GJO–1999–90–TAR
MAC–GWGRJ 1.9

Ground Water Compliance Action Plan for the Grand Junction, Colorado, UMTRA Project Site

May 2001

Work Performed Under DOE Contract No. DE–AC13–96GJ87335 for the U.S. Department of Energy
Approved for public release; distribution is unlimited.

GJO–1999–90–TAR
MAC–GWGRJ 1.9

Ground Water Compliance Action Plan for the Grand Junction, Colorado, UMTRA Project Site

May 2001

Prepared by
U.S. Department of Energy
Grand Junction Office
Grand Junction, Colorado

Project Number UGW-511-0008-09-000
Document Number U0050100

Work Performed under DOE Contract No. DE-AC13-96GJ87335

Contents

Figures

Tables

1.0 Introduction

This Ground Water Compliance Action Plan (GCAP) is a stand-alone modification to the Grand Junction Remedial Action Plan (RAP) (DOE 1991). The GCAP will supercede Attachment 3 of the RAP that refers to ground water restoration and the deferral of ground water compliance as defined in Subpart B of 40 CFR 192. The GCAP recommends the preferred ground water compliance strategy and provides rationales to support the recommendation.

The proposed compliance strategy for the former Climax Uranium millsite (the Grand Junction site) is based on the steps described in Section 2.1 of the *Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project* (PEIS) (DOE 1996) (Figure 1) and *the Environmental Assessment for UMTRA site at Grand Junction, Colorado* (EA) (DOE 1999a). National Environmental Policy Act (NEPA) issues and environmental concerns are also addressed in this Ground Water Compliance Plan and this information is available to public.

2.0 Ground Water Compliance

To achieve compliance with "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings" (Subpart B of 40 CFR 192) at the Grand Junction site, the DOE proposed action is no remediation and application of supplemental standards based on "limited use ground water" (40 CFR 192.21[g]). Ground water in the uppermost aquifer is not a current or potential source of drinking water because widespread, ambient contamination not due to activities involving residual radioactive materials from the designated processing site exists that cannot be remediated using treatment methods reasonably employed in public water systems (40 CFR 192.11[e][2]). The applicability of supplemental standards at the Grand Junction site is presented in the *Final Site Observational Work Plan for the UMTRA Projects Site at Grand Junction, Colorado* (SOWP)(DOE 1999b). The potential risk to human health and the environment has been addressed in the *Baseline Risk Assessment of Ground Water Contamination at the Uranium Mill Tailings Site at Grand* Junction, *Colorado* (BLRA) (DOE 1995), and updated using more recent data in the Grand Junction SOWP (DOE 1999b) and EA (DOE 1999a). Hydrogeologic information in this GCAP is principally derived from the SOWP. This proposed action was determined by applying the compliance strategy selection framework from the PEIS, consisting of five evaluative steps that are discussed in Sections 2.1 to 2.5.

2.1 Assessment of Environmental Data

The first step in the decision process is an assessment of both historical and new environmental data collected to characterize hydrogeologic conditions and the extent of ground water contamination related to uranium ore processing at the site. The three main hydrogeologic units beneath the Grand Junction site are the unconfined alluvial aquifer, the underlying aquitard composed primarily of shale units in the Cretaceous Dakota Sandstone, and the confined aquifer in sandstones of the Dakota Sandstone. The alluvial aquifer is considered the uppermost aquifer at the site. Surface components of the hydrologic system in the area include the Colorado River along the south boundary of the site and irrigation canals and ditches north of the site.

