
**Title 40 CFR Part 191
Subparts B and C
Compliance Recertification
Application
for the
Waste Isolation Pilot Plant
Consideration of Underground
Sources of Drinking Water
(40 CFR § 194.53)**



**United States Department of Energy
Waste Isolation Pilot Plant**

**Carlsbad Field Office
Carlsbad, New Mexico**

**Consideration of Underground
Sources of Drinking Water
(40 CFR § 194.53)**

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Acronyms and Abbreviations

CARD	Compliance Application Review Document
CCA	Compliance Certification Application
CRA	Compliance Recertification Application
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
l	liters
MCL	maximum contamination level
mg/L	milligrams per liter
ppm	parts per million
TDS	total dissolved solids
USDW	Underground Source of Drinking Water
WIPP	Waste Isolation Pilot Plant

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53.0 Consideration of Underground Sources of Drinking Water (40 CFR § 194.53)

53.1 Requirements

§194.53 Consideration of Underground Sources of Drinking Water

In compliance assessments that analyze compliance with part 191, subpart C of this chapter, all underground sources of drinking water in the accessible environment that are expected to be affected by the disposal system over the regulatory time frame shall be considered. In determining whether underground sources of drinking water are expected to be affected by the disposal system, underground interconnections among bodies of surface water, groundwater, and underground sources of drinking water shall be considered.

53.2 Background

40 CFR § 194.53 (U.S. Environmental Protection Agency 1996) requires the U.S. Department of Energy (DOE) to consider, in compliance assessments, underground sources of drinking water (USDWs) near the Waste Isolation Pilot Plant (WIPP) and their interconnections. A USDW is defined in 40 CFR §191.22 (2000) as “an aquifer or its portion that supplies a public water system, or contains a sufficient quantity of ground water to do so and (i) currently supplies drinking water for human consumption or (ii) contains fewer than 10,000 milligrams per liter (mg/L) of total dissolved solids.” The groundwater protection requirements limit releases to the maximum contamination level (MCL) established in the Safe Drinking Water Act Regulations at 40 CFR Part 141 (2003) as they existed on January 19, 1994.

53.3 1998 Certification Decision

The Compliance Certification Application (CCA) (U.S. Department of Energy 1996), Chapter 8.0, discusses the assumptions and approaches used to consider USDWs and the uncertainty associated with the analyses. The DOE provided detailed information on the location and nature of the USDWs, indicated the estimated concentrations of radionuclides in a hypothetical USDW in the accessible environment, and showed that the MCLs for radionuclides will not be exceeded during the regulatory time period.

In the CCA, the DOE presented an evaluation of the USDWs near the WIPP that could potentially be affected by the disposal system over the regulatory time frame. This information was included in the CCA, Chapter 8.0, Section 8.2, and Appendix USDW, Section USDW.3. Based on the definitions in section 191.22, the DOE identified three subcriteria to determine whether a water-bearing horizon located within the WIPP-controlled area would qualify as a USDW:

1. A minimum pumping rate of five gallons per minute (gpm)
2. A supply of water at a rate of five gpm for a 40-year period
3. A maximum of 10,000 mg/L (10,000 parts per million [ppm]) of total dissolved solids (TDS)

1 These requirements characterize the capacity and quality of a public water system. A public
2 water system is defined in section 191.22 as a system providing piped water for human
3 consumption to 25 individuals, or one that has at least 15 service connections.

4 Applying these criteria, the DOE identified the Culebra Dolomite Member of the Rustler
5 Formation (hereafter referred to as Culebra), the Dewey Lake Formation, and the Santa Rosa
6 Formation as potential USDWs. The DOE conducted a bounding analysis of the contaminants'
7 concentrations to assess compliance with 40 CFR Part 191, Subpart C. In this analysis, the DOE
8 assumed 10,000 ppm TDS, which is much less than the observed concentration of brine derived
9 from the Salado anhydrite marker beds. A USDW was also assumed to be present at and beyond
10 the WIPP Land Withdrawal Boundary. The DOE indicated in the CCA, Chapter 8.0, Section
11 8.3, that the bounding analysis showed that the resulting radionuclide concentrations in the
12 USDWs would be less than half the maximum limit specified in Part 141 (the U.S.
13 Environmental Protection Agency's [EPA's] National Primary Drinking Water Standards), and
14 the dose to a receptor drinking from the USDW would be a factor of 10 less than the individual
15 protection standard.

16 The DOE believed the assumption that all contaminants reaching the accessible environment are
17 directly available to the receptor is not realistic but conservative, because this results in
18 overestimating potential doses to an individual. The DOE's findings indicated that even with
19 this conservative approach, the estimated potential dose to an individual was below the Part 191
20 requirements. The CCA analysis also assumed that all contaminants reaching the accessible
21 environment were directly available to the receptor so that the interconnections of surface,
22 ground, and underground drinking water were all considered and treated as a single source.

23 The EPA examined the DOE's approach and assumptions associated with the USDW
24 determination in the CCA. The EPA found the analyses to be well supported and accurate,
25 including the uncertainty associated with these analyses. In addition, the EPA assessed all
26 possible aquifers to determine how USDWs were identified and discussed in the CCA. The EPA
27 also examined whether the flow rates and directions were included in the description. The
28 modeling assumptions and specifications for the bounding analysis were examined to assess
29 reliability and assurance of safety. The EPA reviewed the estimated concentrations of
30 radionuclides to determine if they complied with the groundwater protection standard (see the
31 CCA Compliance Application Review Document [CARD] 53, U.S. Environmental Protection
32 Agency 1998, for details of the EPA's CCA review).

