

# memorandum

DATE: **OCT 27 1987**

REPLY TO  
ATTN OF: IE-12

SUBJECT: Project Indalo

TO: Joe Fitzgerald, EH-35  
Edward J. Vallario, EH-331.2  
Tom McGraw, DP-226.3

Several factors make it important that we meet to discuss DOE's position with respect to continued support for Project Indalo. In this regard, Department of State as well as the Spanish Junta have recently expressed concern on the status of this activity.

Accordingly, I suggest that we meet on November 2 at 2:30 pm in room 7A-029, Forrestal Building. I propose to invite a representative from State Department. I would appreciate your advising Billy Hill of my staff (Tel: 586-6777) if there is a problem with the timing.



Harold Jaffe, Director  
Office of International R&D Policy

cc: Neal Goldenberg, EH-32  
Mike Marelli, EH-33 ✓

Meeting 1/2/87

Correspondance Regarding Project INDALO

1. 10/27/87           Memo: Jaffe to Fitzgerald, Vallario, McCraw  
Request for meeting
2. 9/29/87            Letter: Richmond (ORNL) to Marelli  
Transmitting letter from Spain expressing concern for DOE  
funding
3. 9/18/87            FAX: Marelli to Hill  
Draft letter to Spain to buy time
4. 9/8/87             Memo: Oleszycki (GC-31) to Vallario  
Unable to give legal opinion
5. 8/19/87            Memo: Vallario to Edsall  
Request for a legal opinion on continued funding
6. 6/26/87            Memo: Vallario to Goldenburg  
Request for management attention to funding shortfall
7. 10/1/86            Memo: Spain to McCraw  
Request for FY '88, '89, and '90 funding (500K, 550K, and  
605K)

United States Government

Department of Energy

# memorandum

DATE: OCT 27 1987

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Harold Jaffe, Director  
Office of International R&D Policy

cc: Neal Goldenberg, EH-32  
Mike Marelli, EH-33 ✓

**OAK RIDGE NATIONAL LABORATORY**

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX X  
OAK RIDGE, TENNESSEE 37831

September 29, 1987

Mr. Michael Marelli  
Health Physics Branch  
Office of Nuclear Safety  
EH-331.2  
U.S. Department of Energy  
Washington, DC 20545

Dear Mr. Marelli:

Enclosed is a letter and proposal which I recently received from Dr. Emilo Iranzo from CIEMAT in Madrid. Emilo asked me to forward the information to the project officer in Washington.

Please note the last paragraph in Dr. Iranzo's letter. He is getting very concerned about the lack of commitment on the part of the USDOE.

Best personal regards.

Sincerely,



C. R. Richmond  
Associate Laboratory Director for  
Biomedical and Environmental Sciences

CRR:bpw

Enclosure

cc:wo/enc: E. Iranzo



MINISTERIO DE INDUSTRIA Y ENERGIA  
 CENTRO DE INVESTIGACIONES ENERGETICAS  
 MEDIOAMBIENTALES Y TECNOLOGICAS  
 (C. I. E. M. A. T.)

Madrid, September 1, 1987

Mr. M. Marelli  
 U S DOE

Dear Sir:

In order to integrate our funding requirements for contract DE-GIO1-82EP12126 (Indalo Project) with your budget cycles as it was suggested last year by Dr. Richmond, I am sending to you in detail our current estimated cost for the experimental and surveillance work to be carried out during the period February 1, 1988 to January 31, 1989 in relation to the Palomares accident.

Our estimation has been made on the basis of quantitative activities similar to the last year one's. The cost has been increased a 5% in relation with the cost of last year to take into consideration the 5% inflation in our country for this year.

In Table 1 have been detailed the cost for the analyses to be made. In Table 2 are included with some detail the cost of each item and the total cost of the Project for 1988. Total cost amount to 99,554 kpts. To day exchange rate for dollar is 123 pts, so the total cost amount to 889,382 \$.

In the 889,382 \$ are included the annual amortization for the measurement equipments sent free to us by the Department of Energy along the years. So, the cost of the Project for 1988, without the cost of equipment amortization, amount to 827,366 \$.

