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Nuclear Waste Partnership LLC

A URS-led partnership with B&W and AREVA

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INTER-OFFICE CORRESPONDENCE

DATE: February 13, 2013

FROM: J. Callicoat LOCATION: EPA Compliance Programs

TO: Memo to File LOCATION: Regulatory Environmental Services

SUBJECT: SEISMIC ACTIVITY WITHIN THE DELAWARE BASIN 2012

The U.S. Department of Energy (DOE) has screened out, on the basis of probability and/or consequence, all tectonic, magmatic, and structural related processes. Tectonic activity was used as the siting criterion for the purposes of determining seismic design parameters for the facility. The intent was to avoid tectonic conditions such as faulting and igneous activity that would affect waste isolation over the long term performance period of the Waste Isolation Pilot Plant (WIPP) and to anticipate how earthquake size and frequency could impact facility design and operations.

The purpose of the continuation of seismic monitoring is to build a basis from which to trend ground motions that the WIPP repository may be subjected to in the near and long term performance period of the WIPP. The concern about seismic effects during the operational period pertains mainly to the design requirements for surface structures for providing containment during seismic events. The concern about effects occurring over the long term, after the repository has been decommissioned and sealed, pertains more to faulting within the repository and possible effects of faulting on the integrity of the salt beds and/or shaft seals.

Seismic monitoring data are divided into two categories, pre and post-instrumentation. Seismic data for New Mexico, prior to 1962, is derived from reports of earthquake effects on people, structures, and surface features. Since 1962, seismograph coverage for New Mexico has become comprehensive enough to locate earthquake epicenters in the region. The number of recorded events increased since that time. In the early 1990s, to provide increased coverage in the vicinity of the WIPP Site, the New Mexico Institute of Mining and Technology (NMIMT) installed a network of seven seismograph stations in southeastern New Mexico. This further increased the number of seismic events recorded in the area.

The NMIMT generate comprehensive catalogs that incorporate new algorithms for locating the epicenter and defining the magnitude of seismic events. The NMIMT reviewed old catalogs and regenerated the information incorporating the new algorithms. The Delaware Basin Drilling Surveillance Program (DBDSP) tracks seismic events occurring within 300 km (187 mi) of the WIPP Site. In 2007, the DBDSP completed the update of the seismic database incorporating changes and adding events that were not previously identified within this area.

Starting in January 1997, a large number of seismic events were recorded originating from an area known as Dagger Draw, northwest of Carlsbad, New Mexico, near the Dagger Draw gas field, which suggests that they may be induced by man-made activities. In 2003, to further define what was occurring in this area, two more seismograph stations were added to the array, both located in the vicinity of Dagger Draw. This also allowed for the recording of lower magnitude events in the area. The number of recorded events increased dramatically in this area until peaking in 2004.

During the 2009 Compliance Recertification Application (CRA-2009) monitoring period (Oct 2002 thru Sept 2007) there were 703 seismic events recorded within approximately 300 kilometers of the WIPP Site. Fully 85% of the recorded events occurred in the Dagger Draw area of Eddy County. Approximately 50% of the events that occurred in the Dagger Draw area were detected by the two recorders installed in that vicinity.

During the 2014 Compliance Recertification Application (CRA-2014) monitoring period (Oct 2007 thru Dec 2012) there were 543 seismic events recorded within approximately 300 km (187 mi) of the WIPP Site. One notable seismic event occurred on March 18, 2012 with a magnitude of 2.4. This seismic event was associated with a potash mine roof fall which caused cracks and subsidence of the surface 335 to 366 meters (1,100 to 1,200 ft.) above the collapsed area. This seismic event occurred 14 km (9 mi) southwest of the WIPP Site.

Although the DBDSP collects information on areas outside of the Delaware Basin, such as Dagger Draw, the Delaware Basin is used as the defining area for data collection and input into PA. Table 1, Seismic Events in the Delaware Basin, shows the number of recorded events that have occurred within the Delaware Basin.

Earthquake catalogs are usually divided into categories according to the magnitude registered for each event. Most catalogs have a section detailing seismic events with a magnitude greater than 3.0 because this is the point at which most seismic events can be felt. Below this range most events are very seldom or barely felt. Figure 1 shows the location of 62 seismic events within 240 km (150 mi) of the WIPP Site that have had a reported magnitude greater than 3.0 from July 1926 through December 2012. Of these 62 events only four have occurred in the Delaware Basin.

