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Three events show that the Idaho National Laboratory still doesn't know how to monitor airborne alpha contamination

In addition to the 2011 accident at the Idaho National Laboratory's ZPPR facility where management refused to address any of the safety oversight chairman's stated worker safety concerns when performing ZPPR plate inspections and directed workers to examine the plates in unsafe conditions caused multiple workers to inhale radionuclides that were still at detectable levels, based on urine and fecal bioassay, months after the event, there have been three rather recent events at INL that have exposed workers to radionuclide inhalation. [1]

While the Department of Energy has very loose reporting requirements when it comes to worker internal contamination events, there likely have been many more worker internal contamination events. Three events in the last six years have shown continued inability to detect elevated levels of alpha contamination due to radionuclides such as uranium, americium and plutonium. An event at a repurposed INTEC facility associated with cleanup was later found to have exposed a worker to inhalation of airborne radiological contamination and the facility required weeks of decontamination. [2] [3] Another event in 2010 at the Advanced Mixed Waste Treatment Project caused the internal contamination of 15 workers. [4]

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[1] 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.

[2] Luke Ramseth, *Idaho Falls Post Register*, "October radiation incident leads to concerns," April 15 2015.

[3] The radiation worker overexposure of October 2014 was not officially reported but the INL Citizens Advisory board was briefed on the event in 2015. See related 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."

[4] 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

A 2014 event at the Idaho National Laboratory's FMF facility internally contaminated workers but this was not discovered until weeks had elapsed and workers had been exposed again to elevated airborne contamination during special processing in a leaking glovebox. [5] Battelle Energy Alliance failed to discuss why contamination swipes, hand-held alpha monitoring and step-in portal alpha monitors failed to identify the elevated contamination when the inadequately configured constant air monitor failed to identify the contamination. That curious lack of curiosity about why the elevated levels of airborne contamination was not identified until weeks later when contamination was found on constant air monitor filters is something I find troubling.

And given how quickly workers can get 100 mrem intakes, how many undetected intakes have occurred at INL facilities in early decades at facilities such as the Radioactive Waste Management Complex where Rocky Flats transuranic waste was dumped off of trucks and more than once containers floated in flooded shallow burial grounds?

Radiation workers are trusting in myth; Here's the reality

1. Radiation workers are told that worker safety is a high priority — But despite the expectation that technology and increased knowledge continually improve radiation worker safety, cost-limiting and cost-cutting measures can and has undercut worker safety at Department of Energy nuclear facilities.

While cost-cutting measures that put radiation workers at risk are not unique to the Idaho National Laboratory's ZPPR facility that stores plutonium and other radioactive materials, the accident at ZPPR in 2011 that caused internal contamination of workers because of cost cutting. Equipment had not been maintained, radiation monitors had been removed, and safety issues had gone officially unreported and unaddressed.

Safety concerns over worker safety at the ZPPR specifically concerning the examination of potentially damaged ZPPR plates were ignored when brought by the safety chairman to the facility director. Not only did upper management take no action, no one else at the facility was allowed to report or remedy the problems. Management who understood that the risk of handling the plates was higher than previously recognized in the safety documentation and that safety equipment that existed in the past was no longer available **did nothing** to make sure that the

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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.

[5] Department of Energy Occurrence Report NE-ID-BEA - - FMF – 2014- 0001. "MFC-704 FMF Suspect Contamination Found on CAM Filters," Sept 24, 2014. "On October 9, 2014, it was reported that low levels of transuranic contamination were detected on four separate filters, two each taken from a Continuous Air Monitor (CAM) and a Portable Low Volume Air Sampler operating in the Fuel Manufacturing Facility between August 25 through September 2. Multiple workers were found, weeks later, to have internal contamination as determined by bioassay. Battelle Energy Alliance wrote in the occurrence report that no cause analysis of the undetected elevated levels of airborne contamination was needed.

facility would not be used until safety was further evaluated. [6] Management wanted to avoid the delays and loss of bonus awards if work was delayed to address safety issues. That approach really backfired because decontamination of the contaminated facility took months. And the accident left several workers lives forever changed as they sought help for medical issues and they live with the uncertainty of future health effects.

Failure to address facility changes adequately has occurred at other INL facilities. [7]

2. Department of Energy contractors supposedly comply with comprehensive regulations and procedures to assure safety – but do they really?

