

FIGURE ES-1
SITE MAP DEPICTING
FORMER BADLANDS BOMBING RANGE

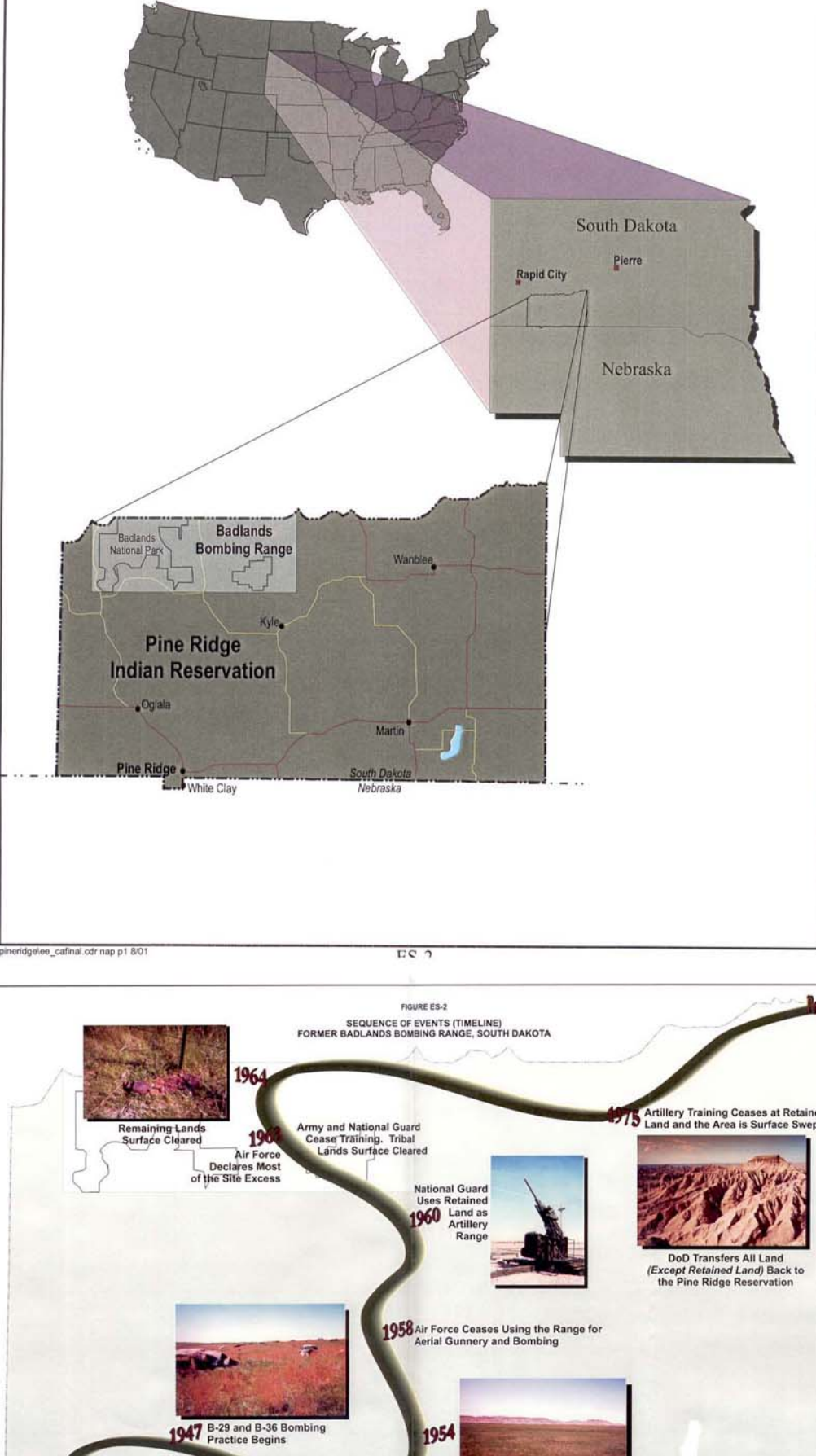


FIGURE ES-2
SEQUENCE OF EVENTS (TIMELINE)
