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September 30, 2004

DEPARTMENT OF THE ARMY
Mr. Karl Blankinship
US Army Corps of Engineers
Attn: CESAM-PM-ME
Building 4488, Room A317A, Martin Road
Redstone Arsenal, Alabama 35898

840891-SHAWCHO-0127

Contract: Total Environmental Restoration Contract
Contract DACA21-96-D-0018, Delivery Order 0020

Subject: Submittal of Final Record of Decision RSA-99, Abandoned Plating Shop Tanks and Sump, Building 7614, Operable Unit 10, Redstone Arsenal, Madison County, Alabama

Dear Mr. Blankinship:

The Final *Record of Decision RSA-99, Abandoned Plating Shop Tanks and Sump, Building 7614, Operable Unit 10*, Redstone Arsenal, Madison County, Alabama (Shaw, September 2004) is published for your review and comment.

The document has been published on ActiveProjects for electronic viewing to subscribers as listed on the attached distribution list and in accordance with the *Document Submission Requirements and Distribution Procedures (Revision XXVII)*. Copies of this document have been forwarded to the recipients listed on the attached distribution list and in accordance with the revised distribution list, quantities as indicated.

If you have any questions or need additional information regarding this submittal, please do not hesitate to call me at 865-694-7433.

Respectfully submitted,

Don C. Burton
Project Manager
Shaw Environmental, Inc.

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DEPARTMENT OF THE ARMY
UNITED STATES ARMY GARRISON – REDSTONE
4488 MARTIN ROAD
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REPLY TO
ATTENTION OF

AMSAM-RA-DES-IR

SEP 2 4 2004

MEMORANDUM FOR Federal Facilities Branch (Ms. Julie Corkran), US Environmental Protection Agency, Waste Management Branch, 61 Forsyth Street, SW, Mail code 4WD-FFB-10th Floor, Atlanta, GA 30303-34013
Government Facilities Section (Mr. Tom Birks), Hazardous Waste Branch, Land Division, Alabama Department of Environmental Management, PO Box 301463, Montgomery, AL 36130-1463

SUBJECT: Final Record of Decision RSA-99, Abandoned Plating Shop Tanks and Sump, Building 7614, Operable Unit 10, Redstone Arsenal, Madison County, Alabama

1. Reference the Installation Restoration Program at Redstone Arsenal, Alabama (EPA ID AL7 210 020 742).

2. This letter transmits one hard copy of subject document.

3. Any questions or concerns regarding this report may be directed to Ms. Terry de la Paz, Installation Restoration Division (AMSAM-RA-DES-IR), e-mail terry.delapaz@redstone.army.mil, 256-955-6968.

Encl

TERRY W. HAZLE
Director, Directorate of Environment
and Safety

CF:
Gannett Fleming, Inc (Mr. J.E. "Ben" Bentkowski), Suite 700, Peachtree Center Tower, 230 Peachtree St, N, Atlanta, GA 30303 (1 hardcopy & 1 CD)
US Army Environmental Center, Installation Restoration Division, (SFIM-AEC-IRP, Mr. Michael Kelly), Bldg #E4480, Aberdeen Proving Ground, MD 21010-5401 (1 CD)
US Army Center for Health Promotion and Preventative Medicine, (MCHB-TS-THR), Bldg #E1675, Aberdeen Proving Ground, MD 21010-5401 (1 CD)
Environmental Compliance Group (Mr. Jack Milligan), Tennessee Valley Authority, 1101 Market St, CST 17B, Chattanooga, TN 37402-2801 (1 CD)
Wheeler National Wildlife Refuge (Mr. Dwight Cooley), US Fish and Wildlife Service, 2700 Refuge HQ Road, Decatur, AL 35603 (1 CD)
Alabama Department of Public Health (Mr. Kenneth Calhoun), 201 Monroe St, Suite 1450 Montgomery, AL 36104 (1 CD)
Marshall Space Flight Center, Mr. Farley Davis, Bldg 4200, Mail Code AD-10, Marshall Space Flight Center, AL 35812 (1 CD)

Final

Record of Decision

RSA-99, Abandoned Plating Shop Tanks and Sump
Building 7614
Operable Unit 10

Redstone Arsenal
Madison County, Alabama
U.S. EPA ID No. AL7 210 020 742

September 2004

Delivery Order 0020
Contract No. DACA21-96-D-0018
Project No. 840891

Alabama Department of Environmental Management

Final

Record of Decision

RSA-99, Abandoned Plating Shop Tanks and Sump
Building 7614
Operable Unit 10
Redstone Arsenal, Madison County, Alabama

Prepared For:

U.S. Army Corps of Engineers, Savannah District
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Contract No. DACA21-96-D-0018
Delivery Order 0020
Shaw Project No. 840891

September 2004

Revision 0

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List of Acronyms

ADEM	Alabama Department of Environmental Management
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemicals of concern
EPA	U.S. Environmental Protection Agency
G&M	Geraghty and Miller, Inc.
HI	hazard index
IT	IT Corporation
µg/L	micrograms per liter
OU	Operable Unit
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	remedial investigation
ROD	record of decision
RSA-99	Abandoned Plating Shop Tanks and Sump, Building 7614
Rust	Rust Environment & Infrastructure, Inc.
SB/PP	statement of basis/proposed plan
Shaw	Shaw Environmental, Inc.
SLERA	screening-level ecological risk assessment
SRI	supplemental remedial investigation
SWMU	solid waste management unit
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
Thiokol	Thiokol Corporation
USAG	U.S. Army Garrison
VOC	volatile organic compound

1.0 The Declaration

1.1 Site Name and Location

Abandoned Plating Shop Tanks and Sump, Building 7614
RSA-99, Operable Unit (OU) 10
Redstone Arsenal
Madison County, Alabama

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Identification Number: AL7 210 020 742

U.S. Army Garrison (USAG)

1.2 Statement of Basis and Purpose

This record of decision (ROD) presents the selected remedy for the Abandoned Plating Shop Tanks and Sump, Building 7614 (RSA-99) at Redstone Arsenal in Madison County, Alabama. The remedy was chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act, and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan. The remedy was also chosen to be in compliance with the Resource Conservation and Recovery Act (RCRA).

The remedy selection was based on the Administrative Record file for this site, including the remedial investigation (RI)/baseline risk assessment reports (Rust Environment & Infrastructure, Inc. [Rust], 1997; Shaw Environmental, Inc. [Shaw], 2004a), the statement of basis/proposed plan (SB/PP) (Shaw, 2004b), and other related documents contained in the Administrative Record file for RSA-99.

This document is issued by the USAG at Redstone Arsenal who is the lead agency for site activities. The U.S. Environmental Protection Agency (EPA), Region 4 and the Alabama Department of Environmental Management (ADEM) are the regulatory agencies providing oversight of the USAG's cleanup program at Redstone. EPA has provided approval of the selected remedy. ADEM has been provided the opportunity to concur/non-concur with the No Action remedy selected in the RSA-99 ROD. At the time of ROD signature, ADEM has not provided a written response to the USAG's request for concurrence. If a letter is received from ADEM stating concurrence or non-concurrence with the No Action remedy, the letter will be placed in the Administrative Record file for RSA-99.

1.3 Description of the Selected Remedy

Conditions at RSA-99 are such that a No Action remedy is appropriate for the surface media (i.e., soil) at RSA-99 as supported by the following:

- No chemicals were detected in concentrations at the site surface media that would meet EPA's definition of a principal threat waste.
- The results of the risk assessment for RSA-99 indicate no unacceptable risk to human health and the environment is posed by site-related contaminants in soil.
- No action (CERCLA or RCRA) is necessary for RSA-99 surface media and no monitoring or restrictions are necessary to ensure that no unacceptable exposure to risks is posed by the site soil in the future.

This response action fits into the overall Redstone Arsenal cleanup strategy by addressing those surface media sites that do not impact groundwater and accelerating them towards closure. Other surface media sites that are impacting groundwater will proceed with timely completion of the investigation effort and remedy selection/implementation so as to minimize the volume of contaminated groundwater and migration of the associated plume. The groundwater cleanup under RSA-99 will proceed under a broader watershed approach (e.g., RSA-146 groundwater unit).

1.4 Statutory Determinations

No remedial action is necessary to ensure protection of human health and the environment at RSA-99. Therefore, none of the CERCLA 121 statutory determinations need to be addressed. Because this No Action remedy will not result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a five year review is not required.

1.5 Authorizing Signatures

27 Sept 04

Col. Robert Devlin Date
U.S. Army Garrison Commander
Redstone Arsenal

9-29-04

Winston A. Smith, Director Date
Waste Management Division
U.S. Environmental Protection Agency, Region 4

Concurrence:

Wm. Gerald Hardy, Chief Date
Land Division
Alabama Department of Environmental Management

Prepared under the direction of:

23 Sept-04

Carl W. Smith Date
U.S. Army Corps of Engineers
Savannah District
Hydrogeologist

Reviewed by:

23 Sep 04

Terry de la Paz Date
U.S. Army Garrison - Redstone
Chief, Installation Restoration Division
Environmental Engineer

Reviewed by:

23 Sept. 04

Terry W. Hazle Date
U.S. Army Garrison - Redstone
Installation Restoration Division
Director, Directorate of Environment
and Safety

Reviewed by:

23 Sep 04

Amy S. Meredith Date
U.S. Army Aviation and
Missile Command
Attorney Advisor

Reviewed by:

23 Sep 04

Al Schwartz Date
U.S. Army Aviation and
Missile Command
Public Affairs Officer

09-29-04 13:46 From-USEPA R4 FedFacs/BRAC Atlanta, GA 4045628512 T-141 P.002/002 F-125

2.0 Decision Summary

2.1 Site Name, Location, and Description

Abandoned Plating Shop Tanks and Sump, Building 7614
RSA-99, OU-10
Redstone Arsenal
Madison County, Alabama

CERCLA Identification Number: AL7 210 020 742

Lead Agency: USAG

Redstone Arsenal is located in the northern portion of Alabama (Figure 1). The Arsenal is in the southwestern portion of Madison County, Alabama and is bounded by the City of Huntsville on the north and east and the Tennessee River to the south. The City of Madison and the town of Triana are northwest and southwest of the Arsenal, respectively.

Redstone Arsenal is an Army facility that encompasses approximately 38,300 acres of land, all of which are either owned or controlled by the USAG. Development within Redstone Arsenal has largely revolved around the historical need to produce conventional and chemical munitions and more recently to test missiles and rockets. Chemical wastes have been the result of these processes since operations began in the early 1940s.

RSA-99 is located in the east-southeast portion of Redstone Arsenal (Figure 1) within the Redstone Arsenal Rocket Engine North Plant area. Building 7614 was a core preparation facility beginning in the mid-1950s in support of processing rocket motor cores. From the late 1970s until approximately 1985 the building was used as a metals plating shop building for the coating of rocket motor casings. Thiokol Corporation (Thiokol), a contractor for the Army, conducted operations in the small, single-story building which encompassed 573 square feet. The building was located within a highly-developed and heavily-industrialized setting containing other process buildings and roadways (Figure 2). Figure 3 shows the former Building 7614, looking west toward Building 7601, prior to its demolition in 1999.

RSA-99 is listed as a solid waste management unit (SWMU) on the Redstone Arsenal RCRA Part B permit. The RCRA Corrective Action requirements for RSA-99 are being deferred to the CERCLA program for further evaluation. The site required evaluation through an investigation process that integrated and combined a RCRA facility investigation (RFI) with a CERCLA RI to

determine the actual or potential impact to human health and the environment of releases of hazardous substances to the environment.