33 The EPA found that the DOE's determination of the USDWs was in accordance with definitions
34 contained in section 191.22 and with the compliance criteria in section 194.53. The bounding
35 analysis was performed with conservative assumptions for a hypothetical USDW to estimate
36 contamination and potential doses to a receptor.

37 A complete description of the EPA's 1998 Certification Decision for section 194.53 is provided
38 in EPA CARD 53 (U.S. Environmental Protection Agency 1998).

1 **53.4 Changes in the CRA-2004**

2 In the 2004 Compliance Recertification Application (CRA-2004) (U.S. Department of Energy
3 2004), Chapter 8.0, the DOE updated some aspects of the USDW analysis. The DOE updated
4 the data for groundwater quantity determination to define a USDW. In the CCA, the DOE used
5 1990 census data to determine the average water usage per person per day of 282 gallons (1067
6 L). In the CRA-2004, the DOE used 2000 census data to determine that the average water usage
7 per person per day had increased to 305 gallons (1154 L). The DOE did not believe it was
8 necessary to change the subcriterion of a 5 gpm rate of production from a well to define a USDW
9 (see the CRA-2004, Chapter 8.0, Section 8.2.1.1).

10 The DOE monitored and evaluated new wells drilled in the area since the completion of the
11 CCA. A new well, C-2737, was drilled to replace H-1 in 2001. Water sampled from the Dewey
12 Lake Formation showed 2,590 ppm TDS. Additional wells were drilled at the WIPP site to
13 investigate the extent of groundwater at the contact of the Santa Rosa and Dewey Lake
14 Formations. The groundwater samples indicate TDS at both below and above 10,000 ppm TDS.
15 The DOE was unable to pump water from any one of these boreholes at a rate of 5 gpm or more.

16 The updates and changes made by the DOE in the CRA-2004 did not significantly impact the
17 conclusions regarding USDWs in the CCA. In the CRA-2004, the DOE continued to identify the
18 Culebra, Dewey Lake, and Santa Rosa as the only potential USDWs. The DOE stated that the
19 conservative bounding analysis used for the 1998 Certification Decision compliance assessment
20 was still applicable (see the CRA-2004, Chapter 8.0, Section 8.2.1.1).

21 **53.5 EPA's Evaluation of Compliance for the 2004 Recertification**

22 The EPA evaluated the information on the USDWs contained in the CRA-2004, Chapter 8.0 and
23 examined data from the new wells drilled within the study area since the 1998 Certification
24 Decision. The EPA determined that the DOE applied adequately conservative assumptions to
25 the data for a hypothetical USDW to determine compliance with section 194.53.

26 Because of the lack of significant changes to the parameters for the protected individual, the
27 potential exposure pathways, and the USDWs, the EPA agreed that the bounding analysis
28 performed for the dose calculation in the CCA still applied. See CRA-2004 CARD 55 (U.S.
29 Environmental Protection Agency 2006) for more information on the results of the compliance
30 assessment.

31 The EPA received no public comments on the DOE's continued compliance with the
32 consideration of USDW requirements in section 194.53.

33 Based on a review and evaluation of the CRA-2004 and supplemental information provided by
34 the DOE, the EPA determined that the DOE continued to comply with the requirements of
35 section 194.53.

1 **53.6 Changes or New Information Since the 2004 Recertification**

2 In support of the CRA-2009, the DOE has reviewed and updated information provided in the
3 CCA and the CRA-2004, Chapter 8.0, Individual and Groundwater Protection Requirements.
4 The updated material is provided as Appendix IGP-2009. Changes or new information
5 pertaining to the update are as follows:

- 6 1. Updated information regarding average household water consumption in communities near
7 the WIPP has been obtained from the New Mexico Office of the State Engineer to assess the
8 continued appropriateness of criteria for making USDW determinations. The updated
9 information is included in Appendix IGP-2009, Section IGP-3.1.1. A review of these new
10 data indicates that no change in the criteria for making USDW determinations is warranted.
- 11 2. Several new boreholes have been drilled near the WIPP since the CRA-2004. These include
12 wells to further characterize flow characteristics in the Culebra and to better understand
13 shallow groundwater flow near the WIPP salt storage piles. Detail regarding these new wells
14 is included in Appendix IGP-2009, Section IGP-3.2. Data from these wells indicate that no
15 changes to the previous USDW determinations are warranted.
- 16 3. Based on the review of available data in support of the CRA-2009, the DOE concludes that
17 no modification of the USDW determinations reported in the CCA, Chapter 8.0 and
18 Appendix USDW is warranted (see Appendix IGP-2009, Section IGP-3.2). The DOE
19 continues to conclude that USDWs are present in the Culebra, and potential USDWs are
20 present in the Dewey Lake and the Santa Rosa. Based on this, the DOE concludes that all
21 USDWs in the accessible environment expected to be affected by the disposal system over
22 the regulatory time frame have been considered. In addition, the DOE approach ensures that
23 underground interconnections among bodies of surface water, groundwater, and USDWs are
24 considered.

25 Based on these considerations, the DOE believes that continued compliance with the provisions
26 of section 194.53 is demonstrated.

27 **53.7 References**

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