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:	**Quality Carriers, Inc. (formerly Chemical Leaman Facility)**
Facility Address:	**Route 25 (1.2 miles west of I-64 Exit 50), Institute, WV 25112**
Facility EPA ID #:	**WVR000001719**

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

Quality Carriers, Inc. (formerly Chemical Leaman Tank Lines) facility is an approximately 8-acre improved portion of the larger 160 acres of property located along Route 25 in Institute, West Virginia. The site is located approximately seven miles northwest of the City of Charleston and approximately one half mile north of the Kanawha River. The property is fenced along Route 25, while steep hills and woods form boundaries on the unfenced sides. A building used for office and maintenance space is located in the center of the improved area with gravel parking lots to the east and west. A Wastewater Treatment Plant (WWTP) is located at the rear of the property, up the hill from the main building and parking areas.

From 1963 to the spring of 2013, the QCI facility was used for tank cleaning operations. The facility utilized a mixture of sodium hydroxide, sequestering agents, and defoamers to clean tanker trucks utilized to haul bulk quantities of commercial products and industrial wastes. Cleaning operations at the site generated different waste streams that were treated in the on-site WWTP or drummed for transportation off-site for disposal. In addition to the short-term drum storage, wastes were stored at the facility between 1977 and 1980.

In response to allegations of on-site burial of drummed waste from facility operations, an investigation and subsequent excavation of drummed waste and associated soil was performed in 1995. Impacted soil, excavated during the removal of the buried drums, was placed in a series of eight bio-cells constructed on-site for biological treatment. Soil that exceeded Land Disposal Restrictions (LDRs) under the RCRA regulations was sent for off-site disposal. Soil that met LDRs was moved to a treated soil stockpile (TSS) constructed at the eastern end of the facility and subsequent ex-situ treatment of excavated soil was performed.

In January 2003, WVDEP authorized the implementation of in-situ bioremediation of groundwater in the drum burial area using the introduction of bio-amendments to stimulate naturally occurring microorganisms. Five injection wells were installed in August 2003 to supply oxygen to the shallow groundwater using the in-situ oxygen curtain (ISOC) technology. In-situ groundwater treatment continued until October 2005. Additional site characterization and in-situ remediation of groundwater were conducted from August 2003 until October 2005, and a schedule of periodic groundwater sampling was

established. The final groundwater monitoring event was conducted in December 2005 and a final report was submitted to the WVDEP in January 2006.

On September 9, 2011, QCI's Voluntary Remediation Program (VRP) Application was accepted and a Voluntary Remediation and Redevelopment Act (VRRA), was executed on February 29, 2012. Site characterization activities under the VRA, pursuant to an approved Site Assessment Work Plan, were performed from August through December 2012. Supplemental soil and groundwater sampling was performed from May to July 2013. In all, soil samples were collected from 26 locations in five areas of the Site where releases to soil are known or suspected to have occurred. A total of 67 soil samples were collected and analyzed for selected metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). Selected soil samples were also analyzed for pesticide/herbicide compounds, polychlorinated biphenyls (PCBs), and dioxin/furan compounds. During both site investigations, groundwater samples were collected from ten monitoring wells and three temporary sampling points. Groundwater samples were analyzed for selected metals, VOCs, SVOCs, pesticide/herbicide compounds, and PCBs.

Groundwater at the facility is not used as a potable water source. Additionally, the Facility and immediate area (to a distance of at least 2,500 feet) are served by a public water supply.

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"**[1] 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):

From June 2000 through May 2003, routine semiannual sampling of all groundwater monitoring wells continued, with analyses for VOCs, SVOCs, nitrate-nitrogen, sulfate, and total and dissolved lead. Groundwater conditions associated with the former drum burial area, bio-cell areas, and the treat soil stockpile investigated through the installation and sampling of 10 groundwater monitoring wells (MW-101 through MW-110). Monitoring wells MW-101 through MW-106, installed during August 1999, were sampled 17 times during the period from September 1999 through December 2005. Monitoring wells MW-107 through MW-110, installed during July 2000, were sampled 12 times during the period from September 2000 through December 2005. Monitoring wells MW-101 and MW-110 are regarded to be hydraulically upgradient from areas of the Site where remediation activities have taken place and, therefore, are regarded to represent background water quality conditions.

