## PALOMARES NUCLEAR WEAPONS ACCIDENT





### REVISED DOSE EVALUATION REPORT

# Volume III Appendix C.2 – Repeat Analysis Cases Appendix C.3 – Contamination Cutoff Cases Appendix C.4 – Remaining Cases

Date: April 2001

Contract: GS-35F-4813G

Task Order: WFZ578410 T0799BG0031

Prepared For: Radiation Protection Division

Air Force Medical Operations Agency

Bolling AFB, DC 20332-7050

Prepared By: LABAT-ANDERSON INCORPORATED

8000 West Park Drive, Suite 400

McLean, VA 22102



Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

#### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	140,000	43/0.43
LUDEP	383,000	27/0.27

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

Organ	Dose Equivalent (rem/Sv)	Weighting Factors	Weighted Organ Dose Equivalent (rem/Sv)
Testes	6.2E+00/6.2E-02	2.5E-01	1.6E+00/1.6E-02
Breast	2.1E-04/2.1E-06	1.5E-01	3.1E-05/3.1E-07
Red Marrow	3.4E+01/3.4E-01	1.2E-01	4.0E+00/4.0E-02
Lung	1.6E+02/1.6E+00	1.2E-01	1.9E+01/1.9E-01
Thyroid	2.0E-04/2.0E-06	3.0E-02	5.9E-06/5.9E-08
Bone Surface	4.4E+02/4.4E+00	3.0E-02	1.3E+01/1.3E-01
Liver	7.8E+01/7.8E-01	6.0E-02	4.7E+00/4.7E-02
Other	7.4E+00/7.4E-02	6.0E-02	4.4E-01/4.4E-03
Lower Large Intestine	1.6E-02/1.6E-04	6.0E-02	9.5E-04/9.5E-06
Upper Large Intestine	5.3E-03/5.3E-05	6.0E-02	3.2E-04/3.2E-06
Small Intestine	1.1E-03/1.1E-05	6.0E-02	6.5E-05/6.5E-07
Effective Dose Equivale	nt	1 y 2	4.3E+01/4.3E-01

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. The sample analyzed by gross alpha counting only was not included in the analysis since it was an on-site sample with a result >0.1 pCi, leading to a suspicion of sample contamination. The result was fit using CINDY and the Jones excretion model, to estimate an intake (140,000 pCi), organ doses, and a CEDE (43 rem/0.43 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 383,000 pCi and a CEDE (ICRP-60) of 27 rem (0.27 Sv).



Revised Dose Evaluation Report April 2001



b) (6)

#### Conclusion:

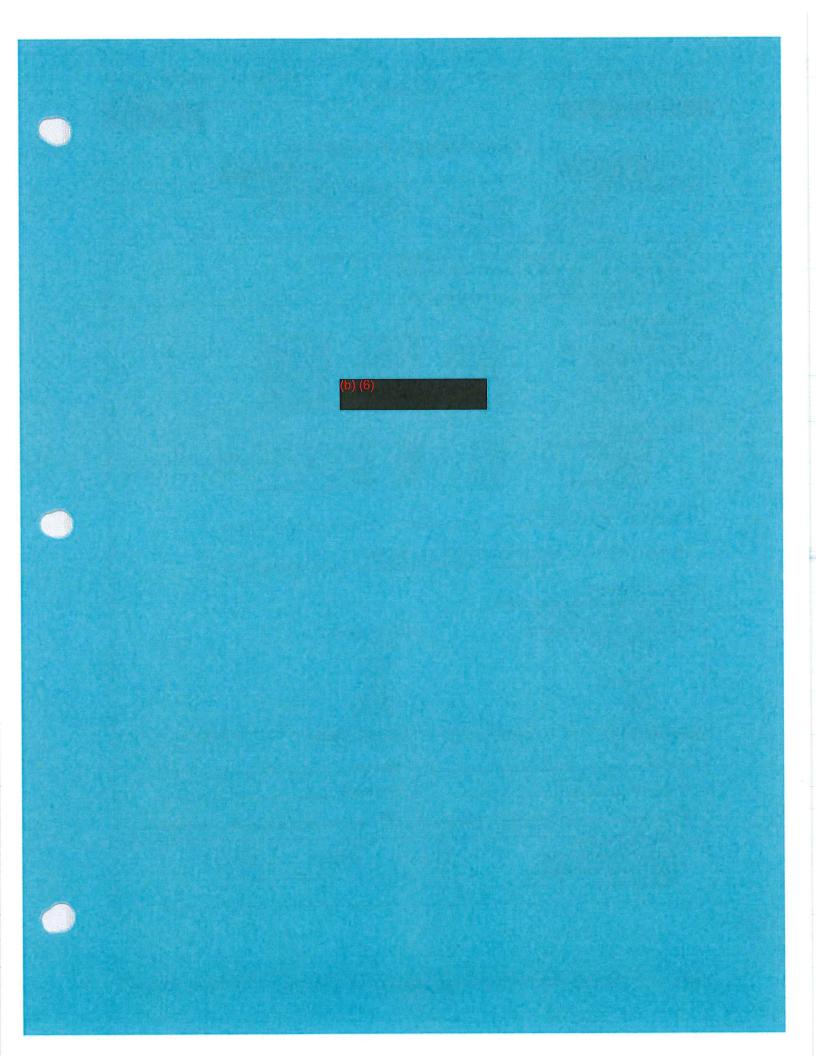
Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 140,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 43 rem (0.43 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be considered to provide additional assessment of the exposure.

Prepared By:			
Name:	<del></del>		
Signature:		Date:	
Peer Reviewed By:			
Name:	<del></del>		
Signature:		Date:	

		(b) (6)	TERN	AL DOSE DAT	A		
NAME (LAST, FIRST, (b) (6)		Tsat	SOC. SEC	. NO. (21-29)	TYPE SAMP		GROSS ALPHA
BASE (57-60)		FROM 24	Lu )	16 Fat 166	lan og a, Asse,	DATE 19	an GGTYPE
DATE RECEIVED	matein			REQUESTED BY	1. · · · · · · · · · · · · · · · · · · ·	,	
FEB 21 195	6	2260 ml (b) (6)		200	ED	DATE ANALYZI	D
TECHNICIAN (SIGN	ATURE AND DATE)	(b) (6)	9	MAR 1966		**************************************	
URINE	GROSS A	PMA .		RADON		FECE	S/BLOOD
Counter Number	H			Chamber Number	****	. Counter N	lumbaa   ·
Counter Bkg. (cpm)	-14			Cham. Bkg. (mv/se	c)	Counter B	
Counter Eff. (%)	51			Counter Eff. (%)		Counter E	
Date/Time - Start	9 MAR 19	66		Millivolt - Start		Date/Tim	
-Stop				Millivolt - Stop			- Stop
Total Counts	47			Total Millivots		Total Cou	
Counting Time	53			Total Drift Time		Counting	
Gross cpm	85			Gross my/sec		Gross cpn	
Bkg. Cpm	.14			Bkg. Mv/sec		Bkg. cpm	
Net cpm	.7/			Net my/sec		net cpm	
= Poi/L	3,14 ± 1-18			curies/mv		dpm	
dpm/24 hr. (69 - 74)				litter (69 - 74)		dps/cc	
						Neutron D	ose (rads) (63-68)
	1 4 . 4						
K 40 Correction Nor Sero P2 / Apl D (q) (63-68)	6-91-2.60		Da= 3.26	D(q) (63-68)	,74	υc/mg (6	9 - 74)

4			RE	SAMPLE	JUL 1419	966	3415
AFSN: (6) (6)			- INTERN	IAL DOSE DATA	· (C)		
(b) (6)	TS		(b) (d	C. NO. (21-29)	PE SAMPLE (3 Urine	TYPE	NAL. (31-32) -
66-3415		SAMPLE DAT		The second second	EXP	OSURE Jan &	
BASE (57 • 60)		OCCUPATION	00 7 Jun	то 0559 8 Jun	66 p.	ATE Feb 66	TYPE
Ramstein		CCUPATIO	N (61-62)	REQUESTED BY			• •
DATE RECEIVED		SAMPLE VOL	UMF	VOLUME ANALYZED	IDATI	EANALYZED	
14 June 1966	i s		30 me	890 ml		E ANALTZED	
TECHNICIAN (SIGNA				che	Rad	Uma di	Lil
URINE	236	239		RADON	Bross	FECES/BLO	00
Counter Number				Chamber Number		Counter Number	<del>~</del>
Counter Bkg. (cpm)	می	1	,	Cham. Blog. (mv/sec)	C	Counter Bkg.	
Counter Eff. (%)	31.8	31.8	115	Counter Eff. (%)	31	Counter Eff.	·
Date/Time - Start	15EP16	1152	K7	Millivolt - Start		Date/Time - Start	
-Stop				Millivolt - Stop		- Stop	
Total Counts	117	4		Total Milliones Time	55	Total Counts	
Counting Time	100	100		Total Break Cts	118	Counting Time	
Gross cpm				Gross my/sec	7,4	Gross cpm	
Bkg. Cpm				Bkg. Martine eta	45 (918)	Bkg. cpm	
Net cpm				Net my/sec	70	net cpm	
tors % REC.	106%			curies/mv		dpm	
dpm/24 hr. (69-74)				-timer (69-74) % AEC	122%	dps/cc	
K 40 Correction		4.7		1477071	10/11/20	Neutron Dose (rad	*) (63-68)
Haz Boto PC/SPL	010949±	0.0499		D(q) (63-68)		uc/mg (69-74)	7,00,00/1
D(q) (63-68)						D(q) (63-68)	
NAME:		ledaniani mg Ngo yayanan pagaya		SOCIAL SECURITY NUME			
				SOCIAL SECORITY NUME		SAMPLE	NUMBER:
AIR FORCE BASE	41						
RESULTS OF ANALY	Pailsal-	0.0949 ±	0.0499	1/1 Kec - 1069	%	Previou	Regulty
	TotAL Vel-	-1680ml		Body Burlen -	0.03		20 20 10
	Ud ANH -	890ml		poor printer	0.03	3.14 82/3	0.74 BB
Repeat the son	nple for the foll	owing reason:					
( ) Significa	int activity in s	ecently analyze	d sample (s)				
	uired to establi		- admitte (a)				
		*** 0074					
( ) Improper	ridsk used			1 100			
( ) Other							
( ) Suggeste	d sampling sch	edule					
SIGNATURE:					DATE:		
OUE THE CON.	AD401 FT#			E DAC (APP 66)		AFLC-WPAFB-	ADD 66 2500

$$3415$$
 $94 \pm 50.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 
 $0.4$ 



DRAFT

(b) (6)

(b) (6)

NAME: (b) (6)	internal Dosnine	Hy Evaluatio	SSN: (b) (6)	
MODE OF INTAKE:  Inhalation Ingestion Unknown	☐ Injection ☐ Absorption ☐Not applicable		TE OR PERIOD th 2/7/66, onsite	
SUMMARY OF EXPOSURE CON Radionuclides/Respiratory Class/Par Date or Period of Evaluated Data: 2 Duration of Exposure: Unknown Location of Exposure: Camp Wilson	rticle Size: <sup>239</sup> Pu/1009 samples, 2/7/66 and 6	/1/66	MAD	
EVALUATION DATA: Air Sampling Health Physics Survey Data Bioassay – Urinalysis Fecal Nasal Smears In Vivo	☐ Attached ☐ Attached ☑ Attached ☐ Attached ☐ Attached ☐ Attached ☐ Attached	☐ In Process	☑ Unavailable ☑ Unavailable ☐ Unavailable ☑ Unavailable ☑ Unavailable ☑ Unavailable	
Medical Treatment: Skin Decontamination: Decorporation: Catharsis: Surgical excision:	☐ Yes ☐ Yes	No Agent: No Agent:		Date:
EVALUATION METHODOLOGY Assumptions: Acute inhalation int  Code/Model used for: Intake E Dose Es	: ake of <sup>239</sup> Pu, 100% Cla stimate: CINDY, Ver timate: CINDY, Ver	. 1.4/JONES		
RESULTS SUMMARY Estimated Intake Activity (pCi): 1 50 YR CEDE (rem): 40 (0.4 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes	30000	60 YR CDE (rem/S 410/4.1 150/1.5 72/0.72 31/0.31 6.9/0.069 5.8/0.058	(v) -	
DOSE ASSESSOR:  Signature:  Print Name:  SSN:		Print Name:	ÆR:	
RECOMMENDATIONS: Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions: N/A		inalysis	cal 1	n Vivo

#### **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### Incidents:

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

#### Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

#### Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1 µm AMAD particle size on 1/29/66. The date is the midpoint of the period on station from 1/20/66 to 2/7/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-442	G	2/7/66	1.24	0.950	
66-3267	AS	6/1/66	0.091	0.065	1
66-3267	G	6/1/66	NR	NR	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry; NR means no result reported.

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

#### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	130,000	40/0.4
LUDEP	370,000	26/0.26

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	5.8E+00/5.8E-02	2.5E-01	1.5E+00/1.5E-02
Breast	1.9E-04/1.9E-06	1.5E-01	2.9E-05/2.9E-07
Red Marrow	3.1E+01/3.1E-01	1.2E-01	3.8E+00/3.8E-02
Lung	1.5E+02/1.5E+00	1.2E-01	1.8E+01/1.8E-01
Thyroid	1.8E-04/1.8E-06	3.0E-02	5.4E-06/5.4E-08
<b>Bone Surface</b>	4.1E+02/4.1E+00	3.0E-02	1.2E+01/1.2E-01
Liver	7.2E+01/7.2E-01	6.0E-02	4.3E+00/4.3E-02
Other	6.9E+00/6.9E-02	6.0E-02	4.1E-01/4.1E-03
Lower Large Int	estine 1.5E-02/1.5E-04	6.0E-02	8.9E-04/8.9E-06
Upper Large Inte	estine 5.0E-03/5.0E-05	6.0E-02	3.0E-04/3.0E-06
Small Intestine	1.0E-03/1.0E-05	6.0E-02	6.1E-05/6.1E-07
Effective Dose E	Equivalent		4.0E+01/4.0E-01

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. The sample analyzed by gross alpha counting only was not included in the analysis since it was an on-site sample with a result >0.1 pCi, leading to a suspicion of sample contamination. The result was fit using CINDY and the Jones excretion model, to estimate an intake (130,000 pCi), organ doses, and a CEDE (40 rem/0.4 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 370,000 pCi and a CEDE (ICRP-60) of 26 rem (0.26 Sv).

Conclusion:

Prepared By:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 130,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 40 rem (0.4 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be considered to provide additional assessment of the exposure.

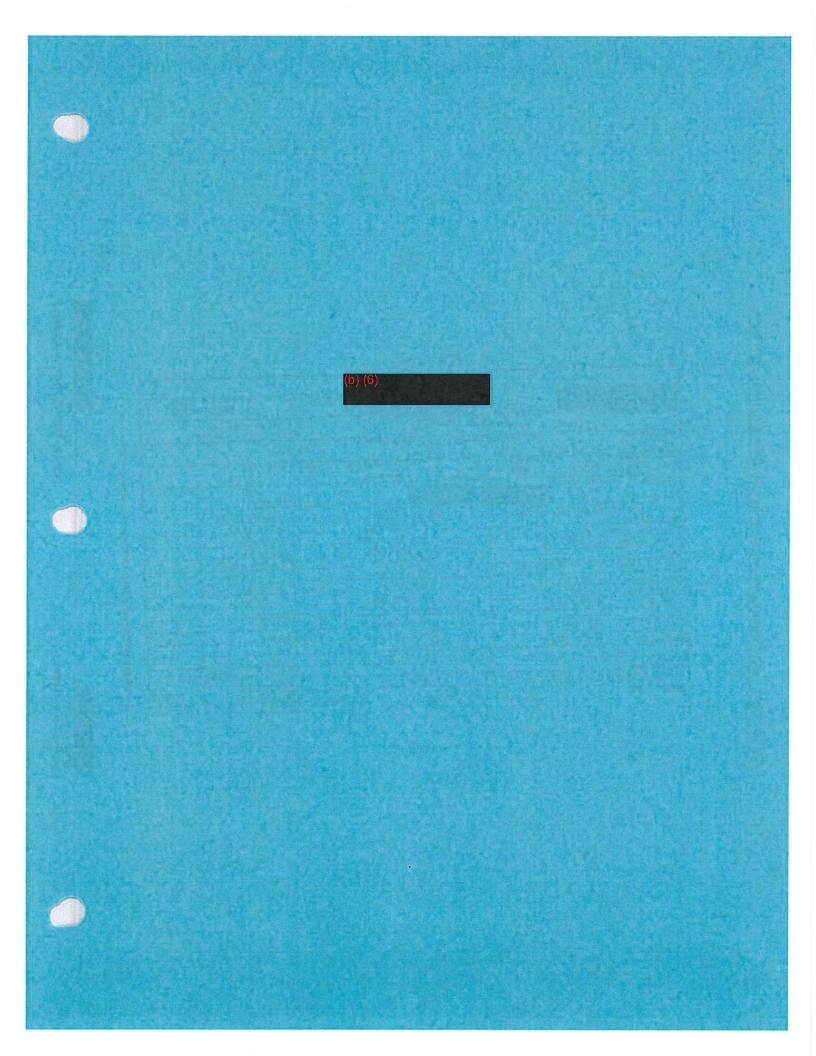
1	36		
Name:			
Signature:		Date:	-
Peer Reviewed By:			
Name:	11.0		
Signature:		Date:	

April 28, 2000 (b) (6)

AFSN: (b) (	6)	and the solution would be	INTERN	and the second second		_	
hame (Last; First,	11 11 12 221		11/1 6 1/1	IAL DOSE DAT	A		
SAMPLE NO. (3303	Mata) ((-20)	TSg1	(b) (	6) 121-221	TYPE SAME Uri	ne	TYPE ANAL. (31-32)
66-3267		The second second	June 66	то	The state of the s	EXPOSURE	
BASE (57-60)	V-CAT III-	OCCUPATIO	N (61 - 62)	REQUESTED BY	to de la de la	DATE Jan	66 TYPE
Toul Rosier	es			WEGOESTED BY	-		
DATE RECEIVED		SAMPLE VOL		VOLUME ANALYZ	FD	DATE ANALYZI	-
6 June 1966		16	20 mil	10000		2 3 SEP	1966
TECHNICIAN (SIGN	ATURE AND DATE)						
URINE	236	239	GROSS ON	RADON		FFOR	- (n) oo
Counter Number	Telefold A mass		C	Chamber Number			S/BLOOD
Counter Bkg. (cpm)	0 3	1	157 (3861	Cham. Bkg. (my/sec	, ,	. Counter N	
Counter Eff. (%)	3/.8	31.8	57	Counter Eff. (%)	-	Counter B	
Date/Time - Start	23 Sept	23505.	19 Sept	Millivolt - Start		Counter E	
-Stop			1	Millivolt - Stop		Date/Tim	
Total Counts	I State Gran		CE 79	Total Millivots		716	- Stop
Counting Time	100	100	50	Total Drift Time		Total Cou	
Gross cpm				Gross my/sec		Counting	
Bkg. Cpm				Bkg. Mv/sec		Gross cpn	<u> </u>
Net cpm				Net my/sec		Bkg. cpm	
dpm	113-11			curies/my		dpm	- Verland
dpm/24 hr. (69 - 74)				litter (69 - 74)		dps/cc	
K 40 Correction	0.08						ose (rads) (63-68)
Net Beta				D(q) (63-68)		uc/mg (d	
D(q) (63-68)	1		82.270 Re	٠.		D(q) (63	The same of the sa
NAME;		****	s	OCIAL SECURITY NE	MBER:	l g	MPLE NUMBER:
AIR FORCE BASE						"	MEE NOMBER!
	ν' κ						
RESULTS OF ANALY	ISIS Pei/spl-	_		% le	c-		11= 4
	-stul-	1620	•	- 1	1 0	(0)	NTAM.
	VH anul-	1000		Body	, sounde	WIT	NTAM. H. PU-ZJJ
Repeat the sar	mple for the follo	owing reason:					
	ant activity in re						
( ) Data	and deliving in to	cently analyzed	sample (s)				
	uired to establis	in dose					
( ) Improper	flask used						
				and the second of			
( ) Other				,			
( ) Suggeste	d sampling sche	dule					
	d sampling sche	dule			IDATE -		•
( ) Suggeste	d sampling sche	dule			DATE		•

$$\frac{3267}{91.\pm65}$$
1.  $.091\pm065$ 
2.  $84.1$ 
3.  $1.62$ 
4.  $127$ 
5.  $6278$ 
6.  $0.03$ 

6)		RAI	DIOLOGICAL	SAMPLE	DATA			
E OR REQUESTOR'S ID (1-	-20)	GRADE	AFSI	ray Ken	SOCIAL	SECURITY NUMBER		HL SAMPLE NUMBER 66-3267 B
TYPE SAMPLE (23-32)	OCCUPATION (34-35)	ANALYSIS D	ESIRED	REQUES	TED BY		AIR FO	RCE BASE (68-71)
DATE RECEIVED (37-42)	DATE ANALYZED	(51-56)	DATE COUNTED	66	DATE C	OLLECTED	E	EXPOSURE DATE
SAMPLE WEIGHT/VOLUME		WEIGHT	VOLUME ANALYZE			TECH(b) (6)		
OTHER DATA				1	^	Sucked o	el 1	whate tiet
ENVIRONMENTAL SAMPLES				10.			11	
COUNTER & EFFICIENCY							20	
TOTAL COUNTS & MINUTES				1				
GROSS CPM				12/				
BKG CPM & MINUTES				121				
NET CPM								
YIELD								
		236		239				
BIOLOGICAL SAMPLES		348				RADON		
COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES	5 000 5	9	1					
GROSS CPM	700		12					
BKG CPM & MINUTES	440			· + 0				
NET CPM	- T (D							
YIELD								
								7 - 7 - 7
								104.0
		•					-	
SUMMARY OF RESULTS:	Pci/spl=	0.091+	an.		% X	ec = 04.1		
	10.750	01011 -	0,063			ec = 84.1 by Burden		
	TOT Uol = 1	620			Bo	burden =		
				P .				
	UOL ANAL=	600						



(b) (6)

Internal Dosimeti	ry Evaluation Form
NAME: (b) (6)	SSN: (b) (6)
MODE OF INTAKE:    Inhalation	
EVALUATION DATA:  Air Sampling	In Process
Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100% Clas  Code/Model used for: Intake Estimate: CINDY, Ver.	
RESULTS SUMMARY Estimated Intake Activity (pCi): 270000 50 YR CEDE (rem): 83 (0.83 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes	9 YR CDE (rem/Sv) 840/8.4 310/3.1 150/1.5 65/0.65 14/0.14 12/0.12
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:
Signature: Print Name: SSN:	Signature: Print Name: SSN:
RECOMMENDATIONS: Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions: N/A	

#### **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

#### Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

#### Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/16/66. The date is the midpoint of the period on station from 2/4/66 to 3/1/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-1855	AS	3/1/66	0.294	0.007	1
66-1855	G	3/1/66	1.52	0.310	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

#### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	270,000	83/0.83
LUDEP	1,270,000	89/0.89

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	1.2E+01/1.2E-01	2.5E-01	3.0E+00/3.0E-02
Breast	4.0E-04/4.0E-06	1.5E-01	6.0E-05/6.0E-07
Red Marrow	6.5E+01/6.5E-01	1.2E-01	7.8E+00/7.8E-02
Lung	3.1E+02/3.1E+00	1.2E-01	3.7E+01/3.7E-01
Thyroid	3.8E-04/3.8E-06	3.0E-02	1.1E-05/1.1E-07
Bone Surface	8.4E+02/8.4E+00	3.0E-02	2.5E+01/2.5E-01
Liver	1.5E+02/1.5E+00	6.0E-02	9.0E+00/9.0E-02
Other	1.4E+01/1.4E-01	6.0E-02	8.6E-01/8.6E-03
Lower Large Intestine	3.1E-02/3.1E-04	6.0E-02	1.8E-03/1.8E-05
Upper Large Intestine	1.0E-02/1.0E-04	6.0E-02	6.2E-04/6.2E-06
Small Intestine	2.1E-03/2.1E-05	6.0E-02	1.3E-04/1.3E-06
Effective Dose Equivale	ent		8.3E+01/8.3E-01

One urine sample was analyzed by gross alpha counting and alpha spectrometry. The gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The result was fit using CINDY and the Jones excretion model, to estimate an intake (270,000 pCi), organ doses, and a CEDE (83 rem/0.83 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 1,270,000 pCi and a CEDE (ICRP-60) of 89 rem (0.89 Sv).

#### **Conclusion:**

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 270,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 83 rem (0.83 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is more than the working lifetime limit of 50 rem

DRAFT

Revised Dose Evaluation Report April 2001

(b) (6)

Dramanad Dra

b) (6)

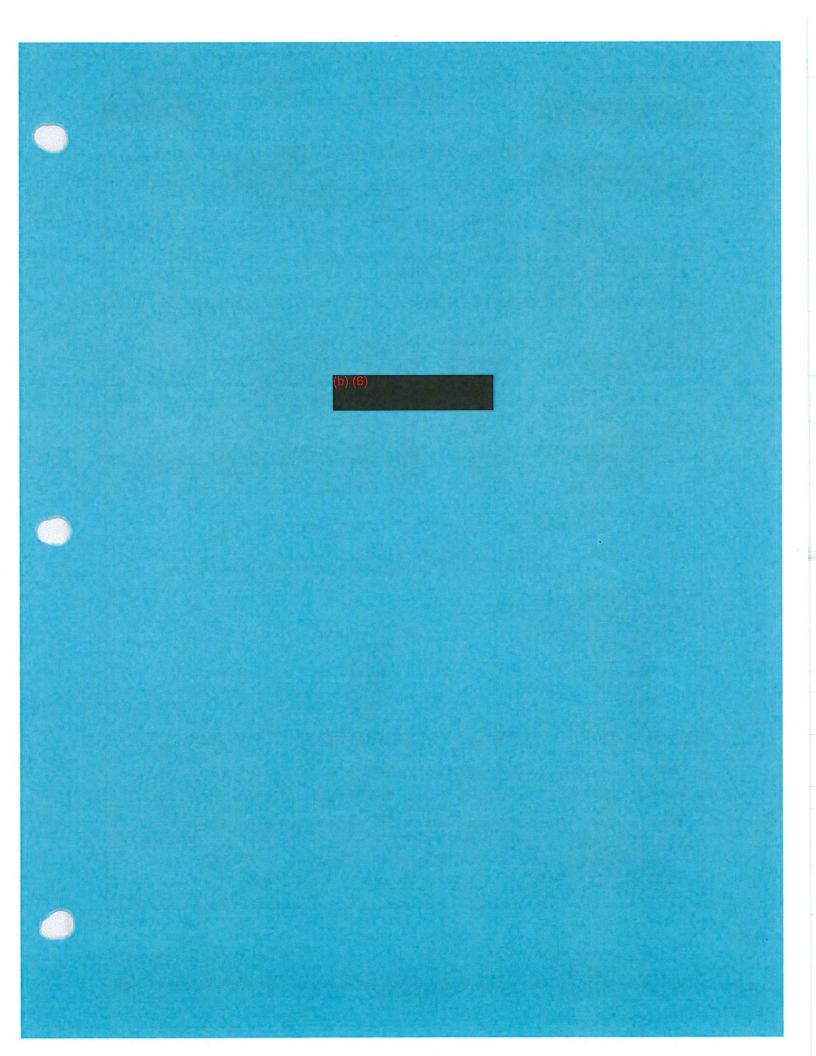
recommended by the National Council on Radiation Protection and Measurements (NCRP). These dose levels are significant, although they were based on very limited data. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Frepared by:			
Name:			
Signature:	-	Date:	7
Peer Reviewed By:			
Name:			
Signature:	 <u> </u>	Date:	

AFSN: (b) (6)			INTERN	AL DOSE DA	TA .			
NAME (LAST, FIRST, (b) (6) SAMPLE NO. (33-38	Can	t	soc. se (b) (6)	C. NO. (21-29)		MPLE (30)	TYPE ANA	L. (31-32)
66-1855 BASE (57-60) Toul Rosiers DATE RECEIVED 28 March 196		FROM 1 M OCCUPATION 9124 SAMPLE VOLU	ar 66 (61-62)	TO REQUESTED BY		DATE ANALYZ		PE
TECHNICIAN (SIGNA	TURE AND DATE)			550				
Counter Number	'D			RADON		FEC	ES/BLOOD	
Counter Bkg. (cpm)				Chamber Number		Counter		T
Counter Eff. (%)	51 9001			Cham. Bkg. (mv/s	ec)	Counter 8		
ate/Time - Start			tow "	Counter Eff. (%)		Counter I	iff.	
	1.3 may 66	4 7 7 1		Millivolt - Start		Date/Tin	e - Start	
-Stop Total Counts	96	Reported		Millivolt - Stop			- Stop	1
		drieles	for spike	Total Millivots		Total Co		<b>-</b>
ounting Time	.55	of 0.965 p	c/ sub-ple	Total Drift Time		Counting		<del> </del>
kg. Cpm	1.75	1	/ /	Gross my/sec		Gross cpr		1
let cpm	0.03			Bkg. My/sec		Bkg. cpm		1,1080
	1.72			Net my/sec		net cpm		NSAL
pri/	2.75 1	0.57		curies/mv	1.5	dpm		19-14-
pm/24 hr. (69 - 74) 40 Correction				litter (69 - 74)		dps/cc		
40 Correction	1.521	A 21					ose (rads) (6	3-68)
las Basa maile Ol	/ 7	0131	1	D(q) (63-68)				
101 Bota pei/Sul	7,023	0.01		D(4) (03-08)		uc/mg (d	59 • 74)	1

	0
	OSE
	7
	**
	п
	0
	=
7	_
5	0
12	7
12.	7
_	2
N	=
lõ	-
-	-
N	-0
ڪا	τ
8	C
⋉	-

YAME OR CEQUESTOR'S ID ( TYPE SAMPLE (23-32)  DATE RECEIVED (37-42)	0CCUPATI (34-35)			DIOLOG	AN CONTRACTOR OF STREET					
DATE RECEIVED (37-42)	0CCUPATI (34-35)		GRADE	1119			-	L SECURITY NUMBER	R	RHL SAMPLE NUMBER
		ON	ANALYSIS D	ESIRED		REQUESTE	D BY		AIR I	RHL SAMPLE NUMBER
	DATE ANA	LYZED (5	1-56)	DATE 8	DUNTED	6	DATE	COLLECTED		EXPOSURE DATE
SAMPLE WEIGHT/VOLUME			WEIGHT	VOLUME A	NALYZED	6	-	TECHNICIAN		
OTHER DATA . 950										
ENVIRONMENTAL SAMPLES			-							
COUNTER & EFFICIENCY	109 10 10 10 10 10									
TOTAL COUNTS & MINUTES				4 8/201		- 1 12	4, 50,			
GROSS CPM				44, 75, 40		Maria -				
BKG CPM & MINUTES	A CONTRACTOR OF THE PARTY OF TH		17.	The second						
NET CPM					Di A III	1.0				
YIELD				- 10 X			10000			
BIOLOGICAL SAMPLES			236		27	9		RADON		
COUNTER & EFFICIENCY	Spec		23C 27,3					RADON 2, 4 G J		\$.52 hn:
COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES	Spec 100		27.3		27	3		2,961	-	5.57 APM
COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES GROSS CPM	1 2 12				27	3 0.13		RADON 2. 9 6 1		3.57 DPM
BIOLOGICAL SAMPLES COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES GROSS CPM BKG CPM & MINUTES NET CPM	500 500		27.3 68 0.6	0	27	0.00/	3	2,961		3.57 DrM
COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES GROSS CPM BKG CPM & MINUTES	1 2 12		27.3	0	27	3 0.13	3	2,961,		5.57 APM
COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES GROSS CPM BKG CPM & MINUTES NET CPM	1 2 12		27.3 68 0.6	0	27	0.00/	3	2,961		3.57 DrM
COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES GROSS CPM BKG CPM & MINUTES NET CPM	1 2 12	2	27.3 68 0.6	0	27	0.00/	37	2,961,		5,57 APM
COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES GROSS CPM BKG CPM & MINUTES NET CPM VIELD	1 2 12	7/-5	27.3 6 8 0 0.6 0.6	0	27	0.00/	37	2,961,		5.57 DPM



DRAFT

b) (6)

(b) (6)

INTAKE DATE OR PERIOD: 1/18/66 through 2/7/66, onsite 1/28/66
100% Class Y/1 µm AMAD nd 6/1/66 Spain
☐ In Process ☐ Unavailable
☐ In Process ☐ Unavailable
In Process Unavailable
☐ In Process ☐ Unavailable
In Process Unavailable
☐ In Process ☐ Unavailable
M No. Date:
No         Date:           No         Agent:           Date:
☒ No         Agent:
No Date:
, Ver. 1.4/JONES
, Ver. 1.4/JONES , Ver. 1.4/ICRP 30, Part 4, General Systemic Model
, Ver. 1.4/ICRP 30, Part 4, General Systemic Model
, Ver. 1.4/ICRP 30, Part 4, General Systemic Model  50 YR CDE (rem/Sv)
, Ver. 1.4/ICRP 30, Part 4, General Systemic Model  50 YR CDE (rem/Sv) 210/2.1
50 YR CDE (rem/Sv) 210/2.1 78/0.78
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16 3.6/0.036
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16 3.6/0.036 3/0.03
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16 3.6/0.036 3/0.03  PEER REVIEWER: DATE: Signature:
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16 3.6/0.036 3/0.03
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16 3.6/0.036 3/0.03  PEER REVIEWER: DATE: Signature:
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16 3.6/0.036 3/0.03  PEER REVIEWER: DATE: Print Name:
50 YR CDE (rem/Sv) 210/2.1 78/0.78 38/0.38 16/0.16 3.6/0.036 3/0.03  PEER REVIEWER: DATE: Print Name:





#### **Internal Dosimetry Case Narrative**

#### **Identification:**

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

#### Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

#### **Assumptions/Basis/Data Sources:**

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 1/28/66. The date is the midpoint of the period on station from 1/18/66 to 2/7/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-499	G	2/7/66	1.66	0.700	
66-3271	AS	6/1/66	0.047	0.047	✓
66-3271	G	6/1/66	NR	NR	
00 32/1	•	. –			lt

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry; NR means no result reported.

(b) (6)

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

#### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	68,000	21/0.21
LUDEP	191,000	13/0.13

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	3.0E+00/3.0E-02	2.5E-01	7.6E-01/7.6E-03
Breast	1.0E-04/1.0E-06	1.5E-01	1.5E-05/1.5E-07
Red Marrow	1.6E+01/1.6E-01	1.2E-01	2.0E+00/2.0E-02
Lung	7.8E+01/7.8E-01	1.2E-01	9.3E+00/9.3E-02
Thyroid	9.5E-05/9.5E-07	3.0E-02	2.8E-06/2.8E-08
Bone Surface	2.1E+02/2.1E+00	3.0E-02	6.4E+00/6.4E-02
Liver	3.8E+01/3.8E-01	6.0E-02	2.3E+00/2.3E-02
Other	3.6E+00/3.6E-02	6.0E-02	2.2E-01/2.2E-03
Lower Large Intestine	7.7E-03/7.7E-05	6.0E-02	4.6E-04/4.6E-06
Upper Large Intestine	2.6E-03/2.6E-05	6.0E-02	1.6E-04/1.6E-06
Small Intestine	5.3E-04/5.3E-06	6.0E-02	3.2E-05/3.2E-07
Effective Dose Equivale	ent		2.1E+01/2.1E-01

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The sample analyzed by gross alpha counting only was not included in the analysis since it was an on-site sample with a result >0.1 pCi, leading to a suspicion of sample contamination. The result was fit using CINDY and the Jones excretion model, to estimate an intake (68,000 pCi), organ doses, and a CEDE (21 rem/0.21 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 191,000 pCi and a CEDE (ICRP-60) of 13 rem (0.13 Sv).

(b) (6)

#### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 68,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 21 rem (0.21 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than half the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level.

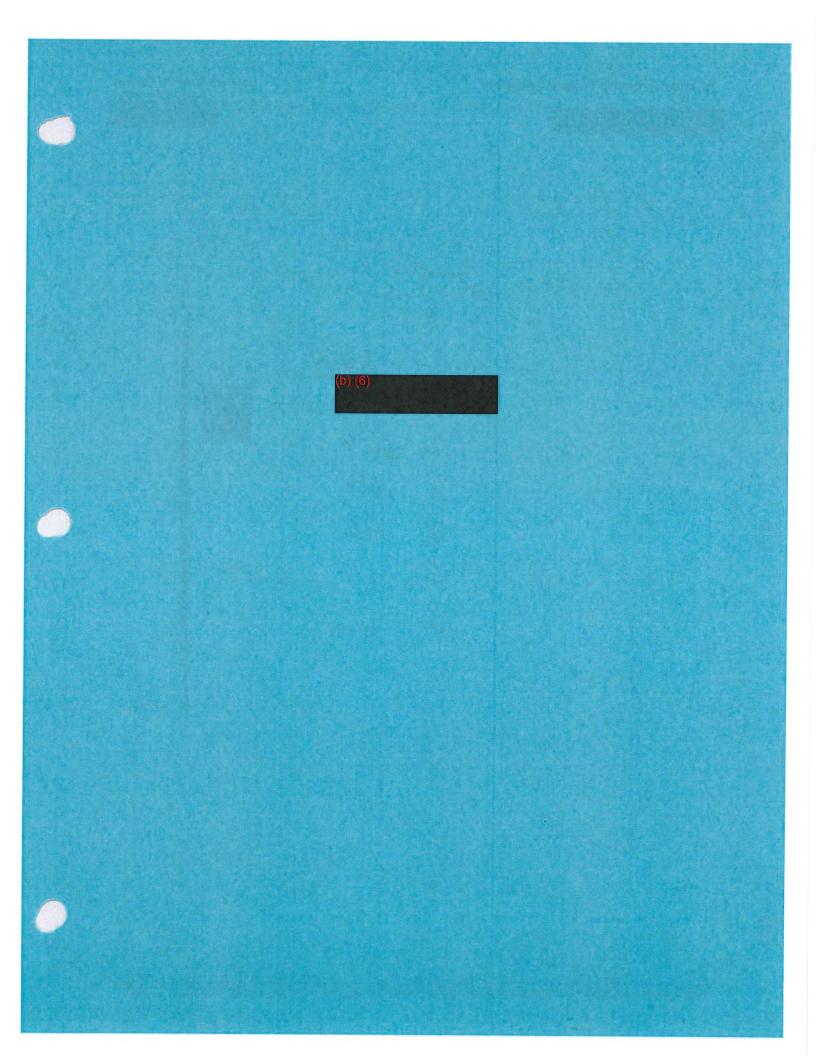
Prepared By:	
Name:	i the second sec
Signature:	Date:
Peer Reviewed By:	A
Name:	
Signature:	Date:

	· 'R'H	ESAMPL	E	JUN 6 19	66	a a	
AFSN:	(6)		INTERN	AL DOSE DATA			
NAME (LAST, FIRST,	M.f.) (1-20)	LANCE MARKET	SOC SE	C NO (21 - 29)	TYPE SAM	PLE (30)	TYPE ANAL. (31-3
SAMPLE NO. (33-38			IC	<i>1</i>	Ur	ine	
	91	8 8 10 10 10 10	ATE (39-44)		4.4	EXPOSURE	//
66-3271 BASE (57-60)			June 66	TO		DATE Jan	66 TYPE
Toul Rosie	res	************************************	(01 - 02)	HEQUESTED BY			
DATE RECEIVED		SAMPLE VO	DLUME	VOLUME ANALYZE	ED.	DATE ANALYZ	FO.
6 June 196	6	1 6	070 ml	370 n	nl		
TECHNICIAN (SIGNA	ATURE AND DATE)	, X	7.0	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		,	
URINE	216	239	GROSS of	RADON		FEC	ES/BLOOD
Counter Number	1		F	Chamber Number		Counter	
Counter Bkg. (cpm)			425 (38 6)			Counter	
Counter Eff. (%)	31.8		51	Counter Eff. (%)		Counter	
Date/Time - Start	24 SEP	766	19 Sept	Millivolt - Start		Date/Tin	ne Start
-Stop				Millivolt - Stop		3 4 7 9 9	- Stop
Total Counts	-		194	Total Millivots		Total Co	unts
Counting Time /00	250	/	55	Total Drift Time		Counting	Time
ross cpm				Gross my/sec		Gross cp	m.
3kg. Cpm 466	3	<b>/</b>		Bkg. Mv/sec		Bkg. cpm	
Net cpm	ļ		41 900	Net my/sec		net com	1-8-9-2
pm	<b>}</b>		% REC	curies/mv		dpm	
pm/24 hr. (69 - 74) 40 Correction	<b>[</b>		= 207%	litter (69 - 74)		dps/cc	
let Beta				544 442 444			lose (rads) (63-68)
(q) (63 · 68)	<b></b>		477	D(q) (63-68)		uc/mg (	
(4) (65-66)	1			E		D(q) (63	- 68)
				A			
IAME:			16	OCIAL SEGURITY AND			
			1°	OCIAL SECURITY NU	mack:	s	AMPLE NUMBER:
IR FORCE BASE							
						* .	
RESULTS OF ANALY	SIS / LD	200	V Decin	ENT "A".	Cana	16	
PC/SPL=	LIND	WHICH	HUCIO	ENI A	אויוחב	LE STATE OF THE ST	2 SEPT 237%
						TAREC.	5 237%
	670 M	c. Voc	· ANAL #	370 ML.		GODY A	
						4001 3	-40600
707. VOL =			:			4.	
707. VOL =	mple for the foll	owing reason				A -70	
To T. VOL &					14		
Repeat the sor	mple for the foll	ecently analys		7)2	01/	IR	
Repeat the sor  ( ) Signification ( ) Data requirements	mple for the foll ant activity in r	ecently analys		Do	01	IR	111.5
Repeat the sor  ( ) Signification  ( ) Data req  ( ) Improper	mple for the foll	ecently analys		Do	01	TH	1112
Repeat the sor  ( ) Significa  ( ) Data req  ( ) Improper  ( ) Other	mple for the foll ant activity in r juired to establi r flask used	ecently analys		DO ME	OV	IR 	IKE
Repeat the sor  ( ) Signification ( ) Data req ( ) Improper ( ) Other ( ) Suggeste	mple for the foll ant activity in r	ecently analys		DO ME	OV	IR Sp	IKE
Repeat the sor  ( ) Significa  ( ) Data req  ( ) Improper  ( ) Other	mple for the foll ant activity in r juired to establi r flask used	ecently analys		DO ME	OV CH		IKE
Repeat the sar  ( ) Significate ( ) Data req ( ) Improper ( ) Other ( ) Suggeste	mple for the foll ant activity in r juired to establi r flask used	ecently analys		DO M&			IKE

	N N N	RAI	DIOLOG	ICAL SA	MPLE	DĄTA	Maria Laboration	71		
E OR REQUESTOR'S ID (1-	20)	GRADE		AFSN			SECURITY NUMBE	R	RHL SAMPLE NUMBER -	
PE SAMPLE (23-32)	OCCUPATION (34-35)	ANALYSIS I	ESIRED		REQUEST	ED BY		AIR	AIR FORCE BASE (68-71)	
ATE RECEIVED (37-42)	DATE ANALYZED	(51-56)	DATE	SUNTER C		DATE	OLLECTED		EXPOSURE DATE	
AMPLE WEIGHT/VOLUME	1	WEIGHT	/VOLUME		300		TECHNICI.(D)			
THER DATA						e	hac bed	Ol	Mrs. Kerly	
NVIRONMENTAL SAMPLES						× 1	222	11:	<del>}                                    </del>	
OUNTER & EFFICIENCY				7 2 2 2				V		
OTAL COUNTS & MINUTES										
ROSS CPM										
KG CPM & MINUTES		Sec. 4. 195			140			_	the second second second second	
IET CPM			1	1					10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
rield										
							-			
		750		- 3	79					
		236			7		RADON			
BIOLOGICAL SAMPLES		3/18								
COUNTER & EFFICIENCY	pec	70		1						
TOTAL COUNTS & MINUTES	100	10								
GROSS CPM	440	,	<u>_</u>	- 3						
BKG CPM & MINUTES	440									
NET CPM										
YIELD	01047 £	0.047	-	-						
	010712	U. U.T.								
							10			
		,								
SUMMARY OF RESULTS:	1				0/	2	66.9 .r.Jer-			
Pai	ISOL- NOF	ľ.			100	es -	וישש			
7.7	15pl- NDF UOL-670				. 2	L. R.	rder-			
70±	Mal - 300				PA	7 014	y = ·			
Vol	AD. AL - 100	•								

NAME (LAST, FIRST, M.I.) (1-20)	INTE	RNAL DOSE DAT	Α		1971
(b) (6)	Alic	SEC. NO. (21 - 29)	TYPE SAMP	LE (30)	DAUSS ALPHA
BASE (57-60) TOW I COSIETTE, France OATE RECEIVED FFB 1 () 1966	OCCUPATION (61 - 62)	REQUESTED BY	4	DATE 18	Fenc. TYPE
FEB 1 U 1966 TECHNICIAN (SIGNATURE AND DATE	1500	VOLUME ANALYZ	ED	DATE ANALYZE	:O
	(b) (6) SSGV.	USAF	1	4 FEB 1966	7 1
Counter Number Nata A		RADON			5 /51 555
71/10/11		Chamber Number		. Counter N	S/BLOOD
Pre		Cham. Bkg. (mv/sec	)	Counter B	
Pate/Time - Start		Counter Eff. (%)		Counter E	
-Stop 4 FEB 1965		Millivolt - Start		Date/Time	
Total Counts 50		Millivolt - Stop		Date/ time	- Stop
ounting Time 55		Total Millivots	1 1	Total Cour	
ross cpm 0.91		Total Drift Time		Counting T	
kg. Cpm 0.24		Gross my/sec		Gross cpm	ime
let cpm 0.67		Bkg. Mv/sec		Bkg. cpm	
pm Pcill 2.96 11.25		Net mv/sec		net cpm	
pm/24 hr. (69 - 74)		curies/mv		dpm	
40 Correction		litter (69 - 74)	10.	dps/cc	
4 Borge: Sel 116+0.7				Neutron Do	se (rads) (63-68)
(q) (63-68)	^	10 ic 26		uc/mg (69	• 74)
	Va = 1.15 x	10-1		D(q) (63-6	

$$\frac{3271}{1.2047\pm047}$$
 $\frac{1.2047\pm047}{2.66.9}$ 
 $\frac{3.67}{4.140}$ 
 $\frac{3.67}{5.67}$ 
 $\frac{6278}{6.02}$ 



(b)	(6)	350	H		94	9
()						

Internal Dosimetry	y Evaluation Form			
NAME:(b) (6)	SSN: (b) (6)			
IODE OF INTAKE:    Inhalation				
SUMMARY OF EXPOSURE CONDITIONS: Radionuclides/Respiratory Class/Particle Size: <sup>239</sup> Pu/100% C Date or Period of Evaluated Data: 2 samples, 2/7/66 and 6/1/6 Duration of Exposure: Unknown Location of Exposure: Camp Wilson, near Palomares, Spain	Class Y/1 µm AMAD 66			
Nasal Smears Attached In Vivo Attached	In Process  Unavailable			
Decorporation: ☐ Yes ☐ Catharsis: ☐ Yes ☐	No         Date:			
EVALUATION METHODOLOGY: Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100% Class  Code/Model used for: Intake Estimate: CINDY, Ver. Dose Estimate: CINDY, Ver.	~			
RESULTS SUMMARY Estimated Intake Activity (pCi): 210000 50 YR CEDE (rem): 65 (0.65 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes	YR CDE (rem/Sv) 650/6.5 240/2.4 120/1.2 51/0.51 11/0.11 9.4/0.094			
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:			
Signature:	Signature:			
Print Name:	Print Name:			
SSN:	SSN:			
RECOMMENDATIONS:  Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions:  N/A	nalysis			

#### **Internal Dosimetry Case Narrative**

#### **Identification:**

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

#### **Previous Intake/Dose Assessments:**

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): <sup>239</sup>Pu.

#### Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 1/29/66. The date is the midpoint of the period on station from 1/20/66 to 2/7/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-464	G	2/7/66	0.500	0.350	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
66-3270	AS	6/1/66	0.146	0.147	✓
66-3270	G	6/1/66	NR	NR	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

#### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	210,000	65/0.65
LUDEP	591,000	42/0.42

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	9.4E+00/9.4E-02	2.5E-01	2.3E+00/2.3E-02
Breast	3.1E-04/3.1E-06	1.5E-01	4.7E-05/4.7E-05
Red Marrow	5.1E+01/5.1E-01	1.2E-01	6.1E+00/6.1E-02
Lung	2.4E+02/2.4E+00	1.2E-01	2.9E+01/2.9E-01
Thyroid	2.9E-04/2.9E-06	3.0E-02	8.8E-06/8.8E-06
Bone Surface	6.5E+02/6.5E+00	3.0E-02	2.0E+01/2.0E-01
Liver	1.2E+02/1.2E+00	6.0E-02	7.0E+00/7.0E-02
Other	1.1E+01/1.1E-01	6.0E-02	6.7E-01/6.7E-03
Lower Large Intestine	2.4E-02/2.4E-04	6.0E-02	1.4E-03/1.4E-05
Upper Large Intestine	8.0E-03/8.0E-05	6.0E-02	4.8E-04/4.8E-06
Small Intestine	1.6E-03/1.6E-05	6.0E-02	9.8E-07/9.8E-07
Effective Dose Equivale	ent		6.5E+01/6.5E-01

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. The sample analyzed by gross alpha counting only was not included in the analysis since it was an on-site sample with a result >0.1 pCi, leading to a suspicion of sample contamination. The result was fit using CINDY and the Jones excretion model, to estimate an intake (210,000 pCi), organ doses, and a CEDE (65 rem/0.65 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 591,000 pCi and a CEDE (ICRP-60) of 42 rem (0.42 Sv).

DRAFT

Revised Dose Evaluation Report April 2001



b) (6)

#### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 210,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 65 rem (0.65 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is more than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not normally associated with these dose levels. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Frepared By:		
Name:		
Signature:	Date:	
Peer Reviewed By:		
Name:		
Signature:	Date:	

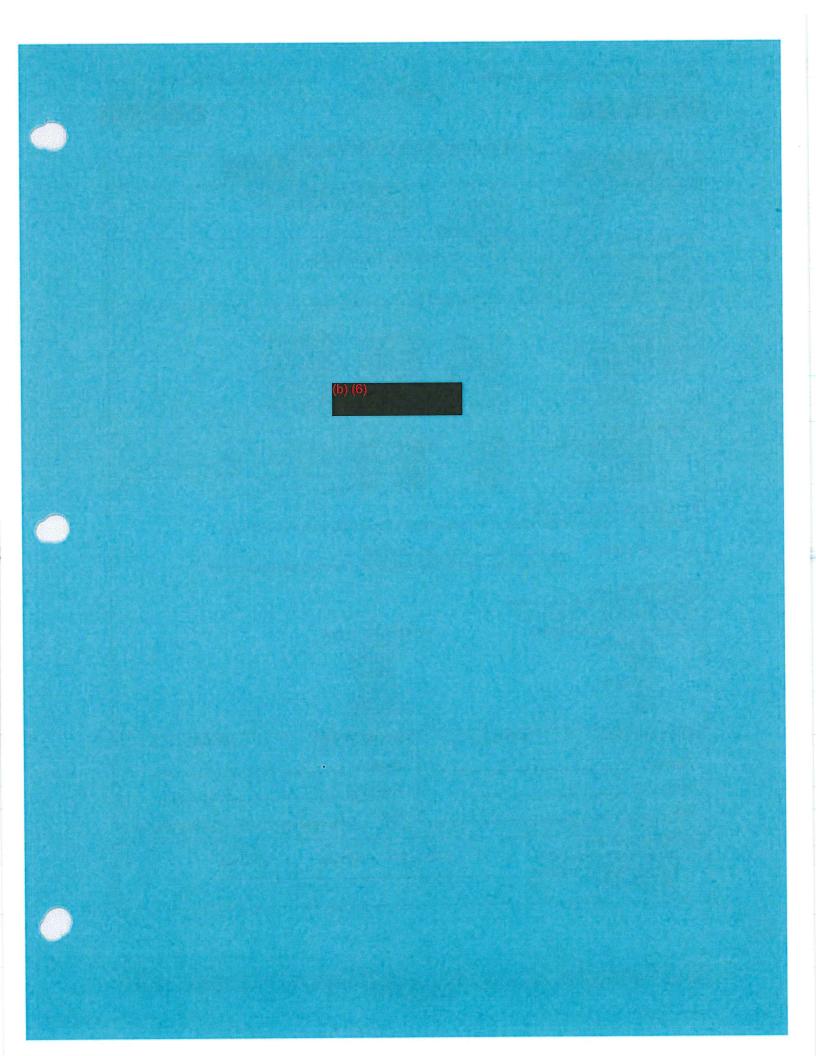
- 7	1250	-	- 4
21			
	w,		

	RESAMPLE	JUN 6 1966			7
AFSN: (6) (6)		AL DOSE DATA			4
AF SIN: MALL (1-20)	SOC. SEC	. NO. (21-29) TYPE SAM		TYPE ANAL. (31 - 32)	- 1
b) (6)	SSgt	(6)	rine		$\dashv$
MPLE NO. (33-38)	SAMPLE DATE (39-44)		DATE Jan	66 TYPE	
66-3270	FROM 1 June 66	TO REQUESTED BY	John Jan	100	$\neg$
NSE (57 - 60)	OCCUPATION (61 - 62)	MEGGEOTES 5.			
Toul Rosieres	SAMPLE VOLUME	VOLUME ANALYZED	DATE ANALYZ	ED	
6 June 1966	EED/860	1060			_
ECHNICIAN (SIGNATURE AND DAT					
CHAICIAN (SIGNATURE)					$\dashv$
URINE		RADON		ES/BLOOD	$\dashv$
ounter Number		Chamber Number	. Counter		$\dashv$
ounter Bkg. (cpm)		Cham. Bkg. (mv/sec)	Counter		$\dashv$
ounter Eff. (%)	1	Counter Eff. (%)	Counter		
te/Time - Start		Millivolt - Start	Date/Ti	me — Start	$\dashv$
-Stop		Millivolt - Stop		- Stop	
		Total Millivots	Total C	ounts	-
otal Counts		Total Drift Time	Countin		
ounting Time		Gross mv/sec	Gross c	pm	_
oss cpm		Bkg. Mv/sec	Bkg. cp	m	$\dashv$
kg, Cpm		Net my/sec	net cpm		-l
et cpm		curies/my	dpm		-1
pm (24) (40, 74)		litter (69 - 74)	dps/co		
pm/24 hr. (69 - 74) ( 40 Correction				Dose (rads) (63-68)	
let Beta		D(q) (63-68)		(69 - 74)	-
(q) (63-68)	Nen- +· 1	cavery (24,608	D(q) (	53 - 68)	-
7(4) (65-66)	The . The	de la		and the second s	-
	y	V			
NAME:	The state of the s	SOCIAL SECURITY NUMBER:		SAMPLE NUMBER:	
AME:					
IR FORCE BASE					
AIR FORCE BASE					
AIR FORCE BASE					
AIR FORCE BASE	$\mathcal{L}_{\mathcal{L}}$	1 1			
,	<u> </u>	in Pigent			
,	folu	in Pipeut			
,	foli	in-Pipeut			
RESULTS OF ANALYSIS		in-Pipeut			
RESULTS OF ANALYSIS  Repeat the sample for the	e following reason:				
RESULTS OF ANALYSIS  Repeat the sample for th	/ ne following reason: y in recently analyzed sample(s)				
RESULTS OF ANALYSIS  Repeat the sample for th  ( ) Significant activity  ( ) Data required to e	/ se following reason: y in recently analyzed sample(s) stablish dose				
RESULTS OF ANALYSIS  Repeat the sample for th	/ se following reason: y in recently analyzed sample(s) stablish dose				
RESULTS OF ANALYSIS  Repeat the sample for th  ( ) Significant activity  ( ) Data required to e	/ se following reason: y in recently analyzed sample(s) stablish dose				
RESULTS OF ANALYSIS  Repeat the sample for th  ( ) Significant activit  ( ) Data required to e  ( ) Improper flask use  ( ) Other	/ ne following reason: y in recently analyzed sample (s) stablish dose				
RESULTS OF ANALYSIS  Repeat the sample for th  ( ) Significant activit  ( ) Data required to e  ( ) Improper flask use  ( ) Other  ( ) Suggested samplis	/ ne following reason: y in recently analyzed sample (s) stablish dose		DATE:		
RESULTS OF ANALYSIS  Repeat the sample for th  ( ) Significant activit  ( ) Data required to e  ( ) Improper flask use  ( ) Other	/ ne following reason: y in recently analyzed sample (s) stablish dose		DATE:	C-WPAFB-APR 66 25	

		(6)		AL DOSE DATA	SAMPLE (3	101	TYPE ANAL. (31-32
NAME (LAST, FIRST, M	.1.) (1-20)	,	SOC. SE	C. NO. (21 - 29) TYPE	. SAMPLE (-	.0,	GROSS ALPHA
b) (6) Sample No. (33-38)	66-464	S/SAMPLE DATE	(39-44) ttel -	7 Feb 66	EXP	SURE ON	1 - 20 fam 66
BASE (57 - 60)		OCCUPATION	(61 - 62)	REQUESTED BY			
Tow - Row		SAMPLE VOLU	ME	VOLUME ANALYZED	DAT	E ANALYZ	ED
<b>~</b> FEBTVf966	)	375 m	I	200 ml-			
TECHNICIAN (SIGNA	TURE AND DATE)			EDWARDS	4 FEB	1966	
URINE	ROSS ALPI	SSG	Т.	USAGON		FEC	ES/BLOOD
	B	-		Chamber Number		. Counter	Number
Counter Number	015			Cham. Bkg. (mv/sec)		Counter	Bkg.
Counter Bkg. (cpm)	C/3			Counter Eff. (%)		Counter	Eff.
Counter Eff. (%)				Millivolt - Start		Date/Ti	me - Start
Date/Time - Start 1	1 FEB 1966			Millivolt - Stop			- Stop
-Stop	105			Total Millivots		Total Co	ounts
Total Counts	55			Total Drift Time		Counting	Time
Counting Time	0.45			Gross my/sec		Gross c	pm
Gross cpm	0.15			Bkg. Mv/sec		Bkg. cpi	m
Bkg. Cpm	0.30	<u> </u>		Net my/sec		net cpm	0/18
Net cpm	1.33±0.90			curies/mv		dpm	3
domPeil		-		litter (69 - 74)		dps/cc	
dpm/24 Hr. (69-74)	<u> </u>	-		111131 141 141		Neutron	Dose (rads) (63-68)
				D(q) (63-68)			(69 - 74)
K 40 Correction	ONO TO!	4			5 Feb 6		

(b) (6)

WE OF FERMI	-		RAL	DIOLOG	ICAL SA	MPLE I	DATA				-
NAME OR REQUESTOR'S ID (1	-20)		GRADE		W. Cont. of 100	THE RESERVE TO SHARE	-	SECURITY NUMBE	R	RHL SAMPLE NUMBER	7
TYPE SAMPLE (23-32)	OCCUPATION (34-35)	AN	LYSIS DI	ESIRED	1.10.1	REQUEST	D BY			66-3270 B -	
DATE RECEIVED (37-42)	DATE ANALY	ED (51-	56)	DATA C	CF66	Att.	DATE CO	II ECTED			
SAMPLE WEIGHT/VOLUME		T	WEIGHT/	VOLUME A	NALYZED .	and the gardening	111	(5)		EXPOSURE DATE	
OTHER DATA					14.7	00 mc	the state of	TECHNICI (D)	(0)		
NVIRONMENTAL SAMPLES					:0.	Soll in the	114 11	cheel	20	012 APS	0
OUNTER & EFFICIENCY								- nu	(بع	March -cx	Ċ,
OTAL COUNTS & MINUTES											
ROSS CPM					12.5					- 21	_
KG CPM & MINUTES						A) -	· ·				
ET CPM					-	140					
IELD					-	. 19	College V	1 4			_
						1.4					_
						1-1	•			<del></del>	_
		20	7								
OLOGICAL SAMPLES			6		2	39					
OUNTER & EFFICIENCY 5	2#4	23,	0				R	ADON	-		
TAL COUNTS & MINUTES	100	48	<u> </u>					F-51			
ROSS CPM		78						55- 75		-	_
G CPM & MINUTES	445	7		-				33-73			_
T CPM	743	2			0			935-78			_
ELD								755-78		<u> </u>	_
0./46	+ 0.147			-							-
	-							-	-		_
								110	-11	-	_
								0/ 1/2	10	1	_
								101	70	-	_
								·			_
MMARY OF RESULTS:	17		-								
	Pullspl= ToT UoL=	Aris.			0/	R	12				
	TT 11	LANG			4	165= 1	115	2	UK.N	4 NOWE	-1
	191 OST=	186	٥		0	1. P.	1 .	•	14.0	7 270 770 4	- 1
	UDL ANAI				130	Rec= (	agh 2			DEROSIT	- 1
	CON HICH	40	0			200				10 8	- 1



DRAFT

b) (6)

(b) (6)

Inter	nal Dosimetry Evalu	ation Form	
NAME: (b) (6)		SSN: (b) (6)	
☐ Ingestion ☐ A	jection 2/5/66 th bsorption 2/15/66 ot applicable NS: ze: <sup>239</sup> Pu/100% Class Y/1 µ , 2/26/66	E DATE OR PERIOD: arough 2/26/66, onsite	
Health Physics Survey Data  Bioassay – Urinalysis Fecal Nasal Smears	Attached	<ul><li>☑ Unavailable</li><li>☐ Unavailable</li><li>☑ Unavailable</li><li>☑ Unavailable</li><li>☑ Unavailable</li></ul>	
Skin Decontamination:  Decorporation:  Catharsis:	Yes No Age Yes No Age	e: Date	
EVALUATION METHODOLOGY: Assumptions: Acute inhalation intake of <sup>2</sup> Code/Model used for: Intake Estimate: Dose Estimate:	CINDY, Ver. 1.4/JONES	MAD particle size on 2/15/66  , Part 4, General Systemic Mo	
RESULTS SUMMARY Estimated Intake Activity (pCi): 7700 50 YR CEDE (rem): 2.4 (0.024 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes	50 YR CDE (1 24/0.24 8.8/0.00 4.3/0.00 1.9/0.01 0.41/0.00 0.34/0.00	rem/Sv) 	uei
DOSE ASSESSOR: DATE: _	PEER RE	VIEWER: D.	ATE:
Signature:	Signatur	e:	
Print Name:SSN:		me:	
RECOMMENDATIONS: Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions: N/A		∏ Fecal ∏ In Vivo	)





# **Internal Dosimetry Case Narrative**

### **Identification:**

Name: SSN:



### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

## **Previous Intake/Dose Assessments:**

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

## Other Information:

None.

Radionuclide(s): <sup>239</sup>Pu.

## Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/15/66. The date is the midpoint of the period on station from 2/5/66 to 2/26/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

		Sample	Result	Error	
Sample	Analysis*	Date	(pCi/day)	(pCi/day)	Included
66-1430	AS	2/26/66	NR	NR	
66-1430	G	2/26/66	ND	ND	✓
* G means g	ross alpha countir	ng; AS means a	alpha spectrome	try.	

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

# Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	7,700	2.4/0.024
LUDEP	38,300	2.7/0.027

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ	
	Dose Equivalent	Weighting	Dose Equivalent	
Organ	(rem/Sv)	Factors	(rem/Sv)	
Testes	3.4E-01/3.4E-03	2.5E-01	8.6E-02/8.6E-04	•
Breast	1.1E-05/1.1E-07	1.5E-01	1.7E-06/1.7E-08	
Red Marrow	1.9E+00/1.9E-02	1.2E-01	2.2E-01/2.2E-03	
Lung	8.8E+00/8.8E-02	1.2E-01	1.1E+00/1.1E-02	
Thyroid	1.1E-05/1.1E-07	3.0E-02	3.2E-07/3.2E-09	
Bone Surface	2.4E+01/2.4E-01	3.0E-02	7.2E-01/7.2E-03	
Liver	4.3E+00/4.3E-02	6.0E-02	2.6E-01/2.6E-03	
Other	4.1E-01/4.1E-03	6.0E-02	2.4E-02/2.4E-04	
Lower Large Intestine	8.7E-04/8.7E-06	6.0E-02	5.2E-05/5.2E-07	
Upper Large Intestine	2.9E-04/2.9E-06	6.0E-02	1.8E-05/1.8E-07	
Small Intestine	6.0E-05/6.0E-07	6.0E-02	3.6E-06/3.6E-08	
Effective Dose Equivale	ent		2.4E+00/2.4E-02	

One urine sample was analyzed by gross alpha counting and alpha spectrometry. The alpha spectrometry analysis was not included in the modeling since no result was reported. The gross alpha counting result was reported as No Detectable Activity. A value of 0.009 pCi was used to represent this outcome. The result was fit using CINDY and the Jones excretion model, to estimate an intake (7,700 pCi), organ doses, and a CEDE (2.4 rem/0.024 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 38,300 pCi and a CEDE (ICRP-60) of 2.7 rem (0.027 Sv).

### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 7,700 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 2.4 rem (0.024 Sv). That dose is less than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the

health effects are not associated with that dose level.

