

# WHAT HAS DRIVEN OR INFLUENCED U.S. NUCLEAR POLICIES

THE POLITICS OF FEAR

Seminar presented to the Students of Middlebury Institute of International  
Studies - at the National Atomic Test Museum

By

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In my opinion: U.S. & other country's nuclear policies has been heavily influenced, by and is summed up in one word!

**FEAR!**

# FEAR OF WHAT?

- ❖ FEAR OF A NUCLEAR WAR
- ❖ FEAR OF EXPOSURE TO IONIZING RADIATION! (via, fallout, dental x-rays, CAT Scans, mammography, transportation accidents, terrorism etc.)
- ❖ FEAR OF THE EFFECTS OF THIS EXPOSURE!
- ❖ FEAR OF CONTRACTING CANCER AT SOME UNKNOWN TIME IN THEIR LIFE!
- ❖ FEAR OF PASSING ON GENETIC EFFECTS TO THEIR OFFSPRING!

# Events that Influenced the Need for Nuclear Weapons Testing

- World War II
- Operation First Lightning/RDS-1 (known as Joe 1 in the West), August 29, 1949: first Soviet nuclear test!
- RDS-37, November 22, 1955: first Soviet multi-megaton, "true" hydrogen bomb test!
- September 1, 1961 – The Russians broke the October 1958 moratorium on testing!
- 1962 – Cuban Missile Crisis
- Chinese Nuclear testing – 16 Oct 64- July 20, 96 (45 tests; 22 atmospheric tests, last atmospheric test in the world, 16 Oct 1980)
- India's nuclear test – 1 test (Smiling Buddha) on 18 May 1974.
- Pakistan's nuclear tests – 5 devices tested on the same day – 28 May 1998.

# Events that Influenced Cessation of Nuclear Testing in the Atmosphere

- Bravo nuclear test (1954) – Japanese fishing boat “Lucky Dragon” incident and the impact on the Marshallese people, e.g., evacuation of residents of Rongalap!
- Japanese Council Against Atomic & Hydrogen bombs: *Peace movements emerged in Japan and in 1954 they converged to form a unified "Japanese Council Against Atomic and Hydrogen Bombs". Japanese opposition to the Pacific nuclear weapons tests was widespread, and "an estimated 35 million signatures were collected on petitions calling for bans on nuclear weapons".*
- The Russell-Einstein Manifesto – Issued in London on July 9, 1955! (called for world leaders to seek peaceful resolutions to international conflict)
- Pugwash Conferences on Science and World Affairs – 1<sup>st</sup> held in Pugwash, Nova Scotia July 1957 (started by Philanthropist Cyrus S. Eaton)
- 1958-Linus Pauling & wife Presents to the United Nations a petition signed by 11,000 scientists calling for an end to nuclear-weapon testing.
- Women Strike for Peace-1961-50,000 women march in 60 cities in the U.S. to demonstrate against nuclear weapons.
- The Baby Tooth Survey (1960s) - initiated by the Greater St. Louis Citizens Committee (Project collected 320,000 teeth and ended in 1970) - *The findings helped convince U.S. President John F. Kennedy to sign the Partial Nuclear Test Ban Treaty (the PNTBT went into effect 10 October 1963) with the United Kingdom and Soviet Union, which ended the above-ground nuclear weapons testing.*

- International Commission on Radiological Protection (ICRP) – Formed in 1928, under the auspices of the International Congress of Radiology. Published recommendations about every 3 yrs. Except for the period 1938-1949!
- National Committee on Radiation Protection and Measurements (1946) – Published recommendations as National Bureau of Standard Handbooks (NBS).
- National Academy of Sciences-National Research Council (1956) – Published reports and recommendations on the Biological Effects of Atomic Radiation.
- The United Nations Scientific Committee on The Effects of Atomic Radiation (UNSCEAR) (1955). First report summarizing the knowledge on effects of radiation exposure on human exposure levels. They have published reports periodically since!
- Tripartite Conferences on Radiation Protection (Canada, UK & USA)- (1949-1953)
- Federal Radiation Council (FRC) – Pres. Eisenhower signs Public Law 86-373 in 1959 to provide a Federal Policy on human radiation exposure – Function was to advise the President on radiation matters.
- EPA succeeds the FRC – Setting Radiation Protection Standards & Guidance was part of the mission given to EPA in its 1970 creation.
- AEC (1946-1974) – Under severe criticism the Congress ended the AEC. It was abolished by the Energy Reorganization Act of 1974, which assigned its functions to two new agencies: the [Energy Research and Development Administration](#) and the [Nuclear Regulatory Commission](#).
- Committee on Interagency Radiation Research and Policy Coordination (CIRRPC) – 1984-1995: The committee was chartered by Dr. George A. Keyworth II, then Science Advisor to the President and Director of the Office of Science and Technology Policy (OSTP).

