



AURS-led partnership with B&W and AREVA

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INTER-OFFICE CORRESPONDENCE

DATE: February 12, 2013
FROM: J. Calicoat *J. Calicoat* LOCATION: EPA Compliance Programs
TO: Memo to File LOCATION: Regulatory Environmental Services
SUBJECT: CASTILE BRINE ENCOUNTERS 2012

Some of the human intrusion scenarios evaluated in the WIPP Performance Assessment include the assumption that a borehole results in the establishment of a flow path between the repository and a pressurized brine pocket that could be located beneath the repository in the Castile Formation. As documented in the 1996 Compliance Certification Application a survey was performed to determine the number of Castile brine encounters in the vicinity of the WIPP Site. A thorough search of the records on file at the New Mexico Oil Conservation Division offices resulted in the identification of 27 Castile Formation brine encounters during drilling.

The locations of these 27 Castile Formation brine occurrences were used to identify the map area to be used in the analysis. The goal was to calculate the probability of a Castile Formation brine encounter as a function of the number of boreholes drilled. This area was made as small as practical to minimize the number of boreholes for which there is no report of a brine encounter thereby maximizing the probability. Figure 1 shows the area used to calculate the probability of a brine encounter. This same area was used to calculate the current probability of a brine encounter. Table 1 shows the original 27 Castile Formation brine encounters plus seven additional encounters that have been reported since the original study was performed. There have been no new Castile brine encounters identified since the CRA-2009

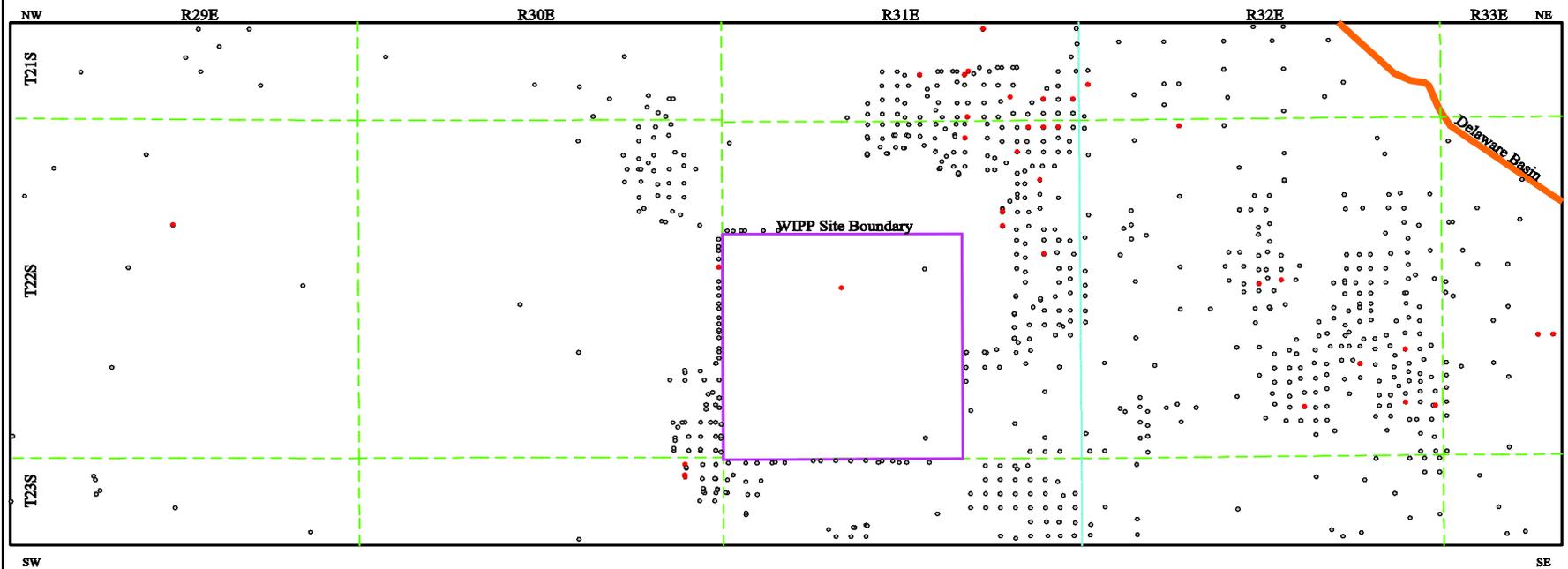
In the 1996 CCA the probability for encountering a Castile brine reservoir was calculated at 8% with 27 hits out of 345 possibilities. In the Performance Assessment Verification Test (PAVT), the EPA mandated a range of 1% to 60%. The higher values did not significantly influence the predicted performance of the repository. The CRA-2004 continued to use the higher values and the probability for encountering a Castile brine reservoir was not calculated. The CRA-2009 used the higher values from the PAVT; however, due to the increased drilling in the area it was necessary to see if the original value was still good. The same parameters were used and the rate was calculated at 5% with 34 Castile Formation brine encounters out of 678 possibilities. The CRA-2014 will continue to use the higher values from the PAVT. In order to validate the original value, a new probability calculation was performed for the CRA-2014. The same parameters were used and the current probability was calculated at 4.5% with 34 Castile Formation brine encounters out of 762 possibilities. This is a reduction of 3.5% over the last sixteen years.