DRAFT

current level (0.100 rem) for members of the public. It is far less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious

Revised Dose Evaluation Report April 2001

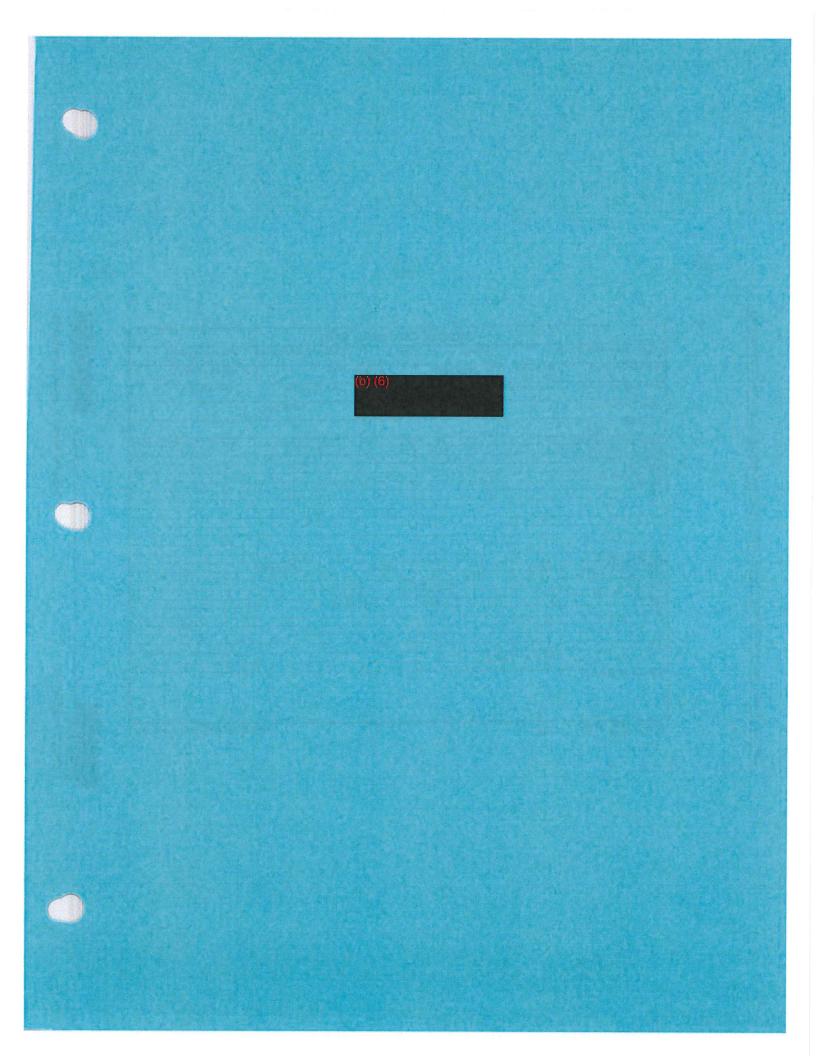
a de la					MAR 9	1966	X	
AESN: (b)	(6)			NAL DOSE DATA				
NAME (LAST, FIRST, R		SAMPLE DA	(b) (G)	TYPE	SAMPLE (3	10)	GROSS	ALPHA
66-1430 BASE (57-60)	1.95%		TE (39-44) FEB 60 N (61-62)	то	EXP.	ATE 5-2	-GG TYPI	:
TORKOTO	N	908-						
9 MARG	6	78	-UME	S//	DATE ANALYZED			
TECHNICIAN (SIGNA	TURE AND DATE)		<u> </u>					
URINE	233	236		RADON		FECES	/BLOOD	
Counter Number				Chamber Number		. Counter Nu		
Counter Bkg. (cpm)				Cham. Bkg. (mv/sec)		Counter Bl	g.	
Counter Eff. (%)				Counter Eff. (%)		Counter Ef	*	
Date/Time - Start	11 MAY 66			Millivolt - Start		Date/Time	- Start	
-Stop				Millivolt - Stop			- Stop	
Total Counts	0	11		Total Millivots		Total Coun		1
Counting Time	102	100		Total Drift Time		Counting T		Ro Socret
Gross cpm	0	0.11		Gross my/sec		Gross cpm	Mary Control	J. Wallet
Bkg. Cpm	0.002	0,004		Bkg. Mv/sec		Bkg. cpm		n/01
Net cpm	٥	0,106		Net my/sec		net cpm	-	NON
dpm % AEC		49%		curies/mv		dpm		
dpm/24 hr. (69 - 74)				litter (69 - 74)		dps/cc		
K 40 Correction							se (rads) (63	(8)
Net Bero Fils DAL				D(q) (63 - 68)		uc/mg (69		55/1
D(q) (63-68)	10.0.9.					D(q) (63-		

b) 6)

	and the second second	RA	DIOLOGI	CAL SA	MPLE DA	ĄΤΑ			
NAME OR REQUESTOR'S ID (1-	-20)	GRADE		AFSN	1	SOCIAL	SECURITY NUMBER		RHL SAMPLE NUMBER
TYPE SAMPLE (23-32)	OCCUPATION (34-35)	ANALYSIS	DESIRED		REQUESTED	ВҮ		AIR I	FORCE BASE (68-71)
DATE RECEIVED (37-42)	DATE ANALYZ	ED (51-56)	DATE CO	JUL 1966		DATE C	OLLECTED		EXPOSURE DATE
SAMPLE WEIGHT/VOLUME		WEIGHT	T/VOLUME AN		7 3 3 3 3		TECHNICIAN		
OTHER DATA . 939	.,					2 2 7			
ENVIRONMENTAL SAMPLES								-	
COUNTER & EFFICIENCY						-		_	
TOTAL COUNTS & MINUTES									
GROSS CPM									
BKG CPM & MINUTES							7.1.		1 1 1 1 1 1 1 1 1
NET CPM YIELD									
BIOLOGICAL SAMPLES		426		2 79			RADON		
COUNTER & EFFICIENCY	Sere	27.3		27.		<del></del>	2.11dpm		
TOTAL COUNTS & MINUTES	100	56		4		-	-1109	<u> </u>	
GROSS CPM			0.5600		0.04	C' ()			
BKG CPM & MINUTES	800	12	0.0150	8	0.010				
NET CPM			0.5450		0,030				
TIELD									
			-	17		-			
	Tiple	58.04							
						$ \tau$		200	100

AFLC FORM 1165

FC 5400 AELC WRAFE MAY SE AFO



0) (6)

	try Evaluation Form
NAME:(b) (6)	SSN: (b) (6)
MODE OF INTAKE:    Inhalation	gh 6/2/66
Nasal Smears Attached In Vivo Attached  Medical Treatment: Skin Decontamination: Yes Decorporation: Yes Catharsis: Yes	In Process
	No Date:
RESULTS SUMMARY	
Estimated Intake Activity (pCi): 240,000 50 YR CEDE (rem): 74 (0.74 Sv) Organ Dose Equivalent Summary Bone Surface	0 YR CDE (rem/Sv)
Lung Liver Red Marrow Other Testes	750/7.5 270/2.7 130/1.3 58/0.58 13/0.13
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:
Signature:	Signature:
Print Name:	Print Name:
SSN:	SSN:
RECOMMENDATIONS:  Additional Bioassay Required  Suggested Sampling Frequency:  Work Restrictions:  N/A	

# **Internal Dosimetry Case Narrative**

# Identification:

Name: SSN:



## **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

# Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

## Other Information:

None.

Radionuclide(s): 239Pu.

## Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 1/24/66. The date is the midpoint of the period on station from 1/18/66 to 1/31/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-267	G	1/21/66	NR	NR	
66-409	G	2/2/66	1.02	0.750	
66-568	G	2/4/66	1.86	0.089	
66-3407	AS	6/2/66	0.168	0.089	1
66-3407	G	6/2/66	NR	NR	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.

Waishado

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

# Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	240,000	74/0.74
LUDEP	680,000	48/0.48

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
_	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	1.1E+01/1.1E-01	2.5E-01	2.7E+00/2.7E-02
Breast	3.6E-04/3.6E-06	1.5E-01	5.3E-05/5.3E-07
Red Marrow	5.8E+01/5.8E-01	1.2E-01	6.9E+00/6.9E-02
Lung	2.7E+02/2.7E+00	1.2E-01	3.3E+01/3.3E-01
Thyroid	3.3E-04/3.3E-06	3.0E-02	1.0E-05/1.0E-07
Bone Surface	7.5E+02/7.5E+00	3.0E-02	2.2E+01/2.2E-01
Liver	1.3E+02/1.3E+00	6.0E-02	8.0E+00/8.0E-02
Other	1.3E+01/1.3E-01	6.0E-02	7.6E+00/7.6E-02
Lower Large Intestine	2.7E-02/2.7E-04	6.0E-02	1.6E-03/1.6E-05
Upper Large Intestine	9.1E-03/9.1E-05	6.0E-02	5.5E-04/5.5E-06
Small Intestine	1.9E-03/1.9E-05	6.0E-02	1.1E-04/1.1E-06
Effective Dose Equivale	ent		7.4E+01/7.4E-01

Three urine samples were analyzed by gross alpha counting only, and the fourth was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. One of the samples analyzed by gross alpha counting only was not included in the analysis since no result was reported. The other gross alpha results were excluded from the analysis because they did not fit the expected pattern of plutonium excretion and because they may have been contaminated during sample collection on the site. The remaining result was fit using CINDY and the Jones excretion model, to estimate an intake (240,000 pCi), organ doses, and a CEDE (74 rem/0.74 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 680,000 pCi and a CEDE (ICRP-60) of 48 rem (0.48 Sv).

DRAFT

Revised Dose Evaluation Report April 2001

b) (6)

When all results were included in a separate evaluation, CINDY produced estimated intake and CEDE of 970,000 pCi and 300 rem (3.0 Sv). LUDEP estimated intake and CEDE at 4,100,000 pCi and 290 rem (2.9 Sv).

# Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 240,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 74 rem (0.74 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is more than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). These doses are significant, although they are based in part, on samples collected on-site and potentially contaminated. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Prepared By:		
Name:		
Signature:	Date:	
Peer Reviewed By:		
Name:		
Signature:	Date:	

ne ji k me ke				·	المنطقا	24.		A . 1 . E	
• 0	•		RES	SAMPLE J	JUL 14	1966		ゴ	4079
AFSN: (b) (6)	)		INTERN	AL DOSE DATA	1				
NAME (LAST, FIRST, M		GT	SOC. SE (b) (6	C. NO. (21-29)	TYPE SAMP Urin			TYPE ANAL.	(31-32)_
SAMPLE NO. (33-36)		SAMPLE DA	TE (39-44)			EXPOS			
66-3407		FROM O	000 1 Jun	TO 0559 2 JE	ın 66	DA.	re Jan	66 TYPE	PP
BASE (57-60)	-	OCCUPATIO	N (61 -62)	REQUESTED BY					
Ramstein				1.			*****		
DATE RECEIVED		SAMPLE VO		VOLUME ANALYZ		DATE	ANALYZE	.0	
14 June 1966		100	90 ml	600 300 m	7-1		<u></u>		
TECHNICIAN (SIGNAT		ee 2	Sept	C	le ha	Va	1 ma	sto In	
URINE	236	239		RADON		- /	FECE	S/BLOOD_	
Counter Number				Chamber Number	E	· Ų	Counter N	lumber	
Counter Bkg. (cpm) %	7	1	T=128	Cham. Bkg. (mv/sec	:)		Counter E	Skg.	
Counter Eff. (%)	3/18	31.8	1-1	Counter Eff. (%)	51		Counter E	ff.	
Date/Time - Start				Millivolt - Start			Date/Tim	e - Stort	
-Stop				Millivolt - Stop			Q	- Stop	
Total Counts	70	4		Total Millivots			Total Cou	unts	
Counting Time	100	100		Total-Cast Time	22		Counting	Time	
Gross cpm				Gross THY ZELL			Gross cpr	π	
Bkg. Cpm				Bkg. My/sec Cl	340	908)	Bkg. cpm		
Net cpm				Net my/sec			net cpm		/
dem % Rec	65,2%			curies/mv		-	dpm		
dpm/24 hr. (69 - 74)				1imor (69 74) % 6 /2	EC 86,	7	dps/cc		L
K 40 Correction								Dase (rads) (63	(68)
Her Bera Pai/SM	0,168 ± 0	1.089		D(q) (63-68)			uc/mg (		
D(q) (63-68)	1					L	D (q) (63	- 68)	L
								•	
NAME:				SOCIAL SECURITY N	UMBER:		5	SAMPLE NUMB	ERt
AIR FORCE BASE									
RESULTS OF ANALY	rsis	oh Re	:-65,2 gulden-1			Pau	miner R	aut	
Pu/sm -41683	ET 0,00 /	,	1. 1/20-1	0.06				C.II BB	<u>.</u>
Total Vol - 120	oo mi	Body	, uzaen			1.5	o gelk	0.11 10	
Vol ANALyzed	- 600 184							····	
Repeat the sa	mple for the fo	llowing reason	:						
( ) Signific	ant activity in	recently analy	zed sample(s)						
( ) Data re	quired to estab	lish dose							
( ) Imprope									
( ) Others									

ONE TIME FORM. OBSOLETE AFTER 30 JUN 66. (MCGSCPF, RAG, 4 APR 66)

( ) Suggested sampling schedule

SIGNATURE:

AFLC-WPAFB-APR 66 2500

	1	NTERN	AL DOSE DAT	A			
NAME (LAST, FIRST, M.I.) (1-20) (b) (6)			SOC. SEC. NO. (21-29)		NE (30)	GROSS ALPHA	
SAMPLE NO-(33-38)	SAMPLE DATE (3	9 - 44)	110000	1. 5	EXPOSURE		
(66-267)	FROM		то :	. 1	DATE	TYPE	
BASE (57-60) TORRETON	OCCUPATION (61		REQUESTED BY				
JAN 25 1966	750 m		200		DATE ANALY	ŽED	
TECHNICIAN (SIGNATURE AND DATE)	1 -		<del></del>		-L		
URINE GROSS ALPH	A		RADON		FE	CES/BLOOD	
Counter Number			Chamber Number		. Counter Number		
Counter Bkg. (cpm)			Cham. Bkg. (mv/se	c)	Counter Bkg.		
Counter Eff. (%)			Counter Eff. (%)		Counter Eff.		
Date/Time — Start			Millivolt - Start		Date/Time - Start		
-Stop			Millivolt - Stop	***************************************		- Stop	
Total Counts			Total Millivots		Total C		
Counting Time			Total Drift Time		Countin	-	
Gross cpm			Gross my/sec	1 18 111	Gross c		
Bkg. Cpm			Bkg. Mv/sec		Bkg. cp		
Net cpm			Net my/sec		net cpm		
1pm			curies/mv		dpm		
dpm/24 hr. (69 · 74)			litter (69 - 74)		dps/cc		
K 40 Correction						Dose (rads) (63-68)	
Net Beta			D(g) (63-68)			(69 - 74)	
D(q) (63-68)				26 Jan	D/-> //		

(b) (6)			TERNAL DOSE DATA	
		SAMPLE DATE (35	) (6)	AMPLE (30) TYPE ANAL. (31-3
86-40 BASE (57-60)	9	OCCUPATION (61 -6	266 TO 1300 Z Fel 66	EXPOSURE TYPE
66-40 BASE (57-60) LAMELIN A. DATE RECEIVED	g. Ger-			
9 Feb 66 TECHNICIAN ISIGNA		SAMPLE VOLUME	JODO	DATE ANALYZED
		WALTER C	. EDWARDS	1 1 FEB 1966
URINE Counter Number	GROSS ALP	SSGT.	<b>USA</b> 版DON	FECES/BLOOD
Counter Bkg. (cpm)	1 = 1		Chamber Number	. Counter Number
Counter Eff. (%)	0.31		Cham. Bkg. (mv/sec)	Counter Bkg.
Octo /Time Start	_5/_		Counter Eff. (%)	Counter Eff.
Oate/Time - Start 0	FEB 1966		Millivolt - Start	Date/Time - Start
otal Counts			Millivolt - Stop	- Stop
ounting Time	53		Total Millivots	Total Counts
ross cpm			Total Drift Time	Counting Time
kg. Cpm	0.67		Gross mv/sec	Gross cpm
let cpm	0.36		Bkg. Mv/sec	Bkg. cpm
	1.59 ±1.17		Net my/sec	net cpm
	107 5/11/		curies/mv	dpm
pm/24 hr. (69 - 74)			litter (69 - 74)	dps/cc
pm/24 hr. (69 - 74)		1		
pm/24 hr. (69-74) (40 Correction let Betale: /24/4 24	1 4 2 + 0.75		D(q) (63-68)	Neutron Dose (rads) (63-68)

2)

APO NY 09012

9 FEB. 66

1300 | FEB - 1300 2 FEB

1300 | FEB - 1300 2 FEB

1 BOTTLE

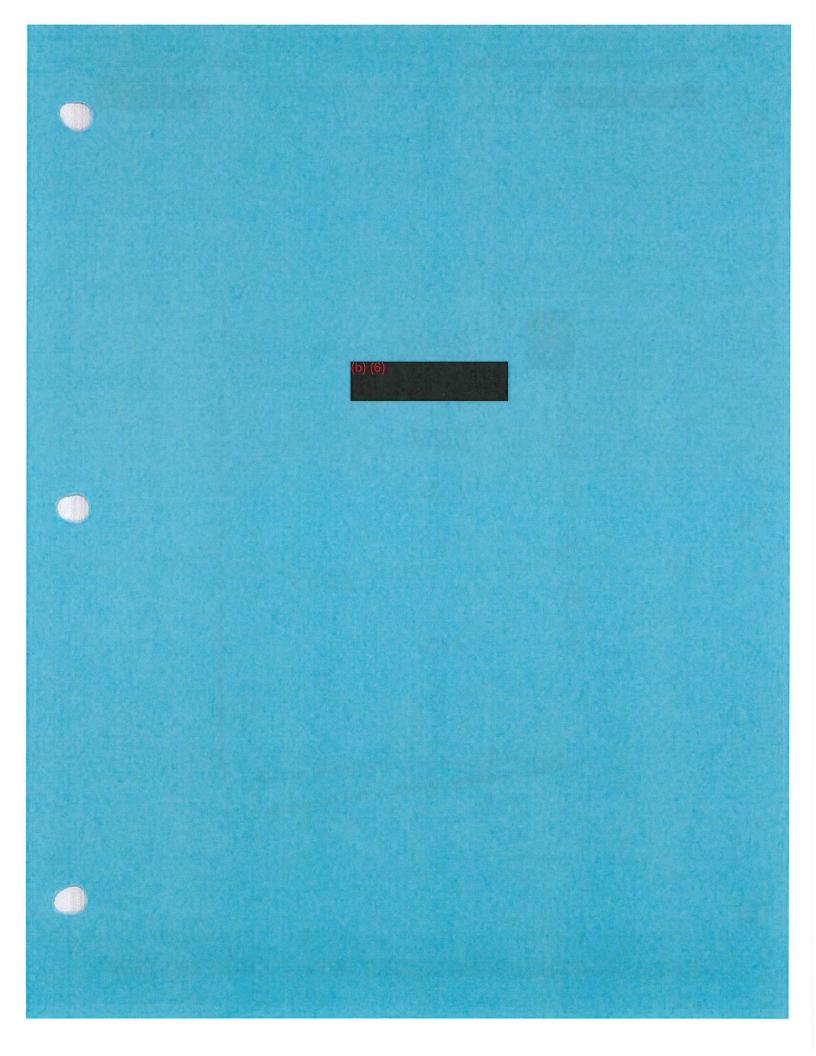
TOTAL SAMPLE YOL 640 ML

AMT USED 200 ML

NITRIC ACID 50 ML

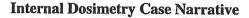
(b) (6)

(h) (C)	
(b) (b)	3407 168.± 20.50
/.	0.168 ± .08
2.	65.2
3.	1.2 128 6245
Н.	128
5,	6245
6.	0.06
	in the state of th
	®
A More	Physiological Approach to Oral Contraception
	Contraception



	imetry Evaluation Form
NAME: (b) (6)	SSN: (b) (6)
MODE OF INTAKE:   ☐ Inhalation ☐ Injection ☐ Ingestion ☐ Absorption ☐ Unknown ☐ Not applicab	
SUMMARY OF EXPOSURE CONDITIONS: Radionuclides/Respiratory Class/Particle Size: <sup>239</sup> Pu. Date or Period of Evaluated Data: 1 sample, 3/1/66 Duration of Exposure: Unknown Location of Exposure: Camp Wilson, near Palomares	
EVALUATION DATA:  Air Sampling	☐ In Process ☐ Unavailable ☐ In Process ☐ Unavailable ☐ In Process ☑ Unavailable ☐ In Process ☑ Unavailable ☐ In Process ☑ Unavailable
Medical Treatment:  Skin Decontamination: Decorporation: Catharsis: Surgical excision:  Yes Yes Yes Yes	☒ No       Date:         ☒ No       Agent:       Date:         ☒ No       Agent:       Date:
EVALUATION METHODOLOGY: Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100  Code/Model used for: Intake Estimate: CINDY Dose Estimate: CINDY	
RESULTS SUMMARY Estimated Intake Activity (pCi): 270000 50 YR CEDE (rem): 83 (0.83 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes	50 YR CDE (rem/Sv) 840/8.4 310/3.1 150/1.5 65/0.65 14/0.14 12/0.12
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:
Signature:	Signature:
Print Name:	Print Name:
SSN:	SSN:
RECOMMENDATIONS:  Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions: N/A	☐ Urinalysis ☐ Fecal ☐ In Vivo

# UKAFI



## Identification:

Name: SSN:



# **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

### **Previous Intake/Dose Assessments:**

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

# Other Information:

None.

Radionuclide(s): 239Pu.

### Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/8/66. The date is the midpoint of the period on station from 1/18/66 to 3/1/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	A a la : - *	Sample	Result	Error	
	Analysis*	Date	(pCi/day)	(pCi/day)	Included
66-1849	AS	3/1/66	0.259	0.151	1
66-1849	G	3/1/66	0.924	0.249	
		V 020			

(b) (6)

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

# Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	270,000	83/0.83
LUDEP	1,110,000	78/0.78

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	1.2E+01/1.2E-01	2.5E-01	3.0E+00/3.0E-02
Breast	4.0E-04/4.0E-06	1.5E-01	6.0E-05/6.0E-07
Red Marrow	6.5E+01/6.5E-01	1.2E-01	7.8E+00/7.8E-02
Lung	3.1E+02/3.1E+00	1.2E-01	3.7E+01/3.7E-01
Thyroid	3.8E-04/3.8E-06	3.0E-02	1.1E-05/1.1E-07
Bone Surface	8.4E+02/8.4E+00	3.0E-02	2.5E+01/2.5E-01
Liver	1.5E+02/1.5E+00	6.0E-02	9.0E+00/9.0E-02
Other	1.4E+01/1.4E-01	6.0E-02	8.6E-01/8.6E-03
Lower Large Intestine	3.1E-02/3.1E-04	6.0E-02	1.8E-03/1.8E-05
Upper Large Intestine	1.0E-02/1.0E-04	6.0Ē-02	6.2E-04/6.2E-06
Small Intestine	2.1E-03/2.1E-05	6.0E-02	1.3E-04/1.3E-06
Effective Dose Equivale	ent		8.3E+01/8.3E-01

One urine sample was analyzed by gross alpha counting and alpha spectrometry. The gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The result was fit using CINDY and the Jones excretion model, to estimate an intake (270,000 pCi), organ doses, and a CEDE (83 rem/0.83 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 1,110,000 pCi and a CEDE (ICRP-60) of 78 rem (0.78 Sv).

# **Conclusion:**

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 270,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 83 rem (0.83 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the

(b) (6)

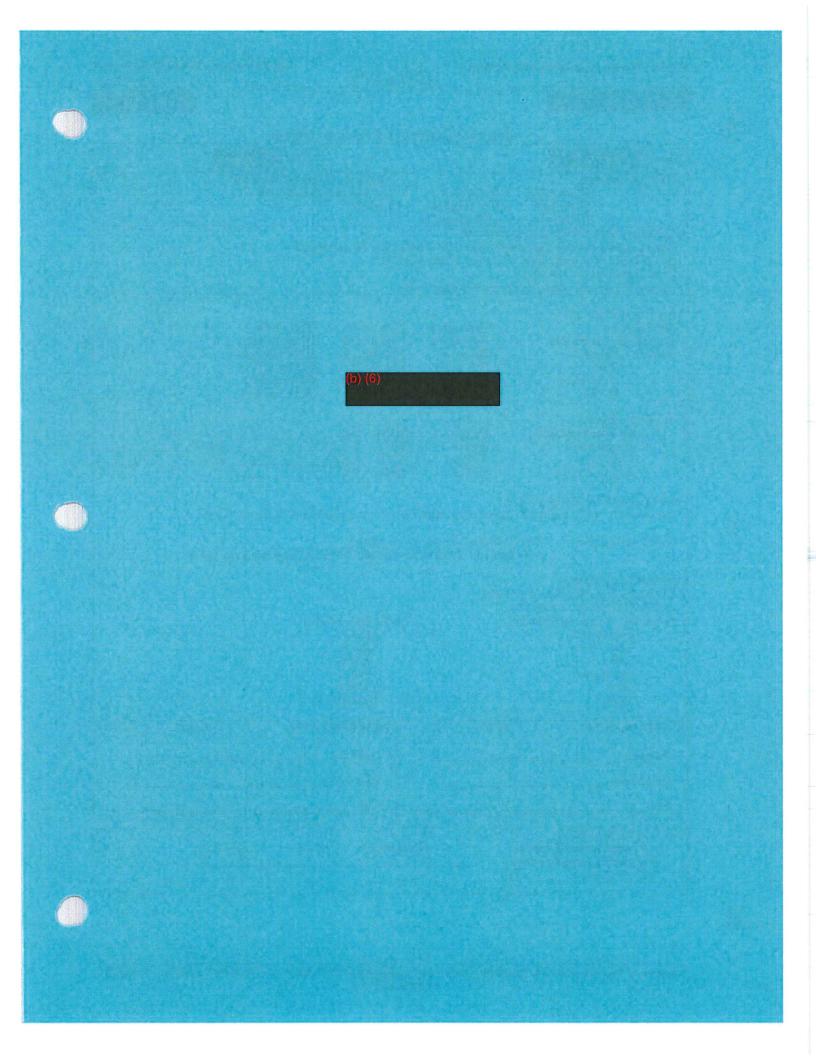
current level (0.100 rem) for members of the public. It is more than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). These dose levels are significant although base on only one data point. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Prepared By:		
Name:		
Signature:	 Date:	
Peer Reviewed By:		
Name:		
Signature:	Date:	

			<b>"过滤滤</b>		×	Maria Comment of the	O HEREN	
FSN: (b) (6)	Same?	. V . W . W . W.	INTERNA	L DOSE DATA			<b>大学教授</b>	
AME LLAST, FIRST, M.	1.) (1-20)	1 1 1 1 1 1	SOC. SEC.	NO. (21-29)	SAMPLE (30	TYPE ANAL.	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1
) (6)	LA	C AND PROPERTY	(10) (0)	4.2 - 01	ine same	ILIRE appropriate and the fear and	instruction and the	7
AMPLE NO. (33-38)	1 - 4 - 1	SAMPLE DATE	(39 - 4-1)	Mark Service (Co.)		TYPE	<b>美國國際</b>	38
66-1849	O'S SUPPLY	FROM 1 Ma	r 66 2000	REQUESTED BY	MARKET POLICE	Marking and the China of the	<b>正共产业的证据</b>	. At
ASE (57-60)	May Sugar		101-021				<b>经过度实验</b>	30
OTON	* *************************************	17150	ME and the second	VOLUME ANALYZED	DATE	ANALYZED	<b>WENTERS</b>	2
28 March 1966	1. 1. A. A.	95	9 2	91970		是一种的	The same of the sa	72.7
ECHNICIAN (SIGNAT		1 10 11 11 11 11	SA SA VIEW SANCES	TO THE REAL PROPERTY.	A SALES OF THE SALES			東方はないないないないないであることないで
ECHNICIAN (SIGNA)	A CONTRACT		TAN 4.44			<b>网络阿拉尔斯</b>	的情况的特殊。	3
* 1 1 nue		7		RADON		编译FECES/BLOOD ~	是自己的思想来	1
URINE	B		i. The Late	Chamber Number	MAN CONTRACTOR	Counter Number	<b>非特别的维护</b>	1
Counter Number	0.04 1900		The Thirty of	Cham. Bkg. (my/sec)	NAME OF TAXABLE PARTY.	Counter Bkg. Tellers	是其他性的分	4.4.4
	5/	- V.A. Mr.	F= 45 230	Counter Eff. (%)	をはなる。	Counter Eff.	<b>美国一种经济</b>	1
ounter Eff. (%)	13 May 16	J. J. March	COMPRESSION	Millivolt Start	ALCOHOL:	Date/Time - Start	THE STREET	1
ate/I Ime - Starr	12 may 66		THE PROPERTY.	Millivolt Stop 學是	を	特种的一个 Stop TE	新学 新学	1
	60	Rooston	1.000	Total Millivors	<b>海岸海岸</b>	MTotal Counts	www.mentputchandi	A to the part of the
otal Counts	55	0	C. Tark	Total Driff/Time Shall	CONTRACTOR OF THE PARTY	ACounting Time History	(智慧是新原理)	1 :
ounting Time	1.09	2015	4/100	Gross my sec while	NAME OF TAXABLE PARTY.	Gross cpm	TOWNER OF THE	1
ross cpm	0.04	0 021618	1 2 4 3	Bkg. My sed	標的翻點的影響	Bkg. cpm	NAM	1
3kg. Cpm	1.05	11 60 5 64	FALL WILLIAM	Net my sec was said	<b>海南海</b>	net com	一种明神阿尔斯斯	1
let cpm	0.964	t 0.260		curies/my		dom white was a series	"一种特殊是他	
om pull	101		, rajejivišti	litter (69-74)	<b>建筑建筑建筑</b>	dps/cc the the war	<b>计图图图图图</b>	1
lpm/24 hr. (69-74)		10 ty 6 10 %	- Charles and San	- AND THE PERSON NAMED IN COLUMN 1		Neutron Dose (rads) (6		1
K 40 Correction	0.924	±0.249	7 . Servicia	D(a) (63·68) 特殊	<b>建筑地域</b>	we/mg (69-74)	一种处理研究的	1
(q) (63-68)	0,124	1 - 0 1	and the	t via house of the party of the party of	的影響的	D(q) (63-68)		

TYPE SAMPLE (23-32)	OCCUPATION (34-35)	the state of the s	ALCOURTED BY	OLI ECTED WEST TO THE	
DATE RECEIVED (37-42)	DATE ANALYZE	(51-86) DATE COL	Were A Pro-	TYECHNICIAN XX	Marketing & State of Marketing State of the
SAMPLE WEIGHT/VOLUME	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	WEIGHT/VOLUMELANA	LYZED	TECHNICIAN CONTROL OF	The state of the s
OTHER DATA .956	Cly - Chillian - A	Carlo arms your	<b>中华的特别的</b>		A STATE OF THE STA
ENVIRONMENTAL SAMPLES	A STATE OF A STATE	Chillian Children Colorate	ANTHORNERS AND PROPERTY.	L. Mille Lond Strate St	SERVICE CONTRACTOR
COUNTER & EFFICIENCY	0.44	A STATE OF THE PARTY OF THE PAR	- ordenstrammentalists	CHARLES AND ANALYSIS OF THE PARTY OF THE PAR	war the start was
TOTAL COUNTS & MINUTES	and the second	ey . 19 ustratist	一下的大人的人工工作的工作的人工作的人工	Property of the second	الما والما المالية والمالية المالية ال
GROSS CPM	V. 19 1	1	THE PERSON AND PROPERTY OF THE	・関係は大きないからないからいからいからいからいません。	Silver on the strong and
BKG CPM & MINUTES		4 SLAPA SULEN	· colored designation of the colored and c		- aproportion of der the
NET CPM	- 200		· TANDAR SHEAD SHIRE ALSO NA SHEAD S	AND THE PROPERTY OF THE PARTY O	a representative the secondaries and
YIELD		and the second of a constitution	* 1 All life App Tallian New York of Control of the	a deposit helpsychological with the	いまなはないではいからいっちょうこと、アルカ
		· Anna Anna Anna Anna	A STANSON OF THE PROPERTY OF THE PARTY OF TH	A STORESTON CONTRACTOR STATE	professor wing as a mark
		and the second s	A SECTION AND ADDRESS OF THE PROPERTY ADDRESS	(Confidence of the second of the second	771 . 37 . h. h . L. 1
		The second second second second second	- Chille Street and the annihilate meticals	<b>東京教育をおけるというかいかいからない。</b>	with a seek for experience of the
			ACCOUNTY CONSTRUCTION PROPERTY AND	行は国際政治の国際の国際の共産党の行うとう。	2 11 104 241 14W AL BANK 104 1 THE CO.
	The second second		· 中心。	Interest to the State of the St	. 45 4 1 1 194 . The second
		The second secon	7 9. Q. oralletroissiliantly.	BADON SOMPTHETH NET	and the real probabilities and the
BIOLOGICAL SAMPLES	and the second second	236	- ムイフ・アンド いかがおおび間接続的	1888 2.160 dans	12,09 OPM
COUNTER & EFFICIENCY	Spie	27.3 178	Limited to the Control of the Contro	REPORTED TO THE TOTAL PROPERTY.	· Additional Control
TOTAL COUNTS & MINUTES	100	0.6100	こうしょうない はんかん かんかん アンターの (場合	The Tale of the Contract of th	COMPANY TO SERVED TO A SERVED TO
GROSS CPM	6.0	1 0.0012	TO SHOW DANGE OF THE	に、自然の情報とは国際の情報をおけれていています。た	· 中的社会的特殊的社会企业中的基础。
BKG CPM & MINUTES	800	0.6088	ALCONOMIC PARTICIONAL	人之明明是国际的国际社会产生的一种中心的对于一个	the of the price of the
NET CPM		END CA A	ACCORDING TO THE PROPERTY OF T	140, 234 20, 131 PUNE	Man of Manager of San
YIELD		and an analysister 9	- vinceles suprementation of a vinceles	これのないできないとなるというかんかい かっていたいかい シャイ・ドー	WALLE STATE OF THE
		· · · · · · · · · · · · · · · · · · ·	THE PERSON OF THE PROPERTY AND A PARTY OF MARKET	FREEDRICH STREET, ST. W. L. FOR	SAZZA CE MANAGEMAN IN SOM
		NAME OF THE PERSON	<ul><li>・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・</li></ul>	MANAGEMENT STATES	- Mandalan Caranagan
		starray at		154 LOUIS AND MANAGEMENT OF THE PARTY OF THE	
	0% Rec	13.68	<b>《大学》的是一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个</b>	PRINCE BUILDING THE PROPERTY.	Charles and thouse of
	0/0/20	2,500,000,000	- 一二、「本土」の方式は大きなないのできる。	このなるのでは、日本のでは、日本の日本の日本の日本の日本の日本	- AMENINGER CARDA - NA
SUMMARY OF RESULTS:		्राप्ता का कार्या की कि	<b>可以为为学校的政策的创新的的</b>		att is a few to the first and the few of the
SUMMART OF RESOLUTION	of the section of	The state of the s	100	10000	<b>"你们可以不是不是这种的</b>
		4		STATE OF THE PARTY	The Party of the P
				<b>第二章 新疆,</b>	
			<b>公司的</b>	語物學論就因為私公司亦以此次	Walter County of the Parish
			Landau Miller Control Control	MINNS AFLC-W	PAFE-MAY 66 45
AFLC FORM 1165	FC 8400	TC (41 - 1) 14 16		A STATE OF THE STA	
THE MAT OF THE PARTY OF	minder in the same had	was est as fair at the contract of the state	VEIGNALING THE TURE	ASSESSED TO THE RESIDENCE OF THE PARTY OF TH	Seattle State of the Control
	1. 1, 11. 11.				
		生。在10个人就能是数数			
	1.00	THE RESERVE OF THE PARTY OF THE		Section of the sectio	and Market Const
A				SESSE SANCES SANCES	对邻国际的国际
	5 TO 10 TO 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	THE TENED AS THE COURT OF THE PARTY OF THE P	CONTRACTOR STATE OF THE STATE O	CASS COUNTY NAME OF STATES

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-292



**Internal Dosimetry Evaluation Form** SSN: NAME: MODE OF INTAKE: INTAKE DATE OR PERIOD: ✓ Inhalation ☐ Injection 1/23/66 through 2/9/66, onsite ☐ Ingestion ☐ Absorption 1/31/66 Unknown ☐Not applicable SUMMARY OF EXPOSURE CONDITIONS: Radionuclides/Respiratory Class/Particle Size: 239Pu/100% Class Y/1 µm AMAD Date or Period of Evaluated Data: 2 samples, 2/9/66 and 6/2/66 Duration of Exposure: Unknown Location of Exposure: Camp Wilson, near Palomares, Spain **EVALUATION DATA:** Air Sampling □ Unavailable ☐ Attached ☐ In Process In Process Health Physics Survey Data ☐ Attached **⊠** Unavailable Bioassay - Urinalysis ★ Attached In Process ☐ Unavailable Fecal Attached In Process ☑ Unavailable □ Unavailable Nasal Smears ☐ Attached ☐ In Process In Vivo ☐ Attached □ Unavailable ☐ In Process Medical Treatment: Skin Decontamination: ☐ Yes ⊠ No ⊠ No ☐ Yes Date: Decorporation: Agent: Agent: Yes Catharsis: ⊠ No Date: Surgical excision: X No Date: ☐ Yes **EVALUATION METHODOLOGY:** Assumptions: Acute inhalation intake of <sup>239</sup>Pu, 100% Class Y, 1 µm AMAD particle size on 1/31/66 Intake Estimate: CINDY, Ver. 1.4/JONES Code/Model used for: Dose Estimate: CINDY, Ver. 1.4/ICRP 30, Part 4, General Systemic Model **RESULTS SUMMARY** Estimated Intake Activity (pCi): 140000 50 YR CEDE (rem): 43 (0.43 Sv) **Organ Dose Equivalent Summary** 50 YR CDE (rem/Sv) **Bone Surface** 440/4.4 160/1.6 Lung Liver 78/0.78 Red Marrow -34/0.34 Other 7.4/0.074 6.2/0.062 Testes DOSE ASSESSOR: DATE: PEER REVIEWER: DATE: Signature: \_ Signature: \_ Print Name: **Print Name:** SSN: SSN: RECOMMENDATIONS: Additional Bioassay Required ☐ Urinalysis ☐ Fecal ☐ In Vivo Suggested Sampling Frequency: Work Restrictions:

# **Internal Dosimetry Case Narrative**

### **Identification:**

Name: SSN:



### Incidents:

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

### **Previous Intake/Dose Assessments:**

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

### **Assumptions/Basis/Data Sources:**

Acute inhalation intake of Pu-239; 100% Class Y; 1 µm AMAD particle size on 1/31/66. The date is the midpoint of the period on station from 1/23/66 to 2/9/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally - windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

		Sample	Result	Error	
Sample	Analysis*	Date	(pCi/day)	(pCi/day)	Included
66-814	G	1/29/66	1.31 (12-hr)	0.510	
66-3401	AS	6/2/66	0.099	0.047	✓
66-3401	G	6/2/66	NR	NR	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry; NR means no result recorded.

b) (6)

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

## Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	140,000	43/0.43
LUDEP	402,000	28/0.28

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	<b>Factors</b>	(rem/Sv)
Testes	6.2E+00/6.2E-02	2.5E-01	1.6E+00/1.6E-02
Breast	2.1E-04/2.1E-06	1.5E-01	3.1E-05/3.1E-07
Red Marrow	3.4E+01/3.4E-01	1.2E-01	4.0E+00/4.0E-02
Lung	1.6E+02/1.6E+00	1.2E-01	1.9E+01/1.9E-01
Thyroid	2.0E-04/2.0E-06	3.0E-02	5.9E-06/5.9E-08
Bone Surface	4.4E+02/4.4E+00	3.0E-02	1.3E+01/1.3E-01
Liver	7.8E+01/7.8E-01	6.0E-02	4.7E+00/4.7E-02
Other	7.4E+00/7.4E-02	6.0E-02	4.4E-01/4.4E-03
Lower Large Intestine	1.6E-02/1.6E-04	6.0E-02	9.5E-04/9.5E-06
Upper Large Intestine	5.3E-03/5.3E-05	6.0E-02	3.2E-04/3.2E-06
Small Intestine	1.1E-03/1.1E-05	6.0E-02	6.5E-05/6.5E-07
Effective Dose Equivale	ent		4.3E+01/4.3E-01

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. The sample analyzed by gross alpha counting only was not included in the analysis since it was an on-site sample with a result >0.1 pCi, leading to a suspicion of sample contamination. The result was fit using CINDY and the Jones excretion model, to estimate an intake (140,000 pCi), organ doses, and a CEDE (43 rem/0.43 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 402,000 pCi and a CEDE (ICRP-60) of 28 rem (0.28 Sv).

(b) (6)

(b) (6

# Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 140,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 43 rem (0.43 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be considered to provide additional assessment of the exposure.

Prepared By:		
Name:		
Signature:	Date	:
Peer Reviewed By:		
Name:		
Signature:	Date	:

W.				FEB 1 7 1035			A THE PARTY OF THE
1/27	) (6)			AL DOSE DATA	- AP-21	# 1 m	
(b) (6)			(b) (6		YPE SAMPLI		TYPE CALL (31, 232)
66-814 BASE (57-60)		FROM /	he	TO 9 4660	E	XPOSURE A	an 66 TYPE
German Y DATE RECEIVED	~ <u>†</u>	SAMPLE VO	3 LUME	VOLUME ANALYZED	) ID.	ATE ANALYZI	70
TECHNICIAN (SIGN	ATURE AND DATE	20	5 FEB 1966	200			
WW URINE	GROSP TOW	-		RADON	T	FEC	o (n) oon
Counter Number	D	0	1	Chamber Number	+	. Counter N	S/BLOOD
Counter Bkg. (cpm)	0.13	-11		Cham. Bkg. (mv/sec)		Counter E	
Counter Eff. (%)	0-51	51		Counter Eff. (%)	-		
Date/Time - Start 9	5 FEB 1966	, MAR	1966	Millivolt - Start	+	Counter E	
-Stop	1-1000			Millivolt - Stop		Date/Tim	
Total Counts	317	41		Total Millivots		7.10	- Stop
Counting Time	55,000	55 min	4 11	Total Drift Time	<del>                                     </del>	Total Cou	
ross cpm	5.76	0,74		Gross my/sec		Counting	
3kg. Cpm	0.13	2-11		Bkg. My/sec	-	Gross cpm	
let cpm	5.63-	.0.63		Net my/sec	<del>                                     </del>	Bkg. cpm	
	WAR THE PARTY OF T	24.8+2.9	A 2.78=10	f curies /mu		net cpm	
- Pie/L	Astronomy and a second	11.02.01	1	litter (69 - 74)	<del></del>	dpm	
				illat (0) • /4)	1	dps/cc	to the second se
pm/24 hr. (69 - 74) (40 Correction	-	-				11 -	ose (rads) (63-68)

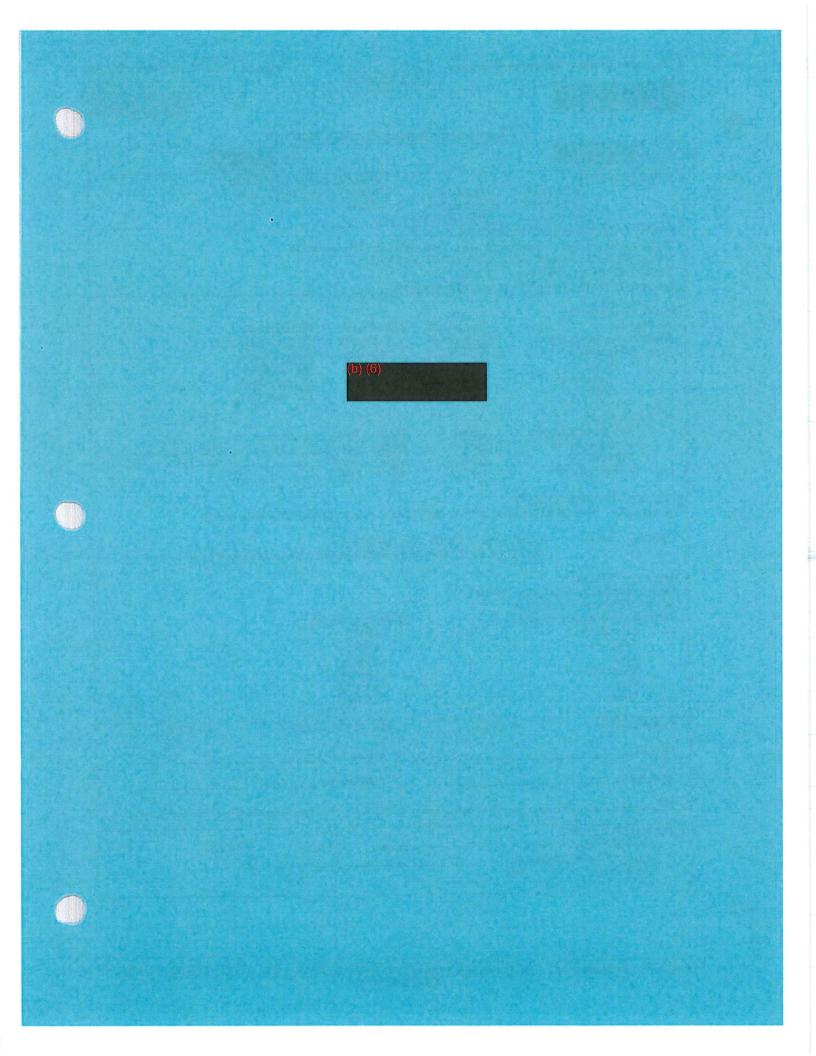
b) (6)

ARMY: (b)	5)		RESA	AL DOSE DATA	ARM	ν Υ	2. 通
ALCIVII:	4.1.) (1-20)				PE SAMPLE (30	TYPE ANAL	. (31 - 32)
i) (6)		1Lt	5 01		Urine	1	-14
AMPLE NO. (33-38	1	SAMPLE DA	TE (39-44)		EXPO		19 P. C.
66-3401		FROM 2	June 66	TO .	DA	TE Jan 66 TYP	E THE PLA
225 Signal C		OCCUPATIO	H (61 - 62)	REQUESTED BY	14.11129.5	1.1	
APO NY 091	85 Pirma			VOLUME ANALYZED	********	ANALYZED	
ATE RECEIVED	,	SAMPLE VO		820ml	100	ANALTZEO	
14 June 1960		12	30 ml	1 gayma	00	0 0.0	
TECHNICIAN (SIGH	ATURE AND DATE)			checked	off has	tu Jest	
URINE	236	259		RADON	11	FECES/BLOOD	
Counter Number				Chamber Number	NME C5	Counter Number	1.
Counter Bkg. (cpm)	3	1	980	Cham. Bkg. (mv/sec)	908-45	Counter Bkg.	
Counter Eff. (%)	31.8	318		Counter Eff. (%)	1 2 4	Counter Eff.	
ate/Time - Start	1 SEP LL	1350	129	Millivolt - Start	55-108	Date/Time - Start	
-Stop			to	Millivolt - Stop	1,9636	- Stop	
Total Counts	112	5		Total Millivots	0495	Total Counts	-
Counting Time	100	100	1	Total Drift Time	1.9141	Counting Time	
ross cpm			1	Gross mv/sec	1 16 16	Gross cpm	
Bkg. Cpm				Bkg. Mv/sec	1 1713 155	Bkg. cpm	14
Net cpm				Net my/sec		net cpm	
- % REC	104%			curies/mv	4' "	dpm	
dpm/24 hr. (69 - 74)			-	litter (69-74)	115.07	dps/cc	1
K 40 Correction				% REC	11270	Neutron Dose (rads) (	63-68)
HATE AND PC/SPL	0.0991=	0.0465		D(q) (63-68)		uc/mg (69 · 74)	
D(q) (63-68)					14 15 445	D(q) (63-68)	
R					مو مينه بيني سيد سيد سه	وكر يوك مرحوب ك	
* 20 T							
NAME :				SOCIAL SECURITY NU	MBER:	SAMPLE NU	MBER:
14							
AIR FORCE BASE							· · · · · ·
	,						
RESULTS OF ANAL	YSIS - 0.0991 ±	0.0465	% Rec	- 104%		Premions Rapel	a ,
. Pa/spl	-0.0777-		21	Bueden-0.03		2.78 pe/l	
Total Voi - 1230		Body 1		70.000		0.28 88	× -1014.
" TOTAL	11 020					0.76 00	***
Vol ANA	yaled - 8 A						
Vol ANA							
Vol Man	sample for the fa						
Vol Man	sample for the fa						
Vol Mund	sample for the fo	recently anal					
Vol Ana	sample for the fo icant activity in required to estab	recently anal					
Repeat the  ( ) Signif	sample for the fo icant activity in required to estab per flask used	recently anal					
Vol Ana	sample for the fo icant activity in required to estab per flask used	recently anal					
Repeat the  ( ) Signif ( ) Data ( ) Impro	sample for the fo icant activity in required to estab per flask used	recently anal					
Repeat the  ( ) Signif ( ) Data ( ) Impro	sample for the for icant activity in required to estab per flask used	recently anal			DATE		

Sequential folder containing fifteen 80-mcg. tablets of mestranol plus five tablets each combining 80 mcg. mestranol and 2 mg. chlormadinone acetate.

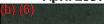
oral Contraception

More Physiological Approach



- Millian con Millian south	Internal Dosin	ietry Evaluati	on Form	
NAME: (b) (6)			SSN: (b) (6)	
MODE OF INTAKE:    Inhalation   Ingestion   Unknown     Unknown     SUMMARY OF EXPOSURE CORRAGIONUCLIDES/Respiratory Class/P     Date or Period of Evaluated Data: Duration of Exposure: Unknown	article Size: <sup>239</sup> Pu/10 2 samples, 1/29/66 an	1/18/66 throu 1/23/66 0% Class Y/1 μm A d 5/30/66	ATE OR PERIOI ugh 1/29/66, onsite	):
Location of Exposure: Camp Wilson	on, near Palomares, S	pain		
EVALUATION DATA: Air Sampling Health Physics Survey Data Bioassay - Urinalysis Fecal Nasal Smears In Vivo	Attached Attached Attached Attached Attached Attached Attached Attached	☐ In Process	<ul> <li>✓ Unavailable</li> </ul>	
Medical Treatment:  Skin Decontamination: Decorporation: Catharsis: Surgical excision:	☐ Yes ☐ Yes ☐ Yes	M No Agent:	2	_ Date:
Code/Model used for: Intake Dose E RESULTS SUMMARY	Estimate: CINDY, V stimate: CINDY, V	er. 1.4/JONES er. 1.4/ICRP 30, Pa	rt 4, General Syster	nic Model
Estimated Intake Activity (pCi): 50 YR CEDE (rem): 34 (0.34 Sv	110000			
Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes		50 YR CDE (rem. 340/3.4 130/1.3 61/0.61 26/0.26 5.8/0.058 4.9/0.049	/Sv)	
DOSE ASSESSOR:	OATE:	PEER REVIE	WER:	DATE:
Signature:		Signature: _		AND THE RESERVE THE PARTY OF TH
Print Name:SSN:		Print Name: SSN:		
RECOMMENDATIONS: Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions: N/		Jrinalysis   1	Fecal 🔲	In Vivo





# **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

# Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

### Other Information:

None.

Radionuclide(s): <sup>239</sup>Pu.

## Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 1/23/66. The date is the midpoint of the period on station from 1/18/66 to 1/29/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-1209	G	1/29/66	6.20	2.18	
66-3400	AS	5/30/66	0.078	0.057	1
66-3400	G	5/30/66	NR	NR	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry; NR means no result reported.



Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

## **Modeling:**

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	110,000	34/0.34
LUDEP	316,000	22/0.22

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

		Weighted Organ
Dose Equivalent	Weighting	Dose Equivalent
(rem/Sv)	Factors	(rem/Sv)
4.9E+00/4.9E-02	2.5E-01	1.2E+00/1.2E-02
1.6E-04/1.6E-06	1.5E-01	2.4E-05/2.4E-07
2.6E+01/2.6E-01	1.2E-01	3.2E+00/3.2E-02
1.3E+02/1.3E+00	1.2E-01	1.5E+01/1.5E-01
1.5E-04/1.5E-06	3.0E-02	4.6E-06/4.6E-08
3.4E+02/3.4E+00	3.0E-02	1.0E+01/1.0E-01
6.1E+01/6.1E-01	6.0E-02	3.7E+00/3.7E-02
5.8E+00/5.8E-02	6.0E-02	3.5E-01/3.5E-03
1.2E-02/1.2E-04	6.0E-02	7.5E-04/7.5E-06
4.2E-03/4.2E-05	6.0E-02	2.5E-04/2.5E-06
8.6E-04/8.6E-06	6.0E-02	5.1E-05/5.1E-07
ent	94	3.4E+01/3.4E-01
	(rem/Sv) 4.9E+00/4.9E-02 1.6E-04/1.6E-06 2.6E+01/2.6E-01 1.3E+02/1.3E+00 1.5E-04/1.5E-06 3.4E+02/3.4E+00 6.1E+01/6.1E-01 5.8E+00/5.8E-02 1.2E-02/1.2E-04 4.2E-03/4.2E-05 8.6E-04/8.6E-06	(rem/Sv)         Factors           4.9E+00/4.9E-02         2.5E-01           1.6E-04/1.6E-06         1.5E-01           2.6E+01/2.6E-01         1.2E-01           1.3E+02/1.3E+00         1.2E-01           1.5E-04/1.5E-06         3.0E-02           3.4E+02/3.4E+00         3.0E-02           6.1E+01/6.1E-01         6.0E-02           5.8E+00/5.8E-02         6.0E-02           1.2E-02/1.2E-04         6.0E-02           4.2E-03/4.2E-05         6.0E-02           8.6E-04/8.6E-06         6.0E-02

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. The sample analyzed by gross alpha counting only was not included in the analysis since it was an on-site sample with a result >0.1 pCi, leading to a suspicion of sample contamination. The result was fit using CINDY and the Jones excretion model, to estimate an intake (110,000 pCi), organ doses, and a CEDE (34 rem/0.34 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 316,000 pCi and a CEDE (ICRP-60) of 22 rem (0.22 Sv).

Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 110,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 34 rem (0.34 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be considered to provide additional assessment of the exposure.

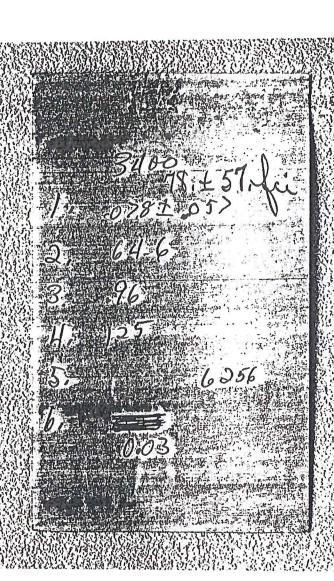
Prepared By:		
Name:		
Signature:	Date:	
Peer Reviewed By:		
Name:		
Signature:	Date:	

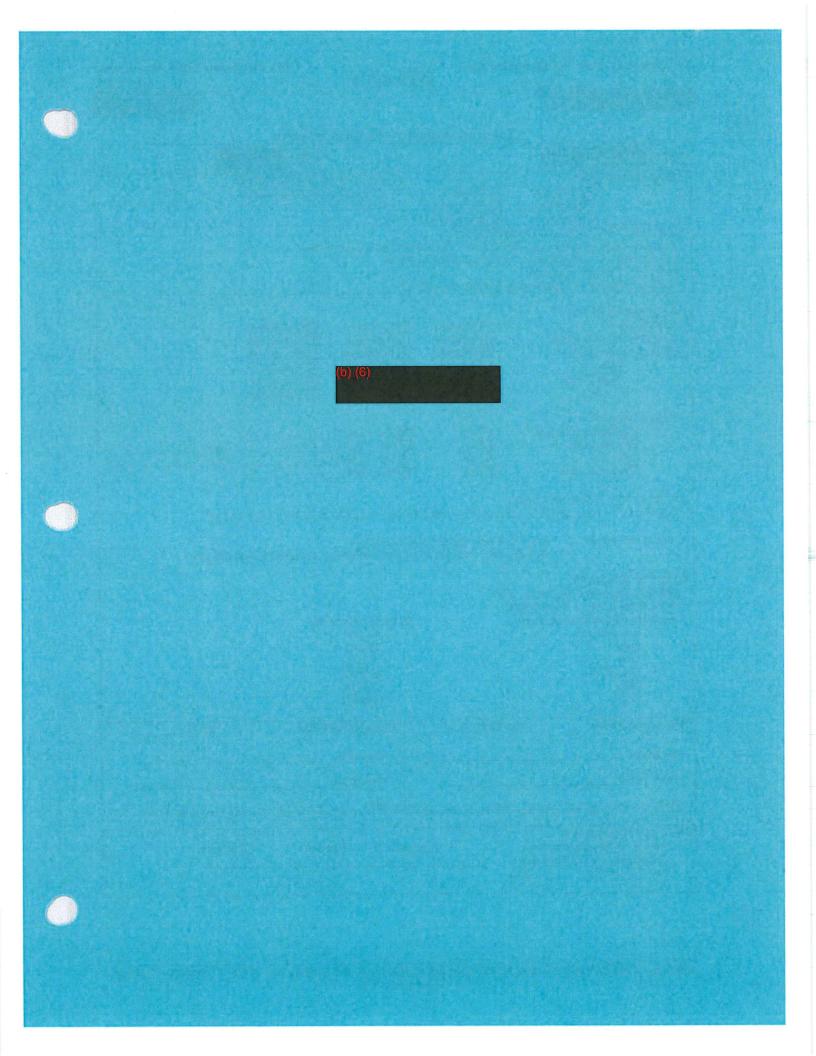
AFSN: (b) (6)			NTERNAL DOSE	DATA	-		
NAME (LAST, FIRST, N (b) (6)	(.1.) (1-20) \lC	()	SOC, SEC. NO. (21 - 29	TYPE SA Urin	MPLE (30) 16	TYPE ANAL	. (31 - 32)
SAMPLE NO. (33-38) 66-1209		FROM 29 Ja	п 66 то		EXPOSURE DATE	TYP	E
BASE (87-60)		OCCUPATION (61	-62) REQUESTE	DBY			
Zaragoza DATE RECEIVED 3 March 1966	)	62250 SAMPLE VOLUME		NALYZED 100	DATE ANALY	ZED,	
TECHNICIAN (SIGNA	TURE AND DATE)						
URINE	239	236	RAD	ON	FE	CES/BLOOD	
Counter Number			Chamber Nu	mber	Counter	Number	
Counter Bkg. (cpm)			Cham. Bkg.	(mv/sec)	Counter	Bkg.	
Counter Eff. (%)			Counter Eff	. (%)	Counter	Eff.	
Date/Time - Start	: MAY 66		Millivolt -	Start	Date/T	lme — Start	
-Stop			Millivolt -	Stop		- Stop	V
Total Counts	10	3	Total Milliv	ots	Total C	counts	
Counting Time	100	100	Total Drift	Time	Countin	g Time	
Gross cpm	0.10	0.03	Gross mv/	sec	Gross	pm alph	& Spect
Bkg. Cpm	0.002	0.004	Bkg. Mv/s	oc l	Bkg. cr	om V	6.20 PC
Net cpm	0.098	0.026	Net mv/se		net cpm		D. 8188
MA PORKC		12	curies/mv		dpm	2 54	
dpm/24 hr. (69 - 74)			11tter (69 - 7	4)	dps/co		
K 40 Correction					Neutron	Dose (rads) (6	3-68)
North PC/SPL	G. NO EA	.18	D(q) (63-6	8)	uc/mg	(69 - 74)	
D(9) (63.68) FC/L	620 +2	(dac = 1) 21	DA = 3,58 X	-2	D(q) (	63 - 68)	

b)

AFSN: (b) (6	The second second second	1	INTER	NAL DOSE DAT	[A			
NAME (LAST, FIRST.	A1C		soc. s	EC. NO. (21-29)	TYPE SAM	PLE (30)	TYPE ANA	(31 - 32)
SAMPLE NO. (33-3)	3)	SAMPLE DATE	E (39 - 44)	201 K20 K11	Urine	EXPOSURE		
_66-1209		FROM 29	Jan 66	TO .		DATE	100	4
BASE (87-60)		OCCUPATION	(61 - 62)	REQUESTED BY		DATE	TYF	E
Zaragoza DATE RECEIVED		62250			1.1			
3 March 1966		SAMPLE VOLU	)	VOLUME ANALY		DATE ANALYZ	ED.	
TECHNICIAN (SIGH)	TURE AND DATE)	,	- 1	1000		<u> </u>		
URINE	239	236		RADON				
Counter Number			-	Chamber Number			ES/BLOOD	
Counter Bkg. (cpm)				Cham. Bkg. (mv/se	<del>.  </del>	Counter		
Counter Eff. (%)				Counter Eff. (%)	(c)	Counter		
Date/Time - Start	: MAY 66			Millivolt - Start		Counter		10
-Stop				Millivolt - Start		Date/Tir	ne - Start	
Total Counts	10	3		Total Millivots			- Stop	1
Counting Time	100	100		Total Drift Time		Total Co		
Gross cpm	0.10	0.03				Counting		1
Bkg. Cpm	0.002	0.004		Gross mv/sec	4 14		m alph	A THE PARTY OF THE
Net cpm	0,098	0.026		Bkg. Mv/sec		Bkg. cpm		6,20 PC
A PORKC	1	12		Net mv/sec		net cpm		D. 8186
dpm/24 hr. (69 - 74)				curies/my	-	dpm		1 903
K 40 Correction				litter (69 - 74)		dps/cc		
MAT GARG PC/SPL	6,20 ± 8.	18		5/1 //2 //2			Pose (rads) (63	:68)
0(q) (63-68) FC/L	100	0 ( )		3,58 × 10 20		uc/mg (	69 - 74)	







MODE OF INTAKE:			SSN: (b)	(6)
SUMMARY OF EXPOSURE CONDITIONS: Radionuclides/Respiratory Class/Particle Size: 239Pu/100% Class Y/1 µm AMAD Date or Period of Evaluated Data: 2 samples, 275/66 and 4/8/66 Duration of Exposure: Unknown Location of Exposure: Camp Wilson, near Palomares, Spain  EVALUATION DATA:  Air Sampling		☐ Absorption	1/18/66 through 2/14/66,	
Attached   In Process   Unavailable   In Process	SUMMARY OF EXPOSURE CON Radionuclides/Respiratory Class/Part Date or Period of Evaluated Data: 2 : Duration of Exposure: Unknown	DITIONS: ticle Size: <sup>239</sup> Pu/1009 samples, 2/5/66 and 4/	/8/66	
Nasal Smears	Air Sampling Health Physics Survey Data Bioassay — Urinalysis	Attached Attached	☐ In Process ☐ Unavai☐ In Process ☐ Unavai	lable lable
Skin Decontamination:			☐ In Process ☐ Unavai	lable
Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100% Class Y, 1 µm AMAD particle size on 1/31/66  Code/Model used for: Intake Estimate: CINDY, Ver. 1.4/JONES	Skin Decontamination: Decorporation: Catharsis:	Yes Yes	No Agent:	Date: Date:
ESULTS SUMMARY Estimated Intake Activity (pCi): 28000 50 YR CEDE (rem): 8.6 (0.086 Sv)  Organ Dose Equivalent Summary  Bone Surface  Lung  Liver  16/0.16  Red Marrow  6.7/0.067 -  Other  1.5/0.015  Testes  DATE:  PEER REVIEWER:  DATE:  Print Name:  SSN:  SSN:  SSN:  SSN:	Assumptions: Acute inhalation inta Code/Model used for: Intake Es	ake of <sup>239</sup> Pu, 100% Clastimate: CINDY, Ven	. 1.4/JONES	
Organ Dose Equivalent Summary         50 YR CDE (rem/Sv)           Bone Surface         87/0.87           Lung         32/0.32           Liver         16/0.16           Red Marrow         6.7/0.067 -           Other         1.5/0.015           Testes         1.2/0.012           POSE ASSESSOR:         DATE:         PEER REVIEWER:         DATE:           Signature:         Signature:           Print Name:         Print Name:           SSN:         SSN:	ESULTS SUMMARY	8000	. 1.4/ICRP 30, Part 4, General	Systemic Model
Lung				
Liver	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary	5		
Red Marrow         6.7/0.067 -           Other         1.5/0.015           Testes         1.2/0.012    OSE ASSESSOR:  DATE:  PEER REVIEWER:  Signature:  Signature:  Print Name:  Print Name:  SSN:  SSN:  SSN:	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface	5	87/0.87	
Testes 1.2/0.012  OSE ASSESSOR: DATE: PEER REVIEWER: DATE:  Signature: Signature:  Print Name: Print Name:  SSN: SSN:	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung		87/0.87 32/0.32	
OSE ASSESSOR: DATE: PEER REVIEWER: DATE: Signature: Signature: Print Name: Print Name: SSN: SSN: SSN:	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver		87/0.87 32/0.32 16/0.16	
Signature: Signature: Print Name: Print Name: SSN: SSN:	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other		87/0.87 32/0.32 16/0.16 6.7/0.067 -	
Print Name:	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other		87/0.87 32/0.32 16/0.16 6.7/0.067 – 1.5/0.015	
SSN: SSN:	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes		87/0.87 32/0.32 16/0.16 6.7/0.067 ~ 1.5/0.015 1.2/0.012	DATE:
	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes  DOSE ASSESSOR: DA	ATE:	87/0.87 32/0.32 16/0.16 6.7/0.067 – 1.5/0.015 1.2/0.012 PEER REVIEWER:	Manager Manager
	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes  DOSE ASSESSOR: Description:	ATE:	87/0.87 32/0.32 16/0.16 6.7/0.067 - 1.5/0.015 1.2/0.012  PEER REVIEWER: Signature:	
	50 YR CEDE (rem): 8.6 (0.086 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes  DOSE ASSESSOR: DA  Signature: Print Name:	ATE:	87/0.87 32/0.32 16/0.16 6.7/0.067 - 1.5/0.015 1.2/0.012  PEER REVIEWER: Signature: Print Name:	





# **Internal Dosimetry Case Narrative**

### Identification:

Name: SSN:



#### Incidents:

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

# Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

### **Assumptions/Basis/Data Sources:**

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 1/31/66. The date is the midpoint of the period on station from 1/18/66 to 2/14/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-1149	G	2/5/66	ND	ND	1
66-2871	AS	4/8/66	0.076	0.007	1
66-2871	G	4/8/66	1.45	0.310	
		1 1907		0.010	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.

