

July 20, 1995

**TO: Paul Seligman**  
**THRU: Harry Pettengill**

**FROM: Elaine Gallin, EH-63**

**RE: SUMMARY OF STATUS OF PROJECT INDALO IN PALOMARES, SPAIN**

**Background**

- On January 17, 1966 during a refueling operation a US Air Force KC-135 tanker and a B-52 bomber carrying 4 thermonuclear devices collided.
- Three devices landed in Palomares, Spain a village of about 1,500 people and one device landed nearby in the Mediterranean.
- The high explosives in two devices detonated upon impact with land. While there was no nuclear yield and no one of the ground was injured, approximately 560 acres of predominantly agricultural land including the village of Palomares were contaminated with plutonium-239.
- Within days of the accident, a 10 cm surface layer of the most contaminated soil (1% of the entire area impacted by the accident) was removed. The remaining area was watered down and deep plowed.
- The Hall-Otera Agreement (Feb.1966) between the US and Spain provided the basis for technical and scientific assistance to Spain for radiological followup of Palomares residents and their environment. Responsibility was transferred to DOE in 1986.

**EH Activities:**

- Provide scientific/technical assistance and collaboration
- Ensure effective assessments and scientific validation of the consequences of radioactive contamination on health and the environment in the Palomares region of Spain.
- DOE participants have included scientists from LLNL and BNL
- ~\$300,000/yr or 20-25% of cost of project to the Spanish Center for Energy, Environment and Technology Research (CIEMAT) in the Ministry of Industry, Commerce and Tourism of Spain.

### Current Status:

- The contract supporting this project was closed by DOE in October 1993.
- There is no evidence that the health of the Palomares residents has been altered by the 1966 incident.
- Urinary analysis of Pu and Am is done on approximately 150 residents of Palomares annually. 55 people are considered to have suffered from detectable internal contamination.
- Future health monitoring of this small population is unlikely to provide new or useful scientific information.
- The Spanish government generally has kept a low profile on potential risk of ingestion/inhalation of actinides.
- An Implementing Arrangement and Annex which will continue DOE support of this work has been drafted (attachment). It is currently being reviewed at the State Department.

### Reasons for Continued Surveillance:

- Continued environmental surveillance may result in improvements in the methodologies used for dose assessment and may further our understanding of the environmental transport of actinides.
- Environmental surveillance suggests changes in the pattern of contamination. Plutonium levels at surface are rising due to migration to top from previously plowed area. Additionally, both increased agricultural activity in once remote areas, and migration of plutonium from the hillsides into agricultural valleys has occurred.
- The migrant agricultural workers (nonresidents of Palomares) who are probably most at risk from exposure to resuspended soil actinides are not being monitored.