A Brief History of Radiation Exposures to Idaho National Laboratory Workers

By Tami Thatcher
January 5, 2016 Update

As the National Institute of Occupational Safety and Health, NIOSH, examines the current Special Exposure Cohort Petitions for radiation exposure at the Idaho National Laboratory, it is helpful to review some of the history. The INL (also named the INEL and the INEEL) was originally called the National Reactor Testing Station when it opened in 1949. In 2005, the separate operation controlled by the Chicago DOE office, the Argonne National Laboratory – West facilities, was combined with the INL. The Naval Reactors Facilities operated by the Department of Energy remains separate and excluded from radiation and chemical exposure compensation. [1]

Previously, unlike many other Department of Energy facilities, [2] the INL and ANL-W did not have any Special Exposure Cohorts recognized for compensation automatically without performing a radiation dose reconstruction. But that may change as recent cohort petitions are investigated by NIOSH. The original petition for all of INL has been divided into two petitions: Petition 219 for INL and Petition 224 for ANL-W. [3]

The SEC petitions are broad and assert that all workers before 1970 should be compensated because of inadequate internal radiation monitoring. So far, NIOSH investigations have determined that control of and monitoring of plutonium and other radionuclides at the Idaho Chemical Processing Plant, now called INTEC, was inadequate from 1963 to 1974. NIOSH is still investigating whether additional INL (and ANL-W) cohorts will be added. [4]

Why it matters:
Former Idaho National Laboratory workers, including ANL-W have been denied radiation illness compensation because recorded doses under-represent their exposures.

What INL Facilities are being reviewed by NIOSH?
INTEC, TAN, ATR Complex, CFA, RWMC and also ANL-W. (Former NRF workers are unfairly still excluded.)

NIOSH reviews are being conducted now:
NIOSH plans to be in Idaho Falls in January 2015.

DOE's Long History of Downplaying Exposures
NIOSH has long been fooled by deceptive reports and missing information.

[1] 42 USC 7384, The Act--Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA), as Amended and see the website for the Center for Disease Control, National Institute of Occupational Safety and Health, Division of Compensation Analysis and Support at http://www.cdc.gov/niosh/ocas/ and U.S. Department of Labor, Office of Workers' Compensation Programs, EEIOCPA Program Statistics, http://www.dol.gov/owcp/energy/regs/compliance/weeklystats.htm

[2] Department of Energy with high numbers of occupational radiation exposure claims include Hanford, Savannah River, Y-12, K-25 Oak Ridge Gaseous Diffusion Plant, Rocky Flats Weapons Plant and many others.

[3] Idaho National Laboratory Special Exposure Cohort Petition Evaluation Report SEC-219, presentation by T. Taulbee, NIOSH-DCAS, March 26, 2015 http://www.cdc.gov/niosh/ocas/pdfs/abrwh/pres/2015/dc-inlsec219-032615.pdf

A recent Department of Labor presentation to NIOSH states that INL had 5,397 people apply for Part B (radiation) or Part E (chemical) illness compensation under the Energy Employee Occupational Illness Compensation law passed in 2000. [5] The presentation states that as of November 1, 2015, 1632 radiation dose reconstructions had been performed with available dose records but only 636 had been approved. There were 926 Part E approvals. Unlike many other DOE sites with more approved Part B claims than Part E claims, it would have appeared that the INL site had caused fewer illnesses from radiation exposure than from chemical exposure. The denied claims, however, were denied on the basis of reported exposures and DOE's radiation monitoring and record keeping are now being questioned. A recent investigative news report includes report includes a database with individual information about thousands of sickened and dead workers at various nuclear sites including the INL. [6]

One of the biggest obstacles to accurate dose reconstruction is the deliberate and diligent efforts by the Department of Energy to oversell its control of radiation exposures. And its story-teller in Chief, John Horan, the past director of health and safety at the Idaho National Laboratory from the 1950s and author/editor of DOE's health and safety reports when they exist, NIOSH consultant and author of a 1993 summary of worker radiation exposure at INEL.

Horan's 1993 report covers external radiation exposures at INL, excluding NRF and ANL-W, from 1951 to 1992. It does not address internal doses. [7] The external radiation annual dose limit was 15 rem/yr until 1958. Then it was 12 rem/yr until 1974. Beginning in 1974, the annual dose limit was 5 rem/yr. The less frequently discussed DOE administrative limit of 2 rem/yr allows DOE to continue to act like any dose less than 5 rem/yr is harmless when it presents radiation standards and radiation doses. Internal dose was compared to maximum body burden and not reported until DOE's reporting began the combining of internal and external dose around 1989.

In Horan's 1993 report, for years that the dose limit was 15 rem/yr, he does not cite any exposures as accidental if remaining under 15 rem/yr. Still, his report indicates that during the years with the 12 rem/yr limit (3 rem per quarter), few workers during the early 1960s were recorded having doses exceeding 5 rem. During the 1961 cleanup of the SL-1 reactor accident at

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[4] See NIOSH presentations regarding the INL Petition 219 at the July 23, 2015 meeting in Idaho Falls http://www.cdc.gov/niosh/ocas/pubmtgs.html

[5] Department of Labor Presentation to NIOSH Advisory Board by F. Crawford, November 2015. http://origin.glb.cdc.gov/niosh/ocas/pdfs/abrwh/pres/2015/dol-update-111815.pdf

[6] "IRRADIATED: The hidden legacy of 70 years of atomic weaponry," McClatchy Newspapers at tinyurl.com/McClatchyReport. McClatchy said it conducted more than 100 interviews and analyzed 70 million records over the last year. The report includes a database with individual information about thousands of sickened and dead workers. It includes reporting from nuclear sites across several states, including Idaho National Laboratory. One section focuses on Idaho Falls resident Ralph Stanton and his wife, Jodi Stanton. Ralph Stanton was the INL employee at the center of the 2011 accident where plutonium powder spilled out of an old fuel plate, went airborne, and exposed 16 employees.

[7] J. R. Horan, "Occupational Radiation Exposure History of the Idaho Field Office Operations at INEL," EGG-CS-11143, October 1993. http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/26/050/26050117.pdf#search=%22doe%2Fid-12119%22

INL, over 1000 workers participated in cleanup, yet the recorded doses do not exceed 5 rem/yr. (See p. 29, Table 2). Worker's doses resulting from SL-1 cleanup resulted in premature death for some workers despite the low recorded doses. For example, Army demolitions expert James Dennis who died of and project accountant Clair Burket who was required to participate in SL-1 cleanup after the large aircraft engine project was cancelled. Dennis died of a rare blood cancer called Waldenstrom's micro globulin anemia and his exposure for over nine hours has been grossly understated by his recorded 2 rem whole body dose. Burket died several years after working at INL of a massive brain hemorrhage at the age of 33. [8]

Horan's 1993 report on external radiation exposure did mention the jobs most likely to have high doses. This is not information that DOE or NIOSH now track or disclose. Table 1, on p. 26 gives the cumulative individual dose for individuals having the highest cumulative, non-accident doses. The jobs are mostly pipe fitters. In a recent study of workers at various DOE nuclear sites, using a cohort of 18,803 workers, the study concluded that mortality was elevated for all causes, all cancers, and construction workers employed at DOE sites have a significantly increased risk for occupational illnesses. [9]

Then Horan's 1993 report describes concern that an error in recording the external radiation doses had occurred. The report states "A recheck of the original source of data indicated the numerical value was correct. Still questioning the accuracy of this figure, a meticulous reconstruction was made of all individual exposures received in 1965.. . .More detailed look into the radiation work being performed indicated a general increase in late 1964 which extended into mid1966 at most facilities, resulting in an exceptional number of workers receiving annual doses in the 4 to 5 rem range, as well as, greater than 5 rem."

