

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRAInfo code (CA725)

Current Human Exposures Under Control

Facility Name: Solite Corporation – A.F. Old Division
Facility Address: Route 1, State Rd. 652, P.O. Box 68, Arvon, VA 23004
Facility EPA ID #: VAD042755082

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 the RCRAInfo database ONLY as long as they remain true (i.e., RCRAInfo 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)?

	<u>Yes</u>	<u>No</u>	<u>?</u>	<u>Rationale / Key Contaminants</u>
Groundwater	<u>X</u>	<u> </u>	<u> </u>	<u>See Rationale below</u>
Air (indoors) ²	<u> </u>	<u>X</u>	<u> </u>	<u>See Rationale below</u>
Surface Soil (<2 ft)	<u>X</u>	<u> </u>	<u> </u>	<u>See Rationale below</u>
Surface Water	<u> </u>	<u>X</u>	<u> </u>	<u>See Rationale below</u>
Subsurf. Soil (>2 ft)	<u>X</u>	<u> </u>	<u> </u>	<u>See Rationale below</u>
Air (outdoors)	<u> </u>	<u>X</u>	<u> </u>	<u>See Rationale below</u>

 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): _

There have been two site-wide soil sampling events conducted at this facility which provided the data to support the HH EI evaluation. A limited soil sampling campaign was conducted by DEQ in August 2004. A second round of sampling was conducted by EPA as part of a CEI in November 2004.

The focus of the initial sampling program conducted by the DEQ and the additional sampling conducted by the USEPA, was to evaluate the potential human exposures to surface and shallow sub-surface soils. Although obtaining data in support of the EI evaluation was not the primary focus of EPA's sampling, their data augmented the existing data sets. Facility-wide groundwater and sediment environmental conditions were not addressed in these investigations but conclusions have been drawn using all existing facility data with respect to potential impacts to surface and ground water quality.

Inorganic constituents (metals) at elevated concentrations were identified as being the primary contaminants of concern and were present in surface and subsurface soils. The elevated inorganics were identified at all the various SWMUs sampled across the site and include arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel, vanadium, and zinc.

Groundwater: The presence of both organics and inorganics in subsurface soils and concentrations of inorganics above the transfer to groundwater screening criteria (DAF=20) lead to the conclusion that ground water is likely to have been impacted by facility operations.

Air (indoor and outdoor): The inorganics which are the primary constituents of concern at this facility are not volatile; hence, air (indoors and outdoors) is not a media of concern.

Surface soil: 10 samples were collected that provide an initial representation of surface soil conditions across the facility. Due to the limited nature of available site soil analytical data, the presence of arsenic, aluminum, chromium, manganese, and vanadium above the calculated site surface soil background concentration as well as applicable soil screening levels was considered to be an indicator of potential surface soil contamination.

Subsurface soil: As with surface soils, the presence of both organics and inorganics in subsurface soils at concentrations above the calculated site-specific background concentration as well as applicable screening levels was considered an indication of potential sub-surface soil contamination.

Surface Water: Although not a primary focus of the sampling, the limited data collected did not indicate that surface water quality standards had been exceeded. However, further characterization will be conducted during the RFI to confirm this assumption.

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)

<u>"Contaminated" Media</u>	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food ³
Groundwater Air (indoors)		<u>No</u>		<u>No</u>		<u>No</u>	
Soil (surface, e.g., <2 ft)		<u>Yes</u>		<u>Yes</u>		<u>No</u>	
Surface Water Sediment		<u>No</u>					
Soil (subsurface e.g., >2 ft) Air (outdoors)		<u>No</u>		<u>Yes</u>		<u>No</u>	

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):

The site is a fenced, secured industrial site; therefore, the likely potential exposure will only be to plant workers and construction workers. The Arvon facility is in full operation; hence, plant workers are exposed to surface soils across the entire site on a continuous basis. Construction activities have the potential to expose construction personnel to both surface and subsurface soils during excavations.

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

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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 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):

Exposure to surface soils (defined as surface to two feet below grade for this determination) is considered to be significant because all the SWMUs across the site appeared to be impacted based upon existing environmental data. This in combination with the entire facility being in full time operation results in continuous worker exposure through out the site.

Construction personnel have the potential to be exposed to subsurface soil at any excavations at the site; however, only one out of 30 subsurface soil sample yielded results greater than the corresponding direct contact RBC.

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?

- X** 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):

Elevated inorganic constituent concentrations were identified at all the SWMUs across the site. Based upon the facility operating 24/7, there will potentially be continuous exposure of plant operating personnel to the elevated levels of contaminants.

Surface soils: Exposure to surface soils (less than two feet deep) can be reasonably anticipated at this site. As a conservative estimate of potential risk, the maximum arsenic surface soil concentration (measured at the baghouse) was used to calculate the risk estimate for direct contact. This concentration for arsenic (86 ppm) exceeded the direct comparison risk-based concentration (RBC) but did not result in a lifetime cancer risk estimate outside the acceptable range. The risk estimate (attached) was calculated by EPA assuming a conservative daily worker exposure of 25 years utilizing both dermal exposure and incidental ingestion pathways. The resultant risk to an on-site worker fell within the acceptable risk range of 1E-4 to 1E-6.

Subsurface soils: Only one subsurface sample yielded concentrations greater than 86 ppm. This sample was taken near the tank farms at a depth of 13-19 inches below grade. This sample, at this time, is considered an isolated hot-spot and construction activities in this area are not anticipated.