ALARA- “As Low As Reasonably Achievable” - The ALARA principle is that the residual risk shall be reduced as far as reasonably practicable: Published in 1987 by the EPA under President R. Reagan’s signature as requirements to all federal agencies.

**Basic elements and principles of the requirement follow:**

- First: Any activity involving occupational exposure should be determined to be useful enough to society to warrant the exposure of workers; i.e., that a finding be made that the activity is “justified”.
- Second: For justified activities, exposure of the work force should be as low as reasonably achievable (commonly designated by the acronym “ALARA”).
- “ALARA is typically implemented in two different ways.”
- One, it is applied to the engineering design of facilities so as to reduce, prospectively the anticipated exposure of workers.
- Two, it is applied to actual operations; that is, work practices are designed and carried out to reduce the exposure of workers.
- This principle applies both to **collective exposures** of the work force and to **annual and cumulative individual exposures**.

## For Nuclear Weapons Testing before and after the Harry event (1953)

Date	Value	Commentary	Authoritative organization	Recommending Committee
1928	1 r/week	Tolerance dose		International Committee on X-ray Protection
1934	0.1 r/day	Tolerance dose		U.S. Advisory Committee on X-ray (later NCRP)
1934 + 6 months	0.2 r/day	Tolerance dose		ICRP using the same data as the NCRP
1947	0.1 rad/day		AEC	
10-17-1948	0.3 rem/wk.	Maximum Permissible Dose for whole body irradiation by x & y		U.K. MRC, proposed & agreed by U.S. NCRP; later (1950) adopted by the ICRP
1949	0.1 rad/day		AEC	
1950	0.3 rad/wk.		AEC	NBS handbook 47, 1950
1951	0.3 r/wk. 3.9 rad/13 wks., >50 r for evac.	Exposures up to 25-50 r, stay indoors, change clothes, bath. > 50 r consider evacuation	AEC/Operation Ranger WT-204-069, p 68	ibid
1951/52	3.0 r/3 mo. Onsite personnel	Public 3.9 r	AEC/ Operation Buster-Jangle; WT-425, 1 <sup>st</sup> para, p. 11	ibid
1952	3.0 r/13 wks. onsite personnel	1.0 r public; WT-558	AEC/ operation Tumbler-Snapper	ibid
1953	3.9 r/13 wks. onsite personnel	3.9 r	AEC/ operation Upshot-Knothole	ibid
1955	3.9 r/13 wks. onsite personnel	3.9r Evac. Guide. Up to 30r (no evac. indicated; 30-50r (15 r must be saved); >50r (evac. indicated w/o regard to quantity saved)	AEC	Published By Dr. G. Dunning, AEC/HQ in The Journal of the American Medical Association, July 15, 1955; all test series after referenced this criteria
1958	1. rem/wk. 3 rem/13 wk. 5 (N-18) rem		ICRP	ICRP 1959 (report 1)
1960	3rem/wk. max 3rem/13wk 12rem/y max 5(N-18) rem	U.S. gov't agencies used FRC as guidance, but was not mandatory	Federal Radiation Council (FRC)	FRC report No. 1
1971	3rem/13 wk. 5rem/y	FRC was abolished in 1970; function transferred to the U.S. Env. Proct. Agency		NCRP 1971 (report 39)
1990	20 mSv/y avg. over 5y (100 mSv in 5y) & 50 mSv/in any single year.		ICRP	ICRP