So the former director of health and safety director over INL during the 1960s says he had no idea why 61 workers have recorded doses much higher than previous years: the workers received recorded doses over 5 rem doses in between late 1964 and 1966.

Interestingly, the dates of the SNAPTRAN tests conducted in the INL's Test Area North correspond perfectly. There were three tests according to "Proving the Principle" and a book "Atomic Accidents", but INL reports only describe two. The dates of the acknowledged two tests are 4/1/1964 and 1/11/1966. The mystery test was apparently scheduled for 7/20/1965. This I have from the DOE's Human Radiation Experiments collection: a draft press release for the missing test is part of the official collection.

The acknowledged 1/11/1966 test is claimed to have released only noble gases. But while the 4/1/1964 test was submerged, the 1/11/1966 test (and likely the missing 7/20/1965 test were

[8] Chuck Broscious, Environmental Defense Institute, "Citizens Guide to the Idaho National Engineering and Environmental Laboratory, May 1998 or more recent copy.

[9] Knut Ringen et al., "Mortality of Older Construction and Craft Workers Employed at Department of Energy (DOE) Nuclear Sites: Follow-Up Through 2011," American J of Industrial Medicine 58:152-167 (2015). https://www.btmed.org/doc/AJIM%20Mortality%20of%20Older%20Construction%20Workers%20DOE%20Feb%202015.pdf

open air and complete core destructive tests. And so perhaps the 7/20/1965 test was horrendous and they kept a lid on the information.

At least I now understand why they hired Horan to write this occupational exposure report which would have been a fairly simple task technically. He knew the truth, and he could be counted on to keep the truth buried.

Another important thing that Horan's 1993 report shows is that gap in Health and Safety Reporting after 1963. See p. 38. Here they have significant open air tests releasing radionuclides. And so DOE decides not to do the annual reports they had been doing since 1958. So the reports that they began issuing after the GE's aircraft engine nuclear IET tests when they admittedly didn't know how to monitor things cease as radiological releases are increasing. Even the reports from 1958 to 1963 change title about every two years so that nobody can find them in the library or ask for them by name. I've talked to former DOE employees who know this sort of thing was deliberate.

Another aspect of this 1965 era mystery is that the INEL Historical Dose Evaluation noted that in 1965 and 1966 there were unexplained high levels of Iodine-131 in milk. They looked at INEL routine and episodic releases, and weapons testing. And they could not determine 18 instances of high levels of Iodine-131 in milk. [10] It may have been unrecorded emissions from SNAPTRAN tests, unrecorded emissions from ANL-W's fast breeder reactor the EBR-II, destructive experiment fuel samples conducted at the EBR-II or other INL emissions.

The 1963 above ground weapons test ban didn't stop the Department of Energy from conducting underground weapons tests at the Nevada Test Site, which vented radioactive air that blew in over Idaho in much the same way that the open air tests had. [11] This exposed INL workers as well as the public.

It all begins to make sense when you understand how the Department of Energy has a long history of withholding information that could erode public trust or to increase its liability from radiation exposures.

A recent article highlighting problems in EEOICPA compensation from unmonitored neutron dose and from chemical exposures has a link to testimony about how DOE knew it had to limit liability and avoid saying anything negative about nuclear contamination or health effects. [12] [13]

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[10] US Department of Energy Idaho Operations Office, "Idaho National Engineering Laboratory Historical Dose Evaluation," DOE-ID-12119, August 1991. See Table E-5 on p. E-36 for mystery milk and see Table C-21 for the public annual dose summary. Volumes 1 and 2 can be found at https://www.iaea.org/inis/inis-collection/index.html

[11] Records of weapons test fallout that reached a particular county can be found by using the Center for Disease Control's interactive iodine-131 fallout map. By entering a birth date prior to 1971, state and county and milk drinking habits, you can obtain potential I-131 dose and the results will present the estimated dose by individual weapons test name and date. https://ntsi131.nci.nih.gov/

[12] Jim Morris and Jamie Smith Hopkins, The Center for Public Integrity, "Unequal Risk – Ailing, angry nuclear-weapons workers fight for compensation," December 11, 2015. http://www.publicintegrity.org/2015/12/11/18936/ailing-angry-nuclear-weapons-workers-fight-compensation

"For example, the 1947 Atomic Energy or AEC Director of Oak Ridge Operations' memo to the AEC general manager stated, 'Papers referring to levels of soil and water contamination surrounding Atomic Energy Commission installations, [idle] speculation on future genetic effects of radiation, and papers dealing with potential process hazards to employees are definitely prejudicial to the best interests of the Government. Every such release is reflected in an increase of insurance claims, increased difficulty in labor relations, and adverse public sentiment.'

Later that year, Oak Ridge recommended that the AEC Insurance Branch review declassification decisions for liability concerns. Their recommendation stated, "following consultation with the Atomic Energy Commission Insurance Branch, the following declassification criteria appears desirable: If specific locations or activities of the Atomic Energy Commission and/or its contractors are closely associated with statements and information which would invite or tend to encourage claims against the Atomic Energy Commission or its contractors, such portions of articles to be published should be reworded or deleted. The effective establishment of this policy necessitates review by the Insurance Branch as well as the Medical Division prior to declassification."

"In 1948, the AEC Declassification Branch found that a study of Los Alamos workers could be declassified as, 'open research.' The Insurance Branch called for very careful study before making the report public and wrote, 'We can see the possibility of a shattering effect on the morale of the employees if they become aware that there were substantial reasons to question the standards of safety under which they are working. In the hands of labor unions, the results of this study would add substance to demands for extra hazardous duty pay. Knowledge of the results of this study might increase the number of claims of occupational injury due to radiation and place a powerful weapon in the hands of a plaintiff's attorney.'