FORMER BADLANDS BOMBING RANGE, SOUTH DAKOTA

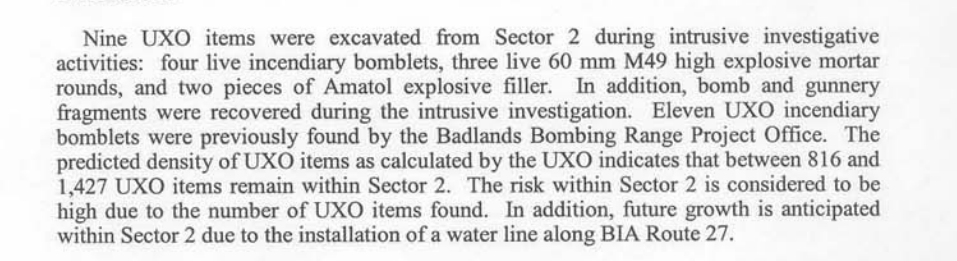
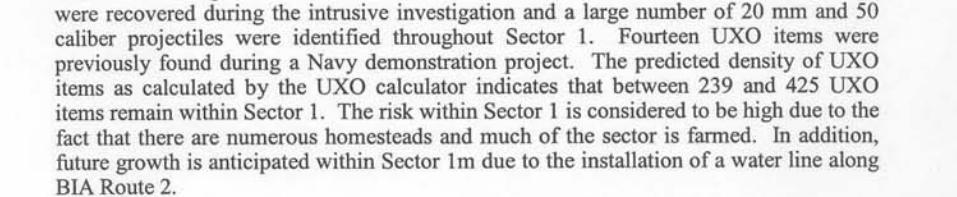
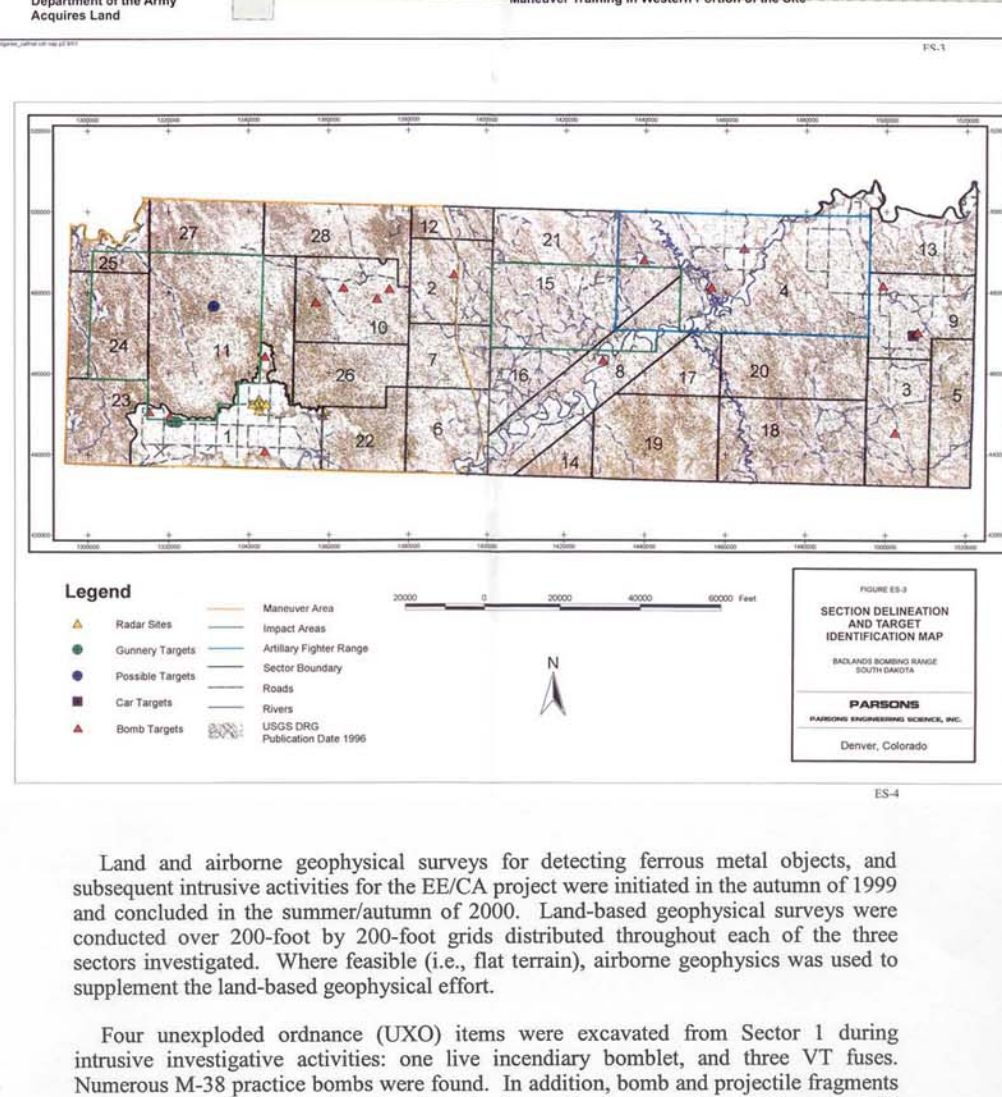


