DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99
Revised 9/20/02

RCRA Corrective Action
Environmental Indicator (EI) RCRA Info code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: **Equistar Chemicals**
Facility Address: **3400 Anamosa Road, Clinton, Iowa**
Facility EPA ID #: **IAD045372836**

DETERMINATION RESULT: YES

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 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 "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): The data reported below as maximum contaminant concentrations are taken from Tables 3 and 4 of the "Summary of Results from Summer 2004 Annual In-Situ Groundwater Sampling Event", dated November 22, 2004; and Table 1 of the "Summary of Results from October 2004 Supplemental Groundwater Sampling Event", dated January 24, 2005. Groundwater key contaminants are tetrachloroethlyene (PCE), benzene, and polynuclear aromatic hyrdocarbons (PAHs). Refer to the September 1990 Consent Decree that requires attaining performance standards (PS) within an area of attainment and defines the PS.

Of the compounds exceeding PS (PS listed in parentheses), the maximum concentration detected during 2004 of benzene (PS = 1 ug/L, micrograms per liter) was 860 ug/L in EW-18B; 1,1-dichloroethene (PS = 7 ug/L) at a maximum of 84 ug/L in Well MW-114A; cis/trans-1,2-dichloroethene (PS = 70 ug/L total) at 1812 ug/L total in Well EW-19a; **tetrachloroethene (PCE) (PS = 5 ug/L) at 8200 ug/L in Well MW-26C,** trichloroethene (PS = 3 ug/L) at 1200 ug/L in Well MW-26C, and vinyl chloride (PS = 0.015 ug/L) at 330 ug/L in Well EW-19a. These wells represent locations where the highest levels of contamination were detected. The only VOC detected in the Munck residential well was PCE at a concentration of 0.27 ug/L (PS = 5 ug/L). Refer to attached Figure 4a for the approximate location of the Munck residence well.

Semivolatile organic compounds (SVOCs) and metals are analyzed generally every two years for site monitoring and extraction wells. The last comprehensive sampling for SVOCs and metals was in 2003.

For the 2004 annual sampling event (Table 4 of the annual sampling report), samples were collected for SVOC analysis only from the Munck residence well and surface water from the west tributary. The following PAHs were detected in groundwater from the Munck well: anthracene at a concentration of 0.18 ug/L, benzo(b)fluoranthene at a concentration of 0.031 ug/L, and benzo(k)fluoranthene at a concentration of 0.050 ug/L. PS have not been set for these compounds. The lowest performance standard set for a PAH, is for benzo(a)pyrene, at a concentration of 0.2 ug/L. All detected PAHs were below this value.

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[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).

The most recent comprehensive sampling of site monitoring and extraction wells for PAHs was reported in Table 4 of the 2003 annual sampling report "Summary of Results from Spring 2003 Annual In-Situ Groundwater Sampling Event", dated August 28, 2003. The only PAH detected in groundwater from site wells was naphthalene at concentrations of 0.12 ug/L and 0.405 ug/L in wells DG-16 and EW-6c (duplicate sample only). The two detected concentrations were below the PS for naphthalene of 20 ug/L. PAHs were not detected in groundwater from the Munck residence well, during the 2003 annual sampling event.

The most recent comprehensive sampling of wells for metals (antimony, arsenic, and barium) was reported in Table 5 of the 2003 annual sampling report "Summary of Results from Spring 2003 Annual In-Situ Groundwater Sampling Event", dated August 28, 2003. Arsenic was detected in Well LF-6 at 21.6 ug/L, above the performance standard of 0.03 ug/L. Metals were not analyzed in samples collected during the 2004 sample event.

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):

Site Information

Groundwater flows generally to the south at the site. In the vicinity of the generally north to south flowing tributaries (present on the east and west sides of the site) the flow tends towards the tributaries, with what appears to be somewhat of a north to south divide in the middle of the site. Because of this divide, discussion of the site may be addressed by east or west side of the site. Refer to attached figures for the thick line through the figure (i.e., approximate location of groundwater divide) separating the site into an east and west region.