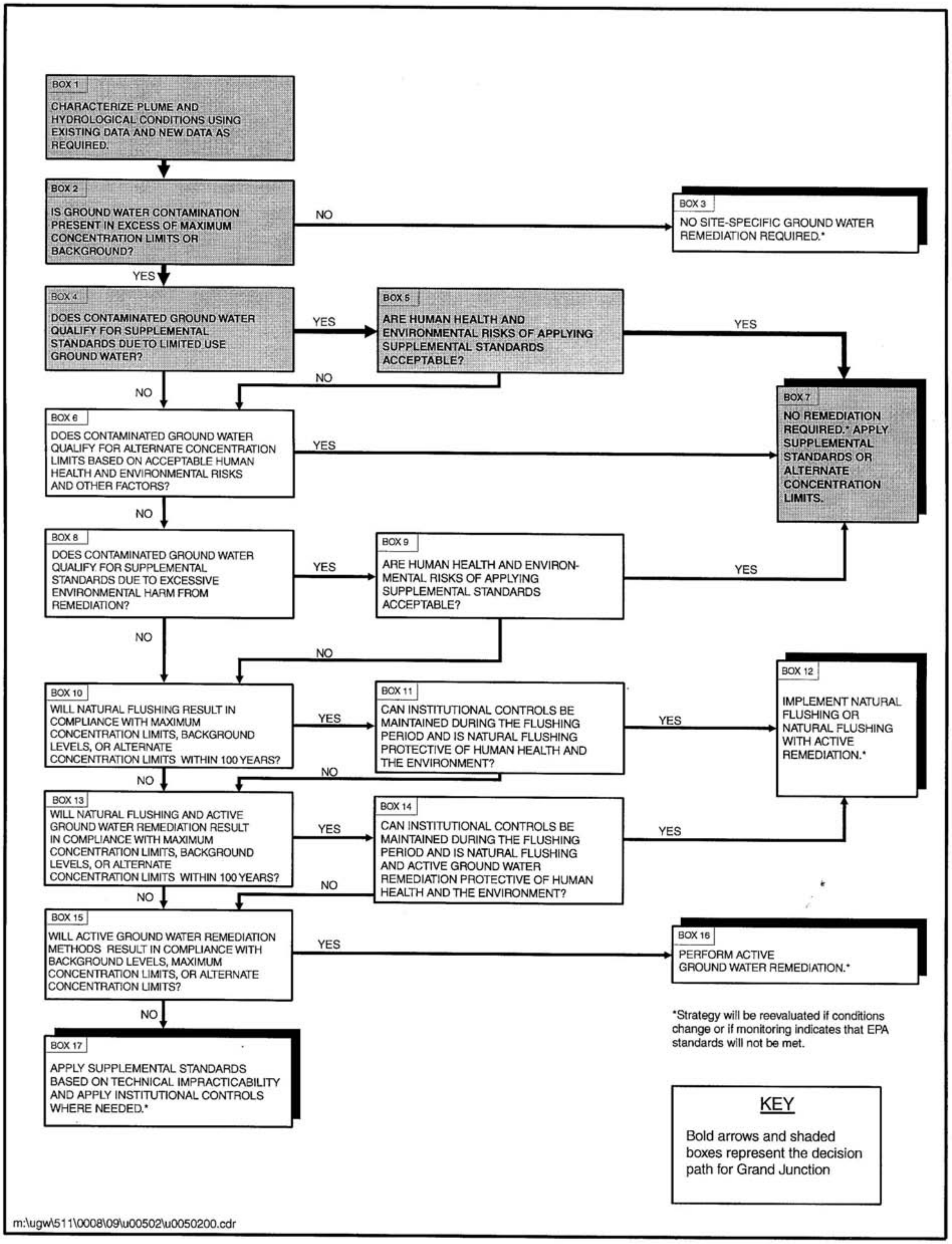

Figure 1. Compliance Selection Framework for the Grand Junction Site

The alluvial aquifer is composed of unconsolidated clays, silts, sands, gravels, and cobbles. Ground water is unconfined in the alluvial aquifer; depth to the water table ranges from zero near the river to approximately 20 feet (ft) (6 meters [m]) at the northern end of the site. The saturated thickness of the aquifer ranges from 5 (1.5 m) to 20 ft (6 m). Ground water generally flows southwest toward the Colorado River at a horizontal gradient of approximately 0.004. The alluvial aquifer is recharged by infiltration of precipitation directly on the site, leakage from upgradient irrigation canals and ditches in the area, and infiltration of river water during spring runoff in the Colorado River. Seasonal fluctuations in water levels beneath the site range from 2 (0.6 m) to 5 ft (1.5 m) in response to changes in river stage. Limited amounts of recharge also occur as upward leakage of ground water from the underlying Dakota Sandstone aquifer. Ground water discharge is primarily limited to drainage into the river during low stage. Some discharge also occurs as evapotranspiration from vegetation growing in areas of shallow ground water depth near the Colorado River. Hydraulic conductivity in the alluvial aquifer ranges from 20 (8.0×10^{-3} centimeters per second [cm/sec]) to more than 200 ft/day (8.0×10^{-2} cm/sec), based on aquifer pumping tests in several monitor wells. The variability is a result of lateral and vertical facies changes typical to alluvial deposits and from other boundary conditions in the vicinity. The average linear ground water velocity beneath the site is 2.0 ft/day (8.0×10^{-4} cm/sec), based on an estimated average hydraulic conductivity of 100 ft/day (4.0×10^{-2} cm/sec), a hydraulic gradient of 0.004, and an effective porosity of 0.20.