C I E M A T	Instituto P R Y M A
	U.O. MEDIO AMBIENTE RADIOLOGICO
	ENTRADA .....
	SALIDA ..... 82
	FECHA 1-9-87

....



MINISTERIO DE INDUSTRIA Y ENERGIA  
CENTRO DE INVESTIGACIONES ENERGETICAS  
MEDIOAMBIENTALES Y TECNOLOGICAS  
(C. I. E. M. A. T.)

...

Our funds requirements for 1988 amount to 550,000 \$.

We have not as yet received funding for the period February 1, 1987 to January 31, 1988 and the year is at it last quarter. Can you please check into the problem for us ?. I will appreciate any information about it.

Sincerely yours.

Fd. E. Iranzo  
Head of Indalo Project  
(DE-GI01-82EP12126)

TABLE 1. BUDGET OF INDALO PROJECT ANALYSES FOR 1988

ANALYSES	PERSONNEL men-hour	COSTS, kpts				TOTAL			
		PERSONNEL		OVERHEADS	SUPPLIES		MEASURE- MENTS. EQUIPMENT		
		SCIENTISTS	TECHNICIANS						
PEOPLE	No	SCIENTISTS	TECHNICIANS	SCIENTISTS	TECHNICIANS	OVERHEADS	SUPPLIES	MEASURE- MENTS. EQUIPMENT	TOTAL
Urine - Pu	180	225	576	534	757	1,937	266	750	4,234
Urine - Am	180	252	540	596	710	1,959	266	750	4,271
L.R.C.	100	100	100	238	137	563	30	309	1,277
Medical Survey	150	300	946	710	1,242	2,928	307	912	6,099
ENVIRONMENT									
Soil - Pu	100	120	175	284	231	773	364	137	1,789
Soil - Am	600	300	600	712	788	2,250	202	2,734	6,686
Air - Pu	156	195	624	464	819	1,925	423	426	4,057
Air - Am	80	112	320	266	420	1,029	218	219	2,152
Vegetación - Pu	90	108	329	256	433	1,034	208	124	2,055
Vegetación - Am	90	49	97	116	128	366	63	442	1,115
Animals - Pu	50	120	320	285	420	1,058	183	209	2,155
Animals - Am	50	70	250	167	329	744	183	209	1,632
Water - Pu	5	7	19	15	25	60	12	7	119
TOTAL	1,831	1,958	4,896	4,643	6,439	16,626	2,705	7,228	37,641

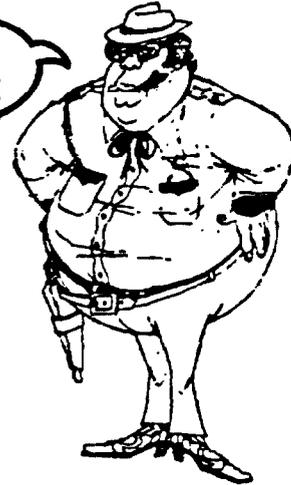
TABLE 2. INDALLO PROJECT BUDGET FOR 1988

C O N C E P T	C O S T S, kpts.				
	T O T A L	C O M P O N E N T S			
		P E R S O N N E L	O V E R H E A D S	S U P P L I E S	E Q U I P M E N T
PEOPLE Radiological Analyses Medical Survey	9,782 6,099	2,972 1,952	4,459 2,928	542 307	1,809 912
ENVIRONMENT Soil Analyses Air Analyses Vegetation Analyses Animal Analyses Water Analyses Soil Sampling Air Sampling Vegetation and Animals Sampling Other activities	8,475 6,209 3,170 3,787 119 386 1,140 1,400 821	2,015 1,969 933 1,201 40 150 274 547 329	3,023 2,954 1,400 1,802 60 225 411 821 492	566 641 271 366 12 11 55 32	2,871 645 566 418 7 400
MANAGEMENT, ADMINISTRATION, REPORTS, etc. 1 TS x 8; 1 TS x 2,7; 1 F x 0,9	39,845	15,938	23,907		
PALOMARES HOUSE AND EQUIPMENT MAINTENANCE	1,626				
TRAVEL AND PER DIEM Palomares people	5,775	5,775			
.C.I.E.M.A.T. people	1,890	1,890			
Others	630	630			
SPECIAL STUDIES	8,400				
T O T A L	99,554	36,615	42,482	2,803	7,628

