DECISION DOCUMENTS

INSTITUTIONAL CONTROLS USING FENCE AND SIGNAGE

For

Selected Sites Within

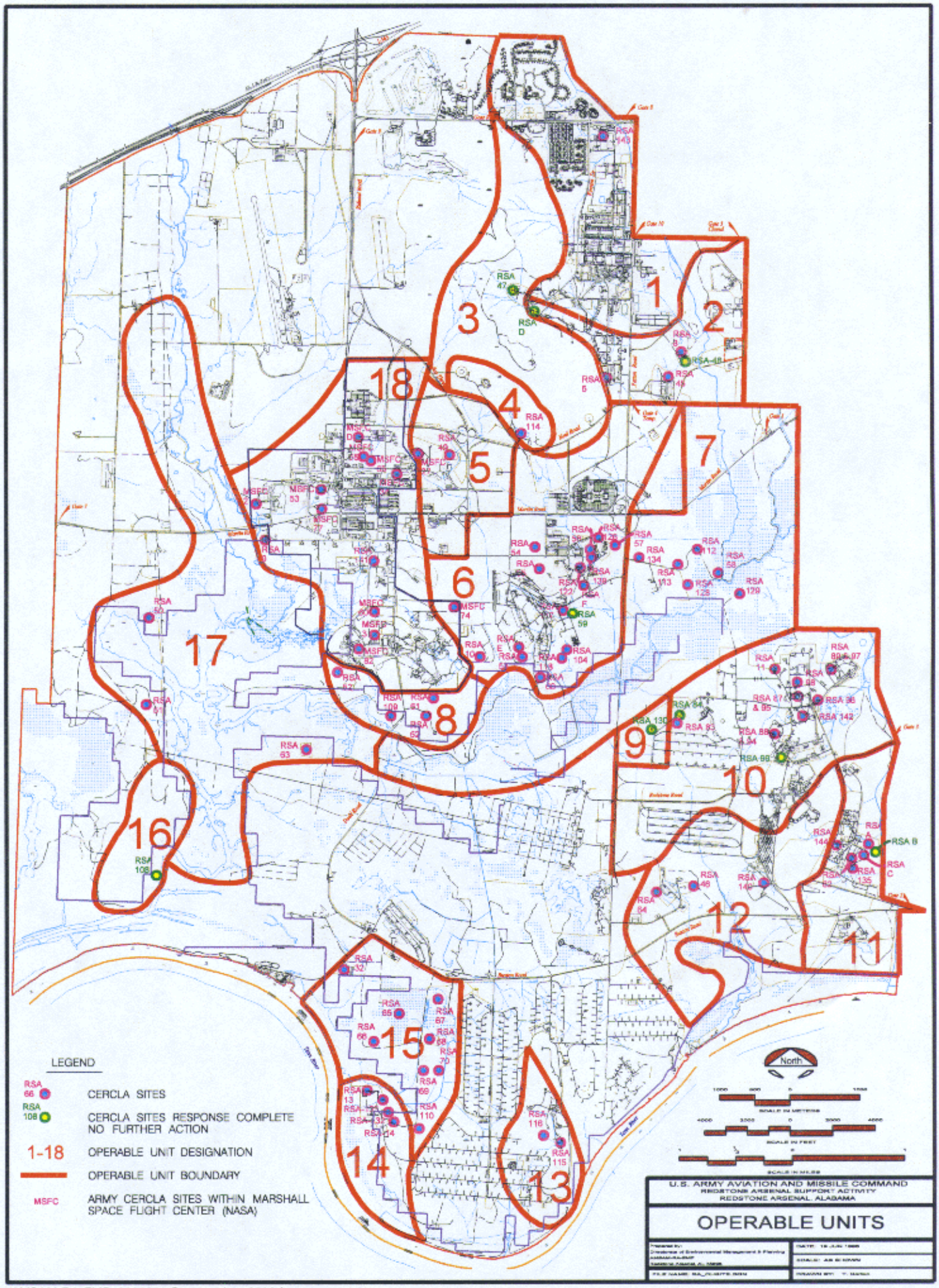
OPERABLE UNIT 02
OPERABLE UNIT 06
OPERABLE UNIT 15

REDSTONE ARSENAL, ALABAMA
ID NO. EPA AL7 210 020 742

AUGUST 1999

TABLE OF CONTENTS

Section



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DECISION DOCUMENT

INSTITUTIONAL CONTROLS USING FENCE AND SIGNAGE

for the

INACTIVE CLOSED SANITARY LANDFILL OU-2 (RSA-048)

REDSTONE ARSENAL, ALABAMA

ID NO. EPA AL7 210 020 742

AUGUST 1999

1.0 PURPOSE

This report documents the decision to construct fencing and signage along the perimeter of an Inactive Closed Sanitary Landfill (RSA-48) as an interim remedial action (IRA). The IRA was chosen in accordance with the CERCLA as amended by SARA, the NCP, RCRA, and AR 200-1, as applicable.