Monitoring and extraction wells are screened in the following geologic units: Overburden (mixture of clay and silt with variable amounts of sand and gravel), Upper Scotch Grove, Lower Scotch Grove, Farmers Creek, Lower Hopkinton, and Blanding, listed in order of depth. All of the units listed, below the overburden, are Dolomite Limestone. The Picture Rock unit (between the Lower Scotch Grove and Farmers Creek unit) has relatively low porosity and hydraulic conductivity compared to the formations above and below. As a result, this formation may be retarding vertical migration of contaminants from the Scotch Grove units into the Farmers Creek and lower units.

Groundwater contamination of PCE above the PS (5 ug/L) extends into the area of attainment. The area of attainment is defined as the area containing contaminated groundwater outside the point of compliance. Refer to the September 1990 Consent Decree that defines PS and the area of attainment and requires attaining the PS within the area of attainment.

The groundwater remediation system began operation in December 1995 and originally included operation of 51 extraction wells in the different geologic units at the site. Currently, 42 of these 51 wells are in

[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.

operation. One well, DAC-2, in the Overburden, was shut down due to silting problems. It was determined that adequate capture coverage was provided by existing extraction wells; therefore, the well was not replaced. In March 1999, all of the seven extraction wells in the Lower Hopkinton unit were shut down, following receipt of EPA approval. These wells were shut down after the PRP discussed concerns with EPA of a downward migration of contamination resulting from the pumping action. In June 2002, one well, EW-13b, in the Farmers Creek unit, was shut down following receipt of EPA approval, due to the same concerns.

Evaluation of groundwater contaminant migration

This discussion concentrates on PCE, the primary site contaminant. Evaluation of other chemicals was not done. Attached Figure 7 shows the concentrations of chemicals other than PCE detected from 1993 through 2004. Perimeter well results for these chemicals do not indicate significant increase in concentration of these chemicals. It is appropriate to use PCE as a site indicator chemical based on the following: review of data for chemicals other than PCE for increasing trend in perimeter wells, PCE is the most widespread in detections, and PCE has the highest site-wide concentration (at 8200 ug/L in 2004; and PCE is the only site wide contaminant subjected to statistical analysis used to evaluate increase or decrease in concentrations.

PCE Data and figures are taken from the "Summary of Results from Summer 2004 Annual In-Situ Groundwater Sampling Event", dated November 22, 2004; and the "Summary of Results from October 2004 Supplemental Groundwater Sampling Event", dated January 24, 2005.

In each annual report, the most recent PCE groundwater concentrations are compared to past results to determine if there is an apparent trend of concentration in either an upward or downward direction or if no trend is evident, that is the concentration is stable (* see footnote, for how mathematical evaluation is performed and reported). Discussion of PCE groundwater concentration trends is broken down by geologic unit. See the attached Figures 1 to 6 from the 2004 annual sampling event that provide PCE trend data by geologic unit. Also, refer to Figures 1 through 4 from the October 2004 supplemental groundwater sample event. Supplemental sampling is performed in the fall of a subset of site wells.

An evaluation of groundwater contaminant migration was originally done by EPA in early 2004, at which time a data gap was identified for the Upper Scotch Grove, Lower Scotch Grove, and Farmers Creek units in the area southeast and between Well MW-57-1 (see figure 2, Upper Scotch Grove unit) and the MW-106 well cluster (A, B, and C wells); in the downgradient groundwater flow direction, i.e., towards the MW-103 well cluster (see Figure 3). The Well MW-103 cluster has not been sampled since the Remedial Investigation efforts in 1992, but would provide the information required to address the identified data gap. In response, the PRPs voluntarily agreed to collect groundwater samples from the MW-103 well cluster. This sampling effort was completed in July 2004, results are included in the 2004 annual sample event. A detailed discussion of historical results for the MW-103 well cluster is presented in the footnote below **. To summarize, historical PCE concentrations are considered to be non detect, at a detection limit of 1 ug/L, for Wells MW-103B (installed in the Scotch Grove, 112 feet below ground surface total depth), MW-103C (installed in the Farmers Creek, 153 feet below ground surface total depth), and MW-103D (installed in the Blanding, 222 feet below ground surface total depth).

Overburden: Refer to Figure 1 and Table 7 of the 2004 Annual Report. The Overburden wells that define the leading edge of the PCE plume, i.e., wells MW-4, 3, 4, MW-94A, MW-107A, and ARMW-2, had either no apparent trend of concentration (i.e., stable concentrations), or a downward trend in concentration. As such, the groundwater contaminant migration in this unit is considered to be stable.

