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DOE Downplays Airborne Contamination Released at Hanford

Last December radioactive contamination was found on vehicles at Hanford and on the soil. The Department of Energy referred to the contamination as "specks of low level" contamination. For the personnel that drove contaminated vehicles home, DOE offered to inspect their homes. For soil contamination, DOE says it applied "soil cement" to prevent the particles from becoming airborne. [1] [2]

The memo that the Department of Energy sent to Hanford seems to imply that by the contamination being only "specks" that small particles are not harmful. But actually, the smaller the particles are, the harder it is to detect them and the easier it is to inhale them. Calling the contamination "low level" seems to imply that it isn't a radioactive material to worry about. But the contamination from the Hanford Plutonium Finishing Plant would seem likely to include plutonium. In the memo, the DOE does not make any attempt to characterize what radionuclides were released, what the range of particle sizes were, or why the release occurred.

The "soil cement" technique is reminiscent of painting over the contaminated sidewalks and even the lawn grass at Oak Ridge years ago. Just what happens in the days and years to come of this "soil cement?" It appears that DOE does not reflect on the ineffectiveness of its actions but rather, takes some action for the sake of appearance and expects no questions to be asked.

The lack of explanation of why the release occurred suggests that it was either business as usual or somebody screwed up. Either way, it seems that the DOE feels it in their best interest not to explain what happened.

The Department of Energy has a deep longstanding tradition of not saying what radionuclides were released and not estimating the total curies of each radionuclide released. The DOE's behavior should be recognized as environmentally irresponsible and displaying a disregard for worker and public health.

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[1] Department of Energy to All Hanford Site Employees, "Update on Plutonium Finishing Plant (PFP), December 19, 2017. Posted by Susannah Frame, King5.com at https://www.scribd.com/document/367569525/DOE-Update-on-Plutonium-Finishing-Plant#from_embed

[2] Associated Press, KING, "More radioactively contaminated vehicles found at Hanford," December 29, 2017. http://www.krem.com/news/local/more-radioactively-contaminated-vehicles-found-at-hanford/503275429

A study published in September 2017 by the U.S. Transuranium and Uranium Registries [3] found "high fired" plutonium, known as Super S class for its high insolubility in the lungs of former nuclear workers with documented internal deposition of plutonium, americium and uranium. Postmortem autopsy findings and radiochemical analyses of donated tissues were used to evaluate Pu-239 activity concentrations in lungs and thoracic lymph nodes from 291 occupationally exposed individuals. Insoluble plutonium material was found in about 50 percent of the analyzed respiratory tract tissues. The Pu-239 activity in lungs was compared to the activity found in thoracic lymph nodes. The ratios ranged from 0.07 to 561, with geometric mean of 14. In 48 percent of cases, this ratio was greater than 19, the value predicted by the International Commission on Radiological Protection (ICRP) Publication 68 regarding its Human Respiratory Tract Model for inhalation of insoluble, type S, material.

Type S insoluble material is assumed to clear the body in 500 days when worker internal radiation doses are estimated.[4] Super S Class, which is what workers at Hanford have actually inhaled clears the body in about 27 years. So far, the Department of Energy and its contractors are ignoring the "high-fired" Super S Class because it would raise worker internal dose estimates. Super S Class has been found to be applicable to the INL in worker compensation assessment for the Energy Worker Compensation program. Plutonium created at Hanford was sent to Rocky Flats and the waste latter shipped to the Idaho National Laboratory. The fires at Rocky Flats are acknowledged to have made "high-fired" Super S class insoluble material. But it is a mistake to think that the material must be involved in a fire or that the material is limited to Hanford and Rocky Flats.

Department of Energy Radiation Monitoring Historically Unreliable

Historically, the monitoring radiation releases to the environment from Department of Energy operations around the U.S. including the Idaho National Laboratory have been unreliable. But you can count on the monitoring to underestimate the release.

At the Idaho National Laboratory, formerly the Idaho National Engineering and Environmental Laboratory, the Idaho National Engineering Laboratory, and the National Reactor Testing Station, historical releases were monitored yet not actually characterized as to what and how many curies were released. When asked by the governor in 1989 to provide an estimate of the radionuclides released from routine operations and accidents, the Department of Energy

[3] Sergei Y. Tolmacher et al., U.S. Transuranium and Uranium Registries, "Analysis of 'High-Fired' Plutonium Oxide in Tissues of Exposed Workers," 6th Asia – Pacific Symposium of Radiochemistry, September 17-22, 2017. http://www.apsorc17.org/upload/abs/1488218421_stolmachev@wsu.edu2.pdf

[4] E. H. Carbaugh et al., Pacific Northwest National Laboratory, "Methods and Models of the Hanford Internal Dosimetry Program PNNL-MA-860," PNNL-15614. January 1, 2003. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-15614.pdf

issued the "INEL Historical Dose Evaluation." [5] [6] It has been found to have underestimated serious releases by sometimes 10-fold. Furthermore, the past environmental monitoring used all along to claim no significant releases had occurred were not used in the INEL Historical Dose Evaluation. The environmental records that could have been used against the Department of Energy were destroyed.