RSA-48 is a 5.5-acre inactive landfill containing construction debris and sanitary wastes disposed from 1947 until the mid-1950's. Sampling efforts revealed concentrations of various chemical constituents in landfill waste, subsurface and surface soil, sediment, surface water, and groundwater samples collected during three phases of field investigations. RSA-48 is also surrounded by an active training area designated as "14W" that is frequently used by active-duty personnel and the National Guard.

The decision has been made to restrict site access by constructing a site perimeter fence and posting signs as an interim remedial action (IRA) while the RI/FS is being finalized. The fence will isolate site hazards (surface debris) and groundwater wells from neighboring training activities, and sportsmen and trespassers that currently have access to McDonald Creek. Fishing is permitted below the old railroad bridge and RSA-048 is a convenient short cut to the creek.

The Directorate of Environmental Management and Planning, Redstone Arsenal, selected this IRA with support from the Alabama Department of Environmental Management and the U.S. Environmental Protection Agency, Region IV.

2.0 SITE RISK

A baseline human health and site-specific ecological risk assessment were conducted to determine if current or anticipated conditions at RSA-48 warrant remedial action. Two scenarios were selected for the human health evaluation. These scenarios were based on current and future land use plans for RSA as presented in the master plan (USACE, 1989) and included: 1) current recreational user exposed to fish, sediment, and soil; and 2) future worker exposed to soil, groundwater, surface water, and

sediment. The results of the human risk assessment indicated that the total carcinogenic risk, the incremental lifetime cancer risk (ILCR), for the recreational user scenario was $5x10^{-8}$ for the future worker scenario, the incremental lifetime cancer risk (ILCR) was $5x10^{-5}$. These ILCRs are within or less than the range of 10^{-4} to 10^{-6} which is considered acceptable to the EPA. The sum of a future worker's noncarcinogenic hazard [hazard index (HI)] was slightly above the acceptable standard of 1. The principal contributing contaminants occurred in groundwater from the residuum (overburden) layer and included arsenic, barium, cadmium, chromium, and lead. Lead was included because its concentration in a few well samples exceeded the EPA action level for lead. The ground surface has exposed construction debris and rubble that are safety hazards.

Army personnel, trespassers, and sportsman have uncontrolled access to the site and are currently at risk because of the unrestricted contact with the contaminated area. This IRA focuses on restricting access onto RSA-048 by installing a chain-link fence and posting warning signs.

3.0 REMEDIAL ALTERATIVES

This section presents the analyses for the remedial alternatives for RSA-048. These include "no action" and "institutional controls". The following IRA alternatives were evaluated:

- **No Action** It was determined that the No Action alternative was not protective of human health because it did not eliminate trespassing on the site. The "No Action" alternative does not prevent access to the site thus not protecting Army personnel, sportsmen, and trespassers from surface hazards.

- **Institutional Controls** It was determined that the appropriate alternative is to install approximately 1,300 linear feet of chain-link fence with one gate, and post signs noting warning and access restriction. Existing land use controls include enforcing regulation prohibiting hunting and fishing below Hansen Road bridge and above the old railroad bridge, including hunting on the site itself.

This action will effectively restrict unauthorized personnel from accessing the site eliminating the identified pathway of exposure. This alternative will presumably become part of the final remedy.

4.0 PUBLIC/COMMUNITY INVOLVEMENT

It is Department of Defense (DoD) and Army policy to involve the local community as early as possible and throughout the IR process at an installation. In accomplishing this goal, RSA is complying with the public participation requirements of CERCLA/SARA, sections 40 CFR 113(k)(2)(a) and 40 CFR 117. RSA is also implementing DoD and Army policy by holding ongoing public information meetings and have established public repositories to document the administrative record of RSA's IR Program.

The repositories are conveniently located at the Huntsville/Madison County Public Library; the Triana Public Library; AMCOM Environmental Office Library, Building 112; the Redstone Arsenal Historical Office, Sparkman Center, Room 5135; and the Redstone Arsenal Scientific Library, Building 4484.

Redstone Arsenal will notify the public of this action through a public meeting forum.

