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Memorandum

Nuclear Engineering & Nonproliferation Division
International Threat Reduction Group NEN-3
Off-Site Source Recovery Project (OSRP)

Subject: Characterization of CEA (French Atomic Energy Agency) Sources

This memo is being generated to describe the rationale behind 14 CEA sources that were recovered by the National Nuclear Security Agency Global Threat Reduction Initiative (GTRI) OSRP team at AEA Technology, ABB Inc., CPN Instrotek and Oak Ridge National laboratory (ORNL). These sources were recovered between 2004 and 2007.

In accordance with the defense determination memo, dated November 8, 2007 DOE/NNSA determined that WIPP can, on a limited basis, accept foreign origin sources that were currently in storage at Los Alamos National Laboratory (LANL) prior to November 8, 2007. This memo is attached with the defense determination check list. All 14 of the CEA sources were stored at LANL the time the defense determination was issued, and are eligible for disposal. The sources are packaged in 4 drums and are comingled with other US origin sources.

Sources recovered by OSRP are characterized for disposal using acceptable knowledge (AK). The derivation of the AK process is described in the OSRP peer review documents. A variety of AK is used to identify source activity and isotope. The AK documentation includes but is not limited to: source markings, device markings, source certificates, manufacture records, manufacture interviews or emails on rare occasions, regulatory authority records, etc. Of the 14 sources only 7 sources were marked with the appropriate AK. The other 7 sources were neither marked nor do we have documentation that is typically used for characterization.

With the exception of one source, all source recoveries were from US companies, licensed by the US NRC. The other source was recovered from ORNL. In all recoveries LANL and the source owners/licensees generated documentation that is required for the transfer of source ownership. The documents generated include the appropriate AK information. Additionally, OSRP notifies the state regulatory authority of the transfer of ownership of each source that is licensed under the NRC. The sources are identified to state authority by serial number, activity and quantity. The documents described above are official documents signed by both the licensee and the LANL OSRP project. Given the lack of the typical supporting documentation OSRP believes, on a limited basis, that these documents can be used as AK. In an effort to obtain additional information and documents an e-mail was sent to CEA with the list of sources. The CEA did verify the source activities and provided the manufacture dates for all but one of the sources.

OSRP complies with the requirement of reporting the 10 WIPP-tracked radionuclides and all other radionuclides that contribute to 95 % of the radioactive hazard within a container. The OSRP peer review describes the process for using AK in determining the isotopic composition for sealed sources offered for disposal by OSRP. Research was done on the industrial process of making radioactive sealed sources. From the data collected a statistical average for each of the reportable radionuclides was compiled for the major actinide (^{241}Am, ^{239}Pu & ^{238}Pu) industrial sealed sources. These average radionuclide composition fractions were incorporated into the OSRP data base which automatically calculates each radionuclide contribution. An effort was made to verify that the CEA sources are within the statistical limits of the OSRP characterization database. Unfortunately the CEA would not provide any isotopic data for the CEA produced Americium.

Although the CEA would not provide the data we believe that these can be characterized using the OSRP data base for the following reasons:

1) According to ORNL sales records over 750 grams of ^{241}Am was sold to the CEA from 1967 to 1979. Also, based on the source manufacture dates and information provided by a prior ORNL employee in the source manufacturing department, it is possible that some of these sources were manufactured with US origin Am or possibly a mixture.
2) Radioactive sealed sources are manufactured with a specific application in mind Examples are neutron output for moisture density gauges, well logging sources, level gauges, fill gauges, etc. Small variations in isotopic compositions can lead to undesirable results which is not acceptable in industry. Therefore, sealed radioactive sources are manufactured under strict QA/QC industrial standards.
3) 13 of the sources were recovered from US companies licensed in the US by the NRC.
4) An analysis of each drum indicates a total ^{241}Am activity (Ci) to be: 53, 44, 25 and 0.75. The activity contribution fraction of the foreign sources is 0.02, 0.017, 0.04 and .25 respectively. With the exception of one drum the fractional contribution to total activity is small. Although the one drum has a higher contribution of activity from the foreign sources that drum's total activity is very low compared to the other 3 drums.

In summary we believe the foreign sources offered up for disposal are manufactured in such a manner that any differences isotopic composition would be insignificant. Additionally, the small fraction of activity contribution in each drum indicates that it is a reasonable assumption to use the ORSP standard characterization technique.

The following table shows the 14 sources offered for disposal in the 4 drums:

Serial Number	Source Isotope	Activity (Ci)	Model Number	Manufacture Date	Markings	Country of Origin	Comments & Recovery Location
Drum # LA00000061593							
206, CEA	241AmBe	0.04	SNA2	Unknown	None		U.S.
675, CEA	241AmBe	0.04	SNA2	7/19/1985	None	France	U.S.
709, CEA	241AmBe	0.04	SNA2	1/31/1985	None	France	U.S.
761, CEA	241AmBe	0.04	SNA2	11/13/1986	None	France	U.S.
776,CEA	241AmBe	0.04	SNA2	7/1/1987	None	France	U.S.
802,CEA	241AmBe	0.04	SNA2	9/28/1987	None	France	U.S.
Drum # LA00000061572							
1317	Am241	0.30	AME3	3/13/1985	1317 AM241 300 mCi CEA 3/13/85	France	U.S.
1579	Am241	0.30	AME3	3/4/1988	1579 AM241 300 mCi CEA 3/4/88	France	U.S.
863	Am241	0.30	AME3B	1/8/1981	863 AM241 300 mCi CEA 1/8/81	France	U.S.
Drum # LA00000061587							
1414	Am241	0.30	AME.3	6/1/1986	CEA; AME3; 1414	France	U.S.
1417	Am241	0.30	AME.3	6/1/1986	CEA; AME3; 1417	France	U.S.
1423	Am241	0.31	AME.3	6/1/1986	CEA; AME3; 1423	France	U.S.
1427	Am241	0.30	AME.3	6/1/1986	CEA; AME3; 1427	France	U.S.
Drum # LA00000061636							
CEA SN3 93	Am241	1.00	unknown	<1971	SN3 93 CEA	France	U.S. CEA Catalogue 1984 (2BH01823)

*Red notation indicates additions by the CEA