Vehicle contamination from historical operations at the INL contaminated highways, private vehicles that use the public highways across the site, and worker and site operations vehicles. Vehicles entering and leaving the waste burial grounds were surveyed for radiation. But that didn't stop radioactively contaminated vehicles from leaving the burial grounds with undetected contamination.

Radiation survey techniques have changed over the years. But it is not clear that things have actually gotten better. At the INL it was not until the 1990s that contamination levels when surveyed by non-DOE agencies found high levels of radioactive contamination at facilities still being used by workers. The buildings, for example, at the Stationary Low Power Complex that remained after the SL-1 reactor building was removed were still used by site workers for decades following the 1961 SL-1 accident. And only in the 1990s was it determined that the buildings remaining there were too contaminated to remediate and had to instead by taken apart and disposed of as radioactive waste.

Just how bad the radiation surveys were through the beginning of the laboratory in 1949 through today is still being investigated as part of understanding what radiation dose workers may have gotten that was under reported. These investigations show that radiation monitoring at the burial grounds, now the Radioactive Waste Management Complex at the INL was conducted but the monitoring was often quite ineffective. Furthermore, worker bioassay programs for many of the years were nonexistent. So, as barrels of plutonium-laden wastes would pop open when pushed into soil pits, there was an enormous potential for inhaling large amounts of radionuclides and there was no urine, fecal or lung count studies being conducted for these workers. Remember that a single barrel of defense waste at the Waste Isolation Pilot Plant (WIPP) in New Mexico contaminated vast areas of the underground mine and was detected miles from the facility. Even above ground WIPP workers who did not go into the contaminated mine were found to have inhaled plutonium and americium from the release of a portion of a single drum in WIPP. It is also notable that during the 2014 WIPP accidental release from the mine that initial surveys of the parking lot and other areas were monitored and stated to be uncontaminated but later they found contamination.

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[5] US Department of Energy Idaho Operations Office, "Idaho National Engineering Laboratory Historical Dose Evaluation," DOE-ID-12119, August 1991. Volumes 1 and 2 can be found at https://www.iaea.org/inis/inis-collection/index.html

[6] Environmental Defense Institute's comment submittal on the Consent-based Approach for Siting Storage for the nation's Nuclear Waste, July 31, 2016. http://www.environmental-defense-institute.org/publications/EDIXConsentFinal.pdf

Radiation detection at facilities that have high background levels of gamma emitters is more difficult. The elevated background from nuclear reactors, spent nuclear fuel or the burial of high gamma emitting materials at the RWMC has to be subtracted from readings to detect radiation levels at these facilities. The RMWC waste included bits of spent nuclear fuel from materials testing and from accidents at the INL as well as other radioactive wastes from facilities at INL and from around the country.

Alpha emitters such as plutonium and uranium are difficult to detect even today because of the dispersed tiny particles that are easily shielded from the detectors. Plutonium on damp surfaces, whether skin or a laboratory floor, can be shielded by the dampness. As we learned from the INL experience with the release of americium-241 at MFC because of a glove box leak, even inside a laboratory building with alpha air monitors, step-in alpha monitors, required alpha surveys, and swipes, workers received significant inhalations of americium-241 that were not detected by any of these detection methods. It was not until the filters for an alpha air monitoring system were evaluated and found to contain americium-241 that bioassay was conducted that confirmed the workers had detectable intakes.

With an understanding of how difficult it is the detect alpha emitters and how easy it can be to inhale significant levels of radioactive particles, you can see how the Department of Energy is kidding the public and the workers around the DOE Complex from Idaho to WIPP to Hanford.

Understanding Your Lung Count Results

If you had a lung count conducted after a suspected inhalation of plutonium, americium, and/or uranium known as “actinides,” how do you decipher the lung count report? That’s easy. The Department of Energy contractor does not let you see the lung count report. But let’s imagine that you did obtain your lung count reports following a series of lung counts because you suspect your inhalation of actinides was serious.

The Department of Energy contractors conduct a lung count for typically 30 minutes or one hour using gamma spectrometry based on the detection of gamma photons using radiation detectors that utilize hyperpure germanium (HPGe). At the INL the lung counts are conducted in a room lined with steel manufactured before the nuclear weapons era. While a full body count could be used to detect gamma emitters such as cesium-137, a lung count would be required to detect alpha emitters such as plutonium. Just a note: at the former Rocky Flats Plant, a lung count was sometimes called a body count.

