



U.S. Department of Energy

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May 13, 2003

Mr. Rob Herbert
Utah Division of Radiation Control
P.O. Box 144850
Salt Lake City, UT 84114-4850

Subject: Response to State of Utah Comments on the Final Site Observational Work Plan for the Green River, Utah, UMTRA Project Site - WM-68

Dear Mr. Herbert:

The U.S. Department of Energy (DOE) has reviewed your comments on the *Final Site Observational Work Plan for the Green River, Utah, UMTRA Project Site* (SOWP) (September 2002) and provides responses as enclosed. In summary, DOE has addressed the open issues and proposes a path forward for compliance with Subparts A and B of 40 CFR 192 for the Green River site.

The nature of the comments is such that revision of the Final SOWP does not appear to be warranted. Changes necessary to address the issues will be included in the Draft Ground Water Compliance Action Plan (GCAP), which is the regulatory concurrence document for the proposed ground water compliance strategy for the Green River site. The Draft GCAP is scheduled for distribution to regulators during June 2003.

In conjunction with institutional controls (ICs) for the site, DOE is currently working with Jerry Olds of the State of Utah Division of Water Rights to implement ICs similar to those in place at the Monticello, Utah, uranium mill tailings site.

If you have questions, please contact me at 970-248-7612.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Metzler", is written over a horizontal line.

Donald R. Metzler
Program Manager

Enclosure

WMSSD8

WM-68

cc:

W. Sinclair, UDRC

J. Lusher, NRC

B. Von Till, NRC

C. Bahrke, Stoller

R. Heydenburg, Stoller

S. Marutzky, Stoller

Project File GWGRN 3.2.3

Drm\RespnstoGR SOWP

Green River, Utah, UMTRA Project Site Response to State of Utah Comments on the Final SOWP

The following is in response to the State of Utah Division of Radiation Control (UDRC) comments on the *Final Site Observational Work Plan for the Green River, Utah, UMTRA Project Site* (SOWP) (September 2002) in their letter to the U.S. Department of Energy (DOE) of 21 January 2003. The letter also provided the status of earlier comments on the Draft SOWP (February 2002).

The nature of the comments is such that revision of the Final SOWP does not appear to be warranted. Changes necessary to address the issues will be included in the Draft Ground Water Compliance Action Plan (GCAP), which is the regulatory concurrence document for the proposed ground water compliance strategy for the Green River site. The Draft GCAP is scheduled for distribution to regulators during June 2003.

Since the disposal cell is located at the Green River site, compliance with both Subparts A and B of 40 CFR 192 are applicable. It is the intent of DOE to propose a comprehensive site-wide compliance strategy for ground water protection to address both Subparts A and B of the regulations. This strategy will be presented in the GCAP. The Long-Term Surveillance Plan (LTSP) (July 1998) will be revised to reflect the proposed compliance strategy and monitoring plan for the entire site. This will be submitted concurrently with the GCAP, as the LTSP will also need NRC concurrence prior to implementation of the modified site-wide compliance strategy.

Response to Comments on the Draft SOWP (February 2002):

4. *Specify wells used in geochemistry plots:*

Individual wells were identified on diagrams in the Final SOWP to provide a better understanding of geochemical differences between wells and aquifer units.

9. *Sample ground water baseflow at mouth of Browns Wash:*

Ammonium will be analyzed in surface water samples collected from the Green River and at the mouth of Browns Wash (locations 0846 and 0847) during the next sampling round in July 2003, and at scheduled sampling intervals thereafter.

10. *Clarify endangered wildlife species:*

Bruce Waddell, U.S. Fish and Wildlife Service (USF&WS) was contacted on April 25, 2002 to discuss threatened and endangered species that should be included in any decision making documents for the Green River site. Objectives of sampling for ecological risk purposes, such as focusing on surface water and sediments at the mouth of Browns Wash, were also discussed. This area is considered prime endangered fish habitat and may be considered a backwater. USF&WS will again be consulted during development of the environmental documents for the Green River site required by the National Environmental Policy Act (NEPA) and DOE NEPA regulations.

11. Alternate concentration limits versus supplemental standards:

Based on the proposed monitoring program for the alternate concentration limit (ACL) compliance strategy for the Cedar Mountain Formation, which includes sampling of surface water at the mouth of Browns Wash, application of supplemental standards for the Browns Wash alluvium is acceptable to the State of Utah.