# Radiation Protective Action Guides (PAG)

Phase	Recommended Protective Action	PAG mSv	Issuing Organization/comments	Reference
Early Phase	Sheltering-in-place or evacuation of the Public	10-50 mSv projected over 4 days	<b>U.S. EPA</b>	<b>U.S. EPA PAG Manual, Jan.,2017</b>
Intermediate Phase	<b>Relocation of the Public</b>	<b>20 mSv, projected dose in the first year; 5 mSv/y projected dose in the 2<sup>nd</sup> and Subs. yrs.</b>	ibid	ibid
Re-entry	Stay times that results in the lowest exposure For the Majority of the Population	Guidelines should begin at 10 mSv;	ibid	ibid
People living in contaminated areas	Recommended from lower part of 1-20 mSv/y For protection of people living in contaminated areas	1mS/y Typical value used for constraining the optimization process in long-term post-accident situations	ICRP	ICRP Publication 111, 2009
Early	20 mSv/y chosen by Japanese authorities for evacuation	20-100 mSv/y	Reference level for emergency exp. situations	ICRP Pub 109 2009
Long term or "planned exp. situations"	1 mSv/y	1 mSv/y	For public exp. in planned exposure situations ICRP recommends an Eff. Dose of 1 mSv/y	ICRP Pub 103 2007
Early, <10 hr.; Acute external exposure	Take precautionary urgent protective action immediately	1 Gy (red marrow)	Table II.1. Generic criteria for doses received in a short period of time to minimize severe deterministic effects	<b>IAEA – Appendix II, Table II.1 GSR Pt 7, Nov. 2015</b>
First 7 days	Sheltering; evacuation; prevent inadvertent ingestion	100 mSv Eff. Dose	Generic Criteria to reduce risk of stochastic effects	IAEA – Appendix II, Table II.2. GSR pt. 7, Nov. 2015
In a month	Health screening based on equivalent doses to radiosensitive organs	100 mSv Eff. Dose in a month	ibid	ibid
First year	Temporary relocation; prevent inadvertent ingestion	100 mSv Eff. Dose	ibid	ibid
Existing exposure situations	Ref. level for public exp. In an emergency exposure situation	<b>20-100 mSv</b>	Acute dose or annual dose. Situations in which the dose threshold for deterministic effects in relevant organs or tissues could be exceeded always require action	<b>IAEA – Appendix A.1. table 1; GSG-8; May 2018</b>
Existing exposure situation, planned exp. Sit. And emerg. Exp. Sit.	Dose constraint for public exposure in planned exposure situations	≤1 mSv per yr.	Ref. level for public exp. In specific existing exp. Situations. e.g., exp. Due to radionuclides in consumable commodities	ibid

The linear No-Threshold (LNT) dose response model:

A comprehensive assessment of its historical and scientific foundations

Edward J. Calabrese (11 Feb. 2019) - Conclusions:

- The LNT single-hit dose-response model for cancer risk assessment was conceived, formulated, and applied in a manner which is now known to have been scientifically invalid.
- Contributing to the embrace of the LNT model were a series of scientific errors and the unfounded assumption that one could accurately extrapolate potential risk from very high to very low doses of ionizing radiation. This occurred despite findings indicating that
- (1) the type of genetic damage/mutation spectra is highly dose dependent (i.e., mostly gene deletions at the high doses used by Muller and not gene mutations), precluding accurate and valid low dose extrapolation,
- (2) the use of mature *Drosophila* spermatozoa which are haploid and lacking of DNA repair to extrapolate to mammalian somatic cells which are diploid and possess efficient DNA repair, and
- (3) the rejection of dose-rate in risk assessment which is now an important concept in ionizing radiation risk assessment. Thus, the concept of LNT single-hit for cancer risk assessment is shown to have multiple flaws that reveal its lack of scientific validity.
- However, despite these flaws the radiation genetics community of the 1940s-1960s promoted and strongly advocated the adoption of the LNT single hit model to replace the threshold model.

# LNT Chronology: Appendix 1. A 90-year LNT Chronology: From mutation to cancer risk assessment

Edward J. Calabrese (11 Feb. 2019)

- *First report of induced mutation; Gager and Blakeslee January 1927*
- *Muller report on X-ray induced mutation in Science July 1927*
- *Ernst Caspari's data support threshold rather than linear dose response in Manhattan Project research with Curt Stern fall 1946-Muller sent data (November 1946)*
- *Muller receives Nobel Prize for 1927 findings - misleads Nobel audience in lecture on dose response December 1946*
- Stern fails to adequately replicate Caspari study with Delta Uphoff 1946-1948
- Stern published Warren Spencer and Caspari papers in Genetics January 1948
- Salvador Luria (future Nobel prize recipient) tries to convince Muller to incorporate McClintock's transposon findings into mutation Theory 1948
- *Robley Evans, MIT, supports threshold model, based, in part, on Caspari threshold evidence in a Science publication 1949*
- Stadler criticizes Muller gene mutation explanation and single hit model in Science 1954
- National Academy of Sciences BEAR I Genetics Panel, 1955-1956 recommend switch to LNT, misrepresent findings in Science paper and later refuse to provide scientific justification for their recommendation Summer 1956
- *NCRPM applies LNT model for cancer risk assessment December 1958*
- William L. Russell (Oak Ridge National Labs) published first evidence of dose rate for mutations with ionizing radiation, suggesting the existence of DNA repair December 1958