"This secrecy policy was documented again in 1960 by AEC biomedical officials where they recognized that, 'possibly 300 people at Paducah should be checked out' for neptunium contamination, but that there was hesitation to, 'proceed to intensive studies because of the union's use of this as an excuse for hazard pay.' "

When I tried to determine the most significant radiation exposure events at the Idaho National Laboratory recently, it would have seemed logical to simply look for the radiation exposures topping 5 or 10 rem based on DOE's annual occupational radiation reports. But the difficulty with this is that the reports were not generally published before 1968 while INL

[13] Hearing before the 109th Congress, March 1, 2006, Serial No. 109-110. p. 9, 10. http://commdocs.house.gov/committees/judiciary/hju26290.000/hju26290_0f.htm

operations began in 1949. Radiation dose limits were 15 rem per year in the bad old days, not 5 rem per year. And internal doses were not included in DOE's occupational radiation reported doses until about 1989. Missed doses and doses mysteriously disappeared or eliminated through analytical prowess would not show up either. And a serious problem is that radiation dose health effects are now known to be no less serious when accumulated gradually in small increments and median exposures of 400 mrem/yr yield excess cancer risk. [14]

So here's a discussion of some of the INL facilities likely to have given excessive radiation doses to Idaho National Laboratory workers.

1. The Chemical Processing Plant now known as INTEC is known to have had inadequate radiation monitoring programs, especially in the earlier decades with underrepresented neutron doses, beta doses, and internal doses, especially alpha doses. [15] [16] This has so far resulted in one new cohort being recommended for INL. Military fuel reprocessing at INTEC, tank farms and subsequent calcining created some of the highest doses for workers at the Idaho National Laboratory, despite the omissions. [17] Horan's 1993 report, p. 50, consistent with DOE Occupational Exposure reports states that: "**The ICPP has been the major source of the highest exposures and collective dose at the INEL. This was basically due to the 1950 through 1960 plant design which provided for direct maintenance."**

   Three accidental criticalities occurred at INTEC, but only the first one in 1959 was acknowledged as giving high doses: one worker was said to have an 8 rem dose, another worker got 6 rem and there were 5 others workers exposed.

2. The 1961 SL-1 accident dosed responders in clouds of airborne fission products as well as unshielded fuel fragments. The monitoring and subsequent descriptions of careful monitoring were not nearly as adequate as the Department of Energy's John Horan described. And the radiation protection standards of the time were high, at 3 rem per quarter for a 12 rem annual limit, that did not include internal dose. [18] Nine emergency responders were said to have received 15 to 27 rem. But no firemen or security guards who initially responded to the accident are included in the nine. One of the early fireman responders was told that night he

[14] Richardson, David B., et al., "Risk of cancer from occupational exposure to ionizing radiation: retrospective cohort study of workers in France, the United Kingdom, and the United States (INWORKS), BMJ, v. 351 (October 15, 2015), at http://www.bmj.com/content/351/bmj.h5359 Richardson et al 2015

[15] S. Cohen & Associates, *Draft Review of the NIOSH Site Profile for the Idaho National Laboratory, Idaho*, SCA-TR-TASK1-0005, September 2005 http://www.cdc.gov/niosh/ocas/pdfs/abrwh/scarpts/sca-inlsp-r0a.pdf

[16] See NIOSH dose reconstruction website for the Idaho National Laboratory, including Petition 217 and 2015 written comments to NIOSH by Tami Thatcher http://www.cdc.gov/niosh/ocas/ineel.html

[17] US Department of Energy, *DOE Occupational Radiation Exposure Report 1992 – 1994*, DOE/EH-0533. http://energy.gov/sites/prod/files/2014/06/f16/94REPORT.pdf and see other years at http://energy.gov/ehss/listings/annual-doe-occupational-radiation-exposure-reports

[18] S. Cohen & Associates, *Draft Review of the NIOSH Site Profile for the Idaho National Laboratory, Idaho*, SCA-TR-TASK1-0005, September 2005, p. 88 http://www.cdc.gov/niosh/ocas/pdfs/abrwh/scarpts/sca-inlsp-r0a.pdf

received 18 rem and this would not have included internal dose. Years later, neither his dose records or the records of the men who were with him could be found. They were in the SL-1 building and went up the stairs to view the reactor main floor. Any scrutiny of the radiation dose maps and their stay times validates the reasonableness of the 18 rem. Yet, NIOSH has said they don't believe any excessive doses occurred other than the acknowledged nine emergency responders.

The SL-1 cleanup involved more than 1000 cleanup workers. [19] I believe doses were falsely lowered doses if their badges didn't jive with limits – this can be most clearly seen with Army demolition expert James Dennis whose affidavit describes conditions that would have given him a much larger dose than officially recorded.

The SL-1 reactor building silo was dismantled after the accident but other adjoining buildings remained in use but were found decades later to be unacceptably contaminated when CERCLA reviews were conducted, and had to be demolished. [20] See also Appendix A below for the NIOSH submittal sent December 16, 2015 and my report about the causes of the SL-1 accident on the Environmental-Defense-Institute.org website.

3. The INL's Radioactive Waste Management Complex disposed of radioactive spent fuel debris from NRF and other INL facilities, INL reactor core internals and resins, radioactive waste from around the country, and plutonium, americium, and uranium wastes from the Rocky Flats weapons plant. NIOSH is currently reviewing the historical lack of monitoring for plutonium or alpha internal dose there. After flooding at RWMC in 1962 and 1969 caused the rising of shallowly buried boxes and barrel, well. . ..the answer, my friend, is blowing in the wind. Subsequent environmental monitoring found americium levels that were too high to be from weapons testing: it had to blow in from RWMC. [21] [22] [23]

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[19] S. Cohen & Associates, *Draft Review of the NIOSH Site Profile for the Idaho National Laboratory, Idaho*, SCA-TR-TASK1-0005, September 2005, p. 81 http://www.cdc.gov/niosh/ocas/pdfs/abrwh/scarpts/sca-inlsp-r0a.pdf

[20] See the CERCLA administrative record at ar.icp.dov.gov for the RI/FS OU 5-05 and 6-01 SL-1 and Borax I Burial Grounds, INEL-95-0027, March 1995. https://ar.icp.doe.gov/owa/getgif_2?F_DOC=INEL-95%2F0027&F_REV=00&F_PAGE=6&F_GOTO=5

[21] T. M. Beasely et al, *Heavy Element Radionuclides (Pu, Np, U) and Cs-137 in Soils Collected From the Idaho National Engineering and Environmental Laboratory and Other Sites in Idaho, Montana, and Wyoming*, Environmental Measurements Laboratory, EML-599, October, 1998.

[22] S. M. Rood et al, Background Dose Equivalent Rates and Surficial Soil Metal and Radionuclide Concentrations for the Idaho National Engineering Laboratory, INEL-94/0250, Rev 1, August 1996.