A nasal swipe (sample #66-1334) was recorded for

b) (6)

as being taken on 2/14/66. No

result was available.

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

## Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	28,000	8.6/0.086
LUDEP	42,400	3.0/0.03

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ	
	Dose Equivalent	Weighting	Dose Equivalent	
Organ	(rem/Sv)	Factors	(rem/Sv)	
Testes	1.2E+00/1.2E-02	2.5E-01	3.1E-01/3.1E-03	
Breast	4.1E-05/4.1E-07	1.5E-01	6.2E-06/6.2E-08	
Red Marrow	6.7E+00/6.7E-02	1.2E-01	8.1E-01/8.1E-03	
Lung	3.2E+01/3.2E-01	1.2E-01	3.8E+00/3.8E-02	
Thyroid	3.9E-05/3.9E-07	3.0E-02	1.2E-06/1.2E-08	
Bone Surface	8.7E+01/8.7E-01	3.0E-02	2.6E+00/2.6E-02	
Liver _	1.6E+01/1.6E-01	6.0E-02	9.4E-01/9.4E-03	
Other	1.5E+00/1.5E-02	6.0E-02	8.9E-02/8.9E-04	
Lower Large Intestine	3.2E-03/3.2E-05	6.0E-02	1.9E-04/1.9E-06	
Upper Large Intestine	1.1E-03/1.1E-05	6.0E-02	6.4E-05/6.4E-07	
Small Intestine	2.2E-04/2.2E-06	6.0E-02	1.3E-05/1.3E-07	
Effective Dose Equivale	nt	1.7	8.6E+00/8.6E-02	

One urine sample was analyzed by gross alpha counting, and the other was analyzed by both gross alpha counting and alpha spectrometry. The gross alpha analysis for the second sample was not included in the modeling since an alpha spectrometry result was available for the same sample. The sample result that was analyzed using gross alpha counting only was reported as No Detectable Activity. A value of 0.009 pCi was used to represent this outcome. The results were fit using CINDY and the Jones excretion model, to estimate an intake (28,000 pCi), organ doses, and a CEDE (8.6 rem/0.086 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 42,400 pCi and a CEDE (ICRP-60) of 3.0 rem (0.03 Sv).

### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 28,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 8.6 rem (0.086 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than half the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level.

Prepared By:	
Name:	
Signature:	Date:
Peer Reviewed By:	
Name:	
Signature:	Date:

Army (b) (6)		Carrier and the	INTERN	L DOSE DATA	100	<b>建筑的</b> ,主动的特	
NAME (LAST, FIRST, M.	1.) (1-20)	the sound of the land	SOC. SEC	NO. (21-29) TX			(31-32)
(b) (6)		E-5	(b) (6)	<b>建物数 线</b>	i rine	<b>國際副列於</b> 一門的第一個	的特殊的
66-1149		FROM 5	E (39-44)	TO-	EXPO	TE TE TYPE	
BASE (57-60)			(61 - 62) install	REQUESTED BY	A PROPERTY OF THE PARTY OF THE	<b>电影性的现在分词</b>	MAN SEPTEMBER
656 Eng. Bn.	APO 0908	1 82D2	0 11 11 11	一、元子等的學問題		THE RESERVE OF THE RE	ALLENST TE
DATE RECEIVED	100	SAMPLE, VOL	UME THE	VOLUME ANALYZED	DATI	MAR 1 7 1966	or et an et
1 March 1966		430	الملايون لد يد 🕻	一辆43〇湯線	<b>建加速 攻</b>	MAR 1 7 1968	性们是多种的这
TECHNICIAN (SIGNAT	IRE AND DATE)	est and stone	die gewert			<b>建筑的基础设施</b>	
			and the stand	<b>分配的數學和數數數</b> 數	用的印度的特殊	的情報的開始的一些學生的	and Lawy April 45 - 40
URINE		La Car	Chapter 5	"地理RADON"编辑编	中學學的	FECES/BLOOD	性的性性的性。
Counter Number		1 - 1 - 2	1 / J. 11/44	Chamber Number	(	Counter Number	Hally Cal
Counter Bkg. (cpm)				Cham. Bkg. (mv/sec)	一种思知识别和外	Counter Bkg.	. Whattar Man.
Counter Eff. (%)	3.5	A Nothern	TO THE STREET	Counter Eff. (%)	<b>州西南部等</b>	Counter Eff.	・大きなないから
Date/Time - Start		4.9	· · · · · · · · · · · · · · · · · · ·	Millivolt Start	<b>一种种种种种种种种种种种种种种种种种种种种种种种种种种种种种种种种种种种种</b>	Date/Time - Start	the marker defilling
-Stop		98 (10.5)	and the same	Millivolf Stop	類的過程的原則性	山城寨中的强烈 Stop The	sofficial hands
Total Counts	1.00	-1	1. 1000 分别公	Total Millivots	。 由時時期間可能	Total Counts	これではないようにない
Counting Time	10 11	The Sales	1			Counting Time	1. 中华工工工
Gross cpm			and the state of	Gross my/ sec	可以認識的	Gross com	"许过学说"
Bkg. Cpm		100 30 15	VT: - 2014年4月	Bkg. MV / sec 中海	1 美加速的影響	Bkg. cpm	
Net cpm	N.	The second second	"548ft	Net my/sec	一组的邮件包括	net cpm	- 一次共和国的证据
lpm		1 1 1 1 1	Egit	curies/my	<b>不能的政策的第三人</b>	dom design	一一一一
dpm/24 hr. (69 - 74)	1,4,41	482 Y V	W WASHINGTON	litter (69-74)		"dps/cc and any order	
K 40 Correction		The Traffice Co	- 1115年以前	· 小叶中间的图1000000000000000000000000000000000000		Neutron Dose (rads) (63	
Net Beta			15 - 14 to \$th"	D(q)*(63-68)*绿鳞绿	是是一个	uc/mg (69-74)	· matter Cornel
D(q) (63-68)		A	15 48 0	THE PROPERTY OF THE PARTY OF TH		D(q) (63-68) 公科提供	1990年
	و تربيدو الله	- of the back and the same	77.591	Cale La Company Company and I shall be a long to the company of th		The last state of the last sta	THE WAY

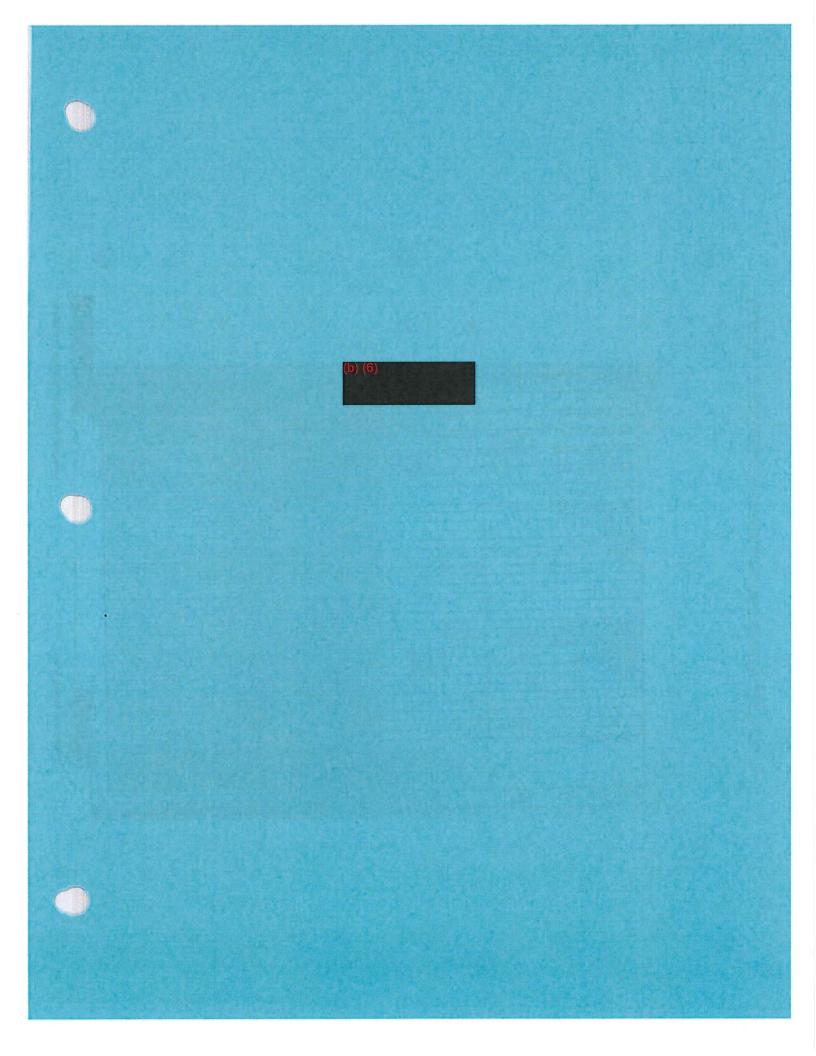
Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-311

(b) (6)	and Street	INTERN	AL DOSE DATA	DE CAMP	PLE (30) TYPE ANAL. (31-32)
AME (LAST, FIRST, M.	1.) (1-20)	SOC. SEC			EL (30)
(6)	10 to	SP5 E-5	W	45.AL	TEXPOSURE
AMPLE NO. (33-38)					DATE TYPE
1-6-1334		FROM 14 FERGE	TO REQUESTED BY		
ASE (57-60)					Language Company
SC ENG. BN. H	190 09081	SAMPLE VOLUME	VOLUME ANALYZE	D	DATE ANALYZED
		SAMELE TOLONE	, , , , , , , , , , , , , , , , , , ,		1000
9 MARCH 1	966			4	
ECHNICIAN (SIGNAT	UKE AND DATE!				
	•		RADON		FECES/BLOOD
URINE	TULLAND		Chamber Number		. Counter Number
Counter Number	TRICARD.		Cham. Bkg. (mv/sec)		Counter Bkg.
Counter Bkg. (cpm)			Counter Eff. (%)		Counter Eff.
Counter Eff. (%)	(1.1171/		Millivolt - Start		Date/Time - Start
Date/Time - Start	10 MAR 66		Millivolt - Stop		- Stop
Stop	11164		Total Millivots		Total Counts
Total Counts	3354		Total Drift Time		Counting Time
Counting Time	30		Gross my/sec		Gross cpm
Gross cpm	168		Bkg. Mv/sec		Bkg, cpm
Bkg. Cpm	164		Net my/sec		net cpm
Net cpm	4=10		curies/my		dpm
dpm	NOA		litter (69 - 74)		dps/cc
dpm/24 hr. (69-74)			milet (of 14)		Neutron Dose (rads) (63-68)
K 40 Correction			D(q) (63-68)		uc/mg (69-74)
					D(q) (63-68)

De la Contraction de la contra	Committee		Antario Salara		1		學別學是特別學
The state of the s	Saru	ity(0)(0)	HTERN	Me done by the	Sugar V		行發展
b) (6)	4.11		SOC. SE	C.No. (21-29) TO TY	PE SAMPLE IS	O) TYPE ANAL.	(31-32)
SAMPLE NV. (33-38	n e	SAMPLE DA	1 = (39 - 44)	1957年代第15年第15年第15日	University EXP	SURE NOT	A PART CONTRACTOR
66-2871		FROM No	t Listed	TO TO	<b>经验</b>	ATE Listed TYPE	1
BASE (57-60)				REQUESTED BY	STATE OF THE PROPERTY OF THE PARTY OF THE PA	Finish the many	
Not Listed		Not SAMPLE VOL	Listed	16年9月1日	論論的語言		1000
22 April 1966	6	SAMPLE VOI	OME	VOLUME ANALYZED	DATE	E ANALYZED	
TECHNICIAN (b) (6	)						
URI				RADON THE		FECES/BLOOD	
Counter Number	10	1.18		Chamber Number		Counter Number	F
Counter Bkg. (cpm)	0.04 8001		t260	Cham. Bkg. (mv/sec)		Counter Bkg.	
Counter Eff. (%)	51			Counter Eff. (%)		Counter Eff.	
ote/Time - Start	13 may 66			Millivolt - Start			1 (84)
-Stop	/	Reporte	value	Millivolt - Stop TE		ASSESS TO Stop	
otal Counts	93	Calrecte		Total Millivots	The second second	- Total Counts	1
ounting Time	.55	010,963		Total Drift Time		Counting Time	CAN SHIP TO ST
ross cpm	1.69		177	Gross my/sec		Gross cpm	* 2000 No. 100
kg. Cpm	0.04	1		Bkg. My/sec 学动为年		Bkg. cpm	1.04PC
et cpm	1.65			Net my/sec 本本語語		net cem	0.1088
m pei/1	2.08	£0.44		curies/my		dpm Val:	211000
pm/24 hr. (69 - 74)			,		1.根海峡运动;	dps/cc	
40 Correction					· AND STREET	Neutron Dose (rads) (63-	68)
let Boto pei/ Sal	1.45	L A 2)	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	D(q) (63-68) - 5000		uc/mg (69 - 74)	00/1

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-313

		. Mar. in .	RADIOLOG	ICAL SAMPLE	<b>PDATA</b>	Karaman Say Sare	20 - 1 5 M 1 1 M 1
ME OR REQUESTOR'S ID (1-	20)	4	GRADE TAKE	Arsin	SOCIA	LECURITY NUMBER 32 RE	L SAMPLE MUNBER THE
PE SAMPLE (23-32)	OCCUPATION	A	ALYSIS DESIRED	The second name of the second na	Grading.	AIR POP	CE BASE (68-71) **ENGE
TE RECEIVED (37-42)	DATE ANALY	ZED (SI	-86) DATE/90	DUNTED TO THE	AT AND MAIN	COLLECTED MEMBERSHED EN	KPOSURE DATE AND SECOND
MPLE WEIGHT/VOLUME	100	139 500	WEIGHT/VOLUME AT	NALYZED: ISSUED IN	* 10	TECHNICIAN TECHNICIAN	
HER DATA 953	Car Bayer	. 2	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2				學就是非常的學
VIRONMENTAL SAMPLES	13.0	11	the second second	• 拉斯斯斯爾斯爾斯			THE WAY WAY
UNTER & EFFICIENCY		-	47.	- Frithmenderption			and the party of the transfer to the transfer of
TAL COUNTS & MINUTES	-	-	30.45	7个34年的個外的開始前	APPENDENCE OF THE PERSON NAMED IN COLUMN TO THE PERSON NAMED IN CO	DANGER OF THE PROPERTY OF THE PARTY OF THE P	" " The Continue Wall of the
OSS CPM		-		A. Tariffy Martin	世代 地方	PROPERTY OF THE PROPERTY OF THE PARTY OF THE	The part of the state of the state of the
G CPM & MINUTES		-	Jr	THE WAY BUT DESCRIPTION OF THE	THE REAL PROPERTY.	LANGUAGE STOCKED CONTRACTOR OF THE PARTY OF	A Comment of the first of the second
T CPM		-		CALIFORNIA SERVICE DE LA COMPANSION DE L	<b>非特别和40</b> 40	Sand Charles Sand Sand State	en interpretation allegate weight are
LD				。 上 上 上 上 上 上 上 上 上 上 上 上 上	研究指挥的	THE THE PLANT OF BUILDING THE	"NEWSTER, ARIZE MEET IN ACTOR
		-		· 计共享中国的国际中国的中国		SAMPHANDAN CONTRACTOR	THE STANSONS OF
		-	100 -101	一些學院的學院的	<b>化的成功等处</b>	CONTRACTOR HOLD AND ACTIONS	THE STREET PROPERTY AND ADDRESS.
			to the total	一个などを登録はは自然の	NO PROPERTY OF	PARTICIPATION OF THE PROPERTY OF THE PARTY O	これではいいますしませんないか。
		-		- 中国中国中国	<b>公司工作的</b> (1)	un applications in the second	a service to
			the second second second	<b>"SRAMMENTAL STATE</b>	和公司等的	HARMAN AND THE PROPERTY OF THE PARTY OF THE	Acherman Attendantes of
			action as the only a	<b>"我是你你的我们是你</b>	中共物理学中	中の日本中国の大学の大学の大学によっている。	はない 年 なべんないない かいいかい
LOGICAL SAMPLES					<b>加州岛市阿伦</b>	HORSE MAN TO THE YEAR OF THE KINDS	and the same and the
		7	76		25年10年10年1	PRADON THICHEONE MAN	Committee and and an area
AL COUNTS & MINUTES	nece	2	7.3	- STANTON THAT THE	<b>本位表表现于</b>	WOOD TO THE PROPERTY OF THE PARTY OF THE PAR	3.2 × " DM +0"
OSS CPM	100	9	4	MICHAEL STREET	有法律學學	CANADARCE THE LANGERS	· who pour this into a public
G CPM & MINUTES	Con		0.9200	MANAGED FOS	O'D' AW	BORNESS AND	- Localitica Diament Spire
CPM	800	_	0.00/3	4 360 0 200	20、维持	MANAGEMENT OF THE PARTY OF THE	いされたはいるとのなるないからいかって
LD			0.9/87	THE DISTORDING	グロ連	COPIE CHESTANTISTEM PORTES	・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
				<b>水水水水流温度温度温度</b>	音音を表示	1007076±0.007	······································
				大きなからないのは日本の日本の		THE PROPERTY OF THE PROPERTY O	and applying the an array
		-		Dien Bud balland	1996年	THE WAR SHEET STATE OF THE STAT	with a builty Might it willing within
Sayl I of a above the		Ded as		1.4.634的1000000000000000000000000000000000000	经经验	THE WAY TO VE TO V	eresting himselfanting
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Of Rec.	07	and the same taken	- 100分割を	<b>特制和制制</b>	いる時代の対象を表現を表現を行うさいからいってい	· · prisht-seith P. Water with an
	Vokec	76.	40	<b>《社会社会社会社会社会社会社会社会社会社会社会社会社会社会社会社会社会社会社会</b>	を発音を	は教育などのは世界はなったではな	WHEN STATISTICS OF THE STATE OF
MARY OF RESULTS:		-		- 145 计标准的 1964 图 1865 图 1865	意志の意味	PERSONAL PROPERTY OF THE PROPERTY OF THE PERSON OF THE PER	. settelderickering the the
MARI OF RESULIS:	the section of		and appropriately	A STATE OF THE PARTY OF THE PAR	Adding to the same	ATTENDED BY THE PARTY OF THE PA	This white with a though and the
ووجلها المالك وحالاتها	15.0	12. A	ALLS FREE CO.	<b>特别</b>	V 10	The second secon	And the second
	17			A Commence of the	A Shirt or		
	mar yers diller	. Y 1.68	4.55				<b>经过度的转移的</b>
	1741 (4)		THE PARTY OF THE PARTY OF	A CONTRACTOR OF THE PARTY OF TH	100	STATE OF THE PARTY	2000年1月1日日本



Internal Dosimer	ry Evaluation Form
NAME: (b) (6)	SSN: (b) (6)
MODE OF INTAKE:	INTAKE DATE OR PERIOD:
	1/18/66 through 4/8/66, onsite
☐ Ingestion ☐ Absorption	2/27/66
Unknown Not applicable	* 111
SUMMARY OF EXPOSURE CONDITIONS:	
Radionuclides/Respiratory Class/Particle Size: 239Pu/100%	Class Y/1 µm AMAD
Date or Period of Evaluated Data: 1 sample, 4/8/66	•
Duration of Exposure: Unknown	
Location of Exposure: Camp Wilson, near Palomares, Spain	
EVALUATION DATA:	
A: 0 1:	1. p
Health Physics Survey Data Attached Attached	In Process Unavailable In Process Unavailable
Diagram III I	
	In Process Unavailable In Process Unavailable
1 1 = =	In Process Unavailable
	In Process Unavailable
	Z Chavanaoic
Medical Treatment:	
	No Date:
	No Agent: Date:
	No Agent: Date:
Surgical excision: Yes	No Date:
EVALUATION METHODOLOGY:  Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100% Class  Code/Model used for: Intake Estimate: CINDY, Ver. 1  Dose Estimate: CINDY, Ver. 2	
RESULTS SUMMARY Estimated Intake Activity (pCi): 95000	Solicial Systemic Model
50 YR CEDE (rem): 29 (0.29 Sv)	
Organ Dose Equivalent Summary 50	YR CDE (rem/Sv)
Bone Surface	300/3
Lung Liver	110/1.1
Red Marrow	53/0.53
Other	23/0.23 5/0.05
Testes	4.2/0.042
Section Applies about 670 of the second of the file of	4.210.042
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:
Signature:	Signature:
Print Name:	Print Name:
SSN:	
DV41.	SSN:
RECOMMENDATIONS:  Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions:  N/A	



**April 2001** 

# **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### Incidents:

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

# Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

## Other Information:

None.

Radionuclide(s): <sup>239</sup>Pu.

# Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1 µm AMAD particle size on 2/27/66. The date is the midpoint of the period on station from 1/18/66 to 4/8/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	A malusia*	Sample	Result	Error	
	Analysis*	Date	(pCi/day)	(pCi/day)	Included
66-2861	AS	4/8/66	0.074	0.011	1
66-2861	G	4/8/66	1.29	0.290	



Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

# Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	95,000	29/0.29
LUDEP	316,000	22/0.22

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

Organ	Dose Equivalent (rem/Sv)	Weighting Factors	Weighted Organ Dose Equivalent (rem/Sv)
Testes	4.2E+00/4.2E-02	2.5E-01	1.1E+00/1.1E-02
Breast	1.4E-04/1.4E-06	1.5E-01	2.1E-05/2.1E-07
Red Marrow	2.3E+01/2.3E-01	1.2E-01	2.7E+00/2.7E-02
Lung	1.1E+02/1.1E+00	1.2E-01	1.3E+01/1.3E-01
Thyroid	1.3E-04/1.3E-06	3.0E-02	4.0E-06/4.0E-08
Bone Surface	3.0E+02/3.0E+00	3.0E-02	8.9E+00/8.9E-02
Liver	5.3E+01/5.3E-01	6.0E-02	3.2E+00/3.2E-02
Other	5.0E+00/5.0E-02	6.0E-02	3.0E-01/3.0E-03
Lower Large Intestine	1.1E-02/1.1E-04	6.0E-02	6.5E-04/6.5E-06
Upper Large Intestine	3.6E-03/3.6E-05	6.0E-02	2.2E-04/2.2E-06
Small Intestine	7.4E-04/7.4E-06	6.0E-02	4.4E-05/4.4E-07
Effective Dose Equivale	ent		2.9E+01/2.9E-01

One urine sample was analyzed by gross alpha counting and alpha spectrometry. The gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The result was fit using CINDY and the Jones excretion model, to estimate an intake (95,000 pCi), organ doses, and a CEDE (29 rem/0.29 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 316,000 pCi and a CEDE (ICRP-60) of 22 rem (0.22 Sv).

### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 95,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 29 rem (0.29 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the

current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level.

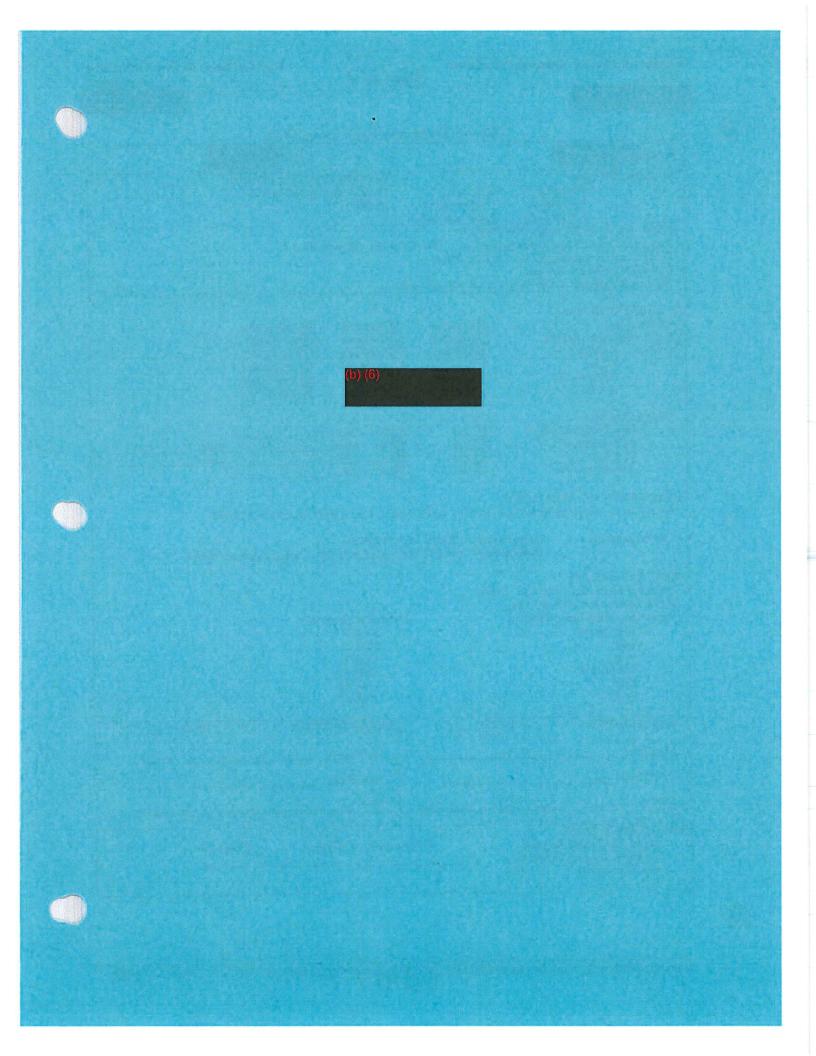
Prepared By:		
Name:		
Signature:	Date:	
Peer Reviewed By:		
Name:		
Signature:	Date:	

· · · · · · · · · · · · · · · · · · ·			MTERN	AL DOSE DATA	THE COLUMN TON	Principle .	
NAME (LAST, FIRST,	W.1.1 (1-20)		INTERN	AL DOSE DATA	<b>以及19</b> 00年第四十二年	AL.	
b) (6)			(b) (6	C. NO. (21-29)	PESAMPLE (3	TYPE ANAL	. (31 - 32)
SAMPLE 110, (33+3)	SSgt	SAMPLE DAT		1 1905 Berli	Urine	Sherita and	
66-2861		FROM 8	- A-A	TO		STE 18 Jan 66 TYP	_
BASE (57 - 60)		OCCUPATION	1 (61 - 62)	REQUESTED BY	OX MANAGEMENT	TE TO Jan PO IA	E
Moron		15 12 90	isted	71 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		1.2	
DATE RECEIVED		SAMPLE VOL	UME	VOLUME ANALYZED	DATE	ANALYZED	•
22 April 196		146	25	1425		A Company of the Comp	
TECHNICIAN (SIGN	ATURE AND DATE)	/			(本作)	Constant and	
		,			The section of the se	Selection of the select	
URINE				RADON POST	" 新文化学 20%	FECES /BLOOD	
Counter Number	C			Chamber Number	THE TALKS	Counter Number	T
Counter Bkg. (epm)	0.04 1900	)		Cham. Bkg. (mv/sec)	一块技术中央证	Counter Bkg.	<del>  .                                     </del>
Counter Eff. (%)	51		1 17 3	Counter Eff. (%)			
Date/Time - Start	13may66			Millivolt - Start Tour		Date/Time - Start	1
-Stop	/		. A7	Millivolt - Stop With	ALMERICAN STATE	of Alive - Stop	1./
Total Counts	83		tope	Total Millivots	一大大学中华中	Total Counts	
Counting Time	575	Reported	solve Correi	Fotal Drift Time	<b>有一种种的社</b>	Counting Time	
Pross cpm	1.51	la soite	010.965pc		*宋朝明后都对党员	Gross cpm	1
3kg. Cpm	0.04	per Han	Slo	Bkg. My/sec	<b>计划数据</b>	Bkg. cpm	0.2290
Net cpm	1.47	,	0	Net my/sec	<b>山市市市市市市市市市</b>	net cpm	NSBB
pm pio/1	0.908	±0.206	ELSONER I	curies/my	and outrace.	dpm	1 A S MA
lpm/24 hr. (69 - 74)				litter (69 - 74) 1175-128	SALE PROPERTY.	dps/cc as war.	
40 Correction				14.2 12141411111111111111111111111111111	· 大大学 计数据字	Neutron Dose (rads) (63	3-68)
ter Bata pri/ Sp	1.29	t 0.29		D(g) (63-68)		uc/mg (69-74)	1
(q) (63-68)					interment in many	D(q) (63-68)	

<u> </u>		DAD		AL SAMPLE DATA		THE PROPERTY OF
4	substituting a dis-		Control of the Contro	AVEN SEE SEE SEE SOCIAL	SECURITY NUMBER THE RHL	SAMPLE NUMBER
AME OR REQUESTOR'S ID (1-3	(0)	GRADE	<b>271.100</b> 000		SECURITY NUMBER 197 RHI	F. BASE (68-71) 2005
YPE SAMPLE (23-32)	OCCUPATION (34-35)	ANALYSIS DE	4 3	REQUESTED BY		E BASE (68-71)
DATE RECEIVED (37-42)	DATE ANALYZED	Letter.	1204	EC66	m. 世代的哲學的數學的學	李母於學校就是是
SAMPLE WEIGHT/VOLUME		WEIGHT/	ANA THULOV	LYZED	A MANAGEMENT OF SOLVE TO SELECT TO A TO	
OTHER DATA . 956		200	100	的根据的图片的		
ENVIRONMENTAL SAMPLES		-	1/8	· WHITE PLANTED AND THE PARTY PARTY	· Committee States of Property Selections in the Committee of the Committe	and the second second second
COUNTER & EFFICIENCY		16.07-41	· · · Amilia	WASH SHINGH AND AND THE PARTY OF THE PARTY O	これのないないということできることできているとうできている	Control of a later to the second of the seco
TOTAL COUNTS & MINUTES		n kata da	107.	privile that a designation of the properties.	<b>利用が開発は対するようないませんだって</b>	The state of the s
GROSS CPM		Water Daniel	-74°C	1.70年在新年中的大学的大学的大学的大学	は高級は大きないないないできょうだって	mark to the exite An
BKG CPM & MINUTES			יונוש:	一一日本の日本からかけるはまれて、 マヤロいはなかれ	Libetings and harm to approve their	
NET CPM			·	。 心,中间还是他们的是不可以	CARGINAL SOLIS A SALESTAN CONTRACTOR	and the same of the same
YIELD			1.50	अन्याद्वाकार स्वाचित्र स्वाचित्र क्षित्र क्ष्याच्या	·明山田山東北京山東北 公司五十年日本北京	A to the stand of the same of the
11000			. A17.44	するのない 大きないない はいまない はいまして 神べからな	· 中国の大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の大学の	THE GOLD OF BUILDING
			10	されの大学には、これのからからからは十分	L THE HISTORY OF THE PARTY OF T	made to the same than them
		7	ינו ו	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	大学の大学の大学、東京学者を大学、中、一十十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十	well here being the property
		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	* - 3.4.	· 人名伊拉尔伊里斯马克特拉克斯拉斯西斯马克	Transferred the Mary Their	- months turbert by a reason of the
			***	· Market desires an Apparent responsible		Company of the control of the or special
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		·		" All Miles bearth Ale the Lead to	- RADON HAMMAN CHOCATON	mintel more and
BIOLOGICAL SAMPLES		231	,	2764239 HE - Principal	7 77	2.88 APM
COUNTER & EFFICIENCY	nee	0-1.3	1 E 3441	······································	1400 20.69 minutes	CONTRACTOR TO STATE OF THE STAT
TOTAL COUNTS & MINUTES	100	85	· · · · · · · · · · · · · · · · · · ·	6個個家多 \$P\$明柳柳\$\$	・ 古の出り事性 やっちゃってかったい では	· Minghardh ar Mahamaran an an an an
GROSS CPM	1724 1 182	Co.	1.8500	Valadic Mattick Act a lange and a	THE COMPANY STATES OF THE PROPERTY OF THE PROP	· · · · · · · · · · · · · · · · · · ·
BKG CPM & MINUTES	800		0.00/2		- Moder bed district and a constraint	Let with the river or total him to
NET CPM	COLUMN TO BE		018488.	CONTRACTOR OF THE PROPERTY OF	D.074 ± 0.011 5	the State of the s
YIELD	The state of the second		-10 14 MO	·· · · · · · · · · · · · · · · · · · ·	AND DESCRIPTION OF THE PERSON	The state of the state of
			y year	・ 一一一一一一一一一一一十二十二十二十二十二十二十二十二十二十二十二十二十二十二		to the profession of the second second
100	diversely sometimes	0.00		The second secon		was to a make to the Carter of
which the some all the same and	10 N N N N N N N N N N N N N N N N N N N		". FUE		· · · · · · · · · · · · · · · · · · ·	- 一十十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十
		0000	in again with the	The second of the second	THE RESERVE TO A PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.	Acres 1 . who they are
	lakec !	88.79	44			o tra Miss service the control
SUMMARY OF RESULTS:						

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-320

1. T.D



	<b>Internal Dosim</b>	etry Evaluation	n Form	
NAME: (b) (6)			SSN: (b) (6)	
MODE OF INTAKE:  Inhalation Ingestion Unknown  SUMMARY OF EXPOSURE CON Radionuclides/Respiratory Class/Pa Date or Period of Evaluated Data: I Duration of Exposure: Unknown Location of Exposure: Camp Wilso	article Size: <sup>239</sup> Pu/100 sample, 4/6/66	1/18/66 throug 2/9/66 0% Class Y/1 μm ΑΝ	TE OR PERIOI h 3/4/66, onsite IAD	):
EVALUATION DATA: Air Sampling Health Physics Survey Data Bioassay — Urinalysis Fecal Nasal Smears In Vivo  Medical Treatment: Skin Decontamination: Decorporation: Catharsis: Surgical excision:  EVALUATION METHODOLOGY	Attached Attached Attached Attached Attached Attached Attached Yes Yes Yes Yes Yes	In Process No Date: No Agent:	⊠ Unavailable ⊠ Unavailable □ Unavailable ⊠ Unavailable ⊠ Unavailable ⊠ Unavailable	Date:
Assumptions: Acute inhalation in Code/Model used for: Intake I	take of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve stimate: CINDY, Ve	r. 1.4/JONES		
50 YR CEDE (rem): 95 (0.95 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes		50 YR CDE (rem/S <sup>-</sup> 970/9.7 350/3.5 170/1.7 75/0.75 16/0.16 14/0.14	v)	
DOSE ASSESSOR: D Signature: Print Name: SSN:			ER:	
RECOMMENDATIONS: Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions: N/A		rinalysis Fe	cal 🔲	In Vivo

# **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

### Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

### Other Information:

None.

Radionuclide(s): 239Pu.

## Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1 µm AMAD particle size on 2/9/66. The date is the midpoint of the period on station from 1/18/66 to 3/4/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-2869	AS	4/6/66	0.224	0.007	1
66-2869	G	4/6/66	1.75	0.340	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

## Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	310,000	95/0.95
LUDEP	950,000	67/0.67

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	1.4E+01/1.4E-01	2.5E-01	3.5E+00/3.5E-02
Breast	4.6E-04/4.6E-06	1.5E-01	6.9E-05/6.9E-07
Red Marrow	7.5E+01/7.5E-01	1.2E-01	9.0E+00/9.0E-02
Lung	3.5E+02/3.5E+00	1.2E-01	4.2E+01/4.2E-01
Thyroid	4.3E-04/4.3E-06	3.0E-02	1.3E-05/1.3E-07
Bone Surface	9.7E+02/9.7E+00	3.0E-02	2.9E+01/2.9E-01
Liver	1.7E+02/1.7E+00	6.0E-02	1.0E+01/1.0E-01
Other	1.6E+01/1.6E-01	6.0E-02	9.8E-01/9.8E-03
Lower Large Intestine	3.5E-02/3.5E-04	6.0E-02	2.1E-03/2.1E-05
Upper Large Intestine	1.2E-02/1.2E-04	6.0E-02	7.1E-04/7.1E-06
Small Intestine	2.4E-03/2.4E-05	6.0E-02	1.5E-04/1.5E-06
Effective Dose Equivale	nt	450.5 86.	9.5E+01/9.5E-01

One urine sample was analyzed by gross alpha counting and alpha spectrometry. The gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The result was fit using CINDY and the Jones excretion model, to estimate an intake (310,000 pCi), organ doses, and a CEDE (95 rem/0.95 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 950,000 pCi and a CEDE (ICRP-60) of 67 rem (0.67 Sv).

## Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 310,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 95 rem (0.95 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the

Palomares Nuclear Weapons Acciden	<b>Palomares</b>	Nuclear	Weapons	Acciden
-----------------------------------	------------------	---------	---------	---------



Revised Dose Evaluation Report
April 2001



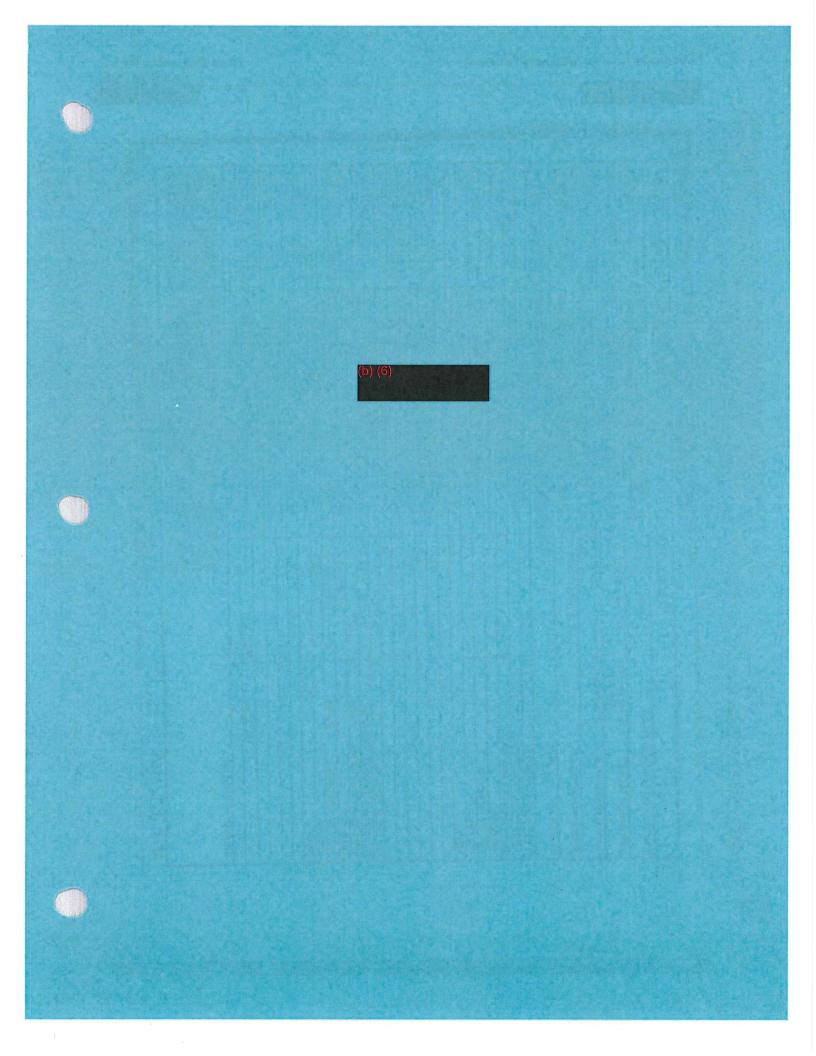
current level (0.100 rem) for members of the public. It is more than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). These dose levels are significant, although they were based on only one sample. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Prepared By:	
Name:	<u> </u>
Signature:	Date:
Peer Reviewed By:	
Name:	
Signature:	Date:

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-325

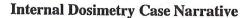
			· (* 15.5)			33	
AFSN:			INTERN	AL DOSE DAT		<b>国际的</b> 2007年	<b>苏州岛</b>
(b) (6)	A2C	and the same of the same	SOC. SEC	. NO. (21 - 29)	TYPE SAMPLE !	O) HATTE TYPE ANAL	(31-32)
SAMPLE NO. (33-3)		SAMPLE DA	TE (39 - 40	道界機能學	Urine	osure 18 Jan -	<b>一种和外外的</b>
66-2869		the state of the s	0 5 Apr	<b>一大大小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小小</b>		OSURE 18 Jan -	一个可以
BASE (57-60)	****	OCCUPATIO	N (61 - 62)	REQUESTED BY	ir 66 THE ELLIP	ATE 4 Mar 66 TYP	E 一种发现的重要
Torrejon		Search	er				ALL MANAGEMENT
22 April 196	5	SAMPLE VOL		VOLUME ANALYZE	DAT	E ANALYZED	
TECHNICIAN (SIGN.			· · · · · · · · · · · · · · · · · · ·				Separate Separate
URINE			1,102	PADON SIN	en e	FECES/BLOOD	THE THE PARTY
Counter Number	A		· · · · · · ·	Chamber Number	· 公司 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	Counter Number	1 2000年
Counter Bkg. (cpm)	0.0x 1900	)	t-33	Cham, Bkg. (my/sec)	CAN SHARING SALES	Counter Bkg.	PL S AFET
Counter Eff. (%)	51		1870.	Counter Eff. (%)	AS CONTRACTOR AS	Counter Eff.	TOWN OF THE PER
Date/Time - Start	13may66	44	(1) (1)	Millivolt - Start		Date/Time - Start	1.A. 5035
-Stop	,		\$144 -	Millivole Stop	A STANDARD BEING	SECRETAL CONTRACTOR	-0.5 JP / 4.55
Total Counts	111	Reported	value 1	Total Millivots	<b>网络阿里斯斯</b>	Total Carrie and	A JOHN
Counting Time	55	correcte	las areko	Total Drift Time Well	<b>建设建筑建筑</b>	Counting Time	THE PARTY AND
Gross cpm	2.02	010,965	de Ishiple	Gross my sec	<b>新人為提出的基礎的</b>	Gross com	The state of the s
Bkg. Cpm	0.04			Bkg. My/sec	境 - 有國際國際政策	SPLANNE THE MARKET	0,90PC#
Net cpm	1.98		1,1124	Net my/sec	和 常數傳統	met com	0.1088
por pei/1	1.25	t 0,24	15. 1. 1	curies/my The The Control	是   在被撤离的数据	dom The State of t	* STATION
dpm/24 hr. (69-74)		1911	ा अनुस्केत	litter (69 - 74) 1888 (69	熙 時機能認識	dos / cc	Trible Bulletonie
K 40 Correction	1 7 1		97.4	"特别是我们的现在分词	经 中国的 电电子	Neutron Dose (rods) (63	68)
Lat Boto sec/ Sxl	11751	0,34		D(a) (63.68) (68.88)	di Almidiatranica	"uc/mg (69-74)	Emilian Miles

19-20	#\$ 1D (1-20) GR.    0CCUPATION ANALY   0.CCUPATION ANALY   0.CCUPA	SAMIPLE DATA    ROUTTED IN   REQUESTED IN   TOTAL COLLECTED IN   TOTAL C
137-42   DATE ANALYZED (S1-56)   DATE COUNTY   LEGISLETIC BATCH   LE	#\$ ID (1-20) GRADE    0CCUPATION AMALYSIS DESIRED	REQUESTED BY  REQUESTED BY  TOTAL COLLECTED  TOTAL COLLEC
137-22   DATE ANALYZED (51-86)   DATE COUNTED   CATALOGUES   CATALOG	CY SPECE CYPATION ANALYSIS DESIRED (154-35)  AND DATE ANALYZED (15-56)  DATE COUNTY OF COUNTY OR	PROUD STOD BY    DATE COLLECTED   TANK   TAN
137-42   DATE ANALYZED (51-86)   DATE COUNTED	10 DATE ANALYZED (51–56) DATE COUNTY  13 WEIGHT/VOLGHE ANALYZED  10 TES  10 TE	TO SERVICE THE PAIR OF THE PAI
1953   SAMPLES	THES  OTHER  OTH	THE STATE OF THE S
1953   SAMPLES   CIENCY   CUTTOTION OF THE PROPERTY OF THE P	13 PLES (PLES (UTES  UTES  OY \$ SPEC  L 3 C  O \$ 9/8 10  O \$ 9/8 10	A CONTROLLE CONT
SAMPLES  CIENCY  INITIATES  THINUTES  THINUTES	INTES  CY SAEL  TYSE  OUTES  O	Section of the sectio
MINUTES	OVES 100 0.878.0	THE CONTROL OF THE PROPERTY OF
HINUTES   A CALL	CY SAEU 273 UTES 100 0.986.0	THE PRINCIPAL STATES OF THE PR
Trees	CY SPEU 273 UTES 100 0.9850	THE STATE OF THE S
1165	CY \$ PEC 27.3 UTES 100 0.8%10	Processing and the formation of the following the processing of the following the foll
1.1   1.2   1.2   1.3	CY SPEC 27.3 UTES 100 0.9840	THE CONTROL OF THE CO
1. ES SOO ( 0.99 % CO	TY SPEC 27.3  UTES 100 88.50  800 1 0.998.0	A SECTION OF THE PROPERTY OF T
1.5	TAS 100 27.3  UTES 100 9850  0.9950	A SECTION OF THE SECT
1-15	CV SPEC. 27.3 UTES 100 8880 0.9880	THE PROPERTY OF THE PROPERTY O
16.5   1.36   1.37	CV SPEC. 27.3 UTES 100 88 50 800 1 0.9987	The second of th
1ES	TYSE 27.3  UTES 100 88.0  800 10.9187	A STATE OF THE STA
1ES	UTES (00 2 7.3 0.9850 83 0.9950 0.99850	Control of the state of the sta
TEST	TAS (00 28 00 0 8 8 00 0 8 8 00 0 8 8 00 0 0 8 9 8 00 0 0 8 9 8 9	A STATE OF THE PROPERTY OF THE
NINUTES   000   0.9%	VIES 100 2860 AND 100	1 3 STATES OF THE STATES OF TH
NINUTES   000   88	UTES 100 88 0.2850 AND 100.815 4 4	2/3 September 13.8
1ES 900 1 0.00/7 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	800 1 0.8860	
7. Loc 92. 20	800 1 0.85% 4	10 10 10 10 10 10 10 10 10 10 10 10 10 1
The Control of the Co	7 1808.0	いるとうというというないのできないできないできないます。
The second secon	18/18/	されていることでは、 では、 できないできない こうしょうしょう さんしょうしょう
ULTS:		The state of the s
10.175:		というとなるとのできます。 0.00~
ULTS:	Birt	THE STANTANT OF THE PROPERTY O
15 & Co. 92,20 and annual transfer of the statement of t	を表すると こびもじ	これではなりのあるよう。 このはななななななななないのではないのではないのできないというないのできないないのできないのではないのできないのできないのできないのできないのできないのできないのできないのでき
ULTS:		のできるという。 1900年の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の
ULTS:		こうかりというとうのという しょうかんかん はないない はないのできる はないないないのできる
ULTS:	6 Kec 12.20	「こうから」というできるとのできるとのできるというできることがある。
DUMMANT OF RESULTS:	The state of the s	このできると、 このできるない日本は一日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日
	SUMMARY OF RESULTS:	1000000000000000000000000000000000000
ないできない。これでは、これでは、これでは、これでは、これでは、これでは、これでは、これでは、	1000年の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の	
FORM 4.4.	FORM AND STREET	



Internal Dosimet	ry Evaluation Form
NAME: (b) (6)	SSN:(b) (6)
MODE OF INTAKE:    Inhalation	INTAKE DATE OR PERIOD: 1/29/66 through 2/14/66, onsite 2/6/66
Radionuclides/Respiratory Class/Particle Size: <sup>239</sup> Pu/100% Date or Period of Evaluated Data: 2 samples, 2/14/66 and 4 Duration of Exposure: Unknown Location of Exposure: Camp Wilson, near Palomares, Spain	/8/66
	In Process  Unavailable In Process Unavailable In Process Unavailable In Process Unavailable In Process Unavailable In Process Unavailable In Process Unavailable
Skin Decontamination: Yes  Decorporation: Yes  Catharsis: Yes	No         Date:           No         Agent:         Date:           No         Agent:         Date:
EVALUATION METHODOLOGY: Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100% Class  Code/Model used for: Intake Estimate: CINDY, Ver. Dose Estimate: CINDY, Ver.	
RESULTS SUMMARY Estimated Intake Activity (pCi): 110000 50 YR CEDE (rem): 34 (0.34 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes	0 YR CDE (rem/Sv) 340/3.4 130/1.3 61/0.61 26/0.26 5.8/0.058 4.9/0.049
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:
Signature:	Signature:
Print Name:	Print Name:SSN:
RECOMMENDATIONS:  Additional Bioassay Required  Suggested Sampling Frequency:  Work Restrictions:  N/A	

(b) (6) A



### Identification:

Name: SSN:



### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

## **Previous Intake/Dose Assessments:**

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

## Other Information:

None.

Radionuclide(s): 239Pu.

# Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/6/66. The date is the midpoint of the period on station from 1/29/66 to 2/14/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-1147	G	2/14/66	NR	NR	
66-2872	AS	4/8/66	0.076	0.007	1
66-2872	G	4/8/66	1.66	0.330	•
				0.000	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry; NR means no result reported.

A nasal swipe (sample #66-1333) was reported to have been taken for result was available for this sample.

on 2/14/66. No

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

## Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	110,000	34/0.34
LUDEP	321,000	22/0.22

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	4.9E+00/4.9E-02	2.5E-01	1.2E+00/1.2E-02
Breast	1.6E-04/1.6E-06	1.5E-01	2.4E-05/2.4E-07
Red Marrow	2.6E+01/2.6E-01	1.2E-01	3.2E+00/3.2E-02
Lung	1.3E+02/1.3E+00	1.2E-01	1.5E+01/1.5E-01
Thyroid	1.5E-04/1.5E-06	3.0E-02	4.6E-06/4.6E-08
Bone Surface	3.4E+02/3.4E+00	3.0E-02	1.0E+01/1.0E-01
Liver	6.1E+01/6.1E-01	6.0E-02	3.7E+00/3.7E-02
Other	5.8E+00/5.8E-02	6.0E-02	3.5E-01/3.5E-03
Lower Large Intestine	1.2E-02/1.2E-04	6.0E-02	7.5E-04/7.5E-06
Upper Large Intestine	4.2E-03/4.2E-05	6.0E-02	2.5E-04/2.5E-06
Small Intestine	8.6E-04/8.6E-06	6.0E-02	5.1E-05/5.1E-07
Effective Dose Equivale	ent		3.4E+01/3.4E-01

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The sample analyzed by gross alpha counting only was not included in the analysis since no result was reported for it. The result was fit using CINDY and the Jones excretion model, to estimate an intake (110,000 pCi), organ doses, and a CEDE (34 rem/0.34 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 321,000 pCi and a CEDE (ICRP-60) of 22 rem (0.22 Sv).

<b>Palomares Nuclear We</b>	eapons Accident
-----------------------------	-----------------

DRAFT

Revised Dose Evaluation Report April 2001

(b) (6)

DECKE !

Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 110,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 34 rem (0.34 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be considered to provide additional assessment of the exposure.

Prepared By:		
Name:		
Signature:	Date:	
Peer Reviewed By:		
Name:(b) (6)		
Signature:	Date:	

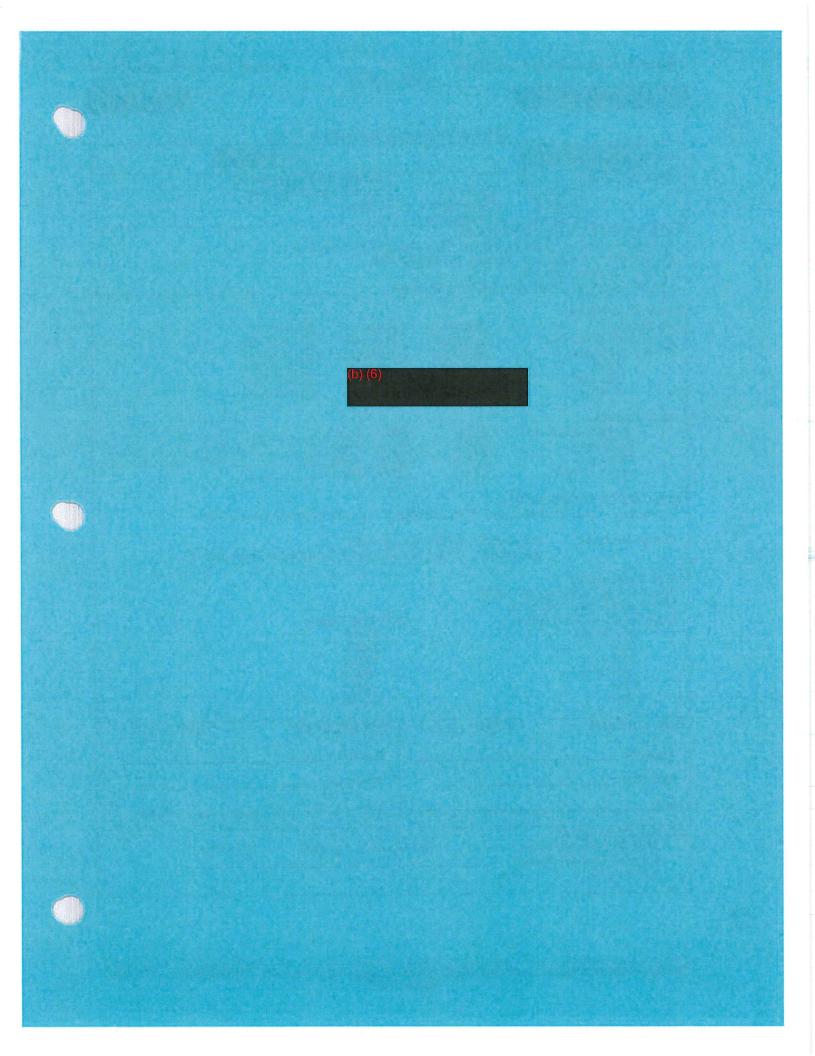
1 Ormy	(6)							27
L. Martin St. St. St. St. St. St.			INTERN	AL DOSE DAT	A	M EMERGE		
STETSON, RON SAMPLE NO. (33-3)	ATD (D)		Not	C. NO. (21-29)	TYPE SAMP		TYPE ANA	L. (31-32)
66-2872 BASE (57-60)	" 🗸	Annual Control of the Control	7E (39-44) Ot Idsted IN (61-62)	TO REQUESTED BY	10,	EXPOSURE NO	ed TY	PE
Not Listed	* * *	Not Li	sted UME	VOLUME ANALYZ	ED	DATE ANALYZ	-0	
22 April 1960 TECHNICI (b) (6)	6	15	60	1500	5	- AMACI E		
W DE URINE	(b) (d	6)	1800	RADON		EEC	S/BLOOD	
Counter Number	D	The second second		Chamber Number		. Counter I		<del></del>
Counter Bkg. (cpm)	8.03 (900)		4260	Cham. Bkg. (mv/sec	)	Counter E		
Counter Eff. (%)	51			Counter Eff. (%)	-	Counter E		<del></del>
Date/Time - Start	132may 6 (			Millivolt - Start		Date/Tim		-
Stop	/			Millivolt - Stop		Date/ I Im	- Stop	1
Total Counts	105	Reported	alue 1	Total Millivots	1 12.	Total Cou		1
Counting Time	55	corrected	for spike	Total Drift Time	1 70	Counting		
Gross cpm	1.91	0 0965	Pc Csample	Gross my/sec	1			
Bkg. Cpm	0.03			Bkg. Mv/sec		Bkg. cpm		D.83F
Net cpm	1.88			Net my/sec		net cpm		0,15B
pri pri/	1.11 4	0,22		curies/mv		dom		01/20
dpm/24 hr. (69-74)				litter (69 - 74)		dps/cc		<b> </b>
K 40 Correction	1777	£ 4 32					ose (rads) (6	3-68)
Not Boto pei / Sych D (9) (63-68)	1.66	6.33		D(q) (63-68)		uc/mg (d		1
> (4) (W-08)	1					D(q) (63		

NAME OR REQUESTOR'S ID (	ME OR REQUESTOR'S ID (1-20) GRADE			AFSN		SOCIAL SECURITY NUMBER		R	RHUSAMPLE NUMBER Z	
TYPE SAMPLE (23-32)	OCCUPATION (34-35)	ANA	NALYSIS DESIRED REQUESTED BY AI			AIR F	ORCE BASE (68-71)			
DATE RECEIVED (37-42)	DATE ANALYZI	E ANALYZED (51-86) DATE			UNTER 6	6	DATE COLLECTED			EXPOSURE DATE
SAMPLE WEIGHT/VOLUME			WEIGHT/VO	DLUME AT	NALYZED			TECHNICIAN		
OTHER DATA , 953			5 231							
ENVIRONMENTAL SAMPLES					100	7.27				
COUNTER & EFFICIENCY										
TOTAL COUNTS & MINUTES	(7)				407	ballan a			HL E	
GROSS CPM					1000	STERRIL POL	41. 2	THE REPORT OF	S Transition &	
BKG CPM & MINUTES		3 9 5		1.00	- Paristo		les Tilles	No. 6 5 (46.17)	Marie C	- F. CO. RUIS - 100
NET CPM				180		W STATE			115	
YIELD		1000	Signal .			V April			and the same	
AND ALL SHOP IN THE RESERVE							9.73	DOMESTIC OF THE PERSON	14	
			E	/ 21						
					100					to the state of
							-		2000	
	Drift January Special	-						4 5 1 1 1 1 1 1	(April	
BIOLOGICAL SAMPLES			7 5 /			25.00			- 2	
COUNTER & EFFICIENCY	5000		236			39		RADON		1 40 0044
TOTAL COUNTS & MINUTES	Spec		7.3		-	23		3.576	m	3.69 DPM
GROSS CPM	700	-		300		100		±0,72		
BKG CPM & MINUTES	800	7	0.0	013	4	0.00	200			
NET CPM	000		8.9	187	7	0.05				•
YIELD		1 5 5	0.9	~ /		0.07	, 0	0,076 ± 0.0	17	
TIELD			Art Service		-		C	410/8-0.0	0/	
TIELD								1		
TIELD					1		-	,		
YIELD				100						
YELD					-		14			J. 34 & S. 5. 5
YIELD	% Rec	97.4	105		- 20 27					

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-332

and the first of the same	2 . VIII					the sealth of the seal of the seal	A LA
			64,45	Mark Colors		<b>(1) 10 10 10 10 10 10 10 10 10 10 10 10 10 </b>	MANAGEMENT AND
2000 (b) (6	5)		2.4	- TANGETHINK ( THE STEEL COM	ACCOUNTS AND MANAGEMENT OF THE	Table in interest to the Author of Manager of	<b>。1997年第18日 187</b> 日
NAME (LAST, FIRST,	Mala) (1 = 20)	11.00%	INTERN	AL DOSE DATA		<b>对外到时间的</b>	如此讲
(b) (6)	STANCE OF		SOC. SE	C. NO. (21 - 29)	PESAMPLE (S	O) TYPE ANAL.	(31-32) -
SAMPLE NO. (83-38	3)	SAMPLE DAT	E (39 - 44)	THE SHAPE OF SHAPE	ASALVA	IPE !	<b>为此是是</b>
66-1333	1.	FROM JU	Fro !!	TO	A CONTRACTOR OF THE PROPERTY O	SURE	Grant Inc
BASE (57-60)	· · · · · · · · · · · · · · · · · · ·	OCCUPATION	N (61 - 62)	REQUESTED BY	表现的方式。 一种	TE MELENWETYPE	· 神中国 (1)
656 ENG. BA	APO 09081	12,54	<b>一种种类型</b>	<b>**</b>		The Author Street	
DATE RECEIVED	- de la propertie	SAMPLE VOL	UME	VOLUME ANALYZED	DATE	ANALYZED	alternations
9 MARCH	1966	18 6 95	类,然后,他们就是				Hart Marie
TECHNICIAN (SIGN	ATURE AND DATE)					The Bridge and Life	Come to the last
TIRHVE	7		THE PROPERTY OF THE	RADON	S LANGE BELLEVIEW	FECES/BLOOD	and wat in Any
Counter Number	TRICTRO	ST495 85 T	**************************************		The second secon	Counter Number	en i plen i frient auge in
Counter Bkg. (cpm)		25. 17.	- at transfe			Counter Bkg.	J. A. Carrier
Counter Eff. (%)	THE LO		Profession Section	Counter Eff. (%) 建设	PARTICIPATION AND AND AND AND AND AND AND AND AND AN	Counter Eff. 100 Year.	Selection of
Date/Time - Start	10MAR 66	4.3	in the state	Millivolt Start		Date/Time - Start	el Francisco
-Stop		L CANA	अकर एक <b>र्स</b>	Millivolt - Stop Wall		Stop Stop	2
Total Counts	4439			Total Millivots	PROTALING	"Total Counts	* 2 will be
Counting Time -	20	and the state of	1	Total Drift Time		Counting Time Time	* 110
Gross cpm	222		Fig. Frankling Sign	Gross my sec	WHITE PROPERTY.	Gross com	dephison that is
Bkg, Cpm	164		· 大学 · 中央	Bkg. My/sec		Bkg. cpm	-14h** 50 +40
Net cpm	58±11	1.04	11年1日日本	Net my/sec	TANKED PROPERTY.	net com	Theres Cons
dpm	50 ±11	. C.	was the transfer	curles/my	PARTY TANKS	dom AMERICA LINE	4 4472 - 4240
	AS-11-157		1.14.14	litter (69-74)		dps/cc with the	· 中华市中华
dpm/24 hr. (69 - 74)			19814 1 2 4 4 4 4 4	And the Restriction and of the property of the same of the same	I m principles and a second		
dpm/24 hr. (69 - 74) K 40 Correction Net Beta	1781		· Sand	<b>运输的数据的数据的数据的数据</b>	<b>兴场战争张扬峰</b> (0)	Neutron Dose (rads) (63-	אמן ייניייייייייייייייייייייייייייייייייי

. . .



	etry Evaluation Form
NAME: (b) (6)	SSN: (b) (6)
MODE OF INTAKE:	INTAKE DATE OR PERIOD:
☐ Inhalation ☐ Injection	2/1/66 through 2/27/66, onsite
Ingestion Absorption	2/13/66
Unknown Not applicable SUMMARY OF EXPOSURE CONDITIONS:	
Radionuclides/Respiratory Class/Particle Size: <sup>239</sup> Pu/100	% Class V/I um ANAAD
Date or Period of Evaluated Data: 2 samples, 2/27/66 and	70 Class 171 μm ΑΜΑD
Duration of Exposure: Unknown	22000
Location of Exposure: Camp Wilson, near Palomares, Spa	in
ENVAR ATA GOVERN A COLA	
EVALUATION DATA: Air Sampling	
Air Sampling Attached Health Physics Survey Data Attached	☐ In Process ☑ Unavailable ☐ In Process ☑ Unavailable
Bioassay – Urinalysis Attached	
Fecal Attached	
	☐ In Process ☑ Unavailable ☐ In Process ☑ Unavailable
	In Trocess
Medical Treatment:	
Skin Decontamination: Yes	No Date:
	⊠ No Agent: Date:
Catharsis:	No Agent: Date:
Surgical excision: Yes	No Date:
RESULTS SUMMARY Estimated Intake Activity (pCi): 190000 50 YR CEDE (rem): 58 (0.58 Sv)	
DOSE ASSESSOR: DATE:	DEED DEVIEWED.
DAIL.	PEER REVIEWER: DATE:
Signature:	Signature:
Print Name:	Print Name:
SSN:	SSN:
RECOMMENDATIONS: Additional Bioassay Required Under Suggested Sampling Frequency: Work Restrictions: N/A	rinalysis Fecal In Vivo



# **Internal Dosimetry Case Narrative**

#### **Identification:**

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

# Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): <sup>239</sup>Pu.

#### Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/13/66. The date is the midpoint of the period on station from 2/1/66 to 2/27/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-3411	AS	2/27/66	0.122	0.045	1
66-3411	G	2/27/66	NR	NR	
66-1494	AS	2/28/66	0.282	0.116	✓
66-1494	G	2/28/66	1.52	0.310	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry; NR means no result reported.

