**DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION**

Interim Final 2/5/99
**Revised 11/8/00**

**RCRA Corrective Action**
**Environmental Indicator (EI) RCRIS Code (CA750)**

**Migration of Contaminated Groundwater Under Control**

**Facility Name:** **Townsend Industries**
**Facility Address:** **4400 Vandalia Road**
**Facility EPA ID #:** **IAD005277231**

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.

SWMUs and AOCs identified at Townsend Industries to date are described below (CH2MHill 1994). Attachment 1 shows the locations of the SWMUs and AOCs.

SWMU/AOC 1, Container Storage Area A: Container storage area A is located outside, under the overhead transfer piping at the northeast corner of the main warehouse. This is an open, undiked area used to store empty 55-gallon drums.

SWMU/AOC 2, Storage Tank Area A: Storage tank area A is located at the northwest corner of the main warehouse and is enclosed within a concrete dike. Storage tank area A contained one storage tank that had possibly contained one load of 2,4-dichlorophenoxyacetic acid (2,4-D). The tank was emptied into drums and then cleaned.

SWMU/AOC 3, Storage Tank Area B: Storage tank area B is located to the north of the main warehouse. Nine vertical storage tanks sit on top of a concrete pad that is enclosed by a concrete dike. Probable constituents include isopropyl alcohol, methyl ethyl keytone (MEK), odorless mineral spirit solvents, 1,1,1-trichloroethane (1,1,1 TCA), xylene, toluene, methanol, methyl butyl keytone (MBK), hexane, and a ketone blend. This area also includes four storage tanks located in an undiked area. Three horizontal storage tanks contained methylene chloride, and possibly TCE. One 6,000 gallon vertical tank contained tetrachloroethene (PCE).

SWMU/AOC 4, Container Storage Area B: This area was a hazardous waste storage area operated by Thompson-Hayward Chemical Company (THCC) prior to 1983. The area contained drums of waste that were stored onsite until a reclaimer could recycle it.

SWMU/AOC 5, 1983 Soil Waste Pile: A tank truck containing contaminated soil spilled in 1983 at an offsite location. Resulting contaminated soil contained acetone, MEK, PCE, xylene, 1,1,1-TCA, and mineral spirits. The soil was excavated from the spill area and transported to the Townsend site. The soil was stored for about 2 weeks in a lined area south of the main building. About 60 tons of soil was disposed of at a hazardous waste facility, following storage.

SWMU/AOC 6, Loading/unloading Areas: The loading/unloading area is located at the south side of the main warehouse and may have had hazardous substances spilled during handling procedures.

SWMU/AOC 7, The Warehouse Mud Pit Drain Line: According to CH2MHill 1994, an area known as the Warehouse Mud Pit Drain Line had been previously identified. However, no supporting documentation or figure has been found to describe this area, and it was not included in the RCRA Facility Investigation (RFI).

SWMU/AOC 8, 2,4-D Spill: According to the RFI, at some point in the past 2,4-D was spilled and the spill material ponded in an area at the northwest corner of container storage area B. The exact dimensions and volume of the spill are unknown.

## BACKGROUND

### Definition of Environmental Indicators (for 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 EIs 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 EIs 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 groundwater 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 Determination status codes should remain in RCRA Info national database ONLY as long as they remain true (i.e., RCRA Info 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 risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria [e.g., Maximum Contaminant Levels (MCLs), the maximum permissible level of a contaminant in water delivered to any user of a public water system under the Safe Drinking Water Act] from releases subject to RCRA Corrective Action (from SWMUs, RUs, or AOCs)?

__**X**__ If yes - continued 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): The site is located at 4400 Vandalia Road in Pleasant Hill, Iowa, which is an industrial and agricultural area southeast of the City of Des Moines, Iowa. Three owners have occupied the site property since 1944. Phillips Petroleum Company owned the site from 1944 to 1972. Jacobson Warehouse Company (also known as Richard O. Jacobson) owned the property from 1972 to 1987, and Townsend Industries, Inc. has owned the property from 1987 until the present.

Little detail is known about the previous two owners. It is known that Phillips Petroleum Company stored and distributed petroleum products at the site. Jacobson Warehouse Company reportedly stored agricultural chemicals at the site. They leased the building to THCC from June 1975 to June 1985. THCC used the site to store and distribute agricultural, industrial, laundry, and dry cleaning chemicals, and stored spent solvents generated off-site by customers. The spent solvents were shipped offsite to a reclaimer. Chemicals stored at the site included acetone, MEK, toluene, xylenes, mineral spirits, methyl alcohol, isopropyl alcohol, PCE, TCE, and 1,1,1-TCA. Townsend Industries currently manufactures acrylic tubing. The only hazardous wastes generated at the Townsend facility are of degreasing solvents that are used for cleaning and maintenance of machinery parts within the main building. A private contractor manages and disposes of the waste.