There are a multitude of regulations that apply to DOE nuclear facilities that would appear to provide assurance of safe conditions; but the tremendous latitude in how requirements are met is not always apparent and DOE actually encourages short cuts in order to reduce costs. [8] [9]

At INL's Materials and Fuels Complex (MFC) where the ZPPR is located, the processes to ensure adequate protection from accidents were broken. The Unreviewed Safety Question process required by federal law (10 CFR 830) required reporting the finding that an accident in the safety analysis has been found to have a higher likelihood. This would have triggered formal steps to assure that mitigations appropriate for that higher likelihood event were in place.

At MFC, the determination that a damaged ZPPR plate was not the stated "extremely unlikely" event of very remote possibility, but actually had occurred several times and was therefore an "anticipated" or expected event, was not reported as an Unreviewed Safety Question. No actions were taken to ensure that work was not performed in ZPPR until procedures, training and so forth had been reviewed to assure that the finding a damaged plate did not create undue risk of spreading airborne contamination. In fact, the Department of Energy actually told MFC that due to their excellent work control processes, the multitude of problems with the facilities safety basis documents was not expected to be a problem.

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[6] 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.

[7] 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."

[8] 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.

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

3. Workers are taught that if they follow procedures and the directions of management, then they will be safe — but the reality is that most exposures to radiation and chemicals occur while workers are following instructions.

At the MFC ZPPR accident, workers questioned whether to proceed with examining the plates that were wrapped in plastic. The supervisor and facility manager directed workers to proceed with the examination of the plates. The plate was in fact damaged, allowing the spread of airborne contamination of plutonium and americium to contaminate the workers, be inhaled into their lungs and to contaminate the facility. Later, upper management would blame workers for the accident, saying they should have stopped work. But upper management had no blame for themselves, the safety analysts, and others – who all knew that finding a damaged plate was to be expected and yet took no action to ensure that the proper precautions were in place.

There is pressure on workers to not stop work. I saw an industrial hygienist who insisted on doing his job which caused delays; he was promptly transferred to a different facility. At MFC, Ralph Stanton had stopped work in the past, correctly predicting that a job, as planned, would result in excessive radiation dose. Another worker was found to replace him. And as Ralph predicted, the job could not come close to being completed with the limited shielding before workers got excessive dose. Despite being right, management was not supportive of his stopping work. Workers who stop work are in effect saying they know more than the engineers and work planners and the facility manager. A formal "stop work" puts the worker in the spot light and management may view it as obstructive, so it puts the worker's employment at risk.

4. Radiation workers are taught that monitoring will protect them from over exposure and contamination — but the reality proves otherwise, both historically and currently. Radiation monitoring continues to fail workers.

Radiation monitoring is essential and a great deal of effort goes toward monitoring radiation. External gamma radiation, internal exposure from inhalation or ingestion of particles, and neutron exposure all require different monitoring capability.

The problem is that monitoring can be less effective than hoped. In the 2014 accident at the Waste Isolation Pilot Plant (WIPP) in New Mexico, radiation alarms were thought to be false alarms. Inadequate recognition and monitoring of the airborne release of plutonium and americium allowed the inhalation and exposure of workers to not be recognized until days later.

In the 2011 ZPPR accident, the detection of airborne contamination was delayed because the only remaining alarming monitoring was 15 feet away and not in the main air flow pathway. External skin contamination monitoring was later not competently performed because of lack of experience with alpha contamination.

In the 2014 leaking glovebox event at another facility at MFC, additional alpha monitoring deficiencies caused numerous personnel internal doses, some estimated doses at 80 mrem. [10] [11] The leaking glove box was not identified as leaking despite a constant air monitor identifying "poor fit." "Poor fit" meant that the signature energy spectrum did not match the radionuclide the CAM was set to detect, nor did it match radon, which the CAM is set to not alarm on. The alarm on "poor fit" led to manual surface swipes to determine if contamination was released but contamination was not found. Only weeks later did analysis of the filter in the CAM identify that excessive americium had been airborne during a glovebox process. Only then were bioassays taken of workers and radionuclide intake determined to have occurred. INL reports decided *cause analysis* was unnecessary and their report do not address why other measures such as step-in alpha monitors or hand-held alpha monitoring did not alert workers to the elevated contamination levels. This happened at the most sophisticated facility at the INL in 2014. These workers intakes occurred during perhaps only a few hours at most.