Underlying the alluvial aquifer is a shale aquitard composed of low-permeability shale units in the Dakota Sandstone. Thickness of the shale aquitard in the Dakota may be as much as 50 ft (15 m); depths to the top of the aquitard range from less than 10 ft (3 m) to more than 75 ft (23 m) below the ground surface. Although the shale unit is regarded as an aquitard, wells completed within the unit indicate that it is saturated with ground water. Horizontal hydraulic conductivity for the aquitard is variable depending on the degree of weathering of the unit, but the lower end of the range for unweathered material may be as low as 0.02 ft/day (8.0×10^{-6} cm/sec). Previously collected data indicate that vertical hydraulic gradients are generally upward, with a few exceptions noted during high water levels in the alluvial aquifer associated with high river stages.

The confined aquifer in sandstones of the Dakota Sandstone underlies the shale aquitard. This aquifer was not extensively characterized during site investigations because of the presence of the overlying aquitard and vertical upward hydraulic gradients that minimize the potential for any infiltration of contamination from the alluvial aquifer. Recharge to the Dakota Sandstone occurs as infiltration of precipitation on outcrops to the south. Ground water flow direction in the Dakota beneath the site likely follows regional gradients, which vary between a northwest and a northeast orientation. Sparse information on hydraulic conductivity for this unit indicates a range of 0.02 ft/day (8.0×10^{-6} cm/sec) to 0.13 ft/day (1.0×10^{-4} cm/sec) (Lohman 1965).

2.2 Ground Water Contaminants

The second step in the decision process is to compare the list of ground water contaminants to maximum concentration limits (MCL) or to concentrations in background ground water. The list of chemicals of potential concern (COPC) identified in the 1995 BLRA was evaluated using 1998 sampling data. Potential risks calculated using the recent data in a residential drinking water exposure scenario indicated that the major risk contributors were uranium, ammonia, iron, manganese, molybdenum, and vanadium. Although there is no consensus as to what concentration of sulfate is acceptable in drinking water, concentrations detected in the site ground water are sufficiently high to be of potential concern. A discussion of COPCs is presented in Section 6.1.2 and data are presented in Table 6–1 of the SOWP (DOE 1999b).

2.3 Applicability of Supplemental Standards

The third step in the decision process is to determine whether contaminated ground water qualifies for supplemental standards on the basis of limited use ground water. Ground water in the unconfined alluvial aquifer is of limited use because of widespread, elevated concentrations of naturally occurring uranium and selenium that cannot be treated by methods reasonably employed in public water systems.

2.3.1 Background Concentrations

Uranium values for background ground water average 0.047 milligrams per liter (mg/L) (MCL is 0.044 mg/L). Activity concentrations for ^{234}U + ^{238}U average 42 pico Curies per liter (pCi/L), well above the 30 pCi/L MCL. Analytical data for the background ground water quality are shown in Table 1.

Selenium values average 0.04 mg/L; the Uranium Mill Tailings Remedial Action (UMTRA) MCL is 0.01 mg/L. Selenium concentrations are high in some wells and not detected in others. The population is bimodal; if the nondetect values are assumed to be at the detection limit, the average of 0.04 mg/L is above the MCL of 0.01 mg/L. A study by the U.S. Geological Survey that focused on selenium in Grand Valley ground water found concentrations of selenium in valley ground water ranging up to 0.88 mg/L (Butler et al. 1994).

The source of uranium and selenium in background ground water is thought to be the dark marine shales in the Mancos Shale, which is found throughout the valley. Black shales are known to contain unusually high concentrations of uranium (Levinson 1980), and Late Cretaceous marine shales, such as the Mancos, are known to have high concentrations of selenium (USGS 1997). These shales underlie most of the valley and are leached by ground water moving to the south and southwest.