[23] "Phase 1 Interim Remdial Action Report for Operable Unit 7-13/14 Targeted Wste Retrievals," October 2014, Prepared for the US DOE Idaho Operations Office, DOE/ID-11396 Rev. 3, Air Emissions table on p. 70 for 2005 through 2013 at https://ar.icp.doe.gov/images/pdf/201411/20141103009 60BRU.pdf

4. Intentionally melting reactor fuel was part of the fun reported in the Department of Energy's Human Radiation Experiment collection for the Idaho site and this coincided with Department of Energy weapons testing fallout from the Nevada test site that blew into Idaho as well as across the country. [24] [25] [26] Five BORAX reactors, SPERT, proposed nuclear aircraft engine tests, NASA's nuclear generating stations for space SNAPTRAN, and LOFT all involved the airborne release of fission products. Following one SNAPTRAN test, the plume was tracked 21 miles by plane. Subsequent monitoring in Monteview, a farming community near TAN at the near end of the INL included cow's milk and alfalfa concluded that the release wasn't above allowable standards but never told residents. The DOE's 1966 report [27] concluded that the release was 20 percent of the total inventory, but it doesn't say what the total inventory was. The INEL Historical Dose Evaluation listed the release on January 11,1966 as 2000 curies but the DOE's waste document said 600,000 curies. [28] They proceed to say "The SNAPTRAN-2 Reactor Dolly was dismantled and the reactor structure and components were removed to the burial ground. . ..Forty-seven truck loads of contaminated soil were removed from around the IET area to the CFA burial ground." If you understand how DOE is really not that particular about soil contamination, you know that the soil had to be hotter than hell. Around the BORAX I reactor debris from intentionally blowing it up, later, a few rocks were scattered over the top of it. Decades later CERCLA reviews found unacceptably high soil contamination problems at TAN where the SNAPTRAN and initial engine tests took place, among others. Coincidentally, the US Geological Survey stopped well water monitoring for the entire north end of the INL from NRF to TAN after 1963 for about a decade. [29]

5. Hot water at Central Facilities Area (CFA). The laundry at CFA washed the contaminated coveralls used by radiation workers around the site. And often the laundered clothing returned for use was still radioactively contaminated because of the ineffective laundering, just mixing the contamination around. But in addition, the radioactive waste water disposal well at INTEC created a plume that contaminated the drinking water at CFA. Tritium at five times the federal maximum contaminant level, iodine-129, and a host of other radionuclides and

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[24] February 1995, the Department of Energy's (DOE) Office of Human Radiation Experiments published *Human Radiation Experiments: The Department of Energy Roadmap to the Story and Records* ("The DOE Roadmap"). See also the INL site profile on Occupational Environmental Dose: http://www.cdc.gov/niosh/ocas/pdfs/tbd/inl-anlw4-r2.pdf)

[25] National Cancer Institute, webpage for Radioactive I-131 from Fallout. See http://www.cancer.gov/cancertopics/causes/i131 and https://ntsi131.nci.nih.gov/

[26] Records of weapons test fallout that reached a particular county can be found by using the Center for Disease Control's interactive iodine-131 fallout map. By entering a birth date prior to 1971, state and county and milk drinking habits, you can obtain potential I-131 dose and the results will present the estimated dose by individual weapons test name and date. https://ntsi131.nci.nih.gov/

[27] Department of Energy, TAN-SPERT Health Physics Progress Report, March 1966, CORD-28-66A.

[28] ERDA-1536; Waste Management Operations, INEL Final Environmental Impact Statement, US Energy Research & Development Administration, September 1977. p. II-249.

[29] US Geological Survey website link: http://id.water.usgs.gov/projects/INL and INL bibliography at http://id.water.usgs.gov/INL/Pubs/INL_Bibliography.pdf

chemicals were in the drinking water at CFA that workers were never told of. [30] [31] Other INL facilities also had contaminated drinking water and INL site epidemiology study findings showed increased risk of certain cancers for INL workers, whether or not they were radiation workers. [32] [33] NIOSH has yet to produce any evidence that they have seriously looked at INL drinking water historical chemical or radiological contaminant levels.

6. TAN's SMC facility for producing military tank armor using depleted uranium involves a gaseous process. The airborne contamination is proven by the elevated uranium levels in radiation and non-radiation workers there. Brilliant SMC radiation experts decided to subtract a baseline 0.16 microgram/L from radiation workers urine levels, which were as high as 0.33 mircrograms/L, despite average US levels being between 0.006 to 0.054 micrograms/L. [34] Damage to DNA from uranium causes increased chance of birth defects and other health concerns. [35]

7. The Test Reactor Area included the Materials Test Reactor, described as "gone now, but not forgotten" by the American Nuclear Society [36] with its multiple experiment locations and beam tube gave workers more than they bargained for. Methods to compensate for missed neutron doses are a frequent topic at NIOSH meetings. In 1956 at the MTR reactor during shutdown, the water level was lowered, reducing the shielding and workers were working near the reactor top, one held by a crane that malfunctioned and left him exposures several extra minutes after the HP finally figured out that the radiation levels were too high. One worker got 21.6 rem. (This is whole body. But his badge on his lapel would get less than his gonads since the radiation source was beneath him.) Another seven workers got from 2.5 to 10.6 rem.

   Another hidden problem at the Test Reactor Area is the high Americium-24l levels found in shallow perched water associated with the retention basin. All warm waste lines from the reactors and various labs could send waste water to the retention basin. Poor record keeping

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[30] US Geological Survey, *Water-Quality Data for Selected Wells On or Near the Idaho National Engineering Laboratory, 1949 through 1982*, Report 84-714, June 1985. http://pubs.usgs.gov/of/1984/0714/report.pdf See USGS well 14 and the Mud Lake well for tritium (H-3) spikes. Multiply picocurie/milliliter (pCi/mL) by 1000 to convert to picocurie/Liter (pCi/L). The MCL for tritium is 20,000 pCi/L.

[31] T. M. Beasley, P. R. Dixon, and L. J. Mann, ^{99}Tc, ^{236}U, and ^{237}Np in the Snake River Plain Aquifer at the Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho, Environ. Sci. Technol., 1998, 32, 8375-3881.

[32] "An Epidemiology Study of Mortality and Radiation-Related Risk of Cancer Among Workers at the Idaho National Engineering and Environmental Laboratory, a U.S. Department of Energy Facility, January 2005. http://www.cdc.gov/niosh/docs/2005-131/pdfs/2005-131.pdf and http://www.cdc.gov/niosh/oerp/ineel.htm and Savannah River Site Mortality Study, 2007. http://www.cdc.gov/niosh/oerp/savannah-mortality/

[33] Environmental Defense Institute report by Tami Thatcher, *The Hidden Truth About INL Drinking Water*, June 2015, http://environmental-defense-institute.org/publications/INLdrinkwaterR1.pdf

[34] S. Cohen & Associates, *Draft Review of the NIOSH Site Profile for the Idaho National Laboratory, Idaho*, SCA-TR-TASK1-0005, September 2005 http://www.cdc.gov/niosh/ocas/pdfs/abrwh/scarpts/sca-inlsp-r0a.pdf

[35] NIOSH goes to great lengths to not identify whether claims have been or continue to be submitted for SMC workers. Worker illness claims submitted are by INL (although ANL-W was previously tracked separately from the INL) and not by facility, years worked or job type.

