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## **Navy’s own data for over 65,000 individuals reveal that Naval personnel have cancer rates exceeding nine times the national average and Navy continues the gaslighting**

In 2011, the Navy’s nuclear powered aircraft carrier USS RONALD REAGAN was about 100 km from the Fukushima reactor meltdowns. The aircraft carrier then took part in “Operation Tomodachi” to assist victims of the Tsunami.

Personnel who served on the aircraft carrier started reporting a wide range of health problems, including cancers and sought legal action. However, a California judge later ruled that the case had to be heard in Japan, <sup>1</sup> undercutting any chance of success in the legal action. But in 2014, the publicity about the problem led to the US Navy deciding to prepare a report to address the accusations that the Fukushima fallout had harmed those who participated in Operation Tomodachi. A report was prepared by the US Defense Threat Reduction Agency (DTRA) that estimated the radiation exposure of personnel exposed during Operation Tomodachi and also the report compared the cancer rates of those exposed to Fukushima fallout to other naval personnel who are exposed to radiation but did not participate near Fukushima. <sup>2</sup>

As of the end of 2021, the U.S. Navy operated 70 nuclear-powered submarines, 11 nuclear-powered aircraft carriers, and three moored training ships. There are also six shipyards to maintain, overhaul, or refuel these nuclear propulsion plants, and two tenders and six naval bases. The U.S. Navy expounds on its meticulous radiation monitoring and attention to avoiding radiation doses that exceed federal standards.

Regarding annual radiation doses, the Navy has long claimed that it keeps average radiation doses far below the permissible 5 rem annual dose. In a 1994 report, the Navy claimed average doses were 200 millirem per year and that total lifetime doses from radiation associated with Naval nuclear propulsion plants averages only about one rem person. <sup>3</sup> More recently in 2022,

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<sup>1</sup> Chris Busby, *Counterpunch*, “Cancer in US Navy Nuclear Powered Ships,” March 6, 2020.

<https://www.counterpunch.org/2020/03/06/cancer-in-us-navy-nuclear-powered-ships/>

<sup>2</sup> Dose Assessment and Recording Working Group (DARWG) with support from the Defense Threat Reduction Agency (DTRA), Submitted by the Office of the Assistant Secretary of Defense for Health Affairs, Final Report to the Congressional Defense Committees in Response to the Joint Explanatory Statement Accompanying the Department of Defense Appropriations Act, 2014, page 90, “Radiation Exposure,” June 2014.

<https://www.health.mil/Reference-Center/Reports/2014/06/19/Radiation-Exposure-Report>

<sup>3</sup> Naval Nuclear Propulsion Program, *Occupational Radiation Exposure from U.S. Naval Nuclear Plants and Their Support Facilities*, NT-94-2, March 1994. “The average occupational exposure of each person monitored is less

the Navy states that no personnel have exceeded 2 rem in any year in the last 41 years. The Navy also states that most of the dose is from external radiation and the since 1962 no civilian or military personnel received more than 500 millirem annually from internal radiation exposure from naval nuclear propulsion plants. The average occupational exposure since 1954 from external and internal radiation combined is less than 110 millirem per year, according to the Navy.

Regarding lifetime average radiation doses, according to the 2022 report by the Navy, the total lifetime average exposure during this 68-year period is less than 1 rem per person.<sup>4</sup>

The term ‘gaslighting’ means basically to provide grossly misleading information in order to manipulate other people for one’s own advantage. While using the term gaslighting is a relatively new practice, the Navy’s disinformation about the radiation doses and estimated health harm is nothing new and has been going on for years. There is a tangle of problems, however, that include the low-balling of reported radiation doses and inadequate models adopted for estimation of health harm from external radiation and from internal (inhaled, ingested or through the skin) radiation doses.

The DTRA study discounted the claim that doses from Fukushima had harmed naval personnel. The DTRA study compared the cancer rate of the 4,843 naval personnel who participated near Fukushima in Operation Tomodachi to matched control group of 65,269 naval personnel. The period of analysis was from 2011 to 2013, less than three years, only 2.55 years.

If there was no particular harm from exposure to Fukushima fallout, the study should have found that the cancer rates for the 4,843 personnel near Fukushima were about the same as the matched control group of over 65,000 naval personnel.

But that’s not what the DTRA study found. The study found that those personnel exposed to Fukushima fallout had a significantly lower rate of cancer incidence. The DTRA study stated that the cancer incidence rate for naval personnel exposed to Fukushima fallout “was nearly 50 percent lower” than the rate of cancer incidence in the over 65,000 personnel not exposed to Fukushima.<sup>5</sup>

Christopher Busby found that if the 4,843 personnel and the “unexposed to Fukushima” control group of 65,269 were compared after adjusting for age, there was actually only 30 percent more cancers in the control group, not 50 percent. Busby also noted that the records from 76 personnel were removed from the 4,843 personnel. Had only 15 more cancers occurred from

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than one-fifth of a rem per year, The total lifetime exposure from radiation associated with Naval nuclear propulsion plants to date for all personnel monitored since 1954 has averaged about one rem per person.”

<sup>4</sup> Naval Nuclear Propulsion Program, Department of the Navy, *Occupational Radiation Exposure from U.S. Naval Nuclear Plants and Their Support Facilities*, Report NT-22-2, May 2022.

<sup>5</sup> Dose Assessment and Recording Working Group (DARWG) with support from the Defense Threat Reduction Agency (DTRA), Submitted by the Office of the Assistant Secretary of Defense for Health Affairs, Final Report to the Congressional Defense Committees in Response to the Joint Explanatory Statement Accompanying the Department of Defense Appropriations Act, 2014, page 90, “Radiation Exposure,” June 2014. <https://www.health.mil/Reference-Center/Reports/2014/06/19/Radiation-Exposure-Report>

the 76 missing individuals, the Fukushima exposed group would have equaled the control group.<sup>6</sup> But it was too much trouble for the Navy to track down medical records for 76 missing individuals.

It must also be stated that the limited three-year period following Fukushima exposure means that many of those cancers may have not had time to manifest. The cancer rates of the Fukushima-exposed naval personnel may yet indeed exceed that of the 65,000 naval personnel not exposed to Fukushima.

The Fukushima-exposed naval personnel having significantly less cancers than the control group is telling us something is fishy and the Navy's willingness to not explain that the Fukushima exposed personnel were not evaluated with a long enough follow-up time shows either incompetence or dishonesty.

**But the real stunning result proves the fallacy of the Navy's claim that they don't expose navy personnel to higher cancer risks. Unstated by the DTRA study was that the control group of 65,269 other naval personnel revealed a far higher rate of cancer, over nine times higher, than expected in the US population.**

Chris Busby compared the control group of 65,269 naval personnel, the control group not exposed to Fukushima, to the US national population, using the data on cancer rates in the US by age group from the SEER database, <https://seer.cancer.gov/data/> **The result showed a 9.2-fold excess of cancer in the naval personnel compared to the national rates. "There were 121 cancers predicted on the basis of national rates, and 1119 reported by the DTRA study."** This is almost 1000 extra cancers and during less than a 3-year follow-up, only 2.55 years.! See Table 1.