Other constituents in background ground water that have concentrations above the secondary drinking water standards established in the Safe Drinking Water Act include chloride, iron, manganese, sulfate, and total dissolved solids (TDS) (Table 1). Although the secondary drinking water standards are not enforceable, they do indicate that the background ground water is of poor quality. The mean TDS concentration for background ground water is 5,238 mg/L, which is below the 10,000 mg/L that defines a limited-use aquifer, but still elevated. The data for uranium and selenium concentrations support the use of the criterion of widespread ambient contamination in the alluvial aquifer (40 CFR 192.11[e][2]).

2.3.2 Reasonableness of Ground Water Treatment

Ground water from the alluvial aquifer is not a current or potential source of drinking water. Potable water is readily available from the municipal water system in the vicinity of the site. Ground water from the alluvial aquifer has no current use, and there is no historical record of wells completed in this unit beneath or downgradient of the site. Future use of ground water from the alluvial aquifer is unlikely based on historical information and the planned future development of a park and recreational facilities in the area. Therefore, the current and

Table 1. Summary of 1998 Ground Water Quality in the Alluvial Aquifer

Contaminant	**Maximum** mg/L	**Mean** mg/L	**MCL** mg/L	**SMCL** mg/L	**RBC** mg/L
Ammonia (as NH_4)					
Plume	233	71.4			0.20 (as NH_3)
Background	0.321	0.093			
Arsenic					
Plume	0.0349	0.005	0.05		0.001N
Background	0.0014	n/a			0.000045C
Chloride					
Plume	1,160	796		250	
Background	991	437			
Fluoride					
Plume	7.57	1.93	4	2	2.2N
Background	1.62	0.895			
Iron					
Plume	21.2	3.88		0.3	11N
Background	3.13	0.552			
Manganese					
Plume	4.54	2.82		0.05	1.7N
Background	2.22	1.4			
Molybdenum					
Plume	0.299	0.101	0.1		0.18
Background	0.124	0.0587			
Selenium					
Plume	0.016	n/a	0.01		0.18
Background	0.137	0.036			
Sulfate					
Plume	3,700	3,154		250	
Background	3,720	2,566			
^{234}U & ^{238}U					
Plume	1,668	215.3	30 pCi/L		
Background	57	42			
Uranium (total)					
Plume	2.5	0.304	0.044		
Background	0.0662	0.0469			
Vanadium					
Plume	0.832	0.0857			0.26
Background	0.0049	0.0019			
Total Dissolved Solids					
Plume	7,840	6,525		500	
Background	7,400	5,238			

Note: SMCL—secondary maximum contaminant level
RBC—risk based concentration (human health)
N—noncarcinogenic risk
C—carcinogenic risk

reasonably projected uses of site-affected ground water would be preserved with the application of supplemental standards.

Even though ground water in the affected area has no current or projected use, a study was performed to test how reasonable the costs would be to treat contaminated ambient ground water for municipal potable use. The study addressed the criterion in 40 CFR 192.11(e)(2) that the water cannot be treated by “methods reasonably employed in public water systems” (Appendix J in the SOWP [DOE 1999b] describes the results of this study, which was based on information provided by contractor personnel and guidance in *Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy* (EPA 1988). The study shows that the cost of producing potable water from the alluvial aquifer is conservatively estimated at $680 per household per year. This value exceeds the threshold of $300 per household per year provided by the U.S. Environmental Protection Agency (EPA) 1988 guidelines; adjusted for inflation of 3 percent per year, which results in a current threshold of $400 per year, the cost is still well above the threshold. The three sources of municipal water in the Grand Valley are Grand Junction city water, Clifton water, and Ute water. The average household uses about 8,000 gallons per month; therefore the cost for each is

- Grand Junction: $222 per year per household
- Clifton water: $222 per year per household
- Ute water: $216 per year per household

These amounts are about one-third the estimated cost of treating alluvial ground water (DOE 1999b).

2.4 Human Health and Environmental Risks

The fourth step in the decision process is to consider whether the human health and environmental risks of applying supplemental standards are acceptable. Assessment of site conditions and consideration of potential effects on environmental resources indicate that supplemental standards will be protective of human health and the environment. An EA (DOE 1999a) is being prepared for the site that will detail risks to humans and the environment.

