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:	Anadarko Petroleum Corporation
Facility Address:	2529 East Willow Street, Enid, Oklahoma
Facility EPA ID #:	OKD007234586

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).

2. 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)?

	Yes	No	?	Rationale / Key Contaminants
Groundwater		X		
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)		X		
Surface Water		X		
Sediment		X		
Subsurf. Soil (e.g., >2 ft)		X		
Air (outdoors)		X		

[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.

[ ] 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.

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

Rationale and Reference(s): Anadarko Petroleum Corporation has a land treatment unit that is currently in post-closure. Semi-annual groundwater monitoring has consistently shown non-detect for indicator constituents in downgradient wells.

References: Post-closure Permit #3524007-PC1 and Semi-annual groundwater reports.

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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 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.

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)

"Contaminated" Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food[3]
Groundwater							
Air (indoors)							
Soil (surface, e.g., <2 ft)							
Surface Water							
Sediment							
Soil (subsurface e.g., >2 ft)							
Air (outdoors)							

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 Pathway Evaluation Work Sheet to analyze major pathways).

___ 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):

_____

_____

4. Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be

_____

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

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 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.

___ 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):

_____
_____
_____
_____
_____
_____
_____

[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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5. Can the significant **exposures** (identified in #4) be shown to be within **acceptable** limits?

___ If "yes" (all significant exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all significant exposures to contamination are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

___ If "no" (there are current exposures that can be reasonably expected to be unacceptable)- continue and enter "NO" status code after providing a description of each potentially unacceptable exposure.

___ If unknown (for any potentially unacceptable exposure) - continue and enter "IN" status code

Rationale and
Reference(s):_____

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6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

X YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Anadarko Petroleum Corporation facility, EPA ID # OKD00723458e located at Enid, Oklahoma under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

___ NO - "Current Human Exposures" are NOT "Under Control."

___ IN - More information is needed to make a determination.

Completed by (signature) Hillary Young Date 12-30-05
(print) Hillary Young
(title) Professional Engineer II

Supervisor (signature) [signature] Date 1/5/06
(print) Saba Tahmassebi
(title) Chief Engineer
(EPA Region or State) Oklahoma

Locations where References may be found:

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Oklahoma City, OK 73101

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FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.