Mill Process Area), groundwater discharges to surface water at concentrations above appropriately protective levels at three SWMUs (SWMU 4 – Former Tall Oil Impoundments, SWMU 5 – Highground, SWMU 8 – Wastewater Treatment System). Groundwater from the other three SWMUs/Areas (SWMU 1 – No. 4 Lime Mud Pond, SWMU 2a – No. 1 Lime Mud Pond, and the Mill Process Area) reaches appropriately protective levels prior to discharging to adjacent surface water bodies. Groundwater from SWMU 1 – the No. 4 Lime Mud Pond discharges to the B-1 Pond, one of the ponds in International Paper’s wastewater treatment system. However, B-1 Pond is part of the Virginia Pollution Discharge Elimination System (VPDES) permitted wastewater treatment system and is not considered a surface water body for the purpose of this EI evaluation.

Groundwater from SWMU 4 – Former Tall Oil Impoundments and SWMU 5 – Highground, discharges to Washole Creek; and groundwater from SWMU 8 – Wastewater Treatment System, discharges to the Blackwater River. For the Former Tall Oil Impoundments and Highground, the constituents in groundwater that discharge to surface water above appropriately protective levels are less than 10 times these levels and, therefore, are unlikely to increase the potential for unacceptable impacts to the environment. Furthermore, in the risk assessments for each of the SWMUs, dilution factors specific to each unit were calculated, and in all cases the dilution factor was 10 or greater and there was no significant risk from the groundwater discharging to surface water bodies. Within SWMU 8, only one location showed constituent (arsenic) concentrations greater than 10 times the appropriately protective level. This location is one of three locations downgradient of the ASB that is monitored under the VPDES Permit. The VPDES Permit uses the VDEQ-accepted surface water screening level of 190 ug/L and the State recommended  $7Q_{10}$  groundwater flow dilution factor of 10.4 to calculate the maximum allowable groundwater concentration for arsenic (1976 ug/L), which is well above the arsenic concentrations in the SMWU 8 location.

SUPPORTING DOCUMENTS: Please refer to Question 1.



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5. Is the **discharge** of “contaminated” groundwater into surface water likely to be “**insignificant**” (i.e., the maximum concentration<sup>3</sup> 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?)

\_\_\_\_\_ 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<sup>3</sup> 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 judgement/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<sup>3</sup> 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<sup>3</sup> 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):**

The discharge of “contaminated” groundwater into surface water is likely to be “insignificant” at all but one location in SWMU 8 – Wastewater Treatment System where one constituent’s (arsenic) concentration exceed 10 times the appropriately protective level. However, the constituent’s concentrations at this location, which is monitored under the VPDES Permit, are well below the maximum allowable groundwater concentration allowed by that Permit.

The groundwater constituents detected at concentrations above appropriately protective levels at SWMU 4 – Former Tall Oil Impoundments, and at SWMU 5 – Highground are all less than 10 times these levels. Additionally, in the risk assessments for each of the SWMUs, dilution factors specific to each unit were calculated, and in all cases the dilution factor was 10 or greater and there was no significant risk from the groundwater

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discharging to surface water bodies. At SWMU 8 – Wastewater Treatment System, although there is one location where one constituent (arsenic) exceeds 10 times the appropriately protective level, this location is monitored under a VPDES Permit. The VPDES Permit uses the VDEQ-accepted surface water screening level of 190 ug/L and the State recommended  $7Q_{10}$  groundwater flow dilution factor of 10.4 to calculate the maximum allowable groundwater concentration for arsenic (1976 ug/L), which is well above the arsenic concentrations in the SMWU 8 location.

SUPPORTING DOCUMENTS: Please refer to Question 1.

<sup>3</sup>As Measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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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<sup>4</sup>)?

  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,<sup>5</sup> 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):**

There is only one location which showed constituent (arsenic) concentrations greater than 10 times the appropriately protective level. As stated in Questions 4 and 5, this location is one of three locations downgradient of the ASB that is also monitored under the Mill’s VPDES Permit. The VPDES Permit uses the VDEQ-accepted surface water screening level of 190 ug/L and the State recommended  $7Q_{10}$  groundwater flow dilution factor of 10.4 to calculate the maximum allowable groundwater concentration for arsenic (1976 ug/L), which is well above the arsenic concentrations in the SMWU 8 location. In all other sampling locations, constituent concentrations are less than 10 times the appropriately protective level.

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Human health and/or ecological risk assessments have been performed at the various Areas and SWMUs at the Franklin Mill (see “Supporting Documents” referred to in Question 1) and specifically both human health and ecological risk assessments have been performed for two SWMUs (SWMU 4 – Former Tall Oil Impoundments, and at SWMU 5 – Highground) that have discharges to a surface water body at concentrations above appropriately protective levels but less than 10 times the this level. The conclusions of these two risk assessments are that these discharges are not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system. For SWMU 8 – Wastewater Treatment System, although there is one location where one constituent (arsenic) exceeds 10 times the appropriately protective level, this location is monitored under a VPDES Permit where the maximum allowable groundwater concentration is well above the arsenic concentrations in this location. Therefore, the discharge of “contaminated” groundwater into surface water is “currently acceptable.”

SUPPORTING DOCUMENTS: Please refer to Question 1.

<sup>4</sup>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.

<sup>5</sup>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.

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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?”

  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):**

International Paper will continue to conduct groundwater sampling at the wastewater treatment system, downgradient of the ASB at SWMU 8 under the Mill's VDEQ VPDES monitoring plan. The No. 4 Lime Mud Pond will continue to be monitored under the Mill's Post-Closure Care permit for this SWMU. Monitoring of other areas will be determined in consultation with EPA following EPA's review of IP's risk assessment submittals.

SUPPORTING DOCUMENTS: Please refer to Question 1.



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Locations where References may be found:

Contact telephone and e-mail numbers:

(name) Denis M. Zielinski

(phone #) (215) 814-3431

(e-mail) zielinski.denis@epa.gov