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

## Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	190,000	58/0.58
LUDEP	616,000	43/0.43

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	8.5E+00/8.5E-02	2.5E-01	2.1E+00/2.1E-02
Breast	2.8E-04/2.8E-06	1.5E-01	4.2E-05/4.2E-07
Red Marrow	4.6E+01/4.6E-01	1.2E-01	5.5E+00/5.5E-02
Lung	2.2E+02/2.2E+00	1.2E-01	2.6E+01/2.6E-01
Thyroid	2.7E-04/2.7E-06	3.0E-02	8.0E-06/8.0E-08
Bone Surface	5.9E+02/5.9E+00	3.0E-02	1.8E+01/1.8E-01
Liver	1.1E+02/1.1E+00	6.0E-02	6.4E+00/6.4E-02
Other	1.0E+01/1.0E-01	6.0E-02	6.0E-01/6.0E-03
Lower Large Intestine	2.2E-02/2.2E-04	6.0E-02	1.3E-03/1.3E-05
Upper Large Intestine	7.2E-03/7.2E-05	6.0E-02	4.3E-04/4.3E-06
Small Intestine	1.5E-03/1.5E-05	6.0E-02	8.9E-05/8.9E-07
Effective Dose Equivale	ent		5.8E+01/5.8E-01

Two urine samples were analyzed by gross alpha counting and alpha spectrometry. The gross alpha analyses was not included in the modeling since an alpha spectrometry result was available for the each sample. The results were fit using CINDY and the Jones excretion model, to estimate an intake (190,000 pCi), organ doses, and a CEDE (58 rem/0.58 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 616,000 pCi and a CEDE (ICRP-60) of 43 rem (0.43 Sv).

### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 190,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 58 rem (0.58 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the

b) (6)

current level (0.100 rem) for members of the public. It is more than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not normally associated with these dose levels. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Prepared By:	
Name:	-
Signature:	Date:
Peer Reviewed By:	
Name:	
Signature:	Date:

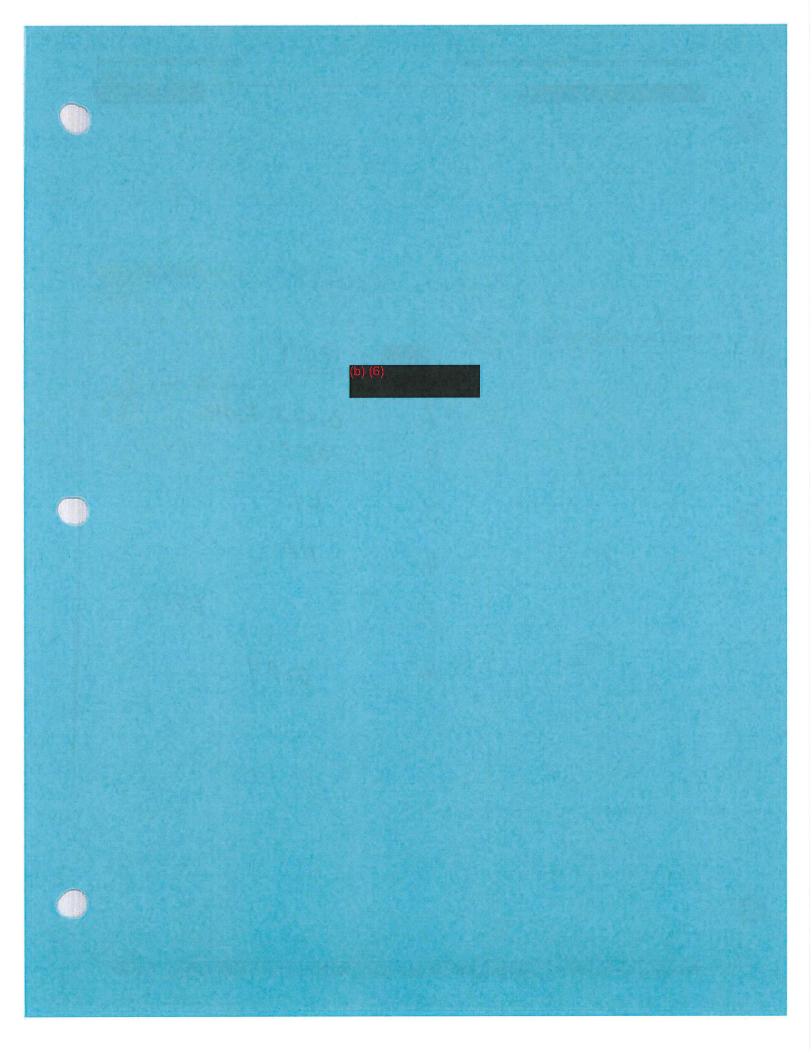
b) (6)

Civilian: GS		. Sur Belging Co.		AL DOSE DATA	NOT 1	lesa	mple	·
(b) (6)	111111111111111111111111111111111111111	SHAP "	· SOC. SE	C. NO. (21-29) TY	ESAMICE	svo-ces	PE ANAL	. (31 - 32)
SAMPLE NO. (33-38)		SAMPLE DATE	(0) (0	·)	Urine	4	rus	-06
66-3411						OSURE		The state of
BASE (57-60) US	Marral	FROM 5 JU	ne 66	REQUESTED BY	0	ATE F	eb 66 TYP	E
Oceanograph	ic Office		01-02)	MEQUESTED BY	ar Egen			Yar sold
Oceanograph	ic Office	SAMPLE VOLUE	4E	VOLUME ANALYZED	IDAT	E ANALY	(450	
14 June 1966		6116	ome	1100			C	
T(b) (6)	E AND DATE)			4901	mut	16	sign-	
V-7 V-7	CAPT	18 Sept		)				
→ URINE	236	239	1011	RADON				
Counter Number	Suc.	Spee		Chamber Number	H -57		CES/BLOOD	T
Counter Bkg. (cpm)	03(10)	6(800)		Cham. Bkg. (hardsee)	136		r Number	-
Counter Eff. (%)	31.8	3/.8		27.7			r Bkg.	Malacian in
ote/Time - Start		27.6		Million St.	5806	Counte		
- Stop				Millivolt - Start		Date/T	Ime - Start	
Total Counts	48	8		Millivolt - Stop	17 0	-	- Stop	
ounting Time	100	100		Total Milliam Cfs	129	Total (		
ross cpm	,,,,	700		Total Dete Time	53		ng Time	
lkg. Cpm				Gross mv/sec		Gross		7,916
let cpm				Bkg. Mv/sec		Bkg. c	pm	
pm i				Net my/sec		net cpn	1	
pm/24 hr. (69 - 74)				curies/mv		dpm		
40 Correction				litter (69-74)		dps/co		
et Beta					31	Neutron	Dose (rads) (63	(8)
(q) (63-68)	L			D(q) (63-68)	185		(69-74)	- 4
(q) (63°66)				% Ricz	13316	D(q) (	63 - 68)	e*
						b b		
				,				
AME:			S	OCIAL SECURITY NUMB	ER:		SAMPLE NUMB	ER:
								s 1
IR FORCE BASE							-	
1								
ESULTS OF ANALYS	15 Pci/SPL	= 0.122 ± 0	, 545	% NEC = 95.6%				
70	T. VOL.	LIND		10 10 10 10				
177	C. AUNCYZKO	1 40-		BODY MUNDEN - C	2.087			
	7500	- 770		Wante	-10			-
				7				
Repeat the sam	ple for the follo	wing reason:	C	H/	A	-0	1.4.4	4
( ) Significan	it activity in rea	ently englyzed s	ample (s)	y wa repe	al som	yes	mos mos	
( ) Data requ				2 4 1 0	0.	4.	242.55	
				First of rese	mpang	pro	TAOMA.	
( ) Improper	nask used			u l	. 1	0 \	2(p) (p)	·
- ( ) Other				1			The state of	100
( ) Suggested	samplina schoo	lule _		Process	TA A	014	~~~~	
GNATURE:	, y - united				IDAYE.	The Control of the Co	P	
MIN LAKE!								

Walter m. S.					21 A . 1 W		A 15 . 10 11. 11
The state of the s	al. tel in sand & minist to a	The Your State of	Same was seen to	والأرافق والمراجع والمداني	he but have	Edwarf finally of the way	4.1
1.44 . 1° .	6		روائه كمدكد تروسه بالدهيمة بالمعادية			and and an interest of the fire and -	4
"	HE MENT !		2 8 2	MAR 1.	1966 📑 9	Ber I I AAM T	1.51
Elvilia				Commence of the second			1
NAME HAST FIRST	211 11 201		INTERN				
(b) (6)			SOC. SE	C. NO. (21-29)	YPE SAMPLE	(30) TYPE ANA	L. (31 - 32)
- NO. 133-3	51	I SAMPLE D	ATE (39 - 44)		Dein	15 Ku 239	L. (31 - 32)
66- 149	11				EXI	OSURE	
66- 149 BASE (57-60)	7	OCCUPATION	ON (61 -62)	REQUESTED BY	EFEBLK!	DATE TY	PE
US NAVAL OC DATE RECEIVED	card Rea	رط	(01 - 02)	REQUESTED BY			
DATE RECEIVED	THE WALL	SAMPLE VO	LUME	VOLUME ANALYZE	<u> </u>		
11 MARI	66	25	TO .	260	DA	E ANALYZED	
TECHNICIAN (SIGN	ATURE AND DATE)			1 2480			
URINE	GKOSS	ALPHA	T	RADON			
Counter Number	IC.			Chamber Number		FECES/BLOOD	
Counter Bkg. (cpm)	0.05 (990)		t230			Counter Number	
Counter Eff. (%)	51		100	Cham. Bkg. (mv/sec)		Counter Bkg.	
Date/Time - Start	12 may 66			Counter Eff. (%)		Counter Eff.	1 1 1 1
-Stop	700	Reported	and .	Millivolt - Start	-	Date/Time - Start	- /
Total Counts	101	1	d for into	Millivolt - Stop .		- Stop	1/
Counting Time	55	£ 0.965		Total Millivots		Total Counts	0
Gross cpm	1.84	0.765	pc/ssingle	Total Drift Time	·	Counting Time	
Bkg. Cpm	0.05			Gross mv/sec		Gross cpm	
Net cpm	1.79			Bkg. Mv/sec		Bkg. cpm	2.18 0
dpm nill	1	± 1.24		Net my/sec		net cpm	NSBE
dpm/24 hr. (69-74)	0.06	1.27		curies/mv		dpm	
		-		litter (69 - 74)		dps/cc	
			1				
K 40 Correction	150	T 1 21				Neutron Dose (rads) (6	3-68)
	1.52	I 0.31		D(q) (63-68)		Neutron Dose (rads) (6 uc/mg (69-74)	3-68)

		. ! RAD	IOLOGI	CAL SA	MPLE I	DĄTA			
311	50)	GRADE		AFSN			ECURITY NUMBE	R	RHL SAMPLE NUMBER
AME OR REQUESTOR'S ID (1-	207				•			TAID	FORCE BASE (68-71)
YPE SAMPLE (23-32)	OCCUPATION (34-35)	ANALYSIS D	ESIRED		REQUEST		2	All	and the same of the same of
ATE RECEIVED (37-42)	DATE ANALYZE	(51-56)	250	UNTED	~	DATE CO	LLECTED		EXPOSURE DATE
AMPLE WEIGHT/VOLUME		WEIGHT	/VOLUME A	NALYZED			TECHNICIAN		
						100			
OTHER DATA . 942				-7, 115					
NVIRONMENTAL SAMPLES									
COUNTER & EFFICIENCY									
TOTAL COUNTS & MINUTES	216								
ROSS CPM									
BKG CPM & MINUTES									2
NET CPM YIELD						TANK ON		3	
- She					239		RADON		
BIOLOGICAL SAMPLES		236			2.2.3		2,93	lam	3,510PM
COUNTER & EFFICIENCY	Spee	27.3		-	13	W. T		7	
TOTAL COUNTS & MINUTES	100	68	G Gel .	0	^ ^	1300	70,60		
GROSS CPM	Freb 1		.6801	6-	0.1	2075		JE 3 1	
BKG CPM & MINUTES	800	3 0	16762		8:7	225			S. San Aller at Mark
NET CPM		0	. 3 / 3 -	THE STATE OF			0.282=0	.116	
AIELD			10. 10. 14		Solet and the	(i)(i)(i)	Mark a service and service	March 1985	
4 \$64	West of the Section o		1 de la 16 de 16 d		71	780		4 7	
		Service Project	1.00			10.00		LaVI.	
	AND THE RESERVE OF THE PARTY OF	THE RESERVE		The state of	The Park To	111/2 37			100 1 100 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	U/o Pluc	11.78	A. 17 1945	Te 184		59. 18		1 14 1	
	1/0 ILLE	713 13				1 1	Herman Marie	16,76,00	

		\$*
(b) (6)	3411 0.122 ±,04	- 40. Pc.
/,	0.122 t,04	
2.	95.6	
3,	1.1	
4.	110	
5.	<i>E</i>	359
6.	0,04	



Internal Dosimetry Evaluation Form					
NAME (b) (6)	SSN: (b) (6)				
MODE OF INTAKE:    Inhalation					
Fecal Attached Nasal Smears Attached	In Process Unavailable				
Skin Decontamination: Yes  Decorporation: Yes  Catharsis: Yes	No         Date:           No         Agent:         Date:           No         Agent:         Date:				
EVALUATION METHODOLOGY: Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100% Clas  Code/Model used for: Intake Estimate: CINDY, Ver. Dose Estimate: CINDY, Ver.	•				
RESULTS SUMMARY Estimated Intake Activity (pCi): 140000 50 YR CEDE (rem): 43 (0.43 Sv) Organ Dose Equivalent Summary  Bone Surface Lung Liver Red Marrow Other Testes	9 YR CDE (rem/Sv) 440/4.4 160/1.6 78/0.78 34/0.34 7.4/0.074 6.2/0.062				
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:				
Signature:	Signature:				
Print Name:	Print Name:				
SSN:	SSN:				
RECOMMENDATIONS: Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions:  N/A	nalysis				



# **Internal Dosimetry Case Narrative**

## Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

## Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

## Other Information:

None.

Radionuclide(s): 239Pu.

## Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/15/66. The date is the midpoint of the period on station from 2/5/66 to 2/26/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-1419	AS	2/26/66	0.163	0.024	1
66-1419	G	2/26/66	0.731	0.216	

(b) (6)

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	140,000	43/0.43
LUDEP	697,000	49/0.49

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
-	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	6.2E+00/6.2E-02	2.5E-01	1.6E+00/1.6E-02
Breast	2.1E-04/2.1E-06	1.5E-01	3.1E-05/3.1E-07
Red Marrow	3.4E+01/3.4E-01	1.2E-01	4.0E+00/4.0E-02
Lung	1.6E+02/1.6E+00	1.2E-01	1.9E+01/1.9E-01
Thyroid	2.0E-04/2.0E-06	3.0E-02	5.9E-06/5.9E-08
Bone Surface	4.4E+02/4.4E+00	3.0E-02	1.3E+01/1.3E-01
Liver	7.8E+01/7.8E-01	6.0E-02	4.7E+00/4.7E-02
Other	7.4E+00/7.4E-02	6.0E-02	4.4E-01/4.4E-03
Lower Large Intestine	1.6E-02/1.6E-04	6.0E-02	9.5E-04/9.5E-06
Upper Large Intestine	5.3E-03/5.3E-05	6.0E-02	3.2E-04/3.2E-06
Small Intestine	1.1E-03/1.1E-05	6.0E-02	6.5E-05/6.5E-07
Effective Dose Equivale	ent		4.3E+01/4.3E-01

One urine sample was analyzed by gross alpha counting and alpha spectrometry. The gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The result was fit using CINDY and the Jones excretion model, to estimate an intake (140,000 pCi), organ doses, and a CEDE (43 rem/0.43 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 697,000 pCi and a CEDE (ICRP-60) of 49 rem (0.49 Sv).

#### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 140,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 43 rem (0.43 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the

(b) (6)

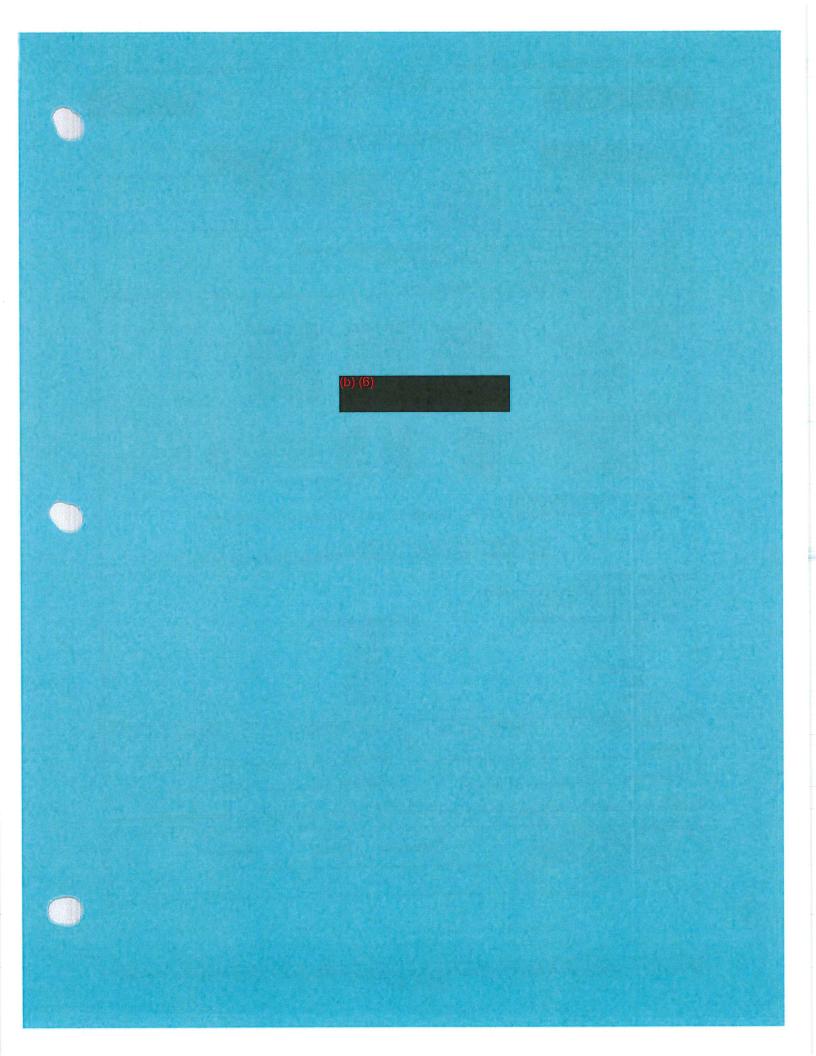
current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be considered to provide additional assessment of the exposure.

Prepared By:		
Name:		
Signature:	Date:	
Peer Reviewed By:		
Name:	<del></del>	
Signature:	Date:	

11/12/20	م معلمه بط من مناهمه الم	بسند شاه سنار	TO OPPOSE TO A PROPERTY.			A STATE OF THE STA	
Su sale it		1 4 4 3	罗州沿岸	nre-	-		30
2 - 13 2 (b) (6	1	. 2 20-	The same	MAP	9 1966	ALE STREET	S COMM
NAME (LAST, FIRST,	(1) (1-20)	30.12	INTERN	AL DOSE DATA		Antonio de la comp	<b>三国的</b>
b) (6)	11-207	I ~~ -	(b) (6)	. NO. (21:-29) - WELLY	S AMPLE (3)	GROSS	(31-32)
SAMPLE NO: (33-38	)	SAMPLE DAT	E (39 - 44)	Alto	URING	STATE SELECTION !	ALPHA ANG
66-1419	E	FROND	FERI	10x		TE OLL	40000
BASE (87-60)		OCCUPATION	(61 - 62)	REQUESTED BY	British William Co.	the state of the s	· The All Copy of the
MORON		43171	E			Marian Andrews	CONTRACTOR OF THE PARTY OF THE
DATE RECEIVED		SAMPLE VOL	UME A TANK	VOLUME ANALYZED	DATE DATE	ANALYZED AN HOLENA	A CONTROL AND
7 MARGO		880	Service Control		是		<b>1.100</b>
TECHNICIAN (SIGNA	TURE AND DATE)	والمناهدا كد	1.5			With the Link	
URINE		1.000	100000000000000000000000000000000000000	RADON SILVA	TEST NAME OF	FECES /BLOOD	<b>2007年联系的</b>
Counter Number	G	, ver	s which it	Chamber Number	<b>经有效的的</b>	Counter Number	The Spheres
Counter Bkg. (cpm)	003 1990		2021	Cham. Bkg. (mv/sec)	KNOW STORY	Counter Bkg.	Leging September
Counter Eff. (%)	51		· Mir and	Counter Eff. (%)	表標準領的影響	Counter Eff.	"Chashings"
Date/Time - Start	12 may 61	1	A NA	Millivolt -Start	<b>希腊斯特斯特</b>	Date/Time - Start	water franchis
-Stop		Reported	relue 1	Millivolt - Stop	<b>法法院教理</b> 政府	· Stop · 和。	wife and pute
Total Counts	49	edirected	In spile	Total Millivots		-Total Counts	Total Control of
Counting Time	55	0 0.965	oclasingle	Total Drift Time	心的特殊的	Counting Time	LINE DIMPERSAL
Pross cpm	0.89 .	2 -1 -12	of strateging	Gross my/sec	主義的指揮的政治	Gross com	THE ACTION
Bkg. Cpm	0.03		22. 网络克克克	Bkg. Mv/sec	<b>运解和通知的</b>	Bkg. cpm ***********	NVP.
Net cpm	0,86	7	and the graph	Net my/sec	<b>建</b>	net com Manager in Actor	中国中共共和国社会
prill	0,831	I 0.24	> ····································	curies/my	<b>建建设的</b>	dpm ***	A CONTRACTOR
Ipm/24 hr. (69-74)	The state of the s	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	一 た ち み 門 か 時	litter (69-74)	時期的學術學	dps / cc 中国的双方国际性性	ARTHUR TOTAL
K 40 Correction			) in colorest	一、体性論論語、批學的影響	金额和数据	Neutron Dose (rads) (63-	68) TRUTTE
Hot Boto pri/syl	01/3/	t 0.216	1 . cm 5-10	D(q) (63-68) - 松野(神)	- 大型新型的新型	uc/mg (69 - 74)	THE PROPERTY OF THE PARTY OF TH
D(q) (63-68)	15.		273	"社社"的 " 一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一	<b>南部地名约</b> 第	D(q) (63-68)	shape serie

(34	JPATION 35)	ANALYSIS I	DESIRED DATE CONTINUE (N	HIED AND STREET	LED ON	RCURITY MUMBER RICHARD	是当一次和4年的第二人的人。
DATE RECEIVED (37-42)  DATE  SAMPLE WEIGHT/VOLUME  OTHER DATA  1956  ENVIRONMENTAL SAMPLES  COUNTER & EFFICIENCY  TOTAL COUNTS & MINUTES  GROSS CPM  BEG CPM & MINUTES  NET CPM	-35)	WEIGHT	T/VOLUME (N	ALYZED!	ILDATE CO	LLECTED EXECUTION OF THE CHARGE AND	CE BASE (66-71)
SAMPLE WEIGHT/VOLUME  OTHER DATA 1958 ENVIRONMENTAL SAMPLES COUNTER & EFFICIENCY TOTAL COUNTS & MINUTES BROSS CPM SKIG CPM & MINUTES LET CPM	ANALYZED (	WEIGHT	T/VOLUME (N	ALYZED!	DATE CO	LECTED EXECUTED EX	POSURE DATE
OTHER DATA 1956  COUNTER & EFFICIENCY OTAL COUNTS & MINUTES  RROSS CPM  KKG CPM & MINUTES  ET CPM		1.	LANGUAGE ON	Land.		TECHNICIAN AT A SA	NAME OF A POST
1956 INVIRONMENTAL SAMPLES SOUNTER & EFFICIENCY OTAL COUNTS & MINUTES IROSS CPM IKIG CPM & MINUTES ET CPM		1.	ローニー 対ことでかれ	A Manufacture Contractor	<b>在在的本人的任何</b>	以 <b>是是对自己的</b> ,但是是是一个一个一个一个一个	是当一次和4年的第二人的人。
OUNTER & EFFICIENCY OTAL COUNTS & MINUTES ROSS CPM IKG CPM & MINUTES IET CPM				the state of the s		TO SHOW THE RESERVE AND ADDRESS OF THE PARTY	元というななな こうかっとう アートロイン・マ
TOTAL COUNTS & MINUTES BROSS CPM BRG CPM & MINUTES HET CPM		ore in defini			<b>されたままままれた地へ</b>	MAN HOLLING	المراور المراورة المراورة المراورة المراورة
GROSS CPM BKG CPM & MINUTES NET CPM			1 2 11'21 " weeky	ALTHUR ACTION OF THE PARTY OF T	CONTRACTOR IN	MANDENSHIELD CO. C.	acceptable of the contract
BKG CPM & MINUTES NET CPM	100 To 10			MALE TO A STANDARD OF THE SAME	Committee the	<b>は一日本の日本の人の人の人の日本の日本の人の人が、これからして、</b>	· There was the contract of
NET CPM			- 1-1 die + 4 gal	The Character and Comment of the Com	AVERTABLE TO	THE WAR PROPERTY OF STREET	Description of the second
	Art Commercial Spins		Section 1	Packet Alba be and the second	PIPE PROPERTY PAR	MANAGEMENT CONTRACTOR OF THE STATE OF THE ST	Commence of the second
YIELD	Sed Adda Fine 3			ACCOUNT OF THE STATE OF THE STA	ECHLOYEALSA	Bushar Bushi and A	
	· block with	ye Table	Treat Ast to	SALE BARRETON CONTRACTOR		kideligens to provide the control of	10
	1.40.08		1 1 A75	A CHARLEST AND STREET OF THE PARTY OF THE PA	<b>斯勒特尼勒格尔</b> 化异	HAVE BURNESHED TANK	and the last of the state of the
	Control of the second		1 4		Commentalist Com	A PROPERTY OF THE PROPERTY OF THE PARTY.	to pass the second of the second
	LEADING PLAN			CALL SELECTION SELECTION AND ADDRESS.	SAMPLE CONTRACTOR	SERVICE OF SERVICE OF SERVICE OF THE	STREAM SECTION
			Security of chief.	· 对外的特别是1000000000000000000000000000000000000	HOPPING	Charles and the same of the same	A STATE OF S
		100	otrant in union	And and a substitute of	<b>与中华市场的</b>	Charles of the charles of the second	י בקינון וויין אין אין אין אין אין אין אין אין אין
보고 있었다. 그 경우 시작하다면서 그들 소리를 하는 것이 모든 40년에서 없었다.			in the straight	- And Andrew Consult of the	<b>\$\$\$</b>	SHIP STREET WAS TAKEN	というないないというないとはないというできません
HOLOGICAL SAMPLES		236	THE RESERVE AND ADDRESS OF THE PERSON NAMED IN	A MANAGEMENT AND A STATE OF THE	<b>会长山田山山市</b>	<b>现代的基础的模型和对对证实实现</b>	COMPANY OF THE AND ASSESSED.
COUNTER & EFFICIENCY SALE	1 3	73	may in the wall map	Service 1 4 Concession	AND ADDRESS IN	ADON melanamente process are	- 1-50 Stellings for 15-1 garage by
TOTAL COUNTS & MINUTES /64	,	39	Library Antiphin	也是是一个人的。 一个人的	外門外後衛行	157 drm	= 1,69 APM - 1001
ROSS CPM	A THE RESERVE		-			一大日本	Completed and more of way in
KG CPM & MINUTES TO	7	7	0.0012	CAMPACHURACION OF	0200-1-4	MINE () (10 TEMPER	manufactured a second of the state
IET CPM				water & Moor O		大学の大学ない ないない かいしていい	F. Diction & S. T. Street
TELD	25 11 27 15 75		ANA	White the state of	ON OI WAY	THE PROPERTY OF THE PARTY.	market action of the second
	ROLLE DIST	-		And on an indicate the section in		163 E-10.024 A	CISPL A MAY
		70.0 March	Colored Table	STATE OF THE PARTY OF THE PARTY.		binding the state of the second of the	. And ber the fire of the
		111 30 50 115		CANTON CONTRACTOR OF THE PROPERTY OF THE PROPE		Sellogist Selection of the Control o	出た。上述は本一元、ハー・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
		F 10 May 1	4.000	27年 海北洋海洋河南 沙湖河流			The state of the s
% Rec	- 111	2.58					es freques languages and and
7ª MC	7.0	000		<b>""张文明的李林明</b> 然	<b>中国的</b>	图片影響的 图片的 经公司 计图片	1 THE CHARLEST AND AS
UMMARY OF RESULTS:			ar asserta	- ANY DESCRIPTION AND ASSESSMENT	为这位的一种	用を対する場合という。そうと	CIARGON CONTRACTOR OF THE OTHER
			20	1.155			and Section Papers

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-348



AND BUILDING	<b>Internal Dosime</b>	etry Evaluation Fo	rm
NAME: (b) (6)	Name of Contract of the Contra		(b) (6)
MODE OF INTAKE:  Inhalation Ingestion Unknown  SUMMARY OF EXPOSURE CON Radionuclides/Respiratory Class/Pa Date or Period of Evaluated Data: 2 Duration of Exposure: Unknown	article Size: <sup>239</sup> Pu/100 <sup>4</sup> 2 samples, 3/14/66 and	6/5/66	R PERIOD: /66, onsite
Location of Exposure: Camp Wilso	on, near Palomares, Spa	in	
EVALUATION DATA: Air Sampling Health Physics Survey Data Bioassay — Urinalysis Fecal Nasal Smears In Vivo		☐ In Process ☐ Un	navailable navailable navailable navailable navailable navailable
Medical Treatment: Skin Decontamination: Decorporation: Catharsis: Surgical excision:	☐ Yes ☐ Yes	X No Date:      No Agent:      No Agent:      No Date:	Date:
Code/Model used for: Intake E	Estimate: CINDY, Ver.	ss Y, 1 µm AMAD particl 1.4/JONES 1.4/ICRP 30, Part 4, Gene	
Estimated Intake Activity (pCi): 1 50 YR CEDE (rem): 43 (0.43 Sv) Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow		0 YR CDE (rem/Sv) 440/4.4 160/1.6 78/0.78 34/0.34	
Other Testes		7.4/0.074 6.2/0.062	
OOSE ASSESSOR: D.	ATE:	Land of the State and the state of	
Signature:		PEER REVIEWER: Signature:	DATE:
Print Name:SSN:		Print Name:	
DOI1,		SSN:	
RECOMMENDATIONS:  Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions:  N/A	Urir	nalysis	☐ In Vivo

(b) (6)



# **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

## Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

### Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/18/66. The date is the midpoint of the period on station from 1/27/66 to 3/13/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-2007	G	3/14/66	0.180	0.100	
66-3402	AS	6/5/66	0.049	0.037	/
66-3402	G	6/5/66	NR	NR	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry; NR means no result reported.



Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	140,000	43/0.43
LUDEP	265,000	19/0.19

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

Organ	Dose Equivalent (rem/Sv)	Weighting Factors	Weighted Organ Dose Equivalent (rem/Sy)
Testes	6.2E+00/6.2E-02	2.5E-01	1.6E+00/1.6E-02
Breast	2.1E-04/2.1E-06	1.5E-01	3.1E-05/3.1E-07
Red Marrow	3.4E+01/3.4E-01	1.2E-01	4.0E+00/4.0E-02
Lung	1.6E+02/1.6E+00	1.2E-01	1.9E+01/1.9E-01
Thyroid	2.0E-04/2.0E-06	3.0E-02	5.9E-06/5.9E-08
Bone Surface	4.4E+02/4.4E+00	3.0E-02	1.3E+01/1.3E-01
Liver	7.8E+01/7.8E-01	6.0E-02	4.7E+00/4.7E-02
Other	7.4E+00/7.4E-02	6.0E-02	4.4E-01/4.4E-03
Lower Large Intestine	1.6E-02/1.6E-04	6.0E-02	9.5E-04/9.5E-06
Upper Large Intestine	5.3E-03/5.3E-05	6.0E-02	3.2E-04/3.2E-06
Small Intestine	1.1E-03/1.1E-05	6.0E-02	6.5E-05/6.5E-07
Effective Dose Equivale	nt		4.3E+01/4.3E-01

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. The results were fit using CINDY and the Jones excretion model, to estimate an intake (140,000 pCi), organ doses, and a CEDE (43 rem/0.43 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 265,000 pCi and a CEDE (ICRP-60) of 19 rem (0.19 Sv).

#### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 140,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 43 rem (0.43 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the

<b>Palomares</b>	Nuclear	Weapons	Accident
------------------	---------	---------	----------

considered to provide additional assessment of the exposure.

DRAFT

current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be

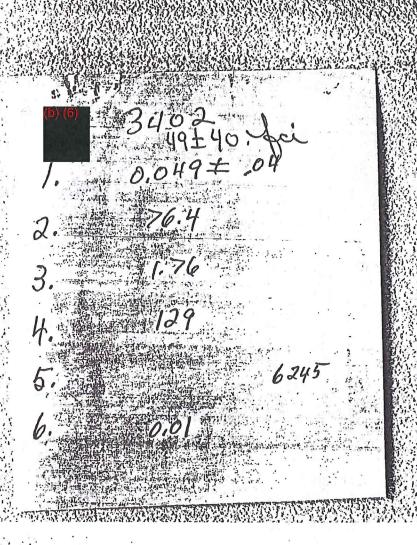
**Revised Dose Evaluation Report** April 2001

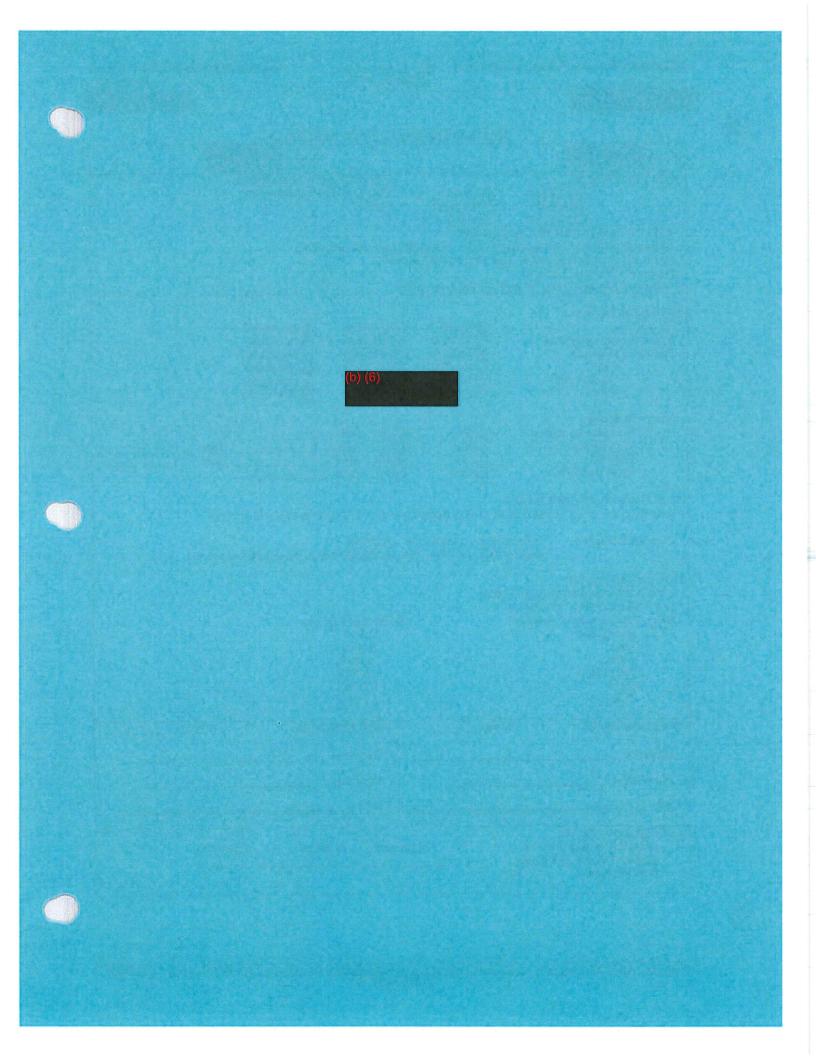
Date: \_\_\_

Prepared By: Date: \_\_\_ Peer Reviewed By: Signature:

75 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	4	VA.			" NOT 1889 3405
Civilian GS	-12	Add to the second	INTERN	AL DOSE DATA	機能ハイスリングが行うがのは
AME (LAST, FIRST, M	1.1.) (1-20)	*	soc. sec	NO. (21-29) 25/0 27	TREADERSON OF CREAMAL DISTRICT
MPLE NO. (33-38)	Test The San	SAMPLE DA	(39 - 44)	meaning law	Urine.  EXPOSURE A CONTROL OF THE CO
66-3402		FROM 5	Tune 66	TO TO	PART SOATE 27 Tan 66TYPE
ASE (57-60) US	Naval :	OCCUPATIO	N (61 -62)	REQUESTED BY	<b>《 10 10 10 10 10 10 10 10 10 10 10 10 10 </b>
Oceanograph		- Ai 3	To the second		
ATE RECEIVED	8 8 16	SAMPLE VOL	UME OF THE	VOLUME ANALYZE	DATE ANALYZED
14 June 1966	17747	170	60 ml	地震   2 60 末の	A STATE OF THE STA
ECHNICIAN (SIGNA	TURE AND DATE)		Light A		Execution with Till
URINE	236	275	Section 1	RADON SEE	FECES/BLOOD
Counter Number			10.40	Chamber Number 307	Counter Number
Counter Bkg. (cpm)804	3	1	4. 国际	Cham. Blog (my sec)	Come By A State At Ball
ounter Eff. (%)	31.8	31.8	- towering the	Counter Eff. (%)	Counter Eff.
ate/Time - Start	25EP66	1.17	1-129	Millivolt Stort 35	Date/Time - Start
-Stop			• क्रिक्ट्रेस् <mark>स्य</mark>	Millivolt - Stop	
otal Counts	82	2	10000000000000000000000000000000000000	Total Millivois	
ounting Time	100	100	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Total Butte Time	Walto Said Counting Time The Think
ross cpm				Gross median clo	
ikg. Cpm			(A) (A) (A)	Blig Market	1/3 (908) Bkg. cpm William William
let cpm	1 4	1 0	يتل الموالي	Net my Lec	Their com Transfer (1997)
O/ARC	7614		i provident	curies/my second	作 大型的 Topm 不是不是不是不是
pm/24 hr. (69-74)		ionsti n		Herer (69-74)	· 中國學術學學 dps/cc 也不可能用的。 合意的學
40 Correction	45	4 4 4 4 4	a positional	D(q) (63-68) 本機能	<b>アソック 3回 Neutron Dose (rads) (63-68)</b> ************************************
Hat Bato PC/SPL	0,0486=	0.0372	1 17 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	D(q) (63-68) "FWAT	本 5回版制度の第次 UC/mg (69-74) ペラス 年間の 1 年間の
(q) (63-68)	1	11			( C   C   C   C   C   C   C   C   C   C
IAME:		" w .e." " a m 5	्रेट नाम कर संदर्भ नाम कर	SOCIAL SECURITY NU	MBER : DITTO SAMPLE NUMBER : 1
IR FORCE BASE			Sin Matter	132	The state of the s
	• 1	(K) (F)			The state of the s
RESULTS OF ANALY	/\$15		% REC =	70 公 建三	Petitions Restills
PC/SPL = 0.048		72	70 KEC	101	10.72 pc/l + 3
TOTAL VOLUM	E= 1760		BODY RU	ROLN = DOO [	Oil BB
VOL. ANALYZE				11年13年13月1日	<b>"我们是一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个</b>
C B		Ilouina		""	
Repeat the so	subre tot the 10	nowing teason	er Transfer	の第0計画	<b>门大学</b> 了大学——————————————————————————————————
( ) Signific	ant activity in	recently enaly:	zed sample (s)	( TOOLS	VOVE
( ) Data re	quired to estab	lish dose	11.	Circle	
( ) Imprope	r flask used	-1	4		
( ) Other		अस्ति । स्टेस			
		and the free fig.		<b>"上大地理"</b>	
	led sampling sc	.neguia	· List read negative Allian		CON DATE: MENTE
SIGNATURE:					

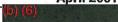
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TYPE SAMPLE (30) TYPE ANAL. (31-32)	ULING EXPOSURE	6 " DATE TYPE		DATE ANALYZED	The state of the s	A Control of the Cont	FECES/BLOOD		Counter Bkg.	_	-	-		Counting Time	-	Bkg. Cpm	and the net com	Hap British Andrew	TO STATE OF THE PROPERTY OF TH	Neutron Dose (rads) (63-68)	
5-6 - Table 18-18-18-18-18-18-18-18-18-18-18-18-18-1	INTERNAL DOSE DATA	SEC. NO. (21-29)	高級を表現であった。	Mar	KEQUESTED BY	Ņ	250 Me 250 Me		-	83	(sec)	1	_		_	-			-	S. C.	T'N	_	D(q) (63-68)
	NAME (LAST. FIRST M.1. 14-20)	(b) (6)	33 - 38)	BASE (57-60) DS NAVA CCUPATION (61-62)	lo Office	SAMPL	F AND DATES	(b) - (6)	Counter Number	Counter Bkg. (cpm) 0.07 Kmn %	15	Date/Time - Start 8 APR 1966	- Stop	Total Counts 2 C		Gross cpm 0.25		,	11/2	II. (69.74) 0.74 0.85		Net Berth Sal O. 194 I D. 10	





Internal Dosimet	ry Evaluation Form
NAME: (b) (6)	SSN: (b) (6)
MODE OF INTAKE:    Inhalation	INTAKE DATE OR PERIOD: 2/4/66 through 2/14/66, onsite 2/9/66  Class Y/I µm AMAD
Date or Period of Evaluated Data: 2 samples, 2/17/66 and 3/ Duration of Exposure: Unknown Location of Exposure: Camp Wilson, near Palomares, Spain	
Fecal Attached Nasal Smears Attached In Vivo Attached  Medical Treatment:  Skin Decontamination: Yes Decorporation: Yes Catharsis: Yes	In Process Unavailable  No Date: No Agent: No Agent: No Date:
EVALUATION METHODOLOGY: Assumptions: Acute inhalation intake of <sup>239</sup> Pu, 100% Class  Code/Model used for: Intake Estimate: CINDY, Ver. Dose Estimate: CINDY, Ver.	
RESULTS SUMMARY Estimated Intake Activity (pCi): 120000 50 YR CEDE (rem): 55 (0.55 Sv)	
Organ Dose Equivalent Summary 50 Bone Surface Lung Liver Red Marrow	9 YR CDE (rem/Sv) 370/3.7 140/1.4 67/0.67
Other Testes	29/0.29 6.3/0.063 5.4/0.054
DOSE ASSESSOR: DATE:	PEER REVIEWER: DATE:
Signature:	Signature:
Print Name:	Print Name:
SSN:	SSN:
RECOMMENDATIONS:  Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions: N/A	nalysis





## **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

#### **Previous Intake/Dose Assessments:**

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

#### **Assumptions/Basis/Data Sources:**

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/9/66. The date is the midpoint of the period on station from 2/4/66 to 2/14/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-1122	G	2/17/66	0.190	0.160	<b>√</b>
66-1554	AS	3/5/66	0.080	0.016	✓
66-1554	G	3/5/66	1.50	0.330	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.



from (b) (6)

on 3/1/66; however, no result was

A nasal swipe was also reported (sample #66-1656) from available.

Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

## Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	120,000	37/0.37
LUDEP	348,000	24/0.24

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
_	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	5.4E+00/5.4E-02	2.5E-01	1.3E+00/1.3E-02
Breast	1.8E-04/1.8E-06	1.5E-01	2.7E-05/2.7E-07
Red Marrow	2.9E+01/2.9E-01	1.2E-01	3.5E+00/3.5E-02
Lung	1.4E+02/1.4E+00	1.2E-01	1.6E+01/1.6E-01
Thyroid	1.7E-04/1.7E-06	3.0E-02	5.0E-06/5.0E-08
Bone Surface	3.7E+02/3.7E+00	3.0E-02	1.1E+01/1.1E-01
Liver	6.7E+01/6.7E-01	6.0E-02	4.0E+00/4.0E-02
Other	6.3E+00/6.3E-02	6.0E-02	3.8E-01/3.8E-03
Lower Large Intestine	1.4E-02/1.4E-04	6.0E-02	8.2E-04/8.2E-06
Upper Large Intestine	4.6E-03/4.6E-05	6.0E-02	2.7E-04/2.7E-06
Small Intestine	9.4E-04/9.4E-06	6.0E-02	5.6E-05/5.6E-07
Effective Dose Equivale	ent	17	3.7E+01/3.7E-01

One urine sample was analyzed by gross alpha counting, and the other was analyzed by both gross alpha counting and alpha spectrometry. The gross alpha analysis for the second sample was not included in the modeling since an alpha spectrometry result was available for the same sample. The results were fit using CINDY and the Jones excretion model, to estimate an intake (120,000 pCi), organ doses, and a CEDE (37 rem/0.37 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 348,000 pCi and a CEDE (ICRP-60) of 24 rem (0.24 Sv).

Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 120,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 37 rem (0.37 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is less than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not associated with that dose level. However, follow-up urine sampling now could be considered to provide additional assessment of the exposure.

Prepared By:		
Name:		
Signature:	Date:	AV.
Peer Reviewed By:		
Name:		
Signature:	Date:	

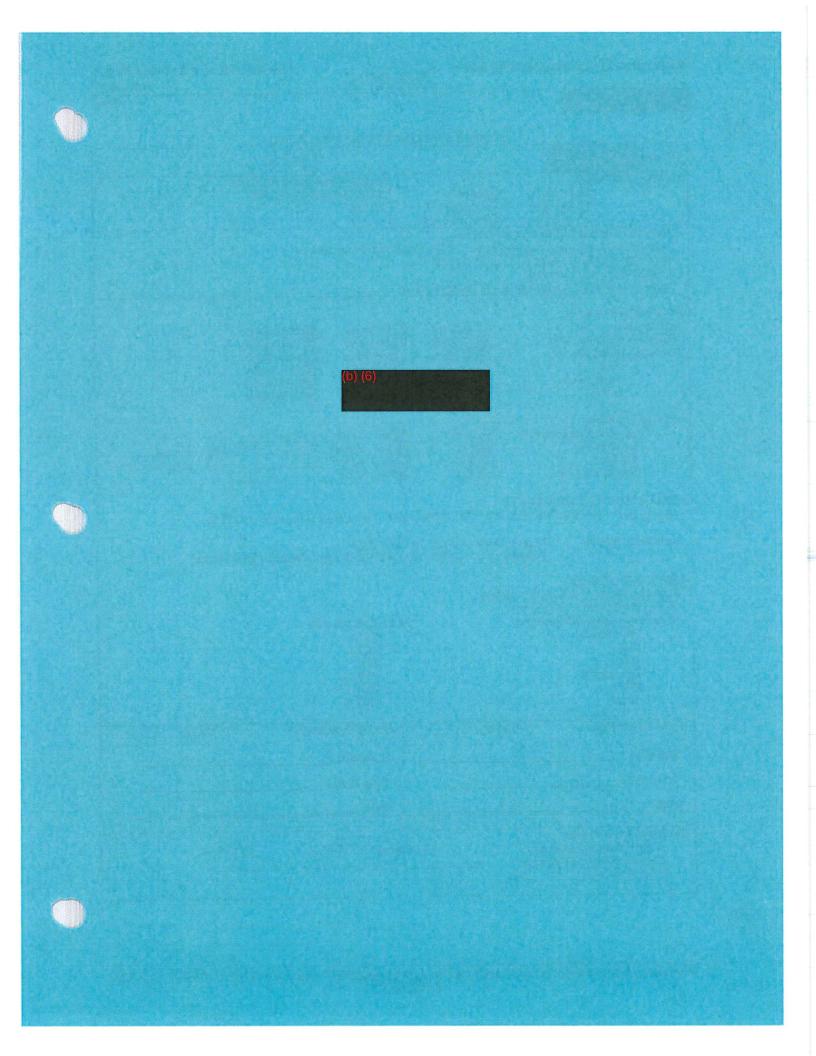
AFSN: (b) (6)			INTERN	AL DOSE DATA		
(b) (6)	SSGT		soc. sec (b) (6)	. NO. (21-29) TYPE	SAMPLE (SO) 21-	(ADHA)
66-1122	4, 4, 4	FROM T	E (39 -44) /7	CEA 64	EXPOSURE FER W TYPE	
Wheeles		27470	N (61 - 62)	REQUESTED BY		T. S. SANS
1 March 1966		SAMPLE VOL	UME -8	VOLUME ANALYZED	DATE ANALYZED MAR 171	966
TECHNICIAN (SIGNA	TURE AND DATE)		transfer of the second	(b) (6)	16 MAR 1966	
URINE			1144132	冷藤 RADON 海南	FECES/BLOOD	
Counter Number	D		<b>一一一二十二十二十二十二</b>	Chamber Number	Counter Number	State of the State of the
Counter Bkg. (cpm)	6	and the second	" Constitution	Cham. Bkg. (my/sec)	Counter Bkg.	A Santa Char
Counter Eff. (%)	51		on Figure .	Counter Eff. (%) 學樣	Counter Eff.	يرتبيوا الملاكم والما
Date/Time - Start1 A	MAR 1966	11.	· 100 100 100	Millivolt = Start 等等		And leader
-Stop	1	a control for	Alle March	Millivoli Stop 報題		文字: 大字
Total Counts	18	. 9	一一、江西东城	· Total Millivots		After March
Counting Time	55		· · · · · · · · · · · · · · · · · · ·	Total Drift Time		randictally decision
Gross cpm	*.*	±12.45	word Existing	Gross my/sec enter		
Bkg. Cpm		/ V	10.00000000000000000000000000000000000	Bkg. My/sec 等型影響 没	Bkg. cpm Horn shora	- grading the
Net cpm	-	100	1 5 公司的基本	Net my/sec		A WOOM - MI
mpd L	0.84±0.69	1 1 1 1 1 1 W	a ministra	curies/my	dpm appeared the	ar-Alta Fall Ri
pm/2/ hr. (69 - 74)		- 4 TH.	· · · · · · · · · · · · · · · · · · ·	litter (69 - 74)		Link Talking
K 40 Correction			. Anifor	<b>小同時時期時期時期時</b> 选	Neutron Dose (rads) (63-6	68) And
Las Declar	0.19± 0.16		1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	D(q) (63-68) 第四個線 [4		Haland To Jabres 1
D(q) (65-68)	Z=13	0	D.	= 3.09 x10 7	07 D(q) (63-68)	1月13年1月1
	n filtrany is fire.	والمراكبة للمراجع المراجع	Training			THE STREET

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-360

0.7.4

IAME ILAST FIR		i i	INTERN	AL DOSE DATA	<b>经验证证证</b>	是一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个	<b>产种外部</b>
						AND THE PERSON NAMED IN COLUMN	BERTHO W
0) (6)	4	CC	(b) (6)	. NO. (21-29).	Charles Anna Paris	をは19月1日 D 239 . 5	
AMPLE NO. (33-38)		SAMPLE DAT	E (39 - 44)	The state of the s	MINISTRATION OF LEXT	OSURE /	State State Control of the
1010- 1555	/	FROM OSA	NAME	TO 0800-1-1	0-10	ATE YEERGGTYP	The same
GASE (87-60)	11.000	OCCUPATION	(61-62)	REQUESTED BY	THE SHARE SHARE SHARE	MANAGER OF THE PROPERTY OF THE PARTY OF THE	TOTAL SERVICE
WHEELUS		- 4 1 T. N. W.	化类型制度				275.47
ATE RECEIVED		SAMPLE VOL	UME	VOLUME ANALYZE	PATAMA PAT	E ANALYZED	Line Short State
16 MARC		110	O when	M / 00 0 個		<b>通知</b>	The same of the sa
ECHNICIAN (SIGNAT	The state of the state of	Sept. 28.73	C mine Stand	A CONTRACTOR			
. 100		ALPHA	Selling Control	A THE PROPERTY OF THE PARTY OF	和名的自然和英雄和	和開催,指於他們的主義。	法。江湖湖
URINE	GROSS A	TLHU.	A WAR	FRERADON E		FECES/BLOOD 2	STATE OF THE PARTY
ounter Number	D	447 4 400	ANT WORLD SERVICE	Chamber Number	has been bout many contracted to	Counter Number	<b>"特种种物</b>
	D.02/990		からない 神経神経療	Cham. Bkg. (mv/sec)	後 海關國際新標準	Counter Bkg.	<b>一种的种种形</b>
ounter Eff. (%)	51	Albert Mark	ta17	Counter Eff. (%)	<b>新物類的關係</b>	Counter Eff.	一些出版
ate/Time - Start	12 may		A Managari	Millivolt Start 编档	是中国的政治的政治	Date/Time - Start	
-Stop	1	Kenostel	value	Millivolr Stop	等學的學學		
otal Counts	86	corrected	Inapile	Total Millivots		Total Counts	- Additional in the
ounting Time	55	M 0.965	be der "	Total Drift Time	<b>東京教育教育教育</b>	Counting Time "514438	· AND STREET
oss cpm '	1.56	lamo	le man	Gross my/sec	<b>神神教師論即編集</b>	Gross cpm	SHAME TO
kg. Cpm	202		1000 工作	Bkg. My/sec	<b>第一位美国共和国共和</b>	Bkg. cpm	
ot cpm	1.54	49.00	本が	Not my sec	经元温物键器的数	net com	NSBE
m peill	1.37	t 0.30	· · · · · · · · · · · · · · · · · · ·	curies/my	<b>此 资酬或编献的</b>	dpm new photos recomme	- 一种种种种
om/24 hr. (69 - 74)			· Agreement	litter (69-74)	2 不可以以外的	dps/cc TANA	
40 Correction	A STATE OF THE STA		en Chinastala.	· 九五年4月10日   100	<b>经</b> 与3的国际的现在分	Neutron Dose (rads) (63	
or Boto pri/sd	1.50 =	0.73	1.415. 4.15. 1.504	D(q) (63-68) ************************************	N CAMPAGE STATE	uc/mg (69-74)	_

the same constitution of the	是意思RAD	lologi	CAL SAMPLE DAT		
AME OR REQUESTOR'S ID (1-20)	GRADE -	Tat.		AL BEGURITY NUMBER	L SAMPLE NUMBER
PPE SAMPLE (23-32) OCCUPATIO		SIRED	A CHEWATERY	AIR FOR	CE BASE (68-71)
ATE RECEIVED (37-42) DATE ANAL	YZED (81-86)	275	MILED)	COLLECTED MANAGEMENT	POSURE DATE
AMPLE WEIGHT/VOLUME	WEIGHT/V	OLUME	ALYZIL	TECHNICIAN TO	AND CONTRACTOR OF THE PERSON O
THER DATA ,939	1. 14 CVT (1.20 )				at the property of the second
NVIRONMENTAL SAMPLES	7	Service and	The state of the s	the market and all and the and a second	statistics are all objects
OUNTER & EFFICIENCY	C	is dirige	* TOWN STREET, SALES OF STREET, STREET		Commission to American States
OTAL COUNTS & MINUTES		1 45 43	The state of the state of the state of		. Programs that we also do a
ROSS CPM	and the second	SE(1) 11 (6	A MARKA MARKA MARKA		CHECKER STORAGE SAN AND
KG CPM & MINUTES				P DUNGSPALAN A BEAUTICA COLOR	the state of the terms of the second section of the section of t
ET CPM	the state of the party of	- 14-15-16-1			enged of a property for the
ELD	March 19 March 19	The States of the			
	Sales Control	out elections	- Marin Charles out of the bank	A CHARLEST AND CHARLES AND PROPERTY.	of a King I had will be her
		in the contract	A CHARLES AND A		CIKA TA TO TO
	The transfer of the		一	200	ine the second
	Company of Page	10 10 - 24	CALLEGE BELLEVILLE CONTRACTOR OF THE PARTY NAMED IN	THE THE PARTY OF THE PROPERTY OF THE PARTY.	Marriage we appear to a
All all all and the second second second second		7 (12)	· 大松。中心的特殊和自己的心态。	A ballation	the transfer process to the
		Acres 18	- CONTRACTOR STATE		the twing on the t
OLOGICAL SAMPLES	236			TRADON SHAWARANA CALL	rice -
UNTER & EFFICIENCY SALC	20,3	100	WHITE THE PARTY OF	MANUEL POLICE	3. 02 00M "ARTHOUT
TAL COUNTS & MINUTES / 100	60	175 17 194	- HANDAMAR AND PARTIES AND PROPERTY OF THE PARTIES AND	神神神神学のです。他の大学時	Lagran of hours with
ROSS CPM	0.0	6000	こうなどはなりのようでんちょう	Authoritation and the section of the section	Collected Control Colors (Acres 1971)
G CPM & MINUTES 800	1/2 0.0	150	Pulled O. Olynos	THE THE PROPERTY OF THE PARTY O	when the second second
T CPM	0.3	1850	WOOD ON SOOM	WHITE COLUMN TO SHEET SHEET SHEET	TA Miles Car Command Marie Committee
LD	The second of the second	friend the	· 这种性量的原理性性的原理性的	1900 7080 ± 0.011	A FILE CONTRACTOR SAINT SAIN
	1 - N-6 - /- A-110	Maria Maria	いまれるないないないないないないないないないかられているとうないない	A CONTRACTOR OF THE PROPERTY OF THE PARTY OF	West Special Loads Tail
		With Little	SEPHERALIZATION STRUCTURES	THE WAR THE WAY TO SEE THE THE THE THE THE THE THE THE THE T	Cardina vo Contra
	1 NOT 10 11	7120 11 407	以为中国中国的中国中国中国中国中国	<b>心情就到你你的你</b>	percent and to an ex-
	1/4	. Joseph Jam	"公式在海路的运动。"	, 公司的特殊的 44 x 40 x 4 x 4 x 4 x 4 x 4 x 4 x 4 x 4	· Carrier
Olo Rec	62.30	Martin Kenga	中江北京北部的京都是大學的政策的地方		With the State of
MMARY 85 85000 50		2	Winder Control of the State of	となるは、からいろうとう	STREET AREA STREET
MMARY OF RESULTS:	1 -1 -1 A			10 Aug.	



NA

	<b>Internal Dosin</b>	netry Evaluation	on Form		
NAME: (b) (6)		TO THE STATE OF TH	SSN: NA		
MODE OF INTAKE:  Inhalation Ingestion Unknown	☐ Injection ☐ Absorption ☐ Not applicable		NTAKE DATE OR PERIOD: 1/5/66 through 2/26/66, onsite 1/15/66		
SUMMARY OF EXPOSURE CO Radionuclides/Respiratory Class/P Date or Period of Evaluated Data: Duration of Exposure: Unknown Location of Exposure: Camp Wils	article Size: <sup>239</sup> Pu/10 1 sample, 2/26/66		MAD		
EVALUATION DATA: Air Sampling Health Physics Survey Data Bioassay — Urinalysis Fecal Nasal Smears In Vivo	Attached Attached Attached Attached Attached Attached Attached	☐ In Process	<ul> <li>☑ Unavailable</li> <li>☑ Unavailable</li> <li>☑ Unavailable</li> <li>☑ Unavailable</li> <li>☑ Unavailable</li> <li>☑ Unavailable</li> </ul>		
Medical Treatment: Skin Decontamination: Decorporation: Catharsis: Surgical excision:	☐ Yes ☐ Yes ☐ Yes ☐ Yes	No Agent: _ No Agent: _		Date:	
Dose E ESULTS SUMMARY Estimated Intake Activity (pCi):	Estimate: CINDY, Vo	er. 1.4/JONES			
50 YR CEDE (rem): 55 (0.55 Sv Organ Dose Equivalent Summary Bone Surface Lung Liver Red Marrow Other Testes		50 YR CDE (rem/s 560/5.6 210/2.1 100/1 43/0.43 9.5/0.095 8/0.08	Sv)		
OSE ASSESSOR:	DATE:	PEER REVIEW	WER:	DATE:	
Signature: Print Name:		Signature: _			
RECOMMENDATIONS: Additional Bioassay Required Suggested Sampling Frequency: Work Restrictions:	(20)	Jrinalysis		in Vivo	



# **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

## **Previous Intake/Dose Assessments:**

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

## Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/15/66. The date is the midpoint of the period on station from 2/5/66 to 2/26/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-1438	AS	2/26/66	0.208	0.086	<b>√</b>
66-1438	G	2/26/66	1.51	0.310	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.



Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

#### **Modeling:**

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	185,000	55/0.55
LUDEP	888,000	62/0.62

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	8.0E+00/8.0E-02	2.5E-01	2.0E+00/2.0E-02
Breast	2.7E-04/2.7E-06	1.5E-01	4.0E-05/4.0E-07
Red Marrow	4.3E+01/4.3E-01	1.2E-01	5.2E+00/5.2E-02
Lung	2.1E+02/2.1E+00	1.2E-01	2.5E+01/2.5E-01
Thyroid	2.5E-04/2.5E-06	3.0E-02	7.5E-06/7.5E-08
Bone Surface	5.6E+02/5.6E+00	3.0E-02	1.7E+01/1.7E-01
Liver	1.0E+02/1.0E+00	6.0E-02	6.0E+00/6.0E-02
Other	9.5E+00/9.5E-02	6.0E-02	5.7E-01/5.7E-03
Lower Large Intestine	2.0E-02/2.0E-04	6.0E-02	1.2E-03/1.2E-05
Upper Large Intestine	6.9E-03/6.9E-05	6.0E-02	4.1E-04/4.1E-06
Small Intestine	1.4E-03/1.4E-05	6.0E-02	8.4E-05/8.4E-07
Effective Dose Equivale	ent		5.5E+01/5.5E-01

One urine sample was analyzed by gross alpha counting and alpha spectrometry. The gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. The result was fit using CINDY and the Jones excretion model, to estimate an intake (185,000 pCi), organ doses, and a CEDE (55 rem/0.55 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 888,000 pCi and a CEDE (ICRP-60) of 62 rem (0.62 Sv).

#### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 185,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 55 rem (0.55 Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is 10% more than the working lifetime limit of 50

<b>Palomares</b>	Nuclear	Weapons	Accident
raivillates	MUCICAL	Weapons	ACCIDENT

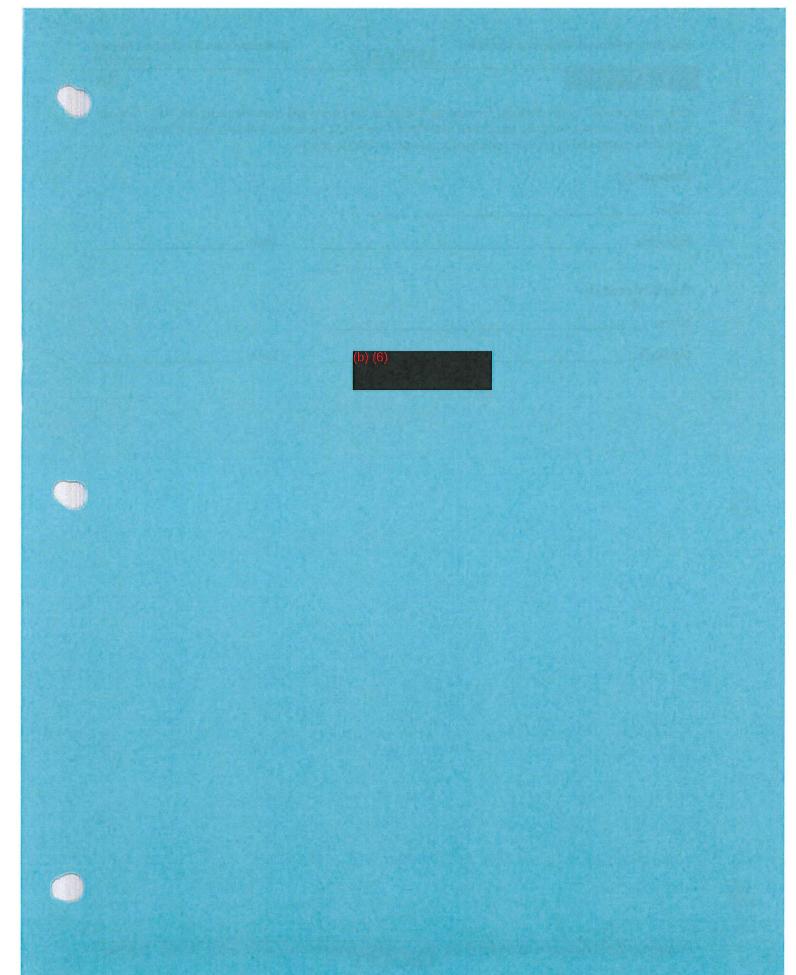
DRAFT

Revised Dose Evaluation Report April 2001

NA

rem recommended by the National Council on Radiation Protection and Measurements (NCRP). Serious health effects are not normally associated with these dose levels. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Prepared By:	
Name:	<del></del>
Signature:	Date:
Peer Reviewed By:	
Name:	
Signature:	Date:



RECOMMENDATIONS:

Work Restrictions:

Additional Bioassay Required

Suggested Sampling Frequency:

N/A

April 2001 **Internal Dosimetry Evaluation Form** NAME: SSN: MODE OF INTAKE: INTAKE DATE OR PERIOD: ☑ Inhalation☑ Ingestion ☐ Injection 2/6/66 through 2/28/66, onsite ☐ Absorption ☐ Not applicable 2/17/66 Unknown SUMMARY OF EXPOSURE CONDITIONS: Radionuclides/Respiratory Class/Particle Size: 239Pu/100% Class Y/1 µm AMAD Date or Period of Evaluated Data: 2 samples, 3/8/66 and 6/1/66 Duration of Exposure: Unknown Location of Exposure: Camp Wilson, near Palomares, Spain **EVALUATION DATA:** Air Sampling ☑ Unavailable☑ Unavailable ☐ Attached In Process Health Physics Survey Data ☐ Attached ☐ In Process Bioassay - Urinalysis In Process ☐ Unavailable Fecal ☐ In Process☐ In Process ☐ Attached ☑ Unavailable Nasal Smears Unavailable
Unavailable
Unavailable Attached In Process In Vivo Attached ☐ In Process Medical Treatment: Skin Decontamination: ☐ Yes ☑ No Date: Decorporation: Yes ☑ No Agent: Date: Catharsis: ⊠ No Yes Yes Agent: \_ Date: Surgical excision: Yes ⊠ No Date: \_ **EVALUATION METHODOLOGY:** Assumptions: Acute inhalation intake of <sup>239</sup>Pu, 100% Class Y, 1 µm AMAD particle size on 2/17/66 Code/Model used for: Intake Estimate: CINDY, Ver. 1.4/JONES Dose Estimate: CINDY, Ver. 1.4/ICRP 30, Part 4, General Systemic Model RESULTS SUMMARY Estimated Intake Activity (pCi): 4,400 50 YR CEDE (rem): 1.4 (0.014 Sv) **Organ Dose Equivalent Summary** 50 YR CDE (rem/Sv) **Bone Surface** 14/0.14 Lung 5/0.05 Liver 2.5/0.025 Red Marrow 1.1/0.011 Other 0.2/0.002 Testes 0.2/0.002 DOSE ASSESSOR: DATE: PEER REVIEWER: DATE: Signature: \_ Signature: \_\_\_ Print Name: \_\_\_\_ Print Name:

☐ Urinalysis

Fecal

☐ In Vivo



# **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

#### Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

## Other Information:

None.