# FACSIMILE COVER SHEET

**DEPARTMENT OF ENERGY  
HEADQUARTERS  
OFFICE OF NUCLEAR SAFETY  
RADIOLOGICAL CONTROLS DIVISION  
(EH-331)**

THE FAX, MAM  
NOTHING BUT THE  
FAX



**FAX NUMBER 301-353-5285 or FTS 233-5285**

**TALK NUMBER 301-353-4093 or 4585  
FTS 233-4093 or 4585**

Name of Person FAX is sent to BILLY HILL IE-12

Phone or Location of Person 6-5906

Number of pages sent NOT including this Page 1

Sender MIKE MARCELLI

Phone No. 3-5865

Comments: PLEASE HELP WITH THIS DRAFT

THANKS

MIKE

faxed to HM per INPUT 9/18  
Bill agreed w/ content

file - SPAIN.TXT

~~lined~~

To: F. Mingot

El Director del Departamento  
de Proteccion Radiologica Y  
Medio Ambiente

Dear Mr. Mingot,

We sincerely regret the delay in responding to your request for funding of our cooperative efforts to investigate various health and safety aspects of fissionable materials in the environment. Mr. Tommy McCraw has retired from federal service and Mr. Vallario of my staff will be coordinating future efforts in this regard. *In view of our current national funding constraints* We want to assure your government that this funding delay does not detract from our interest in this important effort. A review of your funding request is underway at this time and we will contact you again in the near future. Thank you for your patience in this matter.

D.Bunch

cc: IE-10, R. RANDOLPH  
GC-30, J. PRUZAN

FAX 6-1180

# memorandum

DATE: September 8, 1987

REPLY TO  
ATTN OF: GC-31

SUBJECT: Project Indalo - request for a legal opinion

TO: Edward J. Vallario, EH-331

THRU: John M. Edsall *JME*  
Assistant General Counsel  
for Nuclear Affairs, GC-31

Our files reveal no documents on which to base a legal opinion in regard to U.S. or DOE legal obligations resulting from the aircraft collision over Palomares, Spain.

The letters provided with your August 19, 1987 request appear to constitute a voluntary offer of cooperation from the U.S. which was accepted by Spain. In international law, a voluntary offer accepted by another party can indeed result in legal obligations - depending on a number of circumstances. To be definitive more documentation is needed.

As the "Hall - Otero Agreement" appears to be a direct result of a very serious aircraft accident between two USAF aircraft that caused significant contamination of some Spanish territory, it would seem extremely inadvisable to unilaterally terminate our payments (even in the event that we could do so legally) without consultation with the State Department, the USAF, and Spain.



Charles R. Oleszycki  
Attorney/Office of Assistant  
General Counsel for Nuclear  
Affairs, GC-31

# MEMORANDUM

AUG 19 1987

EH-331

Request for a Legal Opinion - Project Indalo

J. M. Edsall, GC-31

On January 17, 1966, a U.S. Air Force KC-135 tanker and a B-52 bomber collided during a refueling operation. The bomber, carrying four nuclear weapons, disintegrated over Palomares, Spain, a village of about 1500 people. Two nuclear weapons were recovered intact. Two others experienced detonation of the high explosives on impact. There was no nuclear yield and no one on the ground was seriously injured.

The U.S., in cooperation with the Spanish government, initiated a program for cleanup of the contaminated area. Subsequently, on February 25, 1966, John A. Hall, Assistant General Manager for International Activities, Atomic Energy Commission, sent a proposal to Professor Jose Otero, Presidente de la Junta de Energia Nuclear, expanding our collaboration in the fields of health and safety pursuant to the August 16, 1957, U.S.-Spanish Agreement for Cooperation for Civil Uses of Atomic Energy. Mr. Hall proposed investigating various health and safety aspects of fissionable materials when released into a rural agricultural environment. The "understanding" between the two agencies was accepted by Professor Otero and initiated technical and financial assistance to Spain for the radiological followup of Palomares residents and their environment. The "Hall-Otero Agreement" has been used as the basis for providing continued financial assistance, Project Indalo, for the past 21 years.

