3.0 Sherwood

Sherwood Site Long-Term Custody Compliance Requirements

The following list comprises the long-term custody compliance requirements for the Sherwood site as defined in Section 3.2 of the site Long-Term Surveillance Plan:

1. Annual site inspection.
2. Annual inspection report.
3. Follow-up inspections and inspection reports, as necessary.
4. Site maintenance as necessary to sustain design functions.
5. Emergency measures in the event of catastrophe.
6. Environmental monitoring as required.

The Sherwood site long-term custody compliance requirements were fulfilled for 2003 as follows:

1. The site was inspected on August 21, 2003, in accordance with the inspection procedure as outlined in Section 3.3.2 of the Long-Term Surveillance Plan (LTSP).
2. This document serves as the annual inspection report.
3. No follow-up inspections were necessary.
4. No maintenance was necessary to sustain design functions.
5. No catastrophic events necessitated emergency measures.
6. The required ground water monitoring, as specified in Section 3.7.1 of the LTSP, and the Dam Safety Inspection specified in Appendix D of the LTSP, were completed and the results are presented in this report.

Sherwood Site Inspection Results

M. K. Kastens (Chief Inspector) and M. R. Widdop (Assistant Inspector), of S.M. Stoller Corporation, the Technical Assistance Contractor at the DOE Grand Junction Office (GJO), conducted the inspection on August 21, 2003. D. Stoffel and G. Robertson, both with the Washington State Department of Health, and D. Bruce, with the U. S. Bureau of Indian Affairs, were present for portions of the inspection. N. Poritz and L. Poritz, with Biological Control of Weeds, also were on site to release a species of insect to combat the invasion of noxious weeds. The inspection was conducted in accordance with the *Long-Term Surveillance Plan* (LTSP) *for the DOE Sherwood Project (UMTRCA Title II) Reclamation Cell, Wellpinit, Washington*, (February 2001) and procedures established by DOE to comply with the requirements of Title 10 *Code of Federal Regulations* Part 40.28 (10 CFR 40.28).

The purposes of the annual inspection are to confirm the integrity of visible features at the site, to identify changes in conditions that may affect site integrity, and to determine the need, if any, for maintenance or additional inspections and monitoring.

Fourteen photographs are included in the Sherwood report. The photographs are referred to in the text of the report and on Figure 3–1 by photograph location (PL) numbers.

Access Road and Perimeter Signs

The Bureau of Indian Affairs (BIA) maintains the all-weather site access road. A double-swing steel gate controls access to the Sherwood mine area and Spokane Tribe-owned facilities near the disposal site. There is a DOE lock on the gate in addition to several other locks that are assumed to belong to the Tribe.

Six perimeter or warning signs, designated P1 through P6, are placed at likely access points around the site property. The signs are attached at a height of about 5 feet above ground to steel posts set in concrete. Perimeter sign P4, north of the site, is located on a fence line north of the actual site boundary on an old two-track road that approaches the site from the northeast. All signs are in excellent condition.

Site Marker and Boundary Monuments

One inscribed granite site marker is present on the southwest side of the site property where the access road lies closest to the site boundary. The marker is in excellent condition.

Six boundary monuments designated BM–1, BM–2, BM–3, BM–3A, BM–4, and BM–5 define the site boundary. Inspectors noted that BM–3A had been bent (PL–1); all other monuments were in excellent condition.

Monitor Wells and Piezometers

Three monitor wells are located on the Sherwood site and are designated MW–2B, MW–4, and MW–10. Monitor well MW–2B is the upgradient or background well, and wells MW–4 and MW–10 are point-of-compliance wells. The aboveground structures at the wells are in good condition.

Four piezometers, designated PZ–1 through PZ–4, were installed in November 2000 along the crest of the tailings dam as part of the Dam Safety Inspection program. The aboveground structures at the piezometers are in good condition.

