RECA REVISTED

Presented at the DRI-CEMP Summer Workshop 20 July 2015 By Bruce W. Church updated November 2015

INTRODUCTION

 The objective of this presentation is to illustrate that RECA (ACT) ignored data available during the gestation period of the ACT and wrongly included downwind areas in Arizona that received very little fallout from the Nevada Atmospheric Tests and wrongly excluded areas in Northern Utah that did receive easily measured fallout from Nevada tests.

•Data is presented showing that about 2/3rds of potential eligible claimants received minimal fallout.

•Technical data obtained from soil samples, Pu isotopic ratios, and rainfall was used to independently verify that the observations obtained historically from monitors measuring the fallout levels during actual cloud passage and the deposition resulting from it were correct. This verification data & the historical data were all available years before the ACT was signed into law.

• This ACT is flawed from it's original intent. However, even with ~\$1billion paid out to downwinders (24June15) there is nearly 3 times that amount remaining to be paid assuming that national cancer causation statistics apply to the downwind population.

What is the Radiation Exposure Compensation Act (RECA)?

- The Radiation Exposure Compensation Act (the Act, or RECA), <u>42 U.S.C. § 2210 note</u> (2006), was passed on October 5, 1990. The Act's scope of coverage was broadened in 2000.
- The Act presents an apology and monetary compensation to individuals who contracted certain cancers and other serious diseases:
- following their exposure to radiation released during the atmospheric nuclear weapons tests, or
- following their occupational exposure to radiation while employed in the uranium industry during the Cold War

The Act provides compensation to individuals who contracted one of 27 medical conditions

• This unique statute was designed to serve as an expeditious, *low-cost alternative to litigation*. Significantly, RECA does not require claimants to establish causation. Rather, claimants qualify for compensation by establishing the diagnosis of a listed compensable disease after working or residing in a designated location for a specific period of time. The Act provides compensation to individuals who contracted one of 27 medical conditions. It covers all states where uranium was mined and processed, as well as specified counties in Nevada, Utah, and Arizona, where significant fallout from the atmospheric nuclear testing was measured.



Downwinder Areas

•UTAH COUNTIES

•Beaver

•Garfield

•Iron

•Kane

Millard

•Piute

•San Juan

•Sevier

•Washington

•Wayne

•ARIZONA COUNTIES

•<u>Apache,</u>

Coconino,

•<u>Gila,</u>

•<u>Navajo,</u>

•<u>Yavapai,</u>

•and that part of Arizona (Mojave Co.) that is north of the Grand Canyon

- NEVADA COUNTIES
- Eureka
- Lander
- Lincoln
- Nye
- White Pine
- Clark County (portion consisting of townships 13-16, at ranges 63-71 [These townships have Hiway 93 as the approx. Western Boundary and the I-15 & Valley of Fire State park intersection as a point going straight east to the state line as the Southern Boundary. The Lincoln Co. line is the Northern Boundary and the AZ /UT state lines are the Eastern Boundary] This area includes the communities of Moapa, Glendale, Logandale, Overton, Mesquite, Bunkerville, Riverside and the Paiute Indian Reservation as well as scattered ranches/homes in the
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Nevada, Utah & Arizona Counties Eligible for RECA Compensation



ELIGIBILITY REQUIREMENTS

- IV. Downwinders: A payment of \$50,000 is available to an eligible individual who was physically present in one of the affected areas downwind of the Nevada Test Site during a period of atmospheric nuclear testing, and later contracted a specified compensable disease.
- A. Exposure: The claimant must have lived or worked downwind of atmospheric nuclear tests in certain counties in Utah, Nevada, and Arizona for a period of at least two years during the period beginning on January 21 1951 and ending on October 31, 1958, or for the period beginning on June 30, 1962 and ending on July 31, 1962.