**Table 1.** Comparison of over 65,000 naval personnel cancer rates to national population rates from SEER finds that 121.9 cancers were expected by 1119 cancers occurred in a 2.55-yr span.

	Population	Average lifetime occupational radiation dose	SEER predicted cancer incidence per year	SEER predicted cancer incidence for 2.55 years	Observed cancer for 2.55 years	Lifetime predicted cancers for 1 rem lifetime dose
Naval personnel, not exposed to Fukushima	65,269	< 1 rem	47.8	121.9	1119	652.7

Table notes: Christopher Busby, *Cancer Investigation*, "High Cancer Risk in US Naval Personnel Serving in Nuclear Powered Ships," January 2020. <https://doi.org/10.1080/07357907.2020.1731526>

<sup>6</sup> Christopher Busby, *Cancer Investigation*, "High Cancer Risk in US Naval Personnel Serving in Nuclear Powered Ships," January 2020. <https://doi.org/10.1080/07357907.2020.1731526>

Naval records showed that 1119 cancers were observed in naval personnel during just 2.55 years! This is almost 1000 excess cancers that appear to be caused by working for the Navy (1119 cancers observed minus 121.9 cancers expected).

For perspective, for a 1 rem lifetime dose, the population of 65,000 naval personnel would have been predicted to have 650 excess cancers that would be spread out over their lifetimes and not occurring in a 2.55 year span.

**This is a stunning development: the Navy personnel, selected for their excellent health and intelligence, have been found to have far more cancers than the general population.** Even a doubling of the cancer rate stands out and is cause for concern.

The 9.2-fold increase in cancers over the general population and during just a 2.55-year interval is stunning! And this 9.2-fold increase in cancer incidence occurred at what the Navy says were very low lifetime doses, far below 10 rem at about 1 rem average lifetime doses, and with the Navy's claimed meticulous radiation monitoring.

Based on the currently adopted understanding of radiation health harm by the nuclear navy and others such as the Department of Energy and the U.S. Nuclear Regulatory Commission: "A widely accepted illustration of the approximate magnitude of the risk from a low dose is that if 100 individuals were each exposed to 100 mSv [10 rem] then, over a lifetime, approximately one of them would be expected to develop a radiation-induced cancer, whereas around 42 of them would be expected to develop cancer from other causes."<sup>7 8</sup> Navy personnel and other radiation workers are told their radiation doses do not significantly contribute to their risk of getting cancer.

The key statement, that if 100 individuals were exposed to a 10 rem lifetime radiation dose, there would be expected to be only 1 extra cancer in 100 people over a lifetime, according to the radiation health model used by the Navy and approved by the illustrious National Council on Radiation Protection and Measurements (NCRP). See Table 2.

The fact that the study of naval personnel by DTRA was comfortable with asserting that those exposed to Fukushima fallout had a 50 percent lower cancer rate than the matched control group when this is clearly not reasonable because the matched controls should have had nearly the same rate of cancer incidence. Add to this the fact that the study did not compare the numbers of excess cancers predicted by their radiation model to the number actually occurring

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<sup>7</sup> Angela R. McLean et al., *The Royal Society*, "A restatement of the natural science evidence base concerning the health effects of low-level ionizing radiation," 2017; *Proc. R. Soc. B* 284:20171070.

<http://dx.doi.org/10.1098/rspb.2017.1070> This paper presents unsafe, distorted and unscientific views, doubling down on a highly flawed radiation model. But it concisely states the subjective nature of the rem or Sievert unit of radiation dose.

<sup>8</sup> American Cancer Society website, accessed July 27, 2020. Note that cancer rates vary with time and place; the American Cancer Society website states that in the U.S. the annual cancer *incidence* (all causes) for 2012 to 2016 for males is 48.9 in 10,000 people (48.9E-4) and for women is 42.1 in 10,000 (42.1E-4) people.

<https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2020/cancer-facts-and-figures-2020.pdf>

and did not point out the huge excess cancer rate, over 9 times higher for naval personnel compared to non-naval US population, it shows major GASLIGHTING by the U.S. Defense department and the Navy.

**Table 2.** Radiation-induced cancer incidence and fatality estimates per rem, lifetime dose, BEIR VII report.

	Males, solid cancers	Females, solid cancers	Males, leukemia	Females, leukemia	Males, all cancers	Females, all cancers
Cancer incidence (fatal and non-fatal)	8E-4	13E-4	1.0E-4	0.7E-4	9E-4	13.7E-4
Fatal cancer only	4.1E-4	6.1E-4	0.7E-4	0.5E-4	4.8E-4	6.6E-4
Average fatal cancer only					5.7E-4	

Table notes: National Research Council, National Academy of Sciences, BEIR VII report, 2006. The average fatal cancer rate per rem, of 5.7 per 10,000 persons per rem is equivalent to 5.7E-4 fatal cancers per rem. Fatal cancer rate is the cancer mortality rate. The incidence of cancer rate is the cancer morbidity rate. The BEIR VII cancer estimates include a dose reduction factor of 1.5. **For males, incidence of cancer of 9.0E-4 per rem, that is roughly 1 radiogenic cancer in 1000 for a 1 rem lifetime dose or 1 radiogenic cancer in 100 for a 10-rem lifetime exposure.**

Whenever there has been a radiological event, the first excuse made for the observed excess rates of cancer has been that the predicted number of cancers from radiation would be small based on the estimated and typically poorly monitored radiation levels that are thought to be too low to be the cause of the excess cancers. This happened following the 1979 Three Mile Island accident, for example. The DTRA study proves that there is a huge disconnect between the estimated rate of cancer from radiation exposure and the reality of the excess cancers due to radiation exposure at doses far below 10 rem lifetime doses.

Sorting out how much is due to the inadequacy of radiation monitoring, the underreporting of radiation doses, particularly the inadequacy of the internal radiation monitoring and the especially the underestimation of cancers from internal radiation by currently used radiation health models is still needed.

## **OTHER HEALTH ISSUES FROM FUKUSHIMA FALLOUT**

Naval personnel on board the USS RONALD REAGAN in 2011 during Operation Tomodachi were exposed the increased levels of radiation from fallout from Fukushima nuclear reactor meltdowns. Some naval personnel who developed cancer and other serious health conditions alleged that radiation exposures while serving on the USS RONALD REAGAN

during Operation Tomodachi may be the cause. The Navy claims that the radiation doses to personnel exposed to Fukushima fallout were very low radiation doses, a tiny 8 millirem.