Alpha emitters such as plutonium, americium and uranium decay primarily by the large alpha particle with atomic mass equal four, having two protons and two neutrons. The alpha particle doesn’t go far, but when inside the human body, it’s like tossing a grenade at the cells of the body. The actinides are also known as “bone seekers” that the body confuses with iron.

The actinides such as uranium decay in a long string of decays known as a decay chain. [7] Uranium-238, for example, decays to thorium-234 which decays to protactinium-234 which decays to uranium-234 which decays to thorium-230 which decays to radium-226 which decays to radon-222 which decays to polonium-218 which decays to lead-214 which decays to bismuth-214 which decays to polonium-214 which decays to lead-210 which decays to bismuth-210 which decays to polonium-210 which decays to lead-206 which does not decay anymore because it is "stable."

The alpha decays reduce the atomic mass of the nuclide by 4. The decays such as Th-234 to Pa-234 are by beta decay that stay at the same atomic mass, but with one more proton and one less neutron.

In addition to the alpha and beta decays are various gamma emissions. A single nuclide such as Lead-217 (known as Pb-217) can emit gamma rays at a dozen different energy levels. The likelihood of it emitting a particular energy level as it decays to a daughter nuclide is known as the abundance in percent. Charting the number of decays versus the energy level of the decay gamma photon in kiloelectron volts (keV) is known as gamma spectrometry and this is performed when doing the lung count. [8] [9] [10]

The peaks in the spectrum that is graphically depicted with energy levels in keV along the horizontal axis versus counts detected along the vertical axis. The same nuclide, such as Th-234 which is the decay product of U-238 will have peaks at several specific energy levels. Protactinium-234 which decays from Th-234 will also have peaks at several specific energy levels, and so will Lead-214 which is radioactive. The lung count detector is combined with a computer program that has libraries of the nuclides that specify the energy level where peaks are expected to occur.

Like a mountain range where you might know the names of prominent peaks, nuclide libraries are created of the peaks where the most decays are expected to be counted at a particular energy level in keV. When a single nuclide is known to be the largest contributor to the peak at that energy level, the nuclide can easily be identified. This will occur when the nuclide has a

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[7] Actinides include uranium and transuranic radionuclides. Many decay progeny may be created before reaching a stable, non-radioactive state. They are alpha emitters that pose significant health risks if inhaled or in the blood stream. Beta and gamma radiation can also be emitted by transuranic radionuclides. See our factsheet at http://www.environmental-defense-institute.org/publications/decayfact.pdf. See also an ANL factsheet at https://www.remm.nlm.gov/ANL-ContaminationFactSheets-All-070418.pdf

[8] The Lund/LBNL Nuclear Data Search, Version 2.0, February 1999, S.Y.F. Chu, L.P. Ekstrom, and R.B. Firestone, LBNL, Berkeley, USA and Department of Physics, Lund University, Sweden. http://nucleardata.nuclear.lu.se/toi/index.asp This has a very handy way to search for radionuclides by their gamma energy and look up information by nuclide.

[9] Gamma Spectrometry – Gamma Radionuclides and X Ray Spectrometry, Theremino System, Rev. 2., 3/09/2015 http://www.theremino.com/wp-content/uploads/files/GammaSpec_ENG.pdf See spectrum graphical depictions for uranium and others.

[10] Interesting presentation of gamma spectrometry analysis of a smoke detector americium source. https://carlwillis.wordpress.com/2017/02/07/analysis-of-soviet-smoke-detector-plutonium/

high abundance of gamma rays at that energy level. But for the dozens of other energy levels that the nuclide also emits gamma rays, those peaks may not be readily recognized.

Key Point: Gamma Spectrometry counts photon emissions from radioactive decay

Gamma Spectrometry detects gamma photon emissions from radioactive materials at each energy level interval. The counts per second detected in that interval are used to plot the peaks of the spectrum from below 17 keV to levels above 200 keV. Recognizable peaks at specific energy levels may allow the identification of the nuclide present. Non-radioactive materials such as asbestos cannot be identified from gamma spectrometry.

So, you have the high-abundance gamma rays that the association with a specific nuclide, such as Lead-214 that should be well known and recognized as the spectrometry shows the number of counts at a specific energy level. And you have some recognized low-abundance gamma rays not usually used for analysis, but that might be recognized. And then you have other low-abundance gamma rays occurring at various energy levels by various nuclides so you don't know what each nuclide is contributing to the decays at the energy region.