Radionuclide(s): 239Pu.

#### Assumptions/Basis/Data Sources:

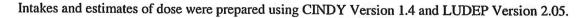
Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 2/17/66. The date is the midpoint of the period on station from 2/6/66 to 2/28/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-2446	G	3/8/66	1.49	0.790	
66-3273	AS	6/1/66	ND	ND	1
66-3273	G	6/1/66	NR	NR	

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.



Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

#### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	4,400	1.4/0.014
LUDEP	12,400	0.9/0.009

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	2.0E-01/2.0E-03	2.5E-01	4.9E-02/4.9E-04
Breast	6.5E-06/6.5E-08	1.5E-01	9.8E-07/9.8E-09
Red Marrow	1.1E+00/1.1E-02	1.2E-01	1.3E-01/1.3E-03
Lung	5.0E+00/5.0E-02	1.2E-01	6.0E-01/6.0E-03
Thyroid	6.1E-06/6.1E-08	3.0E-02	1.8E-07/1.8E-09
Bone Surface	1.4E+01/1.4E-01	3.0E-02	4.1E-01/4.1E-03
Liver	2.5E+00/2.5E-02	6.0E-02	1.5E-01/1.5E-03
Other	2.3E-01/2.3E-03	6.0E-02	1.4E-02/1.4E-04
Lower Large Intestine	5.0E-04/5.0E-06	6.0E-02	3.0E-05/3.0E-07
Upper Large Intestine	1.7E-04/1.7E-06	6.0E-02	1.0E-035/1.0E-037
Small Intestine	3.4E-05/3.4E-07	6.0E-02	2.1E-06/2.1E-08
Effective Dose Equivale	ent		1.4E+00/1.4E-02

One urine sample was analyzed by gross alpha counting only, and the other was analyzed by both gross alpha counting and alpha spectrometry. For the sample analyzed with both methods, the gross alpha analysis was not included in the modeling since no result was reported and an alpha spectrometry result was available for the same sample. The alpha spectrometry sample result was reported as No Detectable Activity. A value of 0.003 pCi was used to represent this outcome. The gross alpha sample was also excluded because it was suspected of contamination during sample collection on the site and because it did not fit the expected pattern of urinary excretion. The result was fit using CINDY and the Jones excretion model, to estimate an intake (4,400 pCi), organ doses, and a CEDE (1.4 rem/0.14 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 12,400 pCi and a CEDE (ICRP-60) of 0.9 rem (0.009 Sv).

(b) (6)

(b) (6)

In a separate run that used the gross alpha result, CINDY produced estimated intake and CEDE of 890,000 pCi and 270 rem (2.7 Sv) respectively. However, these estimates were not considered realistic for the reasons stated above.

#### Conclusion:

Propored Rye

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 4,400 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 1.4 rem (0.014 Sv). That dose is much less than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. Serious health effects are not normally associated with these dose levels.

repared by.			
Name:			
Signature:		Date:	
Peer Reviewed By:			
Name:			
Signature:	· · · · · · · · · · · · · · · · · · ·	Date:	

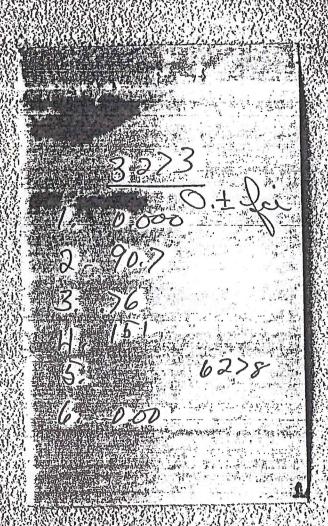
	RESAMPLE		. 100V 6 . 1966 <b>1</b>			
- 71- 3 (6)	A Committee of the last of the	-	L.DOSE DATA		<b>建加州和</b> 农产品等的	7.46
ilrmy; (D) (6)	A ISO	C. SEC	HO_(25-29) ### TYPE	SAMPLE (30)	TYPE AHAL.	31-327
0) (6)	Pvt.	(b) (6		Urines	Plant And Marian	<b>一种人类的</b>
AMPLE NO. (33-38)	SAMPLE DATE (39-4	41 41	The state of the s	EXPOS	URE	The factor of
66-3273	FROM 1 June	66	ATO THE REAL PROPERTY OF THE	PAT HE DAT	EFeb 66 TYPE	37-05000000
66-3273 ASE (57-60)	OCCUPATION (61 - 62	1 13	REQUESTED BY	AND THE PARTY OF T	ALT THE LOT THE	The state of
Giessen		Date P	一种 化二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十		<b>网络国际公司的</b>	AND ASSESSED OF A PARTY OF A PART
ATE RECEIVED	SAMPLE VOLUME	.0 -	VOLUME ANALYZED		Shipping a selection	12.00
6 June 1966		<del></del>	THE COMOC			an interference
ECHNICIAN (SIGNATURE AND DAT	ε)	Clures !			Carrier and Control	the profit of
URINE		17.74	TENERADON WASH	<b>多数数据</b>	FECES/BLOOD	والمالية المهاجر
Counter Number	-4 / e-/	- vie (:		MERCHANICAL .	Counter Number	一个才的一种人
Counter Bkg. (cpm)		in the to	Cham. Bkg. (mv/sec)	が記る事業を	Counter Bkg.	per married to
Counter Eff. (%)				<b>经验的证明</b>	Counter Eff.	11 ch 1 14 1 14
ate/Time — Start		* 1		特別的	Date/Time - Start	10 miles
-Stop		Section.		<b>这种结果和自</b>	胡尔····································	Service of the later
otal Counts		117	Total Millivots	ALC: NO.	Total Counts	31 A.H. 1. 2
ounting Time		- (*1#)	Total Drift Time	<b>沙田洋原市部</b>	Counting Time	or Suche por
ross cpm		4.6.	Gross my / sec least	表现是我们的	Gross cpm	at a line of pater
Skg. Cpm		· · · · · ·	Bkg. My sec	物理學和實施	Bkg. cpm App 13	からなるないない。
let cpm	to the state of the	. 134.		<b>美国的国际</b>	net com ' T	of the state
pm		Sup.	curles/my	马能力的	dpm " A Production of the second	さんがあるのから
lpm/24 hr. (69 - 74)		100	litter (69 - 74) 4	於歐洲的結構	dps/cc 100-4	in the shirt?
(40 Correction			"一种是一种的一种,	<b>MIPSELM</b>	Neutron Dose (rads) (63-	
let Beta	100	الدوج جدارية	D(q)*(63-68) 如於條件	來認納納達爾化	uc/mg (69-74) 42#7	TO SHARWARE
) (q) (63-68)	7	14.00	· (1) - 如此有明年的	2619	D(q) (63-68)	to a lex-
		gar.				
NAME :		22	OCIAL SECURITY NUMBI	ERD	SAMPLE NUMB	ERI MUNICIPAL SERVICE
AIR FORCE BASE						T. P. Land
<u> </u>			THE RESERVE OF THE PROPERTY OF THE PARTY OF	A STATE OF THE STA	Constitution of the Property of the	The court of the State of the S
RESULTS OF ANALYSIS	· LABORATOR	Y A	CLOENT	SAMPL	E- 2 SEPT	No.
		1		AND THE		Can that Had
		7			Miles Time Main Time	with the
		•	一个法律的人的对外,不是	CALMEN CALL		T PASSE
Repeat the sample for the	following reason:				The same of the sa	ALC: THE PARTY OF
		1-61			ALL CALLS	144
( ) Significant activity		pie (S)		100	THE REAL PROPERTY.	的淵默談
( ) Data required to as	tablish dose				And the second	
( ) Improper flask used	la de la compa	14.74 de 1		<b>"是"</b>	and the second second	W. E. W. C.
( ) Other		1. 1. 14.2	Traffic on the sales stee		TALK THE PARTY OF	7774
( ) Suggested sampling	achadula	7.44		<b>"别是你是</b>	Clark Contraction	The state of the s
( ) Suggested sompling	) 2C1100010		A CONTRACTOR OF THE PARTY OF TH	DATE: No	William Property to an amount	Cura Marchy Wallet
SIGNATURE:		-				

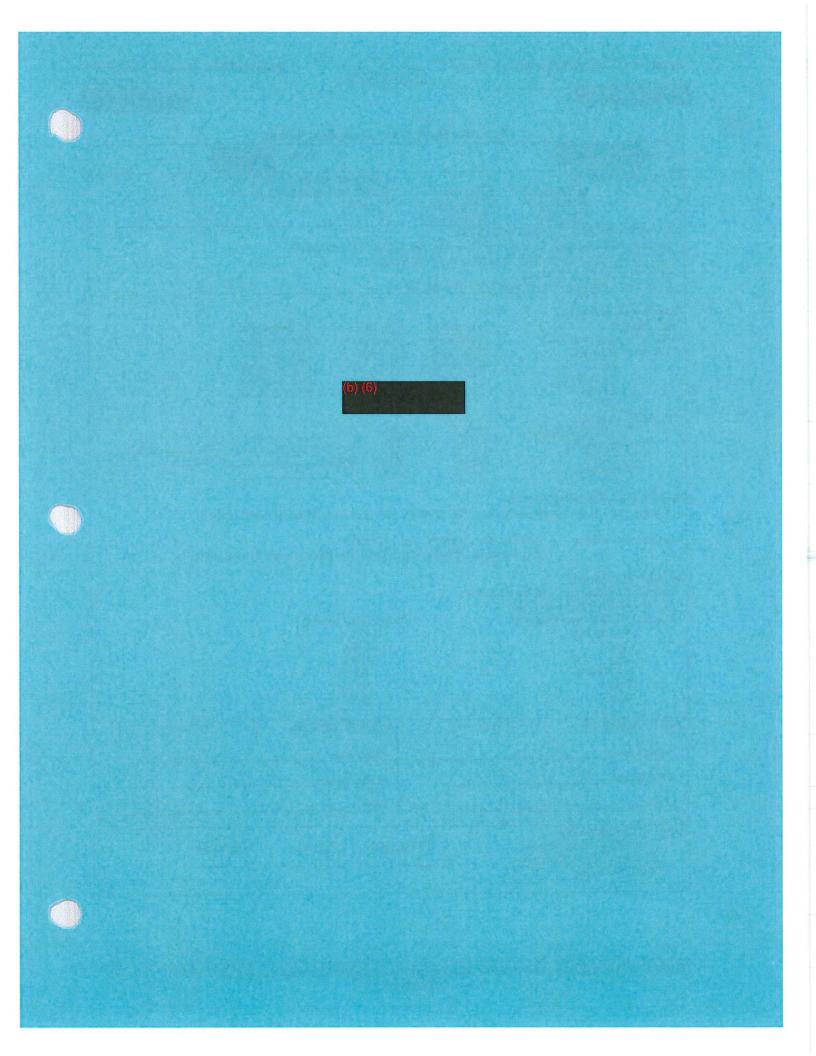
OR REQUESTOR'S ID (1-		GRADE	A STATE		SOCIAL SECURITY NUMBER	
TYPE SAMPLE (23-32)	(34-35)	ANALYSIS DES		PROUEST	AL AL	R FORCE BASE (68-71)
DATE RECEIVED (37-42)	DATE ANALYZED		DATE COL	INTED THE	PATE COLLECTED SHOWN OF	EXPOSURE DATE
SAMPLE WEIGHT/VOLUME		WEIGHT/V	OLUME AN	ALVZED - WORKSHING	ATECHNIC(b) (6)	
OTHER DATA			1047	- Charles	Variable	
NVIRONMENTAL SAMPLES	T	-	· ration .	walking the manipulation with related	の問題を持つないないのはのないというできる。	Maria Company
COUNTER & EFFICIENCY			12. 11. 1			THE STATE AND A PROPERTY OF THE PARTY OF THE
TOTAL COUNTS & MINUTES	- Around the Manager	170	96		PROPERTY AND THE PROPERTY OF T	The Hart Control of the Control of t
GROSS CPM					<b>在中国的一个人的工作的工作的工作</b>	
KG CPM & MINUTES			145 145 11	THE PROPERTY OF	Managar Proposition of Party Color to	\$75°44:
NET CPM			. ve	The the the transfer of the		
MELD	STATE OF THE STATE	We have the	S. Mayer	A CONTRACTOR OF THE PARTY OF TH	Company of the second second	
	I'm withing the life		were ment go f	一ついるないのはないので	MARCHAN CONTRACTOR OF THE PROPERTY	
	The second of the		160		<b>神经神神 3年间的国际中华地区</b>	Paris Mark - Market To be in the
		The state of the state of	1 0 1	とこれが一個ない。	<b>网络阿里斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯斯</b>	THE HOLDER WAS AND THE PERSON OF THE PERSON
	and the second		Star will be	- かしからのなるのできる。	<b>建建设的 在国际中国的政治的企业</b>	the state of the s
			2.2	一 为 在 中 中 市 市 市 市 市 市 市 市 市 市 市 市 市 市 市 市 市	THE THE WANTED	Comment of the second second second
		236	or the legal		<b>电影中心,一种电影中心的一种一种一种一种一种一种一种一种一种一种一种一种一种一种一种一种一种一种一种</b>	
IOLOGICAL SAMPLES		23 5 13	P	- in which a little will be a	HARMAN RADON WHICH THE	the second section of the second
OTAL COUNTS & MINUTES	pec #3	23.8	nitra in 40		原数性 高帝(つ-5   中部	
ROSS CPM	1000	7/			福農館 場所というので	
IKG CPM & MINUTES	440			1、1015日から出作をある。	Manager Application on Service on S	
IET CPM	770		. 7 1		<b>端原和93594 ***</b>	
IELD			71.5			
					MATERIAL PROPERTY OF THE PROPERTY OF	
		ev.	The State of the		MANAGEMENT CONTRACTOR	
	A Property of		2. 2.	CALIFORNIA SANTANIA	THE THE PARTY OF T	Control of Paper of Landson
		20.00	A+	TO SERVICE OF THE SER	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
			100	これの意味のないと	100 March 100 Ma	The of Spanishing at the last
		dist.	·	- Septital als	77	
UMMARY OF RESULTS:	ToT U	1= 760 1 1= 760	1			erministration of Special Land Reference of Special Conference of

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-372

	A Delta	1 10/1	/ water water the same of the	因使用即式	Military D. Charles and a strengther
ARMY: (b) (6)		INTERN	AL DOSE DATA	TO SERVE STREET	<b>の一般に対している。</b>
NAME (LAST, FIRST, )	(1-20) PVT	(6) (6		turing ha	10) Man Type ANAL. (31-32)
66-2116		FROM	то т	EXP	ATE 6 Feb 66 TYPE
66-2446 BASE (87-60) Giessen		OCCUPATION (61 - 62) 57E20			
7 April 1966		SAMPLE VOLUME	VOLUME ANALYZED	PAT	E ANALYZED
TECHNICIAN (SIGNA	TURE(b) (6)	e e e e e e e e e e e e e e e e e e e			
URINE			RADON	WASHING TO SERVE	FECES/BLOOD
Counter Number	13B#7		Chamber Number		
Counter Bkg. (cpm)	0.03		Cham. Bkg. (mv/sec)	ALL PARTY OF THE P	Counter Bkg.
Counter Eff. (%)	0.45		Counter Eff."(%) 等調機	<b>一种战场和地</b>	Counter Eff.
Date/Time - Start	4-28-66		Millivolt - Start	17207634200	Date/Time - Start
-Stop		i., 195	Millivolt Stop	<b>EEGINGSONE</b>	Stop
Total Counts	1411		Total Millivots		
Counting Time	960	1.0	Total Drift Time	<b>一位。</b>	Counting Time
Gross cpm	1147	9. 9. 3. day	Gross my/sec	<b>山湖南部加南战</b>	Gross cpm
Bkg. Cpm	0.00		Bkg. My/sec	相關的	Bkg. cpm 1,92 PC
Net cpm	11.44		Net my/sec		net com DASEB
dpm	3,20		curies/my	<b>建筑的地域</b>	rdpm かかかから ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・
dpm/24 hr. (69 - 74),		1.874	litter (69-74) 神能時間	"如何如何是	dps/cc +
K 40 Correction al	1.92±0.1	<i>}</i>	一种经验证据的证明的	自己的特殊的	Neutron Dose (rads) (63-68)
Not Boto Puis	1,44±0.	79 1 700	D(q) (63-68) (100)	1 中 市 市 市 市 市 市 市 市 市 市 市 市 市	₩27mg (69-74)
D(q) (63 · 68)		July 3	THE PROPERTY OF THE PARTY OF TH	<b>欧洲欧洲</b>	D(q) (63-68)

Palomares Nuclear Weapons Accident





(b) (6)

b) (6)

NAME <sup>(b)</sup> (6)			SSN: (b) (6)	
MODE OF INTAKE:		INTAKE DA	TE OR PERIO	):
	☐ Injection		gh 4/08/66, on-site	
☐ Ingestion	☐ Absorption	3/26/66		
Unknown	☐Not applicable			
SUMMARY OF EXPOSURE CO				
Radionuclides/Respiratory Class/F	Particle Size: 239Pu/100	% Class Y/1 μm Al	MAD	
Date or Period of Evaluated Data:	2 samples, 4/8/66 and 3	5/26/66		
Duration of Exposure: Unknown				
Location of Exposure: Camp Wils	son, near Palomares, Sp	ain		
EVALUATION DATA:				
Air Sampling	☐ Attached	In Process	☑ Unavailable	
Health Physics Survey Data	Attached	In Process	☑ Unavailable	
Bioassay – Urinalysis	Attached Attached	In Process	Unavailable	
Fecal	Attached	In Process		
Nasal Smears	Attached		Unavailable	
In Vivo		In Process	Unavailable	
III VIVO	Attached	In Process	Unavailable	
Medical Treatment:				
Skin Decontamination:	Yes	No Date:		
Decorporation:	Yes	No Agent:		Date:
Catharsis:	Yes	No Agent:		Date:
Surgical excision:	Yes	No Date:		_ Date:
Assumptions: Acute inhalation i  Code/Model used for: Intake	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve	r. 1.4/JONES		
Code/Model used for: Intake Dose RESULTS SUMMARY	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve	r. 1.4/JONES		
Assumptions: Acute inhalation in Code/Model used for: Intake Dose RESULTS SUMMARY Estimated Intake Activity (pCi):	entake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000	r. 1.4/JONES		
Assumptions: Acute inhalation in Code/Model used for: Intake Dose RESULTS SUMMARY Estimated Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 S	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000	r. 1.4/JONES		
Assumptions: Acute inhalation in Code/Model used for: Intake Dose RESULTS SUMMARY Estimated Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 S Organ Dose Equivalent Summar	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/S	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose RESULTS SUMMARY Estimated Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 S Organ Dose Equivalent Summar Bone Surface	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/ 1200/12	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose RESULTS SUMMARY Estimated Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 S Organ Dose Equivalent Summar Bone Surface Lung	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Stream Dose Equivalent Summar Bone Surface Lung Liver	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Stream Dose Equivalent Summar Bone Surface Lung Liver Red Marrow	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Structure)	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96 21/0.21	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Stream Dose Equivalent Summar Bone Surface Lung Liver Red Marrow	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Streng Dose Equivalent Summar Bone Surface Lung Liver Red Marrow Other Testes	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96 21/0.21	t 4, General Syster	
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Dose in Code/Model used for: Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Stream Dose Equivalent Summar Bone Surface Lung Liver Red Marrow Other Testes	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v)	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96 21/0.21 18/0.18  PEER REVIEW	t 4, General System  Sv)	nic Model  DATE:
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Intake Activity (pCi): So YR CEDE (rem): 120 (1.2 Sorgan Dose Equivalent Summar Bone Surface Lung Liver Red Marrow Other Testes  DOSE ASSESSOR:  Signature:	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v) y	7. 1.4/JONES 7. 1.4/ICRP 30, Part 50 YR CDE (rem/S 1200/12 460/4.6 220/2.2 96/0.96 21/0.21 18/0.18 PEER REVIEW Signature:	t 4, General System Sv)	DATE:
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Intake Dose in Intake Dose in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Structure)	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v) y	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96 21/0.21 18/0.18  PEER REVIEV Signature: Print Name:	t 4, General System Sv) WER:	DATE:
Assumptions: Acute inhalation in Code/Model used for: Intake Dose of the Code	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v) y	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96 21/0.21 18/0.18  PEER REVIEV Signature: Print Name:	t 4, General System Sv)	DATE:
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Intake Dose in Intake Dose in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Dose Intake Do	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v) y	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96 21/0.21 18/0.18  PEER REVIEV Signature: Print Name:	t 4, General System Sv) WER:	DATE:
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Intake Dose in Intake Dose in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) Organ Dose Equivalent Summar Bone Surface Lung Liver Red Marrow Other Testes  DOSE ASSESSOR:  Signature:  Print Name:  RECOMMENDATIONS:	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve 400000 v) y	7. 1.4/JONES 1.4	t 4, General System Sv)	DATE:
Assumptions: Acute inhalation in Code/Model used for: Intake Dose in Intake Dose in Intake Dose in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Activity (pCi): 50 YR CEDE (rem): 120 (1.2 Street) in Intake Dose Intake Do	intake of <sup>239</sup> Pu, 100% C Estimate: CINDY, Ve Estimate: CINDY, Ve  400000 v) y	r. 1.4/JONES r. 1.4/ICRP 30, Part 50 YR CDE (rem/s 1200/12 460/4.6 220/2.2 96/0.96 21/0.21 18/0.18  PEER REVIEV Signature: Print Name:	t 4, General System Sv)	DATE:

## (b)(6)

## **Internal Dosimetry Case Narrative**

#### Identification:

Name: SSN:



#### **Incidents:**

Individual participated on site in response duties resulting from an accident involving three nuclear weapons at Palomares, Spain on January 17, 1966. Individual may have been exposed to weapons materials (primarily plutonium-239) by inhalation and ingestion from contaminated weapon and aircraft debris, lands, and vegetation. Primary activities included search, radiological monitoring, recovery of accident debris, and processing for disposal.

## Previous Intake/Dose Assessments:

This assessment applies to Palomares accident activities only. No previous intakes or doses were considered.

#### Other Information:

None.

Radionuclide(s): 239Pu.

#### Assumptions/Basis/Data Sources:

Acute inhalation intake of Pu-239; 100% Class Y; 1  $\mu$ m AMAD particle size on 3/26/66. The date is the midpoint of the period on station from 3/14/66 to 4/8/66.

Inhalation was assumed as the major route of entry because the primary contaminant was created by explosion and fire and deposited in sandy soil and on buildings and plants. Conditions were generally windy and significant activity was underway.

Dose was determined entirely from modeling intake based on the following urinalysis results for this individual. This individual's sample was identified for a follow-up analysis using alpha spectrometry after the initial gross alpha result was reviewed. That is, the initial urine sample for this individual was reprocessed radiochemically for alpha spectrometry. Results of the follow-up alpha spectrometry analysis are reported below and were used in preparing the dose estimate.

Sample	Analysis*	Sample Date	Result (pCi/day)	Error (pCi/day)	Included
66-2860	AS	4/8/66	0.296	0.016	1
66-2860	G	4/8/66	0.619	0.203	
66-3241	AS	5/26/66	NR	NR	
66-3241	G	5/26/66	0.423	0.423	✓

<sup>\*</sup> G means gross alpha counting; AS means alpha spectrometry.



Intakes and estimates of dose were prepared using CINDY Version 1.4 and LUDEP Version 2.05.

Intake was estimated using the Jones excretion model in CINDY and LUDEP.

Inhalation intake was estimated using the ICRP 66 respiratory tract model in LUDEP.

CINDY estimated dose derived using the ICRP 30, Part 4, General Systemic Model and weighting factors; and LUDEP used the recommendations of ICRP 60.

### Modeling:

CINDY and LUDEP were used to estimate the intake and dose with the following results:

Model	Intake (pCi)	CEDE (rem/Sv)
CINDY	400,000	120/1.2
LUDEP	1,280,000	90/0.9

Doses to individual organs and estimation of the effective dose equivalent using CINDY reported the following results:

			Weighted Organ
_	Dose Equivalent	Weighting	Dose Equivalent
Organ	(rem/Sv)	Factors	(rem/Sv)
Testes	1.8E+01/1.8E-01	2.5E-01	4.5E+00/4.5E-02
Breast	5.9E-04/5.9E-06	1.5E-01	8.9E-05/8.9E-07
Red Marrow	9.6E+01/9.6E-01	1.2E-01	1.2E+01/1.2E-01
Lung	4.6E+02/4.6E+00	1.2E-01	5.5E+01/5.5E-01
Thyroid	5.6E-04/5.6E-06	3.0E-02	1.7E-05/1.7E-07
Bone Surface	1.2E+03/1.2E+01	3.0E-02	3.7E+01/3.7E-01
Liver	2.2E+02/2.2E+00	6.0E-02	1.3E+01/1.3E-01
Other	2.1E+01/2.1E-01	6.0E-02	1.3E+00/1.3E-02
Lower Large Intestine	4.5E-02/4.5E-04	6.0E-02	2.7E-03/2.7E-05
Upper Large Intestine	1.5E-02/1.5E-04	6.0E-02	9.1E-04/9.1E-06
Small Intestine	3.1E-03/3.1E-05	6.0E-02	1.9E-04/1.9E-06
Effective Dose Equivale	ent		1.2E+02/1.2E+00

Two urine samples were analyzed by gross alpha counting and alpha spectrometry. For the first sample, the gross alpha analysis was not included in the modeling since an alpha spectrometry result was available for the same sample. For the second sample, no result was reported for the alpha spectrometry analysis, so the gross alpha counting result was used. The results were fit using CINDY and the Jones excretion model, to estimate an intake (400,000 pCi), organ doses, and a CEDE (120 rem/1.2 Sv; ICRP-30) as shown above. LUDEP was also used to estimate an intake of 1,280,000 pCi and a CEDE (ICRP-60) of 90 rem (0.9 Sv).

#### Conclusion:

Based on the results of intake estimates and dose calculations, this individual received an estimated intake of about 400,000 pCi of <sup>239</sup>Pu resulting in a 50-year committed effective dose equivalent of 120 rem (1.2

<b>Palomares Nuclear W</b>	eapons Accident
----------------------------	-----------------

DRAFT

Revised Dose Evaluation Report

b) (6) April 2001 (b) (6)

Sv). That dose is more than the cumulative dose (7 rem) from a lifetime (70 years) of exposure at the current level (0.100 rem) for members of the public. It is more than the working lifetime limit of 50 rem recommended by the National Council on Radiation Protection and Measurements (NCRP). These estimated dose levels are significant, although they were based on one sample that may have been collected on-site. However, follow-up urine sampling should be considered to provide additional assessment of the exposure.

Prepared By:	
Name:	
Signature:	Date:
Peer Reviewed By:	
Name:	
Signature:	Date:

The state of the s	ing paragraphs				12 (2) (2)	7	
" All mit		(A) (A)	INTERN	AL DOSE DATA		THE BUSINESS OF THE PERSON OF	AND CHARLES
NAME (LAST, FIRST,	M.I.) (1-20)	Ling Two Alles		. NO. (21-29)		101 Severe Type ANAL	·新黎尼亚洲
b) (6)	A2C	in which the	(b) (6)	Contract of the Contract of th	Urino	<b>建筑</b>	THE THE PARTY OF T
44 2040	" partials of the	SAMPLE DAT		Later to the second	The same of the sa	OSURE DENVISORE DESCRIPTION	Henry Service Printer
66-2860 BASE (57-60)	7.3-05-2	FROM 8	Apr 66	TO THE DESIGNATION	STATE OF	ATE 14 Mar 66 TYPE	AND THE PROPERTY OF
	e that	OCCUPATION	(61-62) isted	REQUESTED BY	and the second	TANDENERSONE AND SPECIA	iran markatareteka l
Moron DATE RECEIVED		Not L	isted	<b>产品的国际企业</b>		Market Manager	<b>对部结果</b>
22 Apr 66		SAMPLE VOL	the state of the s	VOLUME ANALYZE	DAT GEORGE	E ANALYZED	Photograph Built
TECHNICIAN (SIGN	ATURE AND DATES	20	00	#2000	<b>新州村 法</b>	<b>建筑市场发展的</b>	是是
	TONE AND DATE		A STATE OF				fallecher et
URINE			2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	RADON	世 和 中 中 中	FECES/BLOOD	mariant of Sec.
Counter Number	1 H	11 11 11 11 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15	一个大大学是自己	Chamber Number		Counter Number	quality and
Counter Bkg. (cpm)	0.03 (900)	September 1	4.25	Cham. Bkg. (mv/sec)		Counter Bkg.	tradical allam
Counter Eff. (%)	51	61 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Co Co	Counter Eff. (%)	A SHAPPER AND	Counter Eff.	This will have
ate/Time - Start	13 may 66	. 216.5	of the things	Millivolt Start	S. Diedermanian	Date/Time - Start	
-Stop	1 . 1	0 8/1	4 6 167 25 35	Millivolt Stop		Stop Stop	Link distrik
Total Counts	40	Reporter	volue	Total Millivots	O WHITE WAR TO BE	Total Counts	Distriction of the second
ounting Time	55	Corrected	Josanika	Total Drift Time	· 是我们只要们会对于	Counting Time	
ross cpm	0.73	20,9650	1) saling	Gross my/sec	A STANSFER OF THE	Gross cpm	WHITE A
lkg. Cpm	0.03	- 3 Y	7 3. 8	Bkg. My/sec	A (Village source)	Bkg. cpm	WALLES OF THE PARTY OF THE PART
let cpm	0.70	201 11	We draw	Net my sec	National Street	net com	- N I
m peils	0.309	±0.102	M. with	curles/my	A TORRAL MARKET	dpm was a second	AND THE WARRY OF
pm/24 hr. (69-74)		1. (	1.01,-11-17	litter (69-74)	Profesional de	dps/cc	The Shipping
40 Correction		3.50	· · · · · · · · · · · · · · · · · · ·	THE RESIDENCE OF THE PARTY OF T	Continue to the continue of	Neutron Dose (rads) (63-	
of Boto pei/8pl	0.619:	+0.203	A GOT	D(q) (63-68)	CHARLES AND	"uc/mg (69-74) 3000	4年 11年 11年
(q) (63.68)	4-		ومالين	(六) (不) ( ) ( ) ( ) ( ) ( ) ( )	Challeng Str. Str.		May Cheria

. 1 %

.

Palomares Nuclear Weapons Accident

AFLC FORM 1165 FC 5400

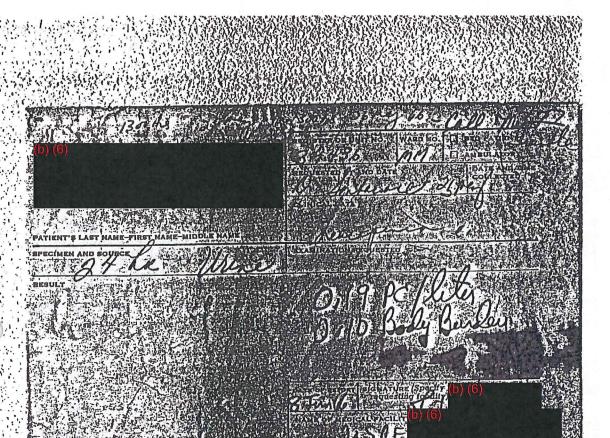
Palomares Nuclear Weapons Accident

-		San	•		
			INTERN	AL DOSE DATA	Marine Marine Marine 1 as a 1 as 1 as 1 as 1 as 1 as 1 as 1
NAME (LAST, FIRST,	M.I.) (1-20)				E (30) TYPE ANAL. (31-32)
(D) (O)	3 3 3 3 3 5	A2C	(13) (6	Waluri	Wash 1
SAMI LE NO. 133-3	91		ATE (39 - 44)	The court of the section of the court of the	EXPOSURE
66-3241	158	FROM 13	00 25 May	то 1300 26 May 66	DATE H MAR 66 TYPE
BASE (57-60)		OCCUPATI	ON (61 - 62)	THE COURT OF THE PROPERTY AND A PARTY OF THE	in all
Moron DATE RECEIVED		Not	Stated	VOLUME ANALYZED	A Control of the Cont
	. ,	SAMPLE VO		VOLUME ANALYZED	DATE ANALYZED
6 June 196		2280	me	1140 me man	The state of the s
SSgt (b) (6)	ATURE AND DATE		LISAE		JN 1966
URINE	The Spini		70.4	RADON WAR	FECES/BLOOD
Counter Number	B			Chamber Number	
Counter Bkg. (cpm)	78 (926			Cham. Bkg. (mv/sec)	
Counter Eff. (%)	51			Counter Eff. (%)	
Date/Time - Start	9 June			Millivolt - Start	7
-Stop				Millivolt - Stop Tong	- Ciui
Total Counts	36			Total Millivots	1
Counting Time	120			Total Drift Time	COURT OF THE PROPERTY OF THE P
Gross cpm	0.30		1	Gross my sec	440
Bkg. Cpm	0.08			Bkg. Mý/sec 地名沙特 经间接	
Net cpm	0.22			Net my / sec was selected	DAY CHILL
porte liler	0.185=	0.687		curies/my 经有品价值	
dpm/24 hr. (69 - 74)		189	,	litter (69 - 74) "岩潭武龍" 中华大学	
K 40 Correction,			100	· · · · · · · · · · · · · · · · · · ·	
Net Beto Pu Sal	0.4237	0.199		D(q) (63-68) 学品设计 建环境	
0(9) (63-68)		A CONTRACTOR OF THE PARTY OF TH	77	2 4.75×10 LE 13	uc/mg (69-74)

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.2-381

Palomares Nuclear Weapons Accident

FRIKE	o = in	e puz	39 /	1070 - 20 P	ב-מינו		
4 ( 2 <b>dr (                                  </b>	Service Peter	and the sale	INTERN	L'DOSE DATA			的社会的
NAME (LAST, FIRST,	M.I.) (1-20)	The Contract of				30) SEPTEMAL	. (31-32) bassel
i) (6)		ALC-			URINE		ALDHA
66-32 4	*	FROM	the state of the s	70		OSURE TYP	E
BASE (57-60)		OCCUPATION	(61 - 62)	REQUESTED BY	NOTE OF STREET	رو .	
DATE RECEIVED	2 2 2	22fo	A CONTRACTORAGE	VOLUME ANALYZE	P. ARMOND DAT	E ANALYSEE	NAME AND THE
TECHNICIAN (SIGN	TURE AND DATE)						143.54
URINE		- 15 / 127 512	and the same	RADON AND	<b>计编编数</b>	報報FECES/BLOOD	性はいる意味が
Counter Number	10		一方がは神神神	Chamber Number	<b>的</b>	Counter Number	一年 日本日本日本日本日本日本
Counter Bkg. (cpm)	39 626	240 J. J. W.	" Some Free	Cham. Bkg. (mv/sec)	中中的基础的	Counter Bkg.	THE PERSON NAMED IN
Counter Eff. (%)	51 200	1.75%	THE MENTS			Counter Eff.	
ate/Time - Start	9 June		520	Millivolt Start Will	<b>第一次位列制的编辑</b>	Date/Time - Start	· 李郎·斯克·哈斯
-Stop	· Design	Transfer Call	Too "			Stop -	
Total Counts	349	1. 15 · 15 16 1 18"	5.580	Total Millivots	<b>地一场然作教创会的</b>	Total Counts	- mannetinden
ounting Time	120	928). 1 (MAT)	autinomic	Total Drift Time		Counting Time	点 建树脂酸钠
ross cpm	2.91		4.20.21.21	Gross my / sec 10	<b>新地區加速</b> 數	Gross cpm	every we
Skg. Cpm	0.04	10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -				Bkg. com	は「明治」の「語言」
let cpm	2,87	4, 14	<b>人名阿伊特拉</b>	Net my/sec	<b>经</b> "特性性精神"	net cpm	430
ρm	0,22		and the Company	curles/my	<b>计</b>	Edom Base Park De To	1 HE O 188
pm/24 hr. (69 · 74)	2.65	ender professor.	we appoint	liner (69-74)	<b>第一個的影響</b>	dps/cc	は、一個なるのでは、
40 Correction	5.20	1. 18 - 14	· AMA			Neutron Dose (rads) (6	
let Beta	4 - 2 - 3			D(q) (63-68)	<b>经工程的</b>	#uc/mg (69 - 74)	<b>《 用部的影响中</b> 语》
		2 Rec					



# **APPENDIX C.3**

# **CONTAMINATION CUTOFF CASES**

Portions of this report have been designated records subject to the restriction of the Privacy Act, 5 U.S.C. 552(a) and are so marked.

### **APPENDIX C.3 CONTAMINATION CUTOFF CASES**

This section contains the intake and dose estimates for individuals whose urinalysis results were categorized as below a "contamination cutoff" of 0.1 picocuries per day (pCi/d). These individuals primarily submitted samples while on-site at Palomares. Most of these initial samples were analyzed by the gross alpha procedure. The results of the analysis were less than 0.1 pCi/d and were evaluated for intake and dose. Most samples collected became contaminated with plutonium because of limited controls on spread of the very low amounts required to indicate a positive urinalysis result. The main body of the report contains a discussion on the problem of sample contamination and the "contamination cutoff".

This "contamination cutoff" group consisted of 314 individuals. Their urinalysis results ranged from 0.002 to 0.099 pCi/d for those processed by the gross alpha procedure and from 0.018 to 0.097 pCi/day for those processed by alpha spectrometry. Intakes ranged from 1,500 to 150,000 picocuries and produced 50-year committed effective dose equivalents (CEDEs) of 0.46 to 46 rem (0.0046 to 0.46 Sv). Table C.3-1 shows the distribution of CEDE for this group and indicates that most individuals' doses were relatively low. This section contains a listing of the results of the assessments. Individual narrative summaries were not prepared for these

Table C.3-1 Distribution of effective doses.

CEDE Range	Number of Cases
(rem)	
0-10	149
10-20	94
20-30	55
30-40	14
40-50	2

individuals.

The listing requires some explanatory notes to clarify features of the data presented. These notes include the following.

- An entry of "n/a" means that data were not available in any of the records reviewed generally because no entry was recorded.
- An entry of "NR" means that a result for an analysis was not recorded on the appropriate data form.
- An entry of "ND" means that an analytical result was recorded as No Detectable Activity (NDA).
- An entry of "(12-hr)" in a Sample Volume cell means that a data form for the sample noted that the sample was collected for 12 hours.
- A shaded cell represents a result for a sample (collected on site) that exceeded 0.1 pCi/day;
   the established maximum for modeling individuals in the "Contamination Cutoff" category.
- An entry of "mean" represents the average value for intake or CEDE from two or more sample results for the same person.

C.3-4

Palomares Nuclear Weapons Accident

DRAFT

Cell shaded = Additional sample for Indiv not modeled since >0.1 pCl/sample, NR, or ND

Results of Modeling Individuals with Samples Assumed to be "Uncontaminated."

02/28/66

03/08/66

04/05/66

11

42

915 (12-hr)

950

700

Gross Alpha

Gross Alpha

Gross Alpha

0.032

0.057

0.091

7.875E-03

3.140E-02

1 200E-01

54.0

36.0

1200

17/0.17

11/0.11

37/0 37

66-1365

66-2434

66-2697

02/06/68

02/22/66

02/13/66

02/28/66

03/08/66

03/04/66

02/17/86

03/01/68

02/22/66

Rev	
evised Dose Evaluation Report April 2001	

												mple for indiv not mple, NR, or ND	
VAME	ssn	START EXPOSURE DATE	END EXPOSURE DATE	ESTIMATED ACUTE EXPOSURE DATE	SAMPLE#	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCII sample)	+l- (pCll sample)	INTAKE (1000s pCl)	50-YEAI CEDE (remiSv
0) (6)	(b) (6)	02/11/66	03/19/66	03/01/66	66-2200	03/19/66	18	900	Gross Alpha	0.035	8 750E-03	35 0	11/0.11
-, (-,	(-x (-x	02/05/66	02/25/66	02/15/66	66-1340	02/25/66	10	1300	Gross Alpha	0.022	1.850E-02	18.0	5.5/0.05
		02/21/66	03/18/66	03/05/66	66-2258	03/18/66	13	780	Gross Alpha	0.034	7.260E-02	31.0	9 5/0 09
		02/21/66	03/19/66	03/06/68	66-2329	03/19/66	13	700	Gross Alpha	0.021	7.350E-02	19.0	5.8/0.0
		02/13/66	03/08/66	02/24/68	66-2425	03/08/66	12	1000	Gross Alpha	0.010	2.740E-02	92	2.8/0.0
12 (1)		02/21/66	03/18/66	03/05/66	66-2245	03/18/66	13	1000	Gross Alpha	0.098	1.090E-01	89.0	27/0.2
	3.5	02/08/66	02/28/66	02/18/66	66-1357	02/28/66	10	950 (12-hr)	Gross Alpha	0.032	7.875E-03	52 0	16/0.1
		03/14/66	03/19/66	03/16/66	66-2333	03/19/66	3	900	Gross Alpha	0.096	1.017E-01	200	6.1/0.0
A LONG THE REAL PROPERTY.		•			66-2357	03/04/68		900	Gross Alpha	0.15	1.190E-01		
i) (6)	(b) (6)	01/18/66	02/03/66	01/26/66	66-1823	02/03/66	8	008	Gross Alpha	0.018	4 500E-03	13 0	4/0.0
		02/11/86	03/08/66	02/23/66	66-2454	03/08/66	13	1000	Gross Alpha	0.085	2.460E-02	77.0	24/0.2
					66-3121	04/13/68		700	Gross Alpha	0.364	1.340E-01		
o) (6)	(b) (6)	02/09/66	03/08/66	02/22/66	66-1889	03/08/68	14	940	Gross Alpha	0.031	1.960E-02	29 0	8.9/0.0
		01/18/66	03/08/66	02/11/66	66-2615	03/08/68	25	850	Gross Alpha	0.070	7.900E-02	77.0	24/0.2
		02/13/66	03/08/66	02/24/66	66-2471	03/08/66	12	1000	Gross Alpha	0.077	1.913E-02	68 0	21/0.2
		02/09/66	03/08/66	02/22/66	66-1882	03/08/66	14	750	Gross Alpha	0.017	2.000E-02	16 0	4.9/0.0
	(b) (6)	02/10/66	03/19/66	02/28/66	66-2208	03/19/66	19	900	Gross Alpha	0.093	1.017E-01	94 0	29/0.2
		01/17/66	01/27/66	01/22/66	66-1234	02/19/66	28	1000	Gross Alpha	0.036	2.120E-02	41.0	13/0.1
		01/18/66	02/03/66	01/26/66	66-1835	02/03/66	8	750	Gross Alpha	0.018	4.500E-03	13 0	4/0.0
		02/24/66	03/19/66	03/07/66	66-2552	03/19/66	12	820	Gross Alpha	0.049	7.140E-02	43 0	13/0.1
		02/21/66	03/18/66	03/05/66	66-2088	03/18/66	13	860	Gross Alpha	0.096	7.640E-02	87.0	27/0.2
		01/18/66	01/20/66	01/19/66	66-1132	01/20/66	1	n/a	Gross Alpha	0.029	1.930E-02	2.5	0 77/0 0
		01/18/86	03/19/66	02/17/66	66-2337	03/19/66	30	800	Gross Alpha	0.016	9.120E-02	19.0	5 8/0.0
		02/10/66	03/29/66	03/05/68	66-2593	03/29/66	24	1475	Gross Alpha	0.057	8.040E-02	63.0	19/0.1
	28 L	02/11/66	03/08/66	02/23/66	66-2453	03/08/66	13	750	Gross Alpha	0.024	3.820E-02	21.0	6.5/0.0
		02/17/66	03/08/66	02/26/68	66-1692	03/08/66	10	930	Gross Alpha	0.021	2.800E-02	17.0	5 2/0 0
		01/18/66	02/03/66	01/26/66	66-1820	02/03/66	8	390	Gross Alpha	0.050	1.238E-02	35.0	11/0.1
		02/24/66	03/19/66	03/07/66	66-2566	03/19/66	12	800	Gross Alpha	0.060	8.030E-02	53 0	16/0.1
		02/09/66	03/09/66	02/23/66	66-2398	03/09/66	14	1200	Gross Alpha	0.026	7.150E-02	25.0	7,7/0.0
	<b>以</b> 第15 第	02/10/66	03/19/66	02/28/66	66-2046	03/19/66	19	695	Gross Alpha	0.013	8.480E-02	13.0	4/0.0
		02/06/66	03/08/66	02/21/66	66-1869	03/08/66	15	1020	Gross Alpha	0.050	1.250E-02	47.0	14/0.1
	# 10 X	01/18/66	03/08/66	02/11/66	66-2623	03/08/66	25	1100	Gross Alpha	0.070	7.900E-02	77.0	24/0 2
		01/18/66	01/22/66	01/20/66	66-1136	01/22/68	2	975	Gross Alpha	0.057	2.560E-02	7.9	2 4/0.0
		02/26/66	03/18/66	03/08/66	66-2112	03/18/66	10	580	Gross Alpha	0.058	6.960E-01	47.0	14/0.1
					66-1157	02/15/86		645	Gross Alpha	ND	ND		
					66-3128	04/13/66		1650	Gross Alpha	NR	NR		

NR - Not Reported; ND - No Detectable Activity; n/a - not available

										Gell shaded = Additional a modeled since >0.1 pCVs			
NAME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ACUTE EXPOSURE DATE	SAMPLE #	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCli semple)	+i- (pCii sample)	INTAKE (1000s	50-YEA CEDE (remis
b) (6)	(b) (6)	01/19/66	03/18/66	02/17/66	66-2240	03/18/66	29	700	Gross Alpha	0.090	8.800E-02	100.0	31/0.3
	(-) (-)	01/31/66	03/19/66	02/23/66	66-2165	03/19/66	24	800	Gross Alpha	0 059	1.463E-02	64.0	20/0
		01/17/68	01/22/66	01/19/66	66-3105	04/13/66	84	800	Gross Alpha	0 058	4.800E-02	81.0	2 5/0 0
		01/21/66	03/18/66	02/18/66	86-2251	03/18/66	28	1000	Gross Alpha	0 040	B.130E-02	45 0	14/0.1
		01/18/66	01/29/66	01/23/66	66-1140	01/29/68	6	560	Gross Alpha	0 025	1.890E-02	13.0	4/0.0
		02/03/66	02/28/66	02/15/66	66-1358	02/28/68	13	550 (12-hr)	Gross Alpha	0 009	2.250E-03	16.0	4.9/0.0
	1000	02/13/66	03/08/66	02/24/66	66-2429	03/08/68	12	1000	Gross Alpha	0.039	2.220E-02	34.0	10/0.
		01/18/66	01/22/66	01/20/66	66-1131	01/22/86	2	950	Gross Alpha	0 085	2.620E-02	12.0	3.7/0.0
		02/21/66	03/19/66	03/06/66	66-2206	03/19/66	13	850	Gross Alpha	0 090	2.250E-02	82.0	25/0.2
		01/18/66	04/05/66	02/25/66	66-2696	04/05/68	39	1000	Gross Alpha	0 040	7.210E-02	51.0	16/0.1
		02/13/66	03/08/66	02/24/66	66-2445	03/08/66	12	1250	Gross Alpha	0 028	1.900E-02	23.0	7.1/0.0
		01/18/66	02/03/66	01/26/66	66-1821	02/03/66	8	700	Gross Alpha	0 090	2.253E-02	64.0	20/0.
	<b>2012 123</b>	01/21/66	02/19/66	02/04/66	66-1229	02/19/66	15	1200	Gross Alpha	0.054	2.190E-02	51.0	16/0.1
		03/14/66	03/19/66	03/16/66	66-2187	03/19/66	3	850	Gross Alpha	0 059	1.463E-02	12 0	3 7/0.0
		02/06/66	02/28/66	02/17/66	66-1361	02/28/66	11	625 (12-hr)	Gross Alpha	0 059	1.465E-02	100 0	31/0.3
		01/18/66	01/29/66	01/23/66	66-1080	01/29/66	6	2050	Pu239	0.079	1.975E-02	42.0	13/0.1
	N. S. Carlot	01/18/66	02/03/66	01/26/66	66-1608	02/03/66	8	540	Gross Alpha	0.099	2.478E-02	70.0	22/0.2
		01/22/68	03/19/66	02/19/66	66-2141	03/19/66	28	500	Gross Alpha	0 056	5 650E-02	64.0	20/0.
	BAR STE	01/18/66	02/03/66	01/26/66	66-1826	02/03/66	8	900	Gross Alpha	0.059	1.465E-02	83.0	25/0.2
		02/06/66	02/28/66	02/17/66	66-1368	02/28/66	11	950 (12-hr)	Gross Alpha	0 050	1.245E-02	85.0	26/0.2
		02/10/66	03/08/66	02/23/66	66-2464	03/08/68	13	850	Gross Alpha	0.021	1.840E-02	19 0	27/0.2
		02/13/66	03/18/66	03/01/68	66-2103	03/18/66	17	640	Gross Alpha	0.051	6 020E-02	51.0	16/0.1
	S7000394	02/13/66	03/29/66	03/07/66	66-2594	03/29/66	22	1900	Gross Alpha	0.088	9.500E-02	93 0	29/0.2
		02/21/66	03/19/66	03/06/66	66-2230	03/19/66	13	550	Gross Alpha	0.054	7.210E-02	49.0	15/0.1
	<b>5054</b> 6	01/18/66	03/27/66	02/21/68	66-2587	03/27/66	34	1300	Gross Alpha	0.097	1.020E-01	120.0	37/0.3
		01/18/66	03/08/66	02/11/68	66-1873	03/08/66	25	910	Gross Alpha	0.099	2 478E-02	110.0	34/0.3
		01/18/66	03/08/66	02/11/66	68-2438	03/08/66	25	350	Gross Alpha	0.013	1.700E-02	14.0	4.3/0.0
		01/18/66	02/03/66	01/26/66	68-1813	02/03/66	8	940	Gross Alpha	0.032	7 875E-03	22.0	6 8/0.0
	40 A 10 A 10	01/18/66	03/19/66	02/17/66	66-2227	03/19/66	30	925	Gross Alpha	0.075	1.160E-01	88.0	27/0.2
		01/18/66	01/21/66	01/19/66	66-1135	01/21/66	2	n/a	Gross Alpha	0 025	2.110E-02	3.4	1/0.0
	12/17/4/8	02/09/66	03/08/66	02/22/66	66-1895	03/08/66	14	900	Gross Alpha	0 044	2 270E-02	41.0	13/0.1
	97187	02/25/68	03/18/66	03/07/66	66-2259	03/18/66	11	500	Gross Alpha	0.065	8.100E-02	55 0	17/0.1
	A SOLVED	01/18/66	01/30/68	01/24/66	66-1481	02/25/66	32	1720	Pu239	0.039	1 560E-01	46.0	14/0.1
		01/24/68	02/05/66	01/30/66	66-1248	02/23/66	24	1345	Gross Alpha	0.024	1 880E-02	26 0	8/0.0
	Carlotte and	02/06/66	02/28/66	02/17/66	66-1364	02/28/66	11	610 (12-hr)	Gross Alpha	0.032	7.875E-03	54.0	17/0.1
· 中国 · 中国 · 中国	10.5 N 34 Mg	02/27/66	03/28/66	03/13/66	66-2675	03/28/68	15	1600	Gross Alpha	0.087	9 500E-02	83.0	25/0.2
		02/27/66	03/08/66	03/03/66	66-2462	03/08/66	5	1000	Gross Alpha	0 024	2 910E-02	10.0	3.1/0.03

03/08/66 NR - Not Reported; ND - No Detectable Activity; n/a - not available

											ed = Additional sau since >0.1 pCVsau		
NAME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ESTIMATED ACUTE EXPOSURE DATE	SAMPLE #	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCil sample)	+l- (pCll sample)	INTAKE (1000s pCi)	50-YEAR CEDE (remISv)
(b) (6)	(b) (6)	03/02/68	03/19/66	03/10/68	66-2218	03/19/68	9	400	Gross Alpha	0 058	1.096E-01	45.0	14/0 14
		02/24/68	03/18/66	03/07/66	68-2119	03/18/66	11	990	Gross Alpha	0 057	6 990E-02	49 0	15/0.15
		01/18/66	02/03/66	01/26/66	68-1833	02/03/66	8	910	Gross Alpha	0.041	1.013E-02	29 0	8 9/0.089
		01/18/66	03/16/66	02/15/66	68-2645	03/16/66	29	450	Gross Alpha	0 026	5.090E-02	36.0	11/0.11
F) (C)					66-2646	03/17/66	24183	850	Gross Alpha	0 048	8 840E-02		
b) (6)	(b) (6)	01/20/66	02/22/66	02/05/66	66-2671	03/24/66	47	910	Gross Alpha	0.026	5.080E-02	34.0	10/0.1
	(1) (0)	i P			66-1086	01/29/66		1250	Gross Alpha	118	3.000E+00		
b) (6)	(b) (6)	03/26/66	04/11/66	04/03/66	66-3204	04/21/66	18	1160	Gross Alpha	0.080	1.121E-01	80.0	25/0.25
	- 44				66-3204-5	04/21/66		1160	Gross Alpha	580	1.450E+02		
b) (6)	(b) (6)	01/18/66	02/12/66	01/30/66	66-1125	02/12/66	13	950	Gross Alpha	0.024	2 080E-02	3.2	0 98/0.0098
	100	01/31/66	02/26/66	02/13/66	66-1417	02/26/66	13	940	Gross Alpha	0.060	1.500E-02	55.0	17/0.17
		03/12/86	03/20/66	03/16/66	66-2286	03/20/66	4	900	Gross Alpha	0.091	9 540E-02	28.0	8.6/0.086
		01/17/66	02/25/66	02/05/66	66-1338	02/25/66	20	1200	Gross Alpha	0.043	1.850E-02	44.0	14/0.14
		02/18/66	03/08/66	02/27/68	66-2436	03/08/66	9	1000	Gross Alpha	0.025	1.640E-02	19.0	5 8/0.058
		02/27/66	03/08/66	03/03/66	66-2442	03/08/66	5	1000	Gross Alpha	0.037	2 010E-02	15.0	4 6/0.046
		02/21/68	03/03/66	02/26/66	66-1922	03/03/66	5	450	Gross Alpha	0.051	2 330E-02	21.0	6.5/0.065
		02/25/66	03/18/66	03/07/66	66-2273	03/18/66	11	850	Gross Alpha	0 036	6 270E-02	31 0	9.5/0.095
		02/27/66	03/19/66	03/09/66	66-2193	03/19/66	10	960	Gross Alpha	0.050	1.238E-02	41.0	13/0.13
		01/18/66	02/03/66	01/26/66	66-1812	02/03/66	8	490	Gross Alpha	0 072	1.803E-02	51.0	16/0.16
		02/11/66	03/03/66	02/21/66	66-1914	03/03/66	10	825	Gross Alpha	0 075	5 930E-02	62.0	19/0.19
		02/13/66	03/18/66	03/01/66	66-2246	03/18/66	17	320	Gross Alpha	0.080	1 030E-01	78.0	24/0.24
		02/13/66	03/03/66	02/22/66	66-1924	03/03/66	9	850	Gross Alpha	0.063	2 770E-02	48.0	15/0.15
		02/21/66	03/09/66	03/01/66	66-2050	03/09/66	8	900	Gross Alpha	0.076	7.120E-02	54.0	17/0.17
		02/13/66	03/25/66	03/05/66	66-2287	03/20/66	15	560	Gross Alpha	0.036	6 270E-02	34.0	10/0.1
					66-3126	04/13/66		1150	Gross Alpha	NR	NR		
1 (0)	// V / 6 V				66-3126-8	04/13/66		1100	Gross Alpha	NR	NR		
) (6)	(b) (6)	02/10/66	03/08/66	02/23/66	66-2518	03/08/66	13	400	Gross Alpha	0.014	3.375E-03	12.0	3.7/0.037
	District by	01/23/66	03/20/66	02/20/66	66-2300	03/20/66	28	800	Gross Alpha	0.055	1.040E-01	63 0	19/0 19
		01/17/66	02/03/66	01/25/66	66-1841	02/03/66	9	800	Gross Alpha	0.009	2 250E-03	7.0	2 2/0 022
		01/17/66	03/09/66	02/11/66	66-2598	03/09/66	26	600	Gross Alpha	0.051	8 040E-02	57.0	18/0.18
THE STATE OF	(FE) (SE)	01/20/66	03/18/66	02/17/86	66-2254	03/18/66	29	950	Gross Alpha	0 075	1.160E-01	87.0	2 7/0 027
<b>国的选择</b>		01/23/66	03/20/66	02/20/66	66-2288	03/20/66	28	900	Gross Alpha	0 091	1.150E-01	100.0	31/0.31
AND CONTRACTOR	A Contract of	02/17/66	02/17/66	02/17/66	66-2673	03/25/66	36	1410	Gross Alpha	0.035	7 220E-02	43.0	13/0.13
		03/14/66	03/19/66	03/16/66	66-2149	03/19/86	3	300	Gross Alpha	0 082	1 023E-01	17.0	5 2/0 052
100000	Part William	03/17/66	03/18/66	03/17/66	66-2437	03/18/66	1	300	Gross Alpha	0 049	5 900E-02	4.1	1.3/0 013
		02/10/66	03/18/66	02/28/66	66-2248	03/18/66	18	800	Gross Alpha	0 072	8 080E-02	72 0	22/0 22
Ser. 18 18 18		02/17/66	03/08/68	02/26/66	66-1880	03/08/66	10	910	Gross Alpha	0.045	2.400E-02	37.0	11/0.11

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a).