JC:dg

Table 1: Castile Brine Encounters in the Vicinity of the WIPP Site

#	Location	Well Name and No.	Spud Date	Status	Well Information
Original CCA-related Castile Brine Encounters - 1896 Through June 1995					
1	21S-31E-26	Federal #1	10/31/1979	P&A	Identified as encountering Castile Brine.
2	21S-31E-35	ERDA-6	6/13/1975	P&A	Identified as encountering Castile Brine.
3	21S-31E-35	Federal "FT" #1	9/25/1981	P&A	Identified as encountering Castile Brine.
4	21S-31E-36	Lost Tank "AIS" State #1	12/7/1991	Oil Well	Identified as encountering Castile Brine.
5	21S-31E-36	Lost Tank "AIS" State #4	11/19/1991	Oil Well	Identified as encountering Castile Brine.
6	21S-32E-31	Lost Tank SWD #1	11/12/1991	SWD	Identified as encountering Castile Brine.
7	22S-29E-09	Danford Permit #1	5/18/1937	P&A	Identified as encountering Castile Brine.
8	22S-31E-01	Unocal "AHU" Federal #1	4/2/1991	Oil Well	Identified as encountering Castile Brine.
9	22S-31E-01	Molly State #1	9/25/1991	Oil Well	Identified as encountering Castile Brine.
10	22S-31E-01	Molly State #3	10/20/1991	Oil Well	Identified as encountering Castile Brine.
11	22S-31E-02	State "2" #3	11/28/1991	Oil Well	Identified as encountering Castile Brine.
12	22S-31E-11	Martha "AIK" Federal #3	5/6/1991	Oil Well	Identified as encountering Castile Brine.
13	22S-31E-11	Martha "AIK" Federal #4	9/2/1991	Oil Well	Identified as encountering Castile Brine.
14	22S-31E-12	Federal "12" #8	3/28/1992	Oil Well	Identified as encountering Castile Brine.
15	22S-31E-13	Neff "13" Federal #5	2/4/1991	Oil Well	Identified as encountering Castile Brine.
16	22S-31E-17	WIPP-12	11/17/1978	Monitoring	Identified as encountering Castile Brine.
17	22S-32E-05	Bilbrey "5" Federal #1	11/26/1981	Oil Well	Identified as encountering Castile Brine.
18	22S-32E-15	Lechuza Federal #4	12/29/1992	Oil Well	Identified as encountering Castile Brine.
19	22S-32E-16	Kiwi "AKX" State #1	4/28/1992	Oil Well	Identified as encountering Castile Brine.
20	22S-32E-25	Covington "A" Federal #1	2/7/1975	Oil Well	Identified as encountering Castile Brine.
21	22S-32E-26	Culberson #1	12/15/1944	P&A	Identified as encountering Castile Brine.
22	22S-32E-34	Red Tank "34" Federal #1	9/23/1992	Oil Well	Identified as encountering Castile Brine.
23	22S-32E-36	Richardson State #1	7/20/1962	P&A	Identified as encountering Castile Brine.
24	22S-32E-36	Shell State #1	2/22/1964	Oil Well	Identified as encountering Castile Brine.
25	22S-33E-20	Cloyd Permit #1	9/7/1937	P&A	Identified as encountering Castile Brine.
26	22S-33E-20	Cloyd Permit #2	6/22/1938	P&A	Identified as encountering Castile Brine.
27	23S-30E-01	Hudson Federal #1	2/25/1974	SWD	Identified as encountering Castile Brine.
Castile Brine Encounters Since July 1995					
1	21S-31E-35	Lost Tank "35" State #4	09/11/2000	Oil Well	Estimated several hundred barrels per hour. Continued drilling.
2	21S-31E-35	Lost Tank "35" State #16	2/6/2002	Oil Well	At 2,705 ft., encountered 1,000 barrels per hour. Shut-in to get room in reserve pit with pressure of 180 psi and water flow of 450 B/H. Two days later no water flow and full returns.
3	22S-31E-02	Graham "AKB" State #8	4/12/2002	Oil Well	Estimated 105 barrels per hour. Continued drilling
4	23S-30E-01	James Ranch Unit #63	12/23/1999	Oil Well	Sulfur water encountered at 2,900 ft. 35 ppm was reported but quickly dissipated to 3 ppm in a matter of minutes. Continued drilling.
5	23S-30E-01	Hudson "1" Federal #7	1/6/2001	Oil Well	Estimated initial flow at 400 to 500 barrels per hour with a total volume of 600 to 800 barrels. Continued drilling.
6	22S-30E-13	Apache "13" Federal "3	11/26/2003	Oil Well	Encountered strong water flow with blowing air at 2,850-3,315 ft. No impact on drilling process.
7	21S-31E-34	Jacque "AQJ" State #7	3/4/2005	Oil Well	Encountered water flow of 104 barrel per hour at 2,900 ft. No impact on drilling process.

Castile Brine Encounters Through 2012



Note 1: The original map area was selected to encompass the locations of all 27 Castile brine occurrences.

Note 2: The four corners of this map are defined in State Plane Coordinates, New Mexico East, 1927 NAD as:

SW Corner X=594,000 Y=480,000
NW Corner X=594,000 Y=529,000
NE Corner X=731,000 Y=529,000
SE Corner X=731,000 Y=480,000

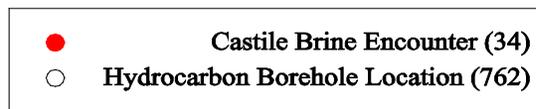


Figure 1