Upper Scotch Grove: Refer to Figure 2 and Table 7 of the 2004 Annual Report and Figure 1 and Table 2 of the 2004 Supplemental Sampling Report. Wells that are sampled on a regular basis (except MW-103B) and that

are on the leading edge of the groundwater plume are: MW-19B, MW-30B, MW-56-1, DG-16, EW-8a, MW-58, MW-57-1, MW-103B, MW-106A, and EW-15a. The PCE concentrations in these wells (except for MW-103B) were either stable or decreasing as determined from the 2004 statistical analysis. Well MW-103B is considered to represent both the Upper and Lower Scotch Grove units based on the screened interval of the well. Prior to 2004, Well MW-103B (installed in the Scotch Grove, 112 feet below ground surface total depth) was sampled twice in 1992 and PCE was not detected at a detection limit of 1 ug/L. This well was sampled again in July 2004 with a detected concentration of 0.76 ug/L. These two results are considered to be stable, since the 2004 positive detection was less than the 1992 detection limit. As such, the groundwater contaminant migration in this unit is considered to be stable.

Lower Scotch Grove: Refer to Figure 3 and Table 7 of the 2004 Annual Report and Figure 2 and Table 2 of the 2004 Supplemental Sampling Report. Wells that are sampled on a regular basis (except MW-103B) and that are on the leading edge of the groundwater plume are: west side MW-111B, MW-97B, MW-110B; and east side MW-103B, ARMW-200B, MW-107B, and MW-85B.

On the west side, the PCE concentrations were stable or decreasing except for Well MW-110B. Well MW-110B had a stable trend of concentration using the 50% statistical analysis, but an upward trend of concentration using the Mann Kendall analysis. The concentrations in this well are fairly low at 10 ug/L, which may have contributed to error for the Mann Kendall analysis. The concentration in this well has been between 10 and 12 ug/L for the last three year's sampling events. The results of this well will continue to be monitored for change, but for the purpose of this evaluation, the groundwater contaminant migration on the west side of this unit is considered to be stable.

On the east side of the site in this unit, the PCE concentrations in the leading edge plume wells (except for MW-103B and MW-107B) were either stable or decreasing as determined from the 2004 annual statistical analysis. Well MW-107B showed an increasing trend using the statistical analysis of fall 2004 supplemental sampling results. The Mann Kendall test showed stable or decreasing concentrations. The annual (July 2004) results, both statistical and Mann Kendall, indicated the well concentrations were decreasing. In fall 2004 the concentration detected in this well was 22 ug/L, up from 1 ug/L in July 2004, however, the concentrations since June 2001 had decreased consistently from 29 to 1 ug/L. Because the 2004 annual statistical results and the Mann Kendall results for the 2004 annual and supplemental results show no trend or decreasing trend in concentration, the PCE concentration in this well will be considered stable but will continue to be monitored in future sampling events. Prior to 2004, Well MW-103B (installed in the Scotch Grove, 112 feet below ground surface total depth) was sampled twice in 1992 and PCE was not detected at a detection limit of 1 ug/L. This well was sampled again in July 2004 with a detected concentration of 0.76 ug/L. These two results are considered to be stable, since the 2004 positive detection was less than the 1992 detection limit. As such, the groundwater contaminant migration on the east side of this unit is considered to be stable.

Farmers Creek:: Refer to Figure 4 and Table 7 of the 2004 Annual Report and Figure 3 and Table 2 of the 2004 Supplemental Sampling Report. Wells that are sampled on a regular basis (except for MW-103C) and that are on the downgradient edge of the plume in this unit are: west side EW-6b, MW-56, EW-7b; east side EW-13b, MW-103C, ARMW200C, MW-107C, EW-15b, and MW-85C. This unit is below the Picture Rock unit that limits vertical migration.

West side: EW-7b showed an increase in concentrations, using the statistical method. The other two wells on the west side, showed stable concentrations. Because EW-7b is an extraction well, it is expected to draw in groundwater with varying PCE concentrations. Results for this well have ranged from 65 to 120 ug/L since 1999. Because a further downgradient monitoring well MW-56 (southwest of EW-7b) shows no trend in PCE concentration, the results of this well will be considered acceptable, but will continue to be monitored during future sampling events.