C.3-7

NR - Not Reported; ND - No Detectable Activity; r/a - not available

Fal
omar
nn se
Clear
Meabous
Acciden
ſ

	Revise
	d Dose
	Evalua
	tion F
2	Repoi

												imple for Indiv not imple, NR, or ND	
NAME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ESTIMATED ACUTE EXPOSURE DATE	SAMPLE #	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCii sample)	+l- (pCil sample)	INTAKE (1000s pCl)	50-YEAR CEDE (remiSv)
o) (6)	(b) (6)	01/17/86	02/25/66	02/05/66	66-1341	02/25/66	20	600	Gross Alpha	0.030	2 330E-02	31.0	9 5/0 095
/ /	(-) (-)	02/10/66	03/04/66	02/21/66	66-2376	03/04/66	11	220	Gross Alpha	0.004	1.010E-01	3.6	11/0 11
		01/18/68	01/29/66	01/23/66	66-1077	01/29/66	6	1415	Pu239	0.079	1.975E-02	42 0	13/0.13
	<b>国际企业</b>	01/17/66	01/18/66	01/17/66	66-1134	01/18/66	1	n/a	Gross Alpha	0 034	2 200E-02	2.9	0 89/0 00
	<b>斯里特加</b>	01/18/68	02/03/66	01/26/66	68-1834	02/03/86	В	280	Gross Alpha	0.018	4.500E-03	13 0	4/0.04
	ALC: NO	02/18/66	03/04/66	02/25/66	66-2342	03/04/66	7	900	Gross Alpha	0.092	1.060E-01	58 0	18/0.18
		03/12/66	03/19/66	03/15/66	66-2189	03/19/66	4	1000	Gross Alpha	0.009	2 250E-03	2.8	0 86/0 00
		01/18/66	01/20/66	01/19/68	66-1128	01/20/66	1	800	Gross Alpha	0 028	2.120E-02	2.4	0.74/0.00
AND THE STATE		02/21/66	03/19/66	03/06/66	66-2330	03/19/66	13	920	Gross Alpha	0.047	8.110E-02	43.0	13/0.13
	<b>AME 18</b>	01/18/68	01/29/66	01/23/66	66-1070	01/29/66	в	2200	Pu239	0.035	8.750E-03	19.0	5.8/0 05
	THE STATE OF	01/29/66	03/18/66	02/22/68	66-2099	03/18/66	24	870	Gross Alpha	0.003	8 270E-02	3.3	1/0.01
		02/13/66	03/08/66	02/24/66	66-2426	03/08/66	12	1000	Gross Alpha	0.034	1.990E-02	30.0	9.2/0.09
	BOOK ST	01/21/66	03/08/66	02/13/66	66-2449	03/08/66	23	600	Gross Alpha	0 034	1.990E-02	37.0	11/0.1
7 1 1 2 2 2 2		03/01/66	03/08/66	03/04/66	66-2450	03/08/66	4	1150	Gross Alpha	0.072	2.510E-02	22.0	6.8/0 06
		02/10/66	03/08/66	02/23/66	66-2447	03/08/66	13	1300	Gross Alpha	0 026	1.660E-02	24.0	7.4/0 0
35650		02/06/66	02/28/66	02/17/66	66-1369	02/28/66	11	960 (12-hr)	Gross Alpha	0.018	4.500E-03	31.0	9 5/0.09
	A 45 72 1	03/15/66	03/19/66	03/17/66	66-2570	03/19/66	2	700	Gross Alpha	0.084	9.520E-02	12.0	3 7/0 03
		03/08/66	03/19/66	03/13/66	66-2325	03/19/66	6	910	Gross Alpha	0 062	9.760E-02	33 0	10/0.1
7 3 . (4)		03/16/66	03/19/68	03/17/86	66-2556	03/19/66	2	950	Gross Alpha	0.045	8.760E-02	6.1	1 9/0.0
	STATE OF THE PARTY	02/23/66	03/08/66	03/01/66	66-2509	03/08/66	7	900	Gross Alpha	0.090	2 250E-02	57.0	18/0.1
		01/18/66	01/29/66	01/23/66	66-1073	01/29/66	6	510	Pu239	0.097	2.425E-02	51.0	16/0.1
A STATE OF		02/27/66	03/08/66	03/03/66	66-2456	03/08/66	5	700	Gross Alpha	0.098	2.570E-02	41.0	13/0.1
	MARKET NO.	02/27/66	03/08/66	03/03/66	66-2465	03/08/66	5	550	Gross Alpha	0.072	2 350E-02	30 0	9 2/0.0
ALT THE APPLIES		01/17/66	01/18/66	01/17/66	66-1138	01/18/66	1	725	Gross Alpha	0.068	2.490E-02	5.8	1.8/0.0
		02/25/66	03/18/66	03/07/66	66-2237	03/18/66	11	340	Gross Alpha	0.062	9.660E-02	53 0	16/0.1
					66-772	02/11/66		360	Gross Alpha	1	4.000E-01	-	10.011
o) (6)	(b) (6)	02/27/66	03/16/66	03/07/68	66-2670	03/27/66	20	820	Gross Alpha	0.086	9.510E-02	68.0	21/0.2
-) (-)	V-Z-V-Z	02/17/68	03/08/66	02/26/66	66-1894	03/08/66	10	900	Gross Alpha	0 075	2 380E-02	62.0	19/0.1
		02/25/66	03/19/88	03/08/66	68-2228	03/19/66	11	920	Gross Alpha	0 002	1.060E-01	1.5	0.46/0.0
CONTACT OF		02/27/66	03/19/66	03/09/66	66-2313	03/19/66	10	1350	Gross Alpha	0.061	8 870E-02	50.0	15/0.1
	MARKET ST	02/10/66	03/08/66	02/23/66	68-2451	03/08/66	13	1250	Gross Alpha	0.012	1 420E-02	11.0	3.4/0.03
<b>是是在</b> 多位在4		02/13/66	03/23/66	03/04/66	66-2583	03/23/66	19	1600	Gross Alpha	0.060	8.030E-02	61.0	19/0.11
		02/25/66	03/19/66	03/08/66	66-2225	03/19/66	11	1000	Gross Alpha	0.037	9.770E-02	32.0	9 8/0.09
	CHAP WITT	01/25/66	03/13/66	02/17/68	66-2547	03/13/66	24		Gross Alpha	0.098	1.010E-01	110.0	34/0.3
		02/13/66	03/08/66	02/1//66	66-2467	03/08/66	12	1000	Gross Alpha	0.032	1.970E-02	29.0	8 9/0.0
TENEDERON	MODEL TO THE	02/13/66	02/03/66	02/24/66	66-1825	02/03/66	8	600	Gross Alpha	0.032	1.970E-02 1.238E-02	35.0	11/0.1

NR - Not Reported; ND - No Detectable Activity; n/a - not available

			Results of M	odeling Indi	Iduals with	Samples A	ssumed to	be "Uncont	aminated."				
												mple for indiv not mple, NR, or ND	
NAME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ACUTE EXPOSURE DATE	SAMPLE#	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCil sample)	+!- (pCil semple)	INTAKE (1000s	50-YEAR CEDE (remiSv)
(b) (6)	(b) (6)	02/21/66	03/10/66	03/01/66	86-1946	03/18/66	17	1690	Gross Alpha	0.093	7.460E-02	92.0	28/0.28
		01/18/66	01/20/66	01/19/66	66-1130	01/20/68	1	780	Gross Alpha	0.048	2 310E-02	4.0	1 2/0 012
100		02/10/66	03/18/66	02/28/66	66-2262	03/18/66	18	988	Gross Alpha	0.055	9.120E-02	55 0	17/0.17
Mark State		01/18/66	02/23/66	02/05/66	66-1246	02/23/66	18	1340	Gross Alpha	0.040	2 410E-02	40.0	12/0.12
AND PARTY		02/13/66	03/18/66	03/01/66	66-2234	03/18/66	17	780	Gross Alpha	0.093	1.220E-01	91.0	28/0.28
		03/12/66	03/13/66	03/12/66	66-2387	03/13/66	1	1300	Gross Alpha	0.045	8.760E-02	38	1 2/0.012
		01/18/66	02/03/66	01/26/66	66-1815	02/03/66	8	190 (12-hr)	Gross Alpha	0.018	4 500E-03	26 0	8/0.08
the office of		03/26/66	04/07/66	04/01/66	66-3104	04/13/66	12	900	Gross Alpha	0.094	5 500E-02	83 0	25/0.25
		02/25/66	03/19/66	03/08/66	66-2317	03/19/68	11	790	Gross Alpha	0.072	8 850E-02	62 0	19/0.19
		02/10/86	03/19/66	02/28/68	66-2149	03/19/68	19	800	Gross Alpha	0.009	7.360E-02	8.0	2 5/0.025
		02/10/86	03/06/66	02/22/66	66-2386	03/09/68	15	450	Gross Alpha	0.078	1 215E-01	74.0	23/0.23
		01/18/66	01/29/66	01/23/66	86-1142	01/29/66	В	380	Gross Alpha	0.022	2 080E-02	12.0	3.7/0.037
		02/18/66	03/08/66	02/27/66	66-2455	03/08/66	9	550	Gross Alpha	0.028	2 460E-02	21.0	6.5/0.065
		03/14/66	03/20/66	03/17/66	66-2303	03/20/66	3	420	Gross Alpha	0.026	B 270E-02	4.7	1.4/0.014
					66-1093	02/22/66		520	Gross Alpha	7:08	6 900E-01		
(b) (6)	(b) (6)	03/14/66	03/19/66	03/16/66	68-2334	03/19/66	3	900	Gross Alpha	0.022	7.310E-02	4.7	1.4/0.014
	The state of the s	02/13/66	03/08/66	02/24/66	66-2431	03/08/66	12	750	Gross Alpha	0.024	2 280E-02	210	6.5/0.065
<b>多代 马车</b> 5 以		01/18/66	02/28/66	02/07/66	66-1078	02/28/66	21	1100	Pu239	0.062	1.550E-02	65.0	20/0.2
		02/25/66	03/19/66	03/08/66	66-2196	03/19/66	11	1000	Gross Alpha	0.041	1.013E-02	35.0	11/0.11
13-28-60 100		02/11/66	03/08/66	02/23/66	66-2443	03/08/66	13	650	Gross Alpha	0.016	3.160E-02	15.0	4.6/0.046
TO SEE THE		01/24/66	03/08/66	02/14/88	66-2599	03/08/66	22	1250	Gross Alpha	0.067	8 800E-02	80 0	25/0.25
STATE OF THE STATE OF		02/18/66	03/19/66	03/04/66	66-2329	03/19/66	15	875	Gross Alpha	0.083	9 540E-02	78 0	24/0.24
<b>有中生物。生态</b>	644.73	02/06/66	02/28/66	02/17/66	68-1363	02/28/66	11	730 (12-hr)	Gross Alpha	0.018	4 500E-03	31.0	9.5/0 095
		02/06/66	02/28/66	02/17/66	66-1370	02/28/66	11	920 (12-hr)	Gross Alpha	0.050	1.238E-02	85.0	26/0.26
		01/18/66	02/23/66	02/05/66	86-1244	02/23/66	18	1200	Gross Alpha	0 086	2 280E-02	86.0	26/0.26
		01/18/66	03/28/66	02/21/66	66-1992	03/28/66	35	1350	Gross Alpha	0.041	1.013E-02	50.0	15/0.15
7 50	,	•			66-910	02/18/66		1900	Gross Alpha	3.44	2.090E+00		
					66-1396	03/02/66		1620	Gross Alpha	0 444	3 840E-01		
(b) (6)	(b) (6)	01/18/66	03/01/66	02/08/66	66-1847	03/01/66	21	520	Gross Alpha	0 058	8 910E-02	61.0	19/0.19
		02/21/66	03/19/66	03/06/66	86-2204	03/19/66	13	1000	Gross Alpha	0 032	7.875E-03	29.0	8.9/0.089
		01/21/66	03/19/66	02/18/66	66-2188	03/19/66	29	1500	Gross Alpha	0.032	7.875E-03	36.0	11/0.11
		02/17/66	03/08/66	02/26/66	66-1893	03/08/66	10	700	Gross Alpha	0.017	3 010E-02	14 0	4 3/0 043
		03/14/66	03/19/66	03/16/66	66-2326	03/19/66	3	880	Gross Alpha	0 083	9.500E-D1	17.0	5 2/0 052
	9 -				66-1072	01/29/66		1040	Pu239	ND	ND	9	12013
(b) (6)	(b) (6)	02/27/66	03/08/66	03/03/66	66-2433	03/08/66	5	500	Gross Alpha	0 042	2 250E-02	17.0	5 2/0 052
		02/10/66	03/06/66	02/22/66	66-1956	03/06/66	12	1100	Gross Alpha	0 076	7.520E-02	67.0	21/0.21
		03/14/66	03/19/86	03/16/66	66-2151	03/19/66	3	925	Gross Alpha	0 070	8 800E-02	15.0	4 6/0 046

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.3-9

	- 0	
	Cilia	
	Ancies	
	1 1150	
	20110	
	Uccinelle	

	_
	20
	~
	W
	<
	Ξ.
	/isec
	æ
	0
	_
	Dose
	0
	in
	ă.
	•12
	m
	<
	C)
	valuat
	~
	=
	=:
⋗	0
÷	=
April 200	on Repo
٥.	-
_	w
	O
13	77
9	×

											d = Additional sa lince >0.1 pGl/sa	mple for indiv not mple, NR, or ND	
AME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ESTIMATED ACUTE EXPOSURE DATE	SAMPLE#	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCil sample)	+l- (pCil semple)	INTAKE (1000s pCl)	50-YEAI CEDE (remiSv
(6)	(b) (6)	01/18/66	03/18/68	02/16/66	66-2260	03/18/66	30	700	Gross Alpha	0.097	1.092E-01	110.0	34/0 34
1 VII-2	V-10 X-2	02/23/66	03/19/66	03/07/66	66-2202	03/19/68	12	600	Gross Alpha	0.032	7 875E-03	28 0	8.6/0.08
ANDERS		02/11/66	03/18/66	02/28/66	66-2275	03/18/66	18	950	Gross Alpha	0.055	8.100E-02	55.0	17/0 1
		01/18/66	01/29/66	01/23/66	66-1143	01/29/66	6	590	Gross Alpha	0.033	2.360E-02	18.0	5 5/0.0
	2 8 8 2 3	02/21/66	03/19/66	03/06/68	66-2201	03/19/68	13	650	Gross Alpha	0 032	7.875E-03	29.0	B 9/0.0
	245 (N. 50)	02/08/66	02/28/66	02/18/66	66-1359	02/28/66	10	850 (12-hr)	Gross Alpha	0.072	1.803E-02	120.0	37/0 3
		01/24/66	02/22/66	02/07/66	66-1337	02/22/66	15	425	Gross Alpha	0.030	1.940E-02	29.0	8.9/0.0
<b>亚安岛沙</b> 尔		01/25/66	04/11/66	03/04/66	66-3413	06/07/66	95	980	Gross Alpha	0.075	4 590E-02	110.0	34/0 3
STATE OF THE PARTY.		•			66-258	01/21/66		1160	Gross Alpha	6.33	1.960E+00		
					66-406	02/02/66		4822	Gross Alpha	ND	ND		
					66-558	02/03/66		1440	Gross Alpha	2,66	1.840E+00		
(6)	11 1 10	i			68-564	02/04/66		1660	Gross Alpha	6.97	1.743E+00		
(6)	(b) (6)	02/13/66	03/19/66	03/02/66	66-2195	03/19/66	17	950	Gross Alpha	0.032	7.950E-03	31.0	9.5/0.0
	PLATES.	02/08/66	02/28/66	02/18/66	66-1360	02/28/66	10	900 (12-hr)	Gross Alpha	0.059	1 465E-02	96.0	29/0 2
		01/30/66	03/18/66	02/22/66	66-2106	03/18/66	24	900	Gross Alpha	0 055	5 650E-02	60.0	18/0
		03/14/66	03/19/66	03/16/66	66-2331	03/19/66	3	910	Gross Alpha	0.028	1.359E-01	60	1.8/0.0
55.6030		01/18/66	03/01/66	02/08/66	66-1515	03/01/86	21	1315	Pu239	0 073	1.356E-01	76 0	23/0
		•			66-347	02/04/68		900	Pu239	83.8	4.900E+00		
	(1) (0)				66-2233	03/18/66		900	Gross Alpha	0.2	6 540E-01		
(6)	(b) (6)	01/18/66	01/29/66	01/23/66	66-1081	01/29/66	6	670	Pu239	0.018	4.500E-03	9.5	2.9/0.0
		02/18/68	03/04/66	02/25/66	66-2340	03/04/66	7	860	Gross Alpha	0 036	7 258E-02	23.0	7.1/0.0
		01/18/66	01/20/68	01/19/66	66-1129	01/20/66	1	450	Gross Alpha	0.030	1.710E-02	2.6	0.8/0.0
		01/18/66	03/10/66	02/12/66	66-1954	03/10/66	26	1100	Gross Alpha	0.044	2.409E-02	50.0	15/0.
7 18 1-5		02/23/66	03/19/66	03/07/66	66-2191	03/19/66	12	600	Gross Alpha	0.081	2.025E-02	72 0	22/0.3
	1. 2. 5	02/27/66	03/08/66	03/03/66	66-2458	03/08/66	5	1000	Gross Alpha	0.028	1.680E-02	12.0	3 7/0.0
		01/18/66	03/08/66	02/11/66	66-2439	03/08/66	25	750	Gross Alpha	0.014	1 755E-02	15.0	4.6/0.0
		02/23/66	03/19/66	03/07/66	66-2081	03/19/66	12	960	Gross Alpha	0.096	7.640E-02	85.0	26/0.2
		02/10/66	03/19/66	02/28/66	66-2043	03/19/66	19	830	Gross Alpha	0 092	6.810E-02	93.0	29/0.2
		01/21/66	03/16/66	02/17/66	66-2027	03/16/66	27	630	Gross Alpha	0.067	6.310E-02	760	23/0.2
		02/21/66	03/18/66	03/05/66	66-2098	03/18/68	13	290	Gross Alpha	0 076	6.600E-02	69 0	21/0.2
	TERRITOR	02/27/88	03/18/66	03/08/66	66-2271	03/18/68	10	750	Gross Alpha	0 020	1.120E-01	16 0	4.9/0.0
		01/18/66	04/11/66	02/28/66	66-3203	04/25/66	56	1080	Gross Alpha	0.421	0.184	580 0	180/1
(0)	1000											mean =	92 45/0.9
(6)	(b) (6)	02/11/66	03/19/66	03/01/68	68-2231	03/19/66	18	750	Gross Alpha	0.029	6 315E-02	29.0	8.9/0.0
		01/18/66	02/03/66	01/26/66	66-1840	02/03/66	8	650	Gross Alpha	0.009	2 250E-03	6.4	2/0.0
ALC: NO.	1000年1日第	02/06/66	02/28/66	02/17/66	66-1313	02/28/66	11	800 (12-hr)	Gross Alpha	0.018	4.500E-03	28 0	8 6/0.04
Strong Line	Street Street	02/27/66	03/08/66	03/03/66	66-2463	03/08/66	5	975	Gross Alpha	0.044	1.640E-02	18.0	5 5/0 0

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.3-10

						•						imple for Indiv not imple, NR, or ND	
NAME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ESTIMATED ACUTE EXPOSURE DATE	SAMPLE #	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCil sample)	+l- (pCil sample)	INTAKE (1000s	50-YEAR CEDE (remISv)
(b) (6)	(b) (6)	01/18/66	01/29/66	01/23/66	66-1083	01/29/66	6	690	Pu239	0.062	1.550E-02	33.0	10/0.1
		02/18/66	03/08/86	02/27/66	66-2466	03/08/66	9	450	Gross Alpha	0.090	2 320E-02	69.0	21/0.21
		03/26/66	04/10/66	04/02/66	66-3206	04/21/66	19	875 (12-hr)	Gross Alpha	0.076	6 240E-02	150.0	46/0.46
		02/09/66	D2/28/66	02/18/66	68-1362	02/28/66	10	675 (12-hr)	Gross Alpha	0.041	1.013E-02	66.0	20/0.2
		02/11/66	03/19/66	03/01/66	66-2169	03/19/66	18	650	Gross Alpha	0.047	1.163E-02	47.0	14/0.14
	37000	01/22/66	03/13/66	02/16/66	66-2541	03/13/66	25	1400	Gross Alpha	0.059	1.463E-02	65.0	20/0.2
		02/17/66	03/08/66	02/28/66	68-1890	03/08/66	10	890	Gross Alpha	0.087	3.460E-02	71.0	22/0.22
		01/18/66	01/29/66	01/23/66	66-1076	01/29/66	6	510	Pu239	0.079	1.975E-02	42.0	13/0.13
		02/25/66	03/19/66	03/08/66	68-2203	03/19/66	11	950	Gross Alpha	0.032	7.875E-03	27.0	8 3/0.083
		02/21/66	03/18/66	03/05/66	66-2255	03/18/66	13	720	Gross Alpha	0.081	1.022E-01	73.0	22/0.22
		01/18/66	03/19/66	02/17/66	66-2042	03/19/66	30	300	Gross Alpha	0.076	7.120E-02	89 0	27/0.27
		02/13/66	03/16/66	02/28/66	66-2029	03/16/66	16	620	Gross Alpha	0.095	8.590E-02	92.0	28/0.28
		02/09/66	03/04/66	02/20/66	66-2382	03/04/66	12	600	Gross Alpha	0.062	8.760E-02	55.0	17/0.17
		01/18/66	01/21/66	01/19/66	66-1127	01/21/66	2	590	Gross Alpha	0.064	2.270E-02	8.7	2 7/0.027
		02/05/66	03/08/66	02/20/66	66-1888	03/08/66	16	810	Gross Alpha	0.037	2.010E-02	35.0	11/0.11
		02/24/66	03/08/66	03/02/66	66-1884	03/08/66	6	600	Gross Alpha	0.018	2.010E-02	9.4	2 9/0.029
		03/14/66	03/19/66	03/16/66	66-2138	03/19/66	3	550	Gross Alpha	0.066	8.040E-02	14 0	4 3/0.043
	1817	02/10/66	03/08/66	02/23/66	66-2435	03/08/66	13	400	Gross Alpha	0.024	1.390E-02	22.0	6 8/0.068
	100 Sept.	02/10/66	03/08/66	02/23/66	66-2432	03/08/66	13	1000	Gross Alpha	0.013	2.170E-02	11.0	3 4/0.034
		02/10/66	03/19/66	02/28/66	68-2185	03/19/66	19	400	Gross Alpha	0.059	1.463E-02	59.0	18/0.18
		02/13/66	03/18/66	03/01/66	66-2250	03/18/66	17	830	Gross Alpha	0 005	9 047E-02	5.0	1.5/0.015
		02/06/66	02/28/66	02/17/66	66-1374	02/28/66	11	930 (12-hr)	Gross Alpha	0.072	1 803E-02	120.0	37/0.37
	<b>发展的</b> 自己从	02/27/66	03/19/66	03/09/66	66-2321	03/19/66	10	550	Gross Alpha	0.010	5.176E-02	8.6	2.6/0.026
	A STATE OF	01/18/66	02/03/66	01/26/66	68-1824	02/03/66	8	760	Gross Alpha	0.018	4 500E-03	13.0	4/0.04
		01/24/66	03/04/66	02/12/66	68-2374	03/04/86	20	1300	Gross Alpha	0.026	7 150E-02	27.0	8 3/0 083
		01/18/66	02/03/66	01/26/66	66-1818	02/03/66	8	930	Gross Alpha	0.041	1.013E-02	29 0	8.9/0.089
	AT ME	01/18/86	02/03/66	01/26/66	66-1828	02/03/66	8	300	Gross Alpha	0 099	2.478E-02	70.0	22/0.22
	MARKET SEL				66-2400	03/09/66		350	Gross Alpha	0.343	1.850E-01	70.0	220.22
0) (6)	(b) (6)	01/18/66	03/13/66	02/14/66	66-2540	03/13/66	27	400	Gross Alpha	0.050	1 238E-02	56.0	17/0.17
7 1 - 7		01/31/66	03/18/66	02/23/66	66-2272	03/18/66	23	300	Gross Alpha	0.083	1.029E-01	90 0	28/0.28
		02/10/66	03/08/66	02/23/66	66-2441	03/08/66	13	950	Gross Alpha	0.003	1.642E-02	38	1.2/0.012
		02/13/66	03/19/66	03/02/66	66-2222	03/19/66	17	900	Gross Alpha	0.066	8.046E-02	65.0	20/0.2
	Sales Sales	02/13/66	03/19/66	03/02/66	66-2197	03/19/66	17	600	Gross Alpha	0.030	7.500E-02	30.0	9 2/0.092
	<b>100 100 100</b>	02/24/66	03/19/66	03/07/66	66-2171	03/19/66	12	750	Gross Alpha	0.081	2.025E-02	72.0	22/0.22
	September 1	02/03/66	02/25/66	02/14/66	66-1339	02/25/68	11	490	Gross Alpha	0.062	2.025E-02	53.0	16/0.16
100		02/18/66	03/09/66	02/27/66	68-2054	03/09/66	10	1480	Gross Alpha	0.075	7.120E-02	61.0	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	AT A COM	02/08/66	03/08/66	02/22/66	68-1881	03/08/66	14	900	Gross Alpha	0.075	2.190E-02	33.0	19/0.19

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.3-11

NR - Not Reported; ND - No Detectable Activity; n/a - not available

Palomares
Muclear
Suodean
ACCIDENT

NAME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ESTIMATED AGUTE EXPOSURE DATE	SAMPLE#	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	modeled since >0.1 pCl/sample, NR, or ND			
										RESULT (pCII sample)	+/- (pCil semple)	INTAKE (1000s pCl)	50-YEAR CEDE (remISv)
(b) (6)	(b) (6)	02/13/66	03/08/68	02/24/66	66-2468	03/08/66	12	350	Gross Alpha	0.020	1.580E-02	18 0	5.5/0.055
		01/20/66	03/20/66	02/18/66	66-2298	03/20/66	30	870	Gross Alpha	0 075	1.157E-01	88 0	27/0 27
		02/11/66	03/08/66	02/23/66	66-2428	03/08/66	13	1000	Gross Alpha	0.029	1 920E-02	27.0	8 3/0.083
		02/21/66	03/19/86	03/06/66	66-2145	03/19/66	13	470	Gross Alpha	0.081	1.020E-01	74.0	23/0.23
		02/08/66	03/19/66	02/27/66	66-2199	03/19/66	20	400	Gross Alpha	0 045	1.125E-02	48 0	14/0.14
		01/18/66	02/03/66	01/26/66	66-1842	02/03/66	8	280	Gross Alpha	0.018	4.500E-03	13.0	40/0.4
		02/09/66	03/09/66	02/23/66	66-2405	03/09/66	14	1500	Gross Alpha	0.025	1.640E-02	23.0	7.1/0.071
		03/11/66	03/19/66	03/15/66	66-2190	03/19/66	4	700	Gross Alpha	0.050	1 238E-02	15.0	4.6/0.046
		01/18/66	01/29/66	01/23/66	66-1205	01/29/66	6	1440	Gross Alpha	0.055	2.230E-01	29.0	8 9/0.089
	987.944	02/09/66	03/08/66	02/22/66	66-1902	03/08/66	14	850	Gross Alpha	0 093	7.460E-02	87.0	27/0.27
		03/11/66	03/19/66	03/15/66	66-2550	03/19/68	4	320	Gross Alpha	0.079	8 700E-02	24.0	7.4/0.074
	1.20	01/18/66	01/22/66	01/20/66	66-1137	01/22/66	2	925	Gross Alpha	0 079	2 890E-02	11.0	3.4/0.034
												mean =	5.4/0.054
b) (6) (b)	(b) (6)	01/18/66	03/08/66	02/11/86	66-2444	03/08/66	25	1500	Gross Alpha	0 050	2 150E-02	55 0	17/0.17
		02/25/66	03/23/66	03/10/66	66-2591	03/23/86	13	1000	Gross Alpha	0 055	1.150E-01	50 0	15/0.15
		01/18/66	03/09/66	02/12/66	66-2404	03/09/66	25	900	Gross Alpha	0.009	2 253E-03	10.0	3.1/0.031
		01/17/66	02/03/66	01/25/66	68-1827	02/03/66	9	400	Gross Alpha	0.050	1 238E-02	38.0	12/0.12
		01/18/68	03/12/86	02/13/66	66-2039	03/12/66	27	1240	Gross Alpha	0.060	5 620E-02	6.8	21/0.21
		03/14/66	03/19/66	03/16/66	66-2316	03/19/66	3	760	Gross Alpha	0 090	9 500E-02	19.0	5.8/0.058
		01/18/66	03/28/66	02/21/66	68-2676	03/28/66	35	1450	Gross Alpha	0.040	7 210E-02	49.0	15/0.15
	16.755.50	01/25/68	02/21/66	02/07/66	66-1242	02/26/66	19	2000	Gross Alpha	0.032	2 530E-02	33.0	10/0.1
					66-1105	01/24/66		1010	Gross Alpha	ND	ND		
(6) (b) (c	(b) (6)	01/18/66	03/17/66	02/16/66	66-2644	03/17/66	29	750	Gross Alpha	0 049	8.100E-02	57.0	18/0.18
					66-805	02/09/66		530	Gross Alpha	NR	NR		
					66-2643	03/16/66		550	Gross Alpha	0.14	1.130E-01		
(6)	(b) (6)	02/06/66	02/08/66	02/07/66	66-1376	02/08/66	1	920	Gross Alpha	0 099	2 475E-02	8.4	2 6/0 026
		02/27/66	03/08/66	03/03/66	66-2494	03/08/66	5	1000	Gross Alpha	0 027	6 750E-03	11.0	3 4/0 034
	12.4	03/14/66	03/19/66	03/16/86	66-2184	03/19/66	3	960	Gross Alpha	0.081	2 025E-02	17.0	5 2/0 052
		02/27/66	03/08/66	03/03/66	66-2440	03/08/86	5	600	Gross Alpha	0 028	1.660E-02	11.0	3 4/0 034
		02/06/66	02/28/66	02/17/86	68-1367	02/28/66	11	675 (12-hr)	Gross Alpha	0 059	1 465E-02	100 0	31/0.31
		03/14/66	03/19/66	03/16/66	66-2075	03/19/66	3	940	Gross Alpha	0 091	1.020E-01	19 0	5 8/0 058
		02/10/66	03/08/66	02/23/66	68-2427	03/08/66	13	1000	Gross Alpha	0 042	2 610E-02	38.0	12/0.12
		02/11/66	03/16/66	02/27/66	66-2585	03/16/66	17	1000	Gross Alpha	0 052	8 050E-02	52 0	16/0.16
	(II-) (C)	- V R			66-1920	03/03/86		900	Gross Alpha	0 168	8 400E-02		
) (6)	(b) (6)	02/13/86	03/19/66	03/02/66	66-2587	03/19/66	17	850	Gross Alpha	0 040	7.210E-02	39 0	12/0.12
		01/18/86	03/09/66	02/12/66	66-2065	03/09/66	25	550	Gross Alpha	0.073	8.400E-02	80.0	25/0 25
		01/18/66	01/29/66	01/23/66	66-1075	01/29/66	6	1335	Pu239	0 062	1.550E-02	33 0	10/0.1

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.3-12

NR - Not Reported; ND - No Detectable Activity; n/a - not available

DRAFT

Palomares Nuclear Weapons Accident

NAME	SSN	START EXPOSURE DATE	END EXPOSURE DATE	ESTIMATED ACUTE EXPOSURE DATE	SAMPLE#	SAMPLE DATE	ELAPSED DAYS	SAMPLE VOLUME (mL)	ANALYSIS	RESULT (pCil sample)	+l- (pCll sample)	INTAKE (1000s pCl)	50-YEAR CEDE (remiSv)
(b) (6)	(b) (6)	01/19/66	02/03/66	01/26/66	66-2683	03/27/66	60	1720	Gross Alpha	0.069	8 800E-02	97.0	30/0 3
		01/18/66	02/03/66	01/28/66	66-1819	02/03/66	В	410	Gross Alpha	0.032	7.875E-03	22 0	6 8/0.068
10 81 8145		02/09/66	03/08/66	02/22/66	66-1885	03/08/66	14	1300	Gross Alpha	0.054	1.980E-02	50.0	15/0.15
		01/18/66	01/26/66	01/22/68	68-1120	01/26/66	4	410	Gross Alpha	0.042	1.900E-02	13.0	4/0.04
		01/18/66	01/29/66	01/23/86	66-1084	01/29/66	6	650	Pu239	0.082	1.550E-02	33 0	10/0 1
The Stant		01/18/66	02/28/68	02/07/66	66-1371	02/28/66	21	915 (12-hr)	Gross Alpha	0.072	1.803E-02	150 0	48/0.46
		01/20/86	02/15/66	02/02/66	66-1232	02/18/66	16	790	Gross Alpha	0 032	1.280E-01	31.0	9.5/0.095
		02/10/86	03/08/66	02/23/66	86-1886	03/08/66	13	1250	Gross Alpha	0 017	3 150E-02	150	4.6/0.046
		02/21/66	03/19/66	03/06/66	66-2192	03/19/66	13	900	Gross Alpha	0.018	4 500E-03	16 0	4 9/0 049
<b>建设建筑</b>		01/18/66	03/18/66	02/16/66	66-2238	03/18/66	30	500	Gross Alpha	0.048	9 000E-02	56 0	17/0.17
	是是更多的	02/10/66	03/08/66	02/23/66	66-2459	03/08/66	13	650	Gross Alpha	0.028	2 310E-02	26 0	8/0.08
		02/27/66	03/08/66	03/03/66	68-2507	03/08/66	5	400	Gross Alpha	0.050	1 238E-02	21 0	6 5/0 065
	347	02/09/66	02/16/66	02/12/66	66-1235	02/19/66	7	1400	Gross Alpha	0.038	2 210E-02	24.0	7.4/0.074
		01/18/66	01/29/66	01/23/66	66-1068	01/29/66	6	1000	Pu239	0.035	8 750E-03	190	5 8/0 058

## APPENDIX C.4

## **REMAINING CASES**

Portions of this report have been designated records subject to the restriction of the Privacy Act, 5 U.S.C. 552(a) and are so marked.

#### APPENDIX C.4 REMAINING CASES

Most of those who responded to the Palomares Broken Arrow submitted one urine sample that was collected during their time on site at Camp Wilson, or nearby. Furthermore, these generally were collected with containers designed for other purposes and under conditions that provided only limited protection against contamination with plutonium in blowing dust. Also, analysis of most of the samples by the gross alpha counting method served primarily as a screening for further study. Since most of the responders were not identified for follow-up, their initial samples were their only sample.

A small number of those in this group initially qualified for assessment in the "Contamination Cutoff" Cases. However, the chemical recovery for the samples processed for alpha spectrometry did not meet the criterion established for this study. Therefore, the data for these individuals are reported in this Remaining Cases category.

Intake and dose assessments were not performed for the cases in this category because the data were considered unreliable. Possible sample contamination, laboratory contamination, and uncertain recording of collection information limit the usefulness of these data for assessing intake and dose. The urine results ranged from 0 to 237.9 pCi per sample. The latter sample, collected three days after the first airmen arrived at the accident site, represents a prime example of possible contamination. That sample was the only sample available for the individual concerned. Personal discussions with one of the first responders indicated that the initial samples were collected using wine, milk, and any other type of bottle available in the village. (Skaar 1999).

The following pages provide a listing of the results for the Remaining Cases. If evaluated, the results documented would produce intakes ranging from about 75,000 pCi to 20,000,000 pCi

corresponding to CEDEs of about 23 rem to 6,000 rem (0.23 to 60 Sv). Results of this magnitude require careful evaluation. The listings contain the basic sample identifying, collection and result information. Hardcopy laboratory records support each of the entries and are maintained by the Air Force.

Palomares Nuclear Weapons Accident

	Revised
	Dose
	Evalu
>	atior
1100	Rep
5	0

	Estimated		Estimated									
	Start Exposure	Estimated End	Acute Exposure			Sample Vol		Sample		Result	24hr Activity	Recorded Systemic
Name SSN	Date	Exposure Date	Date		Sample Date	(mL)	Base	Anal	Date Anal	(pCl/sample)	(pCl/day)	Body Burden
(b) (6)	01/18/66 02/12/66	03/08/66 02/12/66	02/11/66 02/12/66	66-2475 66-2867	03/08/66 04/11/68	1000 1800	Torrejon Torrejon	1000	N/A N/A	0.131 1.10+/-0.27	0.157 1.1	n/a
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	021200	021200	021200	66-2867	04/11/66	1800 (22-hr)	Tonejon	1000	08/30/66	NR	NR	
(b) (6)	01/24/66	02/26/86	02/09/66	68-1428	02/26/68	600	Moron	624	N/A	ND	ND	0
(6) (6)	03/12/66	03/19/66	03/15/66	66-2146	03/19/66	850	Torrejon	850	N/A	0.179+/-0.118	0.253	0.000335
	02/09/66	03/23/86	03/02/68	66-2866	04/06/66	1100	Torrejon	1100	N/A	1.04+/-0.26	1.135	n/a
(b) (c)			03/02/66	66-2866	04/06/66	1100			07/21/66	1.21+/-0.030	1.320	
(b) (b) (6)	01/17/86	02/26/66	02/08/65	66-1403	02/26/68	660	Torrejon	685	N/A	ND	ND	0
	02/20/66	03/09/66	02/28/66	66-2885 66-2885	04/02/66	1500 1500	Torrejon	1500	N/A 08/16/66	0.137+/-0.107 NR	0.137 NR	r/a
(b) (6) (b) (6)	01/18/66	01/25/66	01/21/66	66-1097	01/25/88	850	Wiesbaden	850	03/17/66	ND	ND	0
(b) (d)	03/14/86	03/19/66	03/16/66	66-2912	03/19/88	550	Torrejon	550	N/A	0.189+/-0.124	0.412	0.000274
	01/18/66	01/21/66	01/19/66	66-213	01/21/66	430	Torrejon	200	N/A	NR	NR	n/a
	01/18/66	01/21/66	01/19/66	66-231	01/21/66	475	Torrejon	200	N/A	0.225 +/- 0.111	0.588	n/a
	01/18/68	01/21/66	01/19/66	66-233	01/21/66	475	Torrejon	200	N/A	0.225 +/- 0.111	0.568	n/a
	01/28/66	02/26/66	02/11/66	66-1402	02/28/86	1000	Torrejon	1000	N/A	1.04+/-1.68	1.248	0
	01/18/68	02/07/66	01/28/66	66-496	02/07/66	600	Moron	200	N/A	3.89+/-1.05	7.780	0.0252
经工具的 经现代 经	03/12/66 02/13/68	03/19/66	03/15/66 02/24/68	66-2073 65-2498	03/19/66	490	Torrejon	490 950	N/A	0.141+/-0.083 ND	0.345	0
	02/06/66	03/08/68 02/28/68	02/24/68	66-1379	03/08/66	950 500	Maran Tarrejon	520	N/A N/A	ND	ND ND	0
	J2/V0/00	02/28/00	02/1/100	66-1379	02/28/68	500	Turrejon	520	08/29/6B	NR	NR NR	U
(b) (6)	03/14/66	03/20/66	03/17/66	66-2294	03/20/66	950	Moron	950	N/A	0.162+/-0.136	0.205	0.00027
(b) (d)	01/25/66	02/09/66	02/01/66	68-732	02/09/66	860	Hanaw, Germany	200	N/A	2.62+/-1.07	3.656	0.0125
	01/25/66	02/09/66	02/01/66	66-813	02/09/66	680 (12-hr)	Hanaw, Germany	200	N/A	1.48+/-0.60	1,480	0.00927
	01/25/66	02/09/86	02/01/66	66-739	02/09/86	940	Hanaw, Germany	200	N/A	1.37+/-0.74	1.749	0.00596
	01/24/66	03/08/66	02/14/66	66-1872	03/08/66	940	Naval Station Rota, Spain	978	N/A	0.344	0.439	0.002
(b) (6)	01/18/66 01/18/66	02/04/66 03/16/66	01/26/68 02/15/66	66-2024	02/04/66 03/16/66	550 300	Moron American Embassy, Madrid	200 300	N/A N/A	1.36+/-0.59 0.103 +/-0.077	2.967 0.412	0.00681
(b) (6) (b) (6)	01/18/66	02/08/66	01/28/66	66-834	02/08/66	740 (12-hr)	Moron	200	N/A	1.47+/-0.81	1.470	0.00773
(5) (5)	01/18/66	01/21/66	01/19/66	66-266	01/21/66	900	Torrejon	200	N/A	0.612 +/- 0.211	0.816	n/a
	01/18/66	02/08/66	01/28/66	66-551	02/08/66	1040	Offutt AFB, NE	200	N/A	3.11+/-0.99	3.588	0.0101
	01/20/66	02/06/66	01/28/66	66-915	02/06/66	610	Torrejon	200	N/A	ND	ND	0
(b) (6)	01/18/66	01/30/66	01/24/66	66-1146	01/30/66	700	656 Eng. Bn., APO09081	700	N/A	ND	ND	0
(D) (O)	01/17/66	01/17/66	01/17/66	66-1350 66-209	01/17/66	610 300	Moron	634 86	N/A	0.271+/-0.157	0.533	0.000662
	01/18/66	01/21/66	01/19/68	66-212	01/21/66	460	Torrejon Torrejon	200	N/A N/A	3.51 +/- 0.96 NR	14.040 NR	n/a n/a
	02/04/66	02/25/68	02/14/66	66-1483	03/04/66	1200	USS Amphion AR-	1000	N/A	0.1884 +/- 0.6132		0
(b) (6)	01/20/66	02/07/66	01/29/66	66-481	02/07/66	850	Toul Rosieres	200	N/A	ND	ND	0
V) (G)	02/18/66	03/04/68	02/25/66	66-2339	03/04/66	400	Moron	400	N/A	ND	ND	0
<b>大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大</b>	02/06/66	02/27/66	02/16/66	68-1387	02/28/66	440	Torrejon	457	N/A	1.3	3,545	0.005
	02/25/66	03/18/66	03/07/66	66-2214	03/18/68	900	Moron	900	N/A	0.105+/-0.102	0.140	0.000448
	01/18/66	01/21/66	01/19/66	66-237	01/21/66	425	Torrejon	200	N/A	NR	NR	n/a
(15) (6)	02/03/66	03/14/66	02/22/86	66-240 66-3113	01/21/66	425 1525	Torrejon	200	N/A	NR 0.400110.4F3	NR	n/a
(b) (6)	02/10/66	03/19/66	02/28/66	66-2157	03/19/66	910	Moron Torrejon	762 190	N/A N/A	0.429+/-0.153 0.129+/-0.114	0.429	n/a 0.00084
Company of the last of the las	01/18/66	02/13/66	01/31/66	66-1443	02/15/66	570	Moran	570	03/17/68	0.25+/-0.22	0.170	0.00084
100 CO 10	02/25/66	03/29/66	03/13/66	66-2284	03/29/66	875	Moran	875	N/A	0.119+/-0.115	0.163	0.00097
	01/18/66	03/13/66	02/14/66	66-2537	03/13/66	800	Moron	800	N/A	0.342	0.513	
	02/11/66	03/19/68	03/01/66	66-2217	03/19/66	950	Moron	950	N/A	0.260+/-0.152	0 328	0.00212
	02/13/66	03/18/66	03/01/88	66-2268	03/18/66	500	Torrejon	500	N/A	0.100+/-0.95	0.240	0.0006
No. 1, 10 Park 19	01/18/65	03/09/68	02/12/66	66-2079	03/09/66	850	Torrejon	850	N/A	0.474+/-0.146	0.669	0.00545
	01/25/66	04/11/66	03/04/66	66-3112	04/13/66	1310	Moron	655	05/17/66	0.348+/-0.130	0.348	0.00405
	01/18/66	02/07/66	01/28/66	66-451 66-471	02/07/66	580 550	Torrejon Torrejon	200 200	N/A N/A	0.69+/-0.48 1.02+/-0.58	1,428 2,225	0.00436
	02/20/66	02/20/66	02/20/66	66-2689	03/27/66	900	Torrejon	900	N/A	0.150+/-0.107	0.200	0.00721
	02/08/66	02/26/68	02/17/66	66-1407	02/26/66	760	Moron	790	N/A	ND	ND	

	8	Estimated		Estimated									
		Start Exposure	Estimated End	Acute Exposure		No. or or or or	Sample Vol	- 0152	Sample		Result	24hr Activity	Recorded Systemic
10	SSN	Date	Exposure Date	Date	Sample No. 66-1407	Sample Date 02/26/66	(mL) 760	Base	Anal	Date Anal 07/29/66	(pCl/sample)	(pCl/day)	Body Burden
(6)	(b) (6)	01/18/66	03/04/68	02/09/88	66-2359	03/04/86	950	Albuquerque, NM	950	N/A	NR 0.188+/-0.174	NR 0.237	0.00059
	1-11-1	01/20/66	02/08/66	01/29/66	66-836	02/08/66	905	Toul Rosleres	200	N/A	ND	ND	0,0000
	34 14 15	01/30/86	03/01/66	02/14/68	66-1846	03/01/66	1600	Glessen	1600	N/A	0.417+/-0.170	0.417	
(42)					66-1846	03/01/66	1600			07/05/66	0.187+/-0.098	0.187	
(6)	(b) (6)	01/18/86	02/08/66	01/28/66	66-810	02/08/66	880 (12-hr)	Moron	200	N/A	NR	NR	
T Care Hally		03/03/88	03/18/66	03/10/66	66-2101	03/18/66	590	Torrejon	590	N/A	0.351+/-0.128	0.714	0.00186
		02/13/66	03/03/66	02/22/66	66-1919	03/03/66	600	Moron	600	N/A	0.382+/-0.142	0.724	
		01/18/66	03/03/66	02/09/66	66-1940	03/03/66	1500	Torrejon	1580	N/A	0.252+/-0.112	0.252	
	RECEIPTED.	01/18/66	02/16/66	02/01/66	66-962	02/16/86	650 1000	Torrejon	200	N/A	ND	ND	0.00440
	\$1000 HO	01/23/86	03/17/68	02/18/68	68-1104	02/21/66		Pirmasens	1000	03/11/66	0.22+/-0.21	0.264	0.00148
6)	(b) (c)	01/18/66	02/07/68	01/28/66	66-2647 66-478	03/17/66 02/07/66	2000 560	229 Signal BN	2000	N/A N/A	0.144+/-0.135 ND	0.144 ND	
0)	(b) (6)	01/18/66	02/09/66	01/29/66	66-754	02/09/66	540	Torrejon Moron	200	N/A	2,17+/-0.85	4.822	0.0172
	A SHOP AND A SHOP IN	02/07/86	04/11/66	03/10/66	66-2997	04/27/66	850	Scott	850	N/A	0.802+/-0.232	1.132	0.0172
The second second	STATE OF	01/18/86	02/03/66	01/26/66	66-1829	02/03/66	900	Torrelon	900	N/A	0.149	0.199	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		01/17/86	01/17/68	01/17/66	66-452	01/17/86	430	Torrejon	200	02/11/66	0.89+/-0.45	2.484	0.00763
		01/18/66	03/01/68	02/08/68	68-1477	03/01/86	1880	Offull AFB, NE	1000	N/A	0.207+/-0.168	0.207	0.00141
		01/18/86	04/04/66	02/25/68	68-2892	04/04/66	1050	Vandenburg	1050	N/A	ND	ND	
		01/18/86	01/23/66	01/20/66	65-1103	01/23/66	1340	Pirmasens	1340	03/17/66	ND	ND	
		01/18/86	02/15/66	02/01/66	66-1155	02/15/66	280	Wheelus AF, Libya	280	03/17/66	0.30+/-0.14	1.286	0.00597
		03/14/66	03/19/66	03/16/68	66-2338	03/19/66	610	Moron	610	N/A	0.233+/-0.161	0.458	0.00034
		01/22/66	02/10/68	01/31/66	66-948	02/10/66	905	Torrejon	200	N/A	0.95+/-0.92	1.260	0.00478
	Should be to be	01/18/66	01/20/68	01/19/86	66-1116	01/20/66	810	Toul Rosleres	810	03/23/66	NR	NR	
		03/14/86	03/19/86	03/16/68	66-2320	03/19/66	900	Moron	900	N/A	0.292+/-0.156	0.389	0.00042
T-17 T-27	A COLUMN TO THE REAL PROPERTY.	01/18/86	03/13/68	02/14/68	66-2534	03/13/66	1000	Moron	1000	N/A	0	0.000	
		02/27/66	03/19/86	03/09/68	66-2327	03/19/66	700	Torrejon	700	N/A	0.349+/-0.204	0.598	0.00143
		02/21/66	03/18/86	03/05/66	66-2212	03/18/66	820	Zaragoza	820	N/A	0.472+/-0.196	0.691	0.00328
		02/18/86	03/04/68	02/25/68	66-2363	03/04/66	900	Moron	900	N/A	0	0.000	
		02/25/88	03/20/68	03/08/66	66-2290	03/20/88	950	Torrejon	950	N/A	0.482+/-0.213	0.609	0.0022
		02/25/66	03/19/66	03/08/66	86-2223	03/19/66	750	Moron	750	N/A	0.508+/-0.202	0.813	0.00283
		02/11/66 01/18/86	03/01/86	02/20/66	66-2384	03/10/66	1775	Torrejon	1775	N/A	0.325+/-0.182	0.325	0.00167
		01/18/86	02/05/86	01/27/66 01/30/66	66-893 66-878	02/05/66	900 1200	Moron	200	N/A N/A	4.13+/-1.29 NR	5.507	0.0159
	STATE OF THE PARTY	02/11/66	03/04/86	02/21/66	66-2368	03/04/66	1300	Torrejon Moron	1300	N/A	ND	NR ND	
		02/01/66	04/11/66	03/07/88	66-2542	04/13/86	800	Glessen	800	N/A	0.266	0.399	
A STATE OF THE STATE OF	SU-52100 DE	01/18/66	01/28/68	01/23/66	68-2008	03/10/88	500	Norton	500	N/A	0.165+/-0.088	0.396	
THE RESERVE AND ADDRESS OF THE PARTY OF THE	STATE 12	02/10/68	03/19/88	02/28/66	68-2218	03/19/86	580	Torrejon	580	N/A	0.147+/-0.135	0.304	0.00129
	SECTION AND IN	01/18/66	02/11/66	01/30/66	66-770	02/11/66	890	Топтејоп	200	N/A	ND	ND	3,00 123
CONTRACTOR OF THE		02/17/66	03/08/66	02/26/66	66-1887	03/08/66	n/a	Toul Rosleres	n/a	N/A	NR	NR	
2)					68-2161	03/08/88	925	<b>Toul Rosleres</b>	925	N/A	0.134+/-0.120	0.174	0.00053
6)	(b) (6)	01/29/66	02/19/66	02/08/66	68-1222	02/09/66	950	San Pablo	950	N/A	0.844+/-0.607	0.813	
(6)					66-1222	02/19/66	1000	San Pablo	1000	N/A	0.164+/-0.124	0.197	0.0007
(6)	(b) (6)	02/08/68	02/08/68	02/07/66	68-1398	02/28/66	980 (12-hr)	Torrejon	980	N/A	NR	NR	
MAN TATION IN		01/18/66	02/05/66	01/27/86	66-889	02/05/86	900	Maron	200	N/A	4.85+/-1.27	6.467	0.0188
	A CONTRACTOR	01/31/66	03/20/66	02/24/66	66-2304	03/20/66	750	Norfolk	750	N/A	0.108+/-0.102	0.173	0.00088
The state of the s	SE INTO A	01/17/68	02/10/66	01/29/66	66-1163	02/17/86	1730	Torrejon	1730	03/21/66	NR	NR	
\$45 CL	10 miles	01/18/66	02/18/66	02/02/66	66-971	02/18/66	440	Torrejon	440	N/A	ND	ND	
17 C 18 C 18 C 18 C	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	02/09/66	03/08/66	02/22/66	66-1900	03/08/66	700	Maron	700	N/A	0.216+/-0.092	0.370	5 100 303
THE STREET	219 3138	02/08/66	02/28/66	02/17/66	68-1389	02/28/66	660 (12-hr)	Torrejon	687	N/A	1.1	1.100	0.004
2)	(b) (C)	01/18/66	03/25/66	02/20/66	66-2590	03/25/66	1550	USAH Wurzburg, Germany	1550	N/A	0.859+/-0.252	0.859	0.00734
6)	(b) (6)	02/27/66	03/08/66	03/03/66	66-2448	03/08/66	1300	Moron	1300	N/A	0.19+/-0.033	0.190	
TO A TOP OF	No. 12 Charles	01/18/66	01/21/66	01/19/66	66-262	01/21/66	1150	Torrejon	200	N/A	36.5 +/- 3.7	38.087	
					66-408	02/02/66	232	Ramstein	200	N/A	0.48+/-0.24	2.483	0.0055
					66-556	02/03/68	930	Ramstein	200	N/A	3.49+/-1.10	4.503	80800.0
1	(b) (6)	02/27/66	00110100	on to ma	66-562	02/03/66	1300	Ramstein	200	N/A	5.11+/-1.65	5.110	0.0128
1	(2) (0)	02/27/66	03/19/66 03/18/68	03/09/66	66-2121 66-2211	03/19/68	470 810	Torrejon	470	N/A	0.144+/-0.107	0.388	0.000592
	AND DESCRIPTION OF THE PARTY OF	02/2//08	03/18/00	03/08/00	66-2679	03/18/00	810	Torrejon	810	N/A	0.401+/-0.197	0.594	0.00261

Name	SSN	Estimated Start Exposure Date	Estimated End Exposure Date	Estimated Acute Exposure Date	Sample No.	Sample Date	Sample Vol	Base	Sample Anal	Date Anal	Result (pCl/sample)	24hr Activity (pCl/day)	Recorded Systemic Body Burden
(b) (6)	(b) (6)	01/18/66	02/05/86	01/27/88	66-923	02/05/66	767	Moron	200	N/A	2.33+/-0.79	3.645	0.0105
	* * * * * * * * * * * * * * * * * * * *	01/18/66	02/26/66	02/06/66	66-1948	03/17/66	1550	Torrejon	1550	N/A	0.151+/-0.098	0.151	
	**。安抚在"····································	02/11/66	03/20/88	03/01/66	66-2293	03/20/68	800	Torrejon	800	N/A	0.251+/-0.143	0.377	0.00202
	TO THE PARTY.	02/18/66	03/04/66	02/25/66	66-2367	03/04/66	850	Moron	850	N/A	ND	ND	
		01/18/66 03/11/66	02/08/66	01/28/68 03/15/68	86-515	02/08/66	930	Torrejon	200	N/A	2.18+/-1.12	2.813	0.00858
		02/13/66	03/08/66	02/24/66	66-2150 68-2516	03/19/66	780 900	Moron	780	N/A	0.129+/-0.114	0.198	0.00027
SERVICE WAS INCH		03/09/66	03/19/66	03/14/66	66-2137	03/08/66	450	Torrejon Dreux	900 450	N/A N/A	0	0.000	
CONTRACTOR OF THE PARTY OF THE		01/18/66	01/23/66	01/20/66	66-1202	01/23/66	1240	Torrejon	1000	N/A	0.330+/-0.184 NR	0.880 NR	0.00081
		02/12/66	03/18/68	03/01/66	66-2102	03/18/66	880	Moron	880	N/A	0.126+/-0.087	0.172	0.00079
		01/22/66	02/16/65	02/03/66	66-949	02/16/66	980	Torrejon	200	N/A	1.51+/-1.07	1.849	0.00075
		01/18/66	03/03/68	02/09/66	66-1942	03/03/66	2125	Moron	2125	N/A	0.214+/-0.098	0.214	0.0000
ALC: NOT SEE	ADDITION OF STREET	01/17/86	02/12/68	01/30/86	66-775	02/12/88	650	Torrejon	200	N/A	3.56+/-0.98	6.572	0.0258
		01/18/66	02/05/66	01/27/86	66-2929	02/18/66	800	Torrejon	800	N/A	1.09+/-0.27	1.635	0.000
		01/18/86	02/08/66	01/28/66	66-829	02/08/66	400	Torrejon	200	N/A	ND	ND	
11 0 11 11		01/25/66	02/09/66	02/01/86	66-744	02/09/66	730	Hanaw, Germany	200	N/A	1.42+/-0.84	2.334	0.0079
A NAME OF THE PARTY OF THE PARTY.	F 17 4 4 5 7 1 1 1	02/10/86	03/08/66	02/23/68	66-2500	03/08/86	900	Torrejon	900	N/A	0	0.000	
THE RESERVE OF THE PERSON NAMED IN	The state of the s	02/19/86	03/19/66	03/05/66	66-2041	03/19/66	1240	Torrejon	1240	N/A	0.484+/-0.185	0.484	0.00122
		01/18/66	02/03/66	01/26/66	66-1830	02/03/66	300	Torrejon	300	N/A	0.131	0.524	0.00427
		01/18/86	02/09/66	01/29/66	66-755	02/09/66	690	Torrejon	200	N/A	7.31+/-1.31	12.713	0.0079
L \ (C)	71-1 (C)	03/14/66	03/19/66	03/16/66	66-2324	03/19/66	600	Torrejon	600	N/A	0.288+/-0.156	0.576	0.00042
b) (6)	(b) (6)	01/19/66	02/05/66	01/27/66	66-941	02/05/66	935	Torrejon	200	N/A	ND	ND	222
	AND CHARLES	01/21/66	02/09/66	02/01/66	66-934 66-798	02/05/66	750	Moron	200	N/A	2.18+/-0.82	3.488	0.01
	San Carlotte	02/18/66	03/04/66	02/25/65	66-2355	02/09/68 03/04/66	680 900	Hanaw, Germany Moron	200 900	N/A N/A	ND 0.118+/-0.108	ND	
	Company of the Company	01/26/66	03/13/68	02/18/68	66-2538	03/13/66	1000	Torrelon	1000	N/A	0.118+/-0.108	0.157	0.00037
		01/18/65	02/08/86	01/28/66	66-1343	02/08/68	810	Torrejon	842	N/A	0.581+/-0.162	0.861	0.00567
		01/18/66	01/18/66	01/18/66	66-1203	01/18/66	820	Torrejon	853	N/A	0.56147-0.102	1.332	0.005
		01/17/66	03/11/66	02/12/66	66-1167	02/16/66	960	Torrejon	1000	N/A	NR	NR	0.003
1 \ (6)					56-1944	03/18/66	950	Torrejon	950	N/A	0.745+/-0.094	0.183	
b) (6)	(b) (6)	02/10/68	03/01/66	02/19/68	66-1848	03/01/66	900	Torrejon	900	N/A	NO	ND	
	(in) (in)	- Ingression			66-1848	03/01/66	900			07/11/66	0.392+/-0.152	0.523	
b) (6)	(b) (6)	01/25/66	02/09/66	02/01/66	86-741	02/09/66	895	Hanaw, Germany	200	N/A	3.01+/-1.34	4.036	0.00137
b) (6)	(I-) (C)	03/04/66	04/11/86	03/23/66	66-2993	04/23/66	1100	Furth , Ger. US Army, 20th Sta Hosp.	1100	N/A	ND	ND	
b) (6)	(b) (6)	01/17/66	02/18/86	02/02/66	66-950	02/18/66	3140	Torrejon	200	N/A	4.99+/-3.67	4.990	
A 32 TO 18 TO 18	THE RESERVE OF THE PARTY.	01/18/66	01/23/66	01/20/66	66-1102	01/23/66	1530	Pirmasens	1530	03/17/86	ND	ND	
		01/18/66	02/07/66	01/28/66	66-483	02/07/68	595	Torrejon	200	N/A	0.81+/-0.66	1.634	0.0053
		01/18/66	03/09/66	02/12/66	66-2393	03/09/66	650	Torrejon	650	N/A	0.227+/-0.133	0.419	0.00183
THE RESERVE		01/18/66	01/24/86	01/21/66	68-1158	01/24/66	1440	Toul Rosieres	1000	N/A	0	0.000	
10000000000000000000000000000000000000	Section 1	01/18/66	01/24/66	01/21/86	66-1108	01/24/66	720	Wiesbaden	720	N/A	ND	ND	
	100	01/18/66	02/05/66	01/27/66 02/01/86	66-928	02/05/66	600	Torrejon	200	N/A	1.01+/-0.68	2.020	0.00581
Marie Control	The state of	01/18/66	01/22/86	01/20/66	66-774 66-1099	02/11/66 01/22/66	815	Torrejon	200	N/A	28.7+/-2.93	42.258	0.00734
	A CONTRACTOR OF THE PARTY OF TH	02/27/68	03/19/86	03/09/86	66-2561	03/19/86	1470 700	Pirmasens Torrejon	1470 700	03/17/86	ND .	ND	
The state of the s	The second secon	02/08/86	03/09/66	02/21/66	66-2056	03/09/66	1600	Torrejon	1600	N/A N/A	0.476+/-0.192	0.816	ar commen
		01/25/66	03/08/85	02/15/66	66-2505	03/08/86	200	Charleston	200	N/A	0.161+/-0.102	0.161	0.00092
SERVICE AND THE	Language State	02/06/66	02/08/66	02/07/66	66-1392	02/28/86	420 (12-hr)	Torrejon	437	N/A	1.3	1.300	0.005
	E / 200	01/18/66	02/03/68	01/26/66	66-1814	02/03/66	880	Torrejon	880	N/A	ND	ND	0.005
		02/10/66	03/04/66	02/21/66	66-2352	03/04/66	900	Torrajon	900	N/A	ND	ND	
A CONTRACTOR OF THE PARTY OF TH	8-3-10 Oct.	01/17/88	03/23/66	02/18/68	66-2672	03/23/66	1200	Torrejon	1200	N/A	0.196+/-0.118	0.198	
	12 (88)	02/11/68	03/19/66	03/01/66	66-2045	03/19/66	900	Толејол	900	N/A	0.168+/-0.086	0.224	0.00101
THE WATER	100 100 RA	01/18/66	01/18/66	01/18/66	66-1646	03/01/68	1050	Tomejon	1050	N/A	0.192+/-0.121	0.221	0.00,01
					88-1646	03/01/66	1050			07/05/66	0.204+/-0.076	0.233	
The same of the sa	(b) (6)	01/18/66	02/05/66	01/27/86	66-938	02/05/66	540	Torrejon	200	N/A	ND	ND	
S CH CHILD	V 4 V 1	03/26/88	04/11/66	04/03/66	66-3108	04/13/66	900	Moron	900	N/A	0.151+/-0.057	0.201	
		01/18/66	02/12/68	01/30/66	66-879	02/12/66	1800	Torrejon	200	N/A	ND	ND	
	And the second second	01/28/66	02/06/66	02/01/66	66-510	02/08/66	815	Torrejon	200	N/A	3.31+/-1.23	4.874	0.0149
	The state of the s	02/23/66	03/03/66	02/27/66	66-1921	03/03/66	900	Torrelon	900	N/A	0.263+/-0.110	0.351	

		Indivi	duals with Urin	e Samples	Classified a	s Remainin	g Cases							Palo
		Estimated Start		Estimated Acute									Recorded	Palomares
Name	SSN	Exposure Date	Estimated End Exposure Date	Exposure Date	Comple Ma	Damela Data	Sample Vol	D	Sample		Result	24hr Activity	Systemic	Ü
(b) (6)	(b) (6)	01/20/66	02/09/68	01/30/66	66-820	Sample Date 02/09/68	(mL) 680	Base Toul Rosieres	Anal 200	Date Anal N/A	(pCl/sample) 2.41+/-1.29	(pCl/day) 4.253	Body Burden 0.0112	Nuclear Weapons
(D) (G)	(la) (a)	01120100	0205100	01100100	66-3264	05/01/66	2010	Toul Rosleres	1160	N/A	0	0.000	0.0112	5
(b) (6)	(b) (6)	02/09/66	03/09/66	02/23/66	66-2059	03/09/66	420	Torrejon	420	N/A	0.327+/-0.124	0.934	0.00427	#
	V-0 V-1	02/08/88	03/01/88	02/18/66	86-1851	03/01/68	750	Moron	750	N/A	0.443+/-0.176	0.709		i ii
(b) (C)	(1-) (0)	aniarma	00100100	02/18/68	66-1851	03/01/66	750		1	07/11/66	0.46+/-0.020	0.736		1 2
(b) (6)	(b) (6)	02/05/86	03/08/66	02/20/66	66-2461 66-489	03/08/68	900 310	Little Creek Moron	900 200	N/A	0.132+/-0.030	0.176	0.0915	>
C. P. LEWIS CO., LANSING, MICH.		01/10/00	02/10/00	01129100	66-1442	03/02/66	1920	Moron	1800	N/A 03/17/88	7.32+/-0.87 0.432+/-0.27	28.335 0.432	0.00291	1 8
(b) (6)	(b) (6)	01/18/66	03/17/66	02/18/66	66-2021	03/17/66	1400	24th Avn Bn	1400	N/A	ND	ND	0.00291	ō
(=) (=)	(15) (15)	01/18/66	02/06/66	01/27/66	68-511	02/06/66	920	Torrejon	200	N/A	1.46+/-1.32	1.904	0.00584	0
	MARKET LINE	01/25/88	02/09/86	02/01/66	68-794	02/09/68	930	Hanaw, Germany	200	N/A	1.80+/-1.24	2.323	0.0079	1 2
	W1550 VS	02/05/86	02/26/66	02/15/86	66-1437	02/26/66	820	Torrejon	852	N/A	0.237+/-0.128	0.347		
(b) (c)	(b) (C)		*******		16-1437	02/26/66	820			08/23/66	1.512+/-0.113	2.213		16
(b) (6)	(b) (6)	02/13/66 03/11/86	03/19/86	03/02/66	66-2152 66-2219	03/19/66	380 1050	Torrejon Torrejon	380 1050	N/A	0.208+/-0.129	0.657	0.00127	Ω̈.
PARTY NAMED IN		03/11/86	04/10/66	03/15/66	66-2990	03/19/66	1875	Furth , Ger. US	1875	N/A N/A	0.197+/-0.124 ND	0.225 ND	0.000958	0.
								Army, 20th Sta Hosp.						Accident
(b) (6)	(b) (6)	02/09/86	03/08/86	02/22/65	66-1875	03/08/66	560	Moron	582	N/A	0.958	2.053	0.0049	1
50 S 14 S 15 B 15 B		01/18/86	03/08/66	02/11/66	66-2618	03/08/66	1750	Vandenburg	1750	N/A	0.319+/-0.156	0.319	2022/0	1
The Real Property and the		01/18/66	02/10/66	01/29/66	66-768 66-2620	02/11/66 03/08/66	440	Torrejon	200	N/A	0.52+/-0.48	1.418	0.00536	
		01/18/66	01/22/68	01/20/86	66-1107	01/22/68	1350 1170	Vandenburg Pirmasens	1350	N/A 03/17/68	ND ND	ND ND		1 %
		02/08/66	02/17/66	02/12/68	66-1113	02/17/66	960	San Pablo	960	03/23/66	0.539+/-0.251	0.674	0.00125	DRAFT
TO AN ALL ST	ALCOHOLD	03/14/66	03/19/66	03/16/66	66-2154	03/19/66	490	Torrejon	490	N/A	0.135+/-0.119	0.331	0.000198	51
		01/18/66	04/11/68	02/28/66	66-2945	04/22/66	1000	B097	1000	N/A	ND	ND		-
(b) (G)	/ISV /@V				66-2945	04/22/66	1000			08/01/66	NR	NR		1
(b) (6)	(b) (6)	01/18/66	02/08/86	01/28/66	66-838	02/08/66	620	Moron	200	N/A	ND	ND		
		01/18/66 03/01/66	03/17/68 04/11/68	02/16/66 03/21/66	66-2020 66-3199	03/17/66 05/12/66	1450 890	24th Avn Bn Torrejon	1450 890	N/A N/A	0.137+/-0.079 0.186+/-0.082	0.137 0.251	0.000948	1
		01/28/88	02/28/66	02/12/66	66-2884	03/31/86	1750	Zaragoza	1750	N/A	0.186+7-0.082	0.251		
LANGE OF THE REST	A STATE OF THE STATE OF	01120100	022200	021200	66-2884	03/31/66	1750	Zoragoza	1100	08/17/86	NR	NR		
(b) (6)		01/22/65	04/11/68	03/02/68	66-2991	04/21/66	600	Furth , Ger. US Army, 20th Sta	600	N/A	ND	ND		
(b) (6)	(b) (6)	01/18/66	02/04/66	01/26/68	66-350	02/04/66	700	Hosp.	000	****				
(-) (-)	(D) (D)	01/18/66	02/08/68	01/27/66	66-501	02/06/66	440	Torrejon Moran	200	N/A N/A	ND 2.43+/-0.67	ND 6.627	0.0202	-
TO VOICE AND A	2017	01/18/66	03/03/66	02/09/66	66-1938	03/03/66	1700	625TH MASS	1780	N/A	2.20+/-0.29	2.200	0.0202	Revised
ALCOHOLD NAMED						00100100		(MAC)	1100	1116	2.2077-0.25	2.200	0.02.10	"
b) (6)	(b) (6)	02/27/66	03/18/66	03/08/66	66-2265	03/18/66	780	Torrejon	780	N/A	0.173+/-0.130	0.266	0.00101	1 5
ACCUSED OF THE STATE OF		01/29/68	02/19/66	02/08/66	66-1219	02/19/66	940	Torrejon	940	N/A	ND	ND		9
(F) (C)	/I= \\ /C\	03/14/66	03/19/66	03/16/66	66-2562	03/19/66	n/a	Torrejon	n/a	N/A	NR	NR		"
(b) (6)	(b) (6)	01/18/66 02/06/66	04/11/68 03/08/68	02/28/66 02/21/68	66-3108 66-1883	04/13/66 03/08/86	1900 720	Moran Torrejon	950 720	N/A N/A	0.364+/-0.135	0.364	0.000000	Dose
22 E-20 1/20 1/20		02/04/66	03/18/66	02/25/68	66-2092	03/18/66	780	USS Ft. Snelling	780	N/A	0.120+/-0.030 0.261+/-0.108	0.402	0.000669	1 %
Marie Salas Referen	No. of Concession, Name of Street, or other Designation of the last of the las	03/14/66	03/20/66	03/17/66	66-2301	03/20/88	750	Torrejon	750	N/A	0.129 +/- 0.131	0.206	0.00107	0
		01/18/66	02/09/68	01/29/66	66-817	02/09/66	680	Germany	200	N/A	ND	ND		m
		01/19/66	02/19/66	02/03/66	66-2881	03/31/66	900	Torrejon	900	NIA	1.88 +/- 0.33	2.240		1 8
(I=) (G)	(1) (0)				66-2881	03/31/66	900			08/23/66	NR	NR		Evaluation Report April 2001
(b) (6)	(b) (6)	01/21/68	02/28/66	02/08/66	66-1439	02/26/66	760	Torrejon	790	N/A	ND	ND		6
(b) (6)	(b) (6)	02/21/66	03/04/66	02/26/66	66-1439 66-2350	02/26/66	760 600	Torroloo	600	08/23/68	0.678+/-0.107	1.071		E.
	(13) (13)	01/17/66	02/25/66	02/05/66	66-1351	03/04/66	720	Torrejon Moron	600 748	N/A N/A	ND 0.410+/-0.586	0.683		April
MERCANINGS TO THE	TO THE PARTY	01/31/68	03/18/68	02/23/66	66-2115	03/18/66	890	Glessen	890	N/A	0.131+7-0.098	0.083	0.00099	13
Not the second of the	1 3/4 1/4 1/5 1/2 1/2	01/18/66	02/16/66	02/01/88	66-980	02/16/66	760	Torrejon	200	N/A	NR	NR	0.00003	= Z
grant of the	RESISCHED ST	02/18/66	03/19/66	03/04/66	66-2198	03/19/66	800	Torrejon	800	N/A	0.202	0.303		2001
Marie Total Control	Backetin Fra	01/25/66	02/09/66	02/01/66	66-734	02/09/66	510	Hanaw, Germany	200	N/A	0.78+/-0.55	1.835	0.0063	0 0
PARTY AND SALES	2543.16	02/06/66	02/08/66	02/07/86	66-1381	02/28/66	330 (12-hr)	Moron	343	NIA	1.32	1.320	0.005	1 7 7
Service Control of the Control of th		02/04/66 02/25/66	03/03/66	02/17/66	68-1912	03/03/66	900	USS Charleston	900	N/A	0.199+/-0.089	0.265		
	AND THE STREET, STREET	02/20/00	03/17/68	03/07/68	66-2700	03/30/66	950	Moron	950	N/A	0.158+/-0.113	0.200		