Another recent event at INL occurred at the Advanced Mixed Waste Project. Numerous workers were found to have inhaled radionuclide contamination after delaying response to an alarming CAM during a waste barrel retrieval operation. [12]

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[10] Department of Energy Occurrence Report NE-ID-BEA - - FMF – 2014- 0001. "MFC-704 FMF Suspect Contamination Found on CAM Filters," Sept 24, 2014. "On October 9, 2014, it was reported that low levels of transuranic contamination were detected on four separate filters, two each taken from a Continuous Air Monitor (CAM) and a Portable Low Volume Air Sampler operating in the Fuel Manufacturing Facility between August 25 through September 2. During operations in the facility, there have been no high level CAM alarms nor detectable contamination has been found on personnel, PPE, or equipment as determined by surveys, direct scans, and large area wipes. On September 24, the Materials and Fuels Complex Radiological Engineer informed the Secure Facilities Nuclear Facility Manager of an analysis report indicating possible higher than normal activity airborne radiation levels. At all times during facility operations and glovebox activities, there have been functional CAMs and job specific air monitors. All personnel evacuated and all work in this area was stopped. Processing of bioassay laboratory reports was expedited." They don't say how many workers were contaminated or their estimated dose. They say no cause analysis is needed. Basically, the take away from the event is that workers can rapidly get 100 mrem from inhalation of americium-241 and it can easily go undetected at the most sophisticated facility at INL in 2014. What do you guess has happened to workers at INL's Radioactive Waste Management Complex, the burial ground radioactive waste including Rocky Flats weapons transuranic waste, including plutonium-239 and highly concentrated americium-241, not just ingrowth of americium, throughout its history?

[11] G. H. Borschel et al., Battelle Energy Alliance, "AFCI Glovebox Radiological Release – Evaluates, Corrective Actions and Testing," INL/EXT-15-36996, December 2015. https://www.scribd.com/doc/306287402/INL-AFCI-Glovebox-Report (Note as of April 18, 2016 I could not locate this report on the INL digital library at https://inldigitallibrary.inl.gov/SitePages/INL%20Research%20Library%20Digital%20Repository.aspx)

[12] 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.

These are highlights of some problems found in recent years. The assumption that past radiation worker exposures at INL were carefully monitored and recorded is changing as analysts in radiation dose reconstruction for the National Institute for Occupational Safety and Health (NIOSH) [13] continue to investigate the ability to reconstruct radiation doses for worker illness compensation claims under the Energy Employee Occupational Illness Compensation Act. [14] Recently, their investigations have led to statement that radiation monitoring may not have been conducted effectively for alpha contamination in the 1960 and 70s.

5. Radiation workers are trained to understand the health hazards from radiation, but do they really? The reality is that the Department of Energy as well as the Nuclear Regulatory Commission continue to ignore compelling evidence that the harm is greater than workers are told.

Across the DOE complex, workers are trained that radiation won't harm them and the health risks are low. But these workers are residing in a culture that often refuses to believe compelling evidence to the contrary.

Workers are underinformed and misinformed about specific health hazards of alpha emitters such as plutonium and americium that are more able to cause double strand DNA breaks. The body misrepairs these breaks and the faulty DNA is replicated in the future, as can be seen in analysis of the DNA. The DOE continues to say that internal alpha dose is equivalent to external cosmic radiation such as an airplane ride. [15]

Radiation dose is cumulative but medical dose has tended to be ignored. The belief that small doses, less than 5 rem at a time, have no harmful effect, or less harmful effect than doses all at once has been found to be untrue. Human epidemiology finds that low doses, accumulated in low 100 mrem doses, cause at least as much harm as a single larger dose. [16]

Recent epidemiology of a thousands of radiation workers has found elevated cancer risk occurring at an average 200 mrem/yr. [17] An INL-specific study found radiation and nonradiation

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[13] NIOSH Radiation dose reconstruction for EEOICPA at http://www.cdc.gov/niosh/ocas/ and http://www.cdc.gov/niosh/ocas/ineel.html

[14] 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

[15] Roger B. Falk et al., "Estimating Doses for Plutonium Strongly Retained in the Lung," ORAUT-OTIB-0049, February 6, 2007, http://www.cdc.gov/niosh/ocas/pdfs/arch/tibs/or-t49-r0.pdf In 1994, the ICRP 66 model replaced the ICRP 30 model to include higher lung retention..Yet, many cases have been found to exceed the ICRP 66 lung retention. These cases are described in Attachment A of ORAUT-OTIB-0049, a document used in NIOSH radiation dose reconstruction.