If only a single nuclide was undergoing spectrometry to determine the radioactive decays (counts) at various energy levels of gamma ray emissions, the problem would not be so complicated. But when you have many different nuclides in the inhaled contamination in the lungs, it gets very complicated. So, the focus is on the few peaks that can be readily recognized.

The lung counter may report thorium-234, uranium-238, uranium-235, plutonium-238, plutonium-239, and americium-241. For each reported nuclide, the counts at several energy levels may be reported. For americium-241, the counted decays at the 59.5 keV energy level occur with higher abundance (36 percent) and with higher detector efficiency. The counts at the 59.5 keV level are used as the basis to estimate the americium-241 in the lungs. And typically, the plutonium in the lungs is estimated by knowing the ratio of plutonium to Am-241 in the inhaled mixture.

Key Point: Americium-241 at 59.5 keV is used for plutonium intake estimation.

Even though plutonium-238 and plutonium-239 may be reported on your lung count, the 59.5 keV gamma-ray that americium-241 emits in 35.9 percent of its alpha decays to neptunium-237 often are used as the basis upon which to estimate your official plutonium intake. The amount of plutonium in your lungs is inferred from the Am-241 measurement from the lung count. This requires knowledge about the composition of the material inhaled.

Even though americium-241 can be detected, the sooner the lung count is conducted following possible inhalation, the better. Waiting days to perform the lung count may result in underestimating your intake even though your lung count result will be adjusted to account for the elapsed time between the inhalation and the lung count when your internal dose is estimated.

The rate at which americium-241 clears the lung may be faster than the rate that plutonium clears the lung. Healthy lungs of non-smokers can clear particles from the lungs better than can unhealthy lungs. The retention of particles in the lungs is greater when the particles are more insoluble. DOE has known for years that highly insoluble plutonium, called Super S class, stays in the lungs longer the regular insoluble plutonium. But DOE does not account for Super S class even though worker compensation dose assessments do. Acknowledging Super S class could raise the dose and thus the severity of the inhalation. [11] So, the DOE contractors have permission to underestimates lung count results by ignoring Super S class, by delaying lung counts, by using very coarse methods to estimate chest wall thickness and muscle to fat ratio, by improper positioning of the detector over the lungs and by the selection of the statistical methods which are biased toward not finding a positive result. And beyond all of that, it appears that over the years that the DOE contractors have also manipulated the results to achieve the desired outcome. The lung count results may have been lowered in order to say you did not have a significant inhalation of actinides.

But for now, let's assume that your lung count was not manipulated to lower the results.

For a lung count, an estimate must be made of your chest wall thickness. This is usually based on a formula for height and weight. One equation that has been was based on published biometric relations for CWT measurement relations to weight and height. [12]

An equation such as this one is used to estimate chest wall thickness (CWT):

$$CWT = 1.973\ (W/H) - 2.0038$$

where:

CWT = chest wall thickness in centimeters
W = weight in pounds
H = height in inches

The fraction of the chest wall that is muscle versus fat matters but is typically not adjusted for the individual. So, a weight lifter with a large muscular chest and skinny legs would have their chest wall thickness underestimated. This would mean that more of the radioactive particles in their lungs would be shielded from the lung count detectors. It would mean that their lung count gross counts would be lower and would not be properly adjusted upward when converted

[11] See our EDI newsletter for March 2017 for article "How DOE Underestimates the Harm of Plutonium Inhalation" at http://www.environmental-defense-institute.org/publications/News.17.March.pdf See a table that compares Moderate Solubility, Class S Insolubility, and Super S Class Insolubility on p. 16.

[12] https://www.cdc.gov/niosh/ocas/pdfs/arch/srs2.pdf

from counts per second to activity (in uCi or nCi) to account for their higher chest wall thickness. The lung count results (in uCi or nCi) would underestimate the Am-241 in their lungs. For women, breast tissue density is also going to change the shielding of the radioactive material in the lungs and the placement of the detectors over the lungs.

The statistical methods used for lung counts are created with the assumption that a false positive result is worse than a false negative result. In other words, they assume that incorrectly saying you had an intake is far worse than saying you did not have an intake when in fact you did.

The typical method assumes that 5 percent of the results could show a false negative. But the method allows 50 percent of the cases to say no intake happened when it actually did. This only occurs at the lower lung count results (in counts per second) when the background distribution and the lung count distribution are pretty much overlapping. But importantly, when the lung count results are actually significantly above normal background, the reports don't state this or graph the difference between the background distribution and the lung count result. Even when the lung count result is startlingly miles away from and above background levels, the DOE contractor will pretend that nothing much was found.

The measurement uncertainty the lung count provided on a typical lung count report presents pertains only to detector capability. It does not take into account other uncertainties regarding detector placement, estimation of chest wall thickness, error in estimating the proportion of plutonium based on the measured americium, and others.

