**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:** **Tenneco Automotive**
**Facility Address:** **121 Meridian Avenue, Cozad, Nebraska 69130**
**Facility EPA ID #:** **NE007263619**

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.

## 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 [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, 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): *A Stipulation (Case No. 656) between Tenneco Automotive (formerly Monroe Auto Equipment Company) and the Nebraska Department of Environmental Quality (formerly the Nebraska Department of Environmental Control) identified a list of specific contaminants defining both groundwater and soil contamination at the Cozad facility. These contaminants are: Trichloroethylene (TCE), 1,1,1-Trichloroethane (TCA), 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethene, 1,2-Dichloroethene (Cis and Trans). Tetrachloroethene has also been detected in the groundwater. These contaminants are monitored periodically and are reported to both the NDEQ and the EPA. The results for the most recent comprehensive groundwater monitoring event, completed in October 1999, are discussed in the following paragraph. The results of this sampling event were transmitted to the EPA on January 31, 2000. The results are discussed in terms of total volatile organic contaminants (VOCs), which are the sum of the six contaminants previously identified.*

*The aquifer beneath the facility consists of an upper aquifer and a lower aquifer separated by an aquitard. There are 55 groundwater monitoring wells in the first formation encountered (this has been identified as the Grand Island formation and has been referred to as the alluvial aquifer). The deepest well is 32 feet below ground surface. The range of VOCs detected in these wells are from non-detect to 13.9 ug/L. VOCs were only detected in 18 of the 55 monitoring wells. None of the shallow wells detected VOCs above an MCL for the compounds identified in the previous paragraph. There are 93 groundwater monitoring wells in the lower aquifer identified as the Ogallala aquifer. The Ogallala has been arbitrarily divided into three levels based on monitoring well screen depth below ground surface. The first level is from approximately 30' to 100'. The second level is from 101' to 200' and the third level is below 201'. The monitoring wells vary in depth from 44 feet to 464 feet below ground surface. The range of VOCs in these wells are from non-detect to 1371 ug/L. VOCs were detected in 44 of the 93 monitoring wells. Of the 44 monitoring wells containing detectable levels of VOCs, only 19 wells contained VOCs above Safe Drinking Water Act MCLs. In the upper level, 25 of the 40 monitoring wells had detectable levels of VOCs ranging from 0.6 to 680 ppb. Of the 25 monitoring wells only 6 monitoring wells contained concentrations above an MCL (TCE). In the middle level, 25 of the 40 monitoring wells had detectable levels of VOCs ranging from 0.6 to 1371 ppb. Of the 25 monitoring wells 15 monitoring wells contained concentrations above an MCL (TCE and 1,2-DCA). In the lower level, 4 of the 14 monitoring wells had detectable levels of VOCs ranging from 1.1 to 4.4 ppb.*

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 appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

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): *In October 1986, a groundwater recovery system was completed and began pumping operations. The recovery system initially consisted of three extraction wells. RC-1, which was an existing facility water supply well, and RC-2 and RC-3, which were new recovery wells. The respective approximate pumping capacities for RC-1, RC-2 and RC-3 were 600 gpm, 750 gpm and 600 gpm. It is estimated that the influence of the recovery system extended over a mile and a half downgradient of the facility and over a mile downgradient of the farthest downgradient recovery well (RC-3). In December 1988, RC-1 experienced a failure of its lower screen. This section of screen was sealed off and RC-1 was returned to service in June 1989 at a flow rate of 470 gpm. This recovery well remained in service until October 1995 when the upper casing failed, requiring this well to be abandoned. Since this time RC-2 and RC-3 have been in operation, the approximate combined discharge for these two wells is 1350 gpm.*

*In April 1999, a pumping test was performed on the Ogallala aquifer to confirm the hydraulic properties of the hydrostratigraphic units and the influence of the recovery wells. With recovery system operating at a discharge rate of 1350 gpm the difference in pumping and non-pumping water levels were measured at several groundwater monitoring wells. The difference between pumping and non-pumping water levels in monitoring wells 46-130 (approximately 2500' east of RC-3) and 49-150 (approximately 4200' south east of RC-3) were 1.5 feet and 0.4 feet, respectively. Monitoring well 46-130, the deepest well in a three well cluster at this location, has shown a pattern of non-detects dating back to prior to the start-up of the recovery system. A shallower monitoring well at this location (46-85) has shown low levels of TCE (ranging from 3 ppb to 33 ppb). Monitoring well 41-75 is located approximately 2000' to the east of 48-85 and 4500' east of RC-3, this monitoring well has shown a pattern of non-detects dating back just prior to the start-up of the recovery system. The two Ogallala monitoring wells at location 49 (49-72 and 49-150) have both exhibited patterns of non-detects for VOCs. These monitoring wells either represent the downgradient edge (46-85) or are beyond the downgradient edge of the plume. (Historical analytical data an be found in the quarterly reports that Tenneco has been submitting since 1986) As demonstrated by the pumping test of April 1999, the gradient from these wells is toward the recovery system. In addition, Tenneco drilled three deep borings in the fall of 1999. Monitoring wells were installed in two of the deep borings with 20' screens from 411' to 431' in one boring and 442- to 462' in another. The third deep boring (DB-3) was used for the installation of three vibrating wire piezometers isolated at 301', 347', and 419'. No site-related contaminants were detected (by Hydropunch grab samples during drilling) below 187' and no site-related contaminants were detected in the screened intervals of the deep wells. The piezometers verified an upward gradient thus demonstrating that the vertical component of the contaminant plume is contained within the influence of the recovery system. Based on this information, which can be found in Appendix B of Volume 1 of the Supplemental Response Report dated April 2000, the existing contaminant plume appears to be currently contained in all dimensions.*