2.4.1 Human Health Risk

The BLRA (DOE 1995) and the update presented in the Final Grand Junction SOWP (DOE 1999b) indicate that residential use of ground water, mainly as drinking water, presents the only unacceptable risks due to exposure to ground water at the site. If site ground water were used exclusively for residential consumption, risks would exceed the upper end of EPA’s acceptable level of 1×10^{-4} for carcinogens and the acceptable Hazard Index (HI) of 1 for noncarcinogens. The largest contribution to noncarcinogenic risks from site ground water would be from uranium, ammonium, arsenic, fluoride, iron, manganese, molybdenum, and vanadium. Uranium would also produce the largest carcinogenic risk. Table 2 lists the COPCs discussed in the 1995 BLRA and presents a summary of the rationale for retaining them or deleting them as COPCs in the 1998 update.

Although risks calculated for use of site ground water in a residential setting are unacceptably high, no risks currently exist at the site because no pathways for human use of ground water are

Table 2. Human Health and Ecological Risk COPC Update Summary

COPC	UMTRA MCL mg/L	Updated COPC for Human Health Risk[a]	Updated COPC for Ecological Risk[b]	Comments and Rationale for Retaining as a COPC HR: Human Health Risk ER: Ecological Risk
Ammonia[c]		Y	Y	HR: > 1 for inhalation in residential setting ER: Concentration in one surface water sample exceeded RBC[e]
Arsenic	0.05	Y	N	HR: Risks higher than acceptable; MCL not exceeded
Cadmium	0.01	N	N	HR: Insignificant contribution to total risk
Cobalt		N	N	HR: Insignificant contribution to total risk
Fluoride		N	N	HR: No evidence of use at millsite
Iron		Y	N	HR: HQ[f] > 1
Manganese		Y	Y	HR: HQ > 1
Molybdenum	0.10	Y	Y	HR: HQ > 1 ER: Concentration in cattail stems 2 to 3 times greater in site area than in reference area
Nickel		N	N	HR: Insignificant contribution to total risk
Nitrate	44	N	N	HR: Plume concentrations are within background range
^{226}Ra	5 pCi/g	N	N	HR: Plume concentrations are within background range
Sulfate		Y	N	HR: Toxicity data are currently under evaluation by EPA, but concentrations are high enough to be of probable concern
Uranium	0.044	Y	Y	HR: Primary carcinogenic and noncarcinogenic risk contributor ER: Concentration in one surface water sample exceeded EPA's Ecotox threshold and lowest chronic value
Vanadium		Y	Y	HR: Concentrations exceed RBC but have decreased two orders of magnitude from historical values ER: Concentration in one surface water sample exceeded EPA's Ecotox threshold and lowest chronic value
Zinc		N	N	HR: Insignificant contributor to total risk

NOTE: Boldface type indicates COPCs that were retained in 1998 update of BLRA

[a]Identified as a COPC if concentrations exceeded the calculated acceptable risk for a hypothetical residential exposure scenario.
[b]Identified as a COPC if concentrations exceeded an ecological benchmark or threshold.
[c]Screened out as a COPC in the original BLRA through evaluation of ground water ingestion only; retained here for evaluation through inhalation pathway.
[d]HI = Hazard index
[e]RBC = Risk-based concentration
[f]HQ = Hazard quotient

complete at this time. Risks associated with ground water at the site will continue to be acceptable in the future as long as no significant changes in ground water use occur. Because institutional controls on site ground water are in place and are likely to continue, current and future human health risks are acceptable.

2.4.2 Ecological Risk

Ecological risk assessments evaluate the likelihood that adverse ecological effects are occurring or might occur as a result of exposure to a physical, chemical, or biological entity. Section 6.2 and Appendix I of the SOWP (DOE 1999b) describe the collection and evaluation of information from surface water, sediment, and vegetation to determine risks to the environment. Samples were collected from the plume area and from a reference area located in an ecologically similar environment about 3 miles (5 km) east (upgradient) along the Colorado River.

Results of this sampling indicate generally low levels of a few COPCs in sediment, surface water, and plant tissues. Some residual levels of millsite-related constituents still remain in ponded areas along the Colorado River that receive little or no regular surface water flushing. Nearly all the data indicate no significant differences between the Grand Junction site and the reference area for concentrations of COPCs in biotic and abiotic media. Because isolated maximum values for some constituents exceeded threshold values, the following were retained as COPCs: ammonia in surface water, uranium in surface water, vanadium in surface water, vanadium in reed canarygrass stems, manganese in cattail stems, and molybdenum in cattail stems. Due to the isolated nature of the few elevated occurrences of these COPCs, the Grand Junction site as a whole does not represent an unacceptable ecological risk. Table 2 lists the COPCs discussed in the BLRA (DOE 1995) and presents a summary of the rationale for retaining them in or deleting them as COPCs in the 1998 update.