[36] http://ansnuclearcafe.org/2012/10/25/mtr-gone-now-but-not-forgotten/

and secrecy had left little information as to the amount flushed to the retention basin. CERCLA investigations found 100 times the federal drinking water standard in the shallow perched water at TRA. [37] Subsequent US Geological Survey monitoring and reporting specifically of shallow and deep perched water inexplicably omitted monitoring of americium or an alpha radionuclides in the shallow perched water. [38] The DOE avoids mentioning the americium-241 contamination at TRA when presenting information pertaining to soil and aquifer contamination. It is known that eventually, the contaminants in the shallow perched water will migrate downward into the aquifer.

8. Hot cells at the Test Reactor Area have provided numerous DOE occurrence reports for internal uptakes, external radiation beaming from an undetected penetration in the hot cell wall and exposure to radioactive material dropped out of a transfer cask. The stack became contaminated after a procedure change led to use of a fragile container for powdered Europium. Radioactive material caught in the stack filters provided a shine into a nearby second story office area for weeks until detected. [39] TAN and MFC hot cells likely have caused similar unplanned exposures.

9. MFC's 2011 ZPPR accident which resulted in the inhalation of plutonium, americium and uranium particles because management did not trouble themselves to address written and in-person communication from the safety oversight chairman who actually begged them to address worker safety issues from uninspected ZPPR plates. Workers were reassured that there would be no problem with the plates even after the workers questioned the vague labeling on the plates and the workers were directed to proceed. After the accident and despite a Department of Energy investigation concluding that multiple management failures caused the accident, INL director John Grossenbacher explained that the accident could have been prevented if the workers had only stopped work. [40] [41] [42] [43]

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[37] Idaho National Laboratory Federal CERCLA Cleanup documents at ar.icp.doe.gov S.M. Lewis et al., Remedial Investigation Report for the Test Reactor Area Perched Water System (Operable unit 2-12), EGG-WM-10002, June 1992.

[38] Linda C. Davis, US Geological Survey "An Update of the Distribution of Selected Radiochemical and Chemical Constituents in Perched Ground Water, Idaho National Laboratory, Idaho, Emphasis 1999-2001. The is NO Americium monitoring at the Test Reactor Area now called the ATR Complex. There is not even gross alpha monitoring in the perched water found to have exceeded the MCL for americium in CERCLA studies conducted just a few years before this report was written although it was not released until 2006.

[39] Occurrence report dates include June 17, 1992, September 17 1997, and January 6, 1999.

[40] Department of Energy, Office of Health, Safety and Security (HSS), Accident Investigation Report, "Plutonium Contamination in Zero Power Physics Reactor Facility (ZPPR) at the Idaho National Laboratory" accident 11/8/11 at the Materials and Fuels Complex (MFC). http://energy.gov/hss/downloads/investigation-november-8-2011-plutonium-contamination-zero-power-physics-reactor.

[41] Article by Jessica Murri, "Half-Life: How an Accident at the Idaho National Laboratory Changed a Family," *Boise Weekly*, April 2014.

[42] Letter from Department of Energy, John S. Boulden III Office of Enforcement and Oversight to INL's Battelle Energy Alliance, John J. Grossenbacher, Director, " NEA-2012-01, October 4, 2012. The letter details fines for numerous radiological control problems at INL including failure to perform real-time monitoring and the failure to provide warning of airborne plutonium.

10. Modern era, post-1990 radiation cleanup work at RWMC and associated facilities at the AMWTP and the converted NWCF have resulted in high contamination levels on a daily basis. . .And some days more than others. The air emissions from RWMC through filters have exceeded 5 millicuries per year. Several DOE occurrence reports have found multiple workers with elevated intakes of radioactive contamination. [44] [45] [46] NIOSH has indicated that EEOICPA claims are coming in from post-1990 cleanup workers.

Ah, yes, let's not forget NRF even though workers are ineligible for EEOICPA compensation. NRF has provided information releases in 1955, 1975, 1976, and 1977 that was withheld for decades. NRF had operating reactors, ponds, liquids dumped in drainage ditches, spent fuel pools, hot cells, and destructive examination of nuclear fuel specimens which creates airborne releases. The employees are mainly civilians. NRF decided that their workers did not need EEOICPA compensation because NRF knows how to carefully plan, execute and monitor radiation work. [47] [48]

Finally, here's an interesting plutonium contamination event, not addressed in Horan's 1993 report because it is an internal dose. This plutonium contamination event occurred at "an NRTS reactor area" during the period November 13 to November 18, 1963. The 1963 report concludes that the internal doses "weren't too high." [49] The contamination was first detected on November 15, but discovery of the source and confirmation of the elements involved was not accomplished until

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[43] NE-ID—BEA-INLPROGM-2011-0001, "Radiological Work Control Noncompliance issues" Recurring occurrence reports: 6 occurrence reports and 14 non-reportable issues since 2009. Reported 3/17/2011. Many events were at the Materials and Fuels Complex.

[44] DOE-Idaho Operations Summaries at http://www.id.doe.gov/news/OperationsSummarys.htm

[45] Occurrence Report Number**:** EM-ID--CWI-ICPWM-2014-0001 Positive Unreviewed Safety Question (USQ) - HEPA Filter Accident Analysis at the Idaho Cleanup Project. "The source term used for the NWCF HEPA filter failure event in the Safety Analysis Report, (SAR)-103 New Waste Calcining Facility and the Fluorinel Dissolution Process Area, is based on historic tank farm facility (TFF) waste operations. Current RH TRU waste processing in the NWCF has a different isotopic profile and specific activity from the source term analyzed for the NWCF HEPA filter failure accident. Some of the RH TRU waste has relatively high alpha activity and relatively low gamma activity. Adding the RH TRU waste source term to the accumulated TFF source term on the HEPA filters may result in a higher consequences from the HEPA filter degradation accident scenario than currently evaluated in the NWCF SAR."

[46] A DOE Occurrence Report for the Advanced Mixed Waste Treatment facility (EM-ID-BBWI-AMWTF-2010-0013) discusses bioassay results for 15 employees that indicted positive for internal contamination exposure and for EM-ID—CWI-RWMC-2011-0003 "Spread of Contamination Outside of Accelerated Retrieval Project VI" with onsite radioactive contamination greater than 100 times the total contamination values in 10 CFR part 835 App D. Momentary loss of power and subsequent momentary loss of negative pressure . . .and controls were clearly inadequate to control the spread of contamination.

[47] Naval Nuclear Propulsion Program, Office of Naval Reactors, "Occupational Radiation Exposure from Naval Reactors' Exposure from Naval Reactors' Department of Energy Facilities," Report NT-113, Mary 2011. http://nnsa.energy.gov/sites/default/files/nnsa/02-12-multiplefiles/NT-11-3%20FINAL.pdf

[48] See public comment from EDI at www.environmental-defense-institute.org C*omments on the Recapitalization of Infrastructure Supporting Naval Spent Nuclear Fuel Handling at the INL DOE/IES-94540,* August 2015.