Palomares Nuclear Weapons Accident

DRAFT

		Estimated Start Exposure	Estimated End	Estimated Acute									Recorded
Name	SSN	Date	Exposure Date	Exposure Date	Sample No.	Sample Date	Sample Vol (mL)	Base	Sample	Date Anal	Result (pCi/sample)	24hr Activity (pCl/day)	Systemic Body Burden
(b) (6)	(b) (6)	01/18/66	02/07/66	01/28/66	66-485	02/07/66	950	Torrejon	200	N/A	1.43+/-1.14	1.806	0.00582
(b) (6)	(6) (6)	03/14/66 01/18/66	03/19/66 02/08/66	03/16/66 01/28/66	66-2140 66-831	03/19/86 02/08/86	960 430	Torrejon	960	N/A	0.278+/-0.156	0.348	0.000404
(10) (10)	(b) (6)	01/18/66	03/04/88	02/09/66	66-2353	03/04/66	1050	Torrejon Torrejon	20 105	N/A N/A	ND 0.200+/-0.134	ND 0.229	0.00149
the second second		03/12/88	03/19/66	03/15/66	66-2156	03/19/66	800	Torrejon	800	N/A	0.105+/-0.102	0.158	0.000596
		02/19/86	03/03/66	02/25/86	66-2038	03/21/66	1020	Torrejon	1020	N/A	0.346+/-0.128	0.407	
	A Statement	03/03/66 02/06/66	04/01/66 02/19/66	03/17/66	66-2702	03/30/66	820	Moron	820	N/A	0.114+/-0.101	0.167	
		01/18/66	01/18/66	02/12/86 01/18/86	68-1210 68-1214	02/19/66	900 970	Moron Wheelus AF, Libya	936 970	N/A N/A	ND 1.74	ND 2.153	0.009
		01/25/66	02/15/66	02/04/86	68-1154	02/15/66	910	Toul Rosleres	946	N/A	0	0.000	0.009
		01/18/66	02/10/66	01/29/66	66-765	02/11/88	760	Torrejon	200	N/A	2.28+/-0.98	3.600	0.0135
		02/08/66	03/13/66	02/24/88	68-2544	03/13/66	1200	Pinnasens	1200	N/A	0.518	0.518	
		01/18/66 02/06/66	02/06/66	01/27/66	66-1074	02/06/66	960	Moron	960	N/A	.4	5.000	
		02/00/00	02/28/66	02/16/66	68-1427 68-1427	02/26/86	600 600	Moron	624	N/A 06/23/66	ND 0.337+/-0.075	ND 0.674	
(b) (6)	(b) (6)	01/19/66	01/19/66	01/19/88	66-2877	03/26/66	2300	Torrelon	2300	N/A	0.112+/-0.101	0.112	
	(10) (0)	02/18/66	03/09/66	02/27/66	66-2395	03/09/66	770	Torrejon	770	N/A	0.303+/-0.167	0.472	0.0019
		01/18/66	01/29/66	01/23/88	66-1191	01/29/66	n/a	Torrejon	n/a	N/A	0	0.000	
		01/18/66	02/08/66	01/28/66	66-360	02/04/86	750	Torrejon	200	N/A	62.9+/-3.9	100.640	0.315
					66-1233 66-2032	02/18/86 03/19/88	2050 2300	Torrejon Torrejon	2050 2300	03/03/66 N/A	26.5+/-1.3 0.143+/-0.032	26.500	0.126
(b) (6)	(b) (6)	02/08/66	02/08/66	02/07/66	68-1380	02/28/66	710 (12-hr)	Torrejon	738	N/A	0.143+7-0.032	0.143 0.459	0.00132 0.002
1 2 3 - 2	/ x / x	01/18/66	02/03/66	01/26/66	66-1843	02/03/66	915	Torrejon	915	N/A	ND	ND	NSBB
		01/18/68	02/03/66	01/26/86	66-1810	02/03/86	920	Moron	920	N/A	0.261	0.340	NSBB
	10 mm	02/11/66	03/19/66	03/01/66	66-2205	03/19/66	500	Torrejon	500	N/A	0.144	0.346	
		02/21/66 01/18/66	03/14/66 02/06/66	03/03/66	66-2037 66-523	03/21/66 02/06/66	980 350	Torrejon Torrejon	980 200	N/A	0.355+/-0.152	0.435	NSBB
		02/10/66	03/20/66	03/01/86	66-2289	03/20/66	300	Moron	300	N/A N/A	3.08+/-0.68 0.173+/-0.130	10.560 0.692	0.0324 0.00141
。		01/18/66	02/07/66	01/28/66	66-492	02/07/66	610	Toul Rosleres	200	N/A	0.67+/-0.62	1.318	0.00427
	ALAS A TEMPORAL	01/25/86	02/09/88	02/01/86	66-729	02/09/86	680	Hanaw, Germany	200	N/A	ND	ND	
0.00	<b>第二条金额</b>	01/17/66	02/12/66	01/30/86	66-784	02/12/68	524	Torrejon	200	N/A	23.7+/-2.01	54.275	0.0054
<b>10</b> 10 10 10 10 10 10 10 10 10 10 10 10 10		01/25/68	02/09/66	02/01/66	66-752 66-808	02/09/66	940 600	Hanaw, Germany	200	N/A	ND	ND	
		01/18/66	02/08/66	01/27/66	66-532	02/06/66	705	Hanaw, Germany Torrejon	200	N/A N/A	NR 1.09+/-0.97	NR 1.855	0.00568
		02/24/66	03/07/66	03/01/86	66-2699	04/05/66	1700	Moron	1700	N/A	0.216+/-0.157	0.216	0.00300
A TOTAL STREET		02/10/66	03/08/66	02/23/66	66-2479	03/08/66	1000	Moron	1000	N/A	ND	ND	
		03/14/86	03/19/66	03/16/66	66-2318	03/19/66	820	Moron	820	N/A	0.126 +/- 0.136	0.184	
		01/18/66 02/07/68	02/03/66	01/26/66	66-1807 66-2375	02/03/66 03/04/66	700 400	Moron	700 400	N/A	0.288	0.494	0.00402
		01/29/66	02/19/66	02/08/66	66-1196	02/19/66	1320	Torrejon San Pablo	1000	N/A N/A	0.200+/-0.128 .5412 +/- 0.7735	0.600 0.541	0.000972
		02/06/66	02/07/68	02/06/66	66-447	02/07/66	510	Moron	200	N/A	0.79+/-0.53	1.859	0.00137
		02/10/68	03/19/66	02/28/66	66-2315	03/19/66	640	Torrejon	840	N/A	0.215+/-0.157	0.403	0.0014
	140 60	01/29/66	02/19/66	02/08/66	66-1200	02/19/66	460	Zaragoza	478	N/A	0.396+/-0.514	1.033	0.00394
TALL SECTION		01/18/66	02/05/66	01/27/66 01/28/66	66-935 66-486	02/05/66	655 80	Moron	200 80	N/A N/A	2.11+/-0.92	3.866	0.0111
		02/24/66	03/18/66	03/07/86	66-2094	03/18/66	820	Torrejon Moron	820	N/A	0.65+/-0.26 0.861+/-0.078	9.750 1.260	0.0317 0.0048
		01/29/66	02/19/68	02/08/86	66-1223	02/19/86	1195	Torrejon	1195	N/A	.593+/224	0.595	0.00253
Sales of the State	11 1 1 1 1 1	02/03/66	02/04/66	02/03/86	66-2887	04/03/66	800	Torrejon	800	N/A	ND	ND	
(b) (6)	(b) (C)	02/16/68	00100100	00/40/00	66-2887	04/04/88	800 (12-hr)	_		08/31/66	NR	NR	
(3) (4)	(b) (6)	02/13/66	02/08/66	02/12/66	66-1399 66-2484	02/28/66	900 (12-hr) 1000	Torrejon Maran	936	N/A N/A	0.203	0.203	0.0008
	<b>国际公司</b>	01/18/66	02/13/66	01/31/66	66-1096	02/13/66	1400	Wiesbaden	1400	03/17/86	0.104 ND	0.125 ND	
		02/17/68	03/10/68	02/27/86	66-3109	04/13/68	900	Moron	450	N/A	0.446+/-0.141	0.595	
		01/18/66	04/11/68	02/28/66	66-3109-5	04/13/66	900	Norfolk	450	N/A	0.446 +/- 0.141	0.595	n/a
ACCES 100 ACCES	Assumed the	01/17/68	03/04/66	02/09/68	66-2351	03/04/66	900	Torrejon	900	N/A	ND	ND	
(b) (6)	(b) (6)	01/22/68	02/07/66	01/30/66	66-2688 66-450	03/26/66	900 500	Torrejon	900	N/A	0.209+/-0.134	0.279	
(10) (10)	(D) (O)	01/18/66	02/10/66	01/29/86	66-768	02/11/86	590	Torrejon Moran	200	N/A N/A	ND 1.75+/-0.63	ND 3.559	0.0133
100 C		02/13/66	03/18/66	03/01/66	66-2113	03/18/66	700	Moron	700	N/A	0.140+/-0.084	0.240	0.000969
	33 B W 2 8	02/10/66	03/18/66	02/28/66	68-2097	03/18/66	890	Топејоп	890	N/A	0.116+/-0.077	0.156	0.000647
								8					

		Estimated		Estimated										
		Start		Acute									Recorded	
lame	SSN	Exposure Date	Estimated End Exposure Date	Exposure Date	Cample No.	Sample Date	Sample Vol (mL)	Baso	Sample Anal	Date Anal	Result (pCi/sample)	24hr Activity (pCl/day)	Systemic	
(6)	(b) (6)	01/18/66	02/08/66	01/28/66	66-847	02/08/66	370	Torrelon	200	N/A	ND ND	ND ND	Body Burden	
(0)	(10) (10)	03/14/66	03/19/68	03/16/66	68-2551	03/19/66	900	Torrejon	900	N/A	0.178+/-0.138	0.237	0.000258	
		02/09/66	02/28/66	02/18/66	66-1356	02/28/86	800 (12-hr)	Torrelon	800	N/A	0.149	0.149	0.000758	
		01/18/66	02/08/66	01/27/66	66-533	02/06/66	670	Torrejon	200	N/A	1.83+/-0.76	3.278	0.0101	
		01/18/66	02/04/66	01/26/66	66-342	02/04/66	550	Moron	200	N/A	1.51+/-0.64	3.295	0.00758	
	ALC: NO STATE OF	01/18/66	03/09/66	02/12/66	68-2070	03/09/66	1200	Moron	650	N/A	1.03+/-0.20	1.030	0.00842	
		01/20/86	02/08/66	01/29/68	68-2011	02/28/66	1400 (12-hr)	Torrejon	1400	NA	0.298+/-0.124	0.298		
		01/18/66	02/09/66	01/29/66	66-748	02/09/66	725	Hanaw, Germany	200	N/A	1.47+/-0.84	2.433		
		02/11/66	03/04/66	02/21/86	66-2343	03/04/86	900	Chateauroux, France	900	NA	0.473+/-0.225	0.631	0.00201	
(6)	(b) (6)	02/03/68	03/08/68	02/19/86	66-1908	03/08/66	825	Offutt AFB, NE	825	N/A	0.218+/-0.103	0.317		
	(n) (n)	01/18/66	02/16/66	02/01/66	66-965	02/16/68	1250	Torrejon	200	NA	2.70+/-1.97	2.700	0.0127	
	A STREET	02/17/66	03/08/66	02/28/66	66-1877	03/08/66	780	Toul Rosieres	811	N/A	0.637	0.980	0.002	
	4 H 5 P 8 9 1 2 5 3 1 1	02/10/66	03/18/66	02/28/66	66-2091	03/18/88	n/a	Torrejon	n/a	N/A	ND	ND		
1501-1571-152	S	01/18/66	02/07/66	01/28/66	66-467	02/07/68	930	Torrejon	200	N/A	1.02+/-0.88	1.316	0.00373	
S/A91, 04 (W.) 40	A STATE OF THE STA	02/18/86	03/04/66	02/25/86	66-2372	03/04/66	800	Топејал	800	N/A	0.143+/-0.129	0.215	0.00045	
		01/18/66	01/21/68	01/19/66	66-242	01/21/86	1200	Torrejon	200	N/A	1.45 +/- 1.24	1.450		
		01/17/68	02/08/66	01/28/86	66-849	02/08/68	450	Moron	200	NA	0.52+/-0.42	1.387	0.0047	
		02/11/66	03/23/66	03/03/66	66-2642	03/28/66	1000	09696 "A" Co.	1000	N/A	0.201+/-0.129	0.241		
(6)	(d)	01/18/86	02144/00	0244488	64 0000	00144100	000	504th Avn Bn	200		0.400.10.077			
(0)		01/18/86	03/14/68	02/14/68	68-2009	03/14/66	300	US Naval Ocean Graph	300	N/A	0.103+/-0.077	0.412		
<b>(6)</b>	(b) (c)	02/07/68	02/17/66	02/12/66	66-1440	02/25/66	2030	Moron	1000	N/A	0.35+/-0.26	0.350	0.00137	
(0)	(b) (6)	02/12/66	03/03/66	02/21/66	66-1555	03/10/66	2250	Wiesbaden	1150	N/A	NR	NR	0.00137	
	NAME OF TAXABLE PARTY.	03/12/68	03/19/88	03/15/66	66-2142	03/19/66	920	Torrejon	920	N/A	ND	ND	0.001	
		01/18/66	01/29/66	01/23/66	66-3117	04/13/66	1025	Moron	1025	N/A	0.168+/-0.068	0.197		
		03/14/86	03/19/66	03/16/66	66-2569	03/19/86	750	Moron	750	N/A	0.105+/-0.095	0.168		
ALC: U.S. CARLOS		01/18/66	02/07/66	01/28/66	65-481	02/07/66	790	Moron	200	N/A	0.94+/-0.81	1,428	0.00462	
	487 SHIER X	01/25/66	02/09/66	02/01/66	66-742	02/09/66	860	Hanaw, Germany	200	N/A	3.19+/-1.19	4.451	0.0152	
Section 1989		01/18/66	02/05/66	01/27/68	66-1199	02/05/66	1510	Sembach	1000	N/A	0.206+/-0.233	0.206		
		02/11/66	03/01/68	02/20/66	66-1861	03/01/86	1250	Moron	1250	N/A	0.876+/-0.245	0.876		
(6)	(L) (C)		V.1455 Q.5	and the second	66-1861	03/01/66	1250			07/18/66	8.528+/-0.285	8.528		
(6)	(b) (6)	01/29/66	03/08/66	02/17/68	66-2483	03/08/68	350	Moron	350	N/A	0.27	0.926		
TO BE VEST		02/01/66	03/01/66	02/15/68	68-1859	03/01/66	956	Torrejon	956	N/A	ND	ND		
(C)	(b) (6)	01/23/66	02/09/68	01/31/68	66-1859 66-800	03/01/66 02/09/66	956 920	Tamelan	200	08/28/66	NR	NR		
(6)	(13) (13)	01/18/66	02/05/66	01/27/68	66-937	02/05/66	500	Torrejon Moron	200 200	N/A N/A	ND ND	ND ND		
100 M 100 M	1477 1776	01/18/66	02/05/88	01/27/66	66-916	02/05/66	815	Torrejon	200	N/A N/A	0.59 +/- 0.48	0.869	0.00245	
2000	PAR 14	02/24/88	03/08/66	03/02/66	66-2514	03/08/66	1000	Moron	1000	N/A	0.59 +/- 0.48	0.000	5.00245	
WALL BURGER	The same of the sa	02/02/86	02/15/66	02/08/66	66-1152	02/15/66	590	Panama City, FL	614	N/A	NR	NR.		
03/0 / 03/00		01/25/86	02/09/66	02/01/66	66-751	02/09/66	720	Hanaw, Germany	200	N/A	1.78+/-0.82	2.967	0.0101	
SHEET LINE		01/18/66	02/16/88	02/01/66	66-959	02/16/66	1390	Топејоп	200	N/A	1.47+/-1.32	1.470	0.00693	
		01/18/86	01/24/66	01/21/68	66-1111	01/24/68	1010	Wiesbaden	1000	N/A	NR	NR	AND DESCRIPTION	
1 5 4 5 A 5 A 5 A 5 A 5 A 5 A 5 A 5 A 5 A	PERMITTED AND ADDRESS OF THE PERMITTED ADDRESS OF T	02/09/66	03/09/66	02/23/66	68-2396	03/09/66	700	Torrejon	700	N/A	0.150+/-0.113	0.257	0.000794	
17 (10 mm 1 mm)		02/10/86	03/19/68	02/28/66	66-2220	03/19/66	950	Torrejon	950	N/A	ND	ND		
	100 miles 100 miles	01/18/66	01/21/66	01/19/66	66-215	01/21/68	475	Torrejon	200	N/A	NR	NR		
		02/13/86	03/03/66	02/22/66	66-1915	03/03/66	900	Moron	900	N/A	0.148+/-0.089	0.197		
	1000	01/18/66	02/05/66	01/27/68	66-895	02/05/66	870	Moron	200	N/A	ND	ND		
DESCRIPTION OF THE PERSON OF T	V 32 (1994)	01/18/86 02/09/68	02/06/66	01/27/66	66-517 66-2078	02/06/66	905	Torrejon	200	N/A	5.00+/-1.30	6.630	0.0202	
	A STATE OF THE PARTY OF THE PAR	02/09/66	03/09/66	01/29/68	66-793	03/09/66	650 910	Torrejon	650 200	N/A N/A	0.200+/-0.096	0.369	0.000112	
NAME OF TAXABLE PARTY.	1845 7853	01/18/66	02/09/68	02/01/68	66-825	02/09/66	910 870	Torrejon Germany	200	N/A N/A	4.94+/-1.56 ND	6.514 ND	0	
40 K K L L L L	· KINGSON	02/13/86	03/08/66	02/24/66	68-2495	03/08/66	1000	Torrejon	1000	N/A N/A	0.284	0.341		
335 J. W. S.	At L. 1752	01/18/88	02/03/66	01/28/66	66-2886	03/08/66	1800	Torrejon	1800	N/A	1,21+/-0,282	1.210		
40 70 1 1 1 1 1 1 1 1 1 1 1 1 1	September 1988	01710030	020300	51120100	66-2886	03/30/66	1800	ionejon	1000	08/17/66	NR	1.210 NR		
(6)	(b) (6)	01/18/66	02/03/66	01/26/66	65-1821	02/03/66	700	Torrejon	700	N/A	0.0901	0.154		
(0)	(=1 (=1	01/18/68	04/11/66	02/28/86	66-1207	06/29/66	1450	Torrejon	1000	N/A	1.6	1.600	0.008	
		02/14/66	02/14/66	02/14/66	66-2940	04/24/66	1200	Wiesbaden	1200	N/A	ND	ND	0.000	
(0)					66-2940	04/24/66	1200	2.19		08/01/86	NR	NR		
(6)	(b) (6)	01/18/88	02/05/68	01/27/86	66-942	02/05/86	960	Moron	200	N/A	ND	ND		

CCIORII	DRAF
---------	------

		Estimated		Estimated									
		Start		Acute									Recorded
Name	BSN	Exposure Date	Estimated End Exposure Date	Exposure Date	Sample No.	Sample Date	Sample Vol (mL)	Base	Sample	Date Anal	Result (pCl/sample)	24hr Activity (pCl/day)	Systemic Body Burden
(b) (6)	(b) (6)	03/14/66	03/19/66	03/16/66	66-2071	03/19/66	950	Moron	950	N/A	0.254+/-0.181	0.321	0.000369
	(-) (-)	02/21/66	03/18/88	03/05/66	66-2210	03/18/66	1344	Moron	790	N/A	0.226+/-0.134	0.226	0.00109
		02/09/66	03/09/66	02/23/66	66-2391	03/09/66	900	Torrejon	900	N/A	0.147+/-0.113	0.196	0.000778
	Light Gallery	01/18/66	02/06/66	01/2//66	66-509 66-764	02/06/66	930 320	Torrejon Torrejon	200	N/A N/A	1.27+/-0.88 0.82+/-0.45	1.639 3.075	0.00501
		02/03/86	02/21/68	02/12/66	66-1645	03/01/88	n/a	Reuters News	n/a	N/A	0.8247-0.45 ND	ND	0.0115
/I- \	(I=1 (C)					04101100		Agency AYA LA 5 Madrid, Spain	100	147	110	110	
(b) (6)	(D) (O)	01/29/66	02/19/66	02/08/66	66-1220	02/19/66	1390	Moron	1390	N/A	0.162+/-0.113	0.162	0.000891
W. V. 700	70. N. 7000				66-1220	02/19/66	880	Moron	880	N/A	1.64+/-1.97	2.236	0
(b) (6)	(b) (6)	02/08/88	02/26/66	02/16/66	66-1384	02/26/66	440	Torrejon	457	N/A	1.39	3.791	0.005
	- 154 185	02/15/66	03/12/66	02/27/66	66-2036 66-750	03/18/66	2000 960	Torrejon Moron	2000	N/A N/A	0.300+/-0.115	0.300	0
		02/08/66	03/08/66	02/21/66	66-1868	03/08/88	750	San Pablo	780	N/A	2.14+7-0.71 0.451	2.875 0.722	0.0103
	State of the state of	02/18/66	03/18/66	03/04/66	66-2266	03/18/66	900	Chambley	900	N/A	0.197+/-0.145	0.263	0.00104
		02/08/66	02/26/68	02/16/66	66-1410	02/26/66	590	Moron	613	N/A	ND	ND	0.00104
		02/10/68	03/18/66	02/28/66	66-2267	03/18/66	410	Torrejon	410	N/A	0.378+/-0.187	1.106	0.00241
	<b>对是一个关系</b>	01/18/66	01/21/66	01/19/66	66-220	01/21/66	325	Torrejon	200	N/A	NR	NR	
Visit British College	· 100 (100 (100 (100 (100 (100 (100 (100	01/18/66	01/21/66	01/19/66	66-218	01/21/66	250	Torrejon	38	N/A	0.2625 +/- 1.07	1.260	
		01/18/66	01/21/66	01/19/66	66-224	01/21/86	375	Torrejon	200	N/A	0.604 +/- 0.341	1.933	
The state of the s	All the second	01/18/66	01/21/66	01/19/66	86-224	01/21/66 01/21/66	375 450	Torrejon	200	N/A	6.15 +/- 0.9	19.680	
		02/18/66	03/08/66	02/27/66	66-2489	03/08/66	800	Torrejon Torrejon	200 800	N/A N/A	1.45 +/- 0.522	3.867 0.000	
		03/01/66	03/08/66	03/04/66	66-2517	03/08/66	950	Torrejon	950	N/A	0.221	0.279	
	CONTRACTOR OF THE PARTY OF THE	01/18/66	02/12/66	01/30/66	66-1065	02/12/66	840	Athens	840	03/13/66	ND	ND.	
The state of the s		02/09/66	03/09/68	02/23/66	66-2060	03/09/66	700	Torrejon	700	N/A	ND	ND	0
(1) (2)	2000	01/18/66	03/25/66	02/20/66	66-2596	03/25/66	1250	USAH Wurzburg, Germany	1250	N/A	0.142+/-0.113	0.142	
(b) (6)	(b) (6)	01/18/86	02/05/66	01/27/66	66-885	02/05/88	840	Torrejon	200	N/A	NR	NR	
THE RESERVE OF THE PARTY OF		01/18/66	02/04/66	01/26/66	66-363	02/04/68	750	Moron	200	N/A	59.2+/-3.8	94.720	0.271
		01/18/68	03/19/66 01/30/66	02/17/66 01/24/66	66-2034 66-261	03/19/66 01/21/66	920 1300	Torrejon	920	N/A	0.207+/-110	0.270	0
En RAFFEE		01/18/88	01/30/00	01/24/00	66-1479	02/25/66	1560	Torrejon Sembach	1000	N/A N/A	237.9 +/- 10.4 ND	237.900	
(b) (6)	(I-) (O)							dembach		IVA	ND	ND ND	
(15) (15)	(b) (6)	01/18/66	01/21/68	01/19/86	66-259	01/21/68	850	Torrejon	200	N/A	NR	NR	
	A00//4 8 / /	02/09/66	03/03/66	02/20/86	66-1926	03/03/66	800	Torrejon	800	N/A	0.135+/-0.082	0.203	0
STANK TO STANK		01/18/66	02/05/66 02/03/66	01/27/66	66-901 66-1822	02/05/68 02/03/66	540 410	Torrejon Moron	200 410	N/A	ND	ND	
ALCOHOLD TO THE REAL PROPERTY.	Section 1889	01/18/66	02/05/86	01/27/66	66-900	02/05/66	400	Moron	200	N/A N/A	0.131 0.94+/-0.41	0.383 2.820	0.00808
		01/18/66	02/05/66	01/27/66	86-894	02/05/66	945	Moron	200	N/A	2.88+/-1.15	3.657	0.0105
100		01/18/66	02/05/66	01/27/66	66-883	02/05/66	550	Torrejon	200	N/A	1.68+/-0.59	3.665	0.0105
		01/18/66	02/09/66	01/29/66	66-733	02/09/66	375	Torrejon	200	N/A	0.53+/-0.38	1.696	0.00605
	2.4	02/21/66	03/18/66	03/05/66	66-2269	03/18/66	910	Torrejon	910	N/A	0.204+/-0.140	0.269	0.000992
<b>建筑建筑。 超级数据</b>	17 5 14 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	01/18/86	02/05/66	01/27/66	66-932	02/05/66	490	Torrejon	200	N/A	1.08+/-0.63	2.645	0.00762
	FAMILY STATES	02/10/66 01/25/66	03/08/86 02/09/68	02/23/66 02/01/66	66-2496 66-806	03/08/68	1000	Moron	1000	N/A	0.45	0.540	n/a
	STATE TO BE	02/06/66	03/03/66	02/18/66	66-1642	02/09/66 03/06/66	400 1040	Hanaw, Germany	200 1000	N/A	28.5+/-1.9	85.500	0.00526
	512.32	020000	03/03/00	023 10100	68-3054	04/27/86	1900	Wiesbaden Lindsey AS,	950	N/A N/A	0.194+/-0.156 0.735+/-0.165	0.224 0.735	0.000238
					00 3004	0-1121100	1500	Germany	550	NA	0.73377-0.185	0.735	
(b) (6)	(b) (6)	01/25/86	02/26/66	02/10/86	66-1415	02/26/66	760	Torrelon	790	N/A	0.152	0.240	0.0008
	V-X-V-X-	02/27/66	03/08/66	03/03/66	68-2488	03/08/66	900	Moron	900	N/A	0.149	0.199	
	A Property land	01/18/86	03/25/66	02/20/66	66-2589	03/25/66	1500	USAH Wurzburg, Germany	1500	N/A	0.141+/-0.113	0.141	r/a
(b) (6)	(b) (6)	01/18/66	02/11/66	01/30/66	66-352	02/04/66	850	Torrelon	200	N/A	60.4+/-4.1	85.271	0.302
A Land	V-1 /-1			200	66-1162	02/18/66	1730	Torrejon	1730	03/02/66	0.690+/-0.241	0.690	0.00336
(b) (6)	(b) (6)	02/09/66	02/26/66	02/17/66	66-1416	02/26/66	780	Moron	811	N/A	ND	ND	n/a
(b) (6)					66-1418	02/26/66	780			08/01/66	NR	NR	
(0) (0)	(b) (6)	02/10/66	02/28/66	02/18/66	68-1420	02/26/66	840	Torrejon	873	N/A	ND	ND	0
		01/31/66	03/20/66	02/24/66 01/20/66	66-2297 66-1101	03/20/68	900 1455	Norfolk	900	N/A	0.258+/-0.153	0.344	0.00205
	N. S. A. W.	31710/00	01/23/00	01120100	00-1101	01/23/00	1400	Pirmasens	1455	03/17/66	ND	ND	0

70
evised
Dose
Evalua
tion F
Repo

lame	SSN	Estimated Start Exposure Date	Estimated End Exposure Date	Acute Exposure Date		Sample Date	Sample Vol	Base	Sample Anal	Date Anal	Result (pCl/sample)	24hr Activity (pCl/day)	Recorded Systemic Body Burde
o) (6)	(b) (6)	01/18/68	02/06/66	01/27/66	68-530	02/06/66	670	Топтејоп	200	N/A	1.72+/-0.87	3.081	0.00938
	(2) (3)	01/18/86	02/04/66	01/28/66	66-357	02/04/66	550	Moron	200	N/A	0.97+/-0.52	2.116	0.00486
		01/18/66	02/16/66	02/01/66	66-1005	02/16/66	1500	Kirtland AFB BQ97	200	N/A	ND	ND	0
	Marie Walter Control	02/18/68	03/08/68	02/27/66	68-2485	03/08/66	1500	Dreux	1500	N/A	0	0.000	0
		02/08/66	02/26/66	02/16/66	66-1409	02/26/86	920	Moron	958	N/A	0	0.000	0
		01/25/66	03/24/68	02/23/66	66-2535	03/13/86	450	Charleston	450	N/A	0.293	0.781	n/a
\ (0)					66-2577	03/24/66	1400	USS Everglades AD 24	1400	N/A	0	0.000	0
) (6)	(b) (6)	01/18/66	02/04/66	01/26/66	66-351	02/04/66	500	Torrejon	200	N/A	0.75+1-0.59	1.800	0.00375
		02/10/86	03/18/66	02/28/66	66-2110	03/18/66	900	Torrejon	900	N/A	0.655+/-0.168	0.873	0.00478
	C. 10 S. 10 S.	01/18/66	01/21/68	01/19/66	66-227	01/21/66	152	Torrejon	152	N/A	0.233 +/- 0.176	1.839	n/a
STATE LOS AND A		01/18/66	02/09/68	01/29/66	66-757	02/09/66	680	Torrejon	200	N/A	ND	ND	0
THE RESERVE OF THE PARTY OF THE	TAX DESCRIPTION OF THE PARTY OF	01/18/66	02/09/68	01/29/66	86-749	02/09/88	840	Топејоп	200	N/A	2.15+/-1.09	3.071	0.011
	1000	01/18/66	01/21/66	01/19/86	66-256	01/21/66	1400	Torrejon	200	N/A	18.2 +/- 3.08	18.200	n/a
	San Time	01/18/66	02/07/66	01/28/66	66-449	02/07/86	900	Топејоп	200	N/A	2.94+/-1.04	3.920	0.012
TO STATE OF THE LIE	S 25 S 2 1 S 1 S	02/04/86	03/13/66	02/22/68	66-2545	03/13/66	530	Charleston	530	N/A	0.178+/-0.138	0.403	0.00116
	SCHOOL SAND	01/18/66	02/09/66	01/29/66	66-807	02/09/86	820	Torrejon	200	N/A	4.17+/-1.39	6.102	0.0208
(0)		01/18/66	03/24/66	02/19/66	66-2578	03/24/66	1000	USS Everglades AD 24	1000	N/A	0.109 +/- 0.130	0.131	0
(6)	(b) (6)	01/18/86	02/05/66	01/27/66	66-898	02/05/66	670	Torrejon	200	NIA	3.15+/-0.89	5.642	0.0161
	V. 20 N. 2	03/14/66	03/19/66	03/16/68	66-2128	03/19/66	1000	Torrejon	1000	N/A	0.105+/-0.102	0.126	0.000153
		02/27/66	03/18/68	03/08/66	66-2274	03/18/66	600	Torrejon	600	N/A	0.798 +/- 0.1032	1.596	0
	The property of the same	01/25/66	02/09/66	02/01/68	66-745	02/09/86	860	Hanaw, Germany	200	N/A	2.28+/-1.42	3.181	0.0108
		03/14/66	03/19/66	03/16/66	66-2549	03/19/66	600	San Pablo	600	N/A	ND	ND	0
		01/18/86	02/09/66	01/29/66	68-821	02/09/66	520	Moran	200	N/A	ND	ND	0
		02/08/66	02/08/68	02/08/66	66-1390	02/28/86	900 (12-hr)	Moron	936	N/A	0.757	0.757	0.003
大学生 化管		01/18/66	02/28/66	02/07/68	66-1490	02/28/66	250	US Naval Ocean Graph	260	N/A	ND	ND	0
(6)	(b) (6)	02/09/66	03/08/66	02/22/66	66-1866	03/08/86	n/a	Moron	n/a	N/A	NR	NR	n/a
	( ) ( )				66-2160	03/08/66	770	Moron	770	N/A	0.116+/-0.114	0.181	0.000597
(6)	(b) (6)	02/08/66	02/08/68	02/07/66	66-1398	02/28/66	930 (12-hr)	Torrelon	967	N/A	ND	ND	0
1-1	(-) (-)	01/18/66	02/06/66	01/27/66	66-524	02/06/66	450	Torrejon	200	N/A	1.19+/-0.64	3,173	0.00972
		01/20/86	02/12/66	01/31/66	66-788	02/12/66	630	Moron	200	NA	1.00+/-0.74	1.905	0.00941
		01/18/68	02/05/66	01/27/66	68-925	02/05/66	810	Moron	200	N/A	4.1B+/-1.10	6.193	0.0178
- A A . W. C. L.		200			65-1400	02/28/66	620 (12-hr)	Moron	644	N/A	0.143	0.143	0.001
) (6)	(b) (6)	01/18/66	02/07/88	01/28/66	66-474	02/07/66	400	Torrejon	200	N/A	ND	ND	0
) (0)	(5) (5)	02/27/66	03/19/66	03/09/66	66-2128	03/19/66	940	Топејоп	940	NA	0.116+/-0.114	0.148	0.000477
		01/18/68	02/04/66	01/26/66	68-754	02/04/66	950	Moron	200	N/A	ND	ND	0
Death (St. St. St.	A 33 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	01/29/66	02/19/68	02/08/66	66-1201	02/19/66	1360	San Pablo	1000	N/A	ND	ND	Ö
	25 6 20 5 1	01/18/66	02/08/86	01/28/66	66-832	02/08/66	475	Moron	200	N/A	ND	ND	Ö
	The National Manager	01/18/86	02/09/66	01/29/66	66-759	02/09/86	550	Torrejon	200	N/A	1.14+/-0.61	2,487	0.00887
ACTOR SOCIAL STATE	THE WAY IN THE Y	01/18/66	02/05/66	01/27/66	68-944	02/05/66	430	Torrejon	200	N/A	6.00+/-0.96	16.744	0.0483
The state of the s	and the second				68-2580	03/23/66	n/a	Moron	n/a	N/A	NR	NR	n/a
(6)	(b) (6)	02/11/66	03/08/68	02/23/66	66-2501	03/08/66	975	Torrejon	975	NA	0	0.000	0
(6)	(-) (-)	01/18/85	02/07/66	01/28/66	68-497	02/07/86	810	Torrejon	200	NA	1.29+/-1.00	1.911	0.00617
100	13 50 KV 6	01/19/66	02/19/66	02/03/66	66-1213	02/19/66	960	Moron	998	CAV	NR	NR	n/a
	White the same of		1 3 7		66-3125	04/13/88	900	Moron	450	N/A	0.452+/-0.223	0.603	n/a
702	The same of the sa				65-3125-S	04/13/66	900	Moron	450	N/A	NR	NR.	n/a
) (6)	(b) (6)	01/18/66	01/21/66	01/19/66	66-257	01/21/86	1060	Torrejon	200	N/A	11.02 +/- 2.12	12.475	r/a
/ (5)	(10) (10)	01/18/68	01/24/66	01/21/68	66-1003	02/15/86	1475	Kirtland AFB BO97	200	N/A	18.5+/-3.1	16.500	0
THE RESERVE OF	0X 6K 48	01/18/85	02/02/66	01/25/66	68-407	02/02/86	2628	Ramstein	200	NA	5.47+/-2.87	5.470	0.0118
CONTRACT		01/29/66	01/29/66	01/29/66	65-2277	01/29/68	1420	Топејоп	1420	04/15/86	.3333+/-0.168	0.333	0.00272
CONTRACTOR OF THE PARTY OF THE	44.77	01/18/66	04/11/66	02/28/66	66-2946	04/22/66	1500	B097	1500	N/A	0.142+/-0.102	0.333	n/a
and the state of t	THE RESERVE OF THE PARTY OF THE	OTTION	04/11/00	UZIZOIUU	66-2946	04/22/88	1500	0097	1000	06/18/66	1.93+/-0.334	1.930	Iva
) (6)	(b) (6)	02/13/66	03/18/66	03/01/66	66-2109	03/18/86	890	Moron	890	N/A			0.00120
7 (0)	(b) (6)	02/13/66	03/08/66	03/01/66	66-2109	03/18/66	800	Wheelus AF, Libya	800	N/A N/A	0.197+/-0.092	0.266	0.00138
The Part of the Pa	THE REAL PROPERTY.	01/18/66	02/06/86	03/00/66	68-518	02/06/66	670	Torrelon	200	N/A	7.84+/-1.41	0.000 13.684	0.419
	E 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	01/18/65	02/16/66	02/01/66	66-961	02/16/66	780	Torrejon	200	N/A	ND	ND	0
	The same of the sa	02/24/68	03/17/66	03/06/66	66-2015	03/17/66	1320	Torrejon	1320	N/A	0.266+/-0.109	0.266	0

C.4-12

Individuals with Urine Samples Classified as Remaining Cases

Estimated

		Estimated Start Exposure	Estimated End	Estimated Acute Exposure			Sample Vol		Sample		Result	24hr Activity	Recorded Systemic
(b) (6)	SSN	Date	Exposure Date	Date		Sample Date	(mL)	Base	Anal	Date Anal	(pCl/sample)	(pCl/day)	Body Burder
(b) (d)	(b) (6)	01/18/86	02/05/66 02/09/68	01/27/66	66-917 66-758	02/05/66	780 890	Moron	200	N/A N/A	1.61+/-0.74 2.20+/-1.23	2.477 2.968	0.00713
		02/21/66	03/18/66	03/05/66	66-2236	03/18/66	950	Torrejon Torrejon	950	N/A	0.108+/-0.102	0.136	0.00973
	TANK DEPT.	02/13/68	03/18/66	03/01/66	66-2243	03/18/66	810	Moron	810	N/A	0.230+/-0.139	0.341	0.000715
	122 3 5 5 5 6	02/09/66	03/08/66	02/22/66	66-1899	03/08/66	600	Moron	600	NA	0.181+/-0.085	0.362	0
	A STATE OF THE PARTY.	01/18/66	02/18/66	02/01/66	66-966	02/16/66	800	Torrejon	200	NA	1.27+/-0.69	1.905	0.00948
<b>发生的</b>	计多数符号编	01/18/66	03/24/66	02/19/66	66-2574	03/24/66	n/a	USS Everglades AD-	n/a	N/A	NR	NR	n/a
(b) (G)	(I-) (C)				68-2971	04/24/66	600	USS Everglades AD- 24	600	N/A	ND	ND	0
(b) (6)	(b) (6)	01/29/66	02/19/66	02/08/66	66-1211	02/19/66	760	San Pablo	790	N/A	NR	NR	n/a
		01/17/86	02/05/66	01/26/66	66-918	02/05/68	730	Torrejon	200	N/A	1.71+/-0.94	2.811	80800.0
		02/08/86	02/08/66	02/08/66	66-1355	02/28/66	500 (12-hr)	Toul Rosleres	500	N/A	0.117	0.117	0.000954
A CONTROL OF THE	100000000000000000000000000000000000000	01/18/86	02/08/66	01/28/66	68-842	02/08/68	760	Torrejon	200	N/A	0.81+/-0.59	1.279	0.00433
	3 - 2 10 1 - 2 10 1	01/17/66	02/20/66	02/03/66	66-1957	02/20/66	1650	Moron	1850	N/A	0.107+/-0.071	0.107	0
A STATE OF THE PARTY OF THE PAR		02/08/88	02/26/66	02/16/66	66-1435	02/28/68	760	Moron	789	N/A	ND	ND	0
		02/24/86	03/19/66	03/07/66	66-2085	03/19/66	350	Toul Rosieres	350	N/A	0.112+/-0.074	0.384	0
		02/09/86	02/12/66 03/08/66	01/30/66 02/22/66	66-787	02/12/66	440	Moron	200	N/A	ND	ND	0
No. of Contract of	CONTRACT HIM	01/18/88	03/03/66	02/14/66	66-1906 66-2539	03/08/66	800 1000	San Pablo	800	N/A	0.135+/-0.088	0.203	0
		01/10/00	02/09/86	02/01/66	66-802	02/09/66	700	Moron Hanaw, Germany	1000	N/A N/A	0.293 2.75+/-1.01	0.352 4.714	n/a
The Court of the C		01/18/88	03/16/66	02/15/66	66-2028	03/16/66	870	Moron	870	N/A	0.216+/-0.099	0.298	0.0161
Was to see the		01/18/86	01/21/66	01/19/66	66-263	01/21/66	900	Torrejon	200	NA	NR	0.298 NR	0 n/a
		03/13/66	03/19/66	03/16/66	68-2175	03/19/68	700	Torrejon	700	N/A	0.131	0.225	n/a
	NAME OF TAXABLE PARTY.	01/25/68	03/13/66	02/17/66	66-2548	03/13/66	800	Charleston	800	N/A	0.129+/-0.107	0.194	0.000991
		O IIZOIOO	03/10/00	0217700	66-2573	03/24/66	700	USS Everglades AD-	700	N/A	.133+/-0.113	0.228	n/a
(b) (6)	(b) (6)	01/18/66	02/04/66	01/28/86	68-358	02/04/66	1000	Torrejon	200	N/A	108+/-5.9	129.600	0.541
(2) (2)					66-2354	03/04/66	800	Torrejon	800	NA	0.153+/-0.113	0.230	0.000481
(b) (6)	(b) (6)	02/01/66	03/08/68	02/18/66	66-1864	03/08/66	500	Moron	500	N/A	1.41+/-0.31	3.384	n/a
(6) (6)				02/18/66	66-1864	03/08/66	500			08/29/68	NR	NR	
(D) (O)	(b) (6)	01/18/88	02/04/66	01/26/66	68-346	02/04/66	600	Torrejon	200	N/A	ND	ND	0
	(F) (C)				66-2685	03/27/66	1400	Torrejon	1400	N/A	0.477+/-0.192	0.477	n/a
(b) (6)	(b) (6)	02/13/66	03/08/66	02/24/66	66-2473	03/08/66	450	Moron	450	N/A	0.131	0.349	r/a
() ()		01/18/66	02/06/66	01/27/66	66-528	02/06/66	370	Torrejon	200	N/A	0.98+/-0.41	3.178	0.00972
		01/20/68	02/08/66	01/29/66	66-844	02/08/66	760	Toul Rosleres	200	N/A	ND	ND	0
A STATE OF THE SECOND		03/13/66	03/14/66	03/13/66	66-2876	04/01/66	1600	Torrejon	1600	N/A	1.44+/-0.31	1.440	n/a
(In) (C)	70 × 70 ×	- 4/61	Alteria.		66-2876	04/01/66	1600			07/13/66	2.701+/-0.020	2.701	
(b) (6)	(b) (6)	01/28/88	02/09/66	02/03/66	66-801	02/09/66	950	Torrejon	200	NA	1.51+/-1.26	1.907	0.00851
		01/18/68	02/03/66	01/26/66	66-1844	02/03/66	925	Moron	925	N/A	0.108	0.140	0
		01/18/66	02/05/66	01/27/66	66-890	02/05/66	900	Moron	200	N/A	1.23+/-0.96	1.640	0.00472
	A PROPERTY OF THE PARTY OF THE	02/10/88	03/19/66	02/28/66	66-2147	03/19/66	830	Moran	830	N/A	ND	ND	0
		02/26/66	03/18/66	03/08/66	66-2095	03/18/66	n/a	Torrejon	n/a	N/A	0.132+/-0.095	0.132	0.000736
ALL STREET, ST	ETS ALVANOR	02/09/66 01/17/66	03/09/66	02/23/66 01/29/66	66-2068 66-760	03/09/66	n/a 665	Torrejon	n/a	N/A	0.351 +/- 0.123 ND	0.351	0.00196
	Aller Street Review	01/18/68	02/05/86	01/29/66	66-899	02/11/66	480	Torrejon	200	N/A N/A		ND	0
Company of the Compan	T. Ave. dilla 2	02/11/66	03/08/66	02/23/66	66-2481	02/05/66	900	Moron Torrejon	900	N/A N/A	1.48+/-0.66	3.700	0.0107
DA MILES TOTAL	CHORES	02/09/66	02/28/66	02/18/66	66-2385	03/08/66	1875	Torrejon	1875	N/A N/A	ND 0.155+/-0.113	ND 0.155	0
STONE STATE OF	MOVEMENT AND	02/11/68	03/08/66	02/23/66	66-2482	03/11/66	100	Torrejon	100	N/A N/A	0.155+/-0.113	0.155	0
		02/21/68	03/18/66	03/05/66	66-2263	03/18/66	550	Zaragoza	550	NA	0.322+/-0.484	0.703	0.00156
		01/21/66	03/16/66	02/17/66	66-2026	03/16/66	n/a	Torrejon	n/a	N/A	NR	NR	n/a
-31 (A. 17-17)	THE PARTY OF			J. 1100	66-2144	03/19/66	780	Torrejon	780	N/A	0.112 +/- 0.128	0.172	0
(b) (6)	(b) (6)	01/17/68	02/07/66	01/27/86	66-459	02/07/66	915	Torrejon	800	N/A	ND	ND ND	0
(-)-(-)	(-) (-)	01/18/68	02/07/66	01/28/66	66-484	02/07/66	560	Moron	200	N/A	1.59+/-0.68	3.407	0.011
N. 71 (5) (4) (5) (5) (5)	A CAN LEWY	01/18/88	01/29/66	01/23/66	66-1226	01/29/68	1210	San Pablo	1000	N/A	3.63+/-0.29	3.630	0.021
A THE REST CONTRACT		02/24/68	03/08/66	03/02/66	86-1879	03/08/68	300	Toul Rosleres	312	N/A	1.92	7.680	0.00538
A CONTRACTOR AND ADDRESS OF THE PARTY OF THE	ASSEMBLE OF	01/18/68	02/07/66	01/28/66	66-498	02/07/66	760	Moron	200	N/A	6.65+/-1.59	10.500	0.034
	K ( 6 ( 6 ) ( 6 ) ( 6 )	01/18/66	02/09/86	01/29/68	66-819	02/09/66	410	Torrejon	200	N/A	2.65+/-0.67	7.756	0.0284
AND CONCURS WILLIAM	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	01/16/66	02/05/86	01/26/66	66-902	02/05/66	750	Torrejon	502	03/17/66	35.47+/-0.73	56.752	0.0204
		03/11/66	03/19/66	03/15/66	66-2174	03/19/66	700	Топтејол	700	N/A		0.739	

	Revised D
	)ose
^	Evaluation
3004	Report

		Estimated		Estimated									
		Start		Acute									Recorded
BMO	SSN	Exposure Date	Estimated End Exposure Date	Exposure Date	Sample No.	Sample Date	Sample Vol (mL)	Base	Sample	Date Anal	Result (pCl/sample)	24hr Activity (pCl/day)	Systemic Body Burden
0) (6)	(b) (6)	01/21/66	03/04/66	02/11/66	66-2371	03/04/66	1300	Moron	1300	N/A	NR	NR	- 1
	4 - 5 - 5 - 6 - 6 - 6 - 6 - 6 - 6 - 6 - 6	03/11/66	03/19/66	03/15/66 01/30/68	66-783	03/19/68 02/12/66	790 770	Moron Torrejon	790 200	N/A N/A	ND	ND	0.00791
	A1119 4 5 LT	01/18/66	02/06/66	01/27/66	66-526	02/08/66	930	Moron	200	N/A	1.29+/-0.73	2.010 1.858	0.00791
		01/18/66	02/18/66	02/02/66	66-972	02/18/66	1500	Torrejon	200	N/A	ND	ND	0.00308
		02/09/66	03/09/66	02/23/66	66-2058	03/09/66	680	Torrejon	680	N/A	0.149+/-0.088	0.263	0.000831
	18 47 TO SAIL	01/18/68	03/10/66	02/12/66	68-2388	03/10/66	2275	Torrejon	2275	N/A	0.623+/-0.225	0.623	0.00347
TO SERVICE THE	THE THE	01/18/66	02/13/66	01/31/66	66-1133	02/13/66	1030	Torrejon	1000	03/23/66	0.772+/-0.494	0.899	0.00327
	Mary Street	01/20/66 02/11/66	02/08/66	01/29/66 02/23/68	66-845 66-2492	02/08/66	570 200	Toul Rosleres	200	N/A	1.64+/-0.82	3.453	0.0111
		02/04/66	02/25/66	02/14/66	66-1486	03/04/68	3780	Torrejon USS Paprgo ATF- 160	1000	N/A N/A	0 0.176+/-0.574	0.000 0.176	
(6)	(b) (6)	02/08/68	03/04/66	02/19/68	66-2369	03/04/86	500	Torrejon	500	N/A	0.309+/-0.159	0.742	0.00155
		01/17/65	01/25/68	01/21/68	66-1168	02/17/66	1490	Torrelon	1000	N/A_	NB	NR	of terms of the land
A CONTRACTOR		01/18/66	02/18/66	02/01/66	66-963	02/16/66	1780	Torrejon	200	N/A	94.45+/-7.67	94.450	
		01/18/66	03/09/66	02/12/66 02/01/68	66-795	03/09/66	1400	Torrejon	1400	N/A	0.488+/-0.148	0.488	0.00399
		01/18/86	01/25/66	01/21/68	66-3120	02/09/66 04/13/68	480 795	Hanaw, Germany Moron	200 795	N/A N/A	2.07+/-0.66 0.483+/-0.145	5.175 0.699	0.0185
	<b>主义</b> (4) (4) (5)	03/14/66	03/19/86	03/16/66	66-2554	03/19/66	900	Moron	900	04/19/86	ND ND	ND	
	27.000000	02/13/66	03/18/66	03/01/68	66-2105	03/18/66	790	Torrejon	790	N/A	0.189+/-0.134	0.287	0.00154
沙什里 医直肠管		01/18/66	02/07/66	01/28/66	66-1098	02/07/66	685	Wiesbaden	685	NA	ND	ND	
R 1.5.43 E. P.	100 Sept. 100 Se	02/13/66	03/03/66	02/22/66	66-1913	03/03/66	800	Moran	008	NA	0.232+/-0.106	0.348	
		02/01/66 01/18/66	03/02/66	02/15/66	66-3027	05/05/68	1350	Ramstein	1350	N/A	0.306+/-0.091	0.306	4445
		02/21/66	02/09/66 03/19/66	01/29/66	66-818 66-2209	02/09/66	360 600	Torrejon San Pablo	200 600	N/A N/A	2.03+/-0.63	6.767	0.0231
NA THE STATE OF		02/13/88	03/04/66	02/22/66	66-2349	03/04/68	820	Топејоп	820	N/A	0.148+/-0.135	0.298 0.161	0.00108 0.000435
		01/18/68	01/28/66	01/23/66	66-3118	04/13/66	1500	Maron	750	N/A	0.218+/-0.113	0.218	0.000433
		01/20/66	02/09/66	01/30/68	66-796	02/09/66	750	Torrejon	200	N/A	ND	ND	
	BATTER STATE	01/18/66	01/21/66	01/19/66	66-235	01/21/66	480	Torrejon	200	N/A	0.227 +/- 0.112	0.568	
		01/18/66	01/21/68	01/19/66	66-232	01/21/66	480	Torrejon	200	N/A	0.227 +/- 0.112	0.568	
		01/18/66 02/01/66	01/21/66	01/19/66	66-223	01/21/66	475	Torrejon	200	N/A	NR	NR	1000
		01/18/66	02/19/66	02/10/66	66-1204 66-228	02/19/68	900 410	Moron Torrejon	936	N/A N/A	1.16+/-0.90	1.547	0.00454
	5/10 (6) (c) (d)	01/23/66	03/20/66	02/20/66	66-2308	03/20/66	760	Pirmasens	760	N/A	1.71 +/- 0.60 0.144+/-0.114	5.005 0.227	0.00123
	WINDS AND AND ADDRESS OF THE PARTY OF THE PA	02/10/68	03/09/86	02/23/66	66-2053	03/09/66	790	Zaragoza	790	N/A	0.218+/-0.101	0.331	0.00123
	AND A STATE OF	01/19/66	01/27/86	01/23/66	66-3131	04/13/66	2000	Wheelus AF, Libya	1000	N/A	1.17 +/- 0.33	1.170	0.00112
					66-3131	04/13/86	2000	Wheelus AF, Libya	1000	N/A	1.17+/-0.33	1.170	
(0)	(b) (6)				66-3131	04/13/66	2000			06/03/68	0.590	0.590	
(6)	(10) (0)	02/18/66 01/18/66	03/04/86 02/05/86	02/25/66	66-2360 66-891	03/04/66 02/05/66	650 860	Moron	650	N/A	0.117+/-0.101	0.216	0.000368
		01/18/86	02/07/66	01/28/86	66-457	02/07/86	820	Torrejon Moron	200	N/A N/A	ND 0.94+/-0.77	ND 1.376	0.00422
		02/13/66	03/04/86	02/22/66	66-2364	03/04/66	900	Torrejon	900	N/A	0.147+/-0.119	0.198	0.000581
		01/23/66	02/08/66	01/31/86	66-848	02/08/66	930	Toul Rosleres	200	N/A	ND	ND	0.000301
		02/02/86	02/15/68	02/08/66	66-1156	02/15/66	340	Panama City, FL	340	03/17/68	0.65+/-0.21	2.294	0.00712
	100 TO 10	02/09/66	03/09/88	02/23/66	66-2061	03/09/66	1200	Torrejon	1200	N/A	0.212+/-0.096	0.212	0.00118
	TO STATE OF THE STATE OF	01/28/66	02/12/86	02/04/86	66-947	02/12/66	1060	Torrejon '	200	N/A	ND	ND	
	Springer Street	02/13/66 02/03/66	03/18/66 02/25/66	03/01/66	66-2252 66-1346	03/18/66	980	Moron	980	N/A	0.189+/-0.135	0.231	0.00177
		02/11/66	03/04/86	02/14/66	66-2368	02/25/66 03/04/66	540 1000	Toul Rosieres Wiesbaden	562	N/A	0.118+/-0.385	0.262	
		01/18/66	02/06/68	01/27/66	66-522	02/06/66	540	Torrejon	1000	N/A N/A	ND 1.96+/-0.64	ND 4.259	0.0127
		01/18/66	03/08/88	02/11/66	66-1910	03/08/66	n/a	Torrejon	n/a	N/A	NR	4.358 NR	0.0127
(0)	(b) (6)	01/18/66	03/08/86	02/11/86	66-2159	03/08/66	730	Torrejon	730	N/A	0.129+/-0.114	0.212	0.00103
(6)	(0) (0)	01/18/66	03/08/66	02/11/66	66-1907	03/08/66	875	Torrejon	875	N/A	0.236+/-0.120	0.324	
STATE OF STATE OF	The same	01/29/66	02/22/66	02/10/66	66-1089	02/22/66	755	Torrejon	755	03/17/66	8.86+/-0.78	14.082	0.0682
11201 10070	(1) (0)	01/29/66	02/23/66	02/10/66	66-2939	04/14/66	500	Torrejon	500	N/A	ND	ND	
(6)	_(b) (6)	02/06/66	03/04/68	02/19/66	66-2939 66-2356	04/14/66	500 900	Mana	000	0B/01/66	NR	NR	
	CANADA CAR	02/10/86	03/19/66	02/28/66	66-2130	03/04/66	800	Moron Torrejon	900 800	N/A N/A	ND 0.223+/-0.162	ND 0.335	0.00145
STATE OF THE STATE		01/18/86	03/08/66	02/11/86	66-2480	03/19/66	900	Torrejon	900	N/A	ND	ND	0.00145
	F 15 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	01/25/66	02/09/66	02/01/66	66-737	02/09/66	940	Hanaw, Germany	200	N/A	ND	ND	

Release of this document is restricted under the provisions of the Privacy Act, 5 U.S.C. 552(a). C.4-15

N		Estimated Start Exposura	Estimated End	Estimated Acute Exposure			Sample Vol		Sample		Result	24hr Activity	Recorded Systemic
Name (b) (6)	(b) (6)	Date 02/14/66	Exposure Date 02/26/86	Date 02/20/66	58-1421	Sample Date 02/26/65	(mL) 940	Base	Anal	Date Anal	(pCl/sample)	(pCl/day)	Body Burden
(India)	(6) (0)	02014700	02/20/00	02/20/00	66-1421	02/26/66	940	Moron	978	N/A 08/29/68	0 NR	0.000 NR	
(b) (6)	(b) (6)	01/17/66	02/07/68	01/27/66	66-248	01/21/68	750	Torrejon	200	N/A	2.23 +/- 0.863	3.568	
(b) (6)	(I) V ((0))				66-469	02/07/66	760	Torrejon	200	N/A	0.84+/-0.72	1.326	0.00427
(n) (o)	(b) (6)	02/25/66	03/18/66	03/07/66	68-2249	03/18/68	1300	Torrejon	1300	N/A	0.144+/-0.114	0.144	0.000614
		01/18/66 02/09/66	01/21/66	01/19/66	66-229	01/21/66	126	Torrejon	126	N/A	4.41 +/- 0.58	42.000	
		01/18/66	03/09/86	02/23/66 01/22/66	66-2402 66-1227	03/09/66	600 1480	Torrejon	600	N/A	0.238+/-0.143	0.476	0.00133
	10000000	01/25/68	02/09/86	02/01/68	66-803	02/09/66	770	Torrejon Hanaw, Germany	1000 200	N/A N/A	0.504+/-0.159 ND	0.504	0.00123
Section of the second		01/18/66	02/07/66	01/28/66	66-472	02/07/66	965	Moron	200	N/A	ND	ND ND	
		01/18/88	03/16/66	02/15/66	66-2025	03/16/66	700	Torrejon	700	N/A	0.278+/-0.121	0.477	
2 4 4 4 4 4 4		02/11/66	03/24/66	03/03/66	66-3205	04/21/68	1720	Torrejon	860	N/A	0.275+/-0.163	0.275	
(1.2.70)	/I- \ /O\				66-3205-5	04/21/66	1720	Torrejon	860	N/A	0.275 +/- 0.163	0.275	
(b) (6)	(b) (6)	01/18/86	03/03/66	02/09/66	66-1937	03/03/66	1100	Torrejon	1180	N/A	0.138+/-0.078	0.151	
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		01/18/88	01/18/66	01/18/66 02/25/66	66-1106 66-2515	01/18/66	1110	Torrejon	1000	N/A	ND	ND	
		03/08/66	03/19/66	03/13/66	66-2311	03/08/66	980 <b>75</b> 0	Zaragoza Toul Rosieres	980 750	N/A N/A	0.131	0.160	
and the Art I was the		01/17/66	02/12/66	01/30/66	66-782	02/12/66	550	Torrejon	200	NA	0.384+/-0.211 1.29+/-0.66	0.614 2.815	0.001 0.011
		02/24/68	03/08/66	03/02/66	66-1905	03/08/66	550	Dreux	550	N/A	0.121+/-0.074	0.264	0.011
		02/21/68	03/18/66	03/05/66	68-2117	03/18/66	900	Torrejon	900	N/A	0.223+/-0.162	0.297	0.0015
		01/17/66	02/03/66	01/25/66	66-2880	04/01/86	800	Torrejon	800	N/A	ND	ND	
(b) (c)	(b) (c)	00140100	00104499		66-2880	04/01/66	800			08/23/66	NR	NR	
(b) (6)	(b) (6)	02/18/66 02/13/66	03/04/66	02/25/66	66-2344	03/04/66	900	Torrejon	900	N/A	ND	ND	
		01/18/66	02/11/66	03/02/66	66-2560 66-773	03/19/66 02/11/66	700 980	Moron	700	N/A	0.152+/-0.124	0.261	0.00093
	<b>第</b> 条以中国 扩展	02/08/66	03/08/66	02/22/66	66-1878	03/08/66	925	Torrejon Toul Rosieres	200 956	N/A N/A	1.17+/84 0.538	1.433 0.698	0.00536
		03/27/68	04/04/68	03/31/66	66-2988	04/26/66	1200	Furth , Ger. US	1200	N/A	ND	O.098	0.002
								Army, 20th Sta Hosp.				11.0	
(b) (6)	(b) (G)	02/07/66	03/04/88	02/19/66	68-2988	04/26/66	1200			07/15/66	NR	NR	
(D) (O)	(b) (6)	03/04/66	03/08/66	03/06/66	66-2347 66-2511	03/04/66	700 1000	Bitburg	700 1000	N/A	0.367+/-0.280	0.629	0.00178
THE RESERVE WAS DEED		01/18/66	02/06/66	01/27/66	66-534	02/06/66	360	Torrejon Torrejon	200	N/A N/A	0 0.55+/-0.18	0.000	
ELECTRIC OF STREET, CO.		0111000	01100100	CIIZIIO	66-2503	03/08/66	1500	Torrejon	1500	N/A	0.55+7-0.18	1.833	0.00565
(b) (6)	(b) (6)	01/18/86	04/04/66	02/25/66	66-2893	04/04/66	800	Vandenburg	800	N/A	ND	ND	
Can Can		01/18/88	03/08/66	02/11/66	66-1898	03/08/66	700	Torrejon	700	N/A	0.764+/-0.167	1.310	0.00913
	A Share	01/19/66	02/05/66	01/27/66	66-939	02/05/66	500	Torrejon	200	N/A	1.45+/-0.79	3.480	0.01
<b>国际公司的</b>		01/25/66 02/09/68	02/09/66	02/01/66	66-792	02/09/66	770	Hanaw, Germany	200	N/A	0.55+/-0.72	0.857	
		01/18/66	03/08/66	02/22/66	66-1871 66-790	03/08/66	940 800	Moron	978	N/A	0.611	0.780	0.003
		02/09/66	03/08/66	02/22/66	66-1876	03/08/68	720	Moron San Pablo	200 720	N/A N/A	ND NR	ND NR	
		01/18/66	02/07/66	01/28/66	66-445	02/07/66	370	Moron	200	N/A	0.50+/-0.31	1.622	0.00501
		01/25/66	02/09/66	02/01/66	66-822	02/09/66	530	Germany	200	N/A	0.93+/-0.76	2.106	0.00722
		02/15/86	03/25/66	03/06/66	66-2930	04/18/68	900	Torrejon	900	N/A	1.50+/-0.31	2.000	3.00122
		01/18/88	01/29/88	01/23/66	66-1067	01/29/68	1245	Torrejon	1245	N/A	ND	ND	
		01/17/66 02/20/66	02/07/66	01/27/68	66-462	02/07/66	620	Torrejon	200	N/A	0.79+/-0.50	1.529	0.00469
1000		02/20/66	04/11/66 03/19/66	03/17/66	66-3196 66-2047	05/09/66	690 460	Torrejon	690	N/A	0.190+/-0.087	0.330	
<b>加州东西的城市</b> 15		01/18/66	02/05/66	01/27/68	66-933	02/05/66	840	Torrejon Moron	460 200	N/A	0.190+/-0.100	0.495	
THE STATE OF THE S		01/18/66	02/03/66	01/26/66	66-1832	02/03/66	920	Moron	920	N/A N/A	2.12+/-1.13	3.029 0.235	0.00868
		02/09/66	03/08/66	02/22/66	66-1867	03/08/66	800	Torrejon	800	N/A	ND	ND	
413 703	The state of				66-1867	03/08/66	800			07/07/66	0.273+/-0.226	0.410	
(b) (6)	(b) (6)	02/07/66	03/04/66	02/19/66	66-2358	03/04/66	375	Bitburg	375	N/A	ND	ND	
	1-11-1	01/18/66	02/07/66	01/28/86	66-475	02/07/66	820	Torrejon	200	N/A	ND	ND	100
	1 ( No. 1) I	01/17/66	02/07/88	01/27/66	66-454	02/07/68	795	Torrejon	200	N/A	ND	ND	
<b>数 于</b> 国际发展的		03/28/68	02/04/68 04/11/66	01/26/66	66-353	02/04/66	800	Torrejon	200	N/A	1.10+/-0.92	1.650	0.00551
Chicago State Con	Contain the	J3/20/00	04/11/00	OPINALD	66-2989	04/23/68	600	Furth , Ger. US Army, 20th Sta Hosp.	600	N/A	ND	ND	
				04/04/66	66-2989	04/23/66	600			07/15/68	4.288+/-0.455	8.572	

 Palomares Nuclear Weapons Accident	
DRAFT	
Revised Dose Evaluation Report April 2001	