The USAG is the lead agency for response actions at Redstone Arsenal. The EPA and ADEM are the regulatory agencies providing oversight of the Army's clean up program at Redstone. Environmental investigation activities under CERCLA at Redstone are funded by the Defense Environmental Restoration Account.

2.2 Site History and Enforcement Activities

2.2.1 History of Site Activities

Building 7614 was constructed sometime between 1950 and 1954 based on a review of historical aerial photographs and master building lists. It was initially used as a core preparation building per master building lists for 1954 and 1957 and was assigned the building number L-614 until July 1957 when new building numbers were assigned base-wide (L-614 then became 7614). Review of available Thiokol records provided no specific details of the core preparation operation at Building 7614. Records were available for another Thiokol core preparation facility (Building 7370), however. Because Building 7370 was more than four times the size of Building 7614, it is believed that Building 7614 was used for a small-scale core preparation facility in support of nearby rocket motor development work at Building 7603. It was previously thought that Building 7614 may have served as a refrigeration facility for the rocket motor propellant curing process. However, no supporting information on a refrigeration unit was found in engineering drawings or other documents for the building. Additionally, as more details have been obtained about the former processes in nearby buildings, Building 7614 was likely a core preparation facility performing operations on a much smaller scale than at Building 7370. Nearby buildings were part of a pilot line research service facility for propellant manufacture and rocket motor production. Specifically, Building 7603 was a developmental laboratory that handled mixing, casting, and assembly for small-scale rocket motor development. Building 7601 was the shop facility where the developmental casings were constructed. Nearby Building 7609 operated as a welding shop and curing ovens in Buildings 7602 and 7617 were used for curing rocket motors from the developmental facility.

Core preparation in Building 7614 was believed to have occurred from approximately 1954 until the late 1970s. Elongate machine cores (steel, aluminum, plastic) were sandblasted and subsequently cleaned using trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), or PF degreaser solvent. Once clean, the cores were then coated using Teflon® to minimize the friction from the cured propellant. Lead (i.e., non-conductive) flooring was used in the building to

prevent static cling of the grit blast particles on the cores prior to spraying with a Teflon coating. Tool cleaning was generally performed at a different facility. An indoor, below grade, self-contained sump collected building process wastes. The sump was periodically emptied into containers for disposal by the Thiokol Safety Group. Chemicals/compounds that may have been used or handled in the facility during core preparation are listed in Table 1 (Thiokol, 1996a).

Table 1

Chemicals/Potential Constituents of Concern during Core Preparation

Butanone (MEK)	Teflon premixed primers 850-204/851-204
Methylene chloride	Teflon top coats 856
PF degreaser solvent	Teflon S finishes 851 and 852
RTV 88 Silicone rubber	TCA 1:1:1
Teflon green primer/851-204	TCE

From approximately 1979 to 1985, Building 7614 was used by Thiokol as a small-scale metals plating shop for plating rocket motor casings. The building was equipped with several aboveground plating process tanks/baths that were used for cadmium, nickel, chromium, and silver plating operations. A number of chemicals were used in the process as presented in Table 2 (Thiokol, 1996b). Process leaks as well as floor wash down waste were collected in a below grade concrete sump within the building. The sump was approximately 3 feet long, 2 feet wide, and 2 feet deep and was self-contained. The Thiokol Safety Group periodically emptied the sump contents into containers and disposed of the waste off-site. Releases to the environment may have occurred from leaks in the floor drain pipes connected to the tanks and leaks or overflows in the waste sump. However, no releases were recorded by former Thiokol representatives.

Table 2

Chemicals used during Plating Operations

Acetone	Metex Strip Aid
Acid Salt M-629	Methylene chloride
Ammonium nitrate	Sodium cyanide
Anodex NP-2	Sodium cyanogram
Cadmium	Sulfuric acid
Chromic acid solution	1,1,1-Trichloroethane
Macrobronze 2-C	Trichloroethylene
Metex 157	Udylite Nickel Brightener No. 61

By 1989, the building was in the process of being renovated (i.e., removal of some of the plating equipment) by Thiokol for another use as noted by Geraghty and Miller, Inc. (G&M) during the RCRA Facility Assessment (RFA) (G&M, 1991). This subsequent use never materialized.

Several labeled and unlabeled drums and overpacks were noted as stored in the building during the RFA. Additionally, it was noted that some of the plating tanks still contained liquid. The wastes and remaining equipment were understood to have been disposed by Thiokol in 1992 when the building was officially declared inactive. In 1993, a number of wipe samples were collected throughout the building in preparation for building demolition. Additionally, paint samples were taken from the building and analyzed for TCLP extractable lead. In 1994, documentation was submitted to the Arsenal Real Property Office for building demolition. The building remained inactive in deteriorating condition until 1999 when the building, sump, and lines were demolished and removed from the site. At the time of the building demolition, a contract and demolition instruction was in place for all demolition waste to be taken to the on-post RCRA permitted Construction/Demolition Landfill if the waste met the permit requirements. Approved non-hazardous construction/demolition and asbestos waste streams included waste building materials, packaging, and rubble from construction, remodeling or demolition operations, concrete and masonry wastes, sheet rock, roofing waste, insulation, scrap metal, wood wastes, soil, rock, yard trimmings, leaves, waste asphalt, ash from wood combustion, and similar types of wastes. The building demolition debris at 7614 would have fallen into the approved waste stream categories for the onsite landfill and all indications are that the demolition debris went to this landfill.

2.2.2 History of Investigative Activities

A number of assessments/investigations have been conducted at RSA-99. These include the following:

- Interim RFA – The Interim RFA was conducted by EPA and contractors in July 1989 and consisted of a preliminary review of all available documentation followed by a visual site inspection (A.T. Kearney, Inc., 1989). At the time of the inspection, RSA-99 was noted as an inactive small-scale plating shop. Very few operational details were available and no samples were collected.

- Final RFA – From 1989 to 1990 a final RFA was conducted by the Army and contractors (G&M, 1991). The RSA-99 site was revisited, photographed, and former employees were interviewed. No samples were collected.

- RFI – Subsurface soil and groundwater sampling was performed during the RFI in August 1993 (Foster Wheeler, 1995). Several metals were detected in subsurface soil that may have been an indication of minor site-related contamination. However, most soil samples were collected very deep and are suspected to have been influenced by groundwater. Elevated levels of volatile organic compounds (VOC) (primarily TCE) were detected in groundwater samples collected from monitoring wells.

- RI/Baseline Risk Assessment – On May 31, 1994, EPA placed Redstone Arsenal on the National Priorities List administered under CERCLA. Follow on investigations at RSA-99 were then conducted under CERCLA. An RI/baseline risk assessment was conducted in November 1995 (Rust, 1997). Soil (surface and subsurface) and groundwater sampling was conducted during the RI. Metals were detected in surface and subsurface soil. High concentrations of metals and VOCs were detected in groundwater; however, the metals data is highly suspect due to turbidity concerns with sampling open boreholes.

- Supplemental RI (SRI) – Lastly, a SRI was performed at RSA-99 in 2002 to fill remaining analytical and site characterization data gaps left by the previous investigations (Shaw, 2004a). A human health risk evaluation and a screening-level ecological risk assessment were conducted as part of the SRI. The SRI confirmed that only minor site-related contamination (lead and mercury) remains in surface soil in a very limited area and that the site is not an ongoing source of contamination to groundwater. TCE and perchlorate were detected in groundwater under the site.

2.2.3 History of CERCLA Enforcement Activities

There have been no removal or remedial actions or CERCLA enforcement activities at RSA-99.

2.3 Community Participation

The USAG offers several opportunities for members of the public to become involved in the environmental cleanup and land-use decision-making processes at Redstone Arsenal, consistent with its public participation responsibilities under Sections 113 (k)(2)(b), 117(a), and 121(f)(1)(g) of CERCLA and ADEM 335-14-8-.04 for permit modifications under RCRA including:

- Informational materials and presentations
- Administrative Record file and information repositories
- Public meetings and comment periods.

Informational materials, such as fact sheets, are sent to community members on an ongoing basis. A mailing list of community members and individuals that have requested information is maintained and updated regularly. Presentations and tours for community groups are aimed specifically for members of the public and are also announced through mailings or by the media. A community relations plan (Shaw, 2004c) has been published to keep the community informed of cleanup progress at RSA and to provide opportunities for the public to interact with the USAG.

The Administrative Record file for RSA-99 contains all the documentation the USAG considered in selecting the remedial action for RSA-99. Documents in the Administrative Record file for RSA-99 and other CERCLA sites at Redstone Arsenal can be found at the information repositories maintained at the following locations:

U.S. Army Garrison, Redstone Arsenal

Contact: Ms. Salee Sloan (256) 842-0314
Location: Directorate of Environment and Safety, Building 4488, Room 327L
Business Hours: Monday-Friday 7:00 a.m. – 4:30 p.m.

Contact: Mr. Mike Baker (256) 842-0564
Location: Redstone Arsenal Historical Office – Sparkman Center, Room 5135
Business Hours: Monday-Friday 7:00 a.m. – 4:30 p.m.

Contact: Ms. Martha Knott (256) 842-8434
Location: Redstone Arsenal Scientific Library – Building 4484 (Martin Road)
Business Hours: Monday 11:00 a.m. – 5:30 p.m.
Tuesday-Thursday 7:30 a.m. – 5:30 p.m.,
Friday 7:30 – 4:00 p.m.

Huntsville/Madison County Public Library

Contact: Ms. Anne Fuller (256) 842-8434
Location: Huntsville/Madison County Public Library – Heritage Room,
915 Monroe Street
Huntsville, Alabama 35804
Business Hours: Monday – Thursday 9:00 a.m. – 9:00 p.m.,
Friday – Saturday 9:00 a.m. – 5:00 p.m.,
Sunday 1:00 – 5:00 p.m.

Triana Public Library

Contact: Ms. Myrtle Binford (256) 772-3677
Location: Triana Public Library (Triana Youth Center)
280 Zierdt Road
Triana, Alabama 35758
Business Hours: Monday 10:00 a.m. – 2:00 p.m.,
Tuesday-Thursday 3:30 p.m. – 7:30 p.m.

The final SRI report for RSA-99 (Shaw, 2004a) was released in July 2004 to the Administrative Record file and made available to the public. The SB/PP (Shaw, 2004b) was also released in July 2004 for public review and comment. A notice of availability of the RSA-99 SRI report, the

SB/PP, and other related documents in the Administrative Record file was published in *The Huntsville Times* on July 21, 2004 and July 25, 2004; in the *Speakin' Out News* the week of July 26, 2004; and in the *Redstone Rocket* on July 28, 2004. A 30-day public comment period for the SB/PP began on July 21, 2004. The public was informed that a public meeting would be held if there was sufficient interest from the public. A meeting was not requested and the public comment period ended on August 19, 2004. No comments were received during the public comment period.

2.4 Scope and Role of Operable Unit or Response Action

2.4.1 Overall Cleanup Strategy for Redstone Arsenal and RSA-99

RSA-99 is listed as a non-regulated SWMU on the Redstone Arsenal RCRA Part B permit. The site was originally investigated under RCRA but once the Arsenal was placed on the National Priorities List, the remainder of the investigation was completed under CERCLA. The RCRA Corrective Action requirements for RSA-99 were deferred to the CERCLA program for further evaluation.

Consistent with EPA guidance for RCRA/CERCLA integration, the USAG is pursuing integrated RCRA/CERCLA investigations and remedies for historical releases from waste units at Redstone Arsenal. In accordance with Section 120 of CERCLA, Title 42 United States Code Section 9620, the Army is in the process of negotiating a three-party Federal Facility Agreement with EPA and ADEM to coordinate activities at Redstone into one comprehensive strategy that fulfills these dual regulatory requirements. The agreement, once signed, will provide a procedural framework and schedule for evaluating, prioritizing, and managing areas of contamination on Redstone Arsenal.