The Navy estimated the radiation doses of the individuals aboard the RONALD REAGAN aircraft carrier for the 60-day period, March 12 through May 11, 2011. The whole-body doses of 8 millirem or less and thyroid doses of 110 millirem or less.<sup>9</sup>

A radiation dose in units of rem (or international units of Sievert) is not a physical quantity and is a rough measure of the expected relative sensitivity of tissues for the end point of cancer mortality primarily. The tissue weights used to obtain the “effective” whole-body dose are based “upon an expert consensus grounded in scientific evidence, but with elements of subjectivity.”<sup>10</sup>

More than 70 young people have sued the Tokyo Electric Company over the Fukushima nuclear disaster radiological fallout. The personnel have had many leukemias, other forms of cancer, unremitting bleeding, migraine headaches and hair loss.<sup>11</sup>

The excess illnesses experienced by personnel exposed to Fukushima fallout listed in the DTRA report are conveniently not attributed to radiation. Those illnesses with statistically significant increased rates were diseases of the respiratory system, digestive system, genitourinary system, male infertility, complications of pregnancy, child birth and puerperium [immediately after child birth], and symptoms, signs, and ill-defined conditions.<sup>12</sup>

One of the naval personnel described the radiological fallout from Fukushima as like a cloud I’ve never seen, a gray smoke that surrounded you. This gray cloud may have been fallout similar to “black rain” that occurred following the bombing of Japan.<sup>13</sup>

There were two types of atomic bombs used during World War II, one a U-235 weapon, the other a plutonium-239 weapon. However, enriched uranium (U-235) would include U-234. In addition, a depleted uranium material, U-238, can be included with the weapon. Upon explosion, the U-238 is bombarded with neutrons, creating plutonium-239. The fallout of black rain of

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<sup>9</sup> Submitted by the Office of the Assistant Secretary of Defense for Health Affairs, Final Report to the Congressional Defense Committees in Response to the Joint Explanatory Statement Accompanying the Department of Defense Appropriations Act, 2014, page 90, “Radiation Exposure,” June 2014. <https://www.health.mil/Reference-Center/Reports/2014/06/19/Radiation-Exposure-Report>

<sup>10</sup> Angela R. McLean et al., *The Royal Society*, “A restatement of the natural science evidence base concerning the health effects of low-level ionizing radiation,” 2017; *Proc. R. Soc. B* 284:20171070. <http://dx.doi.org/10.1098/rspb.2017.1070> This paper presents unsafe, distorted and unscientific views, doubling down on a highly flawed radiation model. But it concisely states the subjective nature of the rem or Sievert unit of radiation dose.

<sup>11</sup> Living on earth, “Navy Personnel Claim Radiation Sickness From Fukushima,” January 17, 2014. <https://www.loe.org/shows/segments.html?programID=14-P13-00003&segmentID=5>

<sup>12</sup> Dose Assessment and Recording Working Group (DARWG) with support from the Defense Threat Reduction Agency (DTRA), Submitted by the Office of the Assistant Secretary of Defense for Health Affairs, Final Report to the Congressional Defense Committees in Response to the Joint Explanatory Statement Accompanying the Department of Defense Appropriations Act, 2014, page 90, “Radiation Exposure,” June 2014. <https://www.health.mil/Reference-Center/Reports/2014/06/19/Radiation-Exposure-Report>

<sup>13</sup> Christopher Busby, *Cancer Treatment and Research Communications*, “Ionizing radiation and cancer: The failure of the risk model,” April 2022. <https://doi.org/10.1016/j.ctarc.2022.100565>

uranium and plutonium fell on and contaminated everyone, not just those near the bombings in 1945. This may be why the people assumed to have zero radiation dose had 20 percent excess cancers relative to people not in the black rain and fallout of the bombings. This is the fallout that the U.S. government also denied was present in Japan after the bombings. But people exposed to the black rain and who were deemed not exposed to the gamma radiation of the atomic bombings, although having been harmed by the fallout, were denied compensation. The technology to monitor alpha contamination existed, but the contamination posed a liability issue for the U.S. as well.

The grey cloud that was observed from Fukushima likely included uranium-238, U-235, U-234, plutonium isotopes and americium-241. Mixed oxide fuel (MOX) that contains both uranium and plutonium was being used in Japan and was used in 6 percent of the fuel in Unit 3 that melted down. Fukushima fallout would have also included many other radionuclides, such as iodine-131, strontium-90, cesium-137, krypton and xenon, and others.

The navy gaslighters, however, told commanders that personnel were exposed to negligible amounts of radiation, similar to flying in an airplane or eating a banana. <sup>14</sup>

In addition to the health problems to the young adults, a 26-month-old toddler born to a father who served in Fukushima fallout died from brain and spine cancer. In another case, a pregnancy was terminated after the mother who served in Fukushima fallout learned that the fetus had severe birth defects.

Birth defects, spina bifida, cleft palate, limb reduction defects, malformation of heart and central nervous system, anencephaly, neural tube defects, Down syndrome and congenital malformations were observed to increase after *in utero* exposure following the 1986 Chernobyl nuclear disaster. <sup>15</sup> But in addition to harm caused by exposure to the developing child *in utero*, harm can also occur from damage to the sperm or egg prior to conception. The harm to the unborn child has been observed to occur at radiation doses far below the levels claimed by the International Commission on Radiological Protection (ICRP) that is used by the Navy, Department of Energy, Nuclear Regulatory Commission and other U.S. state and federal agencies. The ICRP continues to claim that doses below 10 rem would not harm the unborn child despite compelling and diverse evidence that harm is caused to the unborn child at doses far below 10 rem.

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<sup>14</sup> Bianca Bruno, *Courthouse News Service*, "US Sailors Face Grim Diagnoses After Fukushima Mission," November 29, 2017. <https://www.courthousenews.com/us-sailors-face-grim-diagnoses-after-fukushima-mission/>

<sup>15</sup> Bhria Busby et al., *Medicine, Conflict and Survival*, "The evidence of radiation effects in embryos and fetuses exposed to Chernobyl fallout and the question of dose response," 2009; Vol. 25. No. 1, January-March 2009, 20-40.

## **Fukushima accident caused an increase in infant deaths, and more death closer to the accident**

While the amount of the increase in infant deaths due to the Fukushima accident has been disputed, the fact that infant deaths increased following the Fukushima accident has been documented.<sup>16 17</sup> As typical, official nuclear boosting organizations such as UNSCEAR wrongly predicted that prenatal exposures from the Fukushima accident were not expected to increase the incidence of spontaneous abortions, miscarriages, perinatal mortality, congenital effects or cognitive impairment.<sup>18</sup>

In Fukushima prefecture and four neighboring prefectures an increase in perinatal mortality was found. In the Fukushima prefecture, the increase was 3 times greater than in four neighboring prefectures. Overall, there was a significant 10.6 percent increase relative to preceding years according to the 2019 Korblein study, lower than the approximately 15 percent found by the 2016 Scherb study. After Chernobyl, a 5 percent increase in perinatal deaths in Germany was observed one year after the disaster.

**The estimated population doses in the first year following Fukushima were estimated as generally being less than 400 millirem in the Fukushima study area and only 20 millirem in Germany following Chernobyl.** Yet the nuclear industry continues to falsely claim — still — that teratogenic effects are not expect to occur below about 10,000 millirem (or 10 rem).<sup>19</sup> In the U.S., the public is allowed routine doses of 100 millirem (higher doses following accidents) and pregnant radiation workers are allowed 500 millirem doses.

