DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

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

Current Human Exposures Under Control
Facility Name: Western Zirconium.
Facility Address: 10,000 West 900 South Ogden, Utah 84404.
Facility EPA ID #: UTD092024934.

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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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_	___	___	**See WZ Human Health Risk Assessment .**
Air (indoors)[2]	___	_X_	___	**Based on knowledge of SWMUs & AOCS .**
Surface Soil (e.g., <2 ft)	_X_	___	___	**Evaporation Ponds are surface Waters .**
Surface Water	_X__	___	___	**Risk assessment Tables 1 & 2 .**
Sediment	_X_	___	___	**Tables 1 & 2, and EI Evaluation Table .**
Subsurf. Soil (e.g., >2 ft)	_X__	___	___	**Tables 1 & 2 and EI Evaluation Table .**
Air (outdoors)	_X__	__	___	**See WZ Human Health Risk Assessment .**

_____ 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.

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

Rationale and Reference(s):

Groundwater: See WZ Human Health Risk Assessment Tables 1 and 2 (URS, May 2005) for information on contaminants for the pond area of the RFI. For the Facility RFI, see the attached EI Evaluation Table.

Air: The RFI work has not identified any contamination of air inside of buildings. Also WZ has a program for protecting workers from occupational exposure, no problems of this nature have been identified in that program.

Outdoor Air: See WZ Human Health Risk Assessment Tables 1 and 2 (URS, May 2005) for information on contaminants for the pond area of the RFI.

Surface Soil, Sediment and Subsurface Soil: For the pond RFI see Risk Assessment Tables 1 and 2. For facility, see EI Evaluation Table.

Surface water, see HHRA Tables 1 and 2

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 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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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	NO	NO	NO	Yes			NO
~~Air (indoors)~~	NA	NA	NA				
Soil (surface, e.g., <2 ft)	NO	Yes	NO	Yes	Yes	NO	NO
Surface Water	NO	Yes			Yes	NO	NO
Sediment	NO	NO			NO	NO	NO
Soil (subsurface e.g., >2 ft)				Yes			
Air (outdoors)	NO	Yes	NO		Yes	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 Pathway Evaluation Work Sheet 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):

Day Care:
Day Care – There are no day care facilities known to exist within at least 5 to 10 miles of the facility, so it was determined that no credible pathway was available under the day care category.

Groundwater:
No residential Groundwater pathways are complete. One resident is about 1 mile away all others are about 5 miles away or greater. No data showing groundwater contamination at or near the resident living 1 mile away.

No worker pathway to groundwater exposure is assumed as the only groundwater pathway seen is from excavation or drilling, this type work would be under the construction category and not the worker category. WZ has no known pathway for exposure of workers to contaminated groundwater.

Construction workers have a potential pathway to exposure of groundwater during excavation activities or drilling activities.

No groundwater pathway to food is seen. No known source of food is supplied from near any of the groundwater contamination areas. Also the background quality of the groundwater is so poor (salty) that it could not be used for food production and no cattle are grazed within the area of groundwater contamination.

Air (indoor):
No contamination of indoor air has been identified

Surface Soil:
No residential pathway to surface soil is available due to the distances involved to the nearest residents.

A potential pathway for contaminated surface soil to reach workers could be envisioned. Workers occasionally are in the vicinity of some of the SWMU/AOCs listed in the EI Evaluation Table. Incidental inhalation or ingestion could occur during times when a worker may have to pass through or near the areas; however there are no routine worker operations in those areas.

Construction workers may have a potential pathway to surface soil. This pathway would occur if excavation, drilling, dirt moving work, or other construction work occurs within the SWMU/AOC. No current construction work is being completed in these areas.

A potential pathway exists for trespassers and surface soil contamination. See WZ's Human Health risk assessment where this scenario is assessed. This would only occur in very specific areas on the fringe areas of the facility and would not occur within the secure area of the facility.

No potential pathway for exposure of contamination during recreation is seen. No recreation areas are close enough to the facility to complete this pathway. Please note on the recreation pathway that there is some potential for what might be termed vehicles used for recreation (ATVs) to trespass on WZ property creating a possible pathway. For this analysis, the ATV pathway is considered under the trespasser pathway and not the recreation pathway.

