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Protecting Yourself

Current and former Idaho National Laboratory employees need to understand how their dose reports are being calculated

By Ralph Stanton

On July 29, 2014 I attended a National Institute for Occupational Safety and Health (NIOSH)[1] meeting in Idaho Falls and had the opportunity to listen to ex-Idaho National Laboratory workers publically comment on dose-related issues they were having.

I listened to an ex-INL fireman who responded to the 1961 explosion of a SL-1 military test reactor and is now battling cancer. His issue was with the dose discrepancies of what he really received in his career and what was recorded. This former fireman explained that the night of the SL-1 accident, he was given a dose of 19,000 milli-rem or 19 rem - for just that day alone. When he requested his career dose totals form the INL, he was given a total of just over 800 millirem or 0.8 rem for his entire career.

I talked to others that night, who did not speak publicly but who are dealing with their own dose discrepancies and who are now having health issues such as cancer, birth defects, etc.

As an ex-employee who also had a big internal dose uptake, I really feel for others former employees who are not only facing health issues from their exposures but information which either has huge discrepancies (always low) or just plain lost.

I encourage any INL worker (current or retired) who has had a big dose, especially an internal dose, to get this report that shows the International Commission on Radiological Protection (ICRP) legal models and calculations they used to get that number they assign to you.

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[1] See more information about NIOSH Idaho National Laboratory Dose Reconstruction at http://www.cdc.gov/niosh/ocas/ineel.html and find an online "probability of causation" calculator at http://www.cdc.gov/niosh/ocas/ocasirep.html.

Get the dose report information as you work in case you have the misfortune of becoming sick from an exposure. You will be able to focus on your health issues rather than having to fight for information after you are sick. Requesting the dose report of how it was calculated, as this is much more important than the dose number they choose to assign you.

If the INL wants to be ethical, transparent and has nothing to hide, this should not be a problem as you are entitled to all data associated with your assigned dose. Can you imagine a doctor, if he/she didn't have anything to hide, refusing to give your a pathology report so you can get a second opinion?

Sadly, I had to get an attorney to get my dose report and discovered that ICRP legal models were not followed when calculating my dose, even though Battelle Energy Alliance legal counsel claimed that the models were followed.

Stanton was one of 16 workers exposed in a 2011 plutonium contamination. He has filed a whistle-blower complaint against INL contractor. [2]
Idaho Falls Post Register, 9/9/14.

Uncertainty in INL Worker Dosimetry

Internal Exposure Dosimetry

There was no regular internal dose monitoring until after 1985. What internal dose monitoring was done was related to specific events/accidents and there are no quantitative estimates, just an indication that there was or was not a positive finding. Also as with external doses, there was an administrative limit below which the dose was recorded as zero. For pre-1976 there is no computer record of internal dose and NIOSH states that data will not be used because it is too much work to manually read the individual records, though the agency acknowledges that "potentially the missed internal dose is rather high for some workers."[3]

During this crucial period, DOE cut NIOSH finding so the agency had to lay-off 6 of its researchers – mostly data processers. EDI and other public advocates did our level best to move funding away from DOE and over to the US Department of Health and Welfare, knowing full well, the agency that holds the purse strings controls the outcome.

[2] Also see; "Half-life; How an Accident at INL Changed a Family" available on EDI's website.
[3] "Protocol for an Epidemiologic Study of Workers at the Idaho National Engineering Laboratory," Health-Related Energy Research Branch, Division of Surveillance, Hazard Evaluation, and Field Studies, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Manual 16, 1994.

Film Badges

Up to 1966, film badges were used. After 1966 thermo-luminescent dosimeters (TLD) were used. It is uncertain how rigorous NIOSH's dosimeter film verification will be that was intended to reread the film badges and verify the recorded data. It is also uncertain if NIOSH followed through with using an automated neutron reader for the TLD badge verification task. The film badges were considered inferior to the TLD's in recording exposures. The TLD's contain a neutron chip to record neutron post-1966 exposure. The neutron exposure is not quantified but recorded with a "quality factor."