The increased rates of perinatal mortality after Fukushima are in agreement with similar observations following the Chernobyl nuclear disaster. In Germany where perinatal mortality was studied after Chernobyl,<sup>20 21</sup> the airborne radionuclides from Chernobyl were carried in the wind to Germany (and to many other countries).

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<sup>16</sup> Alfred Korblein and Helmut Kuchenhoff, *J. Radiol. Prot.*, “Perinatal mortality after the Fukushima accident: a spatiotemporal analysis,” 2019. <https://doi.org/10.1088/1361-6498/ab36a3>

<sup>17</sup> H. H. Scherb et al., *Medicine (Baltimore)*, “Increases in perinatal mortality in prefectures contaminated by the Fukushima nuclear power plant accident in Japan: A spatially stratified longitudinal study,” 2016. Sep;95(38):e4958. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5044925/>

<sup>18</sup> UNSCEAR 2013 Report, Volume 1, Report to the General Assembly, Scientific Annex A: Levels and effects of radiation exposure due to the nuclear accident after the 2011 great east-Japan earthquake and tsunami, United Nations, New York. [http://www.unscear.org/docs/reports/2013/13-85418\\_Report\\_2013\\_Annex\\_A.pdf](http://www.unscear.org/docs/reports/2013/13-85418_Report_2013_Annex_A.pdf)

<sup>19</sup> The paper by Korblein and Kuchenhoff use international units of millisievert. 1 mSv is 100 millirem. Radiation workers in the U.S. still have doses reported in millirem and are generally familiar with millirem rather than millesievert units. Millirem and millisievert doses are fictional doses only loosely related to actual absorbed dose.

<sup>20</sup> Alfred Korblein and H. Kuchenhoff, *Radiat Environ Biophys.*, “Perinatal mortality in Germany following the Chernobyl accident, 1997 Feb;36(1):3-7.

<sup>21</sup> H. Scherb et al., *Environ Health Perspect.*, “Regression analysis of time trends in perinatal mortality in Germany 1980-1993,” 2000 Feb;108(2):159-65.



However, the increased perinatal deaths have lingered longer near Fukushima and may be due to less reliance on milk and differences in diet, such as more dietary consumption of radiologically contaminated mushrooms.

One of the difficulties in studying the rates of perinatal mortality is that the rate varies throughout the year, typically highest in April.

The 2016 study of Fukushima by Scherb et al.<sup>22</sup> found higher increases in perinatal mortality than the 2019 Korblein study and differences are attributed to difference in modeling. Korblein used combined regression of perinatal mortality rates using the rest of Japan as a control region.

Another study by Hayashi and others noted an increase in congenital anomalies for exposures from Fukushima for pregnancies conceived during 3 months before the Fukushima disaster, despite the low radiation doses. They also found that for women who conceived within 6 months of the Fukushima nuclear disaster, an increase in the incidence of preterm birth (less than 37 weeks) and low birth weight (less than 1500 g or less than 2500 g).<sup>23</sup>

In a study of Ukraine after Chernobyl, the prevalence of neural tube defects plus microcephaly was significantly increased in a highly contaminated region.<sup>24</sup>

Of particular interest to people in Idaho, Down syndrome increases were also observed following the 1986 nuclear accident at Chernobyl in the most heavily contaminated southern part of Germany and in Belarus in the Ukraine and in other parts of Europe.<sup>25</sup> **Despite the clear observation of increased radiation exposure to an increase in the rate of Down syndrome cases, official agencies continue to ignore radiation exposure as one cause of Down syndrome, especially in Idaho where airborne radioactive releases continue unfettered and have increased markedly since about 2000.**

The observed increases in cases of Down syndrome in Germany and Europe where the radiation doses from Chernobyl were quite low is particularly significant. The State of Idaho refuses to track birth defects, but the growing number of organizations in Idaho dedicated to helping with Down syndrome is suggestive of increasing numbers of births with DS.<sup>26</sup> It is not

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<sup>22</sup> H. H. Scherb et al., *Medicine (Baltimore)*, “Increases in perinatal mortality in prefectures contaminated by the Fukushima nuclear power plant accident in Japan: A spatially stratified longitudinal study,” 2016 Sep;95(38):e4958. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5044925/>

<sup>23</sup> M. Hayashi et al., *Open Journal of Obstetrics and Gynecology*, “Obstetric Outcomes in Women in Fukushima Prefecture during and after the Great East Japan Earthquake and Fukushima Nuclear Power Plant Accident: The Fukushima Health Management Survey, 2016, 6, 705-713. [http://file.scirp.org/pdf/OJOG\\_2016111113474078.pdf](http://file.scirp.org/pdf/OJOG_2016111113474078.pdf)

<sup>24</sup> A Korblein, *Radiat Biol Radioecol.*, “Strontium fallout from Chernobyl and perinatal mortality in Ukraine and Belarus, 2003 Mar-Apr;43(2):197-202.

<sup>25</sup> Karl Sperling et al., *Molecular Cytogenetics*, “Population monitoring of trisomy 21: problems and approaches,” 2023; 16:6. <https://doi.org/10.1186/s13039-023-00637-1>

<sup>26</sup> Eastern Idaho Down Syndrome Family Connect, Webpage: “Facts About Down Syndrome” states that “Down syndrome is caused by the presence of an extra 21<sup>st</sup> chromosome in a person’s cells.” Accessed 7/29/2024. <https://www.easternidahodownsyrndrome.org/how-to-help/frequent-questions.html> The term “radiation” is no where in the website.

just the counties surrounding the Idaho National Laboratory that have continued and increasing levels of airborne radiological contamination. The western side of Idaho has wide-spread airborne radiological contamination from radioactive waste operations at US Ecology Grand View and its railroad connection at Orchard, Idaho.

## **Nuclear energy promoters continue to ignore adverse impacts to children and the unborn child**

Despite decades of study of radiation effects on humans, and the knowledge that children and particularly, the unborn child is particularly vulnerable to radiation, the radiation protection standards used by the U.S. Department of Energy and by the U.S. Nuclear Regulatory Commission and by the U.S. Environmental Protection Agency fail to protect adults, as well as children and the developing child.

The U.S. EPA created a framework for health that was designed to limit life-time cancer risk to below 1 cancer in 10,000 people.<sup>27</sup> But then EPA ignored it for radionuclides, allowing adults to have an increase in cancer of about 1 cancer in 143 people from their radiation exposure, and ignoring the increased risk to children, to females and to the unborn child.

Radiological contamination affects adults and children. Radiological contamination affects the child developing *in utero* by the air, food and water consumed by the mother. In addition, egg and sperm of the parents are affected by radiological contamination in air, food and water and therefore, the not-yet-conceived child is also affected by radiological releases.

An airborne radiological release depends on wind direction and wind speed and also on possible rain or snow. This means that the level of contamination depends not only on the distance from the source of the release but also on the wind direction, wind speed and precipitation.