During the initial 2012 Site Assessment, groundwater samples were collected from nine MW series groundwater monitoring wells and three temporary (TMP series) groundwater sampling points. Two monitoring wells are located hydraulically upgradient from areas of current or previous waste handling and four monitoring wells and three temporary points are located along a line just north of and roughly parallel to the downgradient boundary of the facility. Three monitoring wells and one temporary point are located within or adjacent to known or suspected release areas. The wells and temporary points were sampled twice, once in August and once in September 2012. During each event, samples were analyzed for arsenic, barium, iron, lead, manganese, vanadium, VOCs, and SVOCs. For metals, both field filtered and unfiltered samples were collected. Samples from the August sampling event were also analyzed for pesticide/herbicide compounds and PCBs.

During the 2013 supplement Site Assessment, groundwater samples were collected from ten monitoring wells and three temporary sampling points. Groundwater samples were analyzed for selected metals, VOCs, SVOCs, pesticide/herbicide compounds, and PCBs. Certain metals, VOCs, and SVOCs were reported at concentrations above groundwater De Minimis Values, predominantly at wells adjacent to or near the former drum burial area. Concentrations decrease rapidly with distance away from the drum burial area. In nearly all cases, concentrations are similar to or lower than historical values. Except for the MW-102 monitoring well, none of the samples from locations along or near the downgradient boundary of the Site exhibited concentrations above De Minimis Values. Additionally, a groundwater monitoring well was installed near the original location of MW-108, which could not be located during the 2012 Site Assessment. The replacement well (MW-108R) was installed to evaluate groundwater quality in the area downgradient of monitoring wells MW-105 and/or MW-106 and was sampled in June and July 2013.

As provided by the Sampling and Analysis Work Plan, approved by WVDEP on July 6, 2012, analytical results are compared to the West Virginia Voluntary Remediation Program De Minimis Values (DMVs). For groundwater, the DMVs assume that groundwater beneath the Site is used for residential potable supply.

Metals

Results for barium and lead were below De Minimis Values in all groundwater samples collected during both sampling events. Arsenic was reported above the DMV (10 micrograms per liter [µg/L]) only in samples from the MW-104 and MW-105 monitoring wells, ranging range from 25 µg/L to 60 µg/L. Because arsenic exhibits increased solubility under reducing conditions, it is considered likely that the results reflect the reduced form of arsenic (As^{+3}).

Iron was reported above the DMV (26,000 µg/L) only in samples from MW-105 (75,000 µg/L and 95,000 µg/L). Iron most typically occurs in groundwater as ferrous iron (Fe+2) and ferric iron (Fe^{+3}), with reduced ferrous iron being the predominant form in solution. Given the concentrations of iron reported for the MW-105 well, it is considered likely that the results reflect the reduced form of iron.

Manganese was reported at concentrations above its DMV in one or both groundwater samples from the following locations: MW-104, MW-105, MW-106, MW-107, MW-108R, TMP-2, and TMP-5. Manganese concentrations above the DMV range from 1,800 µg/L to 5,100 µg/L. Manganese concentrations for samples from monitoring wells MW-101 and MW-110 were less than 1,000 µg/L. In the majority of cases, concentrations for the filtered and unfiltered samples are similar, indicating that manganese concentrations are not heavily biased by turbidity in the samples, unlike other metals analyzed.