In reviewing our records, we find we only have an unsigned copy of the letter transmitting the above mentioned agreement (copy attached) as a basis for providing continued financial assistance. Moreover, we question our legal obligation to continue this funding arrangement. Hence, we request you provide a legal opinion on this issue.

Original signed by  
Edward J. Vallario

Edward J. Vallario, Acting Director  
Radiological Controls Division  
Office of Nuclear Safety

**Attachment**

E331.2:MAMarelli:bbh:353-5865:8/18/87

DISTRIBUTION  
Subject INC-2  
ONS RF  
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Vallario, EH-331  
EH-30 RF

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JUN 26 1987

EH-331

Financial Support for Project Indalo and Oak Ridge National Laboratory (ORNL) (Technical Support to Spain)

Neal Goldenberg, EH-33

U.S. funding support for the subject project has continued since the Hall-Otero Agreement letter (Attachment 1) was signed on February 25, 1966. Direct funding to the Spanish government (Project Indalo) provides supplemental assistance to their environmental surveillance program for Palomares and medical follow-up of area residents. ORNL funding provides project coordination, technical support, training for Spanish scientists, and scientific equipment. In FY 1986, the responsibility for this effort was transferred from the Office of Operational Safety (OOS) to the Office of Nuclear Safety (ONS).

Our current ONS budget summary continues to reflect a significant FY 1987 funding reduction for the subject projects. The ONS FY 1987 budget summary indicates \$120K has been appropriated for Project Indalo. \$100K of this funding was transferred to Spain in February, 1987, to supplement DOE's (OOS) FY 1986 funding support, bringing the total funding for Spain's 1986 fiscal year to \$240K (the original amount requested). This leaves \$20K in our FY 1987 budget to support Spain's FY 1987 request of \$500K. Please note that Spain's fiscal year runs from February 1st to the following January 31st.

The increase in Project Indalo funding from FY 1986 to FY 1987 is a result of several factors. First, Spain is interested in increasing their urine bioassay program considering a growing number of residents since 1983 (52 out of 664) have submitted urine samples that showed Pu-239 and Pu-240 activities greater than the detection limit (0.37 mBq/day). Also, recent Americium separations have shown some Am-241 positives in urine as well (included in totals above). Second, Spain desires the United States to increase its support for the followup effort from about 30 percent to 64 percent. Finally, the exchange rate of the dollar has dropped about 25 percent.

ORNL's funding request for FY 1987 is \$120K. The ONS budget summary reflects \$20K for this support. With only 3 months left in FY 1987, ORNL can only spend an additional \$10K for the purchase of a meteorological tower.

On September 15, 1986, Mr. Tommy McCraw, then with the Office of Nuclear Safety, provided a briefing to Mary Walker on the history, status, and funding needs of the Palomares followup project. At the conclusion of the meeting, Mr. McCraw indicated that Ms. Walker agreed that funding was to be provided. To date, such funding has not been made available.

The Department's continued silence on this issue will only exacerbate the situation. Without proper action, Spain may elect to go through other channels to acquire the requested funds. Such action would reflect poorly on

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EH and the Department. Accordingly, we recommend Spain be provided their FY 1987 requested funding level and that ORNL be provided an additional \$10K as indicated above.

This fall, ORNL will convene a meeting of DOE's advisory panel on Palomares matters. An EH representative will be in attendance. It is expected that the panel's report will provide a basis on which EH can base future funding decisions.

Original signed by  
Edward J. Vallario

Edward J. Vallario, Acting Director  
Radiological Controls Division  
Office of Nuclear Safety