No remedial action is planned at the RSA-99 surface media. However, should remedial action be required to address underlying groundwater at RSA-99 or to address surface media at other sites, it is USAG's intention to complete these actions under CERCLA authority. It is also USAG's intention that these CERCLA actions will concurrently meet its RCRA obligations imposed by the RCRA Part B permit. The USAG will work with ADEM to pursue a RCRA permit modification (including public involvement) for a no further action remedy for RSA-99. This path forward will be consistent with the RCRA permit obligations.

Redstone Arsenal was originally divided up into 18 OUs for the purpose of facilitating groupings for remediation/site closeout under CERCLA. These OUs were determined primarily from a topographic and an ecological habitat/range standpoint. Recognizing that groundwater flow,

however, is not limited to these OU boundaries, the USAG has recently divided up the Arsenal into 13 groundwater units (RSA-145 through RSA-157) based on groundwater watershed boundaries from the basewide hydrogeologic study conducted in 2001 (IT Corporation [IT], 2003). The groundwater under RSA-99 falls within the RSA-146 groundwater unit which includes OU-9, OU-10, OU-11, and OU-12. The groundwater contamination at the CERCLA sites at Redstone is typically widespread and encompasses contributions from more than one site. Using a watershed approach, the relevant impact of each contributing site to groundwater and receptor populations will be evaluated for the groundwater unit as a whole. This in turn will allow a "triage" approach to be applied to more efficiently affect groundwater and remedial decision-making with regards to sites that have in the past, currently, or in the future served as potential source areas to groundwater. Although investigation and remediation of the groundwater will be conducted on a groundwater unit basis, the USAG is keeping the OU designation for administrative purposes. Controls are currently in place through a Site Access Control Program (in accordance with Redstone Arsenal Regulation 200-7) to prevent installation of wells for drinking water or irrigation on the Arsenal (USAG, 2003). Regulation 200-7 will prevent exposure of any persons to the groundwater contamination in the interim until a final groundwater remedy is selected.

At Redstone Arsenal, some sites such as RSA-99 are not current sources of groundwater contamination. In other cases, there are sites that are believed to be ongoing sources of contamination to groundwater. These sites are considered to be a principal threat if the source materials are highly toxic or highly mobile and can not be reliably contained or present significant risk to human health or the environment if exposure occurred. The USAG is accelerating closure of the surface media sites like RSA-99 that are not currently impacting groundwater or expected to in the future. Surface media remediation at RSA-99 and like sites, if necessary, will focus on surface soil, subsurface soil, surface water, and sediment as well as exposure pathways. Conversely, surface media sites that are impacting groundwater will proceed with completion of the investigation and remedy selection/implementation so as to minimize the volume of contaminated groundwater and migration of the contaminant plume.

2.4.2 Scope of Problems Addressed by RSA-99 Response Action

The action or scope covered by this ROD is closure of the surface media at RSA-99 which includes the surface soil and subsurface soil to a depth of 18 feet below ground surface (bgs), consistent with the seasonal high water table. There is no surface water or sediment within the site boundary. There is no contamination at RSA-99 that could contribute to future groundwater contamination.

2.4.3 Relationship of Proposed Action to Removal or Other Operable Units

Two CERCLA sites (RSA-94 and RSA-88) are in proximity to RSA-99 and are known sources of TCE and perchlorate contamination to groundwater. Investigations are continuing for these two sites independent of RSA-99. Sampling in conjunction with potential source areas adjacent to RSA-99 (Figure 2) (e.g., Building 7601 and 7603) is also ongoing and has shown up to 100 micrograms per liter (µg/L) of TCE in the groundwater under these buildings. They are suspected to be sources of TCE and perchlorate contamination given their building use history. These potential source areas are being investigated separately from RSA-99.

With No Action as the selected remedy for RSA-99 surface media, no remediation will be conducted since remediation is not warranted or required for the soils. Any remediation that may be required for the groundwater will be conducted with the ongoing investigation/remediation of the larger RSA-146 groundwater unit, independent of RSA-99 and this ROD for RSA-99 surface media.

2.5 Site Characteristics

This section of the ROD presents an overview of the characterization of RSA-99 with respect to known or suspected sources of contamination, types of contamination, and affected media. Known or potential routes of contaminant migration are also discussed. Figure 1 shows a map of RSA-99 in relation to Redstone Arsenal. Figure 2 is a site map of RSA-99.

2.5.1 Conceptual Site Model

A conceptual site model showing the geologic and hydrogeologic setting of RSA-99 is presented in Figure 4. This model presents potential sources and migration routes of contamination associated with the site. The conceptual site model shows these areas relative to major surface and subsurface features at or near the site. It also shows potential contaminant migration pathways that include surface runoff to low-lying areas and leaching from surface and subsurface soil to underlying soil and groundwater.

Potential sources at RSA-99 included the sump inside the building (core preparation and plating shop) and the plating tanks and drain lines (metals plating shop). RSA-99 contaminants, if present, would be expected around and under the sump where process waste collected in the building. Contaminants would also be expected under the building where leaks may have occurred in building drain lines or plating tanks. Various chemicals that were known to be used in the core preparation facility and the metals plating shop are presented in Tables 1 and 2. Wastes that entered the sump did not exit the sump, as it was not equipped with a drain. These wastes had to pumped out periodically into drums and disposed.

The site is now grass covered since the building was demolished in 1999. The site is only approximately 0.02 acres in size. There are no areas of known or suspected archeological or historical importance in the site area. There are no surface water drainage features on the site. Groundwater has been encountered at depths ranging from approximately 18 to 20 feet bgs in overburden wells at the site. There is a low groundwater gradient at the site with a groundwater flow direction predominantly toward the west and northwest with local mounding due to condensate releases from aboveground steam lines and rainwater runoff from adjacent building roofs. Contaminants in groundwater are suspected to be carried from nearby CERCLA sites (RSA-94 [Degreasing Facility] and RSA-88 [Temporary Waste Storage Pad]), based partly on the TCE and perchlorate plume mapping. There are also potential source areas in the vicinity of RSA-99 that are currently undergoing investigation separate from RSA-99 (Figure 2).

Figure 5 presents the human health conceptual site exposure model. RSA-99 is well within the boundaries of Redstone Arsenal and removed from residential areas, agricultural areas, and areas used for hunting, fishing, or other recreational purposes, thus precluding the possibility of trespasser exposure to soils. Workers are likely to be present and to have a potential for exposure to soil (surface and subsurface) at RSA-99, where an infrequent groundskeeper could be exposed to soil through incidental dermal contact and incidental ingestion. The soils at the site are covered by grass and other vegetation, such that there is minimal direct exposure to soils. Potential groundwater exposure pathways are incomplete under current conditions because groundwater is not utilized as a potable water supply on Redstone Arsenal. The nearest off-site residence is approximately 1.2 miles to the east of RSA-99. The site risks are discussed in Section 2.7.

2.5.2 Nature and Extent of Contamination

During the RFI conducted in 1993, the RI conducted in 1995, and the SRI conducted in 2002, surface soil, subsurface soil, and groundwater were sampled and analyzed for contamination. Figure 6 shows the sample locations in the various investigations conducted at RSA-99. Sampling in the RFI and RI in the early to mid-1990s was concentrated more outside of the potential source area where releases could have occurred (drain lines and sump) due in part to sampling difficulties. The presence of Building 7614 and the adjacent Building 7601 hindered access for drilling equipment to collect samples close to and under the building. Subsequent sampling in the SRI was focused at the potential release points as Building 7614 was already demolished and sampling access was not restricted. Additionally, sampling and resulting analytical in the SRI fully considered the former uses of Building 7614.

2.5.2.1 Nature and Extent of Soil Contamination

Soil samples were collected in and around RSA-99 and analyzed for VOCs, metals, cyanide, perchlorate, and explosives. Only metals are detected in surface soil. Two metals, lead and mercury, are determined from a statistical and geochemical evaluation to present potential site contamination. Both metals appear to be very limited in lateral extent at the site. Figure 7 shows only one location (K99-SB04) at the site where lead contamination may be present. Other adjacent samples were significantly lower in lead concentrations. Figure 8 shows the one location (09912-SB) with elevated mercury that may be indicative of contamination. All surrounding samples have much lower mercury values consistent with being naturally occurring. This elevated mercury level from the 1995 sampling was not replicated in the SRI sampling in 2002. Subsurface soil samples were analyzed for VOCs, metals, cyanide, perchlorate, and explosives. Only metals and TCE are detected in the samples. Metals are detected in the SRI subsurface soil samples at levels that were consistent with naturally-occurring levels. One detection of TCE in a very deep soil sample is likely due to the influence of contaminated groundwater. Tables 3 and 4 present summaries of the surface soil and subsurface soil data, respectively, for lead, mercury, TCE, and perchlorate.

Table 3

Surface Soil Data Summary

Chemical	Unit	Total Samples	Total Analyses	Detections		
				Number of Detections	Minimum Value	Maximum Value
Lead	mg/kg	20	19	19	12	119
Mercury	mg/kg	20	19	19	0.055	10
TCE	mg/kg	20	20	0	-	-
Perchlorate	mg/kg	20	3	0	-	-

mg/kg – Milligrams per kilogram.

Table 4

Subsurface Soil Data Summary

Chemical	Unit	Total Samples	Total Analyses	Detections		
				Number of Detections	Minimum Value	Maximum Value
Lead	mg/L	44	43	43	3.1	47
Mercury	mg/L	44	43	43	0.046	0.28
TCE	mg/L	44	44	1	0.093*	0.093*
Perchlorate	mg/L	44	7	0	-	-

*Data suspect as sample was believed to be influenced by contaminants in groundwater.
mg/kg – Milligrams per kilogram.

The analytical data confirmed that the metals and VOCs of concern from plating operations (cadmium, nickel, chromium, and silver) were not a significant concern in soils. Similarly, VOCs used in the core preparation operations were not detected in the site soils. Explosives, while a concern at surrounding buildings, were addressed in the analytical suite for RSA-99 but were not detected.

2.5.2.2 Nature and Extent of Groundwater Contamination

Groundwater was sampled from hydropunch locations and monitoring wells at the site from 1993 until 2002. Analyses were performed for VOCs, metals, cyanide, perchlorate, and explosives. VOCs, metals, and perchlorate are detected in the groundwater samples. Table 5 presents a summary of the groundwater data for lead, mercury, TCE, and perchlorate. Metals collected from the monitoring wells are consistent with background levels as determined from a statistical and geochemical evaluation. The groundwater contains TCE, other VOCs, and perchlorate. These contaminants were not found in the site soil as discussed in Section 2.5.2.1. While former operations at RSA-99 may have contributed TCE and other VOCs to groundwater in the past, the small scale size of the facility, the lack of direct release points to the ground, and the fact that no VOCs were detected in any of the soil samples collected put RSA-99 in a category of potential minor historical contributions to a widespread plume. Figure 9 shows a perchlorate groundwater plume that appears to originate from RSA-94/RSA-88 just to the northwest. Figure 10 shows a TCE groundwater plume that also appears to have also originated from RSA-94/ RSA-88. Recent hydropunch data from limited site assessment sampling at nearby potential source areas at Buildings 7601 and 7603 confirms that a perchlorate and TCE contaminant plume exists under these buildings as well. Further evaluation is ongoing with these potential source areas.