The detector counts the decays at a particular energy level and the gross counts at predetermined intervals are recorded. If the program software can determine that only one nuclide was the likely contributor to the gross counts, then various attributes associated with the known nuclide can be used in the computation, such as the theoretical abundance (or fraction of decays that emit energy at that energy level).

The lung count programs have various ways of estimating the background to subtract from the gross counts. And the tricky thing is that background levels have to be cast in terms of what the detector would see as background at the worker's chest wall thickness.

The "net" result in counts per second is obtained by subtracting background from gross counts per second. The "net" counts per second can be converted to activity for the identified nuclide by converting counts per second to curies by knowing there are 3.7E10 disintegrations-per-second per 1 curie), and taking into account nuclide abundance at that energy level and the worker-specific detector efficiency for the specified chest wall thickness.

Lung count results are often presented in "uCi" meaning microcuries (1E-6 curies) but dose assessment has traditionally presented results in "nCi" meaning nanocuries (1E-9 curies). One microcurie (uCi) is equal to 1000 nanocuries (nCi); or 1E-3uCi is equal to 1 nCi. One microcurie of plutonium-239 would be rather rapidly lethal and several nanocuries of Pu-239 may be a

health risk. About 40 nCi or plutonium or equivalent material has historically been the allowable body burden although the methodologies have evolved through the years. [13]

The americium-241 activity level on the lung count report has to be considered in light of how many hours elapsed between the inhalation and the lung count. The Am-241 and plutonium result in activity units (of either uCi or nCi) are increased to account for the hours since inhalation. The intake as adjusted for time elapsed can then be used in conjunction with a program that estimates the upper bound whole body and limiting organ dose.

Charts can be used to estimate whole body and limiting organ dose. But an official estimated whole body and limiting organ internal dose from the lung count will typically be prepared weeks later and will not be shown to the worker. So, even if the worker knows generally what plutonium nanocurie intake would exceed 5 rem whole body, the lung count result for americium will not make the combined Am-241 and plutonium intake apparent because the lung count report will not make the adjustment to raise the intake based on elapsed time between inhalation and the lung count nor will the ratio of plutonium to Am-241 used to estimate the amount of plutonium in the lungs to be used in the dose estimate be shown on the lung count report.

In short, even if the contractor provided workers with the lung count report – which they don't – it would be difficult to understand what the internal dose may be, as based on the lung count report. Several nanocuries of Am-241 and plutonium may have significant health risk over time.

The background level of counts for the radionuclide at each energy level have to be assessed and are subtracted from the gross counts for each nuclide at each specific energy level. The lower the intake, the closer it is the background levels. Negative activity levels are the result of a negative net result which occurs when the background counts exceed the gross counts detected. When this occurs, the statistics of the background spectrum are used to determine a Decision Level. If the net counting result exceeds Decision Level, the result is said to be a detection. If not, and the result is below the Decision Level, the conclusion is that the lung count was really the same as normal background and the variation is simply random. In this case, the Decision Level is used as the resulting level of activity in the lungs rather than the negative activity level when the internal dose is assessed.

The capability of measuring a result depends on the equipment and may be called the "minimum detection capability" or MDA. The worker-specific MDA will depend also on chest wall thickness. The "Decision Level" which also is affected by chest wall thickness, is below the MDA. Fewer gross counts (in counts per second) during the lung count will be detected when the chest wall is thicker. But the resulting activity will be adjusted upward based on the estimated chest wall thickness specified for the worker.

[13] George L. Voelz as told by Ileana G. Buican, *Los Alamos Science*, "Plutonium and Health – How great is the risk?" Number 26, 2000. https://fas.org/sgp/othergov/doe/lanl/pubs/00818013.pdf

Key Point: Implications of chest wall thickness

A large chest wall thickness makes it harder for the detector to detect decay counts and more counts are missed. The worker's chest wall thickness is specified so that the resulting activity (uCi) will be adjusted. Specifying a larger than average CWT will cause the adjustment to increase the resulting activity (uCi).

The uranium-238, uranium-235 and thorium-232 decay chains all represent normal background levels of radiation. But consider this: Pu-238 decays to U-234 which then has the decay series identical to that of U-238. Plutonium-239 decays to U-235 which then has the decay series identical to that of U-235. Were the decay products from natural background? The decay products may or may not be from expected background levels. The assessment of whether the counts are elevated depends heavily on how the background counts are being determined and adjusted for the worker's chest wall thickness. These methods vary and are typically behind the scenes.