FIGURE ES-3
SECTOR DELINEATION AND TARGET IDENTIFICATION MAP
INCLUDES BOMBING RANGE IDENTIFICATION
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Land and airborne geophysical surveys for detecting ferrous metal objects, and subsequent intrusive activities for the EE/CA project were initiated in the autumn of 1999 and concluded in the summer/autumn of 2000. Land-based geophysical surveys were conducted over 200-foot by 200-foot grids distributed throughout each of the three sectors investigated. Where feasible (i.e., flat terrain), airborne geophysics was used to supplement the land-based geophysical effort.

Four unexploded ordnance (UXO) items were excavated from Sector 1 during intrusive investigative activities: one live incendiary bomblet, and three VT fuses. Numerous M-38 practice bombs were found. In addition, bomb and projectile fragments were recovered during the intrusive investigation and a large number of 20 mm and 50 caliber projectiles were identified throughout Sector 1. Fourteen UXO items were previously found during a Navy decontamination project. The predicted density of UXO items as calculated by the UXO calculator indicates that between 239 and 425 UXO items remain within Sector 1. The risk within Sector 1 is considered to be high due to the fact that there are numerous homesteads and much of the sector is farmed. In addition, future growth is anticipated within Sector 1m due to the installation of a water line along BIA Route 2.

Nine UXO items were excavated from Sector 2 during intrusive investigative activities: four live incendiary bomblets, three live 60 mm M49 high explosive mortar rounds, and two pieces of Amatol explosive filler. In addition, bomb and gunnery fragments were recovered during the intrusive investigation. Eleven UXO incendiary bomblets were previously found by the Badlands Bombing Range Project Office. The predicted density of UXO items as calculated by the UXO calculator indicates that between 816 and 1,427 UXO items remain within Sector 2. The risk within Sector 2 is considered to be high due to the number of UXO items found. In addition, future growth is anticipated within Sector 2 due to the installation of a water line along BIA Route 27.

No UXO items were excavated from Sector 3 during intrusive investigative activities. The OE items found were mostly practice items such as M-38 practice bombs, 50 caliber projectiles, and 20-mm practice projectiles. The predicted density of UXO items as calculated by the UXO calculator indicates that between 8 and 192 UXO items remain within Sector 3. The risk within Sector 3 is considered to be medium due to the fact that with the exception of one grid, only practice OE items were excavated. In addition, there are few homesteads in this sector and the level of anticipated future growth in Sector 3 is less than the growth expected in Sectors 1 and 2 because the water main is not installed in this sector.

Four response alternatives were considered for the three sectors. The alternatives included in the evaluation are:

- No DoD Action Indicated,
- Institutional Controls,
- Removal of Surface OE Items, and

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- Removal of OE Items to Depth.
- The alternatives were evaluated on the basis of:

- Overall Protection of Human Health and the Environment,
- Compliance with ARARS,
- Long-Term Effectiveness,
- Reduction of Toxicity, Mobility, and Volume,
- Short-Term Effectiveness,
- Implementability,
- Cost,
- Agency Acceptance, and
- Community Acceptance.

It is recommended that an Institutional Controls program be implemented in conjunction with removal of OE items to a depth of 4-feet over specific areas within each of the three sectors. The Institutional Controls program is anticipated to be implemented immediately for the Volume I project sectors, but be extended to the entire former Badlands Bombing Range. Table ES-1 lists the recommended components of the Institutional Controls program. The institutional control program is comprised of items to enhance the safety of both residents and tourists.