Response to Comments on the Final SOWP (September 2002):

Geologic cross sections:

The cross sections (Figures 5-4 and 5-5) in the Final SOWP were constructed at a larger scale (horizontal 1" = 100' and vertical 1" = 20') using detailed lithologic logs (available in Appendix B of the Final SOWP) and relevant field data. Lithologic units were correlated to the extent possible based on the information available and are shown on the cross sections. Screened intervals for the wells and static water levels measured during July 2002 were included. It was determined that a full sized plate would not add substantially to understanding the system, and reducing the scale of the cross sections to a size that would fit in the text of the document (horizontal 1" = 250' and vertical 1" = 50') would serve the required purpose.

Hydraulic gradient of Cedar Mountain middle sandstone unit:

Uncertainties in understanding and interpretation of the hydrogeology and ground water flow system in units of the Cretaceous Cedar Mountain Formation in the vicinity of the Green River site were discussed in Section 5.1 of the Final SOWP, with a summary of the ground water flow system in Section 5.1.2.3. The hydrogeology of the Cedar Mountain Formation is complex at the site with several structural, hydrostratigraphic, and anthropogenic features affecting the area. It was obvious from characterization activities in the vicinity of the site that there are complex lateral facies changes in the hydrostratigraphic sequence in the area.

It was observed that the middle sandstone unit of the Cedar Mountain Formation (uppermost aquifer) was not consistently present or saturated in all areas of the investigation. This presents a problem in establishing a point-of-compliance/point-of-exposure (POC/POE) well network because contaminated ground water that exists in the middle sandstone unit beneath the disposal cell may not be present at a distance laterally in any direction. This is the case with proposed POE well 0182 northwest of the disposal cell. A thin fine-grained sandstone was encountered at the estimated depth of the middle sandstone unit while drilling, but the unit was unsaturated. This indicates that the saturated unit beneath the disposal cell is not present in this area to the northwest and that the extent of contaminated ground water in the middle sandstone unit is restricted and not widespread in the area away from the disposal cell. Consequently, this monitor well was drilled down until intersecting the first significant occurrence of ground water, which was correlated with the basal sandstone unit of the Cedar Mountain Formation.

Another confusing situation occurs when assessing conditions indicated in monitor well 0180 (400 ft east of the disposal cell), which appears to correlate with the middle sandstone unit, but has a static water level consistently higher than the rest of the unit. This could influence the interpretation of the perceived direction of ground water flow in the middle sandstone unit in the vicinity of the site. The reason for this anomaly has not been determined, but the decision was made in this assessment to consider the data as an outlier, and not include it in the interpretation of the ground water flow system.

Based on characterization information, site-related contamination in ground water in the middle sandstone unit of the Cedar Mountain Formation is not widespread or pervasive. Distribution of contaminants is spotty, both temporally and spatially, which may indicate that contaminants attenuate rapidly, movement through the formation is affected by hydrostratigraphy, fractures, or some other limiting feature, or some combination of these or other factors. The saturated portion of the middle sandstone unit does not appear to be extensive, which restricts the area of contamination generally to the area adjacent to the disposal cell that is currently covered by property owned by the State of Utah. Since the disposal cell is located onsite, minor seepage during the long-term may result in somewhat elevated concentrations of mill-related constituents in the immediate vicinity of the cell.

An open issue is the perception that DOE needs to install additional monitor wells to resolve the hydraulic gradient and ground water flow directions in order to establish appropriate POC and POE wells to monitor ground water under the ACL compliance strategy for the middle sandstone unit of the Cedar Mountain Formation. Because of the inherent complexity of the Cretaceous hydrostratigraphy and ground water flow regime in the vicinity of the site, additional characterization would probably not resolve the issues in a satisfactory manner that would enhance monitoring of ground water in the uppermost aquifer to the point of further protecting human health and the environment. Therefore, it is not deemed reasonable or economic to drill additional monitor wells to further characterize the hydrogeology of the area at this time. Also there is no compelling reason to pursue further investigation as there is no unacceptable risk to human health and the environment because there are no complete exposure pathways for contaminated ground water in the Cedar Mountain Formation. Institutional controls (IC) are in place in potentially affected areas, and can be enhanced as discussed below. Rather than pursue an extensive re-characterization program, which may or may not substantially resolve issues, it may be better to accept the inherent uncertainties and implement a monitoring program, in conjunction with effective ICs, to accommodate variations in the ground water flow direction, while still being protective of human health and the environment (see below).