Table 5

Groundwater Data Summary

Chemical	Unit	Total Samples	Total Analyses	Detections*		
				Number of Detections	Minimum Value	Maximum Value
Lead	µg/L	50	9	1	14	14
Mercury	µg/L	50	9	0	-	-
TCE	µg/L	50	47	34	0.74	880
Perchlorate	µg/L	50	14	12	2.4	3,660

*Only unfiltered sample data from monitoring wells were used for metals (lead and mercury).
µg/L – Micrograms per liter.

2.6 Current and Potential Future Land and Resource Uses

2.6.1 Current and Future Land Use

Current land use is restricted to industrial use at RSA-99. It is anticipated that land use around RSA-99 will remain industrial into the foreseeable future, as the USAG is unlikely to change the current mission of Redstone Arsenal. The USAG has demolished a few vacant buildings in the area. Just west of RSA-99 is an active propulsion laboratory (Building 7600). The area around RSA-99 is already developed except for the area to the east-southeast, which is vacant. The past industrial use of RSA-99 and surrounding area would make it an unattractive location for residential land use, however. Off-base residential housing is located approximately 1.2 miles to the east of RSA-99.

2.6.2 Groundwater Use

The groundwater is not anticipated to be used for human consumption or any other purpose within RSA-99, OU-10, or the Arsenal as a whole, with the exception of monitoring water quality for environmental investigations. On the Arsenal, a potable water supply is readily available and groundwater is not currently a source of drinking water or used locally for industrial purposes. The source of drinking water supplied to residents in the area is city water derived from the Tennessee River. Contamination under RSA-99 or the OU-10 area is not likely to impact the Tennessee River and its intake location. It is not anticipated that groundwater resources at RSA-99 will be developed in the future and the Army is unlikely to change the current mission of Redstone Arsenal.

2.6.3 Surface Water Use

Surface water is not perennially present within RSA-99 and surface water is not used for any purpose within the OU-10 area at this time. It is not anticipated that the use of surface water will change in the future.

2.6.4 Recreational Use

There is no current recreational use of RSA-99 or the surrounding area.

2.7 Site Risks

A human health risk evaluation and a screening-level ecological risk assessment (SLERA) were performed for RSA-99 as an addendum to the Rust RI report/baseline risk assessment. These evaluations were presented in the SRI report for RSA-99 (Shaw, 2004a). A number of changes have occurred since the 1997 baseline risk assessment was finalized, including a new protocol for evaluating investigation data against facility-wide background levels; updated screening,

exposure, and toxicological information; and the addition of the chemical perchlorate to those chemicals detected in groundwater. The same data set evaluated previously as well as the new data collected in the SRI were used to permit comparisons with the baseline risk assessment. The risk addendum added site-specific data from the SRI that were collected at the most likely release points (e.g., sump, drain lines).

2.7.1 Human Health Risk Evaluation

A human health risk evaluation was performed to determine potential health impacts of human exposure to chemicals (organics and inorganics [metals] determined not to be naturally occurring) detected in surface media for the site (surface soil 0 to 1 foot bgs and subsurface soil up to 10 feet bgs). Health impacts from groundwater were also evaluated should the groundwater underlying RSA-99 ever be developed as a potable water source. However, the groundwater under RSA-99 and other sites in OU-10 will be evaluated as part of a broader groundwater unit investigation (RSA-146).

The risk evaluation estimated what risks the site poses if No Action were taken. It provides the basis for taking action if needed and identifies the contaminants and exposure pathways that would need to be addressed by the remedial action. This section of the ROD summarizes the results of the risk evaluation for the site. The results of the risk evaluation and the subsequent risk management decisions support the selected remedy for RSA-99.

The land at RSA-99 is currently not in use for any Arsenal activities, and current human exposure to site media is relatively infrequent and sporadic, limited only to groundskeepers. A groundskeeper and construction worker were evaluated under current land-use conditions as a conservative means of evaluating direct exposure to surface and subsurface soil by Arsenal personnel or contractors. In addition to these two receptors, a trespasser, sportsman, and on-site resident were evaluated under future land-use conditions to estimate the risk and hazard for people that might use the site for a wide range of activities in the future. Although residential use is highly unlikely, evaluation of an on-site resident generally provides the most conservative evaluation and a point of comparison for risk managers. Media to which the selected receptors were hypothetically exposed included surface soil, subsurface soil, and groundwater. It was assumed that a future groundskeeper, construction worker, and on-site resident would be exposed to groundwater developed as a source of potable water in the future, although an evaluation of these future scenarios without exposure to groundwater is included.

2.7.1.1 Identification of Chemicals of Concern

In surface media, the site-related constituents (lead and mercury) are not known carcinogens. Therefore, no unacceptable cancer risk is posed by current or future industrial or unrestricted use exposures to lead and mercury in surface and subsurface soils at RSA-99. For all industrial and residential receptors' exposure to surface soil, the noncancer hazard index (HI) values were less than the threshold value of 1.0 and, hence, exposures for these receptors pose no concern for adverse health effects. As a result, no chemicals identified in the surface soil as contaminants (e.g., lead and mercury) emerged as chemicals of concern (COC). An evaluation of the subsurface soil data resulted in no chemicals being identified as COC. The selection criteria for COCs are the same for all receptors. Table 6 presents the risks and hazards summary for surface soil and subsurface soil.

Table 6

Risks and Hazards Summary
Surface and Subsurface Soil

Receptor[a]	Cancer Risk[b]	Noncancer Hazard[c]
Groundskeeper	None[d]	0.0058
Construction Worker	None[d]	0.0019
Sportsman	None[d]	0.0013
Trespasser	None[d]	0.018
On-Site Resident	None[d]	0.071

[a]The groundskeeper and construction worker are industrial receptors. The on-site resident is the residential receptor. Selection criteria are the same for all receptors.
[b]Incremental lifetime cancer risk; unacceptable if greater than 1×10^{-6} for all industrial and residential receptors.
[c]Noncancer hazard index; unacceptable if greater than 1 for all industrial and residential receptors.
[d]No carcinogenic chemicals of concern identified in surface soil or subsurface soil.

Groundwater will be evaluated as part of a broader investigation in the RSA-146 groundwater unit. However, for evaluation purposes, in the risk evaluation it was assumed that groundwater underlying RSA-99 was available for exposure to human receptors. TCE was selected as the only COC for cancer effects for exposure to groundwater for the future groundskeeper, future construction worker, and future on-site resident. Both TCE and perchlorate were selected as COC for noncancer effects for these same receptors. Table 7 presents a summary of the risks and hazards for groundwater.

Table 7

Risks and Hazards Summary
Groundwater[a]

Receptor[b]	Cancer Risk[c]	Noncancer Hazard[d]
Groundskeeper	1.1E-4[e]	256[f]
Construction Worker	4.44E-4[e]	256[f]
Sportsman	No Exposure	No Exposure
Trespasser	No Exposure	No Exposure
On-Site Resident	7.22E-4[e]	1690[f]

[a] Includes total risks and hazards from surface and subsurface soil (i.e., exposure to groundwater not evaluated independently).
[b] The groundskeeper and construction worker are industrial receptors. The on-site resident is the residential receptor. Selection criteria are the same for all receptors.
[c] Incremental lifetime cancer risk; unacceptable if greater than 1 x 10^{-6} for all industrial and residential receptors.
[d] Noncancer hazard index; unacceptable if greater than 1 for all industrial and residential receptors.
[e] Projected risks due to TCE in groundwater.
[f] Projected hazards due primarily to perchlorate in groundwater.

The results of the risk evaluation show that if the groundwater underlying RSA-99 were developed as a potable water source before these chemicals were cleaned up as part of the RSA-146 remedial action, these chemicals pose an unacceptable cancer risk and non-cancer hazard to industrial and residential receptors. As noted in Section 2.4.1, the USAG has a Site Access Control Program in place at Redstone Arsenal to prevent exposure of persons to contaminated groundwater until a final groundwater remedy is selected for RSA-146.

2.7.1.2 Transport of Metals to Groundwater

Transport calculations project it would take approximately 41 to 87 years for lead and mercury detected in surface soil to reach the water table. It would take significantly longer when realistic retardation factors are applied to the mathematical models (Shaw, 2004a). Therefore, RSA-99 soil is not a future source for metals transport to groundwater. Additionally, current groundwater data does not indicate that these metals have reached the groundwater.

2.7.2 Screening-Level Ecological Risk Assessment

The SLERA conducted at RSA-99 included evaluation of potential environmental impacts from exposure to chemicals detected in surface soil. Surface water is not present at RSA-99 so the site would not support aquatic populations. For an adverse impact to occur to a receptor, the receptor must be present in the contaminated area, the contamination in the medium must have a viable pathway to reach the receptor, and there must be a potential that the dose received would be sufficient to pose an adverse effect. Two metals (lead and mercury) exceeded the ecological

screening criteria and were determined not to be naturally occurring at the site in one sample location each. Because the site is small in size and highly industrialized, RSA-99 is likely to provide habitat only for mice and terrestrial invertebrates in grassy areas. Due to the lack of suitable or critical habitat at RSA-99, endangered species do not occur on site or in the immediate area. Small mammals and birds (e.g., mouse and robin) are the primary transient receptors that could potentially be exposed to contaminated soil from RSA-99, but no adverse impacts are expected from such limited exposures. The assessment did not find contamination at concentrations that would warrant further ecological risk evaluation at RSA-99.

2.7.3 Risk Assessment Summary

Despite the addition of samples collected from directly below the building, the results of the human health risk evaluation in the SRI differed little from the baseline risk assessment with the RI in 1997 with respect to exposure to soil but differed substantially in the potential noncancer threat posed by exposure to groundwater. Based on both the baseline risk assessment and the contemporary evaluation, exposure to surface or subsurface soil would not be expected to pose either a cancer risk or a noncancer hazard for both residential and industrial receptors. If the ingestion of perchlorate in groundwater is included in the future scenarios, the noncancer HI is 1,690, a value well above the threshold value of 1. Contamination extends beyond the boundaries of RSA-99 from multiple sources in the area. The groundwater will be more thoroughly evaluated and remediation applied as warranted based on the far more extensive characterization data as part of the RSA-146 groundwater unit investigation. Since groundwater is not currently nor likely to be a future source of drinking water, risk from groundwater ingestion is minimal.

The concentration of mercury and lead in surface soil at this small site would not be expected to impact ecological receptors at or near RSA-99.

2.7.4 Basis for Action

This ROD states that a No Action remedy was selected for RSA-99 surface media. The characterization that was performed at the site supports this selection (see Section 2.5 for site characteristics). Any potential source material (sump, tanks, and waste drain lines) remaining has been removed (see Section 2.2.1 for history of site activities). Two metals are present in surface soil as potential contamination but they are not currently leaching to groundwater based on comparison to soil-screening levels (Shaw, 2004a) and are not expected to leach to groundwater in the future based on transport calculations for these two metals (see Section 2.7.1.2 for Transport of Metals to Groundwater). There have been several rounds of sampling performed at this site for all media and although there is groundwater contamination beneath the

site it is part of a more widespread contaminant plume from other sources. Additional investigation and remediation of the groundwater is deferred to a larger groundwater unit effort for RSA-146 (see Section 2.4 for scope and role of operable unit or response action). This ROD documents that the RSA-99 surface media do not pose any unacceptable risks under current or future industrial or unrestricted exposure scenarios (see Section 2.7 for site risks). The selected alternative of No Action is protective of human health and the environment and complies with applicable requirements, including requirements under CERCLA and Corrective Action requirements under RCRA.

Redstone Arsenal is considered an industrial area and future land use is likely to remain industrial for the foreseeable future. Current guidelines from EPA and ADEM state that "unrestricted use," including residential land use, must be considered in a No Action decision. No Action has been selected for RSA-99 surface media and it has been determined to be sufficient to protect public welfare and the environment. The surface media at RSA-99 are available for unrestricted use.