5.0 DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to this interim remedial action, and is cost effective.

Because the selected remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

6.0 APPROVAL AND SIGNATURE

The chosen alternative for Inactive Closed Sanitary Landfill (RSA-48) is the installation of approximately 1,300 linear feet of chain-length fence with appropriate signage. The total cost of this action is estimated at $17,810. The appropriate approval authority for this action is the Deputy Post Commander for Redstone Arsenal, Alabama.

6.1 Coordination

PREPARED BY:

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REVIEWED BY:

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Jerry M. Hubbard
Director, Directorate of
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REVIEWED BY:

Amy S. Meredith DATE: 31 Aug 99
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Attorney Advisor
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6.2 Approval

for Carver Brewer DATE: 01 SEP 1999
Steven C. Hamilton
Colonel OD
Deputy Post Commander

DECISION DOCUMENT

INSTITUTIONAL CONTROLS USING FENCE AND SIGNAGE

For

Selected Sites Within

OPERABLE UNIT 06 (RSA-053, RSA-054, RSA-055, RSA-056, RSA-059, AND RSA-060)

REDSTONE ARSENAL, ALABAMA

ID NO. EPA AL7 210 020 742

AUGUST 1999

1.0 PURPOSE

This report documents the decision to construct fencing and signage along the perimeter of selected sites (e.g., RSA-53, 54, 55, 56, 59, and 60) within Operable Unit 06 as an interim remedial action (IRA). The IRA was chosen in accordance with the CERCLA as amended by SARA, the NCP, RCRA, and AR 200-1, as applicable.

The decision has been made to restrict site access by constructing a site perimeter fence and posting signs as an IRA while the RI/FS is being finalized. The fence will isolate site hazards (e.g., surface debris, soil, sediment) and groundwater wells from sportsmen and trespassers that currently have permitted access to adjacent hunting areas.

The Directorate of Environmental Management and Planning, Redstone Arsenal, selected this IRA in partnership with the Alabama Department of Environmental Management and the U.S. Environmental Protection Agency, Region IV.

1.1 Site Descriptions

1.1.1 RSA-53

RSA-53 is a closed unlined landfill located near the geographical center of Redstone Arsenal directly east of the post landfill, north of Huntsville Spring Branch (Mile 5 mark), west of Patton Road, and south of Mills Road. The landfill is approximately 50 acres and is comprised of trenches and pits that were used to dispose of industrial and sanitary wastes. It was active from 1963 to 1973 and received household, administrative, sanitary, and industrial wastes. In the northern area of the site are several closed waste oil pits, closed pesticide burial pit, and a closed acid pit. A soil layer covered refuse in the trenches approximately 2 feet thick.

1.1.2 RSA-54/55

RSA-54/55 is an inactive unlined sanitary and industrial landfill, approximately 18 acres located north and south of Fowler Road and west of Lindner Road in central RSA. Fowler Road divides the landfill approximately 5 acres to the south (RSA-55). RSA-54 occupies the northern-most 13 acres. The landfill is

comprised of trenches that were used to dispose of wastes. The waste lies buried in shallow covered trenches and the area is grassed. Between 1968 and 1973, pesticides and pesticide-contaminated soil and debris were disposed of at the site.

1.1.3 RSA-56

RSA-56 was used as an open, unlined surface impoundment that received arsenic-contaminated industrial waste sludge and wastewater from lewisite manufacturing activities in the early 1940s. Lewisite is a chemical warfare agent containing arsenic trichloride. The lewisite manufacturing process used two lagoons that occupied approximately 6 acres. Sometime after 1954, the manufacturing plants were dismantled and demolished. Selected plant debris was flashed and salvaged, and the remaining debris was bulldozed into the neighboring lagoons. The lagoons remained partially open after the plant site was razed. They were completely filled with soil and asphalt rubble in 1972. The area was re-vegetated with grass and pine trees in 1977, but the berm of the impoundment remained. Then in 1994, a clay cap was installed over the covered lagoons. The site is in the east-central part of RSA, north of Viper Road, west of Meteorology Road, and east of Calibration Road. The site drains to the east and south to a stream. The stream originally flowed through RSA-56 dividing the two lagoons, but was rerouted along the eastern border of the impoundment.

1.1.4 RSA-59

RSA-59 is a closed unlined landfill previously used for disposal of rubble, construction debris, and industrial waste. It is approximately 12 acres and was intermittently active from the late 1940s to the mid-1970s. RSA-59 is located in the central portion of RSA--south of Mills Road, and west of Patton Road. It is bounded on the north, east, and south sides by wetlands. Originally, the site was a fill borrow area for early construction activities (e.g., roads, railroads, buildings). Later, RSA-59 received construction rubble, metal debris, railroad ties, and concrete slabs from demolitions. The site is adjacent to the dismantled liquid caustic manufacturing plant (RSA-117); and 1950s-era aerial photographs show that RSA-59 may have been used as the industrial wastewater discharge basin.