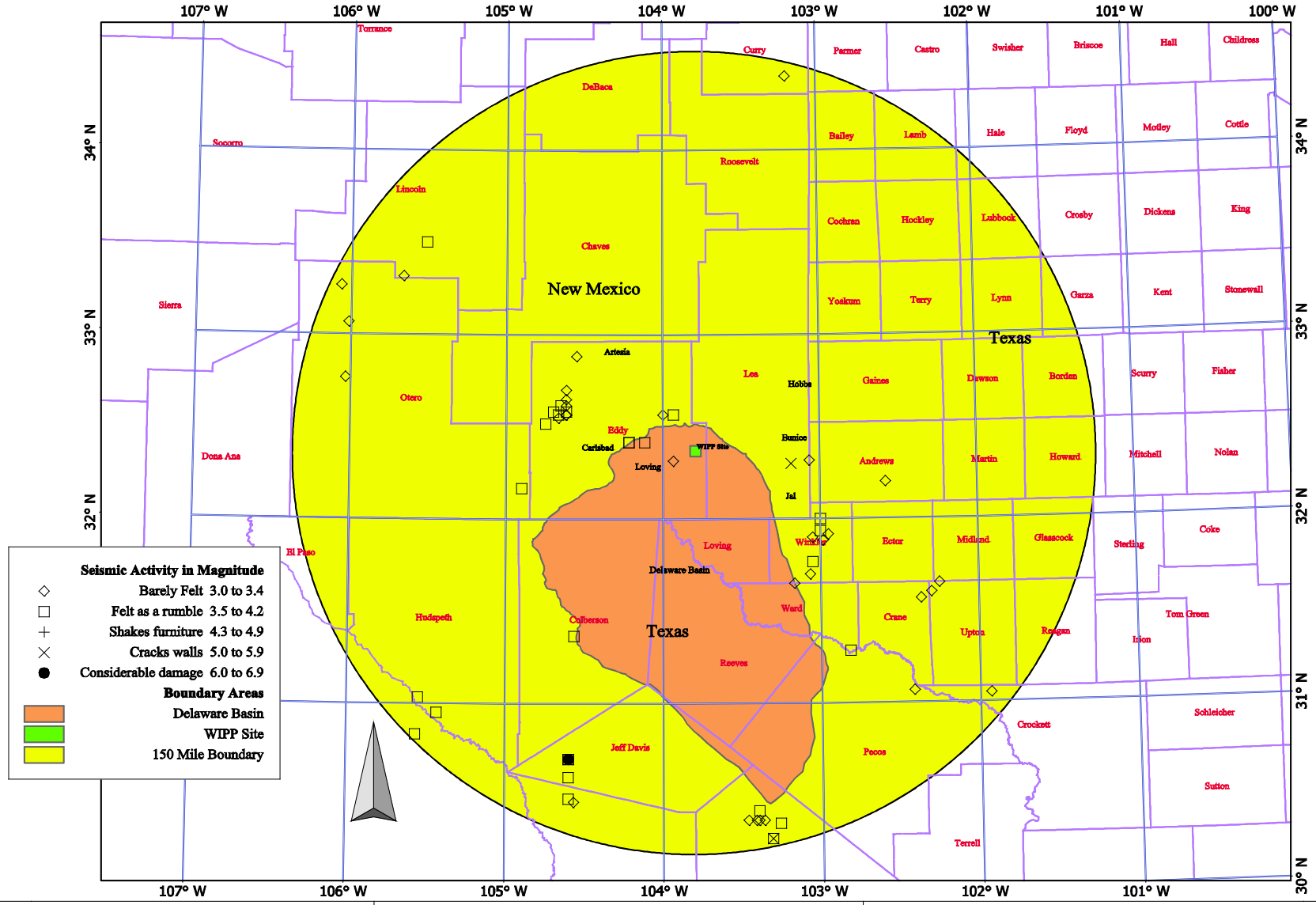
Table 1: Seismic Activity in the Delaware Basin through December 2012

County	No. of Events	Earliest Event	Latest Event	Smallest Magnitude	Largest Magnitude
Culberson	15	10/27/1992	6/28/2007	1.1	2.4
Eddy	19	11/28/1975	3/18/2012	-1.3	3.7
Lea	1	6/23/1993	6/23/1993	2.1	2.1
Loving	3	2/4/1976	4/28/1997	1.1	1.6
Pecos	19	1/30/1975	3/10/2010	1.0	2.6
Reeves	21	2/19/1976	10/9/2012	0.6	2.4
Ward	50	9/3/1976	7/1/2009	0.3	2.8
Winkler	9	9/24/1971	10/19/2007	0.0	3.0
TOTAL	137				

KEY:

Magnitude	
Less than 2	Very seldom ever felt
2.0 to 3.4	Barely felt
3.5 to 4.2	Felt as a rumble
4.3 to 4.9	Shakes furniture; can break dishes
5.0 to 5.9	Dislodges heavy objects; cracks walls
6.0 to 6.9	Considerable damage to buildings
7.0 to 7.3	Major damage to buildings; breaks underground pipes
7.4 to 7.9	Great damage; destroys masonry and frame buildings
Above 8.0	Complete destruction; ground moves in waves

Seismic Activity Within 150 Miles of the WIPP Site through December 2012



Regulatory Environmental Services

0 150 mi

Delaware Basin Drilling Surveillance Program