2.8 Documentation of Significant Change

No significant change has been made to the preferred alternative presented in the SB/PP for RSA-99.

3.0 Responsiveness Summary

The Responsiveness Summary serves three primary purposes. First, it provides the USAG, EPA, and ADEM with information about community concerns with the site and preferences about the preferred alternative presented in the SB/PP. Second, it shows how the public's comments were factored into the decision-making process for selection of the final remedy. Third, it provides a formal mechanism for the USAG to respond to public comments.

This Responsiveness Summary documents the formal public comments received on the RSA-99 SB/PP (Shaw, 2004b) and the USAG responses to the comments. However, no comments were submitted in writing during the 30-day public comment period that began on July 21, 2004 and ended on August 19, 2004.

The No Action remedy presented in the SB/PP (Shaw, 2004b) is the selected remedy for RSA-99 surface media. This decision is based on the Administrative Record file for RSA-99, including the RI reports/baseline risk assessment, revised SB/PP, and other related documents contained in the file for this site, as well as on the fact that no public comments were received on the preferred alternative during the public comment period. EPA has provided approval of the selected remedy. ADEM has been provided the opportunity to concur/non-concur with the No Action remedy selected in the RSA-99 ROD. At the time of ROD signature, ADEM has not provided a written response to the USAG's request for concurrence. If a letter is received from ADEM stating concurrence or non-concurrence with the No Action remedy, the letter will be placed in the Administrative Record file for RSA-99.

4.0 References

A.T. Kearney, Inc., 1989, ***Interim RCRA Facility Assessment of the Redstone Arsenal***, prepared for U.S. Environmental Protection Agency, September.

Foster Wheeler, Inc., 1995, ***Final RCRA Facility Investigation Report, RSA-99, RSA-117, and RSA-130, Redstone Arsenal, Volumes 1 and 2,*** prepared for U.S. Army Corps of Engineers, April.

Geraghty and Miller, Inc. (G&M), 1991, ***Final Identification and Evaluation of Potential Solid Waste Management Units and Areas of Concern, Redstone Arsenal***, prepared for U.S. Army Corps of Engineers, February.

IT Corporation (IT), 2003, ***Final Sitewide Karst Hydrogeologic Investigation, Phase I Report of Findings, Redstone Arsenal, Madison County, Alabama***, Volumes 1 and 2, prepared for the U.S. Army Corps of Engineers, May.

Rust Environment & Infrastructure, Inc. (Rust), 1997, ***Draft-Final Supplemental Remedial Investigation/Baseline Risk Assessment Report for RSA-99, RSA-117, and RSA-130, Redstone Arsenal, Volumes 1 and 2***, prepared for U.S. Army Corps of Engineers, August.

Shaw Environmental, Inc. (Shaw), 2004a, ***Final Supplemental Remedial Investigation Report, RSA-99, Abandoned Plating Shop Tanks and Sump, Operable Unit 10, Redstone Arsenal, Madison County, Alabama***, prepared for U.S. Army Corps of Engineers, July.

Shaw Environmental, Inc. (Shaw), 2004b, ***Draft-Final Revised Statement of Basis/Proposed Plan, RSA-99, Abandoned Plating Shop Tanks and Sump, Operable Unit 10, Redstone Arsenal, Madison, Alabama***, prepared for the U.S. Army Corps of Engineers, May.

Shaw Environmental, Inc. (Shaw), 2004c, ***Community Relations Plan, Redstone Arsenal, Madison, Alabama***, prepared for the U.S. Army Corps of Engineers, July.

Thiokol Corporation (Thiokol), 1996a, ***Documentation for Termination for Building 7370.***

Thiokol Corporation (Thiokol), 1996b, ***Documentation for Termination for Building 7614.***

U.S. Army Garrison (USAG) – Redstone, 2003, ***Redstone Arsenal Environmental Site Access Control Program, Redstone Arsenal Regulation 200-7,*** May.

Glossary of Terms

Administrative Record File – the body of reports, official correspondence, and other documents that establish the official record of the analysis, clean up, and final closure of a site.

Background Levels – Naturally-occurring concentrations of inorganic elements (metals) that are present in the environment and have not been altered by human activity.

Characterization – The compilation of all available data about the waste unit to determine the rate and extent of contaminant migration resulting from the waste site, and the concentration of any contaminants that may be present.

Chemicals of Concern (COC) – Those chemicals that significantly contribute to a pathway in an exposure model of a hypothetical receptor (e.g., a child that resides on a site). They exceed either the calculated numerical limit for cumulative site cancer risk (1 in 10,000 exposed individuals) or the calculated numerical limit of 1 for noncancer effects, a value proposed by the EPA.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – CERCLA was enacted by Congress in 1980 and was amended by the Superfund Amendments and Reauthorization Act in 1986. CERCLA provides federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites and established the Superfund Trust Fund.

Contaminant Plume – A column of contamination with measurable horizontal and vertical dimensions that is suspended and moves with groundwater.

Corrective Action – A requirement under RCRA to conduct remedial procedures at a facility when there has been a release of hazardous waste or constituents into the environment.

Exposure – Contact of an organism with a chemical or physical agent. Exposure is quantified as the amount of the agent available at the exchange boundaries of the organism (e.g., skin, lungs, gut) and available for absorption.

Federal Facility Agreement – A legal binding agreement among EPA, ADEM, and USAG that sets the standards and schedules for the comprehensive remediation of Redstone Arsenal. This Agreement is still in draft for Redstone Arsenal.

Groundwater – Underground water that fills pores in soil or openings in rocks to the point of saturation. Groundwater is often used as for drinking water via municipal or domestic wells but this is not the case at Redstone Arsenal. Groundwater that comes to the earth's surface, such as in streams or springs, is considered surface water.

Groundwater Unit – Constitute sub-watersheds defined at Redstone Arsenal from a sitewide hydrogeologic investigation. Each groundwater unit will proceed through a separate CERCLA investigation to get to closure of the unit.

Human Health Risk Assessment – A study conducted as part of a remedial investigation to determine the risk posed to human health by site-related chemicals.

National Priorities List (NPL) – The EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. EPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.

Operable Unit (OU) – A discrete portion of a remedial response that comprises an incremental step toward addressing site problems. It can be a certain geographic area or can address an environmental medium at the site (e.g., groundwater). At Redstone Arsenal, OUs are distinguished primarily by their topographic and ecological features.

Organic Compounds – Carbon compounds such as solvents, oils, and pesticides. Most are not readily dissolved in water.

Perchlorate – Ammonium perchlorate is a strong oxidizing compound that was used in various industries (solid rocket and jet propellant, medical field, and other processes).

RCRA Facility Investigation – A study designed to gather data needed to determine the nature and extent of contamination at a RCRA site.

Record of Decision – A legal document presenting the remedial action selected for a site or operable unit. It is based on information and technical analyses generated during the remedial investigation/feasibility study and consideration of public comments on the statement of basis/proposed plan and community concerns.

Remedial Investigation – A study designed to gather data needed to determine the nature and extent of contamination at a Superfund site.

Resource Conservation and Recovery Act (RCRA) – Gives EPA the authority to control the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA focuses only on active and future facilities and does not address abandoned or historical sites.

Responsiveness Summary – A summary of oral and/or written comments received during the proposed plan comment period and includes responses to these comments. The responsiveness summary is a key part of a ROD highlighting community concerns.

Screening-Level Ecological Risk Assessment – The initial phase of a baseline ecological risk assessment in which conservative concentrations of site chemicals are quantitatively compared to chemical- and media-specific generic effect levels. Those chemicals selected as chemicals of potential ecological concern are further refined through quantitative comparison to chemical- and species-specific effect doses, as well as qualitative examination. Those chemicals identified as chemicals of concern may be investigated further, remediated, or left in place per the decision of the risk managers.

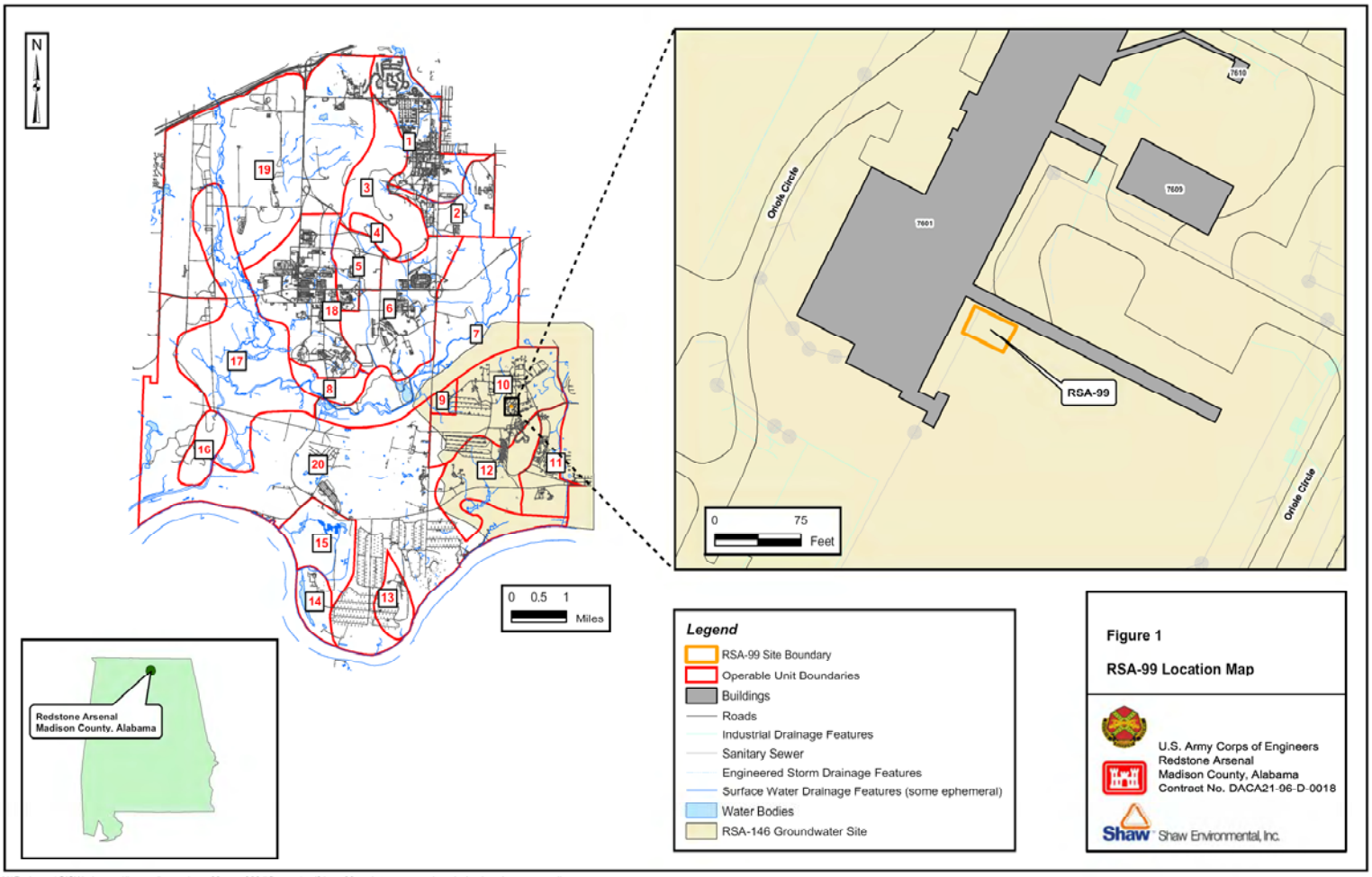
Statement of Basis/Proposed Plan (SB/PP) – A plan for a site cleanup that proposes a recommended or preferred remedial alternative. The SB/PP is available to the public for review and comment and the preferred alternative may change based on public and other stakeholder input.