TABLE ES-1
INSTITUTIONAL CONTROLS PROGRAM

Residents	Tourists
Environmental Permit Program	Signs
Classroom Education	Fact Sheet
Video Tape	Museum Exhibit
Residents Advisory Board	Web Site

The recommended response program for Sector 1 (Cuny Table) includes:

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- Removal of ordnance items immediately surrounding the targets (target-specific distances),
- Removal of ordnance items surrounding homesteads and working structures (500 foot radius), and
- Removal of ordnance items along major ranching and farming roads (30 feet on each side).

Figure ES-4 presents a map of Sector 1 showing the areas recommended for removal actions. Removal actions will be performed 500 feet around the two northwest targets, and 400 feet around the southeast and northeast targets where the density of OE items was less than the density at the northwest targets. The depth of removal will be 4-feet. The response action will be performed over the entire finger area because a high number of OE items were identified surrounding this target. If a significant amount of OE is excavated within the initial radius around the target, then additional removal will be conducted until the density of remaining OE items is equal to the density found in non-target portions of the sector.

A 500-foot buffer zone will be cleared around homesteads and working structures. If a significant amount of OE is excavated from the buffer zone, then additional removal of OE items will be performed until the density of remaining OE items is equal to the density found in non-target areas of the sector. Along farming and ranching roads, removal actions will be performed over an area that extends 30-feet on each side of the road. The total acreage recommended for removal action is 996 acres.

The response program will consist of geophysical mapping followed by intrusive removal of metal anomalies to a depth of 4-feet. The 4-foot depth is recommended due to the fact that ordnance was found at this depth. In addition, ordnance items may erode over time as the Badland soils are easily eroded and may erode as much as 1-inch per year. Frost heave may also push ordnance items towards the surface. The frost depth in the Badlands is 4-feet. The response action will therefore remove ordnance items to the frost depth.

The recommended response program for Sector 2 (Scenic Bombing Range) includes:

- Removal of ordnance items surrounding the target (the entire plateau containing the target),
- Removal of ordnance items along the right-of-way of BIA Route 27 (50 feet each side),
- Removal of ordnance items surrounding homesteads and working structures (500 foot radius), and
- Removal of ordnance items along major ranching and farming roads (30 feet each on side).

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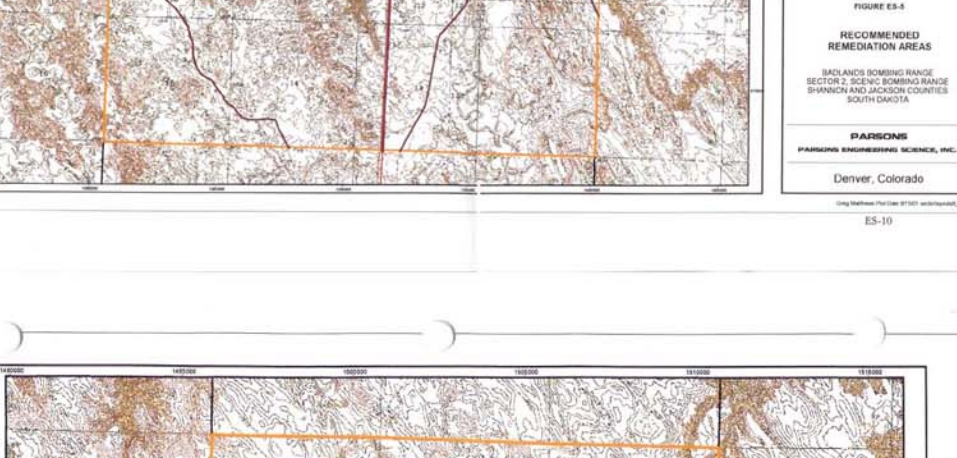


FIGURE ES-4
RECOMMENDED REMEDIATION AREAS
BADLANDS BOMBING RANGE
SECTOR 1 (CUNY TABLE)
SHANNON AND JACKSON COUNTIES
SOUTH DAKOTA
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Figure ES-5 presents a map of the Sector 2 showing the areas recommended for removal action. Removal actions will be performed throughout the entire plateau that surrounds the target. Removal actions will be performed a distance of 50 feet from each side of BIA Route 27 to cover the road's easement.