cc: T. McCraw, EH-35  
J. Judge, EH-10

EH-331.2:MA<sup>Q</sup>Marelli:bbh:353-5865:6/25/87

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Vallario, EH-331

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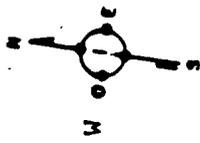
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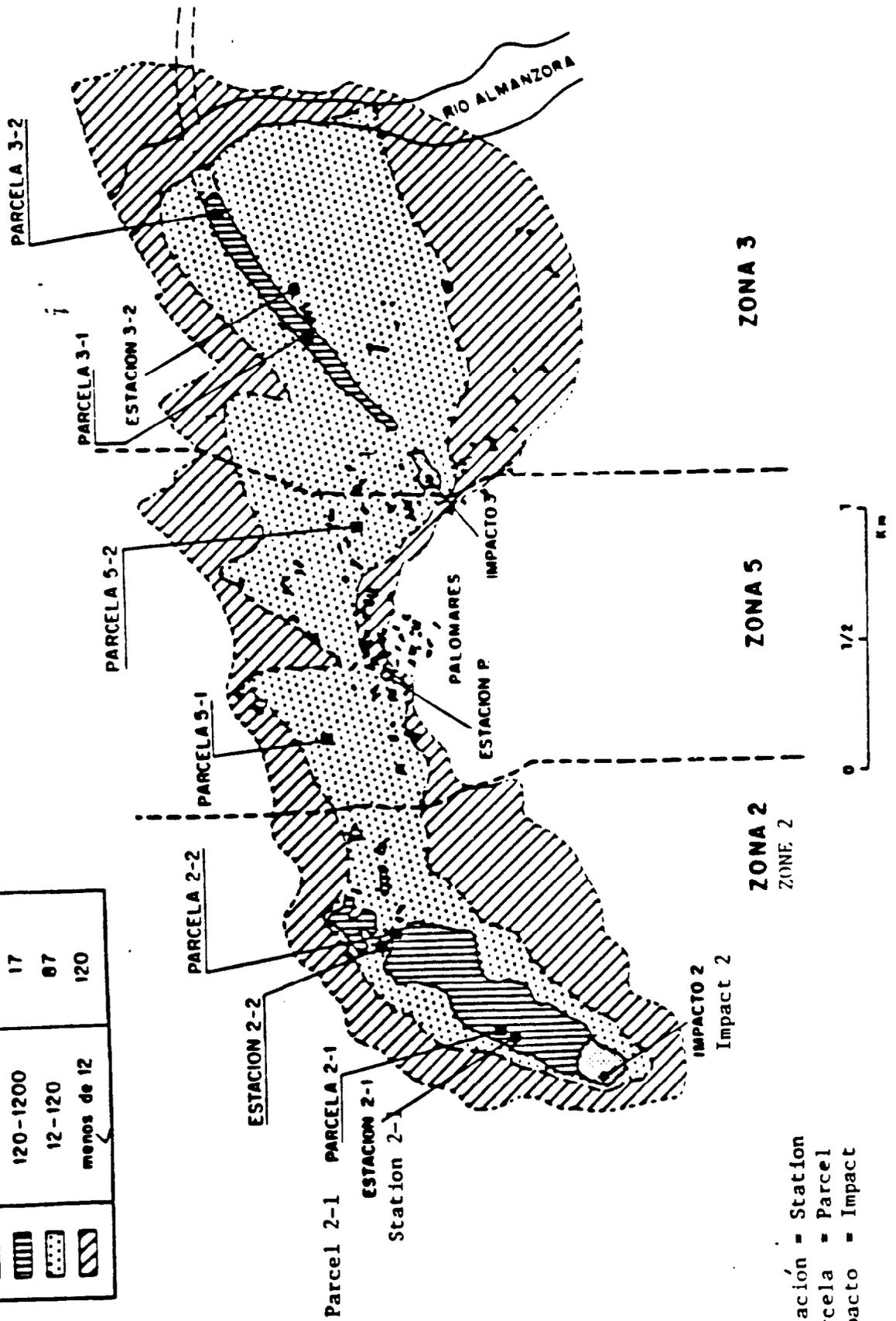
PROJECT INDALO BRIEFING