[16] Jan Beyea, "The scientific jigsaw puzzle: Fitting the pieces of the low-level radiation debate," Article in Bulletin of the Atomic Scientists, May 2012, see http://www.researchgate.net/publication/228085435

[17] 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

workers at the site had higher risk of certain cancers. [18] The US Nuclear Regulatory Commission and the Department of Energy maintain that their 5 rem/yr worker exposure limit is protective despite compelling scientific evidence to the contrary. [19] Workers are also often exposed to both chemical and radiological contamination because chemical solvents are often used in fuel separation processes.

6. Workers are told they are entitled to records of their radiation dose and exposure — But the reality is that workers are not given timely information about their radiation dose or how it was calculated. Workers may be unable to prove their records are missing or inaccurate.

Radiation workers are given annual summaries of their total radiation dose. But workers are often told too little too late about their internal contamination, and what health implications these may have. Workers are not being provided access to their internal dose estimation reports and they are required to submit formal Freedom of Information Act requests for the information. This is a lengthy process and it also brands the worker as a trouble-maker.

Workers usually do not understand how their internal doses are calculated. And more importantly, the days or months of delay in providing any information about the intake has left the employee without information that may be helpful in understanding their medical condition. Should they avoid pregnancy? Should they avoid x-rays that can be extra-harmful if the body contains uranium or transuranics?

The ingestion of contaminated drinking water has not been addressed at the INL where the drinking water has been contaminated with a soup of chemical and radionuclides. Monitoring did not address chemicals prior to 1988 and contamination levels of chemicals as well as radionuclides have exceeded federal drinking water standards. Workers were not told of the contaminated drinking water. [20]

After the ZPPR event, workers were not told of their radiation dose for almost 9 months. Ralph Stanton was told his lung counts indicated a very low intake. Yet, Ralph could not return

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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.)

[18] "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/

[19] "Health Risks from Exposure to Low Levels of Ionizing Radiation BEIR VII – Phase 2, The National Academies Press, 2006, http://www.nap.edu/catalog.php?record_id=11340 The BEIR VII report reaffirmed the conclusion of the prior report that every exposure to radiation produces a corresponding increase in cancer risk. The BEIR VII report found increased sensitivity to radiation in children and women. Cancer risk incidence figures for solid tumors for women are about double those for men. And the same radiation in the first year of life for boys produces three to four times the cancer risk as exposure between the ages of 20 and 50. Female infants have almost double the risk as male infants.

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

to radiation work for months because of his elevated bioassay (urine and fecal) results because he was excreting elevated levels of radionuclides. He was being denied radiation dose estimate information from the company. Obtaining his radiation dose estimation documentation required a lengthy Freedom of Information Act request process. And once obtained, he was on his own to interpret the technical information.

The day after the ZPPR event, Ralph and others exposed in the accident were told that their vomiting and diarrhea were due to the flu – without any evidence taken to confirm the presence of the flu.

Instead of medical help that interfaced with dosimetry experts as policy would suggest, there was months of stonewalling and refusing to provide dose information to Ralph or in-house medical folks. An "expert" was hired who was told that their doses were low simply lectured the men contaminated in the ZPPR accident not to be concerned. Then the expert admitted not knowing that the men had positive bioassay results from excreting elevated levels of americium-241 and other radionuclides months after the accident.

7. Dose estimation based on the International Commission on Radiological Protection (ICRP) model: "it's 'technical' – so it can be trusted." — But the reality DOE uses models intended for estimating harm from a hypothetical dose to an average population that are not adequate to represent an exposed individual's actual dose, nor are the dose estimates made in a conservative manner especially when the doses were excessive.

The INL's dose estimation uses the ICRP models. A 2012 Department of Energy Study finds the International Commission on Radiological Protection (ICRP) model significantly underestimates lung retention and radiation dose from inhaled plutonium. [21] And there is enormous latitude in how the models are constrained and applied.

There is such variability in the level of conservatism and the quality of the data fed into the models, that two people with the same estimated dose may have actually have doses a factor of 10 or 100 or 1000 higher than the estimated doses. Analysts for NIOSH perform a reevaluation of the dose from internal emitters rather than use the DOE contractors dose estimate. NIOSH considers dose-increasing "Super S class" highly insoluble material at INL but INL does not. INL has used default M class for moderately soluble, and in situations where they want to lower the dose, they have argued that S class is applicable. These assumptions change which organ, lung or bone is most affected and can raise or lower the dose by a factor of 10 or more.