2.5 Compliance Strategy Selection

The fifth and final step in the decision process is the final selection of an appropriate compliance strategy to meet the EPA ground water protection standards. The selected strategy is no remediation and application of supplemental standards based on the criterion of limited use ground water (40 CFR 192.21[g]). Ground water in the uppermost aquifer is not a current or potential source of drinking water because “widespread, ambient contamination not due to activities involving residual radioactive materials from a designated processing site exists that cannot be cleaned up using treatment methods reasonably employed in public water systems…” (40 CFR 192.11[e][2]).

2.6 Implementation

2.6.1 Institutional Controls

Institutional Controls (ICs) are not required by regulation for any site with an approved supplemental standards compliance strategy. As a best management practice, DOE and the Colorado Department of Public Health and Environment (CDPHE) included ground water restrictions to the deed for the millsite transfer to the City of Grand Junction. The City of Grand Junction has an ordinance in place restricting access to ground water for domestic purposes which serves as an IC for off-site users. In addition, DOE has committed to monitor the established ICs for a minimum of 25 years to ensure that the mechanisms in place are not compromised.

On-Site Controls

The State of Colorado, through CDPHE (the Grantor), transferred the Climax millsite property to the City of Grand Junction (the Grantee) via two quitclaim deeds recorded in the Mesa County Courthouse on March 29, 1997 in Book 2320, pages 882 to 886. As a covenant in the deed, the City agrees "not to use ground water from the site for any purpose, and not to construct wells or any means of exposing ground water on the property unless prior written approval is given by the Grantor and U. S. Department of Energy." This restriction will follow with any deed transfer to ensure that on-site controls are maintained.

Off-Site Controls

The ground water contaminant plume lies entirely within the city limits (Figure 2). In July 1989, the Grand Junction City Council passed Ordinance 2432 as part of the Grand Junction Zoning and Development Code, which applies to all areas within the city limits. Section 5-4-4 of this Ordinance refers to Potable Water Systems. Paragraph B states "All developments shall be served by the City water treatment and distribution system, unless such requirement is deemed unreasonable or impracticable, as determined by the Utilities Director. All water lines shall be designed to connect to each parcel, as set forth in the previous sentence, with City mains in accordance with applicable engineering standards, unless exempted by the Utilities Manager." Discussions with the Utilities Manager in April 1998 established that city water lines service all potential properties within the ICs boundary thereby eliminating any need to provide relief from the Ordinance.

To determine that there were no users of the ground water prior to passage of the Ordinance, inquiries to the Colorado State Engineer's Office regarding domestic well permits were made and uncovered no record of domestic well permits. Searches of the City of Grand Junction water service records showed no evidence of domestic water use from wells within the affected area. In addition, visual inspections of the area in question were conducted and approximately 40 percent of the landowners within the plume boundary were contacted. There is no evidence of any users prior to passage of Ordinance 2432.

Monitoring for ICs

Verification of ICs with the State of Colorado Engineer's Office, the Grand Junction City Engineering Department, and the local office of the State of Colorado Water Quality Division will be conducted annually for 5 years to ensure continued protection of human health and the environment. If no changes are found or if no issues arise that might compromise established ICs, contacts will subsequently be made every 5 years for the following 20 years. These activities will be conducted through the Long-Term Surveillance and Maintenance Program and will be documented on telephone logs sent to the UMTRA Ground Water Project file for the Grand Junction site.

2.6.2 Public Involvement Plan

DOE prepared a *Public Involvement Plan for the Environmental Assessment of Ground Water Compliance at the Grand Junction, Colorado, Uranium Mill Tailings Site* (PIP) (DOE 1999c). The plan describes the history of the UMTRA Project legislation and scope, a brief history of the Climax mill, Phase I (surface remedial action) at the site, the reasons for soliciting public involvement, and a summary of results from information gathered for this study. It also describes the types of public responses that were recorded at the public meeting conducted June 22, 1995. The public comments received at the meeting are included in Volume II of the PEIS (DOE 1996).