A stack release that continues throughout the year would spread contamination in accordance with annual average wind speed and direction but the release from a short-term release would be very dependent on the wind speed and direction (and any precipitation) during the release. The radiation dose from contamination in the air in the 48 hours from an accident may be important; however, the dose from consumption of contaminated milk, contaminated water, and uptake by plants and animals may continue to provide a chronic radiation dose for weeks, months or years, depending on the radioactive half-life of the radionuclide.

Radiological monitoring is often tardy, spotty, incomplete and not comprehensive of all key radionuclides released. Aerial surveys of cesium-137 can detect cesium-137 but do not detect and therefore tend to not report strontium-90, tritium, carbon-14, and many other radionuclides also present and of importance to inhalation and ingestion dose. Beta emitters difficult to detect and are not detected by Geiger counters. **Low-energy beta emissions from tritium, carbon-14,**

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<sup>27</sup> Cindy Folkers and Linda Pentz Gunter, *BMJ Paediatrics Open*, "Radioactive releases from the nuclear power sector and implications for child health, August 2022;6:e001326. <https://pubmed.ncbi.nlm.nih.gov/36645750/>

**and iodine-129 are particularly difficult to detect and often go unreported. Alpha emitters such as uranium, plutonium and americium are often ignored or attributed to former nuclear weapons testing.**

If cesium-137 is detected in milk or water, there are likely a host of other radionuclides in the milk, even if the iodine-131 has decayed away.

Following Chernobyl, official monitoring ignored americium-241, but researchers discovered that americium-241 was highly mobile in the environment and persistent in the environment. Once taken into the human body, via inhalation or ingestion, americium-241 is highly retained in the body, adversely affecting bone marrow cellular health.

While accidents release radionuclides, routine operations throughout the uranium fuel cycle, including nuclear reactor operation, have released health-harming levels of radionuclides.

In the 1950s, Dr. Alice Stewart found increases in childhood leukemia and cancer rates in children who were exposed *in utero* to medical radiation in doses less than 500 millirem.<sup>28 29</sup>

Elevated rates of infant mortality and birth defects were found in communities near the Department of Energy's Hanford site, but workers were not told of these epidemiology results and newspapers did not report the findings.<sup>30</sup>

**The 2012 NAS study acknowledged the airborne and liquid effluent radiological releases from commercial nuclear power plants, stating "At present, nuclear plants typically release between a few curies and several hundred curies per year in airborne effluents."<sup>31</sup>**

To the nuclear industry, averaging the contamination levels throughout the year is adequate. And to the nuclear industry, emphasizing the average release from a nuclear plant is acceptable. But the variability matters, especially the maximum levels that the unborn, developing child in

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<sup>28</sup> Gayle Greene, *The Woman Who Knew Too Much – Alice Stewart and the Secrets of Radiation*, The University of Michigan Press, 1999. ISBN 0-472-11107-8

<sup>29</sup> John W. Gofman, M.D., Ph.D., Committee for Nuclear Responsibility, Inc., "Radiation-Induced Cancer from Low-Dose Exposure: An Independent Analysis," 1990. (See page 741, "Diagnostic irradiation on the order of 1 to 2 rads, delivered to the fetus in utero provoked about a 50% increase in the frequency of a variety of childhood cancers and of childhood leukemia." And page 746, "the risk in cancer-leukemia risk with each additional film is consistent with a linear relationship between number of films (@ 200-400 millirads per film) and cancer-leukemia risk.)

<sup>30</sup> Kate Brown, *Plutopia – Nuclear Families, Atomic cities, and the Great Soviet and American Plutonium Disasters*, Oxford University Press, 2013. ISBN 978-0-19-985576-6. Note that many publications use spelling variation Mayak instead of Maiak. *Plutopia* documents the elevated percentage of deaths among infants in the Richland population in the 1950s. Elevated fetal deaths and birth defects in Richland were documented by the state health reports, yet Hanford's General Electric doctors and the Atomic Energy Commission that later became the Department of Energy failed to point these statistics out. The local newspapers failed to write of it. The Department of Energy has continued to fail to tell radiation workers and the public of the known risk of increased infant mortality and increased risk of birth defects that result from radiation exposure.

<sup>31</sup> Committee on the Analysis of Cancer Risks in Populations near Nuclear Facilities, Nuclear and Radiation Studies Board Division of Earth and Life Studies, National Research Council of the National Academies, *Analysis of Cancer Risks in Populations Near Nuclear Facilities: Phase 1*, 2012. ISBN 978-0-309-25571-4

utero is exposed to. There is variability due to differing plant designs, variability due to particular operating modes (such as refueling a boiling water reactor), and variability to due plant degradation such as steam generator tube ruptures in pressurized water reactors.

Most of the airborne effluents are from radioactive iodines, krypton, xenon, argon fission and activation gases, and radioactive particulates such as cobalt-58, and cobalt-60, cesium-134 and cesium-137, chromium-51, manganese-54 and niobium-95, and tritium.

A recent 2022 NAS report ignored the variable airborne radiological releases from pressurized water and boiling water reactors as it cited a selected and low-balled radiation exposure from **external radiation** of 1 millirem dose to the public from nuclear power plants.<sup>32</sup> It ignored the tremendous problem in **internal radiation**, especially for children and the unborn, developing child.

The U.S. NRC cancelled what would have been the first meaningful epidemiology study of health effects near US nuclear reactors,<sup>33</sup> despite the German epidemiology study of children living near nuclear plants have roughly double the incidence of cancer and leukemia and similar findings resulted from the study of clusters of childhood leukemia near nuclear sites including Sellafield, Dounreay and La Hague where an excess of 300-fold infant leukemia were found.<sup>34</sup>  
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Nuclear promoters have focused on cancer deaths, ignoring other adverse health outcomes and then refused to adequately study even the cancer deaths.

Airborne radiological releases from nuclear power plants affect downwind residents but contaminated foods are distributed unevenly. Radioactive contamination that lands on pastures grazed by dairy cattle results in radioactively contaminated milk. Radioactive contamination also affects garden produce. Thus, the inhalation and ingestion of radionuclides varies according to location as well as diet.

The harm depends on gender and the age of exposure and it is known that women are more vulnerable than men, and children are more vulnerable than adults. Radiological sampling of milk that was conducted in the U.S. allowed levels of radioactivity that we now know were

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<sup>32</sup> National Academies of Sciences, Engineering, and Medicine, *Leveraging Advances in Modern Science to Revitalize Low-Dose Radiation Research in the United States*, Washington, DC: The National Academies Press, 2022. <http://nap.nationalacademies.org/26434> or <https://doi.org/10.17226/26434>.

<sup>33</sup> NRC (Nuclear Regulatory Commission) 2010. NRC Asks National Academy of Sciences to Study Cancer Risk in Populations Living near Nuclear Power Facilities. NRC News No. 10-060, 7 April 2010. Washington, DC: NRC. The framework for the study was reported in "Analysis of Cancer Risks in Populations Near Nuclear Facilities; Phase I (2012). See cancer risk study at [nap.edu](http://nap.edu).