POPULATION OF DOWNWIND ELIGIBLE COUNTIES FROM 1960

Utah Counties	Population	Nevada Counties	Population	Arizona Counties	Population	Grand Total
Beaver	4331	Eureka	767	Apache	30438	
Garfield	3577	Lander	1566	Coconino	41857	
Iron	10795	Lincoln	2431	Gila	25745	
Kane	2667	Nye	4374	Navajo	37994	
Millard	7866	White Pine	9808	Yavapai	28912	
Piute	1436	Clark-townships 13-16	3000 (estimate)	Mojave – North of the Grand Canyon	1000 (estimate)	
San Juan	9040					
Sevier	10565					
Washington	10271					
Wayne	1728					
Total	62276		17572		165946	245794
Percent of total	25.33		7.15		67.51	99.99%

The 19 Eligible Cancers with percent expected to be diagnosed during their lifetime

The 19 Eligible Cancers	Cancers in downwind population of ~250K x percent diagnosed with a specific cancer at some point during their lifetime	Percent of men and women that will be diagnosed with cancer at some point during their lifetime, based on 2009-2011 data.
Leukemia (other than chronic lymphocytic leukemia), multiple myeloma	3500	1.4
Lymphomas (other than Hodgkin's disease)	5250	2.1
Primary cancer of the thyroid	2750	1.1
Male or female breast	15375	12.3
Esophagus	1250	0.5
Stomach	2250	0.9
Pharynx	ND	ND
Small intestine	500	0.2
Pancreas	3750	1.5
Bile ducts, (see liver)	ND	ND
Gall bladder	ND	ND
Salivary gland	ND	ND
Urinary bladder	6000	2.4
Brain	1500	0.6
Colon	11750	4.7
Ovary	11750	4.7
Liver (except of cirrhosis or hepatitis B is indicated) & bile	2250	0.9

CLAIMS TO DATE SUMMARY OF CLAIMS RECEIVED BY 06/23/2015 ALL CLAIMS AWARDS TO DATE 06/24/2015

Claim Type Desc	Pending	Approved	% Approved/of Disposed	\$ Approved	Denied	Total
Downwinder	383	18,893	81.5	\$944,620,000	4,286	23,562
Onsite Participant	227	3,768	54.5	\$274,234,940	3,145	7,140
Uranium Miner	105	6,136	63.2	\$612,874,560	3,571	9,812
Uranium Miller	38	1,643	76.8	\$164,300,000	497	2,178
Ore Transporter	18	318	69.3	\$31,800,000	141	477
Total:	771	30,758	72.5	\$2,027,829,500	11,640	43,169

POTENTIAL FUTURE PAY OUT

- Cancers expected in eligible population of ~250K people – 84,875
- Approved Claims to date 18,893
- Potential cancer claims that could be claimed 65,982
- Potential costs remaining to be encumbered -\$3,299,100,000.00
- Potential State Share:
 - Arizona 67.51 %
 - Utah 25.35 %
 - Nevada 7.15 %

The Question being examined is:

•DID THE TECHNICAL DATA AVAILABLE PRIOR TO THE PASSAGE OF RECA IN 1990 SUPPORT THE DECISIONS/CONCLUSIONS MADE IN THE RECA LAW?



Figure 1. Location of population centers where 137 Cs inventories were estimated during this study. The heavy line divides the state into the high and low fallout regions defined by Lyon <u>et al</u>. (1979).

The heavy/dark line that divides north Utah from South Utah was first observed in a paper published by Lynn Lyons (Univ. of Utah-epidemiologist) who attempted to establish sections of Utah into high fallout areas and low fallout areas. High being below the dark line and low being above the dark line. Lyons could not of been more wrong. As the data portrays it is the middle counties that are low fallout regions, while the northern counties received significantly more fallout.

Total Exposure (R) TMCEFD & EML-401 Exposure (R) The cities & counties in blue are

