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:	Firestone Industrial Products Company
Facility Address:	1700 Firestone Boulevard
Facility EPA ID #:	IND 006 418 263

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):

Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was conducted at Firestone Industrial Products Company from July 1990 to June 1991, in accordance with the Administrative Order on Consent (AOC) signed on June 20, 1990. Interim Measures and Phase II investigations have been conducted from October 1991 to present. Interim corrective measures included the installation of the groundwater extraction and treatment system, off-site residential well sampling program, oil/solvent mixture removal, and contaminated residential soil removal. The RCRA Facility Investigation, RFI, was submitted in April 1993 and U.S. EPA approved it in May 1994. Firestone submitted the Corrective Measure Study (CMS) in July 1998. The U. S. EPA approved the CMS in July 1999.

Tetrachloroethene (PCE) and its chemical degradation products; trichloroethene (TCE), *cis*- and *trans*- 1,2-dichloroethene (DCE), and vinyl chloride (VC), have been documented in the groundwater beneath, and in the vicinity of, the facility. There has been groundwater contamination west of the West Landfill and southwest of the South Landfill both on and off site. The primary off site constituents have consistently been *cis*-1,2-dichloroethene and vinyl chloride. A low level of trans-1,2-dichloroethene has also been detected off site. Contamination has been highest in the shallow aquifer with lower levels of constituents found in the deep aquifer. The RFI included an investigation of the bedrock which did not present contamination or extensive fracturing.

The following tables outline data collected from on site and off site monitoring wells. Attached is a map illustrating the locations of off site monitoring wells in relation to the rest of the facility, in addition to a brief description of those wells and their relation to the plume. A second map is provided with the off site monitoring wells' shallow groundwater data from 2003-2004. All data from February 2004 represents the effect of the groundwater extraction system's upgrade, an additional extraction well in the South Landfill, which was installed in December 2003.

[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).

On-Site Shallow* Monitoring Wells

Groundwater Cont.	Max. Conc. (ppb) 1990	Max. Conc. (ppb) 2001	MCLs (ppb)
Tetrachloroethene (PCE)	100,000	12,000	5.0
1,2-Dichloroethene (1,2-DCE)	300,000 (total)	3500 (cis-), 33 (trans-)	70 (cis-), 100 (trans-)
Trichloroethene (TCE)	7,900	1,200	5.0
Vinyl Chloride (VC)	19,000	500	2.0

On-Site Deep Monitoring Wells**

Groundwater Cont.	Max. Conc. (ppb) 1990	Max. Conc. (ppb) 2001	MCLs (ppb)
PCE	23	N/A***	5.0
1,2-DCE	66 (cis-)	100 (cis-)	70
TCE	0.45	N/A***	5.0
VC	91	77	2.0

Off-Site Shallow Monitoring Wells

Groundwater Cont.	Max. Con. (ppb) July 2003	Max. Conc. (ppb) Nov 2003	Max. Conc. (ppb) Feb 2004	MCLs (ppb)
cis-1,2-DCE	770	740	700	70
trans-1,2-DCE	32	5.6	N/D	100
VC	280	150	39	2.0

Off-Site Deep Monitoring Wells

Groundwater Cont.	Max. Conc. (ppb) July 2003	Max. Conc. (ppb) Nov 2003	Max. Conc. (ppb) Feb 2004	MCLs (ppb)
cis-1,2-DCE	35	37	45	70
VC	170	170	100	2.0

*shallow wells are screened at the water table
**deep wells are screened at bedrock which varies from 30'-150' below ground level
***not detected in those wells which were sampled, not all wells were re-sampled due to groundwater draw down
MCLs: Maximum Contaminant Levels (Action Levels)

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):

Since February 1993, Firestone has operated a high-volume groundwater extraction and treatment system to capture and clean groundwater that contains residual constituents released from the facility. The groundwater is treated by air stripping, and the purified groundwater is discharged into Wilson Ditch pursuant to a permit issued by the Indiana Department of Environmental Management. The extraction system was recently upgraded with the addition of a fourth extraction well in December 2003, effectively increasing the quantity of groundwater captured and stabilizing the migration. The inward hydraulic gradient produced by the extraction wells serves as a protective barrier which restricts the contaminants from traveling off site. Attached are maps representing the shallow groundwater plume's migration off site from 2003-2004. Additionally, deep well data can be seen on the map displaying the compiled monitoring well data from 2002-2004. Groundwater contamination in the deep aquifer, located near bedrock between 30'-150' below ground level, is following the downward trend apparent in the shallow aquifer, although at a slower rate. Data collected in February 2004 confirms that the upgrade to the extraction system not only stabilized the migration of the plume, but it is also capturing the contamination that had historically migrated off site.

[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?

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

__X__ 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):

Before Firestone initiated the groundwater extraction system, groundwater elevations immediately adjacent to Wilson Ditch were consistently observed to be above the level of water in the Ditch. Groundwater migrated upward and entered the Ditch through its bottom and lower banks, Wilson Ditch at this time was a gaining stream. Operation of the groundwater extraction system has eliminated the movement of released constituents into the on-site portion of Wilson Ditch. Adjacent groundwater elevations have been reduced to such an extent that they are now consistently below the level of the water in the Ditch. Wilson Ditch is now a losing stream, as water flows from the Ditch to the groundwater and thereafter to the extraction and treatment system. Additionally, surface water samples in off site portions of Wilson Ditch were re-sampled in October 2003 and found no contamination. There are no other bodies of surface water within the area of the contaminated groundwater.

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 <u>key</u> 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

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

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 <u>each</u> 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):

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

[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.

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):

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):

As stated in the RCRA 3008(h) Consent Order, Section VIII paragraph 18, "Bridgestone/Firestone will continue operating the groundwater extraction and treatment system until the groundwater achieves the cleanup objectives stated in the Corrective Measures Study, Corrective Measures Study Addendum, Statement of Basis and Final Decision." The Statement of Basis outlines those objectives as such, "The groundwater extraction and treatment system will be modified as needed to maintain the plume on site and will continue operating until chlorinated solvent concentrations in the groundwater are below MCLs." The consent order requires Firestone to monitor the concentrations and remediation effectiveness, flow direction(s), and areal extent of the contaminated groundwater plume through quarterly sampling of the existing network of monitoring wells as well as new monitoring wells to be installed if necessary (as approved by U.S. EPA). The existing network of monitoring wells include off-site monitoring wells 1-7 in addition to the facility's on-site monitoring wells. The quarterly sampling of these wells will continue until the groundwater contamination has achieved and sustained Maximum Contamination Levels.

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 Firestone Industrial Products Company in Noblesville, IN. 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) Michelle Kaysen-Majack

(title) Environmental Scientist

Supervisor (signature) _____ Date _____

(print)

(title)

(EPA Region or State) Region 5

Locations where References may be found:

U.S. EPA Region 5
7th Floor Records Center
77 W. Jackson, Blvd.
Chicago, IL 60604

Contact telephone and e-mail numbers

(name) Michelle Kaysen-Majack
(phone #) (312) 886-4253
(e-mail) majack.michelle@epa.gov