<sup>34</sup> P Kaatsch et al., *Int J Cancer*, "Leukaemia in young children living in the vicinity of German nuclear power plants," 2008 Feb 15;122(4):721-6. <http://www.ncbi.nlm.nih.gov/pubmed/18067131>

<sup>35</sup> Spix C, Schmiedel S., Kaatsch P, Schulze-Rath R, Blettner M., *Eur J Cancer*, "Case-control study on childhood cancer in the vicinity of nuclear power plants in Germany 1980-2003." 2008 Jan;44(2):275-84. Epub 2007 Dec 21. <http://www.ncbi.nlm.nih.gov/pubmed/18082395>

<sup>36</sup> Chris Busby, "Infant Leukaemia in Europe after Chernobyl and its Significance for Radioprotection; a Meta-Analysis of Three Countries Including New Data from the UK," Chapter 8 of *ECRR Chernobyl: 20 Years On – Health Effects of the Chernobyl Accident*, Editors C.C. Busby and A. V. Yablokov, 2006.

harmful. Diminishing radioactivity levels in the diet were accompanied by immediate and significant morbidity and mortality reductions among infants and young children, from 1965 to 1970.

**Joseph J. Mangano and others published a study, “Infant Death and Childhood Cancer Reductions after Nuclear Plant Closings in the United States. The study found that following nuclear power plant closures, decreases in the radioactivity of milk has been noted and reductions in deaths among infants who had lived downwind and within 64 km of each nuclear plant were noted. Cancer incidence in children younger than 5 years of age were also noted to fall significantly after the shutdowns.”**<sup>37</sup>

Jay M. Gould and Benjamin A. Goldman would write in their book *Deadly Deceit – Low Level Radiation High Level Cover-Up* of excess infant deaths near the Department of Energy’s Savannah River Site and near the 1979 Three Mile Island nuclear accident.<sup>38</sup>

Elevated rates of infant mortality and birth defects were found in communities near the Department of Energy’s Hanford site, but workers were not told of these epidemiology results and newspapers did not report the findings.<sup>39</sup>

Following the 1986 Chernobyl nuclear disaster, a comprehensive study also found a spike in perinatal mortality (still-births plus early neonatal deaths) in several countries that received airborne radioactivity from Chernobyl. The amount of airborne radioactivity to cause this was far smaller than generally assumed.<sup>40</sup> The doses to the fetus from Chernobyl that caused observed harm in Germany and Poland were below 100 millirem. (The 1986 Chernobyl accident alone is responsible for over one million deaths according the independent analysis rather than estimates from nuclear energy promoters.<sup>41</sup>)

The U.S. Environmental Protection Agency and also the Department of Energy assume that a protective dose limit for the public is 100 millirem per year. These are unmonitored doses to

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<sup>37</sup> Joseph J. Mangano, Jay M. Gould, Ernest J. Sternglass, Janette D. Sherman, Jerry Brown and William McDonnell, Radiation and Public Health Project, “Infant Death and Childhood Cancer Reductions after Nuclear Plant Closings in the United States,” *Archives of Environmental Health*, Vol. 57 (No.1), January/February 2002.

<sup>38</sup> Jay M. Gould and Benjamin A. Goldman, *Deadly Deceit – Low Level Radiation High Level Cover-Up*, Four Walls Eight Windows New York, 1990. ISBN 0-941423-35-2. The finding of excess infant deaths near the Department of Energy Savannah River site around the 1970s and near the 1979 Three Mile Island nuclear accident are described in Jay Gould’s book *Deadly Deceit*.

<sup>39</sup> Kate Brown, *Plutopia – Nuclear Families, Atomic cities, and the Great Soviet and American Plutonium Disasters*, Oxford University Press, 2013. ISBN 978-0-19-985576-6. Note that many publications use spelling variation Mayak instead of Maiak. *Plutopia* documents the elevated percentage of deaths among infants in the Richland population in the 1950s. Elevated fetal deaths and birth defects in Richland were documented by the state health reports, yet Hanford’s General Electric doctors and the Atomic Energy Commission that later became the Department of Energy failed to point these statistics out. The local newspapers failed to write of it. The Department of Energy has continued to fail to tell radiation workers and the public of the known risk of increased infant mortality and increased risk of birth defects that result from radiation exposure.

<sup>40</sup> Alfred Korblein, “Studies of Pregnancy Outcome Following the Chernobyl Accident,” from *ECRR Chernobyl: 20 Years On – Health Effects of the Chernobyl Accident*, Editors C.C. Busby and A. V. Yablokov, 2006.

<sup>41</sup> Alexey V. Yablokov, Vassily B. Nesterenko, and Alexey V. Nesterenko, Consulting Editor Janette D. Sherman-Nevinger, *Chernobyl – Consequences of the Catastrophe for People and the Environment*, Annals of the New York Academy of Sciences, Volume 1181, 2009.

every member of the public, man, woman and child, every year. In reality, the 100 millirem per year dose limit is not protective of human health and it is devastating to the unborn child developing *in utero*.

Robin Whyte wrote in the *British Medical Journal* in 1992 about the effect in neonatal (1 month) mortality and stillbirths in the United States and also in the United Kingdom. The rise in strontium-90 from nuclear weapons testing from 1950 to 1964 has been closely correlated, geographically, with excess fetal and infant deaths. The doses from strontium-90 due to atmospheric nuclear weapons testing were less than 50 millirem (or 0.5 millisievert), according to the Chris Busby. Radioactive fallout from atmospheric nuclear weapons testing would not only include strontium-90, it would include iodine-131, tritium, cesium-137, and other radionuclides, including plutonium.<sup>42</sup>

## **Nuclear Promoters Know They Have to Lie About Regulatory Oversight, About Risk and About Cost**

The nuclear promoters who snuck through a bill allowing the sale of nuclear facilities in the U.S. to foreign countries, and reducing regulatory oversight should be ashamed and Congress who passed the ADVANCE Act should also be ashamed.