1.1.5 RSA-60

RSA-60 is a closed unlined landfill located near the geographic center of RSA--southeast of RSA-53, north of the Huntsville Spring Branch, and south of Mills Road. It is down gradient of the former pesticide manufacturing plant, and is sometimes referred to in the reports as "the old sanitary landfill". A large portion of the site borders the Wheeler National Wildlife Refuge on two sides. The landfill is approximately 25 acres and is characterized by several covered northeast/southwest trending disposal trenches, and a closed used oil disposal pit. The landfill was active from 1963 to 1968, and received household, administrative, sanitary, and industrial wastes. Used oil was disposed into unlined clay pits south of the trenches. Pesticide was also buried throughout the site.

2.0 SITE RISK

A human health risk assessment (HHRA) and, in some studies, site-specific ecological risk assessment were conducted at RSA-53, 54, 55, 56, 59 and 60 to determine if current or anticipated conditions warrant remedial action.

Personnel, trespassers and sportsman currently have uncontrolled access to these sites and are at risk because of the uncontrolled contact with surface debris and contaminated media. This IRA focuses on restricting access onto RSA-53, 54, 55, 56, 59, and 60 by installing a chain-link fence with one lockable gate and posting warning signs for each site.

2.1 RSA-53

A HHRA was prepared to evaluate the probability and magnitude of potential adverse effects on human health associated with actual or potential exposure to site-related chemical contamination. Under current land-use conditions, trespasser exposures to surface soil and surface water were evaluated, along with hunters' exposures to venison. Under future land-use conditions, site worker exposures to groundwater and site-wide surface soil were evaluated. Residential exposures to groundwater, site-wide surface soil, and surface water were also evaluated under future land-use conditions.

The highest potential risks were associated with worker and residential exposures to groundwater. In each of the four-groundwater data groupings evaluated, the total upper-bound excess lifetime cancer risks were at the high end of or above the USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ for health protectiveness at Superfund sites (USEPA, 1990) due primarily to chloroform, methylene chloride, arsenic, and beryllium.

2.2 RSA-54/55

Three types of individuals or receptors were identified in the HHRE as having potential exposures to site contamination: a current groundskeeper; a future groundskeeper; and a recreational user (hunter) who might trespass on the site. Each of these receptors could be exposed to either contaminated soil or groundwater through a number of different exposure pathways, including incidental ingestion of soil, inhalation of dust, direct skin contact with soil, and future groundskeeper exposure to groundwater. Table 1 below summarizes the results of the HHRA.

Table 1. Summary of Site Risks and Hazards for RSA-54/55

Receptor/Medium	**Total Cancer Risk**	**Total Non-Cancer Hazard Index**	**Risk Drivers**
Current Worker/ Surface Soil	$2x10^{-9}$	$3x10^{-5}$	None
Current Worker/ Groundwater	No Current Exposure		None
Future Worker/ Surface Soil	$4x10^{-5}$	$6x10^{-5}$	None
Future Worker/ Groundwater	$8x10^{-5}$	2.0	Chlorobenzene Benzene
Future Recreational User/ Surface Soil	Less Than Future Worker		None
Future Recreational User/ Groundwater	Less Than Future Worker		None

The total cancer risks are within acceptable levels. The non-cancer hazard indices for the current and future groundskeeper exposed to surface soils is within acceptable limits. The non-cancer hazard index for future workers exposed to groundwater exceed acceptable levels. The major

contributors to the unacceptable hazard index are benzene and chlorobenzene in the groundwater. A site-specific ecological risk assessment was prepared to evaluate the potential exposure of terrestrial wildlife to chemicals in surface soil. Endangered species are unlikely to occur in the immediate area of RSA-54/55.

2.3 RSA-56

The results of the HHRA indicate that the total health risks associated with exposure to contaminated media at RSA-56 exceed acceptable levels. Cancer and non-cancer health effects were evaluated for four receptors: a groundskeeper, a construction worker, a trespasser, and an on-site resident (theoretical, only). The total incremental lifetime cancer risk (ILCR) for a groundskeeper exposed to all contaminated media at the site is greater that the maximum allowable cancer risk level of $1x10^{-4}$ prescribed by EPA. The total non-cancer hazard indices for a groundskeeper and a construction worker exposed to all contaminated media at the site are both greater than the maximum allowable non-cancer risk level of 1.0 prescribed by the EPA. Although contaminated groundwater is the primary risk driver, exposure to contaminated soil outside the boundary of the capped area is also a significant contributor to both cancer and non-cancer human health effects.