A public meeting was conducted March 15, 1999 with the Grand Junction city council, U.S. Fish and Wildlife Service, other representatives from the city and county, the State Engineer's Office, CDPHE, and the public (see Table 3). A presentation included information gathered for this study, risks to human health and the ecology, and the supplemental standards compliance strategy based on the classification of limited use ground water. The purpose of the meeting was to inform the public about decisions that affect the community and to solicit comments for consideration during planning of the final compliance strategy.

The PIP also provides a schedule for producing the EA, the Finding of No Significant Impact, and any meetings with stakeholders deemed necessary during this process (see Table 4). These documents are planned for completion in fiscal year 1999.

Table 3. Public Participation Activities To Be Conducted Before Completion of the Environmental Assessment, SOWP, and Compliance Strategy

Activity	Scheduled Date
Send letter describing the proposed compliance strategy to: City Council County Commissioners Planning Commission State Engineer's Office	February 19, 1999
Send letter to adjacent property owners	February 26, 1999
Make presentation to City Council during regularly scheduled meeting. (D. Metzler, DOE-GJO[a])	March 15, 1999
Press releases (as needed)	
Publish public notice in the Daily Sentinel twice a week for two months before issuing the Finding of No Significant Impact (FONSI)	July 15, 1999
Public meeting	To Be Determined