Dosimeter Records

Pre-1976 dosimetry was not computerized. Individual sub-contractor dose records were more detailed than the records kept by the prime site contractor. It is uncertain if NIOSH will attempt to access the sub-contractor records. Practice in the early years was to read the badges on a weekly basis. This frequent processing of the badges accumulates a high error because there is no cumulative dose since the new badge is at zero every Monday. Readings below an administrative limit were recorded as zero. Badges were only worn inside a facility and not to and from work. Pre-1987 annual whole body exposure ended December 31 and stated on January 1 at zero. This practice made it possible to exceed annual dose limits, so post-1987 dosimetry is kept on a rolling 12 month. Person rem peaked in 1961 during the period of the largest data gaps.

NIOSH has dosimetry on 2,000 individuals with exposures over 50 mSv (5 rem) but at this time does not know how many are deceased and also can be linked to National Death Index (NDI) or Social Security Number (SSN) data. NIOSH says that the maximum single cumulative dose for an individual is 79 rem and the site wide cumulative external penetrating dose exceeds 48,000 rem. If NIOSH included the SL-1 victims, these numbers would be much higher.

NIOSH found that the median length of employment was 3 years and they never considered the fact that nuclear workers and construction workers move frequently between DOE Complex sites around the country (i.e., Los Alamos in New Mexico). Consequently, INL workers cumulative dose would not include work exposure at Los Alamos, and thus understate the most important cumulative individual dose.

NIOSH considered construction workers as not in a radiation hazard area. However, construction workers repairing/replacing radioactive waste pipes are regularly exposed to chemicals and radiation. NIOSH lack of knowledge of the INTEC/ICPP and RWMC operations is reflected in not including chemical and radiation exposure in those groups.

Mortality and Cause of Death Data

The National Death Index (NDI) only contains post 1978 cause of death information. The Social Security information does not have reliable cause of death data for the pre-1978 mortalities. Idaho's Cancer Registry did not start until 1975. Employee mobility (moves from Idaho prior to

cancer death) will effect (bias to null). Seattle continues to be the major cancer treatment center for the Pacific north-west; thus an INL worker with cancer may-well move to Seattle for treatment and possibly die in Washington State and never become an Idaho statistic. Social Security Numbers were not required until after 1961.

Confounders

It is uncertain if NIOSH will adjust for INL workers living in Pocatello that received additional exposure from the phosphate mill and slag (rated at 25 mrem/hr. by Dunning) used as aggregate on roads and foundations. Inclusion of these workers in the unexposed cohort will bias the dose response in favor of a negative response (high mortality rate at low doses). The "healthy worker effect" cannot be adjusted for in NIOSH study when the mortality rates are compared to national Standard Mortality Rates (SMR) or state rates. Consequently, the worker mortality rate would have to be exceedingly high to overcome the SMR.

According to the National Cancer Institute, southeastern Idaho received more Nevada Test Site (NTS) fallout than any other region in the country. Additionally, according to DOE, southeastern Idaho got more fallout from the Chernobyl accident than in most other parts of the continental US. These non-INL doses could mask NIOSH's comparison of exposed and "unexposed" "un-badged" workers.

Workers Excluded from Cohort

The three SL-1 victims are not included in the NIOSH cohort even though at least one survived the rescue and was monitored at 400 rad/hr. at his head. The second SL-1 victim was removed from an area that was monitored at 750 rad/hr. [4] Navy personnel at NRF are also not included in the cohort. The SL-1 Recovery Operation report notes that the dosimetry badges issued workers only had a maximum reading level of 1,000 mrad.[5] This would challenge the accuracy of SL-1 recovery personnel's dosimetry.