The ILCR for a groundskeeper exposed to surface soil is 4.05×10^{-5}. The non-cancer hazard index for a groundskeeper exposed to surface soil is 0.115. The non-cancer hazard index for a construction worker exposed to subsurface soil is 0.242. Because the total site risks for cancer and non-cancer health effects exceed acceptable levels and there are multiple chemicals of concern (COC) in more than one environmental media, primary remediation goals for soil are based on an ILCR of $1x10^{-5}$ or a non-cancer hazard index of 0.1, whichever is lower. Arsenic, chromium, and benzo(a)pyrene are COC for surface soil at RSA-56. Arsenic is the only COC in subsurface soil.

The results of the HHRA also determined that the surface water and depositional soil (sediment) located in the drainage structures along the perimeter of RSA-56 does not present an unacceptable risk to human health.

A Tier I small-range receptor ecological screening assessment was performed using the white-footed mouse and the American robin as target receptors for exposure to surface soils at the site. The results indicated that the ecological hazard quotient based on a "no observable adverse effect" level for the receptors were potentially elevated for several chemicals of potential ecological concern.

In summary, it has been concluded that concentrations of COC in surface and subsurface soil outside the boundaries of the capped area of RSA-56 present a potentially unacceptable health threat to site workers, such as a groundskeeper or a construction worker, who may come in contact with the contaminated soils.

2.4 RSA-59

A HHRA was prepared and it presented the potential health impacts of human exposure to chemicals detected in soils, surface water, sediment, and groundwater. Exposure routes that were evaluated included incidental ingestion of soil, groundwater, surface water; inhalation of dust; and direct skin contact with soil and sediment. The HHRA evaluated one scenario (e.g., workers exposed to soil, groundwater, surface water, and sediment) based on current and future land use plans for RSA as presented in the *Master Plan Narrative for Redstone Arsenal, Alabama* (USACE, 1989).

The data indicated no unacceptable carcinogenic risk for current and future workers (ILCR of $7x10^{-5}$ and $8x10^{-5}$, respectively). These values are within the range of $1x10^{-4}$ to $1x10^{-6}$ considered to be acceptable by the EPA (EPA, 1989). The future worker's non-carcinogenic hazard index of 1.0 is equal to the EPA's accepted standard of 1.0. In summary, the HHRA indicates that there are no unacceptable risks to human health at RSA-59.

2.5 RSA-60

Under current land-use conditions, the potential cumulative risk for trespassers exposed to site-wide surface soil, site-wide surface water, northern sediment, and southern wetlands sediment was $1x10^{-5}$. This is in the middle of the USEPA's target risk range of $1x10^{-6}$ to $1x10^{-4}$ for health protectiveness at Superfund sites

(USEPA, 1990). The potential cumulative hazard index for trespassers was equal to 1.

The potential cumulative risk for hunters exposed to COPCs in venison under current land-use conditions was $7x10^{-9}$, which is below USEPA's target risk range for health protectiveness. The potential cumulative hazard index for hunters was less than 1.

Under future land-use conditions, the potential cumulative risk for site workers exposed to site-wide surface soil and shallow overburden groundwater was $9x10^{-4}$, which is above the target risk range, and the cumulative hazard index was 51. The potential cumulative risk for site workers exposed to site-wide surface soil and lower rubble zone groundwater was $1x10^{-3}$, which is above the target risk range, and the cumulative hazard index was 41. The potential cumulative risk for site workers exposed to site-wide surface soil and bedrock aquifer groundwater was $8x10^{-5}$, which is at the high end of the target risk range, and the cumulative hazard index was 8.0.

The potential cumulative risk for excavation workers exposed to COPCs in site-wide subsurface soil under future land-use conditions was not calculated since thallium, the only COPC selected in subsurface soil, lacks carcinogenic toxicity criteria. The potential cumulative hazard indices for adult residents exposed to soil and groundwater ranged from 24 to 110.

The potential cumulative risk for child residents exposed to site-wide surface soil, site-wide surface water, northern sediment, southern wetlands sediment, and groundwater in each of the three groundwater groupings ranged from $1x10^{-4}$ to $2x10^{-3}$, which are the high-end of or above USEPA's target risk range for heath protectiveness. The potential cumulative hazard indices for child residents exposed to soil, surface water, sediment, and groundwater ranged from 61 to 313.

3.0 REMEDIAL ALTERATIVES

This section presents the analyses for the remedial alternatives. These include "no action" and "institutional controls". The following IRA alternatives were evaluated:

- **No Action**. It was determined that the No Action alternative was not protective of human health because it did not eliminate trespassing on the site. The "No Action" alternative does not prevent access to the site thus not protecting future workers, sportsmen and trespassers from site hazards.