[a]GJO = Grand Junction Office

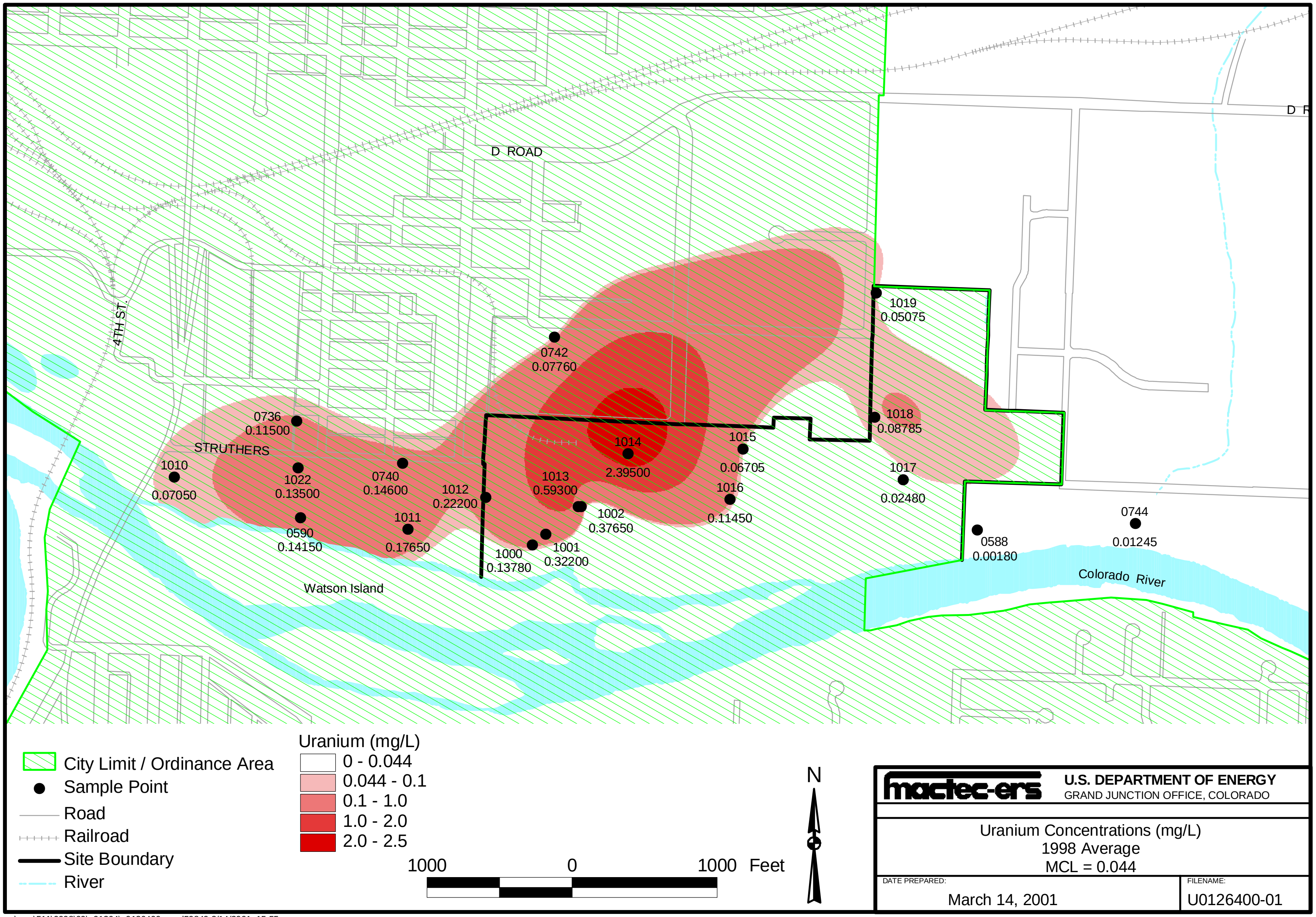

Figure 2. Ground Water Contaminant Plume

Table 4. Scheduled Public Participation Activities for Preparing the Environmental Assessment of Ground Water Compliance at the Grand Junction UMTRA Project Site

Activities	Scheduled Date
Review of draft Environmental Assessment by the State of Colorado	April 1999
Notification of Environmental Assessment availability: • News Release • Federal Register notice (not required)	May 1999
Transmit draft Environmental Assessment to interested stakeholders, other agencies, public (upon request)	June 1999
Place copies of Environmental Assessment in public locations: • Mesa County Library • DOE-GJO[a] Reading Room • Other	June 1999
Hold public meetings	As Needed
Comments received from stakeholders	through July 1999
Comments addressed	July 1999
News release of Finding of No Significant Impact (FONSI) approval	August 1999
Final Environmental Assessment and Finding of No Significant Impact issued to the public, stakeholders, and agencies	September 1999
Place copies of Environmental Assessment in public locations: • Mesa County Library • DOE-GJO Reading Room • Other	September 1999

[a]GJO = Grand Junction Office

3.0 References

Butler, D.L., G.W. Winfield, D.A. Hahn, P. Krueger, and B.C. Osmundson, 1994. *Physical, Chemical, and Biological Data for Detailed Study of Irrigation Drainage in the Uncompahgre Project Area and in the Grand Valley, West-Central Colorado, 1991–1992*, U.S. Geological Survey Open-File Report 94-110, Denver.

Levinson, A.A., 1980. *Introduction to Exploration Geochemistry*, Applied Publishing Ltd., Wilmette, Illinois.

Lohman, S.W., 1965. *Geology and Artesian Water Supply, Grand Junction Area, Colorado*, U.S. Geological Survey Professional Paper 451.

U.S. Department of Energy, 1991. *Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site at Grand Junction, Colorado*, UMTRA-DOE-AL-050505, September.

———, 1995. *Baseline Risk Assessment of Ground Water Contamination at the Uranium Mill Tailings Site at Grand Junction, Colorado*, DOE/AL/62350–104, Rev. 2, prepared by the U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, September.

U.S. Department of Energy, 1996. *Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Ground Water Project*, DOE/EIS–0198, prepared by the U.S. Department of Energy, UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, October.

———, 1999a. *Environmental Assessment of Ground-Water Compliance Activities at the Uranium Mills Tailings Site, Grand Junction, Colorado,* prepared for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, in press.

———, 1999b. *Final Site Observational Work Plan for the UMTRA Projects site at Grand Junction, Colorado*, GJO-99-86-TAR, prepared by MACTEC Environmental Restoration Services, LLC, for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, February.

———, 1999c. *Public Involvement Plan for the Environmental Assessment of Ground Water Compliance at the Grand Junction, Colorado, Uranium Mill Tailings Site*, prepared by MACTEC Environmental Restoration Services, LLC, for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, February.

U.S. Environmental Protection Agency, 1988. *Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy*, Office of Ground Water Protection, Washington, D.C., June

U.S. Geological Survey, 1997. *Methods To Identify Areas Susceptible to Irrigation-Induced Selenium Contamination in the Western United States*, Fact Sheet FS-038-97, National Irrigation Water Quality Program, U.S. Government Printing Office, Washington, D.C.