The decay series for Am-241 is man-made. Americium-241 decays to neptuniuim-237 which decays to protactinium-233 which decays to uranium-233 which decays to thorium-229 which decays to radium-225 which decays to actinium-225 which decays to francium-221 which decays to astatine-217 which decays to bismuth-213 and has resulting decay products of thallium-209, polonium-213, lead-209, and bismuth-209. These are unique to the Am-241 (or U-233) decay series and are not naturally occurring in the environment. When nuclides from the Am-241 decay series show up, the source should be identified and distinguished from that of past nuclear weapons fallout or other releases.

It should be a concern when the DOE contractor says your lung count matches normal background, yet your lung count report contains unidentified nuclides or nuclides that the report notes don't match the expected peak profiles as expected.

Lung counts can provide important information following a serious inhalation event. Lung count results may be used to determine the level of medical follow-up and whether or not to monitor blood changes. [14] Unfortunately, there are decades of evidence that lung count results in the DOE Complex has been manipulated in order to lower any high lung count results detected.

Bioassay analysis of urine and fecal samples can detect lower levels of intakes. It has long been recognized for the low but chronic inhalation of actinides, bioassay could detect intake when lung counts could not. The detection of radioactivity above expected background levels in urine and fecal samples reveals that a detection occurred. The activity in the bioassay (in disintegrations per second or curie) is then used in a variety of creative ways that allow the estimation of actinide intake to be as low as the DOE contractor wants the intake to be. The

[14] See our EDI newsletters for March and October 2017 for articles that discuss blood lymphocyte and monocyte monitoring. http://www.environmental-defense-institute.org/publications/News.17.Oct.pdf or http://www.environmental-defense-institute.org/publications/News.17.March.pdf

contractor can claim to follow official ICRP models and come up with any internal dose, ranging from 10 mrem to 30,000 mrem, whole body. [15] [16] So, the internal dose assessment based on bioassay results should not be comforting to the worker. The worker must obtain the bioassay results of the amount of activity and the nuclides occurring that are above expected background levels.

Workers are routinely denied access to their lung count reports, their internal dose assessment based on upper bound lung count intakes, their bioassay reports of nuclide and activity found, and their final internal dose assessment. DOE contractors have even denied workers these documents when Freedom of Information Act requests were submitted, saying that the dose results were contractor work product and were confidential information that could not be provided to the worker. Access to this information if it is attained is often many months after the intake and the reports may not be finalized until many months after the intake.

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Key Point: Internal Dose Estimation Records

Workers in the DOE Complex, including the Idaho National Laboratory, are routinely denied access to their internal dose records despite contractor claims to the contrary. Workers who have obtained the records found various errors and irregularities.

Despite the claims of DOE contractors that they will provide professionals to answer any questions about their internal dose, the reality is that doing so has sometimes resulted in these professionals telling the inquiring worker that they have been told not to discuss their dose. When workers have been promised medical help to understand the implications of their actinide intake, would you think it would be appropriate for the contractor to hire a non-medical professional who does not examine any individual's lung counts or bioassay results and does not interview any worker about their medical history of symptoms but simply tells the group of gathered workers that their doses were low? And what if the professional says their doses were low because otherwise they would have plutonium in their urine. Then if the workers told the professional that they did have plutonium in their urine and the professional continued on **giving uninformed assurances that their internal doses were low.** Radiation workers have no real advocate and are pressured not to make waves if they want to keep their jobs.

For the 2011 accident at the Materials and Fuels Complex Zero Power Research Reactor, the organ and whole body upper bound doses based on lung count results were tabulated a month

[15] Blanchin, N. et al., *Radioprotection*, "Assessing internal exposure in the absence of an appropriate model: two cases involving an incidental inhalation of transuranic elements," December 2008. DOI: https://doi.org/10.1051/radiopro:2008014 and see at http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/43/004/43004048.pdf

[16] See our EDI newsletter for March 2017 for article "How DOE Underestimates the Harm of Plutonium Inhalation" at http://www.environmental-defense-institute.org/publications/News.17.March.pdf

later at the Oak Ridge National Laboratory. The Oak Ridge report emphasized that of the lung counts taken, the majority were near background levels.

If a shooting occurred in your community, it would seem odd if the news or the police reported that the majority of those present were not hit by bullets. But this is exactly how the DOE contractors report about radiation incidents. Even when dose results clearly indicate a significant intake of plutonium, neither the worker nor the public are informed about what actually happened.

Finally, workers who are told they have no detectable intake based on lung count results and have very low estimated internal doses need to be concerned when their fecal bioassay still is above months after the accident. Their intakes and actual internal doses appear to be far higher than DOE contractors have estimated.