Superfund Amendments and Reauthorization Act (SARA) – Amended CERCLA in 1986. SARA resulted in more emphasis on permanent remedies for cleaning up hazardous waste sites, increased the focus on human health problems posed by hazardous waste sites, and encouraged greater citizen participation in making decisions on how sites should be cleaned up.

Surface Media – The soil (surface or subsurface), surface water, and sediment present at a site as applicable. The source material in the surface media may be contributing to groundwater contamination.

Trichloroethylene (TCE) – TCE is a colorless or blue liquid with an odor similar to ether. It is man made and does not occur naturally in the environment. TCE was once commonly used to remove oils and grease from metal parts and is used in the dry cleaning industry.

FIGURES



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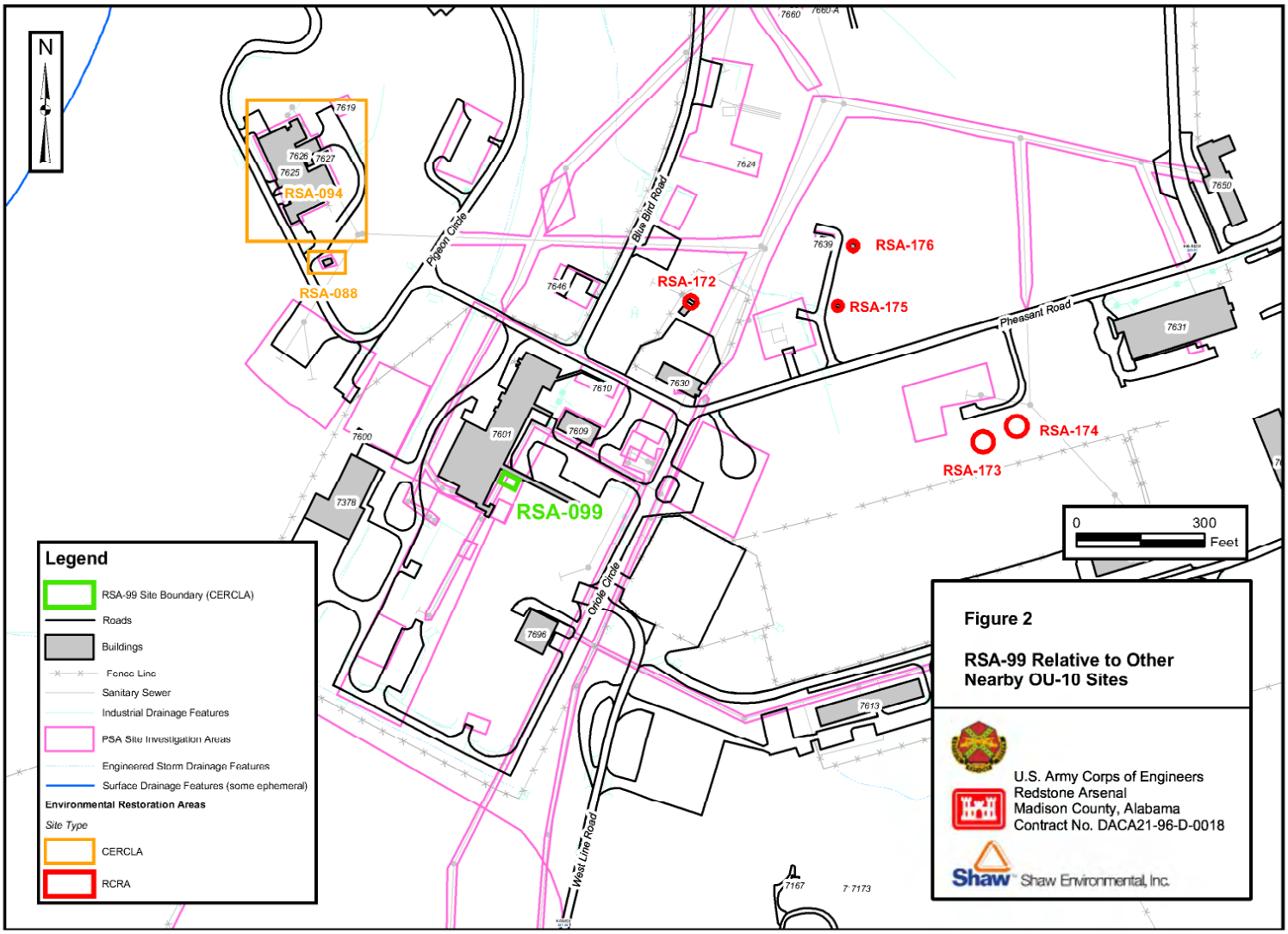

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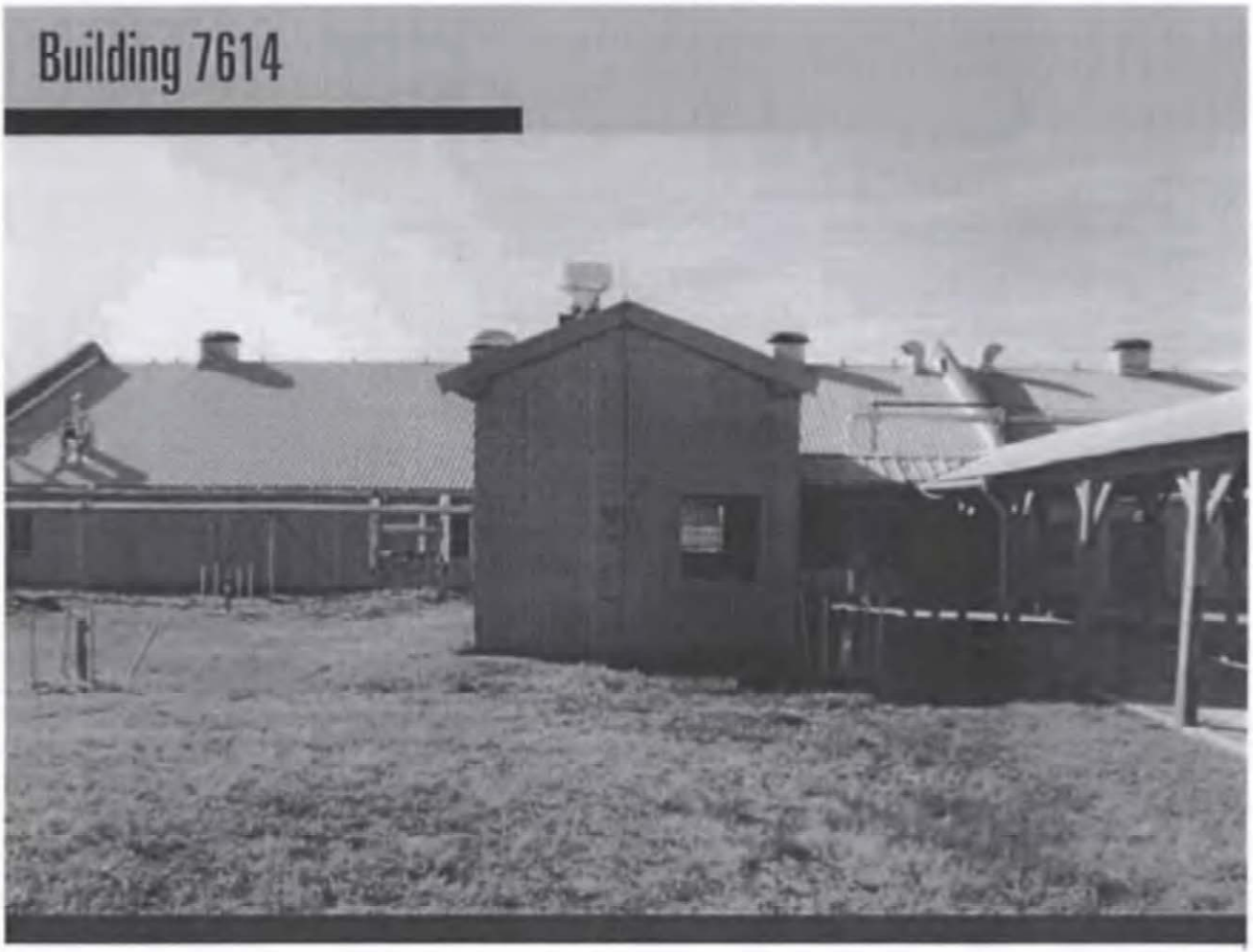
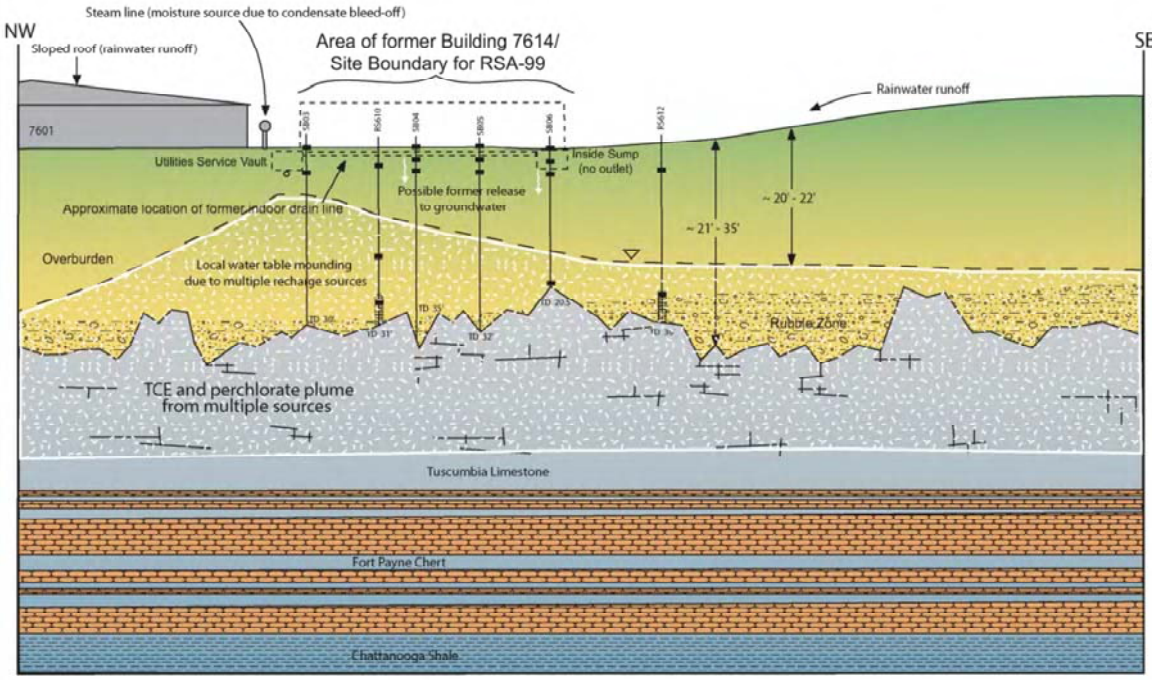


Figure 3
Former Building 7614, looking West (1998).
Building 7601 in background



Chemicals used at RSA-99:

Acetone	Methylene chloride
Acid Salt M-629	PF Degreaser
Ammonium nitrate	Silicone rubber
Anodex NP-2	Sodium cyanide
Butanone (MEK)	Sodium cyanogram
Cadmium	Sulfuric acid
Chromic acid solution	Teflon primers, top coats, and finishes
Macro bronze 2-C	1,1,1-Trichloroethane
Metex 157	TCE
Metex Strip Aid TS40A	Udylite Nickel Brightener No. 61

Figure 4
Conceptual Site Model
for RSA-99

U.S. Army Corps of Engineers
Redstone Arsenal
Madison County, Alabama
Contract No. DACA21 96-D-0018

Shaw Environmental, Inc.

