

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

**RCRA Corrective Action
Environmental Indicator (EI) RCRIS code (CA725)**

Current Human Exposures Under Control

Facility Name: Kerr McGee Chemical Corporation
Facility Address: Henderson, Nevada
Facility EPA ID #: NVD008290330

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, 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 #6 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 "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "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 "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

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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- Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **“contaminated”**¹ above appropriately protective risk-based “levels” (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	X			Ground water under facility contaminated. Ground water contaminated from facility boundary to entrance to Las Vegas Wash. Principle contaminant is PERCHLORATE, chromium also present through portions of this area
Air (indoors) ²		X		
Surface Soil (e.g., <2 ft)	X			
Surface Water	X			Las Vegas Wash contaminated above provisional action level of 18ppb. Currently perchlorate detected in Lake Mead below 18 ppb at drinking water intake.
Sediment		X		
Subsurf. Soil (e.g., >2 ft)		X		
Air (outdoors)		X		

_____ If no (for all media) - skip to #6, and enter “YE,” status code after providing or citing appropriate “levels,” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded.

_____ X If yes (for any media) - continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

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 appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

² Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

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_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s): Cr+6 in ground water up to 60 ppm near unit 4 on Kerr McGee property.

Perchlorate: **Up to 6,600 ppm** in ground water under facility (1)

Up to 400 ppm at **Athens Road wells** approximately 1 mile north of facility boundary (2)

Up to 160 ppm in ground water near Las Vegas Wash, up to **1 ppm** in Las Vegas Wash (surface water) (3)*

Up to 24 ppb in Lake Mead drinking water intakes. Lake Mead is the main drinking water source for the Las Vegas Valley.

*** These values represent conditions prior to the start of interception and treatment of perchlorate in ground water by Kerr McGee in November of 1999.**

Current conditions: Approximately 400 ppm at Athens Road (4)

Up to approximately 20 ppm in ground water near Las Vegas Wash (4)

Up to 200 ppb in Las Vegas Wash (4)

Perchlorate has been measured in the soils on Kerr McGee property south of the slurry wall located at the chrome treatment line of ground water extraction wells. This perchlorate is the result of inadequate past management practices. However, perchlorate does not pose a human health threat as a result of dermal contact, and workers/contractors are unlikely to ingest perchlorate-contaminated soil.

References: **Kerr McGee Semi-Annual Ground water Monitoring Reports for chromium +6**

Phase I, Phase II Investigation Reports by Kerr McGee 1997, 1998

Seep Area Ground Water Characterization Report January 2001

Seep Area Ground Water Capture Report August 2001

EPA's Comprehensive Perchlorate Monitoring Reports dated September 2003, December 2003, March 2004 and June 2004.

Quarterly Reports- Perchlorate Remediation by Kerr McGee 2001- 2004

Sampling results of Las Vegas Wash and Lake Mead conducted by State of Nevada, Kerr McGee

and Southern Nevada Water Authority- various reports

Chromium Evaluation by Kerr McGee 1993

Phase I Final Report for Chromium by Kerr McGee 1993

Various environmental monitoring reports:

(1)- May 2003

(2)- October 2000 and revised January 2001

(3)- January 1998 and revised July 1998

(4)- May 2004

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3. Are there **complete pathways** between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential **Human Receptors** (Under Current Conditions)

<u>“Contaminated” Media</u>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater	<i>NO</i>	<i>NO</i>	<i>NO</i>	<i>NO</i>			<i>NO</i>
Air (indoors)	<i>NO</i>	<i>NO</i>	<i>NO</i>				
Soil (surface, e.g., <2 ft)	<i>NO</i>	<i>YES</i>	<i>NO</i>	<i>YES</i>	<i>NO</i>	<i>NO</i>	<i>NO</i>
Surface Water	<i>YES</i>	<i>NO</i>			<i>NO</i>	<i>NO</i>	<i>YES</i>
Sediment	<i>NO</i>	<i>NO</i>			<i>NO</i>	<i>NO</i>	<i>NO</i>

³ Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

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Groundwater	NO	NO	NO	NO			NO
Soil (subsurface e.g., >2 ft)				NO			NO
Air (outdoors)	NO	NO	NO	NO	NO		

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.
2. enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media - Human Receptor combinations (Pathways) do not have check spaces ("___"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

	If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional <u>Pathway Evaluation Work Sheet</u> to analyze major pathways).
X	If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.
	If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

Yes for surface water/residences- Flow in Las Vegas Wash enters Lake Mead. Las Vegas Valley drinking water intakes are located 5-6 miles downstream from Las Vegas Wash's entry point to the lake. Perchlorate has been measured in the intake water up to 24 ppb (1). Drinking water supplies extracted from Lake Mead and the Lower Colorado River are currently within the range of US EPA's existing provisional reference dose drinking water equivalent concentration (4-18 ppb)

Yes for surface water/food- Perchlorate has been detected in the Colorado River down to the US-Mexico border. Agriculture along the river uses river water for irrigation of crops including lettuce. Studies have shown that lettuce exhibits uptake of perchlorate into the upper leaves of the lettuce. Other crops, including alfalfa, have also exhibited perchlorate uptake. Alfalfa is used as feed for dairy cattle, thus providing a possible pathway for perchlorate to enter the milk supply. Currently, the FDA has not promulgated standards for perchlorate in crops or for milk.

Yes for surface soil/ workers and construction workers- Kerr McGee operates under an approved health

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and safety plan which addresses regular Kerr McGee employees as well as construction workers which may perform work of a temporary nature.

References: Same as #2 above,

(1)- Winter of 2000

Dr. Charles Sanchez from University of Arizona- slides from a7/15/04 presentation to USDA entitled “Occurrence of Perchlorate in Vegetable Crops in the Lower Colorado River Region.”

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **“significant”**⁴ (i.e., potentially “unacceptable” because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks)?

If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any

⁴ If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

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	complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."
X	If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."
	If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s): **Kerr McGee is currently extracting approximately 1000 gpm of ground water using 3 lines of wells located between Kerr McGee and Las Vegas Wash. Partial capture began in November of 1999 with full capture achieved by October of 2002. Captured water is treated using ion exchange and/or a biologically-based fluidized-bed reactor (FBR). The treated water is discharged back to Las Vegas Wash with a current perchlorate concentration typically less than 18 ppb. Perchlorate loads in Las Vegas Wash, measured at North Shore Road (see graph 1), have decreased from approximately 900 pounds per day prior to November 1999 to under 150 pounds per day as of late summer 2004. Modeling studies have predicted that the perchlorate load in Las Vegas Wash should decrease to about 100 pounds per day by late 2004. As a result, perchlorate concentrations in Lake Mead began to decline during the last half of 2003. Monthly average perchlorate concentrations at Saddle Island in Lake Mead have not exceeded the upper end of the range for US EPA's provisional reference dose drinking water equivalent of 4-18 ppb. In the last 2 years, concentrations of perchlorate at Saddle Island (drinking water intake for the Las Vegas Valley) have ranged from 5-17 ppb. This is greater than US EPA's proposed reference dose drinking water equivalent concentration of 1 ppb and California's Public Health Goal of 6 ppb. However, the continuing decreases in the amount of perchlorate entering Lake Mead and the rapidly decreasing concentrations at Saddle Island indicate the 2005 concentrations will be at the lower third of EPA's 4-18 ppb provisional reference dose range. Perchlorate concentrations farther down the Colorado River have also begun to decrease.**

In the last 2 years, concentrations of perchlorate in the Colorado river Aqueduct near Parker Dam have ranged from 4-6 ppb, which is at the lower end of the range of the existing US EPA provisional reference dose drinking water equivalent concentration (4-18 ppb), but greater than US EPA's proposed reference dose drinking water equivalent concentration (1 ppb). Since June 2002, all of the monthly samples have been at or below California's Public Health Goal of 6 ppb.

GRAPH 1