		Indivi	duals with Urin	e Samples	Classified a	as Remainin	g Cases						
Name	SSN	Estimated Start Exposure Date	Estimated End Exposure Date	Estimated Acuta Exposure Date	Sample No.	Sample Date	Sample Vol	Base	Sample Anal	Date Anal	Result (pCl/sample)	24hr Activity (pCilday)	Recorded Systemic Body Burden
(b) (6)	(b) (6)	01/25/66	02/17/66	02/05/66	66-1123	02/17/66	970	Toul Rosleres	970	03/23/66	ND	ND	Body Builden
	(-7.8.72	02/09/66	03/09/66	02/23/66	66-2074	03/09/66	700	Torrejon	700	N/A	0.308+/-0.121	0.528	0.00172
		01/18/66	01/30/66	01/24/66	66-3127	04/13/86	2090	Moran	1045	N/A	NR	NR	
(b) (6)	(b) (6)	01/18/66	04/04/66	02/25/66	66-3127-S 66-2890	04/13/66	2090	Moron	1045	N/A	NR	NR	
(-) (-)	(0) (0)	03/28/66	04/11/66	04/04/66	66-2994	04/04/66	720 1600	Vandenburg Furth , Ger, US	720	N/A	ND	ND	
(b) (C)	W. V. (O)		PAGE ATREES		250000000		1000	Army, 20th Sta Hosp.	1600	N/A	ND	ND	
(b) (6)	(b) (6)	01/21/66	02/01/66	01/26/66	66-2878	04/04/66	1300	Torrejon	1300	N/A	0.249+/-0.133	0.249	
6) (G)	(h) (c)				66-2878	04/04/66	1300			07/13/66	NR	NR	
0) (6)	(b) (6)	01/18/66	03/08/66	02/11/66	66-2616	03/08/66	650	Vandenburg	650	N/A	ND	ND	
10 4 CEL TO 10	A SELECTION OF	01/18/66	01/27/66	01/22/68	66-1139 66-1493	01/27/66	148 250	US Naval Ocean Graph US Naval Ocean	148	03/17/68	ND	ND 0.700	
	(1-) (6)				00-1453	022000	250	Graph	260	N/A	1.40+/-0.17	6.720	0.00888
(b) (6)	(b) (6)	02/20/66	03/29/66	03/10/68	68-2279	03/29/68	1000	Torrejon	1000	N/A	0.214+/-0.129	0.257	0.00119
		02/16/66	03/19/66	03/03/66	66-2322	03/19/66	870	Torrejon	870	N/A	0.117 +/- 0.159	0.161	0.00119
		02/13/68	03/09/66	02/25/86	66-2051	03/09/86	440	Torrejon	440	N/A	0.137+/-0.079	0.374	
		01/19/68	02/19/66	02/03/88	66-1208	02/19/66	860	Toul Rosleres	894	N/A	ND	ND	
		01/18/66	03/03/66	02/09/86	66-1929	03/03/68	850	Albuquerque, NM	850	N/A	0.255+/-0.099	0.360	
o) (6)	(b) (6)	02/28/66	03/18/66	03/09/66	66-2096 66-2335	03/18/68	900	Lindsey AS, Germany	900	N/A	0.115+/-0.085	0.153	0.000487
3) (0)	(5) (5)	02/21/68	03/27/66	03/07/66	66-2595	03/19/66	890	Toul Rosleres	890	N/A	0.221+/-0.139	0.298	0.001
		02/18/66	03/18/66	03/04/66	66-2239	03/27/66	7510 950	Moron Toul Rosieres	750	N/A	0.102+/-0.102	0.102	
		01/17/66	02/12/66	01/30/66	68-776	02/12/66	340		950 200	N/A	0.180+/-0.155	0.227	0.00168
		02/13/66	03/19/66	03/02/66	68-2559	03/19/66	700	Torrejon Torrejon	700	N/A N/A	1.21+/-0.80 0.167+/-0.124	4.271 0.286	0.0106
		01/18/66	02/07/66	01/28/66	68-470	02/07/66	990	Moron	200	N/A	1.05+/-0.78	1,273	0.00102 0.00411
		02/25/66	03/11/66	03/04/66	66-3132	04/13/66	740	Wheelus AF, Libva	740	N/A	0.168+/-0.087	0.272	0.00411
V (6)	(1-) (0)				66-3132	04/13/66	740		1-10	n/a	0.230	0.373	
0) (6)	(b) (6)	02/13/68	03/16/65	02/28/66	66-2030	03/16/86	980	Torrejon	980	N/A	0.136+/-0.079	0.167	
, , ,		01/25/66	02/09/66	02/01/66	66-804	02/09/66	810	Hanaw, Germany	200	N/A	2.07+/-1.05	3.067	0.0105
		01/17/66	04/01/66	02/23/66	66-2879	04/01/86	900	Топтејол	900	N/A	1.48+/-1.31	1.973	
) (6)	(1) (2)			1,70	66-2879	04/01/66	900			08/22/86	NR	NR	
) (0)	(b) (6)	01/18/66 02/27/66	02/12/88 03/08/66	01/30/68	66-785	02/12/66	420	Torrejon	200	N/A	0.94+/-0.62	2.688	0.0106
		01/18/66	03/09/66	03/03/66 02/12/66	66-2502 66-2064	03/08/66	1000	Torrejon	1000	N/A	0	0.000	
		02/09/66	03/08/68	02/22/66	66-1897	03/09/66	830 825	Torrejon	830	N/A	0.161+/-0.088	0.233	
		01/24/66	01/29/66	01/28/66	86-1190	01/29/56	n/a	San Pablo San Pablo	825 n/a	N/A N/A	0.183+/-0.112	0.268	
- 6100 Zati		02/11/66	03/19/66	03/01/66	66-2086	03/19/66	550	Moron	550	N/A	0	0.000	
About Substitution		01/24/66	02/12/66	02/02/66	66-781	02/12/66	670	Toul Rosieres	200	N/A	0.172+/-0.103	0.375 1.684	n/a 0.00681
1 (0)	71 3 700				66-3265	06/01/66	1780	Toul Rosieres	1060	N/A	. 0	0.000	0.00001
) (6)	(b) (6)	01/18/66	01/21/66	01/19/66	66-225	01/21/68	350	Torrejon	200	N/A	0.662 +/- 0.385	2.270	
	3 - 4 - 5	01/31/66	03/28/66	02/28/66	66-2674	03/28/66	1000	Torrejon	1000	N/A	ND	ND	
MARKET SERVICE	11 11 11 11	01/18/66	01/21/66	01/19/68	66-219	01/21/66	275	Torrejon	84	N/A	5.45 +/- 1.18	23.782	
		01/19/66	02/23/66	02/05/66	66-1047	02/23/66	960	Ramstein	980	05/17/66	2.39+/-0.40	2.988	0.0173
	3 = 70 A 2 = 0	02/12/66 02/13/66	03/08/66	02/24/66	66-2497	03/08/66	500	Moron	500	N/A	0.14	0.336	
DOMESTIC STATE OF THE PARTY OF	Charles and the	02/13/66	03/19/66	03/02/66 03/03/66	66-2207 66-2701	03/19/66	600	Maron	600	N/A	1.45	2.900	
ENGREEN)	SERE!	01/20/66	03/21/66	02/19/66	66-2008	03/21/66	300	Moron US Naval Ocean	1300 300	N/A 04/11/88	0.209+/-0.134	0.209 0.812	n/a 0.00663
) (6)	(b) (6)	01/30/66	03/18/66	02/22/86	66-2118	03/18/66	900	Graph Glessen	900	N/A	0 1824/0 1/2	0.040	0.00454
( ) (	(-) (-)	02/09/66	03/08/66	02/22/66	66-1911	03/08/66	850	Torrefon	850	N/A	0.162+/-0.113 0.230+/-0.096	0.216	0.00151
SVAGE 12 TESTS	CARL MEXICA	01/18/66	02/08/66	01/28/66	6B-1348	02/08/66	400	Toul Rosleres	416	N/A	0.230+/-0.098	0.325	n/a
) (6)	(F) (C)	02/03/66	02/15/66	02/09/66	68-1164	02/15/66	1875	American Embassy, Madrid	1000	N/A	0.115 47-0.154	0.000	
0) (6)	(b) (6)	01/18/66	02/07/66	01/28/68	66-500	02/07/66	970	Torrejon	200	N/A	3.72+/-1.45	4.602	0.0149
	A STATE OF THE STATE OF	01/18/66	01/21/66	01/19/68	68-252	01/21/66	1275	Torrejon	200	N/A	2.04 +/- 1.44	2.040	0.0.10
A Reference to the control of the	CONTRACTOR OF	01/18/66	02/12/66	01/30/66	66-1002	02/12/66	1500	Kirtland AFB BO97	200	N/A	ND	ND	
SECULO DE LOS DESCRIPTIONS	The state of the s	01/18/68	03/04/66	02/09/86	66-1953	03/04/66	1825	Moron	1825	N/A	0.580+/-0.152	0.560	0.0044

		Estimated Start		Estimated Acute									Recorded
ne	SSN	Exposure Date	Estimated End Exposure Date	Exposure Date	Cample No.	Comple Date	Sample Vol		Sample		Result	24hr Activity	Systemic
(6)	(b) (6)	01/17/66	03/19/66	02/16/68	66-1934	Sample Date 03/03/66	(mL) 1875	Base Torrejon	Anal 1875	Date Anal N/A	(pCl/sample)	(pCl/day)	<b>Body Burd</b>
				0.0100	66-2572	03/19/66	900	Torrejon	900	N/A	0.25+/-0.106	0.250 1.613	0.01163
(6)	(b) (6)	01/25/66	03/13/86	02/17/66	68-2546	03/13/66	1500	Charleston	1500	N/A	0.382+/-0.171	0.382	0.00317
and the same of the		01/18/66	02/07/66	01/28/66	66-494	02/07/66	970	Torrejon	200	N/A	8.49+/-1.84	10.503	0.00317
		02/25/66	03/08/66	03/02/66	66-2478	03/08/56	300	Torrejon	300	N/A	0.311	1.244	0.007
THE RESERVE	CANADA A A	01/29/68	03/18/66	02/22/66	66-2090	03/18/66	890	Torrejon	890	N/A	0.327+/-0.130	0.441	0.00259
		02/27/66	03/19/66 02/09/66	03/09/66	66-2228	03/19/66	920	Moron	920	N/A	ND	ND	
Carlotte Control		01/18/66	01/29/66	01/29/66	66-816 66-1144	02/09/66	290 194	Moran	200	N/A	0.46+/-0.32	1.903	0.00651
(C)	(1) (0)				00-1144	01/29/00	194	856 Eng. Bn., APO09081	194	03/17/66	ND	ND	
(6)	(b) (6)	01/29/66	02/19/66	02/08/66	66-1206	02/19/68	1400	San Pablo	1000	N/A	ND	ND	
400		02/25/68	03/08/66	03/02/66	68-2490	03/08/66	1000	San Pablo	1000	N/A	ND	ND	
	100000000000000000000000000000000000000	01/18/66	01/17/66	01/17/66	66-1150	01/17/68	465	Torrejon	465	03/17/68	ND	ND	
	NATE OF THE REAL PROPERTY.	01/18/66	02/28/66	02/07/66	66-1495	02/28/66	260	US Naval Ocean Graph	270	N/A	ND	ND	
6)	(b) (6)	02/27/86	03/14/66	03/06/66	66-2680	03/28/66	900	Torrejon	900	N/A	0.178+/-0.113	0.237	
H. C.		01/19/66	02/08/66	01/29/66	66-843	02/08/66	650	Toul Rosieres	200	N/A	ND	ND	
2)	(I-) (C)	03/08/66	03/19/66	03/13/66	66-2178	03/19/66	250	Toul Rosieres	250	N/A	0.212	1,018	
6)	(b) (6)	02/13/66	03/08/66	02/24/66	66-2460	03/08/66	850	Moron	850	N/A	ND	ND	
		02/08/68	02/08/66	02/08/66	66-1375	02/28/66	840 (12-hr)	Torrejon	840	N/A	0.108	0.108	
AND THE STREET, STREET		02/08/66	03/01/66	02/18/66	66-1850	03/01/68	760	Moron	760	N/A	ND	ND	
		02/18/68 02/25/66	03/04/66	02/25/66	66-2345	03/04/66	910	Moran	910	N/A	ND	ND	
1000		03/14/66	03/18/66	03/07/66	66-2253 66-2072	03/18/66	900	Moron	900	N/A	0.233+/-0.134	0.311	0.000994
		01/18/66	02/05/68	01/27/66	66-920	03/19/66	960	Moron	960	N/A	1.23+/-0.23	1.538	0.00179
	TOTAL TRANSPORT	03/17/66	03/17/68	03/17/66	66-2937	02/05/66	420 500	Torrejon	200	N/A	1.33+/-0.49	3.800	0.0011
THE PARTY OF	and the second second	00/1/100	03/1//00	03/1/100	66-2937	04/20/66	500	Torrejon	500	N/A	ND	ND	
6)	(b) (6)	02/04/66	02/25/86	02/14/66	66-1487	03/04/66	3700	USS Masopelea	1000	07/18/68 N/A	NR NR	NR NR	
					68-2874	03/04/66	1000	ATF-158 USS Masopelea	1000	04/15/66	0.171+/-0.119	0.205	
(6)	(b) (6)	01/25/66	02/09/68	02/01/66	68-799	02/09/66	910	ATF-158 Hanaw, Germany	200				
		01/18/66	02/15/68	02/01/66	68-951	02/15/66	2100	Torrelon	200	N/A N/A	ND	ND	
	QUESAL TO	02/27/66	03/08/66	03/03/68	66-2474	03/08/66	900	Torrelon	900	N/A	ND 0.27	ND	
		01/18/66	02/05/66	01/27/66	66-892	02/05/68	540	Torrelon	200	N/A	6.63+/-1.12	0.360 14.733	0.0400
Sec. 1973. 1771	100 100 100	01/25/66	02/09/68	02/01/66	66-730	02/09/66	980	Hanaw, Germany	200	N/A	ND	ND	0.0426
1000000	V 43.75 (2)	02/08/66	03/19/66	02/27/68	66-2084	03/19/66	990	Moron	990	N/A	0.254+/-0.112	0.308	0.00176
		02/18/66	03/18/66	03/04/66	66-2089	03/18/66	800	Torrejon	800	N/A	0.191+/-0.108	0.287	0.00170
14 D 18 20 5 5	1356 Jale 1611	01/25/66	02/09/66	02/01/66	66-743	02/09/66	725	Hanaw, Germany	200	N/A	1.34+/-0.77	2.218	0.00756
A STATE OF THE	NW STORY	01/29/66	02/19/66	02/08/66	66-1195	02/19/66	1395	San Pablo	1000	N/A	3.85+/-9.56	3.850	2.00100
	AM 5765 AM	01/18/66	01/29/66	01/23/66	86-1110	01/29/66	960	Moron	960	N/A	NR	NR	
1 1 1 1 1	The state of the	D1/29/86	03/12/66	02/25/66 02/10/66	66-2035	03/19/68	900	Torrejon	900	04/07/68	NR	NR	
		Unzaido	322200	02/10/00	66-1063 66-2928	02/22/66 04/21/66	910 600	Torrejon	910	03/17/66	8.22+/-0.78	10.840	0.0526
3)	(b) (6)	01/18/68	02/08/68	01/27/66	66-505	02/05/66	930	Torrejon	600	N/A	1.37+/-0.30	2.740	- 1
	V-7 (-1	03/12/66	03/19/66	03/15/68	68-2181	03/19/66	500	Torrejon Torrejon	200 500	N/A	5.05+/-1.68	6.516	0.0199
Children Son III		01/19/68	02/08/66	01/29/66	66-833	02/08/66	775	Toul Rosleres	200	N/A N/A	0.54 NR	1.296 NR	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A CONTRACTOR OF THE PARTY OF TH	01/18/66	02/05/86	01/27/66	66-887	02/05/66	870	Torrejon	200	N/A	1.08+/-0.67	1.462	0.00443
THE REST	COLUMN TO THE REAL PROPERTY.	01/18/66	01/29/66	01/23/66	68-1066	01/29/68	440	Zaragoza	440	N/A	ND	ND	0.00443
Carl Carl Carl	100000	02/10/68	03/19/66	02/28/66	66-2166	03/19/68	1150	Moron	1150	N/A	0.329	0.343	
- SEVERE TRANS		02/01/66	02/18/66	02/09/66	68-1198	02/18/66	n/a	Moron	n/a	N/A	NR	NR	
	CONTRACTOR OF THE PARTY OF THE	01/24/86	04/11/66	03/03/66	66-1038	02/20/68	495	Torrejon	200	N/A	1.42+/-0.55	3.442	0.0183
6)	(b) (6)				66-3404	06/10/66	590	HQ 8 AF Westover AFB, Mass	330	N/A	NR	NR	
	(0) (0)	02/10/66	03/20/66	03/01/66	66-2309	03/20/66	860	Torrejon	860	N/A	0.199+/-0.134	0.278	0.000132
	OF A SECURE OF SECURE	01/20/66	02/08/66	01/29/66	66-443	02/08/66	600	Toul Rosleres	200	N/A	0.76+/-0.48	1.520	0.00403
CAN CAN	THE RESERVE OF THE PERSON NAMED IN	02/26/66	03/28/68	03/13/66	66-2583	03/19/66	n/a	Moron	n/a	N/A	NR	NR	0.00400
6)	/LV (0)	02/25/66	0244000		66-3111	04/13/66	550	Moron	550	N/A	0.233+/-0.072	0.508	
6)	(b) (6)	02/25/66	03/18/88	03/07/66	66-2247	03/18/66	510	Torrejon	510	N/A	0.126+/-0.128	0.298	
EVIDA IV	The state of the state of	01/18/68	02/19/66	02/03/66	68-1225	02/19/86	650	Torrejon	650	N/A	NR	NR	

			duals with Urin	o oumpido	Oladolliod (	is Remailin	g Cases						m ci	2
		Estimated		Estimated									MC.	,
mo	ecu	Start	Estimated End	Acute Exposure		Lection 1	Sample Vol		Sample		Result	24hr Activity	Recorded Systemic	
(6)	(b) (6)	Date 01/18/66	Exposure Date 02/07/66	Date 01/28/66	5ample No. 66-493	Sample Date 02/07/66	(mL) 950	Base Torrejon	Anal 200	Date Anal	(pCl/sample) 1.43+/-1.11	(pCl/day) 1.806	Body Burden 0.00582	-
(6)	(-) (-)	01/18/66	02/08/66	01/28/66	66-1395	02/28/68	980 (12-hr)	Torrejon	1000	N/A	0.539	0.539	0.00582	
		01/18/86	03/04/66	02/09/68	66-341	02/04/66	1000	Torrejon	200	N/A	2.16+/-1.25	2.592	0.0108	
(6)	(b) (6)		75-0.0		66-2373	03/04/86	700	Torrejon	700	N/A	0.435+/-0.182	0.746	0.00137	
(6)	(b) (d)	02/09/66	03/09/66	02/23/86 01/28/66	66-2392	03/09/86	1200	Torrejon	1200	N/A	0.147+/-0.143	0.147	0.000778	
		03/12/66	03/19/66	03/15/88	66-491 66-2179	02/07/66 03/19/66	830 600	Torrejon Torrejon	200 600	N/A N/A	3.93+/-1.31	5.682	0.0183	
		01/18/66	02/07/86	01/28/66	66-477	02/07/86	625	Torrejon	200	NA	ND	0.216 ND		
		01/18/66	02/14/66	01/31/66	66-269	01/21/66	790	Torrejon	200	N/A	1.074+/-0.7031	1.631		
(0)	Control of the Contro				66-1006	02/14/66	1170	Kirtland AFB BO97	200	N/A	NR	NR		
(6)	(b) (6)	01/29/66	02/22/66	02/10/66	66-1092	02/22/66	1150	Torrejon	1150	03/17/68	3.93+/-0.54	4.101	0.0192	
		01/18/66	01/21/66	01/19/66	66-210	01/21/66	300	Torrejon	200	N/A	NR	NR		
50x02545		01/18/66 02/25/66	01/21/66 03/18/66	01/19/66 03/07/66	66-217 66-2261	01/21/66 03/18/66	400 880	Torrejon	200	N/A	NR 0.4222140.4400	NR		
		02/06/66	03/18/66	02/16/88	66-1385	03/18/66	900	Moron Torrejon	880 930	N/A N/A	0.1338+/-0.1408 1.51	0.182 2.013	0.006	
78 M S - 57 M	<b>大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大</b>	03/14/66	03/19/66	03/16/66	66-2123	03/19/66	900	Torrelon	900	N/A	0.240+/-0.165	0.320	0.000	
37.572		01/22/66	03/07/66	02/13/66	66-2992	04/26/66	750	Furth , Ger. US Army, 20th Sta Hosp.	750	N/A	ND	ND	0.0003	
(6)	(b) (6)	01/25/66	02/09/66	02/01/66	66-735	02/09/66	970	Hanaw, Germany	200	N/A	1.88+/-0.87	2,326	0.0079	
N. S. S. Min.		03/14/66	03/19/66	03/16/66	66-2077	03/19/66	310	Torrejon	310	NA	0.128+/-0.076	0.495	0.0070	
		02/09/66	03/09/66	02/23/68	66-2399	03/09/66	980	Torrejon	980	N/A	0.129+/-0.107	0.158	0.000719	
		01/18/65 03/11/68	02/05/66	01/27/66	66-886	02/05/66	840	Moron	200	N/A	0.63+/-0.34	0.900	0.00259	
		02/25/66	03/19/66	03/15/66 03/08/66	66-2180 66-2224	03/19/66	950 730	Maron Maron	950	N/A	0.342	0.432		
TO 16 1944	100000000000000000000000000000000000000	01/31/66	03/03/66	02/15/66	66-2012	03/03/66	890	Torrejon	730 890	N/A N/A	0.1015+/-0.1088 0.401+/-0.147	0.167 0.541		
		01/18/66	04/11/66	02/28/68	66-3115	04/13/66	1450	San Pablo	725	N/A	0.217+/-0.120	0.217		
		01/28/66	02/09/68	02/02/66	66-815	02/09/66	910	Hanaw, Germany	200	N/A	ND	ND		
	A	01/18/66	02/07/66	01/28/66	66-456	02/07/66	520	Torrejon	200	N/A	0.55+/-0.40	1.269	0.00389	
10 10 miles		01/18/66	02/03/68	01/26/66	66-1817	02/03/66	875	Torrejon	875	N/A	0.64	0.878	0.00714	
F 2 12	5-27-11	01/18/66 01/18/66	02/06/66 03/17/66	01/27/66 02/16/66	66-512 66-2019	02/06/66 03/17/66	570 1750	Torrejon Blytheville AFB, AR	200 1750	N/A N/A	1.19+/-0.74 ND	2.505 ND	0.00764	
(6)	(b) (6)	01/24/66	02/19/66	02/08/66	66-1952	02/23/66	1350	Тоггејоп	1350	N/A	0.187+/-0.093	0.187		
( = 7	(-) (-)	01/18/66	02/04/66	01/28/68	66-344	02/04/88	800	Топејан	200	N/A	2.37+/-0.92	3.555.	0.0112	
SUPPLIES BY	AND THE STREET, STREET	03/14/88	03/14/66	03/14/68	66-2069		960	Moron	960	N/A	0.571+/-0.171	0.714	0.00235	
		01/17/56	02/06/66	01/27/66	66-913	02/08/66	945	Топејоп	200	N/A	ND	ND		
		02/06/66	03/19/66	02/26/66	66-2129 66-1377	03/19/66	600	Torrejon	600	N/A	0.159+/-0.119	0.318	0.000231	
					66-1377	02/28/66	840 (12-hr) 840 (12-hr)	Torrejon	872	N/A 08/29/66	ND NR	ND NR		
(6)	(b) (6)	02/10/66	03/19/66	02/28/66	66-2136	03/19/66	860	Moron	860	N/A	ND	ND		
	MANAGER DEFEN	02/01/68	02/19/66	02/10/66	66-1216	02/19/66	970	Sandla Base	970	N/A	4.67+/-1.29	5.777	0.0183	
THE RESERVE THE PARTY.		02/06/66	02/28/86	02/16/66	66-1386	02/28/66	1520	Torrejon	1000	N/A	2.13	2.130	0.009	
TO THE	(C) (C) (C) (C)	01/19/68	02/08/86	01/29/66	66-840	02/08/66	780	Moron	200	N/A	ND	ND		
0.551 18/51/51	NUMBER OF STREET	02/01/88 01/29/88	02/26/66	02/13/66 02/10/66	66-1406 66-1085	02/28/66	800 510	Torrejon	832	N/A	0.363+/-0.212	0.545	0.00182	
	\$20.00 may \$20.00	01/18/66	02/05/66	02/10/66	66-931	02/05/68	880	Torrejan Maron	510 200	03/17/66 N/A	1.28+/-0.34 16.2+/-2.2	3.012	0.0147	
N. H. M. S. F.		01/18/66	02/07/66	01/28/86	66-468	02/07/66	845	Torrejon	200	N/A	0.90+/-0.78	22.091 1.278	0.0634	
REAL PROPERTY.	DUTCTP STORE ON THE STORE OF TH	02/15/86	04/11/68	03/14/68	68-1949	03/18/66	1550	Torrejon	1550	N/A	1.31+/-0.23	1.310	0.00758	
				- Annual Control of the Control of t	66-2936	04/15/66	1000	Torrejon	1000	N/A	ND	ND		
5)	(b) (6)	01/18/66	01/21/66	01/19/66	66-2938	04/14/66	1000		200	07/05/66	7.403+/-0.455	8,916	. 8	
,	(5) (5)	02/06/66	02/28/66	02/16/66	66-1425	01/21/66 02/26/68	610 820	Torrejon Moron	200 644	N/A N/A	0.8528+/-0.8375	1.536	the same	
		02/06/66	02/26/66	02/16/66	66-1431	02/26/66	900	Moron	938	N/A	0.440+/-1.81 NR	0.852 NR		
SECTION AND ADDRESS.		02/21/66	03/19/66	03/06/66	66-2082	03/19/66	870	Moron	870	N/A	0.163+/-0.086	0.225	0.000937	
7 1 2 2 2		01/18/66	02/08/66	01/28/66	66-1342	02/08/66	1210	<b>Toul Rosleres</b>	1000	N/A	NR	NR	2.223007	
ST TO STORY	450052151	01/17/86	01/24/66	01/20/86	66-2588	03/23/66	1200	Norton AFB, CA	1200	N/A	0.221+/-0.134	0.221		
THE SECTION		02/11/68	03/19/66	03/01/86	66-2314 66-490	03/19/86	550	Torrejon	550	N/A	0.111+/-0.108	0.242	0,000852	residence in
BOW and YOU	1.32 T 512 31 14	01/18/68	02/05/88	01/28/66	66-940	02/07/66	920 350	Torrejon Torrejon	200	N/A N/A	4.64+/-1.48	6.052	0.0195	
	A SHOP OF STREET	31110100	22000	- 11-1100	40.940	SELOGICO	300	Tunejun	200	INIA	0.70+/-0.57	2.400	0.00687	

	Estimated		Estimated									
	Start		Acute									Recorded
Name SSN	Exposure Date	Estimated End Exposure Date	Exposure Date	Sample No.	Sample Date	Sample Vol (mL)	Base	Sample	Date Anal	Result	24hr Activity	Systemic
(b) (6) (b) (6)	02/11/66	03/19/66	03/01/66	66-2132	03/19/66	880	Torreion	880	Date Anal N/A	(pCl/sample) 0.212+/-0.134	(pCl/day) 0.289	0.00133
(-) (-)	01/25/86	02/21/88	02/07/86	66-1114	01/24/66	980	Ramstein	980	03/23/68	NR	NR.	0.00133
				66-1013	02/21/86	1870	Torrejon	200	N/A	ND	ND	
(b) (6)				66-2586	03/16/66	2325	Ramsteln	2325	N/A	0.120+/-0.108	0.120	
(b) (b)	01/18/66	02/08/68	01/28/66	66-368	02/04/66	900	Torrejon	200	N/A	61.4+/-4.3	81.867	0.307
(b) (6)	0444000			66-1160	02/18/66	2120	Torrejon	2120	N/A	ND	ND	
(b) (c)	01/18/66	01/21/66	01/19/66	66-236	01/21/66	500	Torrejon	200	N/A	NR	NR	
(b) (6)	01/18/66	02/07/66	01/28/66	66-239 66-460	01/21/66	425	Torrejon	200	N/A	NR	NR	
(5) (5)	01/18/66	03/18/66	02/16/66	65-2244	02/07/66	395 440	Moron	200	N/A	2.06+/-0.71	6.258	0.0202
	01/18/66	02/04/66	01/26/66	66-339	02/04/68	900	Torrejan Torrejan	440 200	N/A N/A	ND	ND	12.2000
	02/13/66	03/19/66	03/02/66	66-2153	03/19/66	940	Torrejon	940	N/A	2.22+/-0.99	2.960	0.0111
	01/18/66	02/07/66	01/28/66	66-465	02/07/68	960	Torrejon	200	N/A	0.137+/-0.107	0.175 1.538	0.000839 0.00469
	01/18/68	02/04/66	01/26/66	66-338	02/04/66	660	Torrejon	200	N/A	ND	ND	0.00469
<b>医结合医心性神经</b>	01/18/66	03/03/86	02/09/66	66-1936	03/03/66	1825	625TH MASS (MAC)	1905	N/A	0.225+/-0.118	0.225	
(b) (6) (b) (6)	02/08/66	02/25/66	02/16/66	66-1354	02/25/66	500	Toul Rosieres	520	N/A	ND	ND	
	01/29/66	03/19/66	02/22/66	66-2044	03/19/66	790	Torrejon	790	04/05/68	NR	NR	
	01/18/66	02/26/66	02/08/66	66-1414	02/26/66	880	Torrejon	915	N/A	ND	ND	
(b) (c)	20000000000			66-1414	02/26/86	880	1 00 00 miles		07/29/66	NR	NR	
(b) (6) (b) (6)	01/18/66	01/21/66	01/19/68	66-265	01/21/66	1100	Torrejon	200	N/A	NR	NR	
	01/18/66	01/31/66	01/24/86	66-381	02/01/66	2800	Sembach	200	N/A	ND	ND	
(L) (C)	04/40/00	annous		66-381	02/01/66	2800			n/a	ND	ND	
(b) (6)	01/18/68	03/02/66	02/08/56	66-912	02/18/66	2760	Seymour Johnson	200	02/23/66	ND	ND	
(b) (6)	01/18/68	02/07/66	01/28/66	66-1298 66-1353	03/02/86	2910	Seymour Johnson	1000	N/A	ND	ND	
(5) (5)	01/20/66	02/07/66	01/29/66	65-466	02/07/66	340 655	Moron	353	N/A	0.158+/-0.209	0.551	
	01/31/66	03/20/66	02/24/66	66-2291	03/20/68	550	Toul Rosieres Norfelk	200	N/A	0.64+/-0.52	1.173	0.00375
	01/18/66	02/22/66	02/04/66	66-1243	02/22/68	810	Offutt AFB, NE	550 842	N/A N/A	0.133+/-0.120	0.290	0.00124
· · · · · · · · · · · · · · · · · · ·	02/08/66	02/26/66	02/16/66	66-1423	02/25/68	760	Moron	790	N/A	ND 0.453+/-0.175	ND 0.715	
(II.) (O)				66-1423	02/26/66	760	moron	750	06/23/68	0.057+/-0.023	0.090	
(b) (6) (b) (c)	01/18/66	02/16/88	02/01/66	66-987	02/16/66	2570	Torrejon	200	N/A	ND	ND	
	02/18/68	03/18/66	03/04/66	66-2114	03/18/66	430	Moron	430	N/A	0.179+/-0.118	0.500	0.00137
	02/08/88	02/28/66	02/16/66	66-1433	02/26/66	720	Moron	748	N/A	0.131+/-0.178	0.218	0.00101
	02/10/66	03/08/68	02/23/66	66-2510	03/08/66	1000	Maron	1000	N/A	0.45	0.540	
(b) (6)	01/18/66	03/25/66	02/20/66	68-2597	03/25/66	950	USAH Wurzburg, Germany	950	N/A	0.371+/-0.210	0.469	
(b) (6)	02/27/86	03/19/66	03/09/66	66-2125	03/19/66	940	Torrejon	940	N/A	ND	ND	
	02/05/86	02/25/66	02/15/66	66-1349	02/25/66	600	Sembach	624	N/A	0.176+/-0.574	0.352	
	02/09/66	03/01/66	02/19/66	66-1852	03/01/66	600	San Pablo	600	N/A	1.86+/-0.35	3.720	
	01/18/66	03/18/66	03/07/66	66-2264	03/18/66	950	Moron	950	N/A	0.161+/-0.113	0.203	0.000986
	02/02/66	02/22/68	02/12/66	66-778 66-1088	02/12/66	785 370	Torrejon	200	N/A	2.77+/-0.98	4.234	0.0166
Many Sales and American Sales an	020200	022200	021200	68-2592	03/28/56	1750	San Pablo San Pablo	370	03/17/86	10.6+/-0.8	34.378	0.146
(b) (6)	02/18/88	03/19/68	03/04/86	66-2048	03/19/66	800	Moron	1750	N/A	0.229+/-0.184	0.229	
V-7 V-7	02/21/66	03/18/66	03/05/86	66-2579	03/18/66	1000	Torrejon	1000	N/A N/A	0.269+/-0.109	0.404	
	02/18/88	03/12/66	03/01/66	66-2033	03/19/66	1500	Torrejon	1500	N/A	.396+/-0.175	0.475 0.167	
	02/06/66	02/08/66	02/07/68	66-1397	02/28/66	880 (12-hr)	Moron	915	N/A	0.195	0.195	0.0008
	01/18/66	03/08/66	02/11/88	66-2477	03/08/66	250	Torrejon	250	N/A	0.38	1.728	0.0008
	01/18/68	02/06/68	01/27/86	66-502	02/06/86	860	Torrejon	200	N/A	2.36+/-0.99	3.293	0.01
	01/29/68	02/22/68	02/10/88	66-1090	02/22/68	1460	Torrejon	1460	03/17/86	4.35+/-0.53	4.350	0.0212
(株式の大学では、1987年度)	03/14/66	03/19/86	03/16/68	68-2158	03/19/66	900	Топејоп	900	N/A	0.148+/-0.135	0.197	0.000215
	03/21/66	04/11/66	03/31/86	66-3198	05/09/88	950	Torrejon	950	N/A	0.191+/-0.089	0.241	
	01/18/66	02/06/66 03/24/68	01/27/66	66-503	02/06/66	900	Torrejon	200	N/A	4.89+/-1.43	6.520	1.99
	03/14/66	03/24/68	03/11/66	66-2698 68-2555	04/05/68	800	Moron	800	N/A	0.133+/-0.113	0.200	
· 学校、10 (10 元 10 元)	01/17/66	02/02/86	03/16/66	66-3211	03/19/66	950	Torrejon	950	N/A	0.147+/-0.143	0.186	0.000213
	J.11100	320200	01120100	00-3211	05/16/66	450	67th ARS Prestwick MOA, Scotland	450	N/A	0.161+/-0.078	0.429	
(b) (6)	02/11/66	02/15/65	02/13/66	66-3208	04/20/66	1340	Torrejon	670	N/A	0.500+/-0.198	0.500	

Recorded Systemic

Body Burden

0.000714

0.0259

0.0115 0.00183 0.00109 0.00443 0.000864 0.00184

0.00108

24hr Activity (pc(day))
NR
NR
0.163
0.163
0.197
0.164
0.197
0.164
0.335
0.220
0.8494
ND
0.156
0.754
0.164
0.165
0.754
NR
NR
0.754
NR
0.758
0.286
NR
0.758
0.286
NR
0.758
0.286
0.286
NR
0.163
0.758
0.291
0.291
0.291
0.291
0.292
0.293

(pcl/sample)
NR
0.136+/-0.082
0.105+/-0.102
0.114+/-0.081
0.151+/-0.100
0.1302+/-0.1302
ND
0.1768+/-0.144
0.183+/-0.093
4.534+/-0.084
1.444+/-0.129
0.225+/-0.1302
0.1224+/-0.130
0.1564+/-0.084
1.444+/-0.129
0.225+/-0.130

Palomares Nuclear Weapons Accident

DRAFT

b) (6)

(b) (6

(b) (6

THE RESERVE OF THE PARTY OF THE		02/06/68	02/26/66	02/16/66	66-1424	02/26/86	860	Moron	894	N/A	0.205+/-0.124	0.286		- 1
	71.3.763				66-1424	02/26/66	860			06/28/66	NR	NR		
3)	(b) (6)	02/13/66	03/13/66	02/27/66	66-2678	03/25/66	2000	Torrejon	2000	N/A	0.125+/-0.094	0.125		1
	V-1-X-1	01/17/66	02/12/68	01/30/66	68-777	02/12/66	292	Torrejon	200	N/A	0.49+/-0.45	2.014	0.00791	- 1
		01/18/66	02/05/66	01/27/66	66-924	02/05/66	465	Torrejon	200	N/A	1.42+/-0.65	3.665	0.0105	- 1
		01/22/66	02/20/66	02/05/66	66-1040	02/20/66	2200	Furth , Ger. US Army, 20th Sta	200	03/17/88	12.91+/-3.17	12.910		
6)	(b) (C)							Hosp.					- Library	1
6)	(b) (6)	02/06/66	02/28/86	02/16/68	86-1411	02/26/66	640	Moron	665	N/A	1.07+1-0.13	2.006	0.00454	- 1
	A STATE OF THE PARTY OF THE PAR	02/22/66	03/19/66	03/08/86	66-2194	03/19/66	800	Moron	800	N/A	ND	ND		- 1
		01/18/66	01/28/86	01/23/66	66-3026	05/06/88	1400	Ramstein	1400	N/A	0.131+/-0.057	0.131		1
	100000000000000000000000000000000000000	02/08/66	03/19/66	02/27/86	66-2183	03/19/86	802	Toul Rosieres	800	N/A	0.829	1.240		1
	A PRODUCT ON THE	01/18/86	02/05/88	01/27/66	86-884	02/05/66	880	Torrejon	200	N/A	ND	ND		1
	A 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	02/06/66	02/26/66	02/16/66	66-1412 66-1412	02/26/66 02/26/66	650 650	Moron	676	N/A 06/27/68	0.135+/-0.103 NR	0.249 NR		
6)	(b) (6)	03/14/66	03/28/66	03/20/66	66-2280	03/29/86	710	Torrejon	710	N/A	ND	ND		- 1
	( ) ( )				66-2865	04/06/86	1500	Torrejon	1500	N/A	1.16+/-0.28	1.160		- 1
	(I=) (C)				66-2865	04/06/66	1500			08/30/66	NR	NR		- 1
(1)	(b) (6)	02/09/66	03/08/88	02/22/66	66-1865	03/08/66	800	Moron	800	N/A	ND	ND		- 1
	200				66-1865	03/08/68	800			07/07/66	0.273+/-0.226	0.410		- 1
6)	(b) (6)	01/18/66	02/09/66	01/29/66	66-656	02/09/66	1950	Blytheville AFB, AR	n/a	N/A	NR	NR		
<b>6</b> )	(b) (6)	01/18/86	02/05/86	01/27/88	66-922	02/05/66	820	Torrejon	200	N/A	NR	NR		
	(-) (-)	03/26/66	04/11/66	04/03/66	66-3110	04/13/66	625	Moron	625	N/A	0.330+/-0.087	0.634		
	13140 514	02/11/66	03/12/66	02/25/66	66-2641	03/28/66	600	09696 *D* Trp, 2/4 1966	600	N/A	0.287+/-0.168	0.574		100
6)	(b) (6)	02/06/66	02/18/66	02/12/66	66-1388	02/18/66	700	Torrejon	728	N/A	1.05	1.800	0.004	- 1
	(5) (5)	01/18/66	02/13/66	01/31/66	66-1441	03/02/66	930	Moron	930	03/17/68	ND	ND		D
10 mg	100000000000000000000000000000000000000	01/25/66	02/09/66	02/01/68	66-811	02/09/66	810	Hanaw, Germany	200	N/A	1.64+/74	2.430	0.00873	15
		01/17/86	02/26/86	02/08/88	66-1418	02/26/66	880	Torrejon	915	N/A	0.117+/-0.157	0.160		pril
	100000000000000000000000000000000000000	01/18/66	01/17/66	01/17/88	66-1100	01/17/88	1160	Torrejon	1180	03/17/66	ND	ND		=
144734.466		03/26/66	03/29/68	03/27/66	66-3124	04/13/66	980	Moron	490	N/A	0.212+/-0.161	0.260		N
		7.6	3.47		66-3124-5	04/13/86	980	Moron	490	N/A	NR	NR		2001
6)	(b) (6)	01/24/66	01/30/66	01/27/66	66-2686	03/28/66	1800	Torrejon	1800	N/A	0.112+/-0.101	0.112		13
2)		02/18/88	03/08/66	02/27/66	86-2472	03/08/86	900	Топејоп	900	N/A	0.194	0.259		1-
K MITS AVEC AND AND ADDRESS OF THE PARTY AND A	ON A STATE OF THE SEA	01/18/88	02/04/66	01/26/68	88.338	02/04/88	950	Mome	200	AUA	ND.	AID.		

Base
I/Ia
Torrejon
Moron
Moron
Torrejon
Moron
Torrejon
Torrejon
Torrejon
Torrejon
Albuquerque, NM
Moron
Hanaw, Germany
Tinker AFB
Torrejon
Pirmasens
Zaragoza
Moron
Moron
San Pablo
Moron
Torrejon

Sample Da 04/20/86 04/20/86 03/91/66 03/14/66 03/14/66 03/14/66 03/19/66 03/19/66 03/03/66

ample No 66-3208-5 66-2003 06-2081 66-2139 66-2139 66-355 66-214 66-713 86-738 86-2018 66-525 66-225 66-225 66-225 66-2209 66-225 66-2209 66-2229 86-1901 66-241 66-241 66-244 66-1444 66-1444 66-147 66-6777 68-777 68-777

murviduaia	441611	Oillito	Campias	Olassilled	00 11011	Ruman	Caous

Estimated Acute Exposure Date O228/66 O2/23/66 O2/23/66 O3/02/86 O3/02/86 O3/02/86 O1/26/66 O1/27/66 O1/27/66 O1/27/66 O3/05/66 O

01/23/86 01/19/66 03/07/66 02/16/66

Estimated End

Exposure Date
04/11/68
03/09/66
03/19/66
03/19/68
03/19/68
03/19/68
03/19/68
03/19/68
03/19/68
03/19/68
03/19/68
03/19/68
03/19/68
03/20/68
03/20/68
03/20/68
03/20/68
03/20/68
03/18/68
03/18/68
03/18/68
03/18/68
03/18/68

01/29/66 01/21/66 03/19/66 02/26/66

Estimated Start Exposure Date O11/6/66 O2/19/66 O2/19/66 O2/13/66 O2/13/66 O11/16/66 O11/16/66 O11/16/66 O11/16/66 O11/16/66 O11/16/66 O2/13/66 O2/13/66 O2/13/66 O2/13/66 O2/13/66 O2/13/66 O1/16/66 O2/13/66 O2/13/66 O2/13/66

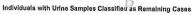
01/18/66 01/18/66 02/24/66 02/06/66

	SSN	Estimated Start Exposure Date	Estimated End	Estimated Acute Exposure Date	Sample No.	. Sample Date	Sample Vol	Base	Sample Anal	Date Anal	Result (pCl/sample)	24hr Activity (pCl/day)	Recorded Systemic Body Burden
6)	(b) (6)	02/13/66	03/19/66	03/02/66	66-2571	03/19/66	975	Torrejon	975	N/A	0.133+/-0.113	0.164	1915 Table 1915
	(6) (0)	01/18/66	02/11/68	01/30/66	66-771	02/11/86	771	Moron	200	N/A	2.42+/-1.13	3.767	0.0141
Service Control		01/24/66	02/20/66	02/08/66	66-1046	02/20/66	1410	Torrejon	200	N/A	3.24+/-1.51	3.240	0.017
		01/18/66	01/21/66	01/19/66	66-222	01/21/88	450	Torrejon	200	N/A	NR	NR	
100	の行品会議	03/10/66	04/08/66	03/24/66	66-2987	04/26/66	1100	Furth , Ger. US Army, 20th Sta Hosp.	1100	N/A	ND	ND	
C)	(b) (C)				66-2987	04/26/66	1100			07/14/88	0.437+/-0.027	0.477	
6)	(b) (6)	03/05/66	03/19/66	03/12/66	66-2336	03/19/68	890	Glessen	890	N/A	0.165+/-0.125	0.222	0.000519
	Alexander (Indian	01/18/68	03/19/66	02/17/86	66-2163	03/19/68	480	Torrejon	480	N/A	0.108	0.270	
BUILDING STATE		01/18/68	02/08/66	01/28/68	66-837	02/08/66	690	Torrejon	200	N/A	ND	ND	
STATE OF THE RESERVE		01/18/66 02/08/68	03/20/88	02/17/66	66-2307 66-1413	03/20/66	930	Torrejon	930 956	N/A N/A	0.411+/-0.201 0.194+/-0.156	0.530	0.0035
	11 Sept. 10 10	03/14/66	02/26/66	02/16/66	66-2173	02/20/66	920 750	Moron Moron	750	N/A	0.19447-0.158	0.253	0.00108
223 Land 1988	374 MISS 18	03/14/00	03/09/66	02/23/66	66-2397	03/09/66	450	Torrelon	450	NA	ND	ND	
	42000	02/21/88	03/18/86	03/05/66	66-2235	03/18/66	940	Torrejon	940	N/A	ND	ND	
		03/11/68	03/29/68	03/20/66	66-2283	03/29/68	700	Pimasens	700	N/A	0.147+/-0.136	0.252	0.000332
	SALE WITH STORY	02/01/66	02/10/66	02/05/66	66-3197	05/07/66	520	Torrejon	520	N/A	0.145+/-0.079	0.335	
		02/07/68	03/13/66	02/24/68	66-2536	03/13/88	1000	Torrejon	1000	NA	0.135	0.162	
		02/10/66	03/08/66	02/23/66	66-2491	03/08/88	700	Moron	700	N/A	0	0.000	
		02/21/66	03/18/86	03/05/66	66-2215	03/18/66	630	Zaragoza	630	N/A	10.205+/-0.158	19.438	0.000997
		02/28/66	03/19/66	03/09/66	66-2568	03/19/66	500	Torrejon	500	NA	0.229+/-0.184	0.550	
		01/18/66	01/29/66	01/23/66	66-1094	01/29/66	1030 2000	Torrejon	1030	N/A N/A	ND ND	ND ND	
250		01/18/66 01/29/66	02/22/66	02/10/66	66-1245 66-1087	02/22/66	555	Offutt AFB, NE Torrejon	1000 555	03/17/68	16.1+/-1.0	34.811	0.17
	Section 19 M.	01/29/00	02/22/00	02/10/00	66-2935	03/18/88	1600	Torrejon	1600	N/A	1.32+/-0.29	1.320	0.17
					66-2935	03/18/66	1600	ronejon	1000	08/27/68	NR	NR	
5)	(b) (6)	01/18/66	02/07/66	01/28/68	66-488	02/07/66	550	Moron	200	N/A	1.46+//-0.71	3.185	0.0103
	(-7/-)	01/18/88	02/16/88	02/01/68	66-964	02/16/66	1050	Torrejon	200	NA	2.04+/-1.11	2.331	0.011
		01/18/86	01/30/68	01/24/68	66-1069	01/30/66	750	Moron	750	N/A	0.115	0.184	0.000312
		01/17/86	03/04/66	02/09/66	66-2378	03/04/66	1400	Torrejon	1400	NA	0.238+/-0.143	0.238	0.00179
C		01/17/86	01/21/68	01/19/68	66-253	01/21/68	800	Torrejon	200	N/A	17.76 +/- 6.88	26.640	
6)		02/24/66	03/19/86	03/07/68	66-2558	03/19/66	800	Toul Rosleres	800	N/A	0.173+/-0.118	0.260	0.00079
		02/13/86	03/23/66 02/05/66	03/04/68	68-2582 68-1347	03/23/66 02/05/66	1400 610	Moron	1400 634	N/A N/A	0.976+/-0.295	0.976	0.005977
	12 To 10 To	01/18/86	02/05/66	01/27/66	66-1344	02/05/66	720	Torrejon Toul Rosieres	750	N/A N/A	NR 0.820+/-0.181	NR 1.033	0.00255
		01/18/88	01/23/66	01/20/66	66-1935	01/23/66	1200	Torrejon	1250	N/A	0.247+/-0.104	0.247	0.00233
		01/18/66	01/25/66	01/21/66	68-1991	01/25/66	1000	Torreion	1000	N/A	0.217+/-0.099	0.260	
		01/18/86	01/22/66	01/20/66	68-2883	04/03/66	1600	Torrejon	1600	N/A	ND	ND	
	(1) (0)				66-2883	04/03/66	1600			08/17/66	NR	NR	
	(b) (6)	01/19/66	02/11/66	01/30/66	66-769	02/11/66	117	Torrejon	117	N/A	0.36+/-0.29	3.692	0.0139
	A SOUTH PROPERTY.	01/18/86	02/07/66	01/28/88	68-453	02/07/66	460	Moron	200	N/A	0.51+/-0.40	1.330	0.00373
SECTION STREET	PER LAYOUR	01/18/66	04/08/66	02/27/88	66-2862	04/08/66	800	Moron	800	N/A	ND	ND	
21	(b) (C)	03/10/66	02/00/00	DOLLETING	66-2862 66-2292	04/08/66	800	0	750	07/20/88	1.306+/-0.098	1.959	D 000007
5)	(b) (6)	03/10/66	03/20/66 02/09/66	03/15/66 02/01/66	66-797	03/20/66	750 930	Sembach Hangw, Germany	750 200	N/A N/A	0.161+/-0.118 4.47+/-1.35	0.258 5.768	0.000687
S. T. J. Co. L. C. C.		01/25/66	02/07/68	01/28/66	66-446	02/09/66	950	Moron	200	N/A N/A	1.53+/-0.92	1.913	0.0197
	0.5 TO \$ 0.00	01/18/66	03/02/68	02/08/66	66-1445	03/02/66	350	Moron	350	N/A	ND	ND	3.00303
N. A. J.	200	01/18/88	01/29/66	01/23/66	86-1141	01/29/66	340	656 Eng. Bn., APO09081	340	N/A	ND	ND	
6)	(b) (6) (b) (6)	02/05/66	02/25/66	02/15/66	66-1419 66-214	02/26/66	880 325	Torrejon	200	06/27/66 N/A	0.163+/-0.024 0.731+/-0.216 NR	0.222 NR	
6)	(D) (U)	01/15/66	02/09/88	02/01/66	66-753	02/09/66	690	Hanaw, Germany	200	N/A	4.60+/-1.32	8.000	0.0273
	Mary Jan 2	01/18/86	03/08/66	02/11/66	66-2829	03/08/66	1350	Vandenburg	1350	N/A	0.222+/-0.115	0.222	0.0273
CONTRACTOR OF THE PARTY OF THE		01/18/66	01/29/66	01/23/66	66-1082	01/29/86	1540	Torrelon	1540	N/A_	0.177	0.177	
16.6 (0.00)	CHARLES TO SERVICE TO	01/24/66	02/17/66	02/05/66	66-1119	02/17/86	530	Rein-Main	530	03/23/66	0.473+/-0.334	1.071	0.00231
1000 Sans	12 N. 123	01/18/66	02/06/66	01/27/66	66-514	02/06/66	820	Torrejon	200	N/A	6.52+/-1.42	9.541	0.0291
	ASSET OF THE PARTY	01/18/66	03/08/68	02/11/88	86-1870	03/08/66	500	Torrejon	520	N/A	NR	NR	
WE HAVE BUILDING	MARKET OF THE STATE OF THE STAT	02/24/88	03/18/66	03/06/66	66-2013	03/16/66	980	Torrejon	980	N/A	0.108+/-0.074	0.132	

Palomares Nuclear Weapons Accident

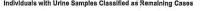
DRAFT





	Estimated		Estimated									
Name	Start Exposure	Estimated End	Acute Exposure			Sample Vol		Sample		Result	24hr Activity	Recorded Systemic
	Date 02/09/66	Exposure Date 03/09/66	Date		Sample Date	(mL)	Base	Anal	Date Anal	(pCl/sample)	(pCl/day)	Body Burdan
(b) (6)	01/18/66	02/04/68	02/23/66 01/26/66	66-2052 66-356	03/09/66	1450 370	Torrejon	1450	N/A	0.194+/-0.129	0.194	0.00102
	01/18/66	02/05/66	01/27/66	68-919	02/05/66	375	Torrejon Torrejon	200	N/A N/A	ND 0.99+/-0.40	ND	
	02/11/66	03/18/66	02/28/66	66-2089	03/18/66	820	Moron	820	N/A	0.169+/-0.091	3.168 0.247	0.00914
	02/11/86	03/19/66	03/01/66	66-2221	03/19/66	900	Moron	900	N/A	ND	ND	0.00108
	03/12/66	03/18/66	03/15/86	68-2270	03/18/66	640	Moron	640	N/A	0.126+/-0.105	0.238	0.00021
	01/18/66	02/07/86	01/28/66	66-458	02/07/66	180	Torrejon	180	N/A	0.203 +/- 0.23	1.353	
	02/10/86	03/04/66	02/21/66	66-2341	03/04/66	820	Torrejon	820	N/A	0.181+/-0.129	0.265	0.000799
The second secon	01/18/66	02/02/66	01/25/66	66-1071	02/02/66	400	Moron	400	N/A	ND	ND	
	02/04/66	03/09/66	02/23/66	66-2390 66-2016	03/09/66	1400	Moron	1400	N/A	0.115+7-0.107	0.116	0.00059
	02/04/66	02/20/66	02/12/66	66-1039	02/20/66	2000 700	USAH Numberg, Germany Furth, Ger. US	2000	N/A N/A	0.386+/-0.134 92+/-5	0.386 157,714	0.813
(b) (c) (b) (c)	I Jugan		0.00	00-1035	022000	700	Army, 20th Sta Hosp.	200	N/A	92+1-5	157./14	0,813
(b) (6)	01/18/88	02/07/66	01/28/66	66-487	02/07/68	500	Moron	200	N/A	0.75+/-0.59	1.800	0.00582
	02/18/66	03/04/66	02/25/66	66-2348	03/04/66	900	Torrejon	900	N/A	ND	ND	
	01/18/66	02/04/66	01/28/88	66-345	02/04/68	800	Torrejon	200	N/A	ND	ND	
	02/13/68	02/05/66	01/27/66	66-928 66-3119	02/05/66	480	Moron	200	N/A	1.06+/-1.02	2.650	0.00365
	02/11/86	03/18/86	02/28/66	66-2111	03/18/66	725 950	Moron	725	N/A	0.133+/-0.066	0.220	
	01/18/06	01/31/66	01/24/86	66-1091	01/31/66	625	Torrejon Torrejon	950 625	N/A N/A	0.251+/-0.138 ND	0.317 ND	0.00157
	02/18/88	03/04/68	02/25/86	66-2361	03/04/66	900	San Pablo	900	N/A	ND	D	
	01/23/68	03/20/66	02/20/66	66-2296	03/20/66	820	Pirmasens '	820	N/A	0.289+/-0.169	0.423	
	01/18/66	02/05/68	01/27/66	66-927	02/05/86	845	Torrejon	200	N/A	NR	NR	
(b) (c)	01/18/68	03/08/66	02/11/66	66-1903	03/08/66	1025	Torrejon	1025	N/A	0.199+/-0.093	0.233	
(b) (6) (b) (6)	02/06/66	03/04/66	02/19/66	66-2377	03/04/6B	900	Remstein	900	N/A	0.102+/-0.094	0.136	0.00051
	01/18/66	02/18/66 03/02/68	02/02/68	66-911	02/18/66	1085	Saymour Johnson	200	02/23/66	ND	ND	
(b) (6)	01/25/88	02/09/66	02/08/68	66-1297 66-746	03/02/66	2150 980	Saymour Johnson	1000	N/A	ND	ND	
(b) (6)	02/13/66	03/18/66	03/01/66	66-2276	03/18/66	800	Hanaw, Germany Torrejon	200 800	N/A	2.20+/-1.35	2.694	0.0092
	01/18/88	02/07/66	01/28/66	66-440	02/07/86	380	Moron	200	N/A N/A	0.376+/-0.195 0.52+/-0.37	0.584 1.842	0.00235
	01/18/66	04/08/68	02/27/68	66-2864	04/08/88	1800	Moron	1800	N/A	ND	ND	0.00533
(b) (6)				66-2864	04/08/68	1800	27.17	1000	07/20/88	1.428+/-0.181	1.428	
(b) (b)	01/18/86	03/08/66	02/11/66	66-1904	03/08/66	850	Torrejon	850	N/A	0.151+/-0.079	0.213	
(b) (c)				66-2310	03/19/66	660	Torrejon	660	N/A	0.136+/-0.114	0.247	0.000887
(b) (6)	01/18/66	02/06/66	01/27/66	68-529	02/06/66	945	Torrejon	200	N/A	ND	ND	
(b) (6)	01/18/66	03/24/66	02/19/66	66-2575 66-929	03/24/66	1100	USS Everglades AD 24	1100	N/A	0.208+/-0.139	0.227	
(-) (-)	02/06/66	02/26/66	02/18/65	66-1401	02/28/66	800	Moron Torrejon	200 832	N/A N/A	1.08+/-0.66 ND	3.240	0.00929
	01/18/88	02/08/66	01/28/66	66-839	02/08/66	620	Torrejon	200	N/A	1.23+/-0.82	ND 2.381	0.00773
	01/18/66	02/05/68	01/27/66	66-943	02/05/66	720	Топтејон	200	N/A	6.71+/-1.30	11,183	0.00773
(A)	02/07/66	03/04/68	02/19/66	66-2365	03/04/68	850	Wiesbaden	850	N/A	ND	ND	0.0322
	01/19/66	01/24/66	01/21/66	66-1482	03/03/66	1080	Ramstein	1000	N/A	0	0.000	
	02/11/66 01/18/68	03/18/66	02/28/88	66-2107	03/18/66	970	Torrejon	970	N/A	0.253+/-0.106	0.313	0.00175
	02/14/66	02/06/66	01/27/86	66-531	02/06/66	310	Torrejon	200	N/A	ND	ND	
	03/11/66	03/19/86	03/15/86	66-2533 66-2557	03/13/66	800	Torrejon	800	N/A	0.135	0.203	
	01/18/66	02/04/86	01/26/66	66-359	03/19/68	800 490	Moron Torrejon	800 200	N/A N/A	0.202+/-0.133	0.303	0.000417
(1) 10 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	01/18/66	02/07/86	01/28/88	66-479	02/07/66	610	Torrejon	200	N/A N/A	ND 1.73+/-0.81	ND 3,403	0.044
THE RESERVE OF THE PERSON OF T	01/18/86	01/13/66	01/15/66	66-1126	01/13/66	875	Torrejon	875	N/A	1.73+7-0.81 ND	3.403 ND	0.011
<b>电影 高级</b>	01/18/66	02/06/66	01/27/66	66-506	02/06/66	920	Torreion	200	N/A	3.82+/-1.30	4.983	0.0152
	01/18/66	02/03/66	01/26/68	66-1809	02/03/66	740	Moron	740	N/A	0.131	0.212	0.0102
	01/18/66	02/07/88	01/28/86	66-448	02/07/86	945	Torrejon	200	N/A	2.67+/-1.04	3.390	0.0104
	01717/88	03/13/68	02/13/66	66-2532	03/13/68	950	Torrejon	950	N/A	0	0.000	
( <u>b) (6)</u>	02/04/66	02/25/66	02/14/66	66-2162 66-1485	04/05/66 03/04/66	850 2710	Torrejon USS Recovery ARS-	850 1000	N/A N/A	0.108 3.14 +/- 12.20	0.152 3.140	
(b) (6)	02/13/68	03/08/66	02/24/66	66-2469	03/08/66	1000	43 Wheelus AF, Libya	1000	N/A	0.689+/-0.056	0.827	





Name	SSN	Estimated Start Exposure Date	Estimated End Exposure Date	Estimated Acute Exposure Date	Sample No.	Sample Date	Sample Vol	Base	Sample Anal	Date Anal	Result (pCl/sample)	24hr Activity (pCl/day)	Recorded Systemic Body Burder
	(b) (6)	01/18/88	02/12/66	01/30/86	68-791	02/12/68	655	Moron	200	N/A	ND	ND	IN THE STATE
		02/21/66	03/18/66	03/05/86	66-2241	03/18/68	630	Zaragoza	630	N/A	0.182+/-0.145	0.347	0.000885
	THE RESERVE	01/17/66	01/19/68	01/18/86	66-1950	02/22/66	1900	Torrejon	1900	N/A	0.660+/-0.169	0.680	0.00428
		01/18/66	02/12/66	01/30/88	66-779	02/12/66	720	Torrejon	200	N/A	3.34+/-1.11	5.587	
		01/19/66	02/11/68	01/30/86	66-763	02/11/68	870	Torrejon	200	N/A	1.98+/-0.82	3.546	0.0133
		02/01/66	03/29/66	03/01/66	66-2282	03/29/66	970	Torrejon	970	N/A	0.367+/-0.168	0.454	
		01/18/66	02/08/66	01/27/88	66-519	02/06/66	810	Moron	200	N/A	2.86+/-1.24	4.237	0.013
	With the property of the	02/13/66	03/08/88	02/24/66	66-2513	03/08/66	1300	Torrejon	1300	N/A	0	0.000	
		03/14/66	03/29/86	03/21/86	66-2281	03/29/66	820	Moron	820	N/A	0.449+/-0.200	0.657	0.000552
		01/18/66	02/07/66	01/28/86	66-441	02/07/66	570	Torrejon	200	N/A	1.44+/-0.66	3.032	0.00924
	STREET, THESE	01/18/66	02/04/66	01/26/66	68-335	02/04/66	260	Torrejon	260	02/07/66	ND	ND	
		02/13/66	03/19/66	03/02/66	66-2177	03/19/68	570	Torrejon	570	N/A	n/a	n/a	
	THE SHEET SHEET	01/25/66	02/09/66	02/01/66	66-731	02/09/68	700	Hanaw, Germany	200	N/A	1.70+/-1.14	2.914	0.00995
		03/28/66	04/11/66	04/04/66	66-2986	04/26/66	900	Furth , Ger. US Army, 20th Sta Hosp.	900	N/A	ND	ND	
	70 8				66-2986	04/26/66	900			07/13/66	NR	NR	
b) (6)	(b)	01/18/66	03/11/66	02/13/66	66-1643	03/11/66	260	US Naval Ocean Graph	270	N/A	NR	NR	
0) (6)	(b) (6)	02/18/86	03/19/66	03/04/66	66-2564	03/19/86	850	Torrejon	850	N/A	0.178+/-0.138	0.251	0.000967
		01/18/66	02/05/86	01/27/66	66-898	02/05/88	820	Moron	200	N/A	ND	ND	
		01/18/66	04/04/86	02/25/66	66-2894	04/04/86	1500	Vandenburg	1500	N/A	ND	ND	
		01/24/86	03/04/86	02/12/66	66-2346	03/04/66	600	Torrejon	600	N/A	ND	ND	
		01/27/66	02/19/66	02/07/66	66-1224	02/19/68	1140	San Pablo	1190	N/A	0.281+/-0.143	0.275	0.00119
					66-1224	02/19/66	1030	San Pablo	1000	N/A	0.176+/-0.574	0.205	
	(b) (6)	02/09/66	03/09/88	02/23/66	66-2394	03/09/66	750	San Pablo	750	N/A	0.220+/-139	0.352	0.00116
	(-) (-)	01/18/86	01/21/86	01/19/66	66-268	01/21/68	690	Torrelon	200	N/A	0.72 +/- 0.69	1.252	
	// \ /@\	02/12/66	02/26/68	02/19/66	66-1404	02/26/66	860	Torrejon	893	N/A	0.116+/-0.156	0.162	
o) (6)	(b) (6)	01/18/66	02/05/66	01/27/66	66-2682	03/25/66	1500	Torrajon	1500	N/A	0.155+/-0.124	0.155	
- / \-/	V-7 V-7	01/17/66	02/11/86	01/29/66	66-761	02/11/68	940	Torrejon	n/a	N/A	3.95+/-1.61	5.043	0.0189
		03/27/86	04/08/66	04/02/66	66-2933	04/20/66	900	Torrejon	900	N/A	0.138+/-0.107	0.181	
COLUMN TO THE PARTY OF THE PART	A CONTRACTOR OF THE PARTY OF TH				66-2933	04/20/66	900			08/19/66	NR	NR	
b) (6)	(b) (6)	01/24/86	02/13/66	02/03/66	66-1231	02/15/66	1390	Torrelon	700	N/A	0.427+/-0.0207	0.427	0.000368
	(0) (0)	01/25/86	03/29/66	02/25/66	66-2285	03/29/86	620	n/a	620	N/A	0.119+/-0.115	0.230	0.000973
AND THE RESERVE AND THE PARTY OF THE PARTY O	Committee of the Commit	02/13/68	03/03/66	02/22/66	66-1928	03/03/66	800	Moron	800	N/A	0.203+/-0.110	0.305	2.500575
14. \$ 000 to 100 to 100 to		02/10/66	03/19/66	02/28/66	66-2080	03/19/66	890	Torrelon	890	N/A	0.143+/-0.088	1.541	
A CENTRAL CONTROL		02/08/68	02/26/66	02/18/66	66-1405	02/26/66	540	Moron	562	N/A	NR	NR	