Location Name	County	Tota	al Cs-137 -	Total Exposure	EML-401
Location Name	County		nCi/m2	(R) TMCEFD	Exposure (R)
St. George, UT	Washington		80.3	3.7	3.7
Kanab, UT	Kane		72	1.6	0.7
Parowan, UT	Iron		101.9	0.42	1.1
Cedar City, UT	Iron		67.8	0.64	0.6
Enterprise, UT	Washington		100.7	0.59	1.7
St. George, UT	Washington		96.7	3.7	3.7
Hurricane, UT	Washington		265	3.5	4.2
Kanab, UT	Kane		91.9	1.6	0.7
Parowan, UT	Iron		126	0.42	1.1
Cedar City, UT	Iron		89.4	0.64	0.6
Panquitch, UT	Garfield	П	75.4	0.7	0.4
Beaver, UT	Beaver		74.3	0.25	0.6
Milford, UT	Beaver	П	85.1	0.1	0.6
Fillmore, UT	Millard		105		1.3
Delta, UT	Millard	П	93.1		1.8
Richfield, UT	Sevier		59.7		0.2
Hanksville, UT	Wayne	П	227		
Blanding, UT	San Juan		69.4		0.5
Monticello, UT	San Juan	П	128		1.7
Alton, UT	Kane	П		0.85	
Anderson	Washington	П			
Junction, UT	washington			1.9	
Beryl, UT	Iron			0.53	
Bryce Canyon,	Carfield	П			
UT	Garneiu			0.56	
Cental, UT	Iron			1.9	
Enoch, UT	Iron			0.54	
Gunlock, UT	Washington			3.1	
Hatch, UT	Garfield			0.54	0.6
Hilldale, UT	Washington			0.44	
				1.0	0.7

those eligible under the RECA rule setting forth the geographical boundaries. The data compares the Test Managers Committee to Establish Fallout Doses (TMCEFD) (using actual exposure data recorded by monitors in the field) with that computed by Beck & Krey (Environmental Measurement Laboratory-report EML-401) using Pu isotopic ratios and rainfall data. The total Cs-137 includes world wide and NTS contribution. The world wide has to be stripped out leaving the net NTS Cs-137 which then can be used to calculate the historic exposure.

Total Exposure (R) TMCEFD & EML-401 Exposure (R)

Location Name	County	Total Cs-137 - nCi/m2	Total Exposure (R) TMCEFD	EML-401 Exposure (R)
Gunnison, UT	Sanpete	81.7		0.6
Nephi, UT	Juab	97.5		0.6
Manti, UT	Sanpete			0.6
Payson, UT	Utah	126		1.1
Salem, UT	Utah			1.5
Spanish Fork, UT	Utah			1.5
Provo, UT	Utah	117.5		1.6
American Fork, UT	Utah			1 2
Midvale, UT	Salt Lake	123		1.5
SLC, UT/Liberty Park	Salt Lake	133		1.2
SLC, UT/U of U	Salt Lake	144		1.2
SLC, UT/Jordan Park	Salt Lake	120		
Murry, UT	Salt Lake			1.2
Magna, UT	Salt Lake	153		1.2
Tooele, UT	Toole	139		0.7
Bountiful, UT	Davis	151		0.8
Layton, UT	Davis	137.5		1.3
Ogden, UT	Weber	161		1.8
Brigham City, UT	Box Elder	177		0.4
Tremonton, UT	Box Elder	134		1.2
Logan, UT	Cache	133		1.1
Heber City, UT	Wasatch	118		0.5
Marion, UT	Summit			1.1
Duchesne, UT	Duchesne	93		0.2
Vernal, UT	Duchesne	83.2		0.7
Price, UT	Carbon	81		0.2
Dragerton, UT	Carbon	92.2		0.4
Moab, UT	Grand	78.5		0.9
Green River, UT	Emery	117		19

The counties in red are the cities/counties EXCLUDED under RECA. However note that there was significant residual Cs-137 which was available to compute the listed exposure.

Total Exposure (R) TMCEFD & EML-401 Exposure (R)

Location Name	County	Total Cs-137 - nCi/m2	Total Exposure (R) TMCEFD	EML-401 Exposure (R)
Kingman, AZ	Mojave	52.3	0.04	
Grand Canyon, AZ	Coconino	91.2		
Grand Canyon, AZ	Coconino	72.7		
Tuba City, AZ	Coconino	54.7		
Holbrook AZ	Navajo	60.6		
Ganado, AZ	Apache	61		
Chinle, AZ	Apache	74.9		
Williams, AZ	Coconino	106.4		
Flagstaff, AZ	Coconino	82.4		
Flagstaff, AZ	Coconino	80.8		
Flagstaff, AZ	Coconino	72.8		
Fort Defiance, AZ	Apache	43.7		
Bullhead City, AZ	Mojave	34.2	0.02	
Tucson, AZ	Pima	54.8		
Tucson, AZ	Pima	37.6		
Tucson, AZ	Pima	43.5		
Fredonia, AZ	Coconino	80.3		
Grand Canyon, AZ	Coconino	135.1		
Moccasin, AZ	Coconino	66.1		
Grand Canyon, AZ	Coconino	133.5		