Groundwater was most recently sampled in October 2000 (CH2MHill 2001). Three contaminants were found in offsite groundwater. These included PCE, TCE, and TCA. However, biodegradation by anaerobic reductive dehalogenation is transforming these compounds into 1,2-dichloroethene (1,2-DCE), 1,1-dichloroethane (1,1-DCA), vinyl chloride (VC), 1,1-dichloroethene (1,1-DCE), chloroethane (CLEA), and ethane. Table 1 shows the amount of time for natural attenuation to reduce concentrations below MCLs. Contaminant concentrations and distributions are shown in Attachment 2.

TABLE 1

GROUNDWATER CONTAMINANTS, CONCENTRATIONS,
AND THE ESTIMATED NUMBER OF YEARS BEFORE CONTAMINANT LEVELS
ARE BELOW MCLs AT TOWNSEND INDUSTRIES

| Compound | MCL (µg/L) | Maximum Concentration µg/L | Number of Years before Concentrations are Below MCL using Natural Attenuation | Number of Years before Concentrations are Below MCL using Biodegradation rates |
|---|---|---|---|---|
| PCE | 5 | 19 | 1 | Not Applicable |
| TCE | 5 | 8.5 | 3 | Not Applicable |
| TCA | 200 | 5 | 0 | Not Applicable |
| cis-1,2-DCE | 70 | 2,600 | 5 | 10 |
| VC | 2 | 1,100 | 10 | 21 |

Modified from CH2MHill (2001)

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 appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

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): Data was recently collected by CH2MHill (2001) to evaluate groundwater contaminant concentrations, migration, and biodegradation. Data for dissolved oxygen, oxidation-reduction potential, iron, sulfate, and methane indicate that iron-reducing conditions predominate throughout the area where chlorinated volatile organic contaminants (CVOC) have been detected. Methanogenic conditions that are optimal for reductive dechlorination exist above background concentrations. Although the methane concentrations are not at the preferred concentration to indicate anaerobic biodegradation (> 0.5 milligrams per liter), the levels of other natural attenuation parameters provide evidence that anaerobic biodegradation processes are occurring (CH2MHill 2001).

Data also indicates that conditions are increasingly oxidizing at the edges of the area of CVOC detections, which is less conducive to CVOC dehalogenation, but more suitable for direct oxidation of VC by iron reduction or aerobic biodegradation. See Attachment 3 for a summary of conditions that limit or support natural attenuation processes.

In addition to the above referenced processes, the horizontal and vertical extent of chemical constituents in groundwater is well-defined for the site (CH2MHill 2000). The upper 4 to 7 feet of soil beneath the site is clay with low permeability. Beneath the clay layer is a sand and gravel aquifer that extends 35 to 40 feet below ground surface (bgs). Below this aquifer is the regional aquitard. These conditions have resulted in contamination in groundwater limits largely to within the Townsend Industries boundary or offsite directly downgradient (CH2MHill 2000). In addition, a soil bentonite containment wall (SBCW) has been constructed around the site to surround a dense non-aqueous phase liquid (DNAPL) zone and the highest concentrations of dissolved groundwater constituents. The SBCW was constructed during the summer of 1995 and surrounds the site property with a low-permeable cutoff wall keyed into bedrock at a depth of about 40 feet below ground surface. This wall acts as a physical barrier to inhibit DNAPL migration or further migration of groundwater containing dissolved VOCs from the property. A final cover was placed over the SBCW alignment to minimize the infiltration of precipitation into the SBCW, restore the site to preconstruction conditions, and decrease the amount of ponded water that accumulates onsite (CH2MHill 2000). Off-site CVOC concentrations are decreasing from natural attenuation processes and the length of the area where dissolved phase CVOC have been detected, has stabilized to an estimated 3,000 feet (including onsite portions). Concentrations of CVOCs have decreased by an order of magnitude at the piezometer located nearest the SBCW (PZ-18S) since the installation of the SBCW.

A gradient control treatment system (GCTS) has also been installed at the facility to extract groundwater from within the SBCW to obtain an inward hydraulic gradient across the SBCW. The GCTS was installed within the SBCW to remove and treat the volume of groundwater required to obtain an overall inward hydraulic gradient across the SBCW. The frequency of

operation of the GCTS is based on the hydraulic response of groundwater levels within the SBCW to pumping and to groundwater conditions external to the SBCW (CH2MHill 2000).

[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): Surface water sampling has been conducted in Four Mile Creek. The samples collected from the surface water sampling in Four Mile Creek detected one VOC in the five surface water samples collected. The only VOC detected was 1,1,2,2-PCA at an estimated value of 0.7 µg/L.

Five sediment samples were also collected in Four Mile Creek near the location of each surface water sample. Only one contaminant was detected at a concentration that was not estimated MEK at 27 µg/L [as reported by CH2MHill 1994]). MEK has not been detected in groundwater samples in any offsite wells near the creek and the sample containing MEK was taken at the most downstream sampling location. Therefore, the constituents' presence cannot be directly attributed to the site but may be attributed to activity at any of the other industries south of the site (CH2MHill 1994).