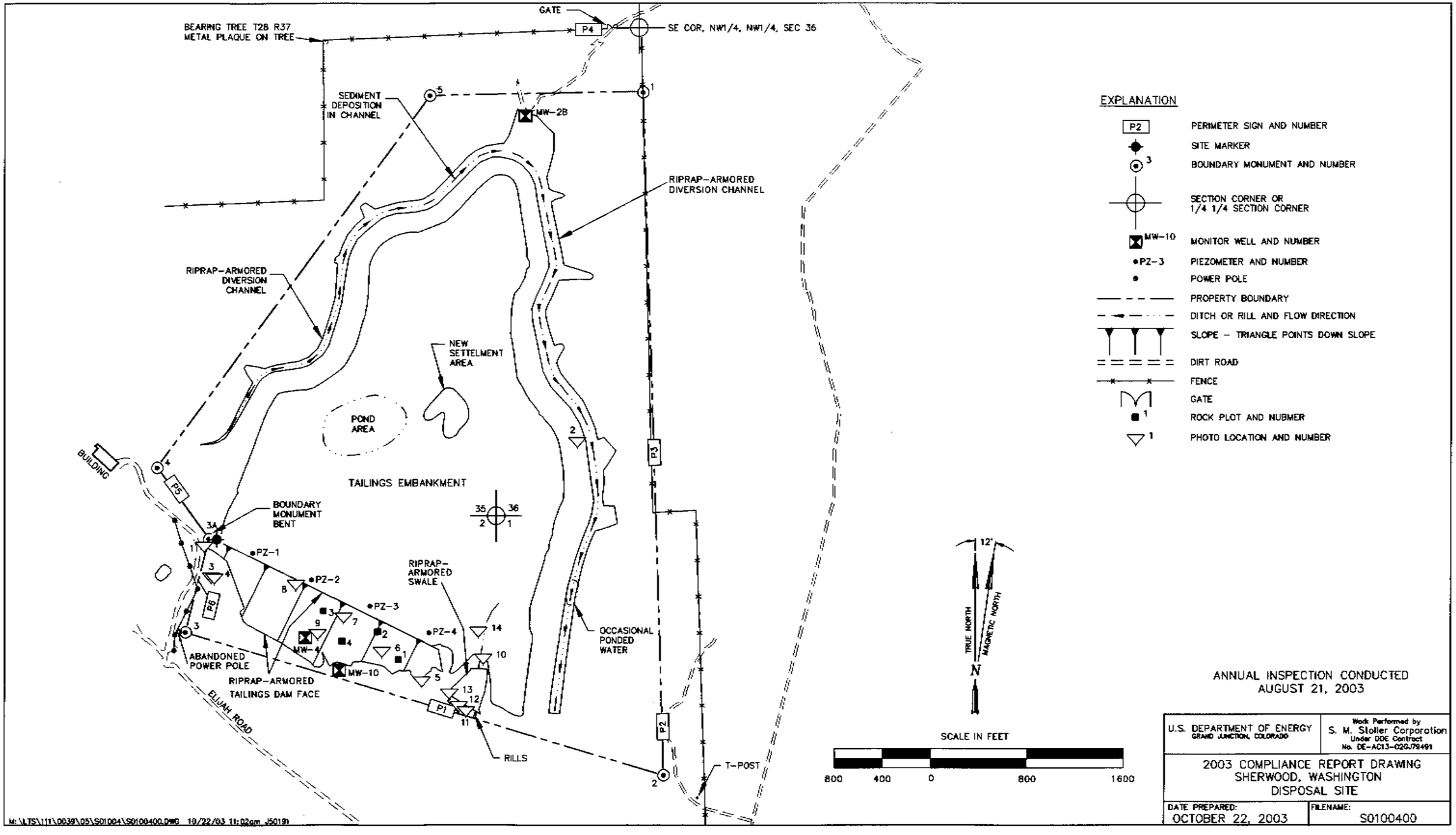

Figure 3–1. Sherwood, Washington, 2003

Tailings Impoundment Cover

The tailings impoundment cover for the Sherwood site consists of 12 to 20 feet of uncompacted soils. During site reclamation, surface soils were seeded and planted with shrubs, forbs, grasses, and trees. Reclamation has been successful, as a healthy stand of vegetation is now established.

Designers of the cell predicted that up to 10 feet of settlement could occur on the cover. Settlement has occurred over an approximate 7-acre area that has been referred to as the "pond area" and is shown on Figure 3–1. The pond area contained about 0.5 acre of standing water at the time of the inspection. The pond area was dry during the 2002 inspection. The plant species present indicate that there is year-round moisture below the surface. Vegetation in the pond area is composed primarily of native wetland species such as hardstem bulrush (*Scirpus acutus*), Olney threesquare (*Scirpus americanus*), common spikerush (*Eliocharis palustris*), sandbar willow (*Salix exigua*), and plantain (*Plantago eriopoda*). The pond provides habitat for small mammals, birds, and reptiles and appears to be a water source for larger mammals such as deer and elk, whose sign was abundant in this area.