[49] *Annual Progress Report 1963*, Idaho Operations Office of the U.S. Atomic Energy Commission, primary author John R. Horan, August 1964. p. 4. https://www.osti.gov/opennet/servlets/purl/16106420-S3V14P/16106420.pdf

November 18. The source of the contamination was found to be a movable glove box which had previously been used for seal welding various capsules containing transuranic elements including one containing Pu-240. Personnel who were unaware of the contamination used the box for unrelated work, which subsequently resulted in the spread of contamination.

After the contamination was detected, control measures were instituted, which included isolation of the area and contamination checks of persons, buses, and homes. Low level contamination was found in eight homes, one auto- mobile, and three NRTS buses, ***all of which were easily cleaned***. Evaluation of personnel exposures was started on November 16, with collection of urine and feces samples for analysis by the ID Analysis Branch."

"All of which were easily cleaned" Even a chemistry lab room contaminated with plutonium, all hard surfaces of floor and counter, is extremely difficult and actually impossible to decontaminate from plutonium and recent building contaminations at INL have taken months to decontaminate.

Below are submittals to NIOSH concerning their investigation of INL petitions.

Appendix A. NIOSH Submittals

December 2, 2015

Dear NIOSH,

Following up on last year's NIOSH interviews with current and former Idaho National Laboratory employees regarding radiation exposure estimation I would like to emphasize again that the conflict of interest involving the fact that Department of Energy contractors who often were at fault for causing excessive exposures, and will be fined or have award-fees reduced due to excessive radiation exposures are in charge of the processes to estimate the radiation exposure. There has been more than one instance the I know of personally that involves INL contractors being less than forthcoming about the radiation exposure of workers, especially when the contractor is at fault for the exposure. Thus, the highest radiation doses received may not be acknowledged and existing documentation of the dose may not sufficiently allow NIOSH to estimate the actual dose a worker received.

This conflict of interest is coupled with the practice of withholding radiation dose estimation reports from the exposed employees. While an employee is provided when an annual total dose summary, an employee seeking information about how his or her internal dose was estimated must conduct a Freedom of Information Act request. This request is often initially denied for no justifiable reason, thus requiring the additional effort and time of an appeal. The time delays this involves come to many weeks, and this is only after the weeks or months that the contractor may take in order to prepare the radiation dose estimate. How does the exposed worker get competent and timely medical assistance when they do not have identification of the radionuclides and amounts taken in to the body? And worse, the employee may be branded a trouble maker simply for requesting the more detailed information about their radiation exposure. The level of conservatism in contractor radiation dose estimates is widely variable and without knowing what assumptions were made in the assessment as well as bioassay trending, a worker lacks sufficient information about the characterization of their dose. For example, contractors are not required to consider solubility class super S for plutonium exposures, even decades after the Department of Energy has found plutonium lung clearance can be much slower than assumed in officially recognized dose estimation models. Thus, lung dose for workers inhaling plutonium may be much higher than official dose estimates yield. While it is commendable that NIOSH does not rely on the contractor's dose estimates and NIOSH will conduct an analysis that can include more accurate assumptions regarding such things as solubility class, Super S for highly insoluble plutonium, NIOSH is still going to be reliant on contractor information about the exposure.

As I found no record of NIOSH having grasped these facts from several interviews that I attended or directly participated in, I want to state on the NIOSH website that the conflict of interest issue works against radiation workers and may result in underestimation of radiation

dose for workers, especially those workers involved in any kind of mishap at the Idaho National Laboratory. The supposed NIOSH reviews of contractor radiation record programs and dose reconstruction appear to not factor in the intentional act of underreporting radiation doses.

I would like to also mention the fact that individuals interviewed by NIOSH have their comments recorded in a way that I can only describe as haphazard and with a bias toward a deaf ear to anything negative about Department of Energy contractors. And the comments provided by individuals to NIOSH are subsequently provided to the Department of Energy and its contractors with full identification of the person giving the comments. Thus, a current employee can expect retaliation for providing any information that can be deemed unflattering to the Department of Energy or its contractors. Does this sound like the best way to really investigate any problems at DOE contractor's sites?

On the issue I raised to NIOSH concerning drinking water contamination at the Idaho National Laboratory, there was no meaningful response by NIOSH that I could perceive and a pervasive tendency to repeat that the Idaho Snake River Plain Aquifer is clean - just read the latest website information about it. There are two problems with this: measurements off the Idaho site have no bearing on measurements at the Idaho site's facilities. And measurements today at the Idaho site do not reflect what INL workers at various locations were ingesting in earlier decades.

The analysis necessary to estimate the levels of radioactive and chemical contaminants in INL drinking water based on intermittent and often decades-tardy monitoring, for each drinking water well and for each year of operation has not been performed. While various documents have some years of monitoring data, most decades of INL operation do not have complete monitoring or hindsight derivation of what the contamination levels were. I have compiled some highlights of drinking water contamination at the Idaho National Laboratory in a report, "The Hidden Truth About INL Drinking Water"available at http://environmental-defense-institute.org/publications/INLdrinkwaterR1.pdf

The Energy Employee Occupational Illness Compensation law addresses both chemical and radiological exposure. However, it is an unfortunate fact that NIOSH does not consider the damage caused by simultaneous exposure to both chemical and radiological contamination. But not having the legal requirement to consider both effects does not alleviate the increased damage to health, nor what should be learned about the exposure of workers to both chemicals and radiation. The failure to characterize, for each year of INL operation, the level of chemical contamination and radiological contamination in INL drinking water, as can be derived from plume migration and later monitoring results is a serious flaw in INL site characterization as well as NIOSH epidemiology efforts that NIOSH should have had the technical ability to identify. But NIOSH not only did not identify this problem, they seem unreceptive to acknowledging the need for a forensic analysis, so-to-speak, of past INL drinking water contamination levels.

I also want to point out how unfortunate it is that NIOSH chose not to present the bulk of Idaho National Laboratory related ongoing investigations when the NIOSH board met in Idaho

in July 2015. Why would the board choose to conduct its meeting in a way that omitted the most important and INL-relevant presentation while former INL workers were in attendance? It is also extremely saddening to see the way that NIOSH meetings give public comment opportunities and yet these comments again and again appear to fall on very intentionally deaf ears, whether those of the NIOSH staff or of the oversight board. It is the image of transparency but not actual transparency (i.e., choosing not to provide presentations on INL at the Idaho Falls meeting) that matters most to NIOSH. It is the image of caring what workers and the public think but not actually caring as evidenced by lack of comprehension and lack of action. It is the image of a highly technical and scientific process that matters most to NIOSH and an absence of clarification of where existing approaches are likely to be inadequate.

The image of the Wizard of Oz, providing a pageant, smoke and mirrors all intended to mesmerize the audience comes to mind as I watch NIOSH explain how it performs radiation dose reconstruction. NIOSH seems to use technically incomprehensive jargon-filled discussions to disenfranchise former workers and family members. Communication with more clarity would no doubt lead to anger and disgust at past and continuing Department of Energy practices.

It is encouraging that NIOSH is investigating the recent petition regarding historical radiation doses at INL, Petition 219. Without that petition, many of the recent discoveries of inadequate radiation protection of INL would not have occurred. NIOSH and its contractors are to be commended on the ongoing investigations that have found sufficient evidence for establishing radiation cohorts for workers than would not have an adequately monitored and recorded dose.