The Senate passed S.870, the bill originally “An Act to amend the Federal Fire Prevention and Control Act of 1974 to authorize appropriations for the United States Fire Administration and firefighter assistance grant programs,” but hijacked by nuclear boosters’ pro-nuclear ADVANCE act bill. The 93-page ADVANCE bill had to be snuck into the 3-page Fire Grants and Safety Act.<sup>43 44</sup>

The nuclear lobby has seized our democratic processes and co-opted the climate movement with pervasive lies and profit grabbing, writes Mays Smithwick and Jacqui Drechsler in a July 26 article in *Counterpunch*.<sup>45</sup>

They also write about the longstanding problems of the uranium fuel cycle that includes uranium mining, milling, conversion to HF6, uranium-235 enrichment, deconversion, fuel fabrication, reactor operations, decommissioning, and spent fuel storage. They discuss the increased nuclear proliferation and terrorism risks of high-assay low enriched uranium that the Department

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<sup>42</sup> R. K. Whyte, *British Medical Journal*, “First day neonatal mortality since 1935: re-examination of the Cross hypothesis,” Volume 304, February 8, 1992. <https://www.bmj.com/content/bmj/304/6823/343.full.pdf>

<sup>43</sup> David Kraft, Nuclear Energy Information Service, Press Statement: Senate Nuclear Fetishists Take Lid Off of Pandora’s Box, June 19, 2024, <https://neis.org/press-statement-senate-nuclear-fetishists-take-lid-off-of-pandoras-box/>

<sup>44</sup> See [Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy \(ADVANCE\) Act](https://docs.house.gov/billsthisweek/20240506/S_870_Peters_updated.pdf), or [https://docs.house.gov/billsthisweek/20240506/S\\_870\\_Peters\\_updated.pdf](https://docs.house.gov/billsthisweek/20240506/S_870_Peters_updated.pdf) and <https://www.congress.gov/bill/118th-congress/senate-bill/870>

<sup>45</sup> Mays Smithwick and Jacqui Drechsler, *Counterpunch*, “The ADVANCE Act: a Bipartisan Surrender to the Nuclear Lobby,” July 26, 2024. <https://www.counterpunch.org/2024/07/26/the-advance-act-a-bipartisan-surrender-to-the-nuclear-lobby/>

of Energy is pushing. They discuss the lack of a long-term solution for spent nuclear fuel. They also point out how funds that are intended for the dismantling of closed nuclear power plants are being hijacked and the U.S. Nuclear Regulatory Commission claims it is unable to hold the nuclear industry accountable.

They point out how consolidated interim storage of spent fuel is being pushed and would entail thousands of shipments of spent nuclear fuel through an unfit transportation infrastructure. In 2022 alone, there were 952 freight train derailments. They point out the unaffordable cost of spent fuel reprocessing and that reprocessing increases nuclear material proliferation threats.

They write that the ADVANCE Act would allow foreign entities to buy, build and operate nuclear power reactors here in the United States, and would encourage the export of American nuclear technology. Title III, No. 1. Of the ADVANCE Act authorizes the “rules will be modernized to reduce restrictions on international investment and issuing reactor licenses to certain foreign corporations and entities.” This puts citizens at risk of terrorism and proliferation threat as well as increased threat of leaving rate payers holding the bag for costs.

Every Congressman who voted in favor of the ADVANCE Act should read their excellent article and start asking how they have been so fooled by the nuclear promoters.

While the nuclear promoters continue to falsely claim that nuclear energy is affordable, the cost of the Vogtle units build in the U.S. is getting painful and is being passed on the Georgia ratepayers.

In 2009, at the start of construction, Georgia Power claimed that the two AP1000 reactors would be built on time and on budget. In 2017, Westinghouse declared bankruptcy. The costs to construct Vogtle’s unit 3 and 4 reactors now exceed \$36.8 billion, the most expensive power plant ever built and more than double the original cost estimates. The Georgia Public Utilities Commission has approved passing the costs to ratepayers and building the reactors cost approximately four times more than any other generation choice would have cost.<sup>46</sup>

## **Idaho Cleanup Project – Responses to Questions**

The Department of Energy has provided responses via email July 10, 2024, to my questions. I follow the Q and DOE Response with a brief explanation of why DOE’s response probably isn’t adequate.

**Q: What are RWMC aquifer monitoring trends & contaminates since CAB last presented data? The “shifts” are for which contaminants?**

Response: The most recent validated data set is available on the on the Administrative Record/Information Repository (ARIR Home - ARIR ([idahoenvironmental.com](https://idahoenvironmental.com))). Carbon tetrachloride showed a slightly increasing trend from 2017 through 2022. However, the 2023

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<sup>46</sup> Patty Durand, Kim Scott and Glenn Carroll, *Plant Vogtle – The True Cost of Nuclear Power in the United States*, May 2024. <https://gevedfund.org/plant-vogtle/>

results showed a decrease in the concentrations of carbon tetrachloride. Monitoring well M15S was the only well with a concentration exceeding the MCL (5 µg /L) [microgram/liter] with a concentration of 5.05 µg/L.

Trichloroethylene (TCE) concentrations near RWMC remain well below the MCL (5 µg /L) and show a relatively neutral trend with the exception of well M15S. The TCE concentrations show an increasing trend at well M15S, however the concentration remains below the MCL (5 µg /L) with the reported concentration of 3.96 ug/L in FY 2023.

*My response to DOE's response: Contaminants are not decreasing despite the limited exhumations and the catalytic conversion of VOCs for years that polluted Idaho skies.*

**Q: Why not discuss DOE-STD-5506-2021 for TRU deficiencies at ICP?**

Response: ICP is in the process of implementing the latest DOE-STD-5506-2021, Preparation of Safety Basis Documents for Transuranic (TRU) Waste Facilities. Transuranic waste operations continue to be conducted safely and in accordance with approved nuclear safety basis documents in conformance with the previous version of the Standard, DOE-STD-5506-2007.

*My response to DOE's response: This hedging on how unsafe the operations are is typical of the Department of Energy and it is dangerous to workers and to citizens.*

**Q: Why isn't the RWMC soil cap designed with consideration of waste heat load? Will the covered SDA become a smoldering dump?**

Response: Due to the successful completion of the buried waste retrieval effort, the SDA contains significantly less organic (combustible) matter than a municipal landfill or tire disposal area; therefore, chemical oxidation or biological decomposition is not likely to rapidly generate heat. Combustion of subsurface waste has historically not been an issue at the SDA, and the surface barrier will be constructed to add highly compacted soil over the existing SDA which will further limit oxygen influx and the potential for sustained combustion. During the development of the OU-7 13/14 Record of Decision, a scenario involving nitrate compounds rapidly decomposing to produce oxygen for combustion and creating a sustained subsurface fire beneath the evapotranspiration surface barrier was examined and was determined to be a non-credible scenario for waste buried in the SDA.

*My response to DOE's response: Nitrate compounds are not the only chemicals that may smolder upon heating up. As DOE has no peer-reviewed or Professional Engineer stamped analysis of the potential wastes buried and heat load and has already admitted that the temperatures that will accelerate chemical oxidation processes are unknown (just hopeful that ambient conditions did not cause exothermic oxidation processes), be prepared for a possible forever smoldering heap at the RWMC.*

**Q: Why were assumptions made that lowered the level of calcine contaminants. Low Kd's not based in calcine studies.**



(Note this information is consistent with responses provided to questions received on the 3116 draft determination document)

Response: The assumption was made based on the level of contaminants that could be present in a residual depth of 2 in. of calcine after retrieval is complete, and past and current retrieval studies. The residual depth was chosen based on three historical, full-scale calcine retrieval tests that all yielded similar results. After the tests, the residual depth of 2 in. was determined to be a realistic assumption for performing the performance assessment calculations. More recent tests using pneumatic retrieval systems used in a full-scale mockup demonstrated effective removal of 99% of the material in the most difficult bins.