There is no credible potential pathway for contaminated surface soil to affect food. This is due to no food being grown even close to any contaminated surface soil.

Surface Water:

No residential pathway to surface water is available due to the distances involved to the nearest residents

There is the potential for a pathway to be complete between a worker and surface water. This would be exposure of a worker to WZ's evaporation pond SWMUS or storm water pond SWMU. This is no routine work for workers to be in contact with the pond water or storm water, but the potential pathway may exist on occasion as workers are in vicinity of these areas. No surface water associated with the facility RFI has been identified per the RBSL described in the EI Evaluation Table.

Trespasser may also have a completed pathway to contaminated surface water due to exposure to the storm water pond. They would not have a pathway to the evaporation ponds due to the security fence in place. See the pond Human Health Risk assessment for more information on this pathway.

No potential pathway for exposure of contamination from surface water during recreation is seen. No recreation areas are close enough to the facility to complete this pathway. The surface water bodies are small shallow areas; boats would not be on the ponds. No swimming is reasonable possible in the storm water pond. Please note on the recreation pathway that there is some potential for what might be termed vehicles used for recreation (ATVs) to trespass on WZ property creating a possible pathway to surface water. For this analysis, the ATV pathway is considered under the trespasser pathway and not the recreation pathway.

No potential pathway is complete for surface water to food. No food is produced even close to surface water in question.

Sediment:
No residential pathway to sediment is available due to the distances involved to the nearest residents.

There is a potential pathway for workers and sediment that was considered, but was determined to be not complete. The only contaminated sediment is found in the evaporation pond SMWUs and AOC 15 (storm water ditch). The exposure would be very rare, but may occur if workers complete sampling operations. However the sediment currently remains covered with water and due to the very remote chance for exposure the pathway is listed as incomplete.

There is no complete pathway for sediment and trespassers. Sediment is found only in the evaporation ponds and in the storm water ditch. These areas are secure from trespassers with fences, locks, etc.

There is no complete pathway for sediment and recreation due to the fact that no recreation areas exist that would come in contact with contaminated sediment.

There is no complete pathway for sediment and food due to the fact no food is produced near the facility. Also the sediment is in a secure area.

Subsurface Soil:
Construction workers may have a potential pathway to sub surface soil. The SWMU/AOCs with potential subsurface contamination are listed in the EI Evaluation table. This pathway would exist only during excavation, or drilling within the SWMU/AOC. No current construction work is being completed in these areas.

Outdoor Air:
There is no reasonable pathway between contaminated outdoor air and residents due to the distances involved between location of potential air contamination and the residents.

The pathway between workers and contaminated outdoor air is a possible complete pathway. Ammonia levels have been modeled for potential ammonia in the air around the ponds. Workers may be at the ponds for this pathway.

There is a potential pathway between trespassers and outdoor air contamination as outlined in the human health risk assessment with potentially contaminated dust in the air where trespassers may enter.

No potential pathway for exposure of outdoor air contamination during recreation is seen. No recreation areas are close enough to the facility to complete this pathway. Please note on the recreation pathway that there is some potential for what might be termed vehicles used for recreation (ATVs) to trespass on WZ property creating a possible pathway. For this analysis, the ATV pathway is considered under the trespasser pathway and not the recreation pathway.

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

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)?

_X_ 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):

Nine items from question 3 were marked as yes for a complete pathway. Each item is discussed below as to the significance:

1. Exposure of construction workers to ground water. This exposure is not considered significant due to the following factors:

   - The RFI process has identified areas of groundwater contamination and these areas are known before any construction would be completed in those areas. WZ has a permit system construction workers would use before beginning. Construction workers would have warning of potential exposure before beginning the work and could take appropriate precautions.