# LNT Chronology - Continued

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  - and later refuse to provide scientific justification for their recommendation Summer 1956
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- William L. Russell (Oak Ridge National Labs) published first evidence of dose rate for mutations with ionizing radiation, suggesting the existence of DNA repair December 1958
- NAS BEAR II Genetics Panel, report acknowledges dose rate in mouse and Drosophila 1960
- *Russell and Muller have debates in international advisory committees over the role of dose rate in human risk assessment 1963-1965*
- *Muller dies April 1967*
- Russell publicly renounces radiation genetics dose response mantra 1969 and 1970 based on dose rate findings
- *NAS creates BEIR I (1970) which retains LNT while rejecting total dose; it switches to use of Russell mouse data from fruit fly reliance.*
- *Committee is unaware of significant error in Russell control group data report in 1972*
- *EPA adopts LNT based on the use of the Russell data (which is still in error) 1975 and reaffirms it in 1977*
- *EPA adopts single-hit LNT model for radiation and chemical carcinogen risk assessment, incorporating an independence of background modeling feature 1979 - notice in Federal Register*
- EPA switches from single-hit to multi-stage model for cancer risk assessment November 1980
- EPA adopts additive to background assumption for cancer risk assessment, drops independent to background 1986 - EPA cancer guidelines
- *Paul B Selby reports error in Russell control group in 1995; error confirmed by the Russell and corrected in the scientific literature separately by Russell [140] and Selby [144,145] 1996 and 1998*
- *Calabrese applies Russells' and Selby corrections to BEIR 1972 risk assessment and reports that a threshold or hormesis response would*

# The Linear no-threshold (LNT) Model For Radiation-induced Cancer

(from Mohan Doss, PhD, MCCPM, Medical Physicist, Professor, Diagnostic Imaging, Fox Chase Cancer Center, Philadelphia, PA  
Presentation at the CE Session Radiopharmaceutical Dosimetry and Radiobiology -The Future is Now at the SNMMI Annual Meeting, June 25, 2018