- **Institutional Controls**. It was determined that the appropriate alternative is to install 21,650 linear feet of chain-link fence with lockable gates, and post signs noting warning and access restriction. Existing land use controls include enforcement of regulation prohibiting hunting on the sites themselves. The fence would prevent inadvertent trespassing from adjacent hunting areas.

Table 2. Estimated Linear Feet of Fence Required

SITE	ACREAGE	LINEAR FEET	ESTIMATED COST
RSA-053	50	10,500	$143,850.00
RSA-054	13♦	1,400	$ 19,180.00
RSA-055	5	1,100	$ 15,070.00
RSA-056	8♦	900	$ 12,330.00
RSA-059	12	2,500	$ 34,250.00
RSA-060	25	5,250	$ 71,925.00
TOTAL		21,650	$368,530.00

♦ Fence only two sides of the site.

This action will effectively restrict unauthorized personnel from accessing the site thereby eliminating the identified pathway of exposure. This alternative will presumably become part of the final remedy.

4.0 PUBLIC/COMMUNITY INVOLVEMENT

It is Department of Defense (DoD) and Army policy to involve the local community as early as possible and throughout the IR process at an installation. In accomplishing this goal, RSA is complying with the public participation requirements of CERCLA/SARA, sections 40 CFR 113(k)(2)(a) and 40 CFR 117. RSA is also implementing DoD and Army policy by holding ongoing public information

meetings and have established public repositories to document the administrative record of RSA's IR Program.

The repositories are conveniently located at the Huntsville/Madison County Public Library; the Triana Public Library; AMCOM Environmental Office Library, Building 112; the Redstone Arsenal Historical Office, Sparkman Center, Room 5135; and the Redstone Arsenal Scientific Library, Building 4484.

Redstone Arsenal will notify the public of this action through a public meeting forum.

5.0 DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to this interim remedial action, and is cost effective.

Because the selected remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

6.0 APPROVAL AND SIGNATURE

The chosen alternative for the selected sites within Operable Unit 06 are the installation of approximately 21,650 linear feet of chain-length fence with lockable gates, and appropriate signage. The total cost of this action is estimated at $368,530.00. The appropriate approval authority for this action is the Deputy Post Commander for Redstone Arsenal, Alabama.

6.1 Coordination

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REVIEWED BY:

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REVIEWED BY:

Jerry M. Hubbard DATE: 8/23/99
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REVIEWED BY:

Amy S. Meredith DATE: 31 Aug 99
Amy S. Meredith
Attorney Advisor
U.S. Army Aviation
and Missile Command

6.2 Approval

FOR Darrell Brewer DATE: 01 SEP 1999
Steven C. Hamilton
Colonel OD
Deputy Post Commander

DECISION DOCUMENT

INSTITUTIONAL CONTROLS USING FENCE AND SIGNAGE

For

Selected Sites Within

OPERABLE UNIT 15 (RSA-065, RSA-066, RSA-067, RSA-068, RSA-069, RSA-070, AND RSA-110)

REDSTONE ARSENAL, ALABAMA

ID NO. EPA AL7 210 020 742

AUGUST 1999

1.0 PURPOSE

This report documents the decision to construct fencing and signage along the perimeter of selected sites (e.g., RSA-65, 66, 67, 68, 69, 70, and 110) within Operable Unit 15 as an interim remedial action (IRA). The IRA was chosen in accordance with the CERCLA as amended by SARA, the NCP, RCRA, and AR 200-1, as applicable.

The decision has been made to restrict site access by constructing a site perimeter fence and posting signs as an IRA while the RI/FS is being finalized. The fence will isolate site hazards (e.g., surface debris, UXO, metal fragments, soil, sediment) and groundwater wells from personnel, sportsmen and trespassers that currently have uncontrolled access to adjacent fishing and hunting areas. Fishing is permitted in Igloo Pond, and hunting areas 43, 44, and 45 along the perimeter of OU-15.

The Directorate of Environmental Management and Planning, Redstone Arsenal, selected this IRA in partnership with the Alabama Department of Environmental Management and the U.S. Environmental Protection Agency, Region IV.

1.1 Site Descriptions

1.1.1 RSA-65

RSA-65 is a 300-acre area that was used for above ground drum storage during the 1940s and 1950s. Chemical warfare agents, including lewisite and mustard gas, were stored as finished products in distinct cells in the early to mid-1940s. After WWII, RSA-65 received chemical warfare agents. The chemical materials were shipped off-post for disposal, or were demilitarized as waste at the site. RSA-65 is located in the southern part of the Arsenal south of Buxton Road and within the floodplain of the Tennessee River. The site is generally flat with numerous rectangular storage cells, with each cell occupying approximately 200 square feet. The storage cells create a grid pattern over the site and the cells, railcar tracks, and/or trails are clearly visible on 1956 aerial photographs.