Sediment samples have also been collected from the drainage ditch that forms the southern boundary of Townsend Industries, north of Vandalia Road. The only constituents detected were at estimated concentrations. The constituents included benzene at 0.8J mg/L and xylene at 1J µg/L. These are constituents that are associated with hydrocarbon sites and may be ubiquitous in the area because of previous ownership of the site and petroleum distributions and automobile salvage on adjacent properties.

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 the appropriate groundwater "level," and there are no other conditions (e.g., the nature

or 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)?

__x__ 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 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.

_____ 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 the 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): Monitoring well cluster MW-13 is located very close to Four Mile Creek. Samples collected in October 2000 from this well contained a concentration of cis-1,2-DCE up to 2,600 µg/L and a concentration of vinyl chloride up to 1,100 µg/L. Groundwater in the vicinity of this well potentially discharges to the creek. However, the surface water is not used as a drinking water source. Therefore, values other than MCLs are appropriate for use in an analysis of potential impact for potentially discharging groundwater. Great Lakes Program Tier II values for aquatic life were used as a comparison for cis-1,2-DCE. The secondary acute and chronic values for cis-1,2-DCE are 1,100 and 590 µg/L respectively. In order for groundwater concentrations at this well to be of concern as it discharges to surface water, it should be at least "10 times appropriate groundwater levels". Levels of DCE in groundwater are less than this, therefore no significant impact is likely in the creek. Vinyl chloride did not have Tier II value to use in a comparison. Vinyl chloride has a highly volatile nature upon entering surface water bodies, and is therefore not expected to impact the creek. Therefore, DCE and vinyl chloride are not expected to impact aquatic life in the adjacent surface water body.

Past surface water sampling has not detected significant levels of potential contaminants. Surface water sampling has only detected estimated concentrations of 1,1,2,2-PCA at 0.7J µg/L. No MCL has been established by the EPA for this constituent. Iowa's statewide protected groundwater level for 1,1,2,2-PCA is 70 µg/L, which is well above the detected concentration. MEK has been detected in the Four Mile Creek sediments at concentrations of 27 µg/L. There are no state or federal sediment criteria for MEK. It should be noted that MCL has been

established for this constituent, but Iowa's statewide protected groundwater level for MEK is 4,200 µg/L. Benzene and xylene were detected in drainage ditch samples at estimated concentrations 0.8J µg/L and 1J µg/L respectively. The MCL and Iowa's statewide protected groundwater level for benzene is 5 µg/L. The MCL and Iowa's statewide protected groundwater level for xylene is 2,000 µg/L, well above the detected concentrations.

[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 specialist(s), 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 cannot 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-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): According to CH2MHill (2000), the DNAPL and area of highest VOC contamination will continue to be physically and hydraulically contained and controlled through the use of the SBCW and GCTS. Groundwater will be monitored on a semi-annual basis of a select group of monitoring wells to observe the natural attenuation process of contaminants and to establish the continued effectiveness of the SBCW and the GCTS. In addition, a treatment process using UV-oxidation with hydrogen peroxide as a treatment technology for groundwater extracted by the GCTS will be used.

8. Check the appropriate RCRA Info 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 Townsend Industry facility, EPA ID # IAD005277231, located at 4400 Vandalia Road in Pleasant Hill, Iowa. 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) Original signed by Date _8/31/01____
(print) Wray R. Rohrman
(title) Project Manager

Supervisor (signature) Original signed by Date _8/31/01____
(print) John Smith
(title) Chief, RCAP Branch
(EPA Region or State) USEPA Region 7

Locations where References may be found:

_____USEPA Region 7 Records Center_____
_____901 North 5th Street_____
_____Kansas City,KS 66101_____
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REFERENCES

CH2MHill. 1994. Resource Conservation and Recovery Act Facilities Investigation Report, Volume 1 of 2-Text and Figures. Prepared for Submittal to the United States Environmental Protection Agency (EPA) on Behalf of T H Agriculture and Nutrition Company, Inc.; Harcros Chemicals Inc.; Townsend Industries, Inc. December.

CH2MHill. 2000. Corrective Measures Study Report; Tasks IX and X. Prepared for Submittal to the U.S. Environmental Protection Agency. October. CH2MHill. 2001. Letter from CH2MHill to Mr. Randy Rohrman, Project Coordinator Regarding October 2000 Groundwater Monitoring Results and Natural Attenuation Evaluation. February 26.

ATTACHMENT 1

LOCATIONS OF SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

(One Page)

ATTACHMENT 2

CONTAMINANT CONCENTRATIONS AND DISTRIBUTIONS IN GROUNDWATER

(Five Pages)

ATTACHMENT 3

SUMMARY OF NATURAL ATTENUATION PROCESSES

(One Page)