The above determinations will be re-evaluated again within the next 12 months. An RFI will be conducted in the near future that will verify the preliminary determinations described above.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION III 1650 Arch Street Philadelphia, Pennsylvania 19103-2029			
		DATE:	02.14.05
SUBJECT:	Solite Corporation, Arvonva VA Data Analysis		
FROM:	Ruth Prince, Toxicologist Technical Support Branch		
TO:	Bob Greaves, Branch Chief General Operations Branch		

Multimedia data collected by RCRA Enforcement and soil data collected by the COE for VDEQ from the Solite Corporation facility in Arvonva was reviewed. The data was screened against the appropriate criteria and/or standards. Data that exceeded screening concentrations was further evaluated via calculation of risk estimates. Results are summarized below.

RCRA Enforcement Data
Total Metals Analyses for All Samples; Dioxin/Furan Analyses for Baghouse Samples #7 and #8

Sample Type

Facility Drinking Water Well

The results were all below MCLs and Region III RBCs for tapwater.

Raw Material

Only arsenic exceeded direct contact RBCs. A risk estimate was first calculated for the maximum arsenic concentration, which was found in a baghouse sample, see below.

Refractory Brick (pulverized for analysis)

The results were all below direct contact RBCs.

Old Aggregate Pile

Only arsenic exceeded direct contact RBCs. A risk estimate was first calculated for the maximum arsenic concentration, which was found in a baghouse sample, see below.

Soil near Old Aggregate Pile

Only arsenic exceeded direct contact RBCs. A risk estimate was first calculated for the maximum arsenic concentration, which was found in a baghouse sample, see below.

Baghouse Sample #7

This sample contained the maximum arsenic concentration (89 mg/kg) found at this facility. No other inorganics exceeded direct contact RBCs. A risk estimate was calculated from this maximum arsenic concentration, assuming a conservative daily worker exposure for 25 years, utilizing both incidental ingestion and dermal exposure. The excess lifetime cancer risk was 5.6E-5. This cancer risk estimate does not exceed EPA's acceptable risk range of 1E-4 to 1E-6.

The dioxin/furan result for this sample was 21 ng/kg 2,3,7,8-TCDD toxic equivalencies, slightly exceeding the direct contact RBC. Using the same calculation as above, the excess lifetime cancer risk due to 2,3,7,8-TCDD was 1.2E-6, for a combined excess lifetime cancer risk due to arsenic and 2,3,7,8-TCDD of 5.7E-5. This combined cancer risk estimate does not exceed EPA's acceptable risk range of 1E-4 to 1E-6.

Baghouse Sample #8

Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.
Customer Service Hotline: 1-800-438-2474



Only arsenic exceeded direct contact RBCs. A risk estimate was first calculated for the maximum arsenic concentration, which was found in a baghouse sample, see above.

Stormwater Outfall Sediment

These results were treated as potential aquatic sediment, since the outfall empties into a ditch leading to the James River. The results were therefore screened against Threshold Effect Concentrations for adverse effects on benthic organisms inhabiting aquatic sediment (McDonald et al, 2000). These ecologically based screening values are much lower than direct contact RBCs used for human contact, and are therefore protective of human health as well. Five inorganic results slightly exceeded the Threshold Effect Concentrations, with all hazard quotients < 2. This does not indicate an unacceptable risk to potential aquatic organisms. While this is only one sample, it is consistent with all of the on-site results. Therefore, no further action is necessary.

Old Quarry Water Sample

Half of these results were non-detect. The other half were well below surface water quality criteria or, if not available, surface water quality benchmarks.

Stormwater Outfall Water Sample

Half of these results were non-detect. The other half were below surface water quality criteria or benchmarks, except manganese, which exceeded a non-enforceable benchmark value, resulting in a hazard quotient of 2. Since this occurred in a ditch leading to the James River, it does not indicate an unacceptable risk to potential aquatic organisms.

Soil Data Package - Environmental Indicator for Human Health Exposure Study, USACOE/ICOR for VDEQ

A total of 25 soil borings were collected from the Arvonite Solite Corporation facility, distributed throughout the identified AOCs and SWMUs. All soil samples from the borings were analyzed for SVOCs and metals, and a portion of the samples were analyzed for VOCs. About 10 samples from these borings were representative of surface soils, while the remainder (about 30) characterized the subsurface. The only chemical concentration that exceeded direct contact RBCs in these results was arsenic. In all cases except one, the arsenic concentration did not exceed the maximum concentration (89 mg/kg) found in the RCRA Enforcement data above. Since this maximum concentration did not result in an unacceptable excess lifetime cancer risk, these results obtained by the USACOE/ICOR would not either.

The one exception was an arsenic result of 252 mg/kg, in the 13" - 19" interval of sample 04-SA-TF-SB7 (tank farm). This single result is too limited in areal extent to pose an unacceptable facility-wide risk. However, it would be prudent to obtain more samples surrounding this location to determine the nature and extent of this isolated hotspot.

Uncertainty Analysis

Data Quality

None of the data appear to have undergone third party data validation. There were no quality control samples for the RCRA Enforcement data. The quality control samples for the ACOE/ICOR data appeared to be uniform. There were no data qualifiers applied to the data by the laboratories which would adversely affect usability. In summary, while the lack of third party data validation adds uncertainty to this analysis, the data from multiple laboratories does appear consistent, and no qualifiers affecting usability were applied.

Data Quantity

In total, the combination of the RCRA Enforcement multimedia results and the 40 ACOE/ICOR soil results appear adequate to characterize this facility. More importantly, the trends in the data collected for the Solite Corporation facility are very consistent. The vast majority of the organics data is nondetect. The vast majority of the dioxin/furan data is below Region III direct contact RBCs. The vast majority of the inorganics data is below Region III direct contact RBCs.