The green counties in Arizona were eligible under RECA, those counties in black were not. An earlier slide states that the area in Mojave county north of the Grand Canyon was the only area eligible in Mojave county. Note that the few measurements taken historically basically indicated very low exposure for areas south of the Grand Canyon. Those values showing significant exposure were in communities/area north of the Grand Canyon.

Total ¹³⁷Cs- nCi/m²



Graphical depiction of total Cs-137 measured by soil sampling.

IOLAI EXPOSUIE (K) IMCEFD & EML-401 EXPOSUIE (K)



Graphical depiction of exposure data reported by the sources mentioned in the heading. Shows what little data was measured south of the Grand Canyon.

Explanation of the data sets following:

- The next series of slides are copies of exposure data in "R" collected by monitors in the field during the time of cloud passage and subsequent deposition at the time of the atmospheric test and at the locations indicated.
- The committee (TMCEFD) that compiled this data not only had the measurements available as indicated above, but weather data that indicated where the fallout cloud was headed. Also Airborne tracking monitors and cloud sampling aircraft was available for evaluation.

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		Pre-Plumbbob Effective Biological Dose	Plumbbob Estimated Docuteens)	Hardtack II Estimated Dose (Roentgens)	All Nevada Tests Cumulative Estimated Dr (Roentgens
Location	Population	(0.23)	Timenegate	1.100000	0.23
Adamiville	90	0.23	0.02	_	0.83
Alton	194	1.00	0.63		1.88
Anderson Junction	17	0.40	0.65	_	0.95
Bear Valley Junction	10	0.40		- E	0.25
Beaver	1,005	0.29	0.03		0.53
Beryl	15		0.05	-	1-95
Beryl Junction	8	(0.05)	.0.05	_	0.05
Black Rock	18/	(0.55)			0.56
Bryce Canyon	Variable -	(0.33)	0.01	_	0.64
Cedar City	8,108	(7.50)	0.24		1.91
Central	49	(1.50)	0.41	_	0.07
Cove Fort	-1	0.07			
Station	5	(0.10)	-	-	0.10
Duck Creek Forest Camp	x	(0.90)	0.17	-	1.07
Enoch	250	(0.50)	0.04	-	0.54
Enterprise	800	0.70	0.09	-	0.79
Garrison	125	0.70	0.18	-	• 0.88
Glendale	275	(0.24)	-	-	0.24
Greenville	173	(0.24)	-	-	0.24
Gunlock	127	2.60	0.52	-	3.12
Hamilton Fort	26	0.60	0.20	-	0.80
Hamlin Valley	Variable	(0.50)	0.01	-	0.51
Eatch	24	(0.50)	OIL	-	0.54
<u>Hilldale</u>	10	(0.30)	0.14	-	0.44
Burricane	1,375	4.20	0.15	-	4-35
Kanab	1,900	1.60	0.02	-	1.62
Kanarrville	263	1.20	0.73	-	1.93
Kanosh	476	(0.05)	-	-	0.05
La Verkin	387	(3.50)	0.16	-	3.66
Leeds	215	3.00	0.70	-	3.70

