

## 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:** Crown Central Petroleum Corporation  
**Facility Address:** 111 Red Bluff Road, Pasadena, Harris County, Texas 77506  
**Facility EPA ID #:** TXD008091290

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 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).

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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.

*Rational: Crown is required to complete HSWA corrective action requirements for nine (9) Solid Waste Management Units (SWMUs) listed in the Compliance Plan CP-50112 for which a RCRA Facility Investigation and/or necessary corrective action are required as result of release or potential release from SWMUs. Investigation results indicate that releases to groundwater have been confirmed from five Areas of Concern (consisting of Region 1 north of Tank 808, Region 2 north of Tank 824, Region 5 south of Storm water Pond, Region 6 near the Ship Docking on the Houston Ship Channel, and Region 7 near the Washburn Tunnel) and RCRA-regulated unit Ponds WMA (Groundwater Regions 3&4 consisting of Storm Water and Bauxite Pond). RFI reports indicate COCs such as volatile organic compounds (VOCs), SVOCs, PAHs and metals were detected in soil and groundwater, and assessment results confirm no off-site contamination. An interim baseline risk assessment was conducted as part of the affected property interim control measures implemented at the above SWMUs (e.g., surface cover/cap, soil removal (via excavation) near, access restrictions(fencing), and continued groundwater monitoring), no human exposures to affected soil or groundwater presently occur for the above area. Crown is seeking closure/remediation of the above referenced SWMUs, Areas of Concern, and RCRA-regulated WMA under Risk Reduction Standard (RRS) No. 3 [Alternate Concentration Limits (ACLs) which consist of MCLs or MSCs]. Groundwater investigation and semiannual groundwater monitoring reports required by the Compliance Plan CP-50112 indicate that the plumes are stable and shrinking. The 07-29-2002 Compliance Plan CP-50112 specifies the Ground-water Protections Standard (GWPS) for the COCs which have been detected in groundwater from releases at the above referenced units. The GWPS are based on the ACLs that are protective of human health and the environment. Crown is currently authorized to implement a RCRA Corrective Action Monitoring Program, which includes removal/extraction of light non-aqueous phase liquids (LNAPLs) and dissolved phased COCs via pump and treat, semi-annual monitoring and reporting of results, in accordance with applicable provisions of Compliance Plan No. CP-50112. The January 2004 semiannual report includes groundwater monitoring data verifying the whether COC concentration in groundwater are less than or greater than their respective GWPS. The following COCs exceed their respective GWPS : benzene detected at 15.0 mg/l (GWPS 0.006mg/l), ethyl benzene detected at 0.997 mg/l (GWPS 0.700 mg/l), and toluene detected at 227 mg/l (GWPS 1.0 mg/l).*

*References: RCRA Hazardous Waste Compliance Plan dated 07-29-2002 and Semiannual Groundwater Report, dated 01-20-2004.*

**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: Crown is currently authorized to implement a RCRA Corrective Action Monitoring Program, which includes removal/extraction of light non-aqueous phase liquids (LNAPLs) and dissolved phased COCs via pump and treat, semi-annual monitoring and reporting of results, in accordance with applicable provisions of Compliance Plan No. CP-50112. The January 2004 semiannual report includes groundwater monitoring data from July 2003 verifying the concentration of COCs in groundwater monitoring wells are either less than their respective GWPS, or COC concentrations exceeding the GWPS at point of compliance wells are sporadically detected or declining, indicating the plume has stabilized and is shrinking.*

*References: RCRA Hazardous Waste Compliance Plan dated 07-29-2002 and Semiannual Groundwater Report, dated 01-20-2004.*

<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.

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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: Groundwater investigation and semiannual groundwater monitoring reports as required by the Compliance Plan CP-50112 indicate that the plumes are stable and shrinking at the RCRA-regulated unit Ponds WMA and the five Areas of Concern. Groundwater monitoring results provided in the January 2004 semiannual report indicate no offsite impacts.*

*Reference(s): RCRA Hazardous Waste Compliance Plan dated 07-29-2002, Semiannual Groundwater Report, dated 01-20-2004 and RFI Reports dated 1999, 2000 and 2003.*

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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.

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

<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>)?

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

<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?”

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): *Crown’s Compliance Plan CP-50112 requires the facility to operate a corrective action and groundwater monitoring program which requires semiannual sampling events and submittal of semiannual monitoring reports to the TCEQ. The monitoring program includes sampling of point of compliance wells, background and corrective action observation wells which is presented in the January 2004 Semiannual groundwater monitoring report.*



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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 Central Petroleum Corporation facility, EPA ID # TXD00S091290, located at Pasadena, Harris County, Texas. 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) Maureen Hatfield Date: April 29, 2004  
(print) Maureen Hatfield  
(title) Project Manager

Supervisor (signature) Donald N. Boothby Date: April 29, 2004  
(print) Donald Boothby  
(title) Supervisor  
Texas Commission on Environmental Quality

Locations where References may be found:

TCEQ Central Records, Austin, Texas

Contact telephone and e-mail numbers

Project Manager listed above  
(512) 239-2343  
contact@tceq.state.tx.us

**Final Note:** The purpose of the Migration of Contaminated Groundwater EI is to verify that the groundwater plume is stable. A "YE" determination does not constitute a screening tool to end the corrective action process. The "YE" determination may be changed at any time as new information becomes available.