*Although the unconfined alluvial aquifer (the Grand Island formation) is influenced by the groundwater recovery system through recharge of the leaky aquitard underlying the site, groundwater in this aquifer is not contained by the recovery system. However, an evaluation performed in 1992 concluded that the plume that previously existed in the alluvial aquifer and migrated east of the irrigation canal had been*

*naturally attenuated by a series of gravel pits that intercepted groundwater flow in this aquifer. Additionally, a comprehensive groundwater data evaluation, completed in 1999, concluded that some of the contaminants in the alluvial aquifer were remediated as they were pulled down through the aquitard and captured by the recovery wells. Accordingly, the most recent comprehensive groundwater sampling event did not identify any VOCs in the alluvial aquifer that were above their respective MCLs . Refer to the discussion in number 2 above.*

[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): *Discharge from the recovery wells is pumped to an air stripping tower located at the facility. Following treatment in the air stripping tower, treated groundwater is then pumped to a drainage ditch approximately 1000' to the west of the facility. Tenneco discharge then commingles with the discharge from Nebraska Plastics and/or storm water and flows approximately one mile to the south and discharges into the Platte River. Since January 1999, the monthly concentrations for TCE from the air stripping tower being discharged to the drainage ditch have been less that the MCL. The reported monthly range for TCE has been from less than the detection limit of 0.5 ug/L to 3.3 ug/L.*

*In the alluvial aquifer (identified as the Grand Island formation), groundwater that contains low concentrations of VOCs has been identified as discharging to a series of gravel pits approximately 6500' east of the facility.*

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)?

.

**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 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): *As discussed previously, groundwater that is discharged from the Ogallala is treated in the air stripping tower. As the concentration in the influent to the air stripping tower has decreased, so has the effluent concentration. Since January 1999, the monthly concentrations for TCE from the air stripping tower being discharged to the drainage ditch have been less that the MCL. The reported monthly range for TCE has been from less than the detection limit of 0.5 ug/L to 3.3 ug/L. Based on the downward trend of treated groundwater being discharged to the drainage ditch, it is very unlikely that concentrations causing unacceptable impacts will be observed in either the ditch or the Platte River.*

*In the alluvial aquifer, there is a groundwater monitoring well directly upgradient of the borrow pits (41-25). The last VOC concentration greater than an MCL occurred in October 1997. The total VOC for this sample consisted of 6.3 ug/L (0.6 ug/L of TCE and 5.7 ug/L of PCE). Although there was a slight increase in concentrations in the mid-90s (total VOCs reached a peak of 41 ug/L), the concentrations have generally been declining since the late 1980s. Groundwater samples taken in 1998 and 1999 from MW 41-25 have VOCs at concentrations below the MCLs. Based on these recent groundwater monitoring events, it is very unlikely that concentrations causing unacceptable impacts will be observed in these surface waters.*

[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 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):_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

[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): *Groundwater monitoring of the existing area of contaminated groundwater will continue under Tenneco's Post-Closure Permit. The groundwater monitoring program outlines specific monitoring wells that define the vertical and horizontal extent of contaminated groundwater. A total of 31 monitoring wells will be sampled every two years to accomplish this task. In 2005, all 148 groundwater monitoring wells will be sampled to give a complete analysis of how well the groundwater recovery system has operated. Additionally, a number of municipal water supply and private drinking water wells are monitored quarterly as a preventative measure.*

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 __Tenneco Automotive facility , EPA ID #_**NE007263619**_____ , located at_____Cozad, 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 _8/01/02_
(print) William F. Lowe PG_____
(title) Project Coordinator_____

Supervisor (signature) Original signed by_____ Date __8/01/02_
(print) John Smith_____
(title) RCAP Manager_____
(EPA Region or State) EPA Region 7_____

Locations where References may be found:

EPA Region 7 Records Center_____
_901 N. 5th Street
Kansas City Kansas

Contact telephone and e-mail numbers

(name)_____Bill Lowe_____
(phone #)____(913) 551-7547_____
(e-mail)_____lowe.bill@epa.gov