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Location	Population	Pre-Plumbbob Effective Biological Dose (Roentgens)	Plumbbob Estimated Dose (Roentgens)	Hardtack II Estimated Dose (Roentgens)	All Nevada Tests Cumulative Estimated Dose (Roentgens)
Long Valley Junction	10	0.80	9.07	-	0.87
Land	75	0.50	-	-	0.50
Manderfield	62	(0.20)	0.03	-	0.23
Milford	1,673	0.10	-	-	0.10
Minersville	593	0.20	-	-	0.20
Modena	100	0.50	0.04	-	0.54
Mount Carnel	125	0.85	0.09	-	0.94
Mount Carmel Junction .	10	(0.80)	0.05	-	0.85
Nev Castle	115	0.60	0.05	-	0.65
New Harmony	126	1.20	0.68	-	1.68
Orderville	371	1.50	0.10	-	1.60
Paiute Indian Reservation	95	(0.30)	_	_	0.30
Panguitch	1,500	0.20	0.50	. -	0.70
Paragonah	404	0.40	0.02	-	0.42
Parowan	1,455	0.40	0.02	-	0.42
Pintura	50	1.20	1.00	-	2.20
Reckville	125	3.00	0.10	-	3.10
Saint George	5,000	3.00	0.70	+	3.70
Santa Clara	319	3.50	0.77	-	4.27
Shivwits	95	2.80	0.80	· •	3.60
Springdale	209	2,60	0.09	-	2.69
Summit	146	(0.50)	0.02	-	0.52
Toquerville	219	2.00	0.33	-	2.33
Uvada	15	(0.70)	-	-	0.70
Veyo	100	2.00	0.82	-	2.82
Vic's Place	3	(1.20)	0.68	-	1.88
Vic's Service Station	2	(3.00)	0.90	-	3.90
Virgin	147	1.50	0.12	-	1.62

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Location	Population	Pre-Plumbbob Effective Biological Dose (Roentgens)	Plumbbob Estimated Dose (Roentgens)	Hardtack II Estimated Dose (Roentgens)	All Nevada Tests Cumilative Estimated Do (Roentgens
Washington	435	3.00	0.30	-	3-30
Zane	25	0.30	-	-	0.30
Zion Lodge	Variable 18	(1.00)	0.16	-	1.66

Footnotes concerning populations of communities

- 1. Lake Mohave also some transients.
- 2. Apex about 50 day workers; generally only a watchman at night.
- 3. Bardoli Ranch population only 1 after Flumbbob.
- 4. Innanza Boy Scout Camp variable population, summer months only.
- 5. Railroad maintenance stations (Boyd, Cloud, Etna, Galt, Garnet, Hoya, Kyle, Leith, Rox, Stine, Vigo)-population variable from 0 to about 15.
- 6. Butler Ranch Mrs. Butler was absent during the important fallout in Plumbbob, (from the Bmoky burst) and Mr. Butler was evacuated for a few hours shortly
- after the fallout arrived. Personnel film badges indicated that Mrs. Butler received less than 2 Roentgens and that Mr. Butler received less than 5 Roentgens.
- 7. Crystal unpopulated after Plumbbob.
- 8. Desert Rock unpopulated except during major test series.
- 9. Dodge Construction Camp unpopulated except Plumbbob series.
- Groom Mine population variable 2-10 prior to Plumbbob, intermittent during Plumbbob but only trivial doses indicated by personnel film badges during Plumbbob.
- 11. Indian Springs-population variable, about 250:plus 2400 on military post during Plumb
- 12. Lehman Caves tourists during summer season.
- 13. Reed population 3 during the Teapot series only, and these were evacuated for 7-10 days during the highest fallout activity.
- 14. Reveille Mill unpopulated prior to Plumbbob.
- 15. Riverside population 2-14 through Upshot-Knothole, 2 during Teapot and 0 after Teapot.
- 16. Warm Springs Ranch up to 500 people on weekends during the summer.
- 17. Watertown population 0 prior to Plumbbob; about 300 during first month of Plumbbob, and 2 thereafter.
- 18. Bryce Canyon and Zion Lodge many tourists during summer.

