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:	**Solite LLC (former Solite Corporation)**
Facility Address:	**Arvonia, VA**
Facility EPA ID #:	**VAD042755082**

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?

   __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 "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).

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?

   _X_ 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):

The environmental data that was used in the groundwater EI determinations for each of these facilities was gathered when the two facilities were owned by the same parent company. Effective January 2005, Solite LLC purchased the Solite Corp. Arvonia facility (see Corrective Action fact sheet).

As indicated on the corrective action fact sheets, the Environmental Indemnity Agreement between the owners of the two facilities and the Administrative Order of Consent between the Giant Cement Holding, Inc. (GCHI - the parent company of Solite Corporation) and the EPA provides the framework for corrective action to be administered and conducted through Giant Resource Recovery-Arvonia (Grr-Arvonia), Inc., with responsibility for overall CA at both Solite LLC (Solite) and Grr-Arvonia remaining with the GCHI. This document satisfies the Migration of Contaminated Groundwater Under Control EI for both the Solite and Grr-Arvonia facilities.

There are currently eight (8) monitoring wells on the property containing Solite and Grr-Arvonia. These eight wells are used to evaluate groundwater for both permitted facilities. The groundwater monitoring wells were installed as part of due diligence during a property transfer and were not surveyed. Therefore, the locations of the monitoring wells and groundwater flow direction can not be verified. The most recent groundwater data was collected in November 2004. Analytical results indicate that the concentration of cadmium in MW-8 (0.015 mg/L) exceeds the EPA maximum concentration limit (MCL) (0.005 mg/L). No additional hazardous constituents (metals, semi-volatile organics, or volatile organics) identified in 40 CFR Part 264 Appendices VIII and IX were detected in facility monitoring wells.

As stated in the Evaluation of DEQ Collected Data – Revision 1 (November 2005), the groundwater sampling locations do not correspond to a particular solid waste management unit or area of concern. For that reason, further evaluation was performed using the analytical results from soil samples.

Soil samples were collected by the Virginia Department of Environmental Quality in September 2004 and analytical results have been compared to background concentrations and the EPA Region 3 transfer to groundwater DAF-20 Soil Screening Levels (SSLs). Table 1 (below) summarizes the exceedances of background or SSLs for those hazardous constituents which have an established RBC or MCL.

During installation of the monitoring wells in November 2004, additional soil samples were collected. Table 2 (below) summarizes the exceedances of background (BKG) or SSLs for those constituents that have an established RBC or MCL.

Table 1:

Constituent of Concern	Background Concentration (mg/kg)	Region 3 SSL (mg/kg)	Maximum Observed Soil Concentration (mg/kg)
Kiln Area (Solite)			
Arsenic	28.2	0.026	30.6
Nickel	22	na	32.5
Baghouse Area (Solite)			
Arsenic	28.2	0.026	29
Nickel	22	NA	41.3
Tank Farm Area (Grr-Arvonia)			
Arsenic	28.2	0.026	252
Chromium	36.9	42	345
Used Oil Area (Solite)			
Nickel	22	NA	84.9
Chromium	36.9	42	55.7
Surface Impoundment Area (Grr-Arvonia)			
Arsenic	28.2	0.026	48.7
Nickel	22	NA	51
Cadmium	1.5	27	65
Chromium	36.9	42	71
Selenium	<1.2	19	29
Waste Oil Area (Solite)			
Arsenic	28.2	0.026	46.3
Diesel Tank Area (Solite)			
Nickel	22	NA	33.7

Table 2:

Monitoring well	MW-5	MW-6	MW-7	MW-8	Background Concentration (mg/kg)	Region 3 SSL
Approximate Location	*Tank Farm area*	*North of Tank farm*	*Northeast of Kiln area*	*North of Kiln area*		
Antimony	42	23		24	NA	13
Arsenic	30	< BKG	65	68	28.2	0.26
Chromium	87	< BKG	< BKG	< BKG	36.9	42
Selenium	46	27	<BKG	31	<1.2	19
Thallium	68.6	34.3	23.9	33.8	NA	3.6

The DEQ concludes that it is reasonable to suspect that groundwater is contaminated in these areas and further evaluation will be needed in a RCRA Facility Investigation (RFI).

References:
Evaluation of DEQ Collected Data – Revision 1, November 3, 2005
EPA Risk Based Screening Levels

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).

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)?

__X__ 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):

Groundwater onsite most likely flows to the north-northeast, towards the Slate River and the James River. A line of perimeter monitoring wells are installed between the facility and the rivers. Please note that this line of wells intercepts the expected flow path of groundwater from MW-8 (location of MCL exceedance) to the river. Concentrations of the hazardous metals in these wells are below screening levels (RBC for tap water and MCLs). Please see Table 3 below. Therefore, the migration of potentially contaminated groundwater is considered stable.