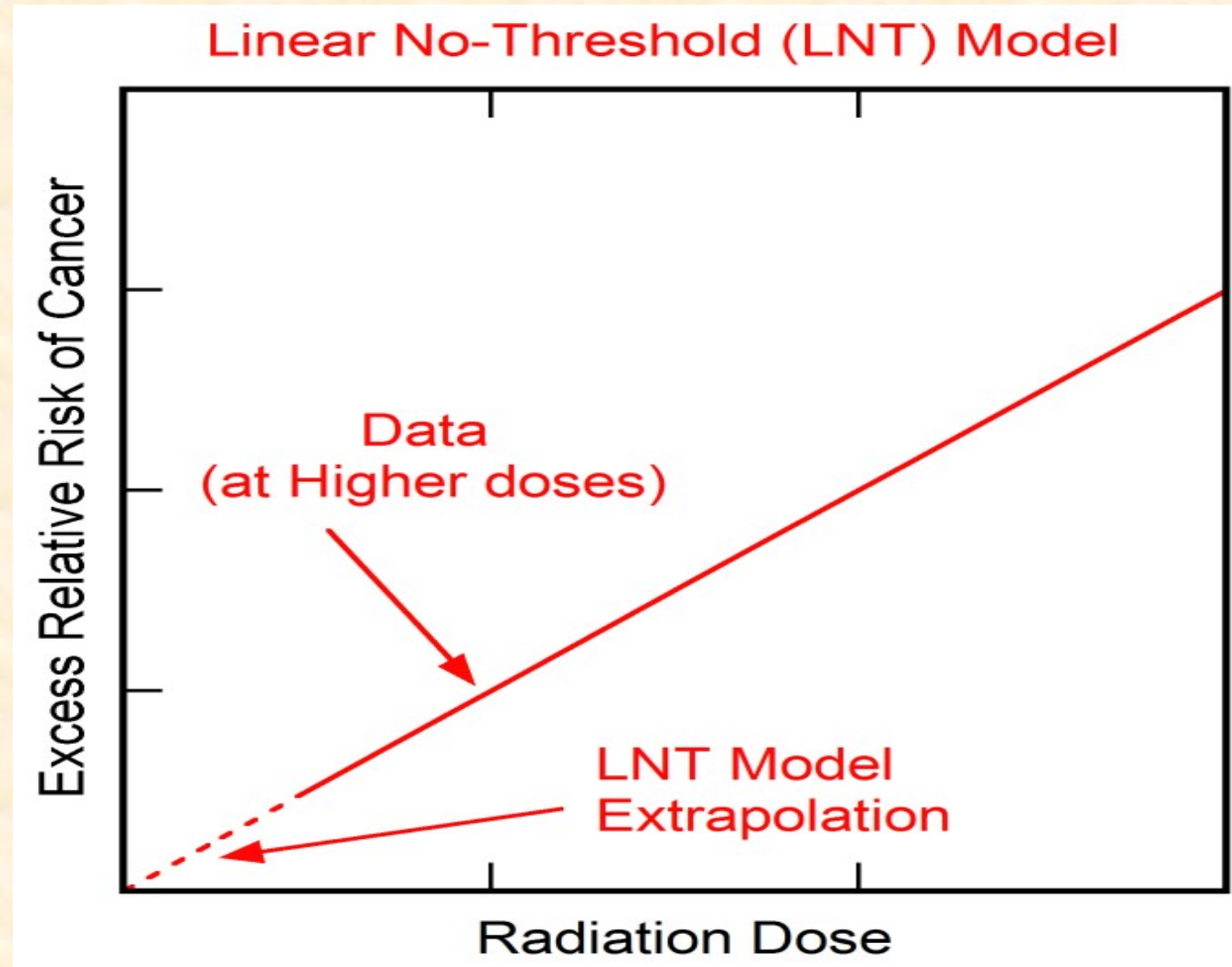
Excess Relative Risk (ERR) =  $R - B/B$

$R$  = Cancer Rate after Irradiation

$B$  = Background Cancer Rate

Problem with the model: The absence of threshold results in the fear of the smallest amount of radiation.

The LNT model was adopted by advisory bodies in the 1950s and has been endorsed by them repeatedly .



- The Linear no-threshold (LNT) Model
- For Radiation-induced Cancer
- $R = \text{Cancer Rate after Irradiation}$
- $B = \text{Background Cancer Rate}$
- The LNT model was adopted by advisory bodies in the 1950s and has been endorsed by them repeatedly .  $B \ B \ R \ } \text{Excess}$   
Relative Risk (ERR) =
- Problem with the model: The absence of threshold results in the fear of the smallest amount of radiation.

# Events that Influenced the Policies of Radioactive Waste Management

- In 1959, a letter in the *Bulletin of the Atomic Scientists* was the start of a successful campaign to stop the Atomic Energy Commission from dumping [radioactive waste](#) in the sea 19 kilometres from [Boston](#)

# In My Opinion: Some of the events that has influenced Nuclear Policy Many of these events stoked FEAR in people others were reactions out of fear!

- The potential use of nuclear weapons in a war setting!
- **Hermann Mueller's Nobel Prize - 1946** "for the discovery that mutations can be induced by X-rays"- led to the advent of the LNTH!
- Bravo nuclear test (1954) – Japanese fishing boat "Lucky Dragon" incident and the impact on the Marshallese people, e.g., evacuation of residents of Rongalap!
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- 1958-1961 Testing moratorium - *On 31 October 1958 the three countries (U.S., U.K. & Soviet Union) initiated test-ban negotiations. The moratorium would last for close to three years. Russia broke the Moratorium 1 September 1961. The U.S. responded on 15 September 1961.*