ESTIMATED NTS 137 Cs DEPOSITION IN UTAH POPULATION CENTERS

Town	County	1950 Population (1000's)	1979 Inventory* (mC1~km ⁻²)	1955 Deposition (mCi-km ⁻²)
St. George	Washington	4.6	30 1/ 4	53±8
Washington		0.4	20±25	35±40
Santa Clara		0.3	20±25	35±40
Enterprise		0.8	14±3	25±5
Hurricane- La Verkin	.,	1.8	37±19	65±33
Modena	Iron	0.1	<5	<10
Veyo	Washington	0.1	50±45	88±80
Mt. Carmel	Kane	0.1	<5	<10
Kanab		1.3	6±6	11 ± 11
Parowan- Paragonah	Iron	1.9	10±8	18±14
Kanarraville		0.3	6±22	11±39
Cedar City	0	6.1	5±5	. 9±9
Hatch	Garfield	0.2	<5	<10
Panguitch		1.5	4±5	7±9
Beaver	Beaver	1.7	<5	<10
Minersville		0.6	10±21	18±37
Milford		1.7	<5	<10
Filmore	Millard	1.9	13±6	23±11
Delta		1.7	19±5	33±9
Richfield	Sevier	4.2	2±4	4±7
Gunnison	Sanpete	1.1	<5	<10
Manti		2.1	<5	<10
Nephi	Juab	3.0	7±4	12±7
Payson	Utah	4.0	13±10	23±18

Table 1 presents the net Cs-137 deposition after stripping out the global contribution from world wide fallout/rainout and then decay corrected to the midtime of the Atmospheric test period.

Town	County	1950 Population (1000's)	1979 Inventory* (mCi-km ⁻²)	1955 Deposition (mCi-km ⁻²)
Salem	Utah	0.8	<5	30†
Spanish Fork - Springville		11.7	<5	30†
Provo		28.9	19±5	33±9
American Fork		5.1	<5	25†
Midvale	Salt Lake	4.0	18±7	32±12
Murray		9.0	<5	25†
Salt Lake City		1.82.1	15±6	26±11
Magna		3.5	14±8	25±14
Toole	Toole	7.3	8±8	14±14
Bountiful	Salt Lake	6,0	10±10	18±18
Layton-Clearfield	Davis	8,2	17 ±6	30±11
Ogden	Weber	57.1	23±6	40±11
Brigham	Box Elder	6.8	5±10	9± 18
Tremonton		1.7	16±6	28±11
Logan	Cache	16.8	14±9	25±16
Heber	Wasatch	2.9	<5	<10
Marion	Summit	-	13±8	23±14
Duchesne	Duchesne	0.8	3±4	5±7
Vernal	Vintah	2.8	9±6	16±11
Price	Carbon	6.0	3±3	5±5
Draggerton- Columbia- Sunnyside	n	3.5	5±6	9±11
Green River	Emery	0.6	22±9	39±16
Blanding	San Juan	1.2	0±5	<10
Monticello	San Juan	1.2	20±30	35±50
Moab	Grand	1.3	10±10	18±18

TABLE 1 (Cont'd)

*From Krey and Beck (1981)

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†Estimated from more precise measurements in nearby towns.

Note: When the 1979 inventory estimate was <5, the deposition was conservatively taken to be <10.

Best Estimates of NTS ¹³⁷Cs Deposition nCi/m²





The geographical depiction is very telling, because it shows the net Cs-137 from the NTS and the comparison of the areas showing significant NTS fallout in cities/counties not eligible under RECA in Northern Utah.

ARIZONA

Location	Population	Pre-Plumbbob Effective Biological Dose (Roentgens)	Plumbbob Estimated Dose (Roentgens)	Hardtack II Estimated Dose (Roentgens)	Nevada Tests Cumulative Estimated Dose (Roentgens)
Beaver Dam	5	2.00	0.30	.*	2.30
Big Bend Ranch	5	(2.00)#	0.19	-	2.19
Bullhead	500	-	0.02	-	9.02
Catherine Ranger Station	x	-	-	-	-
Chloride	160	-	0.02	-	0.02
Davis Dam	15	-	-	-	-
Grasshopper Junction	2	-	0.03	-	0.03
Hackberry	100	-	0.01	-	0.01
Hughes Ranch	Transient	(2.00)	0.30	-	2.30
Kingman	5,500	0.03	0.01	-	0.04
Lake Mohave	2 ¹ /	-	0.02	-	0.02
Littlefield	44	1.60	0.32	-	1.92
Mount Trumbull	100	0.16	-	-	0.16
Oatman	40	-	-	-	-
Peach Spring	600	-	-	-	-
Short Creek	90	1.60	-		1.60
Topock	80	-	-	-	-
Truxton	26	-	-	-	-
Valentine	50	-	0.01	-	0.01
Walapa1	15	-	-	-	-
Warm Springs	· x	-	-	-	-
Willow Beach	5		-	-	-
Wolf Hole	5	1.30	-	-	1.30
Yucca	150	- •	-		-

All these locations of significant exposure values were north of the Grand Canyon.