Battelle's INL Contract Extended to 2024

The Post Register reported that the Department of Energy has extended Battelle Energy Alliance's contract to operate the Idaho National Laboratory until at least 2024. [17] [18] Battelle took over the non-cleanup portion of the INL in 2005. INL Director Mark Peters was praised by DOE-Idaho Manager Rick Provencher, who awarded BEA's performance with $15.52 million, or 97 percent of possible fee awards and an excellent rating.

Provencher praised the lab's continued investment in the Gateway for Accelerated Innovation in Nuclear and Nuclear Science User Facilities programs, as well as research in advanced reactor and fuel concepts. Refurbishment of the Transient Test Reactor Facility (TREAT) was completed last summer ahead of schedule and under budget. Experiments at the TREAT reactor are to begin in the summer of 2018 to test a variety of nuclear fuels from INL and other DOE labs and private industry. [19]

TREAT can irradiate materials with five times the energy of a standard nuclear reactor to simulate a severe rapid transient. The Advanced Test Reactor, on the other hand, typically provides a steady neutron bombardment of materials to simulate years of neutron bombardment in a shorter time frame so the deterioration of the material to expected use can be studied.

Provencher noted that improvements were needed in Advanced Test Reactor outage planning and execution procedure. Improvements were also needed to improve the availability of ATR for experimental programs.

Growth in security roles in cybersecurity and advanced computing research was also praised.

[17] Kevin Trevellyan, The Post Register, "Fee total released for INL – Lab earned more than $15 million," December 13, 2017.
[18] *The Post Register*, "Battelle's INL contract extended – Contractor will manage lab until 2024. December 9, 2017.
[19] Kevin Trevellyan, *The Post Register*, "INL to restart test reactor," November 16, 2017.

NuScale Small Modular Reactor Won't Require Safety Related Electrical Systems

The Nuclear Regulatory Commission has determined during its review of the proposed NuScale design that its passive safety features eliminate the need for safety related electrical systems - class 1E power. This is expected to reduce the cost to build, operate and maintain according the NuScale Chief Commercial Officer Thomas Mundy. [20] [21]

NuScale's design can includes up to 12 small reactors, or "power modules." NuScale's first reactor is expected to be built by 2026 at the desert site shared by the Idaho National Laboratory. It will be operated by Utah Associated Municipal Power Systems, a consortium that includes Idaho Falls Power.

Because no operator action is necessary to protect the reactor, power for instrumentation is deemed unnecessary.

It does not appear that they have thought about the instrumentation to detect lowering spent fuel pool levels or to add emergency makeup to the pools. But that's not too surprising because the NRC has never been an agency to address spent nuclear fuel pool safety in a meaningful way.

Bogus "Fuel on Hand" Subsidy Rejected for Nuclear and Coal Plants

The Department of Energy Secretary Rick Perry's politically motivated thinly veiled proposal to subsidize coal and nuclear plants for their "fuel on hand" characteristics regarding grid stability was rejected by the Republican-controlled Federal Energy Regulatory Commission. The proposal could have resulted in billions of dollars of subsidies to coal and nuclear plants. [22] People concerned about energy costs and the environment were relieved to learn of FERC's unanimous rejection of Perry's proposal. [23] Cheap fracked gas has made nuclear power plants very uneconomical. And renewables like wind and solar have put additional pressure on energy generators.

The five-member energy panel agreed with critics who said there was no evidence of a threat to the grid's day-to-day reliability that would justify the action Perry was seeking.

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[20] Kevin Trevellyan, *The Post Register*, "NuScale's SMR design validated by key agency," January 12, 2018.
[21] *World Nuclear News*, "NRC agrees NuScale SMR needs no back-up power," January 10, 2018.
[22] *The Guardian*, "Subsidy plan for coal and nuclear plants 'will cost US taxpayers $10.6bn a year', https://www.theguardian.com/environment/2017/oct/27/subsidize-coal-nuclear-plants-taxpayer-cost-rick-perry
[23] Joshua S. Hill, *Clean Technica*, "Happy Responses to FERC's Unanimous Rejection Of Coal & Nuclear Subsidy Plan Proposed By US Energy Secretary Rick Perry (+ FERC Statements)," January 9, 2018. https://cleantechnica.com/2018/01/09/ferc-rejects-us-energy-secretary-perrys-plans-subsidise-coal-nuclear/

Grid reliability is an important issue. So why did Perry sidestep the experts when he decided on this rigged special subsidy for uneconomical coal and nuclear plants. With eight nuclear reactors announcing retirement plans in 2017, the nuclear industry was extremely hopeful for any economic aid. Perry did succeed in providing $3.7 billion additional loan guarantees to the Vogtle AP1000 nuclear power plants under construction in Georgia.[24]

Grid reliability is important and the FERC plans to study the issue. Regulatory decisions should take into account grid reliability and if they do, microgrids are likely to benefit. Grid reliability was described by Amory Lovins at the Rocky Mountain Institute back in June when Perry's proposal was issued. [25]

Lovins points out that nuclear plants shutdown for about 36 days every 18 to 24 months for refueling and scheduled maintenance. Nuclear plants tend to be slow to restart from blackouts. Most grid failures are due to power line transmission problems. Nuclear plants have had to shut down during heat waves due to inadequate cooling water. Equipment failures can cause unplanned and extended outages at nuclear plants.