1.1.2 RSA-66

RSA-66 is a closed unlined waste disposal and demolition area located on the southern portion of RSA, south of Buxton Road within a one-half mile of the Tennessee River. It is approximately two acres. The landfill portion of the site was active from the 1950s to the late 1970s, and was used as a disposal area for incineration ash, residue, and non-salvageable metal debris (e.g., rocket motor parts, crushed drums) from the open burning operations at the OB/OD grounds. Detonation lines and small bunkers indicate that about six acres of the site was used for demilitarization and demolition of munitions. This would support the mission of the Gulf Chemical Warfare Depot in the middle to late 1940s.

1.1.3 RSA-67

RSA-67 is an inactive 43-acre drum storage area that was used in the 1940s and 1950s for aboveground storage of mustard gas. Originally, the site was separated into storage cells by unlined earthen berms, railcar tracks, and/or trail. RSA-67 is located in the southern part of Redstone Arsenal in OU-15, adjacent to another chemical agent storage area, RSA-65. Most of the northern part of this area is wooded. The majority of the unit is inundated with water.

1.1.4 RSA-68

RSA-68 is located in OU-15 in the southern portion of the Arsenal less than 1 mile east of the Tennessee River. It is about 5 acres with wetlands to the north and Igloo Pond to the east. RSA-68 was formerly known as Toxic Area 4 within the Gulf Chemical Warfare Depot during the 1940s and used as a demilitarization and disposal area for explosives.

From the 1950s to 1980, the site was active as a disposal area for toxic waste and laboratory chemicals. A variety of chemicals were dumped in open trenches and treated in open pits. Historical aerial photographs show trenches and pits along the perimeter (except northern boundary) and in the interior of the site. Reportedly, beryllium, red fuming nitric acid, chlorine trifluoride, cyanide, metallic salts, chromate chemical waste, miscellaneous laboratory wastes, and high explosives were

treated and disposed on site. High explosives were detonated and burned on the ground surface.

Nitric acid was neutralized in open pits lined with crushed limestone. Chlorine trifluoride was neutralized in a pit using sodium bicarbonate. Metal drums containing beryllium are buried on site. Small cylinders of phosgene gas were placed in a shallow pit with explosives and detonated. Ordnance (e.g., a canister, a bomb, rockets, shells, warheads, a projectile, chemical munitions, and metal containers) was found buried on site during field investigations. Active dumping stopped after 1980 and the ground surface was cleared of metal fragments in 1982.

Presently, the site is covered with grasses, briars, and pine trees. The vegetation is sparse, discolored, and stressed. Reports by PELA (1988 and 1989) lists dozens of chemicals and hazardous wastes disposed of at RSA-68.

1.1.5 RSA-69

RSA-69 consists of an inactive mustard gas storage area in the southern portion of the Arsenal along the eastern margin of the floodplain of the Tennessee River within OU-15. It was used for the storage of mustard gas canisters on bare ground during the 1940s and 1950s. The mustard gas was removed and shipped off-site and/or demilitarized at OU-15. The storage area occupies approximately 130 acres. RSA-69 is wooded, and the berms for the storage cells are visible. Areas of the site are usually inundated with water. Currently, there is no distinction between RSA-69 and RSA-70.

1.1.6 RSA-70

RSA-70 is an abandoned chemical storage/disposal area that is about 2 to 5 acres. The ditch that drains Igloo Pond to the south and forms the site's eastern boundary characterizes it. This site is located in a marshy area in OU-15 along the eastern margin of the floodplain of the Tennessee River. RSA-70 was used for storage and disposal of chemical agent and mustard gas. The site shares it's western boundary with RSA-69, and may not be a separate site. A large portion of the site is usually inundated with water.

1.1.7 RSA-110

RSA-110 is a 10-acre site located in the southeastern portion of OU-15 within the 100-year floodplain of the Tennessee River. The site boundary was determined from historical photographs and is suspected to have had been used to store drums of chemical warfare materials. The source of the drums and their contents are not completely known, but mustard gas is suspected. A slight earthen berm is apparent on the south and east sides of the site. An active drum storage area was defined at this site on a 1943 aerial photograph. By 1950, these drums were removed. The outline of the storage area can be discernable off a 1988 aerial photograph. Based on these photographs, RSA-110 was active during the 1940s and 1950s.