Inspectors noted an additional settlement area east of the existing pond area (PL–2). This low-lying area, 3 to 5 acres in size, contains riparian vegetation and shows indications of having saturated soils during certain times of the year. There was no water in this settled area at the time of the inspection.

Significant populations of two noxious weed species—diffuse knapweed (*Centaurea diffusa*) and dalmation toadflax (*Linaria genistifolia*)—occur throughout and around the Sherwood site. A biological weed control program was initiated in the spring and summer of 2003 with the release of six species of insects. During the site inspection, the knapweed root weevil (*Cyphocleonus achates*) (PL–3) was being released.

Diversion Channel and Impoundment Dam Face

Inspectors walked the length of the diversion channel. Volunteer plant intrusion within the diversion channel is evident in most areas of the channel; however, because the channel is oversized, this intrusion is not expected to interfere with the channel’s design function. Rock condition is good and is the same as observed during earlier inspections. Sediment deposition is evident in places on the west side of the diversion channel, but currently does not interfere with the channel’s design function. The degree of sediment deposition should be noted during future inspections although it is not expected to increase to the degree that it could become a maintenance issue. At times, standing water has been observed in the channel along the east side of the impoundment (see Figure 3–1); this area was dry during the 2003 inspection.

The tailings embankment on this site, classified as a dam, necessitates a dam safety inspection to assure continued compliance with the Federal Dam Safety Act. The impoundment dam face was inspected in accordance with the attached Dam Inspection Checklist and photographed (PL–4 and PL–5). No evidence of seepage, slumping, erosion, or instability was observed. Ponderosa pines, some as tall as 24 inches, were observed on the face.

A small percentage of riprap has crumbled. In response to NRC concerns about rock quality, four “rock plots” were established on the embankment face to monitor the quality of riprap. The plots are intended to be approximately 1-meter square. Inspectors placed either a metal pin covered

with a sleeve of PVC pipe or a section of PVC pipe at the center of each plot and obtained location information using global positioning system equipment. Baseline photographs were taken of each plot (facing a northerly direction) (PL–6 through PL–9). Photography should be repeated during future inspections for comparison to baseline rock quality. Future inspectors may recommend changes to the plot inspection frequency or cessation of monitoring.

Adjacent to the eastern end of the dam face is a steep slope that is underlain by rock and covered with soil. Numerous rills and gullies noted during previous annual inspections were inspected on this slope (PL–10 through PL–13). No new rills were identified, and the size of existing rills had not increased since the 2001 and 2002 inspections. Although these erosional features do not threaten site integrity, they should be inspected annually to ensure the slope remains stable and sediment is not transported offsite.

A swale across the south end of the top slope is armored with riprap at the east end of the embankment, where the gradient increases. Erosion noted previously north of the riprap has cut to bedrock but considering the resistant material exposed at the invert and the low gradient of the unarmored portion of the swale, the swale appears stable (PL–14). Although additional erosion is unlikely, inspectors should monitor this area for changes.

Site Perimeter, Outlying Area, and Balance of Site

The inspectors covered the site perimeter while searching for boundary monuments and warning signs. No evidence of off site activity that could affect the integrity of the tailings impoundment was observed. Ponderosa pine forest comprises most of the surrounding area. The site property and surrounding lands are part of the Spokane Tribe of Indians Reservation. There are no residences within 0.25 mile of the site boundary.

Ground Water Monitoring and Piezometer Water Level Results

Both the required ground water sampling and the piezometer water level measurements were conducted on July 24, 2003. Ground water constituent concentrations were less than the action level (Washington water quality criteria) for confirmatory sampling. Ground water analytical results from 2001, 2002, and 2003, and piezometer water levels from 2000, 2001, 2002 and 2003 are presented in Tables 3–1 and 3–2, respectively.