Table 3:

Constituent	Concentration at MW-1	Concentration at MW-2
Antimony	ND	ND
Arsenic	ND	ND
Chromium	ND	ND
Cadmium	BD	ND
Nickel	BD	ND
Selenium	ND	ND
Thallium	ND	ND

References:
Evaluation of DEQ Collected Data – Revision 1, November 3, 2005
EPA Risk Based Screening Levels

Footnotes:

[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.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

_____ If yes – continue after identifying potentially affected surface water bodies

__X__ 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):

Groundwater onsite most likely flows to the north-northeast, towards the Slate River and the James River. A line of perimeter monitoring wells is installed between the facility and the rivers. Concentrations of the constituents of concern in these wells are below screening levels; therefore, it is unlikely that contaminated groundwater discharges to the rivers.

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 concentration[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 judgement/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 concentration[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 – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Footnotes:

[3]- As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

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 ecosystems), 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 into surface water is potentially significant) continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of <u>each</u> 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 – skip to #8 and enter "IN" status code.

Rationale and Reference(s):

Footnotes:

[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.

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?"

__X__ 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. 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 RCRA Facility Investigation Workplan is currently under review. The DEQ review of the workplan will request:

- a survey of the existing monitoring wells,
- installation and survey of a background monitoring well,
- installation of additional downgradient wells if deemed necessary, and
- continued groundwater monitoring.

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).

X 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 **Solite LLC** facility, **EPA ID # VAD042755082**, located in **Arvonia, Virginia**. 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			Date	9/27/07
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Locations where References may be found:
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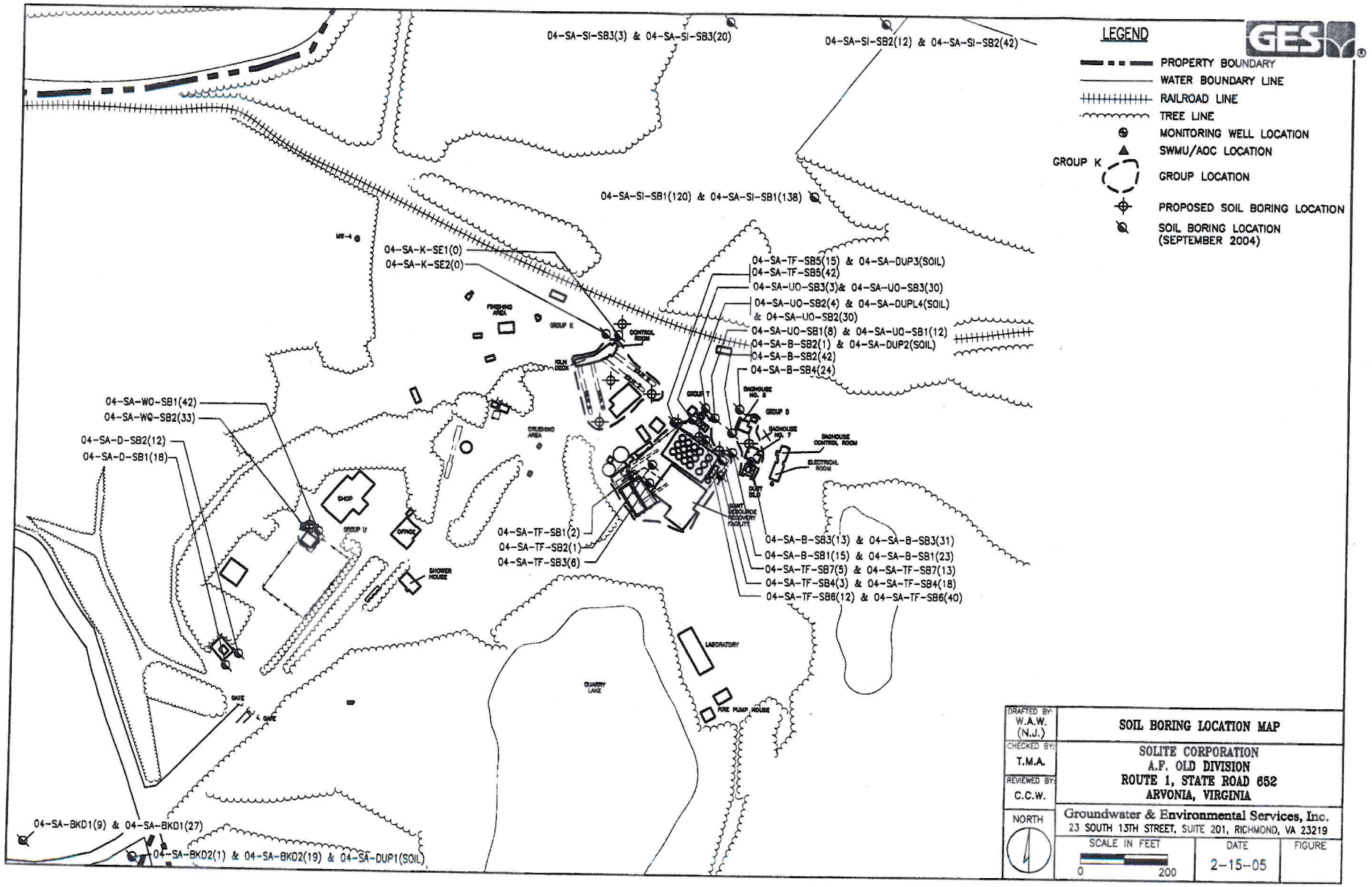