The ICRP models are known to not adequately represent the actual excretion rates for individuals. And the models can be used but with extensive subject assumptions and mathematical constraints that affect the final dose.

[21] Christopher E. Nielsen et al., "Microdistribution and Long-term Retention of ^{239}Pu $(NO_3)_4$ in the Respiratory Tracts of an Acutely Exposed Plutonium Worker and Experimental Beagle Dogs," *Cancer Res* 2012. http://cancerres.aacrjournals.org/content/72/21/5529.full.pdf

The DOE contractors control the accident prevention measures, monitoring of contamination, control the measurement of lung counts, bioassay, and control the dose estimation report development. Higher doses mean fines, penalties, and scrutiny of the contractor.

If an employee hires an expert to assess his internal dose, this can cost thousands of dollars.

Anyone reporting irregularities by the DOE contractor in the process risks their employability in the nuclear industry.

8. The Energy Employee Occupational Illness Compensation Act (EEOICA) of 2000 [22]provides compensation to Department of Energy (or contractor) workers who get certain cancers if determined by radiation dose reconstruction to have likely been caused by work exposure. The reality is that without adequate records to document the exposure, records controlled by the contractor and the DOE, workers will have difficulty proving their exposure.

The problem is that radiation dose reconstruction relies on records of the dose or records of bioassay and the conditions the worker was exposed to. Since a cancer may take 10 to 15 years or more before it develops, unless the worker has these records, the contractor may not provide adequate records for dose reconstruction. The result is that the overexposed radiation worker is likely to have his compensation claim denied, even though in reality, he or she was significantly overexposed on the job. It is important to note that non-DOE workers, such as radiation workers at nuclear power plants have no illness compensation from their exposures.

Radiation workers are currently and always have been told they will not be harmed, yet they have been and continue to be harmed from their radiation exposures. Radiation illness claims continue to be submitted under the EEOICPA for recent decades of work. But what many people don't know is that most (two thirds), a very high percentage of INL radiation claims are denied because to doses are estimated to have been too low to have caused the cancer.

When radiation workers have been in the industry long enough to see fellow workers get sick, and they finally suspect the truth – their careers are established and they are told that their sacrifices are for the good of the country. When radiation workers get sick, even if they suspect their cancer was due to radiation exposure, they may be denied compensation and pressured to avoid blaming radiation exposure for the good of the industry.

INL Update on NIOSH Cohort Petitions

Under the Energy Worker compensation program (EEOICPA), there are new cohort petitions currently recommended and more are being investigated. There are over 800 INL

[22] 42 USC 7384, The Act--Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA), as Amended.

radiation illness claims in play with the proposed new INL SEC cohort for the chem. plant and about 800 more for other INL areas. [23]

NIOSH has both combined and separated INL and ANL-W statistics and petitions, causing confusion. NIOSH has two petitions it is reviewing. One is for INL, petition 219. The other is for ANL-W, petition 224. Currently recommended cohorts include the Chem plant (now called INTEC) 1963-1974; INL 1970-1974, and ANL-W 1951-1957. [24] [25]

The recommended SEC cohorts still have numerous hurdles of additional approvals: by the Advisory board, by the Department of Health and Human Services and by Congress. Until then, radiation dose reconstruction that may tend to underestimate workers doses resulting in denied claims will still be performed.

In the February 2016 presentation (link below), a presentation states:

"Based on SC&A's review of sampled claimants, it is not apparent that the lack of internal monitoring data is indicative of a lack of internal exposure potential. Given the uncertainty in establishing work areas, activities and ultimately exposure potential for claimants (particularly in the early years), it is recommended that coworker models be evaluated and developed for workers who were unmonitored, but like should have been monitored during all periods." [26]

Who knows how long this investigation of historical operations will take and whether any new recommended cohorts actually be approved? NIOSH relies on available contractor records. It's basically an innocent until proven guilty system – and lost information or never-monitored exposures and intakes can mean denied claims.

Having looked at NOISH site profiles and other documents, I do not find that NIOSH has previously done enough investigation to determine what really went on at INL in the past. And having attended meetings, it is clear that the Department of Energy exerts an influence to press the view that radiation was adequately monitored, controlled and recorded.