Table 3–1. Ground Water Sampling and Analysis Results Summary

Constituent	Water Quality Criteria	Year	Background Well MW–2B	POC Well MW–4	POC Well MW–10
Chloride, mg/L	250	2001 2002 2003	1.460 1.790 1.330	6.290 3.100 5.260	2.350 2.630 2.190
Sulfate, mg/L	250	2001 2002 2003	3.040 3.170 3.500	27.500 20.900 27.400	25.500 27.500 28.100
TDS, mg/L	N/A	2001 2002 2003	242 258 287	445 418 432	742 715 705

mg/L = milligrams per liter

Table 3–2. Piezometer Water Levels, November 2000, July 2001, August 2002, and July 2003

Parameter	PZ–1	PZ–2	PZ–3	PZ–4
Water Level, November 2000 (initial reading at installation)	Dry	3.05 feet	Dry	Dry
Water Level, July 2001	Dry	1.95 feet	Dry	Dry
Water Level, August 2002	Dry	2.80 feet	Dry	Dry
Water Level, July 2003	Dry	3.22 feet	Dry	Dry

Conclusion

The Sherwood disposal site is in good condition at this time. No issues were identified during the dam safety inspection and no evidence of excessive settlement was observed in the pond area. The pond contained approximately 0.5 acre of water at the time of this inspection. Ground water monitoring and piezometer water level measurements conducted in July 2003 showed all measured parameters to be within acceptable ranges.

Sherwood Inspection Photographs

Table 3–3. Photograph Descriptions for Sherwood, Washington, Disposal Site

Photograph Location Number	Description
SHE PL–1	Boundary monument 3A, bent.
SHE PL–2	Additional settlement area (foreground) on top of tailings impoundment; pond area (dark green) is in background.
SHE PL–3	Knapweed root weevil.
SHE PL–4	Embankment face showing vegetation encroachment.
SHE PL–5	Embankment face showing vegetation encroachment.
SHE PL–6	Rock Plot 1.
SHE PL–7	Rock Plot 2.
SHE PL–8	Rock Plot 3.
SHE PL–9	Rock Plot 4.
SHE PL–10	Gully north of east end of embankment face.
SHE PL–11	Gully and headcut below riprap-armored portion of swale east of embankment face.
SHE PL–12	Gully below riprap-armored portion of swale east of embankment face.
SHE PL–13	Gully below riprap-armored portion of swale east of embankment face.
SHE PL–14	Swale at top of east end of embankment showing erosion to bedrock.

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SHE 8/2003. PL–1. Boundary monument 3A, bent.

SHE 8/2003. PL–2. Additional settlement area on top of tailings impoundment; pond area (dark green) is in background.

SHE 8/2003. PL–3. Knapweed root weevil (Cyphocleonus achates).

SHE 8/2003. PL–4. Embankment face showing vegetation encroachment.

SHE 8/2003. PL–5. Embankment face showing vegetation encroachment.

SHE 8/2003. PL–6. Rock Plot 1.

SHE 8/2003. PL–7. Rock Plot 2.

SHE 8/2003. PL–8. Rock Plot 3.

SHE 8/2003. PL–9. Rock Plot 4.

SHE 8/2003. PL–10. Gully north of east end of embankment face.

SHE 8/2003. PL–11. Gully and headcut below riprap-armored portion of swale east of embankment face.

SHE 8/2003. PL–12. Gully below riprap-armored portion of swale east of embankment face.

SHE 8/2003. PL–13. Gully below riprap-armored portion of swale east of embankment face.

SHE 08/2003. PL–14. Swale at top of east end of embankment showing erosion to bedrock.

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Appendix A

Sherwood, Washington, Dam Inspection Checklist

Dam Inspection Checklist

Piezometer P1 current year water elevation (feet)	dry
Piezometer P2 current year water elevation (feet)	3.22
Piezometer P3 current year water elevation (feet)	dry
Piezometer P4 current year water elevation (feet)	dry
Was evidence of significant seepage observed on the dam face? If yes discuss in report.	no
Was evidence of significant slumping observed on the dam? If yes discuss in report.	no
Was evidence of significant erosion observed on the dam? If yes discuss in report.	no
Was vegetative growth that could compromise dam stability observed? If yes discuss in report.	no, but Ponderosa pine seedlings are establishing on the dam face
Was any condition that presents imminent hazard the public health and safety or the environment observed?	no

If yes immediately contact the following:

DOE Project Manager (970) 248-6037
NRC Operations Center (301) 951-0550
Spokane Tribal Police/Sheriff (509) 258-4400

End of current text