The storage area is no longer in existence. However, small amounts of construction debris remain on site. In 1989, RSA personnel removed most of the building bricks and fire bricks from the site and dismantled several incinerators/ovens that may have been used to destroy munitions. The ground surface of the non-wooded portion of the site has a heavy gravel base (up to 1 foot in thickness in places) with scattered areas containing small surface debris.

An area of hummocky surface soil covering about 1 acre was identified in the northeastern portion of RSA-110. The uneven surface may be the result of differential settling within a former excavation area. Two piles of discarded Dragon rocket motors were discovered on site, one pile is south of the road on the western boundary and the other pile is south and east of RS-815.

2.0 SITE RISK

Currently, these sites are undergoing field investigations and limited analytical data is available. The studies are in various phases of the RI/FS process. To complete the process, supplemental data is actively being collected.

The ground surface is littered with UXO, metal fragments, rocket motors, soil mounds, open pits, and crushed drums that may potentially cause safety hazards. These sites are not well defined to personnel, sportsmen,

and trespassers that may inadvertently walk into these areas.

Preliminary results from site investigations have revealed elevated concentrations of various on-site chemicals in landfill waste, subsurface and surface soil, sediment, surface water, and groundwater samples. These chemicals may be impacting the site and neighboring TVA property. Igloo Pond surface water and sediment results are not at a concentration to cause a human health hazard.

Hunters and fishermen are at risk because they have unrestricted access to the contaminated areas because of the sites' proximity to neighboring Igloo Pond and hunting areas 43, 44, and 45. Intrusive investigations are still ongoing and future additional hazards are likely to be encountered.

3.0 REMEDIAL ALTERATIVES

This section presents the analyses for the remedial alternatives. These include "no action" and "institutional controls". The following IRA alternatives were evaluated:

- **No Action**. It was determined that the No Action alternative was not protective of human health because it did not eliminate trespassing on the site. The "No Action" alternative does not prevent access to the site thus not protecting future workers, sportsmen and trespassers from site hazards.

- **Institutional Controls**. It was determined that the appropriate alternative is to install 105,250 linear feet of chain-link fence with lockable gates, and post signs noting warning and access restriction within OU-15. Existing land use controls include enforcement of regulation prohibiting hunting on the sites themselves. The fence would prevent inadvertent trespassing from adjacent hunting areas. Table 1 below lists the estimated length and cost of chain-link fence by site.

Table 1. Estimated Linear Feet of Fence Required

SITE	ACREAGE	LINEAR FEET	ESTIMATED COST
RSA-065	300	63,000	$863,100.00
RSA-066	10	2,000	$ 89,500.00
RSA-067	43	9,000	$123,300.00
RSA-068	6	1,250	$ 56,000.00
RSA-069	130	27,000	$370,000.00
RSA-070	5	1,000	$ 13,700.00
RSA-110	10	2,000	$ 89,500.00
TOTAL		105,250	$1,694,600.00

This action will effectively restrict unauthorized personnel from accessing the site thereby eliminating the identified pathway of exposure. This alternative will presumably become part of the final remedy.

4.0 PUBLIC/COMMUNITY INVOLVEMENT

It is Department of Defense (DoD) and Army policy to involve the local community as early as possible and throughout the IR process at an installation. In accomplishing this goal, RSA is complying with the public participation requirements of CERCLA/SARA, sections 40 CFR 113(k)(2)(a) and 40 CFR 117. RSA is also implementing DoD and Army policy by holding ongoing public information meetings and have established public repositories to document the administrative record of RSA's IR Program.

The repositories are conveniently located at the Huntsville/Madison County Public Library; the Triana Public Library; AMCOM Environmental Office Library, Building 112; the Redstone Arsenal Historical Office, Sparkman Center, Room 5135; and the Redstone Arsenal Scientific Library, Building 4484.

Redstone Arsenal will notify the public of this action through a public meeting forum.

5.0 DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to this interim remedial action, and is cost effective.

Because the selected remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

6.0 APPROVAL AND SIGNATURE

The chosen alternative for the selected sites within Operable Unit 15 are the installation of approximately 105,250 linear feet of chain-length fence with lockable gates, and appropriate signage. The total cost of this action is estimated at $1,694,600.00. The appropriate approval authority for this action is the Deputy Post Commander for Redstone Arsenal, Alabama.

6.1 Coordination

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REVIEWED BY:

Amy S. Meredith DATE: 31 Aug 99
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6.2 Approval

for Darrell Brewer DATE: 01 SEP 1999
Steven C. Hamilton
Colonel OD
Deputy Post Commander