NIOSH, despite the name: "National Institute of Occupational Safety and Health" appears to take no interest in the health of current employees as evidenced by the refusal to identify what jobs and what INL sites have had and continue to have radiation illness claims. It would not be that difficult to do, yet because it could cost the Department of Energy money to clean up its act at various facilities, it isn't being done. Did workers who change contaminated air filters have adequate protection? Or pipe fitters working to repair pumps and valves in radioactive systems? Or workers using bulldozers to move contaminated soil? Or workers in depleted uranium processes? Workers drinking contaminated water for decades? NIOSH chooses not to be able to answer these questions.

In reviewing the November 10, 2015 presentation regarding the Idaho National Laboratory's Test Reactor Area, "INL Test Rector Area Nuclear Modeling," a presentation give in Ohio and not in Idaho, I find the presentation raising many questions regarding the estimation of unmonitored fission products. The presentation characterizes the reactor fuel used in reactor's there but makes no mention of the many experiment fuels and experiment materials, often destructively examined both in reactor facilities and laboratory facilities at TRA. The shortcomings would not be apparent to anyone in Ohio.

As I have witnessed very incorrect and incomplete understanding of various issues at INL expressed by NIOSH personnel such as "all the plutonium at INL is safely bound up in reactor fuel" when plutonium has been and continues to be emitted by various INL facilities as

evidenced in site environmental monitoring reports. Plutonium and other radionuclides have been blowing in the wind from disposal and subsequent flooding of the disposal site at the Radioactive Waste Management Complex. Airborne releases of plutonium from RWMC's cleanup efforts have been high, even with supposed air filtering. Thus, I have heard with my own ears placating falsehoods spoken by supposed NIOSH INL experts, so I have come to not trust the completeness of understanding of NIOSH experts trying to comprehend the enormous variety and complexity of operations at the Idaho National Laboratory. Given the historical shortcomings of NIOSH's ability to grasp the operations at INL, NIOSH should be making an effort to get feedback from INL workers. Withholding INL presentations while in Idaho and giving INL presentations while in Ohio isn't really an excellent way to proceed.

I appreciate the difficult technical challenge that radiation dose reconstruction at INL entails. I appreciate that progress that has recently been made in investigating the INL Petition 219. But I wish to caution former workers and NIOSH about the longstanding tendency of NIOSH to avoid seeing, hearing, acknowledging or acting in any way that might cast a negative view on nuclear radiation and Department of Energy operations.

And I will close with this suggestion. Before I hear one more time from one more NIOSH person how "people get cancer – radiation doesn't cause cancer" or something to that effect, I suggest that these highly educated NIOSH people so sure that radiation doesn't cause cancer and so eager to informally inform people at NIOSH events of this fact read the latest epidemiology study for occupational exposure to ionizing radiation by Richardson published in 2015. [Richardson, David B., et al., "Risk of cancer from occupational exposure to ionizing radiation: retrospective cohort study of workers in France, the United Kingdom, and the United States (INWORKS), BMJ, v. 351 (October 15, 2015), at http://www.bmj.com/content/351/bmj.h5359 Richardson et al 2015] (And please note that studies of high leukemia risk in radiation workers and of ongoing studies to assess health effects of high and low-linear energy transfer internal radiation must also be studied in addition to this one on external radiation.)

Tami Thatcher

Sent December 16, 2015

Dear NIOSH at 'nioshdocket@cdc.gov'

It is a very important finding that was reached because of investigation of Special Cohort Petition 219. Specifically, the finding that for the Chemical Processing Plant at the Idaho National Laborator between 1/1/1963 and 12/31/1974, bioassay data were insufficient to support reconstruction of internal exposures the Uranium, Neptunium, and Plutonium as well as other related transuranics.

The topics I discuss here for the Test Reactor Area and Test Area North (TAN) merit a much closer look and what I discuss is by no means everything that should be examined. This is only a cursory glance.

I want to be quite sure that you are aware of the large and apparently unrecorded transuranics dumped into waste water at the Test Reactor Area at the INL, now called the ATR Complex. CERCLA evaluation documents in the early 1990s found perched water levels of Americium-241 at the Test Reactor Area of 2110 picoCuries/liter, far exceeding 15 pCi/L that relates to alpha emitters. (See EGG-WM-10002 on ar.icp.doe.gov) The source of the exceedingly high Americium levels would likely not have arisen from normal reactor effluent. However, the MTR did run on plutonium for a few years.

If NIOSH has not studied the CERCLA findings, they could easily be missed because deeper perched water and the aquifer water monitoring do not yet yield such high alpha radionuclide levels. It is particularly important for NIOSH to study early CERCLA findings in addition to recent reports.

At the Test Reactor Area, over time, the Americium-241 has moved from shallow perched water into the soil and will migrate to deep perched water and then to the aquifer. The monitoring of the leaking retention basin and related shallow perched water has often not addressed alpha contamination, for some unknown reason. The alpha contamination may be in the soil now when the shallow perched wells are dry. But that does not change the fact the enormous quantities of alpha emitters were flushed through the warm waste piping to the retention basin and pond. The record keeping was deliberately inadequate and estimates of the discharges from the 1950s and 1960s, especially, are only guesses at best.

Again, the laboratories at the Test Reactor Area were doing rather secretive work involving significant quantities of Americium-241 and probably other transuranics. The work and subsequent amount dumped to the warm waste system, as system which focused more on gamma than alpha content, is largely undocumented and unknown. Records do not exist and little effort has been made to derive and explain the quantities involved in laboratory work or dumped to the warm waste system which was piped to the retention basis and open air percolation ponds. The CERCLA documents for the Test Reactor Area appear very weak in this regard. MTR canal contamination levels should also be examined. Reactor and canal water cleanup systems in the early and middle decades were probably non-existent to very ineffective at the Test Reactor Area.

Thus, it is important that NIOSH understand that alpha monitoring deficiencies were a problem at the Test Reactor Area, in addition to the Chemical Processing plant.

In addition, during the 1960s while efforts were made to stay below 5 rem/yr even though the annual limit was 12 rem/yr, it is remarkable that so many workers received greater than 5 rem external radiation doses that later were thought to be an error. Yet, it is not credible that John Horan, NIOSH consultant and previous Department of Energy Health and Safety Director who was the chief editor of INL health and safety reports did not comprehend how and when these recorded doses occurred in the 1960s.

It was John Horan who stopped issuing health and safety reports that he had previously issued between 1959 and 1963. The reports covered in some fashion, worker and environmental radiation exposures, but the reports lapse between roughly 1964 and 1969. Perhaps partly to hide the effluent blowing in from below ground weapons testing after the 1963 above ground weapons test ban, the environmental monitoring records are "disappeared." And partly because the actual SNAPTRAN releases were probably understated by the Department of Energy. In fact, one of the SNAPTRAN tests at INL in 1965 seems to have totally been "disappeared" yet is mentioned in the DOE's Human Radiation Experiments document collection. SNAPTRAN tests were at the Test Area North. USGS water monitoring ceased for about a decade from NRF to Mud Lake due to some odd coincidence.