# Events that has influenced Nuclear Policy - Continued

- ❖ Operation First Lightning/RDS-1 (known as Joe 1 in the West), August 29, 1949: first Soviet nuclear test!
- ❖ Onset of the Korean War - 25 June 1950 - 27 July 1953!
- ❖ Atmospheric Nuclear Weapons Testing begins at the NTS in 1951 - Pres. Truman letter designating the NTS for Nuclear Weapons Testing! Harry event (May 19, 1953) - raises concern over fallout from the NTS into the downwind area.
- ❖ RDS-37, November 22, 1955: first Soviet multi-megaton, "true" hydrogen bomb test!
- ❖ 1962 - Cuban Missile Crisis
- ❖ 1962 - Plowshare Program spawns Project Sedan, Cabrolet, Buggy (5), Schooner and Gas Stimulation (3) events.
- ❖ **Beatty, Nevada - Low Level Waste Disposal Incident (1976) - See Politics of Fear - The genesis of the LL Waste Policy Act - ppt slides 5May01 - Eco-Infirma presentation**
- ❖ Three Mile Island Accident - March 1979
- ❖ Chernobyl Accident - April 1986
- ❖ The Goiânia accident was a radioactive contamination accident that occurred on September 13, 1987, in Goiânia, in the Brazilian state of Goiás, after a forgotten radiotherapy source was taken from an abandoned hospital site in the city. It was subsequently handled by many people, resulting in four deaths. About 112,000 people were examined for radioactive contamination and 249 of them were found to have been contaminated.
- ❖ Nuclear Weapons Testing by North Korea - 2006, 2009, 2013, twice in 2016, and in 2017.
- ❖ **Fukushima Reactor Accident- March 2011**

# Hermann Mueller and the Linear Non Threshold Hypothesis (LNTH)!

## **Beatty, Nevada-Low Level Waste Disposal Incident (1976)-The genesis of the Low Level Waste Policy Act and the beginning of the demise of Yucca Mountain**

- September 1962 - 1st Commercial Low Level Radioactive Waste Facility Opens near Beatty, NV
- May 1963 - AEC policy requires Commercial disposal
- By 1971 Five Additional facilities open
- Incident at Beatty, March 1976
- Three of six disposal facilities close after reaching initial design limits.

# Incident Time Line

- Early Feb., 1976 - NECO RSO reports diminishing pile of cement bags
- Mid Feb., 1976 - NECO reports suspicion that contaminated concrete has been used off the disposal site to NV Officials.
- 24 Feb., 76 - NV notifies NRC of impending investigation
- 8 March, 76 - NECO license suspended by NV State Health Officer

# • Incident Time Line Cont.

- 9 March, 76 - NV State Health Officer issues ORDER to investigate
- 10 March, 76 - Radiation Survey initiated by NV State assisted by EPA
- 12 March, 76 - ERDA Radiological Assistance Team Activated to assist in survey (led by BW Church).
- 15 March, 76 - Gov. Robert List briefed.

# Radiological Relevance

- Radium Dials - 5-150 mrad/hr  $\beta, \gamma$  @ contact. 9-27  $\mu\text{R/hr} > \text{bkg.}$  @ 1 meter. Typical clock with  $\sim 10 \mu\text{Ci}$  would add about 0.5 pCi/l of radon to a house.
- Few laboratory items wiping  $\sim 3,000$  dpm, alpha, I.D. Pu-239
- Other isotopes found on equipment were I. D. as Cs-137, Co-60, Cs-134,
- Three living areas were found with contamination, which was removed.
- No exposure to residents documented.

## • Post Incident Events

- May 77 - NECO fined \$10K for 2 specific 1972 violations. Five year statute of limitations reduced no. of violations.
- June 77 - NECO requests termination of NRC license to dispose of special nuclear materials.
- May 78 - B. Arkell reports to Energy Resources Adv. Bd.- No longer sure of support of the 75 Legislature position of encouragement to Fed. Gov. to pick Hawthorne, NV as HL waste site as a result of Beatty Incident.
- ~ June 78 - NECO licensed to resume operations by NV.
- May 15, 79 - Truck catches on fire while over nighting at Beatty's front gate. Gov. List says "inexcusable". "who is responsible should be hanged from the yardarm....."
- May 18, 79 - Gov. List by Exec. Order bans shipment from certain California Med. & Ind. waste generators.

## Post Incident Events Continued

- Oct. 22, 79 - List orders Beatty dump closed for 3rd time after 5 barrels of waste are found outside of existing fenced area. License revocation hearing set for Nov., 27, 79.
- *Oct. 25, 79 - List sends Pres. Carter telegram informing him that the State will protest the opening of any Federal Sites to LLW during period Commercial dumps remain closed. [List led boycott of disposal of LLW is underway!]*
- Oct. 27, 79 - DOE announces policy change. Now DOE generated waste is to be disposed of at DOE disposal sites. In 1979 18% of commercial waste was DOE generated.
- Nov. 3, 79 - NECO response, no requirement for fencing. Only initially fenced 20 of the 80 acres permitted.
- Nov. 28, 79 - NV State Bd.. Of Health rules that NECO “had not substantially violated any State Regs nor was the site mismanaged.