   - Groundwater contamination was identified and evaluated as part of the facility RFI work. Within the facility screening level RBSLs have been approved, but a full risk assessment has not been completed. Based on an RBSL of 10-4 (HI=1) only 5 chemicals in 12 different locations have been identified as groundwater contamination. For those 12 different locations an average of the contamination level in each SWMU or AOC was completed and only 2 chemicals in 4 locations showed the average concentration to be above the RBSL. That contamination is discussed as follows:

- The average ammonia concentration in ground water in AOC 4 was 388 mg/L compared to the RBSL of 307 mg/L. The average ammonia concentration in SWMU 58 was 415 mg/L. Both of these averages are only slightly above the screening levels and are assumed to not be significant when a risk assessment is complete, based on an extrapolation of the pond human health risk assessment. Both of these areas are known and identified and WZ has a permit system construction workers would use before beginning and work. This permit system would require proper personal protective equipment be worn, should work in the contaminated area be required.
- SWMUs 27 and 38 show average iron concentrations in ground water to be slightly above the RBSLs. These are not considered significant based on an extrapolation of the pond human health risk assessment. Both of these areas are known and identified and WZ has a permit system construction workers would use before beginning and work. This permit system would require proper personal protective equipment be worn, should work in the contaminated area be required.

2. Exposure of site workers to surface soils. Exposure of site workers to contaminated surface soils is not considered significant based on the following:
    - SWMUs and AOC's with surface soil contamination are not part of any working area, workers only enter those areas occasionally and only for short periods of time. The pathway may be complete on occasion, but the exposure time is not significant.
    - No significance (HI<1 and cancer risk <1E-04) was found in the risk assessment for exposure of current workers to surface soil.
3. Exposure of construction workers to surface soils. Exposure of construction workers to surface soils is not considered significant based on the following:
    - No construction work is being completed in the SWMU/AOC's with surface soil contamination.
    - WZ's has a permit system to control work within the facility and would make construction workers aware of contamination if work was completed in those areas and workers could take proper precautions.
4. Exposure of trespassers to surface soils. Exposure of Trespassers to contaminated surface soil was evaluated as part of WZ's Human health risk assessment completed by URS. That evaluation showed that surface soil alone did not pose a significant risk to trespassers where a pathway existed. The risk assessment did indicate that a combination of surface soil and surface water may pose a cancer risk of 2E-6, however for this assessment that risk would have to be a combined risk (not an individual risk) and would is still less than a 1E-4 risk and therefore is not considered significant.
5. Exposure of site workers to contaminated surface water is not considered significant. There was no surface water contamination identified as part of the facility RFI. Some surface water contamination was identified for the Pond RFI. The Pond Human Health Risk Assessment evaluated the risk of site workers to contaminated surface water and did not find any areas of significance because direct exposure to water in the evaporation ponds was considered to be an incomplete pathway for current workers. Therefore, exposure of site worker to contaminated surface water is not considered significant.
6. Exposure of trespasser to contaminated surface water is not considered significant. The only pathway identified for trespasser and surface water was part of the Pond Human Health Risk Assessment. That evaluation showed that surface water alone did not pose a significant risk to trespassers where a pathway existed. The risk assessment did indicate that a combination of surface soil and surface water may pose a cancer risk of

2E-6, however for this assessment that risk would have to be a combined risk and would is still less than a 1E-4 risk and therefore is not considered significant.

7. Exposure of construction workers to subsurface soil contamination is not considered significant. This is due to the fact that no known construction has taken place in areas of subsurface soil contamination. Also if construction were to occur, WZ has a permitting system in place that would identify that contamination and would ensure precautions are taken.
8. Exposure of worker to contaminated outdoor air is not considered significant. This is due to the fact that the pond human health risk assessment states "Ammonia in air volatilizing from evaporation pond water does not pose an unacceptable threat to current workers.
9. Exposure of trespassers to contaminated outdoor air is not considered significant. This is due to the fact that the exposure of potentially contaminated outdoor air to trespassers occurs from the exposure of air borne dust particles to trespassers. This is discussed in the Pond Human Health Risk Assessment. The risk assessment indicates that the cancer risk from surface soil was 1E-06 (which is not significant); therefore the exposure to this dust is also considered to be not significant.

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[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):

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 _____ _____ facility, EPA ID #_____, located at _____ 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) _____. Date 9-8-05
(print) Jim Lansbarkis _____.
(title) Environmental Health Scientist _____.

Supervisor (signature) _____. Date 9-8-05
(print) Brad Maulding _____.
(title) Hazardous Waste Facilities Section Manager

.

(EPA Region or State) Utah .

Locations where References may be found:
Utah Department of Environmental Quality, Division of Solid and Hazardous Waste
288 North 1460 West, Salt Lake City, UT 84116
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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.