NIOSH needs to take an in depth look at the Test Area North (TAN) and the highly contaminated soils remaining after 47 truck loads of contaminated soil were trucked away from TAN for burial in 1966 at either CFA or the RWMC. The subsequent highly contaminated soils were found decades later in CERCLA investigations at TAN, so the cleanup in the 1960s was not entirely effective.

John Horan claimed that the wind direction changes so frequently that the radioactive effluents from a discharge wouldn't blow offsite. The NIOSH analysts claim that INL workers were not exposed because releases were timed to blow offsite. John Horan claims he didn't know why the external radiation doses for 61 workers were so high in 1965, yet it was his job to know what the human and environmental exposures were. John Horan goes out of his way to claim that a deliberate action of an unstable crewman caused the SL-1 accident despite a congressional board that absolved the crew and despite the autopsy conclusion that the supposed unstable man's hands had not been the hands that pulled the rod. When NIOSH hired John Horan as an expert, they were hiring among the most skilled nuclear apologists of all time. He knew his job was to promote public acceptance of nuclear energy. When John Horan claims that all radiation exposures at INL were carefully planned, monitored and recorded, NIOSH should look again.

See Idaho National Laboratory Federal CERCLA Cleanup documents at ar.icp.doe.gov S.M. Lewis et al., Remedial Investigation Report for the Test Reactor Area Perched Water System (Operable unit 2-12), EGG-WM-10002, June 1992.

See J. R. Horan, "Occupational Radiation Exposure History of the Idaho Field Office Operations at INEL," EGG-CS-11143, October 1993. At www.iaea.org/inis.

See the Department of Energy Human Radiation Experiments documents collection (of the small subset publically accessible) including J. R. Horan, "Annual Progress Report 1963, Idaho Operations Office of the US Atomic Energy Commission," 1964, and INEL-HRE-TO70228 and the SNAPTRAN collection at http://www4vip.inl.gov/library/searchreadingroom2.shtml

Tami Thatcher

Sent December 16, 2015, pertaining to SL-1

Dear NIOSH,

At the July 2015 NIOSH Advisory Board meeting in Idaho Falls, it is notable that a Department of Energy employee repeated, informally, the myth that "no one will ever know what caused the 1961 SL-1 accident." So strong is the mythology that the Department of Energy embraced in order to divert attention from its important role in safety oversight at the SL-1 reactor and to avert blame from the contractors operating the SL-1.

In the report EGG-CS-11143, "1993 Occupational Radiation Exposure History of Idaho Field Office Operations at the INEL," by J.R. Horan, Consultant and J.B Braun, October 1993, a section of this report described the January 3, 1961 accident at the Stationary Low Power Reactor (SL-1). Specifically, for the accident description the report states: "Experienced technician manual withdrawal of central control rod 80 times the distance specified by the Standard Operating Procedure." Probable causes stated: "Emotionally unstable operator deliberately withdrew control rod at a rate and distance beyond reason."

These statements far exceed any referenced document cited. The fact is that documents describing the accident never say the rod was withdrawn 80 times the distance in the procedure. The only distance specified in the operating procedure was to not lift over 4-inches. Did Horan mean to imply that the rod was lifted 320 inches by the operator?

None of the references documents describe any of the three operators as emotionally unstable. The man most often implicated in rumors had marital problems. But the autopsy report found that his hands were not damaged; he could not have lifted the control rod. It was the trusted leader of the crew who overlifted the rod that fateful winter evening.

The autopsy report is posted at http://www4vip.inl.gov/library/docs/lams-2550.pdf and at a further report of the incident at www.environmental-defense-institute.org .

From p. 56 of autopsy report of the SL-1 crewmen http://www4vip.inl.gov/library/docs/lams-2550.pdf "While this reconstructed scene probably is not exactly correct, it appears to be sufficiently well fixed by the nature of the wounds to warrant the important conclusion that these men were carrying out their assigned task in accordance with the standard operating procedures in which they had been trained."

From p. 57: "The distribution and nature of these wounds, along with chemical dosimetric studies of hair samples, enabled a logical reconstruction of the scene at the time of the explosion, which led to the conclusion that the explosion occurred while standard operating procedures were being followed."

The June 1961 Joint Committee on Atomic Energy SL-1 Atomic Energy Commission Investigation Board Report in addressing responsibility for the incident: "We specifically absolve the military cadre, as such, from any responsibility."

The EG&G report by Horan makes no mention of the multitude of design and operational problems with the SL-1 reactor or the numerous rod sticking events. There had been 7 instances of the center rod sticking and 8 to 12 instances for each of the other rods. And very importantly, that the rods had stuck precisely where the SL-1 rod stuck, probably due to a weld discontinuity, and pages in an Appendix showing this fact just happened to be absent from the report.

The 84-lb rod had to be lifted from a squatty position with the attached lifting tool. Mock-up tests found that overlift of the rod could easily occur in an effort to free a stuck rod. The lifting of the rod far enough and fast enough to result in prompt criticality of the reactor did not require maximum effort. The partially raised rod, as held by the c-clamp, required only about 16 inches of travel to achieve the 20-inch withdrawn position and was lifted in less than a third of a second. But they didn't know what force was needed to free the stuck rod.

During the investigation, little emphasis was given to the sticking prevalent in the shutdown position when a portion of the control blade extended below the core and the shroud. As the lower portion of the control blade was pulled up into the shroud, evidence would later be found of pre-accident "scouring" marks on more than one blade. It points to serious material condition and design flaws reducing the clearances needed for control blade movement.

There were weld discontinuities and shroud cut-outs for the lower portion of the rod to have interference. In fact, the rods had stuck many times at this very position. Yet, inexplicably later investigations limited to Idaho laboratory contractors or Department of Energy personnel ruled out sticking as a cause of the accident.

Existing safety/hazard analysis had never been conducted to determine the conditions that could cause a prompt criticality. The cold temperature of water in the reactor vessel that night, days since operating the reactor was later found to have made the accident ten times worse. There was really no way the operators could have conceived of the severity of the event.

The entire description by Horan in the EGG report was aimed at shifting blame from leadership at the Idaho Field Office. John Horan, formerly in charge of Health and Safety at the Idaho Field Office of the AEC, now known as the Department of Energy Idaho Field Office, was later hired by NIOSH.

The credibility of John Horan's assessments, so often used by NIOSH as Horan became a consultant for NIOSH, must be taken into account when reading his assessment of INL worker doses and radiation release consequences.

The cleaned up SL-1 buildings approved for continued use by the Department of Energy after the SL-1 accident were later found during CERCLA cleanup investigations decades later to be hopelessly contaminated and had to be demolished. There might have been something less than adequate about the way radiation monitoring was performed in early decades and not just at the Chemical Processing plant.