Again, workers' dose history who moved from other DOE nuclear sites to INL are not included. This is not a significant logistical obstacle but rather a political motivated decision to understate individual workers cumulative dose. This is especially true given the fact that NIOSH had already taken on worker dose reconstruction studies at the other major DOE nuclear sites.

Demographic Fields Blank

Worker records have a demographic (place of work) field that is rarely filled in. Workers were routinely rotated around the site when their dose exceeded the allowable limit for the period. This practice is commonly called "body banking."

[4] "SL-1 Recovery Operations," Department of Energy Idaho Field Office Report IDO-19301, June 30, 1961, p 23-24.
[5] ibid, p 32.

Comparing Exposed with Unexposed Workers

Exposed workers, as defined by NIOSH, are those with dosimetry records and linkable mortality data. Unexposed workers are those without dosimetry records and with linkable mortality data. The onsite populations are generally considered to be the most affected by radioactive and chemical releases to the environment from INL operations and therefore should not be considered "unexposed." Therefore, not a legitimate comparable cohort.

Reliability of Dosimetry Accuracy

According to the National Research Council's 1994 review of CDC's protocol, "Dosimetry is of interest to the committee because, as has occurred in other epidemiologic studies, it can be the major determinant of the credibility of the outcome." "A critical study-design question is whether the study will have sufficient statistical power. This requires an adequate range of doses and enough subjects at the higher end of the dose range." INL workers allege that the maximum individual cumulative dose of 79 rem is grossly understated, and their experience with INL was that badge readings were not accurately recorded in the dosimetry records. See EDI's Case Studies that discuss inaccurate exposure record keeping. Errors in calculating Hanford doses resulted in a fatal bias in the Hanford Thyroid Disease Study. Unreliable Rocky Flats worker dosimetry convinced researchers that they would have to reconstruct individual exposures based on the plant they worked in.

DERA Panel Recommendations

The Idaho State sponsored 1993 Report of the Dose Evaluation Review and Assessment (DERA) Advisory Panel[6] notes that "Data indicate that there were exposures to workers onsite from drinking water obtained from the contaminated region of the aquifer. We recommend that such exposures be thoroughly investigated." Related to doses to workers, the panel states that "..... existing occupational dosimetry data (primarily data from film badges and urine sample analyses for radionuclides) may not be adequate for estimating exposures from tritium-contaminated drinking water and from radionuclides that could have been inhaled by workers while working outdoors during some of the INL [sic] releases. This is because film badges measure doses from external radiation and do not account for radionuclide exposure by inhalation or ingestion." "Because the same models that will be used for the dose reconstruction can be used to estimate doses to workers, we strongly recommend that the proposed future dose reconstruction take advantage of the opportunity to clarify risks to all persons who have worked on the INL [sic] site including military, research, and construction personnel. Omitting these dose estimates would

[6] "Report of the Dose Evaluation review and Assessment (DERA) Advisory Panel," To the Idaho Department of Health and Welfare, January 1993, Review of INEL Dose Models and the INEL Historical Dose Evaluation. p. 36, 78-79.

provide an incomplete picture of health risks at the INL [sic]. Such estimates would also be useful for quantifying risks to members of the public who may have been on INL [sic] property during releases."

DERA continues, "....a realistic dose assessment model for the INL would include the contamination of ground surfaces through wet deposition, the re-suspension of radionuclides from soil into the air, the contamination of game and domestic animals that incorporate radionuclides on the site, the contamination of ground water consumed by workers, and the ingestion of soil by children." "It is clear, in particular, that wet deposition processes (scavenging of radioactive materials to the ground by rain or snow) deserve to be considered. Wet deposition was ignored in the models used by the INL because of low annual precipitation at the site. In its 1986 Environmental Monitoring Program Report (U.S. DOE 1987), however, the INL reported that fallout from the Chernobyl accident was greater in southeastern Idaho than in most other parts of the continental United States because of the slow drizzle that occurred during the passage of the radioactive cloud. This fact alone justifies the inclusion of wet deposition processes in the INL models."