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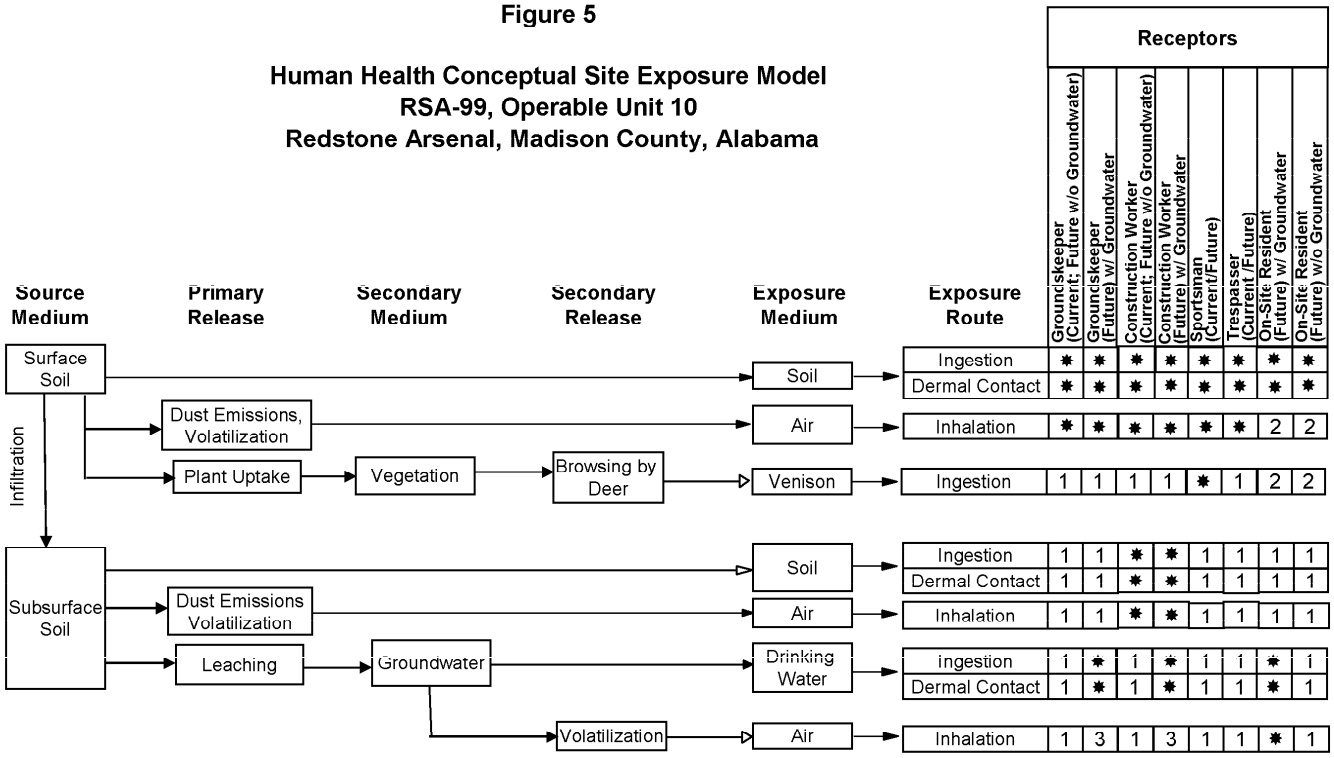
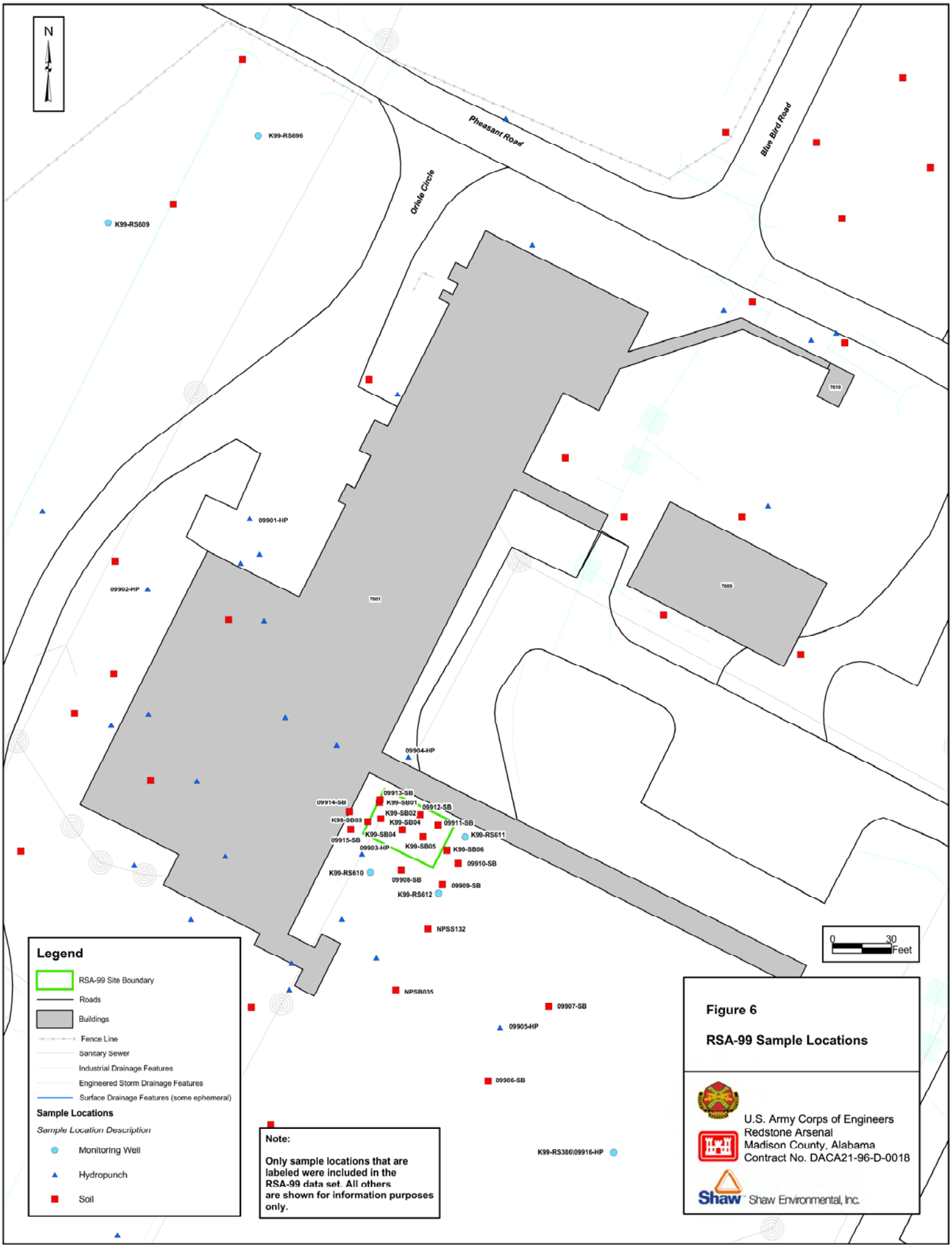
Figure 5

Human Health Conceptual Site Exposure Model
RSA-99, Operable Unit 10
Redstone Arsenal, Madison County, Alabama



✱ = Complete exposure pathway evaluated in baseline risk assessment.
1 = Incomplete exposure pathway
2 = Residential use of this site precludes this exposure pathway.
3 = Although theoretically complete exposure pathway, large dilution by ambient air renders exposure insignificant with respect to other pathways.

KN4\RSA\RSA-99\ROD\D-F\Fig5\9/23/2004 4:15 PM



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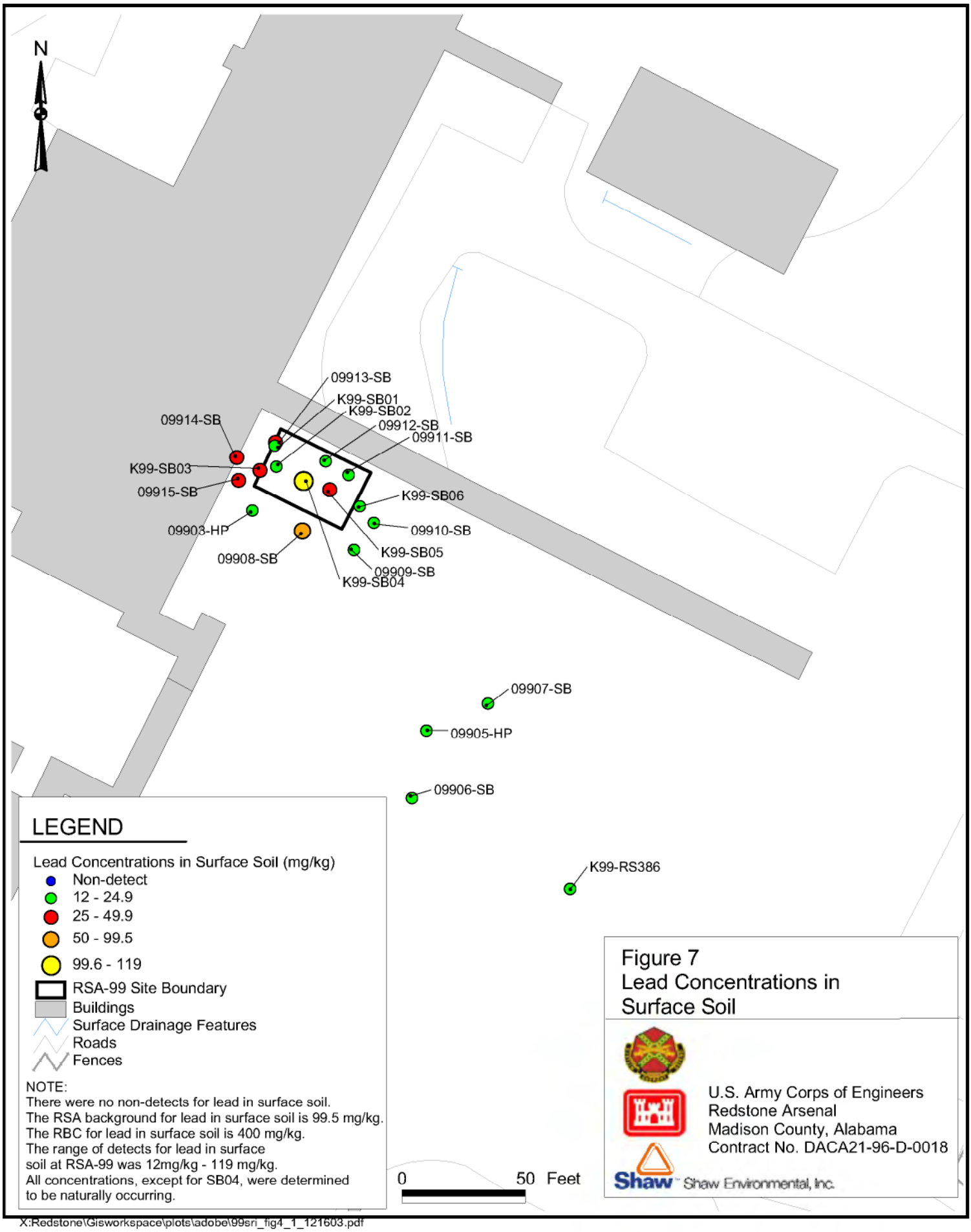