And consider Fukushima: an accident at one unit can mean that all the reactors at that site must shutdown and they may stay shutdown. And an accident can mean that all the nuclear reactors in the country must shutdown as safety issues or terrorism issues are addressed. Most of Japan's nuclear reactors have not returned to operation following the 2011 Fukushima nuclear meltdowns.

Still think uneconomical nuclear plants should collect special fees for being a base load plant that supports grid reliability?

Complaint to Idaho Governor on Mackay Dam Hazards Ignored

EDI's March 2017 request to Governor Otter to take preventative action to protect the towns of Mackay, Leslie, Darlington, Moore, Arco and Butte City Idaho from the collapse of Mackay Dam has been ignored. Pursuant to Idaho Code Title 42 Chapters 1701-1721, we are again requesting that an inspection and administrative enforcement action be commenced for Mackay Dam. Written by Chuck Broscious

Mackay Dam is in poor condition, in an unsafe location and is a clear and present danger to the town of Mackay, Leslie, Darlington, Moore, Arco and Idaho National Laboratory. At risk are more than 600 residents and their property that is in close downstream proximity to the dam. Mackay residents will have no advanced warning of an imminent dam collapse; even with

[24] *World Nuclear News*, "Perry acts to support US nuclear," October 2, 2017. http://www.world-nuclear-news.org/NP-Perry-acts-to-support-US-nuclear-0210177.html

[25] Amory Lovins, Rocky Mountain Institute, "Does 'Fuel On Hand' Make Coal and Nuclear Power Plants More Valuable?," July 17, 2017. https://rmi.org/news/fuel-hand-make-coal-nuclear-power-plants-valuable/

warning evacuation could be difficult or impossible. At this time, there is no electronic or human warning system in place to allow evacuation.

We haven't seen anything to indicate that Mackay Dam management corrected the earlier inspection problems that EDI identified. [26] And additionally, if that dam can have 7 times its capacity flowing through, as IDWR indicates below, it would seem advisable to inspect that dam every month during the flood season, not every year.

Idaho Department of Water Resources Denies Access to Crucial Mackay Dam Inspection Reports

The Environmental Defense Institute filed a Public Records Request to the Idaho Department of Water Resources (IDWR) 12/12/17 under Idaho Code Title §74-102 that included:

1) All Mackay Dam Inspection/Dam Safety Reports post 8/11/15.
2) The current Mackay Dam Operation/Emergency Plans.
3) All communications post 8/11/15 between IDWR (including John Falk) and the Mackay Dam management regarding Mackay Dam.

IDWR response/denial stated: "A portion of your request is denied under Idaho Code § 74-105(4) (b) which exempts from disclosure IDWR records related to existing critical infrastructure. Dam Inspection/Safety Reports and Operation/Emergency Plans are considered critical infrastructure records and are therefore exempt from disclosure." "The Office of the Attorney General reviewed your request. Pursuant to Idaho Code § 74-115, you have 180 days to appeal this decision by filing a petition in the state district court of the county where all or part of the records are located." [27] IDWR further states: "As explained in the original email sent with the instructions for the document some documents are exempt from disclosure and have been withheld under § 74-105(4)(b). The inspection report falls under this exemption." [28]

After reading one of the released documents that discussed IDWR John Falk's 10/10/17 letters to the Big Lost River Irrigation District (owner of Mackay Dam) acknowledging the 10/4/17 Dam inspection, EDI challenged IDWR for excluding Mackay Dam inspection report. These inspection reports are crucial for the public to understand the current condition and hazard risk the dam poses. Link to website full article at our home page http://www.environmental-defense-institute.org/publications/MackayDam2018.pdf

Articles by Tami Thatcher and Chuck Broscious for January 2018.

[26] Environmental Defense Institute 3/14/17 letter to Governor Otter and Gary Spackman acting Director ID Department of Water Resources "Mackay Dam: A Preventable Disaster. http://www.environmental-defense-institute.org/publications/MackayDam2017.pdf

[27] Rosemary DeMond, Administrative Assistant to the Director, Idaho Dept. of Water Resources, email to C. Broscious, EDI, December 28, 2017.

[28] Rosemary DeMond, email to C. Broscious, EDI, December 29, 2017.