Recently, NIOSH and Centers for Disease Control and Prevention subcontractor Sanford Cohen and Associates (SC&A) to the Advisory Board on Radiation Worker Health/ABRWH gave a presentation in Idaho Falls. Below are excerpts from SC&A's report.

"Issue: The identification and determination of missed internal dose for workers are heavily influenced by the assumption of confidence, but SC&A found this premise to be unsupported after examining several critical DOE-HQ Tiger Team and Defense Nuclear Facility Safety Board (DNFSB) site audit reports. In addition, many site experts interviewed by SC&A indicated that there were significant deficiencies and inconsistencies in radiation work practices throughout the operating history of the INL facilities. These observations jeopardize the validity of the technical basis document TBD approaches in reconstructing missed worker internal doses.

"NIOSH Response: The default table for missed dose (5-24) does not have a basis in the "confidence" of the INL radiological program. The table is based on monitoring results, favorable ratios, and other claimant-favorable assumptions.

However, in resolving the issue associated with SC&A's Finding 3.5-1 for the ANL-W Site Profile, the previous approaches used to calculate missed and unmonitored internal doses have been completely replaced. The missed and unmonitored doses for activation and fission products are now based on the approach described in OTIB-0054 (ORAUT 2007b). The unmonitored actinide doses are now being calculated using a new site-specific approach based on source term information and a broader list of radionuclides." [7]

[7] Stephen L. Ostrow, PhD, Sanford Cohen and Associates (SC&A), 2/14

At a March 25, 2014 SC&A meeting report notes other items for NIOSH to address:

* NIOSH to explain its contention that an external dosimetry coworker model is not required (NIOSH preparing an internal dosimetry coworker model).
* NIOSH to issue a white paper, Investigation of the NTA Film Dosimeter Limits of Detection Being Used for INL Dose Reconstruction.
* The Working Group believes that there are gaps in the record that warrant further data capture and interviews: to that end – NIOSH and SC&A were tasked to plan and conduct worker interviews in June 2014.
* June 23-26: 34 interviews were conducted in parallel with data capture efforts." [8]

The EEOICPA [9] Bulletin No. 084 from Oct 29, 2007, pertaining to NIOSH's OCAS-PER-017 "Evaluation of Incomplete Internal Dosimetry Records from Idaho, Argonne-East and Argonne-West," cites failure of the labs to provide internal dose records for proper dose reconstruction for compensation claims. DOE-ID says that the reporting problem was resolved in 2007. When the problem was discovered in April/May 2006, past claims were reviewed and additional data was requested by NIOSH. [10]

It has been over a decade that NIOSH and CDC's health monitoring and dose reconstruction deficiencies have been presented to the agencies by its own advisory boards [11] and the public. [12] However, as the above reports clearly show – little progress has occurred. Ralph Stanton's article above is representative of the human tragedy caused by health agencies that fail to meet their mission mandates.

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[8] SC&A Idaho National Laboratory (INL) Site Profile Update, John Stiver, CHP, Health Physicist and Program Manager, S. Cohen and Associates, Contractor to : Advisory Board on Radiation Worker Health/ABRWH, Centers for Disease Control and Prevention, July 29, 2014, Idaho Falls.

[9] Energy Employees Occupational Illness Compensation Program Act (EEOICPA).

[10] http://www.dol.gov/owcp/energy/regs/compliance/PolicyandProcedures/finalbulletinshtml/EEOICPABulletin08-04.htm
http://www.dol.gov/owcp/energy/regs/compliance/PolicyandProcedures/finalbulletinshtml/Bulletin08-04Attachments/EEOICPABulletin08-04Attachment1.htm

[11] See; Advisory Committee on Energy-Related Epidemiological Research (ACERR) administrated by CDC.

[12] Author, Chuck Broscious advocated for and served on CDC's INL Dose Reconstruction Study Advisory Board