

**Documentation of Environmental Indicator Determination  
in Accordance with EPA Interim Final Guidance 2/5/99**

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

**Migration of Contaminated Groundwater Under Control**

Facility Name: Crown Cork & Seal Company, Inc.

Facility Address: 4133 South 72nd Street - Omaha, Nebraska 68127

Facility EPA ID #: NED007263353

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

- If yes - check here and continue with #2 below.
- If no - re-evaluate existing data, or
- If data are not available, skip to #8 and enter "IN" (more information needed) status code.

**BACKGROUND**

**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 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**"<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?

- 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):

*Groundwater monitoring at the facility began in October 1987, with the installation of monitoring wells as part of a RCRA Facility Investigation (FRI). Additional wells have been installed and sampled as investigation activities at the site have proceeded. The monitoring well network has been sampled on a scheduled quarterly basis since the Second Quarter of 1995 as directed by the Nebraska Department of Environmental Quality (NDEQ). The*

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<sup>1</sup> "Contamination" and "contaminated" describes media-containing contaminants (in any form, NAPL and/or dissolve, 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).

*scheduled groundwater sampling was reduced to semiannual in 2001 in consultation with the NDEQ and USEPA.*

*Additional groundwater sampling has also been conducted since 1999 from new wells and temporary borings as part of an ongoing Focused RFI being conducted at the facility. The current monitoring well network and temporary boring locations are shown in relation to the facility on Figure 1. Several volatile organic compounds (VOCs) are driving virtually all of the environmental risk at the site. These include the following chemicals, which exceed the noted risk-based criteria:*

- *Toluene in excess of the MCL*
- *2-Butanone (MEK) in excess of EPA Region III risk-based table*
- *4-Methyl-2-Pentanone (MIBK) in excess of EPA Region III risk-based table*
- *Trichlorethene (TCE) in excess of MCL*
- *1,2-DCE in excess of MCL*
- *Vinyl chloride in excess of MCL*

*A tabulated summary of the recent analytical results for these compounds detected in permanent monitoring wells and temporary borings is included as Table 1.*

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)?

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

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<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 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.

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):

*Sampling results from monitoring wells and temporary borings installed at the site indicates that three separate groundwater plumes associated with specific AOCs and SWMUs are present. These include two plumes confined to the north half of the site, which primarily consist of non-chlorinated volatile organics (aromatics & ketones). A third plume (primarily TCE and its breakdown products) is located in the southern half of the facility and has migrated off-site.*

*A review of the long-term data trends for each of these plumes indicated that they are relatively stable. This review covered historical analytical results obtained on a regular schedule from the monitoring well network since 1995, and was submitted to the NDEQ and USEPA in February 2001. Concentration trends in most of the wells located within these plumes are steadily decreasing over time, which is consistent with the expected effect of corrective actions already implemented at the source areas (elimination of release points, removal of impacted soils & operation of a soil vapor extraction system).*

*Shallow groundwater has been shown to flow consistently to the south and southeast, based on depth to water measurements during all sampling events. Chemical analyses of the groundwater below the site have demonstrated that both the vertical and horizontal extent of impact to groundwater has been established. The boundaries of both non-chlorinated plumes in the north half of the site have not significantly changed over time. Migration of organic compounds within these northern plumes appears to be contained by the natural attenuation processes. Sampling at the leading edge of the groundwater plume south of the facility has demonstrated that the vertical and horizontal extent of the impact has been delineated. Chemical analyses of shallow groundwater in permanent monitoring wells and temporary borings installed at the southern edge of the plume have defined the leading edge of the measured impact attributable to Crown. Monitoring wells installed to monitor conditions immediately below the shallow groundwater in the Loveland Loess (MW-44D) and immediately below the Loveland Loess in the Kansan Aged unit (MW-43D) have demonstrated vertical and horizontal limits attributable to Crown.*

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

- If yes - continue after identifying potentially affected surface water bodies.
- If no - skip to #7 (and enter a “YE” status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that

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groundwater "contamination" does not enter surface water bodies.

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

Rationale and Reference(s):

*The only surface water bodies located within the area of known groundwater impact are intermittent flowing drainage ditches located in the southern section of the site (refer to Figure 1). Based on water level data from adjacent monitoring wells, the bottom elevations of these ditches are significantly above the groundwater table, and they cannot receive infiltration discharge from the shallow aquifer. In addition, this drainage ditch system was sampled for VOC analysis in September 1997. None of these surface water samples contained detectable amounts of VOCs and were clearly not being impacted by the TCE plume in the southern section of the site. These results were summarized and discussed in the Third Quarter of 1997 Groundwater Sampling Report, which was submitted to the NDEQ. Additional samples of surface water will be collected when conditions permit as part of the on-going Focused RFI being conducted at the facility.*

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 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)?

\_\_\_\_\_ 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.

\_\_\_\_\_ 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 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

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

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): \_\_\_\_\_

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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>)?

\_\_\_\_\_ 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 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-

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<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 encourage 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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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):

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

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

If no - enter “NO” status code in #8.

If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

*Continuing semi-annual groundwater monitoring is being conducted as described in the Sampling and Analysis Plan, Groundwater Monitoring for the facility dated June 6, 1995, as amended by the May 1, 2001 letter from NDEQ. This letter modified the original plan per Crown’s request to eliminate redundant or unnecessary monitoring locations and lessen the frequency of sampling. The wells, which have been included in the sampling program, have been reviewed and approved by the NDEQ and USEPA. In addition to the monitoring wells currently scheduled to be sampled on a routine basis, Crown will voluntarily include monitoring wells as necessary to verify the current delineation of the groundwater plumes. This scheduled sampling of select monitoring wells will verify that the groundwater plumes at the site are remaining stable.*

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

YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Crown Cork & Seal Company, Inc., facility, EPA ID # NED007263353 , located at 4133 South 72nd Street - Omaha, Nebraska. 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 9/11/02  
(Print) Kenneth S. Ritchey  
(Title) Project Manager

Supervisor: (Signature) Original signed by \_\_\_\_\_ Date 9/11/02  
(Print) William F. Lowe for John Smith  
(Title) Chief, RCAP Branch  
(EPA Region or State) EPA Region 7

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Locations where References may be found:

U.S. EPA Region VII Records Center, 901 N. 5<sup>th</sup> Street, Kansas City, KS 66101

Nebraska Department of Environmental Quality

Crown Cork & Seal Company, Inc.

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