East Side: Data from wells on the east side of the site (except for MW-107C and MW-103C) showed stable or decreasing PCE concentrations, using the statistical and Mann Kendall tests. For supplemental sampling of Well MW-107C (October 2004), the 50% statistical method indicated a decreasing PCE concentration, while the Mann Kendall method indicated an increase. The 2004 annual results (July 2004) showed no trend using the statistical test and an increase using the Mann Kendall test. The concentration detected in October 2004 was 1 ug/L. Before that, the concentrations ranged from 20 to 32 ug/L in the previous four sampling events. Based on this information, the results of this well will continue to be monitored for change, but are considered stable for the purpose of this evaluation. Prior to 2004, Well MW-103C (installed in the Farmers Creek, 153 feet below ground surface total depth), was sampled twice in 1992 and PCE was not detected at a detection limit of 1 ug/L. This well was sampled again in July 2004 with a detected concentration of 0.82 ug/L. These two results are considered to be stable, since the 2004 positive detection was less than the 1992 detection limit.

Based on the discussion above, the groundwater contaminant migration in this unit is considered to be stable.

Lower Hopkinton: Refer to Figure 5 and Table 7 of the 2004 Annual Report. As discussed above, the extraction wells in this unit were taken out of operation in 1999, due to concerns that contamination was being pulled into deeper units by the extraction in this unit. The 2004 results (50 % and Mann Kendall methods) show either stable or decreasing PCE concentrations in the following furthest downgradient wells, EW-11c, EW-13c, and EW-14c. For Wells EW-6c and EW-15c, the 50% statistical method indicated an increasing PCE concentration, while the Mann Kendall method indicated no trend. The concentrations in these wells were fairly low at 5 and 6 ug/L, respectively, which may contribute to error of the statistical analysis. The concentrations in Well EW-6c have ranged from non detect to no higher than 5 ug/L, and in Well EW-15c from non detect to a high concentration of 12 ug/L since monitoring began in 1993. The results of these wells will continue to be monitored for change, but are considered stable for the purpose of this evaluation. As such, the groundwater contaminant migration in this unit is considered to be stable.

Blanding: Refer to Figure 6 and Table 7 of the 2004 Annual Report and Figure 4 and Table 2 of the 2004 Supplemental Sampling Report. Four monitoring wells have been sampled in the Blanding unit: MW-57, MW-73, and MW-85D on a regular basis; and MW-103D once in 1992 and once in 2004. The 2004 annual and supplemental reports shows that the PCE concentrations in monitoring wells MW-57 and MW-85D are stable. Prior to 2004, Well MW-103D, was sampled once in 1992 and PCE was not detected at a detection limit of 1 ug/L. This well was sampled again in July 2004 with PCE not detected at a detection limit of 0.5 ug/L. These two results show the PCE concentration to be stable in this well.
The Mann Kendall result showed no trend for MW-73, while the statistical test showed an increase. The concentration in this well was fairly low at 5 ug/L, which may contribute to error of the statistical analysis. The PCE concentration in this well has ranged from 2 to 5 ug/L since 2001. The results of this well will continue to be monitored for change, but are considered stable for the purpose of this evaluation. As such, the groundwater contaminant migration in this unit is considered to be stable.

SUMMARY: Based on the discussion above, the groundwater contaminant migration is considered to be stable for all geologic units.

FOOTNOTES
***Statistical analysis of groundwater data:** The annual and supplemental reports include mathematical analysis of groundwater results using two methods to compare current PCE concentrations with past results. First, (referred to as the 50% or statistical method) the current concentration is compared directly to the past two sampling rounds. A potential upward trend is identified if the current concentration is at least 50% greater than the levels in either of the past two rounds and at least 10% greater than the level in the previous round. A downward trend is identified if the reverse is true, at least 50% less than the previous two rounds and 10% less

than the last round. Secondly, the Mann-Kendall statistical test is performed on the data to determine if an upward, downward or stable trend is indicated. Refer to the annual report on how this calculation is done. Figures 1 through 6, 2004 annual report and Figures 1 through 4 of the supplemental sampling report show the results of the 50% or statistical calculation. The Mann Kendall trend results are presented in Tables 7 of the annual report and Table 2 of the supplemental report.