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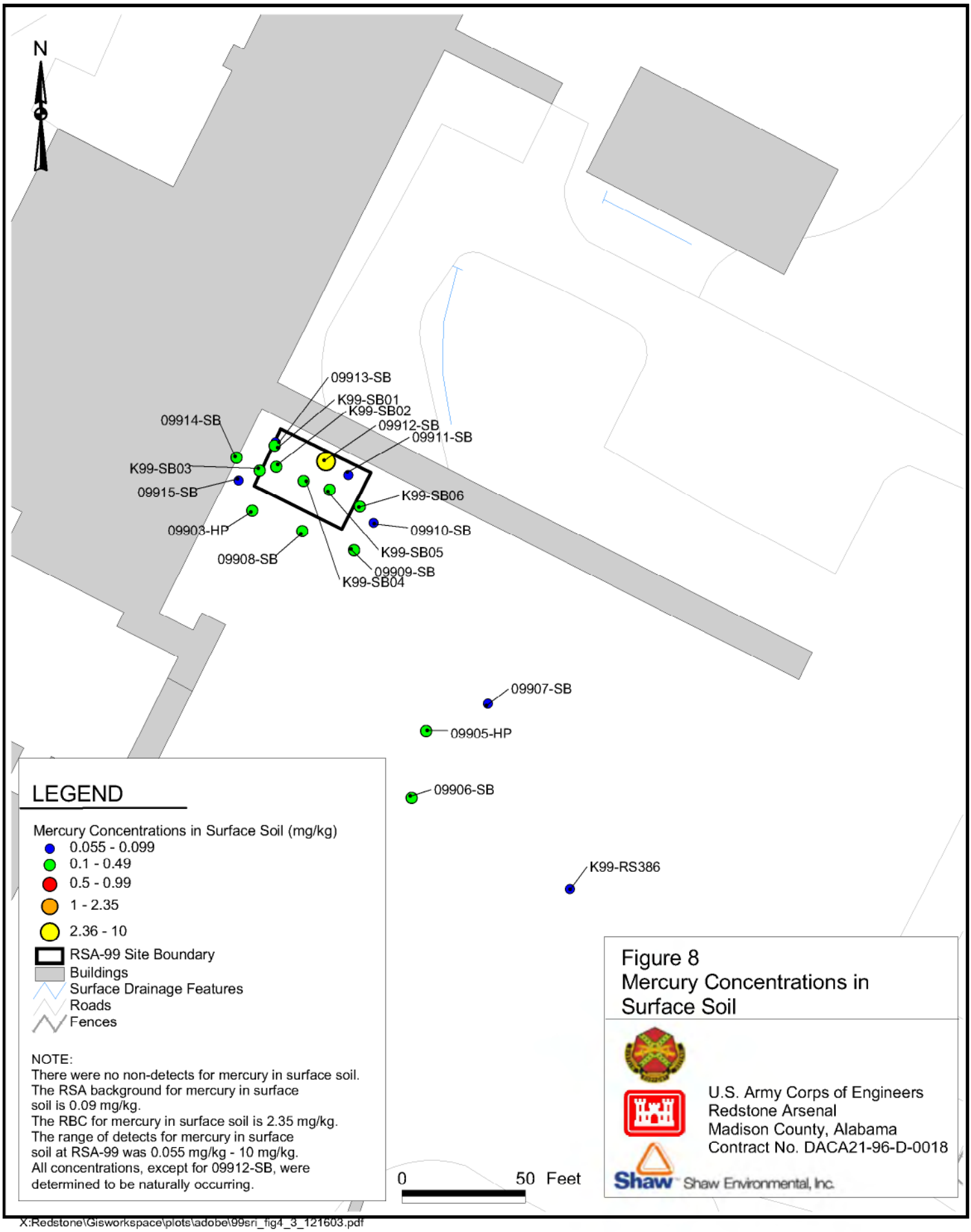

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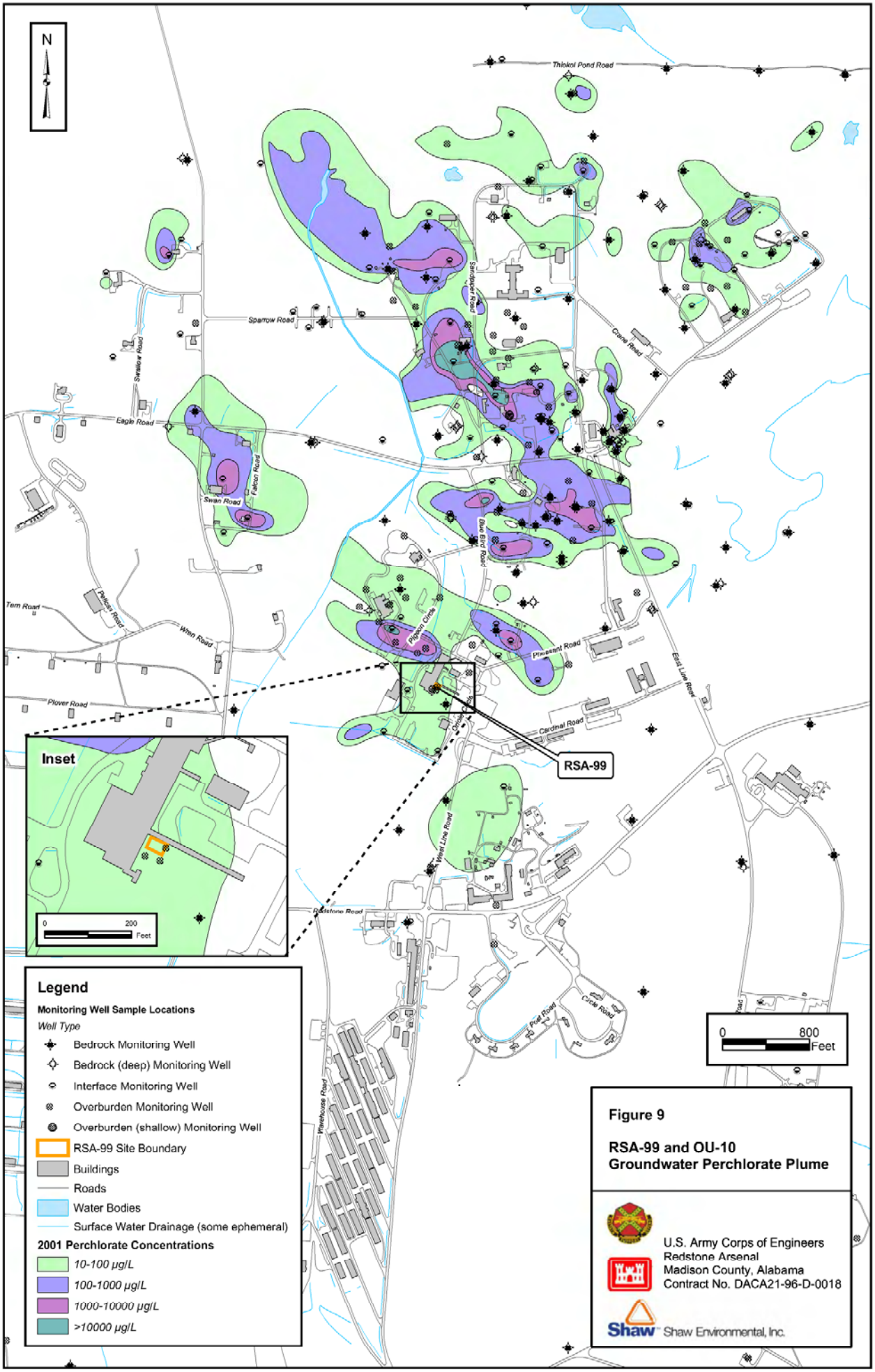

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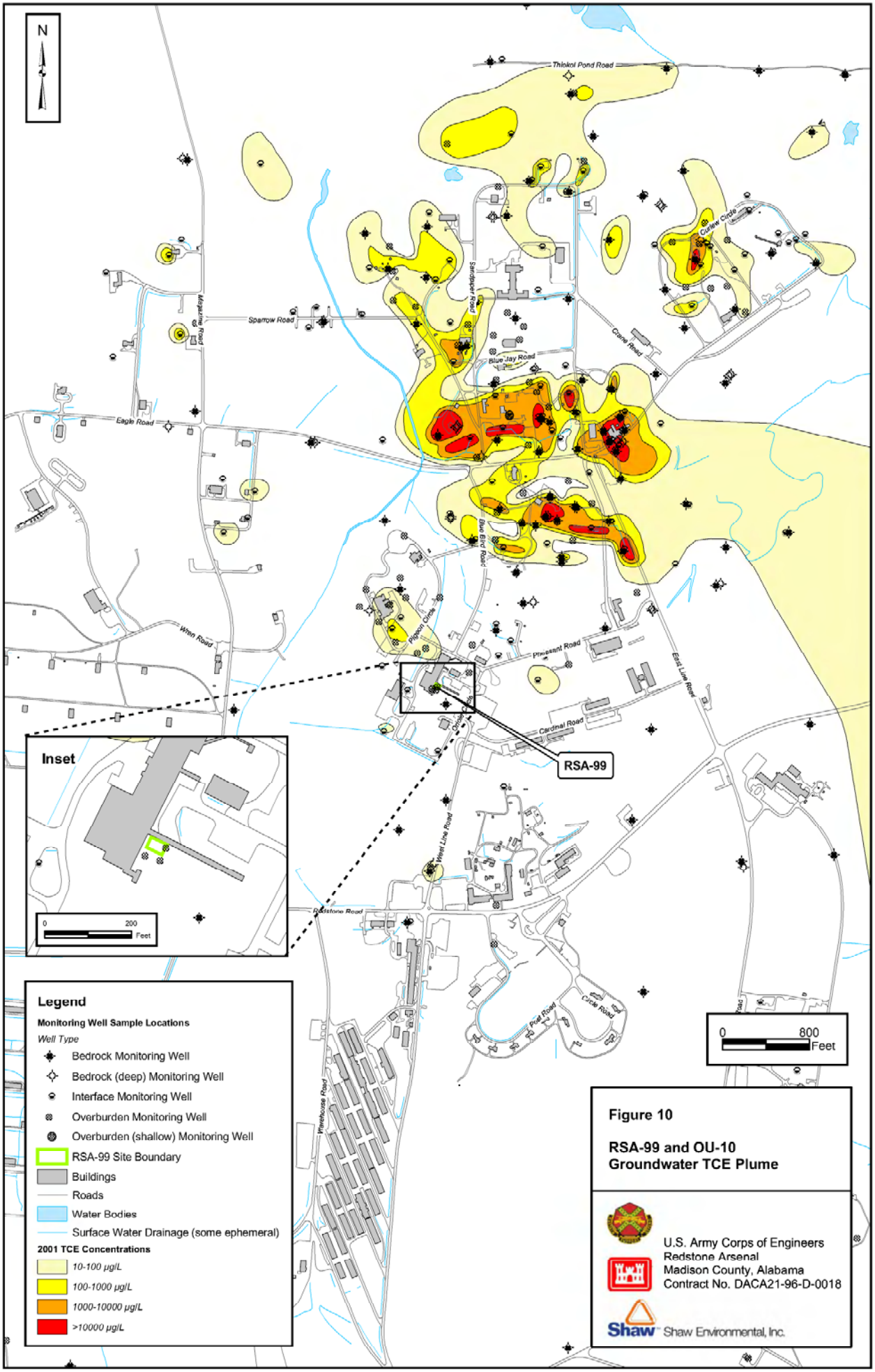

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