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[23] See program stats at http://www.cdc.gov/niosh/ocas/pdfs/abrwh/pres/2015/dc-ineelsec219-111815.pdf and see NIOSH's website description of the SEC process at http://www.cdc.gov/niosh/ocas/ocassec.html and on this page see petition process and on the left menu under SEC, see petition status.

[24] See NIOSH home page for INL at http://www.cdc.gov/niosh/ocas/ineel.html#techdoc and petition at http://www.cdc.gov/niosh/ocas/ineel.html#pet219 and NIOSH/ORAU: Response to Observations presented in "Evaluation of Internal Monitoring for Fission and Activation Products among INL Claimants (1949-1970), SCA-SEC-2015-0074-E2, Revision 0" [112 KB (6 pages)]
February 25, 2016

[25] See NIOSH home page for ANL-W at http://www.cdc.gov/niosh/ocas/anlw.html#sec and see the proposed 1951-1957 cohort at: http://www.cdc.gov/niosh/ocas/pdfs/abrwh/pres/2016/dc-anlwer-032316.pdf

[26] NIOSH/ORAU: Response to Observations presented in "Evaluation of Internal Monitoring for Fission and Activation Products among INL Claimants (1949-1970), SCA-SEC-2015-0074-E2, Revision 0" [112 KB (6 pages)]
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The problem can be similar for chemical exposure: often the industrial hygiene records by the contractor are inadequate or non-existent. And NIOSH bases the reality of the chemical exposure on proof provided by records – records that don't exist. Concern about this problem has increased with claims evaluators having a directive to follow that assures them that no chemical over exposures have occurred since 1995, when that is clearly not the case as Hanford Challenge knows: [27]

The directive, which became effective in December 2014, orders claims examiners to conclude that workers at Department of Energy nuclear facilities have not have any significant exposure to toxins since 1995 "in the absence of compelling data to the contrary."

Meanwhile, NRF continues to deny that its workers need to be eligible for EEOICPA. **The mantra that workers were all adequately monitored and radiation work was carefully planned and monitored is the rational and sole basis that the Naval Reactors Facility (NRF) has used to say that none, repeat: NONE of the NRF workers are eligible for Energy worker compensation.** Most NRF workers are not military personnel, they are civilians. Some NRF workers actually died quite young from radiation exposures and it is faulty, extremely faulty logic they have used to say their workers didn't get radiation illness. This is even more true as we now know that much lower doses than 5 rem/yr cause increased risk of cancer. I commented to NRF last year – and they say they are carefully considering their response to all comments.

And radiation monitoring and exposure issues and the illnesses caused won't be looked at by NIOSH in any preventative way. Then the illnesses, no matter the number, will likely be denied based on faulty monitoring, aggressive dose-lowering dose estimations, lost records, etc. NIOSH tends to avoid reporting claims by facility, job classification, or year worked in claims statistics.

And workers are not learning about the new strong scientific evidence of elevated cancer risk for average radiation worker doses of 200 mrem/yr is not being acted on by the US nuclear industry. [28]

[27] Read more here: http://www.thenewstribune.com/news/nation-world/national/article56125775.html#storylink=cpy and http://www.thenewstribune.com/news/nation-world/national/article56125775.html

[28] 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

Diesel Replacement Project at the Advanced Test Reactor Fails to Adequately Evaluate the Safety of Simultaneous Experiment Loop Pump Coastdown

An occurrence report at the Advanced Test Reactor resulted in a positive Unreviewed Safety Question last fall that has yet to be reported in the Department of Energy DOE-ID Operational Summaries. [29] It was initially reported 10/29/2015 and made final on 12/10/2015. [30]

The 2015 event, NE-ID- - BEA-ATR-2015-0041 found that the safety analysis of the project to replace an operating diesel generator with a battery bank did not consider the effect of all of the experiment loops coasting down at once due to a loss of commercial power. The occurrence report never mentions the recent upgrade. Coastdown of loop pumps powered by commercial power, may result in experiment loop voiding and cause an increase in reactor power prior to reactor scram.

ATR always used to have an operating diesel generator as well as commercial power. Some or all of the experiment loop pumps were powered by the diesel generator which would usually continue to run during a loss of commercial power event. A loss of commercial power is a frequent, expected event of about once per year. Steam formation in experiment loop piping that passes through the ATR reactor core, because of heatup of experiment loop coolant due to loss of loop pump flow can increase reactor power due to ATR's positive void coefficient, making it more difficult to shutdown. The higher power levels due to the transient make fuel melt more likely.