## Post Incident Events Continued

- Sep. 12, 80 - If Beatty closes, say witnesses, it will help spur impetus for the establishment of regional dumpsites, and also improved packaging procedures on the part of the Nuclear Industry. NV State Dir. Of Human Resources - R. DiSibio testified *he denied NECO's license renewal because he did not want to "TAMPER" with the lives of Nevadans.*
- Oct. 23, 80 - NV State Bd. Of Health votes to renew NECO's license for 3 more years and keep the waste site open.
- *Dec. 22, 80 - PRESIDENT CARTER SIGNS THE LOW LEVEL WASTE POLICY ACT, creating regional compacts for the disposal of radioactive LLW waste.*
- April 1981 - State of NV institutes 3rd party inspections.
- June 1981 - NV State Senate fails to pass bill to close Beatty.

# Nevada State Assembly Joint Resolution No.15; 26 Feb.,1975

THE THIRTY-EIGHTH DAY CARSON CITY (Wednesday), February 26, 1975 Assembly called to order at 11:10 a.m.

By Assemblymen Mann, Robinson, Price, Hickey, May, Getto, Jacobsen, Hayes, Moody, Chaney, Schofield, Benkovich, Dreyer, Howard, Heaney, Bennett, Christensen, Jeffrey, Vergiels, Sena, and Brookman: **Assembly Joint Resolution No. 15-Urging the Energy Research and Development Administration to choose the Nevada Test Site for disposal of nuclear wastes and for solar energy research under the Solar Energy Research, Development and Demonstration Act of 1974.** Assemblyman Mann moved that the resolution be referred to the Concurrent Committees on Environment and Public Resources and Commerce. Motion carried.

Transmittal also included supporting resolutions from the mayor of Las Vegas, Clark County Commissioners, Nye County Commission and Lincoln County Commissioners.

# Summary

- Beatty formally closed Dec. 31, 1992.
- The Colorado site has never opened. In 1993 the No. West Compact closed access to all states except those within the NW and the Rocky Mountain Compacts.
- On July 1, 1994, The State of South Carolina denied access to 31 states who had been sending their LLW to Barnwell. Only 8 states, members of the South East Compact are allowed to send their LLW to the Barnwell facility.
- In June, 1995, South Carolina reopen Barnwell to every state except North Carolina. With an additional surcharge of \$235 per ft<sup>3</sup>. Total Type A dry waste is \$350 per ft<sup>3</sup>.
- The generation of LLW waste has declined over the years, while the number of generators and users of radioactive materials has increased.

## Summary Continued

- 21 years after the LLW Policy Act of 1980, no compact sites have opened, while \$100s of millions are being spent on attempts at siting a disposal site.
- While NV officials were finally successful in closing Beatty, after fighting to do so for about 15 years, it was not closed on the merits of being unsafe, or having unsafe shipments, as attested to by the Two Board of Health Hearings and subsequent decisions.
- Numerous and continuous statements over the years, about the imminent danger of contracting cancer or leukemia from exposure to radiation to the unsuspecting Nevada Citizens were made by high state government officials.
- Highly critical and inflammatory rhetoric was continuous from a Las Vegas newspaper.

# Conclusions

- NV was set to recommend the acceptance of High Level Nuclear Waste at Hawthorne, NV before the Beatty 1976 incident woke the politicians and provided a platform of FEAR.
- The Beatty incident has been extremely costly to the United States, as it ultimately has contributed to the following:
  - Denied the use of an excellent facility for the use of LLW disposal.
  - Indirectly spawned the misbegotten LLWPA of 1980.
  - Has driven up the cost of disposing of LLW.
  - Has spun up the rhetoric of transporting radioactive materials
  - Has contributed to the continued rhetoric against Nuclear Power indirectly contributing to the energy crisis of the Nation.
  - Is contributing to making nuclear medicine, research and commercial use of radioisotopes more costly for US citizens.
  - And, has fueled the concern of cleaning up the environment to very low levels contributing to increased risk to workers.

# Fukushima-The Cost of Fear?