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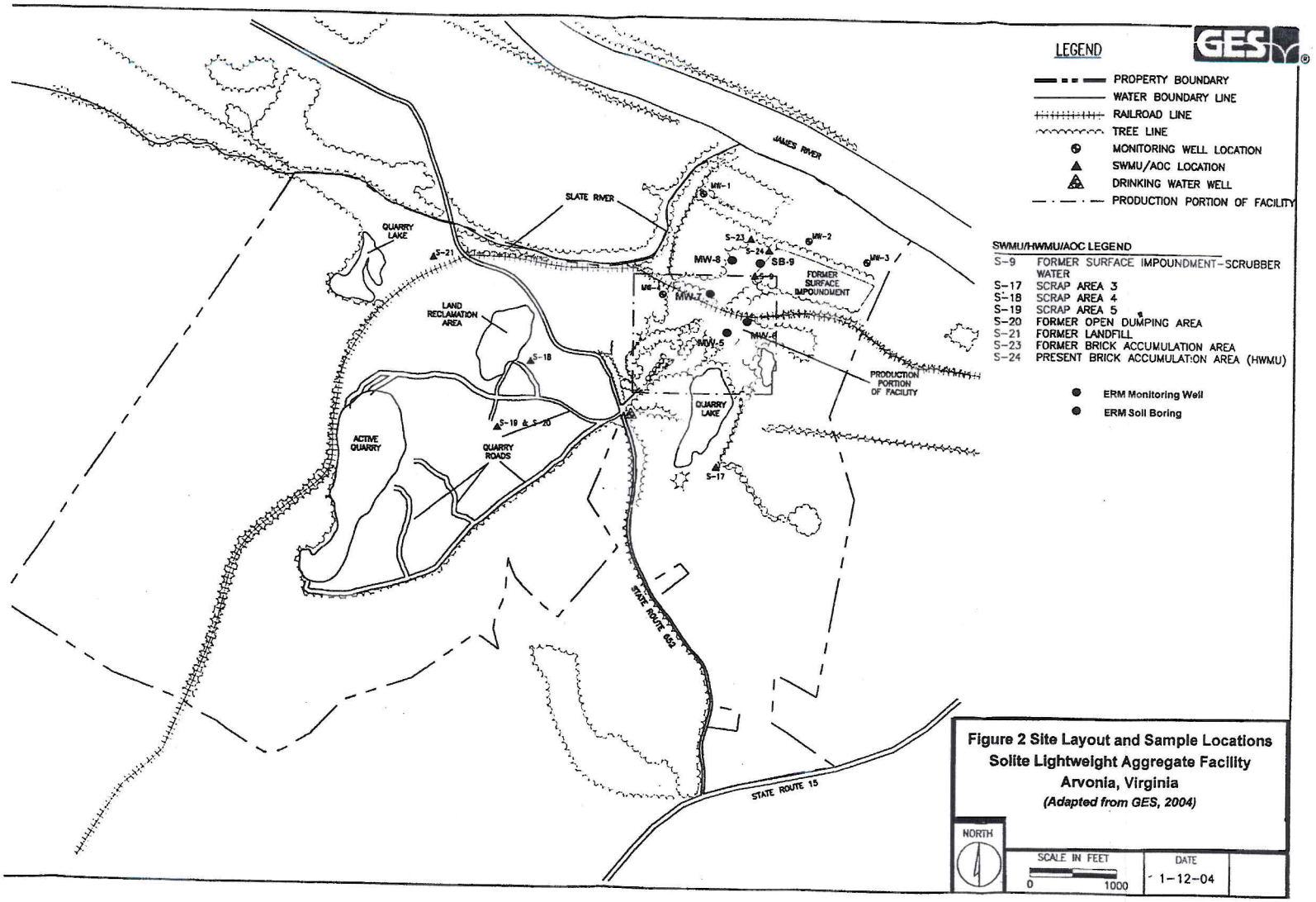

Figure 2 Site Layout and Sample Locations
Solite Lightweight Aggregate Facility
Arvonia, Virginia
(Adapted from GES, 2004)