This failure to adequately analyze the plant modification is coupled with continuing problems with safety control rods, primary coolant system, deep well pump, and bulkhead seals used to protect fresh used nuclear fuel in the storage canal.

EBR-II Reactor Dome to be Demolished This Spring

The EBR-II sodium-cooled fast neutron reactor began operating in 1964 at Argonne National Laboratory-West, now part of the Materials and Fuels Complex at the Idaho National

[29] See Department of Energy DOE-ID Operations Summaries at http://www.id.doe.gov/NEWS/OperationsSummarys.htm

[30] The Occurrence report is on DOE's dashboard for INL has the 2015 event, NE-ID- - BEA-ATR-2015-0041

Laboratory. [31] It produced about 20 MW of electricity when operating. The program expanded into research called the Integral Fast Reactor program, but funding was cut in 1994.[32]

The EBR-II reactor had onsite dry separations processing called uranium electrorefining and proved that uranium separations could be conducted. Much of the EBR-II used fuel, however, about two thirds of the fuel has not been processed yet, however. The separated fission products are stored in metal canisters partially buried at MFC's Radioactive Scrap and Waste Facility. This facility is known to require remediation yet it has not been part of the CERCLA cleanup nor has it been monitored for leakage to soil. INL plans to put this bury this waste at a new disposal facility at INL, the Replacement facility for the Radioactive Waste Management Complex. [33]

The Replacement facility for any waste not deemed to be spent nuclear fuel will contain long-lived greater-than-class c low-level radioactive waste and it is known that the waste will migrate to the aquifer. The Replacement facility supposedly considered existing in-soil contamination at the ATR Complex where it will be located; however, subsequent CERCLA cleanup documentation indicate that the soil contamination inventory for long-lived alpha contamination was underestimated in the Replacement facility NEPA study.

Other waste from EBR-II fuel after it is Pyroprocessed is slated to go to a geologic repository such as Yucca Mountain. But the hurdles to opening Yucca Mountain remain insurmountable.

Unlike its predecessor the EBR-I which did suffer an accident reactor fuel meltdown, the EBR-II did not have a meltdown. It was not without problems however, and its fuel was not usable for the expected fuel burnup because of fuel swelling. The deforming and swelling of fuel made removal difficult and created safety issues for safety rod insertion. [34]

Research to use the dry separations processes are ongoing. Various plans to separate uranium, actinides such as plutonium and fission products using pyroprocessing have been researched, some for return to a reactor as fuel and other forms for geologic disposal. [35] Research for commercial power nuclear reactors has been proposed in order to improve the detection of pyroprocessing for separations to obtain nuclear weapons material but the spent nuclear fuel

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[31] Luke Ramseth, Idaho Falls Post Register, "Farewell to the EBR-II," April 13, 2016.

[32] Susan M. Stacy, *Proving the Principle – A History of the Idaho Engineering and Environmental Laboratory 1949-1999*, DOE/ID-10799, 2000. Note that this popular and picture filled document contains informative history, it incorrectly states that the EBR-II generated 62.5 MW of electricity on page 165. The EBR-II was a 62.5 MW thermal reactor that could generate almost 20 MW electric. A picture of the EBR-I core that melted in 1955 is provided on page 135.

[33] US Department of Energy, "Environmental Assessment for the Replacement Capability for Disposal of Remote-Handled Low-Level Radioactive Waste Generated at the Department of Energy's Idaho Site," Final, DOE/EA-1793, December 2011. http://energy.gov/sites/prod/files/EA-1793-FEA-2011.pdf

[34] L.C. Walters, *Journal of Nuclear Materials*, "Thirty years of fuels and materials information from EBR-II," April 1998.

[35] M. A. Willimason and J.L Willit, *Nuclear Engineering and Technology*, Vol 43, no. 4, August 2011, "Pyroprocessing flowsheets for recycling used nuclear fuel," July 2011.

shipments require waiver to the Idaho Settlement Agreement because the Department of Energy has missed milestones for sodium-bearing waste treatment and waste shipments to WIPP.

Interestingly, when MFC sold pyroprocessing technology in recent years to South Korea, the scientists claimed that there was no weapons material proliferation concern.

Articles above by Tami Thatcher, April 2016. Thatcher is a former safety analyst for the Idaho National Laboratory and a nuclear safety consultant. She has written editorials about the nuclear industry, especially as it affects Idaho, since 2011.

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