*As explained in the text, a dash implies no fallout or fallout not readily distinguishable from background radiation.

#Parentheses indicate that the community was not included in the October, 1956, list of Pre-Plumbbob doses.

*Population figures not available.

NOTE: . Footnotes concerning populations of communities are on page 20.

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City	Event Name	Historical Dose Estimate (rem)	Percent of Total
St. George, UT			
(Washington County)	Annie (UK)	0.35	0.09
	Simon (UK)	0.01	0.00
	Harry (UK)	2.50	0.68
	Tesla (Teapot)	0.10	0.03
	Zucchini (Teapot)	0.04	0.01
	Priscilla (Plumbbob)	0.03	0.01
	Smoky (Plumbbob)	0.66	0.18
	Morgan (Plumbbob)	0.01	0.00
total		3.70	
Cedar City, UT			
(Iron County)	Fox (TS)	0.02	0.03
	Harry (UK)	0.25	0.39
	Apple I (Teapot)	0.03	0.05
	Zucchini (Teapot)	0.10	0.16
	Priscilla (Plumbbob)	0.03	0.05
	Smoky (Plumbbob)	0.21	0.33
total		0.64	



These fallout patterns were constructed after the fact using all available data for their construct. Annie and Harry (following) are examples of the results.

OPERATION UPSHOT-KNOTHOLE, ANNIE Event, March 17, 1953. Fallout pattern 1956.





OPERATION UPSHOT-KNOTHOLE, HARRY Event, May 19, 1953. Fallout particle path shown by heavy line with arrowheads.

This pattern for Harry shows with the heavy line with arrows the particle trajectory. But more importantly it shows that a wind shear occurred over the north edge of the Grand Canyon pushing the deposition into So. Utah and explains why this significant event DID NOT cause any deposition in the location in Arizona south of the Grand Canyon. Harry also caused higher than expected fallout exposure readings because the upper air winds were faster than forecasted and reached So. Utah in about 4 hours. This parameter was carefully watched in those days to prevent such an occurrence, but for Harry



Figure 9. Extended range fallout pattern contours (mR/hr at H + 12 hours) and meteorologically derived time of maximum rate of fallout (H + HOURS).

OPERATION UPSHOT-KNOTHOLE, HARRY Event, May 19, 1953. Fallout pattern reanalyzed by Weather Service Nuclear Support Office in 1980. An other look at the fallout pattern for Harry showing the significant shear that spread fallout over So. Nevada & So. Utah.

Wind shear was a good thing as spread out fallout deposition minimizing concentration on the downwind communities.

Cumulative Dose Map



cumulati ve map shows two major fingers pointing to the east and the north east. Because this is the direction of the majority of the wind patterns which woro

OBSERVATIONS

- Estimates of exposure determined via soil sampling & rainfall agree very well with actual exposure measurements made in real time!
- Highest exposures to NTS fallout occurred in Washington County!
- Northern valleys of Utah received larger amounts of NTS fallout than did most counties much closer to the NTS!
- These Northern Valleys in Utah received MUCH more than the Arizona Counties South of the Grand Canyon.
- Most of the RECA ELIGIBLE population (67%) resides in Arizona Counties that received minimal NTS fallout!

CONCLUSIONS

- THERE WAS ADEQUATE DATA AVAILABLE TO MAKE THE GEOGRAPHIC ELIGIABLITY AREA EQUATABLE!
- IT IS UNFAIR OF RECA TO PAY COMPENSATION TO THE MAJORITY OF ELIGIBLE RESIDENTS WHEN THEY RECEIVED MINIMAL (insufficient for ground personnel to track & insufficient total Cs137 to strip out the NTS Cs137 component) FALLOUT FROM NEVADA TEST SITE NUCLEAR WEAPONS TESTING
- The fallout exposure levels are so low that it would be unexpected for any effect from the exposure to be observable.
- The RECA is a political trick to show alleged compassion, imbuing cancer fear in those living downwind of the NTS, while ignoring data that shows otherwise. And is now an other Government entitlement program!

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