In some cases, the 50% statistical method result differed from that of the Mann Kendall. If both results indicated an increasing trend, the result would be considered to be increasing. If one method showed an increase, but the other method showed either stability or a decrease, it may have been assumed for the purposes of this evaluation that the stable or decreasing result was acceptable with future sampling events to be monitored, see discussions above.

****Historical Results for MW-103 Well Cluster**

In addition to RCRA investigation activities, a Remedial Investigation (RI) was completed under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) at the site by ACC Chemical Company (ACC) and Getty Chemical Company (GCC), as partially reported in the "First Operable Unit Remedial Investigation Report, dated August 1992. Monitoring wells MW-103B, MW-103C, and MW-103D were installed in January 1992 and sampled as part of the RI effort to determine groundwater contamination extent. Results of this installation and sampling are presented in the above-mentioned report.

Groundwater samples were collected during drilling of the MW-103 well cluster, for onsite analysis to evaluate appropriate elevations to screen the wells. These samples were collected using packers, i.e., a packer was inflated both above and below the sample interval to seal off the sampled interval. VOCs were not detected in the MW-103 packer groundwater samples collected at approximate depths of 70 feet (Upper Scotch Grove unit), 97 feet (Middle Scotch Grove unit), 127 feet (Johns Creek Quarry unit), 157 feet (Picture Rock unit), and 187 feet (Farmers Creek unit) below the ground surface. PCE analysis had a detection limit of 4 ug/L for onsite laboratory analysis. At approximate depths of 207 (designated as from Farmers Creek unit) and 225 feet (designated as from Blanding unit), PCE was detected at 13 and 11 ug/L, respectively. Confirmation sampling (i.e., packer sample analyzed by an offsite laboratory) at an approximate depth of 202 feet (lower Hopkinton) at the MW-103 cluster showed detections of chloroform at 0.9 ug/L, cis-1,2-dichloroethene at 0.6 ug/L, methylene chloride at 4 ug/L, and PCE at 9 ug/L. The confirmation packer groundwater sample (i.e., analyzed by an offsite laboratory) collected from the MW-103 cluster at a 70 foot depth (Upper Scotch Grove unit), had detections of 11 ug/L for methylene chloride and PCE of 2 ug/L. The quality assurance/quality control samples associated with the packer groundwater samples also had detections of PCE. It was assumed that the PCE detections in the packer samples may have resulted from contamination introduced from purging and sampling techniques.

To evaluate this assumption, packer groundwater results were compared to groundwater samples collected from the MW-103 monitoring well cluster after installation was completed, using traditional sampling techniques. PCE was not detected in groundwater samples from MW-103B, MW-103C, and MW-103D after installation and development. The PCE detection limit for this analysis was 1 ug/L. The only compound detected in groundwater collected from these wells following installation (besides one detection of bis 2-ethylhexyl phthalate at 7 ug/L in the sample from MW-103B) was methylene chloride at concentrations ranging from 2 to 8 ug/L. Methylene chloride was also detected in the associated laboratory blank in each of these samples. The MW-103 well cluster has not been sampled since the RI efforts. Based on this information, historical PCE concentrations are considered to be non detect, at a detection limit of 1 ug/L, for Wells MW-103B (installed in the Scotch Grove, 112 feet below ground surface total depth), MW-103C (installed in the Farmers Creek, 153 feet below ground surface total depth), and MW-103D (installed in the Blanding, 222 feet below ground surface total depth).

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): Site groundwater discharges to the tributaries that run north to south on the east and west side of the facility. These tributaries discharge to Rock Creek, south 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):
Refer to Figure 5 of the "Summary of Results from October 2004 Supplemental Groundwater Sampling Event", dated January 24, 2005. Surface water samples are collected from the western unnamed tributary on an annual basis for VOC analysis and every other year for PAH analysis. Surface water samples were collected from the east and west tributaries in 1992 as part of the RI efforts. Surface water samples were collected from the east and west tributaries and Rock Creek in October 2004 in response to a request from EPA for this data to support this EI evaluation.