A 500-foot buffer zone will be cleared around homesteads and working structures. If a significant amount of OE is excavated from this zone, then additional removal will be conducted until the density of remaining OE items is equal to the density found in non-target portions of the sector. Along farming and ranching roads, removal actions will be performed over an area that extends 30-feet on each side of the road. The total acreage recommended for removal action is 1,248 acres. As discussed for Sector 1, the response action will consist of geophysical mapping followed by intrusive removal of metal anomalies to a depth of 4-feet.

The recommended response program for Sector 3 (Radar Bombing Range) includes:

- Removal of ordnance items around the target (500 foot radius), and
- Removal of ordnance items surrounding homesteads and working structures.

Figure ES-6 presents a map of Sector 3 showing the areas recommended for removal action. Removal actions will be performed 500 feet around the target. If a significant amount of OE is excavated within the 500-foot radius around the target, then additional removal will be performed until the density of remaining OE items is equal to the density found in non-target portions of the sector.

A 500-foot buffer zone will be cleared around homesteads and working structures. If a significant amount of OE is excavated from the buffer zone, then removal of OE items from an additional distance around the homestead/structure may be warranted until the density of OE items is equal to the density found in non-target portions of the sector. Along farming and ranching roads, removal actions will be performed over an area that extends 30-feet on each side of the road. The total acreage recommended for removal action is 36 acres. As discussed for Sector 1, the response action will consist of geophysical mapping followed by intrusive removal of metal anomalies to a depth of 4-feet.

Table ES-2 provides a summary of the acreage and costs associated with remediating Sector 1, Sector 2, and Sector 3. The total acres recommended for removal actions are 2,280 at an estimated cost of \$8,250/acre. Table ES-3 projects the total cost for the recommended Removal to Depth response action for these three sectors at \$21,164,200.

In addition, it is projected that each year the environmental permit program will conduct a response action over 234 acres for 13 new homesteads in Sectors 1, 2, and 3. A 500-foot buffer zone will be surveyed around each new homestead. The anticipated annual cost of future response actions is \$1,939,500. Based on an estimated annual cost of \$9,000 to maintain the Institutional Controls program, the total annual operating cost of the response action is estimated to be \$1,948,500.

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FIGURE ES-5
RECOMMENDED REMEDIATION AREAS
BADLANDS BOMBING RANGE
SECTOR 2 (SCENIC BOMBING RANGE)
SHANNON AND JACKSON COUNTIES
SOUTH DAKOTA
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FIGURE ES-6
RECOMMENDED REMEDIATION AREAS
BADLANDS BOMBING RANGE
SECTOR 3 (RADAR BOMBING RANGE)
SHANNON AND JACKSON COUNTIES
SOUTH DAKOTA
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The costs to perform the response action are significant and funding may not be available to complete the recommended actions all at once. Therefore, a prioritization of the response action components is prudent. It is important that funding be appropriated for use in performing EE/CA studies around the other target areas at the former Badlands Bombing Range as well as performing the recommended response actions at Sectors 1, 2, and 3. Therefore, funding will be requested for both EE/CA studies and response actions.

The general priority for the response action is as follows:

1. Removal actions around existing homesteads, working structures, and commercial structures.
2. Enhance Institutional Controls and support new construction.
3. Perform removal actions on access roads to homesteads, working structures, and commercial structures.
4. Removal actions around targets.
5. Removal actions along farming and ranching roads.
6. Removal actions along the primary roads.

TABLE ES-2
REMOVAL ACTION COSTS

Sector	Sector 1	Sector 2	Sector 3	Total
Acres Remediated	996	1,248	36	2,280
Estimated Removal Action Cost per acre	\$8,250	\$8,250	\$8,250	\$8,250
Estimated Cost	\$8,217,000	\$10,296,000	\$297,000	\$18,810,000

TABLE ES-3
TOTAL PROJECT COSTS FOR DEPTH REMOVAL

Cost Category	Activity	Cost per Acre	Cost
Field Preparation, Preliminary Permitting and Approval	Historical data review and archaeological permitting with state Historical Preservation Officer. Interface with Oglala Sioux Tribe.	N/A	\$15,750
	Natural Resource Survey	N/A	\$55,000
	Interaction with Oglala Sioux Tribe	N/A	\$26,250
Site Removal	Removal to Depth	\$8,250	\$18,810,000
Additional Costs	USACE Oversight & Management (12%)	N/A	\$2,257,200
Total			\$21,164,200