Vanadium was reported at concentrations exceeding the DMV in samples from all downgradient monitoring wells at the Site, except MW-108R. Vanadium was also reported above the DMV in upgradient wells MW-101 and MW-110. Values for the upgradient wells are from 3.6 µg/L to 4.4 µg/L. Except for reported values of 15 µg/L and 12 µg/L for the September 2012 samples from MW-103 and TMP-2, respectively, the range for all other values above the DMV is 2.8 µg/L to 6.7 µg/L.

Volatile Organic Compounds (VOCs)

Nine VOCs were reported at concentrations above their respective DMV. Almost all of these reported VOC detections are for samples from monitoring wells MW-104, MW-105, and MW-106, which are adjacent to or immediately downgradient from the former Drum Burial Area. One VOC, 1,2-dichloroporopane , was detected in monitoring well MW-102. No other detections of VOCs exceeding DMV or RSL values were reported for sampling locations along the downgradient boundary.

A total of 31 SVOCs were reported in one or more groundwater samples. Of these, the VOCs above their respective DMV were: 1,1,2-trichloroethane (24 to 25 µg/L); 1,2-dichloropropane (5.6 to 7.9 µg/L); 1,4-dioxane (280 to 390 µg/L); benzene (5.2 to 120 µg/L); chlorobenzene (1,500 to 4,100); chloroform (0.7 to 0.8 µg/L); cis-1,2-dichloroethene (71 to 120 µg/L); trichloroethene (49 to 170 µg/L); and, vinyl chloride (5.2 to 5.6 µg/L).

Semi-volatile Organic Compounds

1,4-dioxane, ranging from 0.92 to 190 µg/L, was reported in all samples from monitoring wells MW-104, MW-105, and MW-106, which are all adjacent to or immediately downgradient from the drum burial area. Hexachlorobutadiene was above the DMV in in the August 2012 samples from MW-102 (1.2 µg/L) but below detection during sampling of MW-102 (0.22 µg/L) in September 2012. Additionally, bis(2-chloroethyl)ether ranged from 3.3 to 6.9 µg/L and naphthalene ranged from 23 to 36 µg/L

Pesticides/Herbicides

None of the pesticide/herbicide compounds were reported at concentrations exceeding their DMV in any of the samples analyzed.

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).

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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"[2] 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"[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):

[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.

The predominant migration pathway for COI in groundwater is transport of dissolved constituents of concern according to groundwater flow conditions. Certain metals, volatile organic compounds, and semi-organic compounds were reported at concentrations above groundwater De Minimis Values (DMV), predominantly at wells MW-104, MW-105, and MW-106, which are adjacent to or near the former drum burial area. Concentrations decrease rapidly with distance away from the drum burial area.

In nearly all cases, concentrations are similar to or lower than historical values. Except for the MW-102 monitoring well, none of the samples from locations along or near the downgradient boundary of the Facility exhibited concentrations above DMVs. Available data indicate the potential for contaminant concentrations that are above DMVs to persist far downgradient of the drum burial area is minimal.

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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 groundwater "contamination" does not enter surface water bodies.

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

Rationale and Reference(s):

The predominant surface water feature in the area of the Facility is the Kanawha River, which is approximately 1,000 to 1,200 feet south of the southern boundary of the Site. The conservative analysis of the data indicates that the potential for impacts to surface water in the Kanawha River as a result of groundwater discharge to the river is negligible.

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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)?

☐ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting:
1) the maximum known or reasonably suspected concentrations[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 judgment/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 concentrations[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):

[3] 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[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.

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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):

There are no plans to abandon the monitoring wells and the Facility will be submitting a Remedial Action Plan that will provide the Final Remedy for the Facility.

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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 Quality Carriers, Inc. facility (formerly Chemical Leaman Tank Lines), EPA ID # WVR000001719, located at Route 25 (1.2 miles west of I-64 Exit 50), Institute, WV 25112. 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) Catherine Guynn Date 7-16-2014
(print) Catherine Guynn
(title) Project Manager

Supervisor (signature) Date 7-16-2014
(print) Charles Armstead
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