Several monitor wells were completed in the basal sandstone unit of the Cedar Mountain Formation at locations farther away from the disposal cell where the middle sandstone unit was either unsaturated or not present, and this unit represented the first significant occurrence of ground water (0182 northwest and 0185 southwest of the site, respectively). Ground water in this unit has not been contaminated by site-related activities because it has a strong upward hydraulic gradient and is hydrogeologically isolated from the middle sandstone unit. Therefore, no monitoring of ground water in the basal sandstone unit is planned.

Major ion geochemistry:

The distinction between the Mancos Shale, Dakota Sandstone, and the upper and middle sandstone units of the Cedar Mountain Formation (in Figure 5-15 in the Final SOWP) is not considered important in the overall characterization of ground water at the Green River site. The Mancos Shale and Dakota Sandstone are considered non-water-bearing units in this area (Section 5.1.2). Significant ground water is not encountered until reaching the middle sandstone unit of the Cedar Mountain Formation. The reason for including the different formations is that some of the screens in the shallower monitor wells cross formation boundaries, and residual ground water may have been encountered over time. To facilitate discussions in the geochemistry section of the Final SOWP, these formations are included along with the "upper portion" of the Cedar Mountain Formation, which includes the upper unit and the middle sandstone unit.

Summary and Conclusions:

Browns Wash Alluvium:

In conjunction with the acceptable supplemental standards compliance strategy for the Browns Wash alluvium, DOE will monitor surface water at two locations to ensure that contaminated ground water is not adversely affecting surface water habitats near the mouth of Browns Wash and in the Green River. Ammonium will be analyzed in surface water samples collected during the next sampling round in July 2003 and at scheduled intervals thereafter at the mouth of Browns Wash (location 0847) and in the Green River (location 0846).

Cedar Mountain Formation:

Based on the discussion above, additional characterization and increasing the number of POC and POE wells does not appear warranted relative to any enhanced benefit for further protecting human health and the environment. The proposed solution to the monitoring issues would be to monitor the four existing POC wells along the northwest edge of the disposal cell (0171, 0173, 0181, and 0813), plus the additional best management practice well on the southeast side of the disposal cell (0179). Also, the best management practice well adjacent to Browns Wash (0194) would track potential migration of uranium in the alluvial ground water. Monitoring of surface water at the mouth of Browns Wash (0847) and just downstream in the Green River (0846) would fulfill requirements at this potential POE. A summary of the proposed monitoring locations for the Green River site is shown in Table 1. This monitoring would be done in conjunction with implementation of ICs, as discussed below.

Table -1. Summary of Proposed Monitoring for the Green River Site

Location	Monitoring Purpose	Analytes	Frequency
Ground Water			
0171, 0173, 0181, 0813	Point of compliance wells for disposal cell; middle sandstone unit of the Cedar Mountain Formation; ensure ACLs are not exceeded.	As, Na, NO ₃ , Se, SO ₄ , U	Annual for 5 years; reevaluate monitoring requirements at that time.
0179	Best management practice monitoring for uranium; middle sandstone unit of the Cedar Mountain Formation; near disposal cell.	U	Annual for 5 years; reevaluate monitoring requirements at that time.
0194	Best management practice monitoring for leading edge of contamination in the Browns Wash alluvium.	Mn, Na, NO ₃ , Se, SO ₄ , U	Annual for 5 years; reevaluate monitoring requirements at that time.
Surface Water			
0846, 0847	Point of exposure for critical surface water habitat; ensure no degradation of water quality resulting from ground water discharge.	As, Mn, Na, NO ₃ , Se, SO ₄ , U	Annual for 5 years; reevaluate monitoring requirements at that time. Monitoring will occur during time of year when habitat is most critical.

Monitoring program will address both Subparts A and B of 40 CFR 192.

In conclusion, the most reasonable solution to long-term protection of human health and the environment, in addition to the ground water and surface water monitoring proposed above, is establishment of appropriate and enforceable ICs that would control and prevent access to potentially contaminated ground water in the vicinity of the Green River site.

ICs will be secured from the State of Utah using a process that has proven successful for ground water contamination at the former Monticello Mill Tailings Site. DOE will apply to the State of Utah Division of Water Rights to establish restrictions within an area designated by DOE as needing restricted access to ground water for domestic purposes. DOE will provide the State with information on the constituents of potential concern, the levels of contamination present, and the associated potential risk of exposure. The application will have sufficient data to demonstrate understanding of the ground water system and contaminant movement. The State will conduct a public meeting to evaluate and address stakeholder concerns. Once any concerns have been addressed, the State will issue and maintain a policy specifying the ground water uses within the ICs boundary that will be restricted and will not be permitted. The policy will remain in effect until contaminant levels return to acceptable levels.