Western Tributary: As discussed above, surface water samples are collected from the western unnamed tributary on an annual basis for VOC analysis and every other year for PAH analysis. PAHs were not detected in the sample collected in 2003 as presented in Table 9a of the "Five Year Review Report for the Chemplex Site", dated June 21, 2004. Results of the past five years sampling events for VOCs are presented in Table 7 of the "Five Year Review Report for the Chemplex Site", dated June 21, 2004. Within the past five years, PCE was detected at concentrations ranging from 0.2 to 3 ug/L., below the MCL and site specific PS for PCE of 5 ug/L. Other VOCs detected over the past five years (trichloroethene at a highest concentration of 1 ug/L, MCL 5 ug/L; methylene chloride at a high of 0.6 ug/L, MCL of 5 ug/L; and cis-1,2-dichloroethene at a high of 3 ug/L, MCL of 70 ug/L) were at concentrations below the corresponding MCL. 2-Butanone was detected but does not have an MCL; however, the concentration detected (0.4 ug/L) is well below the Region 9 tap water preliminary remediation goal of 1900 ug/L. Iowa water quality standards (567-61.3(3) Table 1) are available for methylene chloride (5 ug/L), TCE (27-4000 ug/L), and PCE

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

(8 ug/L). For each of these compounds, the highest detected concentration was below the state water quality standard.

A surface water sample was collected from the west tributary in October 2004 for VOC analysis. VOCs were not detected in this sample. Based on this data, discharge into surface water is not considered to be significant on the west side of the site.

Eastern Tributary and Rock Creek: Samples have not been collected from either the east tributary or Rock Creek since the RI in 1992, until a sample was collected in October 2004. The surface water samples collected in October 2004 were in response to a request from EPA to provide data to support this EI evaluation.

Results from 1992: Metals analysis from 1992 did not indicate the presence of site related contamination in the eastern tributary. All detected concentrations in the 1992 sample were below the corresponding MCL, where available. The secondary MCL was exceeded for aluminum, iron and manganese; however, these standards are intended primarily for aesthetics of water consumption (e.g., odor/taste/ appearance/etc), not health concerns. VOCs and SVOCs were detected in 1992 in surface water from the eastern tributary. The results are presented in Table 38, attached. This table also has the MCL (or Region 9 PRG, where an MCL is not available) and the Iowa water quality standards listed. The majority of the VOCs and SVOCs were detected at concentrations below the Iowa water quality standard, where values were available. PCE and methylene chloride were detected above the Iowa WQS; however, methylene chloride may have been attributable to laboratory contamination. PCE was detected at 46 ug/L above both the MCL (5 ug/L) and Iowa water quality standard (8 ug/L). Other compounds were below the Iowa WQS. Where a WQS was not available, the concentration was compared to the MCL or PRG. Tetrachloroethane was detected at a concentration of 10 ug/L, above the PRG of 0.055 to 0.43 ug/L. The two PRG values provided are for two isomers (1,1,1,2 and 1,1,2,2); the isomer was not identified in the RI analysis. Only 4-nitrophenol, detected at 2 ug/L did not have either an Iowa WQS or MCL/PRG. These results indicated that surface water VOC concentrations on the east side of the site may be significant. As such, EPA requested that the PRP collect a sample of the east tributary to allow determination of current surface water conditions.

In October 2004, surface water samples were collected from the east tributary, the west tributary, and Rock Creek for VOC analysis. No VOCs were detected in any of these samples. Therefore, discharge of groundwater to surface water at the site is not considered to be significant.

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 and surface water data are collected on an annual basis at the facility from a subset of site monitoring wells and the western tributary as outlined in the Performance Monitoring Evaluation plan dated November 1993. Some modifications have been made to this plan since 1993 as approved by EPA. The original PME and current sampling requirements are presented and compared in Table 5 of the "Five Year Review Report for the Chemplex Site", dated June 21, 2004. EPA will continue to monitor the concentrations in groundwater and surface water to confirm that the determinations made in this CA750 remain valid. Any indication of consistent increase in PCE concentration for edge of plume wells identified above will require reevaluation of this environmental indicator.

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 Equistar/ ACC/GCC facility, EPA ID # **IAD045372836** , located at 3400 Anamosa Road, Clinton 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 _____ Date September 15, 2005
(signature)
Mary Grisolano
Project Manager, RCRA Corrective Action & Permits Branch
EPA Region 7

Supervisor _____ Date_____
(signature)
Don Toensing
Branch Chief, RCRA Corrective Action & Permits Branch
EPA Region 7

Locations where References may be found:

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REFERENCES

FIGURES

(X pages)