History of Accident at Palomares, Spain

- o On January 17, 1966, during a refueling operation, a U.S. Air Force KC-135 tanker and a B-52 bomber carrying four nuclear weapons collided and disintegrated over Palomares, Spain, a village of about 1500 people. One crew member survived.
- o Two nuclear weapons were recovered intact. Two others experienced detonation of the high explosives on impact. There was no nuclear yield and no one on the ground was seriously injured.
- o Two overlapping patterns of Plutonium-239 contamination were laid down over a predominantly agricultural area, but also including the village of Palomares.
- o Working cooperatively, representatives of the U.S. and Spanish Governments initiated a joint program for cleanup of the contaminated area. Agreement was obtained on cleanup methods and on cleanup radiological criteria.
- o Contaminated vegetation was collected for disposal. Contaminated soil was scraped into piles, loaded into trucks, and collected in a holding area where it was packaged for shipment to the United States for disposal. A large area was watered down and deep plowed.
- o The contaminated vegetation and soil from Palomares were transported by ship to Charleston harbor and transported to the Savannah River Plant for land burial.
- o In the Hall-Otero Agreement between the United States and Spain, the United States agreed to provide technical and financial assistance to Spain for radiological followup of Palomares residents and their environment. This assistance, Project Indalo, has continued for the past 20 years.
- o It was agreed that the findings for Indalo would be published by Spanish scientists. This has been done. No report on cleanup field operations appears to have been issued by U.S. participants. The fact that Palomares soil containing plutonium from U.S. weapons was buried at SRP has appeared in an ORNL report dated June 1985. Burial at SRP was also reported by Spanish scientists at an international symposium in Monaco in October 1966, and their report on this presentation contains this and other details on cleanup operations.
- o Dr. Emilio Iranzo, Director of Project Indalo in Spain, has submitted a report for publication in Health Physics entitled "Air Concentrations and Potential Radiation Doses to People Living Near Contaminated Areas in Palomares (Spain)." This should be published before the end of this year. This will be the first publication of exposure estimates for Palomares residents in a journal with a large readership. This will focus the attention of the radiation protection community (worldwide) on the accident at Palomares. We can anticipate requests for additional information.



CLAVE	CONTAMINACION SUPERFICIAL KBq / m <sup>2</sup>	SUPERFICIE AFECTADA Ha
	> 1200	2,2
	120 - 1200	17
	12 - 120	67
	menos de 12	120



Estación = Station  
 Parcela = Parcel  
 Impacto = Impact

## Radiological Summary

o 226 hectares (about 560 acres) of land was contaminated with Pu.

o Radiological cleanup consisted of the following:

Removed all Pu contaminated cultivated and natural vegetation for disposal;

Removed 10 centimeters of soil with surface contamination greater than 1,200 kBq/m<sup>2</sup> (about 5.5 acres);

Deep plowed all arable land with surface contamination less than 1,200 kBq/m<sup>2</sup>; and

Contaminated surfaces of houses were washed with pressurized water and detergents.

o Radiological Followup

DOE and its predecessors have been funding about 20 percent of the annual cost to monitor soil, air, vegetation, and people;

Recent monitoring of Pu in soil shows hot spots over an area of about 100,000 m<sup>2</sup>;

Soil samples from hot spots had Pu levels from 0.7 to 2.6kBq per gram (20,000 to 70,000 pCi/g);

Results of sampling Pu in air showed 100 percent of the results from three sampling stations had concentrations above the detection limit;

About 60 percent of vegetation sampled had Pu concentrations in the detectable range;

146 residents of Palomares were taken to Madrid during 1985. 600 residents have been checked at least once for Pu internal contamination and given a medical examination;

Pu internal contamination has not been detected in 516 residents that have been checked;

Pu internal contamination has been detected in 52 residents;

The maximum committed effective dose equivalent derived from urine excretion of Pu were as follows:

22 persons	$\frac{\text{mrem}}{5,000}$
22 persons	5,000 to 10,000
8 persons	10,000 to 20,000

Risk estimates for the above exposures have not been published to date.

- o As a result of a technical review conducted for DOE in 1979, ORNL was requested to assume responsibility for coordinating the technical aspects of Indalo and to assist Spanish scientists. Funding for ORNL began in FY 1982.
- o Dr. Richmond, ORNL project manager, established a technical advisory group for the project that meets annually.
- o Dr. Emilio Iranzo has reported that he and his staff have expended much effort responding to the concerns of Palomares residents and their leaders. Their concern is a 20 year statute of limitations in Spain. The 20th anniversary of the accident was January 17, 1986. Statements have been made in the Spanish press that U.S. support will end now that the 20 years has passed.

## Funding and Program Options

- o Starting in 1966, funding for Indalo was provided by the AEC Division of Biology and Medicine and, later, by the Office of Health and Environmental Research (OHER). When OHER was transferred to Energy Research (ER), Project Indalo was moved to the Division of Operational Safety under Environment. This was proper because Indalo is a health protection not a research program.
- o DOE funding for Project Indalo has been in two parts. There are funds to ORNL for project coordination, technical support, training for Spanish scientists, and scientific equipment. There is also funding directly to the Spanish government that amounts to about 20 percent of their costs for radiological monitoring of the Palomares residents and their environment.
- o Funding requested from the Office of Operational Safety (OOS) for Spain for FY 1986 (the Spanish fiscal year is from February to January) was 240K. For the first time in 20 years, an amount was put into the budget that was less than requested, i.e., 140K. Only 140K has been obligated.
- o By memorandum of June 13, 1986, the Director, OOS, stated that funding for Indalo more appropriately falls under the mission of the Office of Nuclear Safety (ONS) and that this was the final year of funding by OOS. There were no items in the ONS budget for ORNL and Spain for FY 1987. The amounts needed for FY 1987 are the same as for FY 1986.
- o The consequences of a reduction or termination of U.S. support are unknown but could be significant. Spain could seek U.S. funding to cover the entire cost of their followup operations.
- o Options:
  1. Extend the contract period to January 31, 1988, for Spain, fund Spain and ORNL for the full amount needed for FY 1987, i.e., 240K and 140K, and provide an additional 100K for Spain as was requested for support through January 31, 1987; or
  2. Provide interim funding until transfer of the program to the Office of Health and Environmental Research or to Defense Programs can be accomplished.
- o Advice:
  1. Do not reduce funding abruptly without advanced notice to the Spanish and to ORNL; and
  2. If support for the program is to be significantly altered, more attention must be given to the likely consequences and DOE management briefed on the impact.



MINISTERIO DE INDUSTRIA Y ENERGIA

JUNTA DE ENERGIA NUCLEAR

CENTRO DE INVESTIGACION ENERGETICA  
MEDIOAMBIENTAL Y TECNOLOGICA  
Avda. Complutense 22. 28040-Madrid

Madrid, October 1, 1986

Mr. TOM McCRAW  
Radiological Control Division  
Office of Nuclear Safety  
U.S. Department of Energy  
WASHINGTON D.C.

Dear Mr. Mc Craw:

Dr. Richmond visited the CIEMAT-JEN last week to discuss our research and measurement program related to the Palomares accident. I believe he can now discuss with you the current situation relative to activities in Area 2. We also discussed our latest findings concerning soil particle size analysis and the distribution of radioactivity among the various size fractions and their mineral composition. This data, when confirmed, will allow us to estimate the fraction of activity inhaled and thus increase the accuracy of our dose calculations.

During his visit, Dr. Richmond suggested that we begin to better integrate our funding requirements with your budget cycles. Some time ago Dr Whachholz recommended the current schedule.

Our current estimates for the periods February 1987-January 1988, February 1988-January 1989 and February 1989-January 1990 are (500,000, 550,000 and 605,000) dollars respectively.

We have not as yet received funding for the period February 1986-January 1987 and the year is rapidly disappearing. Can you please check into the problem for us. Dr. Richmond thinks the delay is related to problems associated with changes in program responsibility within DOE. Unfortunately this has caused us some difficulties.

As you know the value of the exchange rate dollar/peseta continues to drop rapidly. During the past year it dropped from about 180 per dollar to about 135 per dollar, that is by approximately 25%. We have not made adjustments for the relative value of the dollar or inflation in our funding request for some time.

The funding estimates given above can be elaborated upon in a letter that we will prepare before the end of this year. But for now you have the estimates for our needs corresponding to your fiscal years 1987, 1988 and 1989. Please let us know if this schedule is acceptable to you.

We appreciate your assistance in these matters. We continue to believe that the information obtained from the Palomares accident will provide information for evaluating the original remedial action. It will also allow us to better understand how transuranium elements behave in the environment. Of course we must continue to monitor and study the people involved so we can better estimate exposure and dose resulting from the accident.

Sincerely yours,

EL DIRECTOR DEL DEPARTAMENTO  
DE PROTECCION RADIOLOGICA Y  
MEDIO AMBIENTE

A handwritten signature in black ink, appearing to be 'F. Mingot', written over the typed name.

Fdo. F. Mingot