The sorption coefficients (Kd values) used in the Calcined Solids Storage Facilities Performance Assessment analysis for the radionuclides in the residual calcine are based on literature studies of radionuclide sorption in grout at the Hanford site. Grout is intended to be used in each bin and the residual is assumed to be incorporated into the grout; therefore, the controlling environment for leaching and transport of radionuclides will be the grout matrix.

*My response to DOE's response: Assuming mixing of calcine in the added grout is a big "if." Let's make sure that the amount of calcine left over the aquifer is not more than this 2-in. depth amount. In other words, DOE must not be allowed to use this study to increase the amount of calcine left over the aquifer.*

**Q: Flood levels and risk at INTEC ignore the now-known high risk of Mackay Dam failure. Why?**

Response: The documented safety analysis (DSA) for INTEC evaluates multiple (four) scenarios involving failure of the Mackay Dam. The evaluated scenarios are compliant with the methods described 10 CFR 830 and applicable DOE Orders.

Hazardous Waste Management Act/Resource Conservation and Recovery Act (HWMA/RCRA) does not have requirements for assessing the probability of an upstream dam failure. Both INL site contractors have a Documented Safety Analysis (DSA) to provide safety analysis methodologies and information required for and common to all facilities operated at the INL site that are subject to the requirements of Title 10 Code of Federal Regulations (CFR) Part 830, Subpart B, "Safety Basis Requirements." The DSA includes flooding from natural phenomena and flooding from Mackay Dam failure. The models indicate the current flood controls adequately mitigate flood water away from INL site facilities.

HWMA/RCRA requires floodplain requirements be applied to the permit if a facility is located within the 100-year floodplain. None of the facilities at RWMC/AMWTP are in the 100-year floodplain. There are two buildings at INTEC within the 100-year floodplain: Buildings T-1 and T-5. The INL Site Diversion Dam was constructed in 1958 to divert high run-off flows from downstream facilities. The diversion dam consists of a small earthen dam and head gate that diverts water from the main channel, through a connecting channel, and into a series of four natural depressions called spreading areas. The INL Site Diversion Dam has sufficient capacity

to mitigate water from the 100-year flood from the Big Lost River and the potential failure of Mackay Dam away from INL site facilities. In addition, to ensure that all potential sources of flooding were evaluated for INTEC facilities, the report “100-Year Storm Water Runoff Floodplain and 25-Year Runoff Analyses for the Idaho Nuclear Technology and Engineering Center at the Idaho National Engineering and Environmental Laboratory” (INEEL/EXT-03-01174, Revision 3, January 2004) was prepared. This study evaluated the largest 25-year and 100-year storm water flood flows through and in the vicinity of INTEC and determined no flooding impacts to RCRA buildings at INTEC. INTEC is surrounded by a perimeter road and ditch system, which serves as a major drainage divide around the facility. Storm water run-off from within INTEC is controlled by a network of channels and culverts that drain to a storm water basin outside the facility. These physical barriers provide flood protection for the HWMA/RCRA unit partially in the 100-year floodplain.

*My response to DOE’s response: The physical barriers do not protect INTEC from the Mackay Dam break which is now known to be more likely than a 100-year flood and has not been accounted for by DOE or the Idaho Department of Environmental Quality. See the Environmental Defense Institute September 2022 newsletter article “Mackay Dam Failure, Far More Likely Than Previously Thought – No Apparent Action by State and Federal Agencies,” and the powerpoint presentation at [www.environmental-defense-institute.org/publications/MackayDamPPT.pdf](http://www.environmental-defense-institute.org/publications/MackayDamPPT.pdf)*

*Even if Mackay Dam failure is not thought to release any calcine or cause a reactor meltdown at the Advanced Test Reactor — and I know how unreliable the Department of Energy’s documented safety analyses are — Mackay Dam failure can cause flooding at Central Areas Facility, INTEC, the Advanced Test Reactor Area as well as NRF and could be 4 or 5 ft deep in some locations. And there is a large variety of nuclear facilities and numerous potential vulnerabilities. Even if a significant radiological release did not occur, the storage and repackaging costs could be considerable. Stainless steel, for example, when exposed to chlorides in ground water can experience through-wall cracking within two decades.*

**Q: What radiological monitoring confirms IWTU airborne emission levels? When and where is it reported?**

Response: The IWTU has a stack emissions sampling system installed that is online during plant waste treatment operations which complies with NESHAP (40 CFR 61.93 [c]) and conforms to the ANSI 99 standards. The sample data is reported annually to DOE by the operating contractor and included in the Idaho National Laboratory (INL) National Emission Standards for Hazardous Air Pollutants (NESHAP) Annual Report for Radionuclides.

*My response to DOE’s response: The monitoring of ITWU airborne emissions is spotty and reporting is untimely and unreliable based on my experience with DOE monitoring of effluents.*

**Q: Regarding Test Area North “pump and treat” conducted since about 2000 – What report(s) would document radiological airborne and return water monitoring results? CERCLA, USGS, etc. Report numbers.**

Response: New Pump and Treat Facility (NPTF) operations started in October 2001. In accordance with the Operations and Maintenance Plan for OU 1-07B TAN Groundwater Remediation (DOE/ID-11558, Table 1) no emission testing is required because the worst-case air emissions for NPTF and the Air Stripper Treatment Unit (ASTU) were determined to be well below standards for VOCs and radionuclides per an air emissions analysis performed for NPTF and ASTU (EDF-9474). The noted data from Table 1 is included below.

The return water monitoring results are reported in the Annual Report for the Final Groundwater Remediation, Test Area North, Operable Unit 1-07B. The results are included in Section 3 (PUMP and Treat) in the more recent reports. For FY 2023 the Report number is DOE/ID-12096, for FY 2022 the Report number is DOE/ID-12083, and previous report numbers can be found in the citations.

These annual reports are also available on the Administrative Record/Information Repository. (ARIR Home - ARIR (idahoenvironmental.com)).

Table 1 of DOE response:

Requirement	ARAR Type	ISB	ASTU	NPTF	Comments
Clean Air Act and Idaho Air Regulation					
Idaho Air Pollution – noncarcinogens (IDAPA 58.01.585)	Chemical specific	NA	A	A	These regulations address air pollution emissions from the air strippers. Worse-case air emissions from the NPTF and ASTU are expected to be well below these standards, therefore, <b>no air sampling for VOCs is required</b> (EDF-9474).
Idaho Air Pollutants – carcinogens (IDAPA 58.01.586)					
NESHAP - <10 mrem/yr (40 CFR 61.92)	Chemical specific	NA	A	A	Thresholds are less than 10 mrem/yr for releases from the INL Site to the public (40 CFR 61.92) and 0.1 mrem/yr radionuclide emissions for continuous monitoring (40 CFR 61.93). The calculated worst-case radionuclide emission from NPTF and ASTU – based on the historical maximum concentration – is more than six orders of magnitude less
NESHAP – monitoring (40 CFR 61.3)		NA	A	A	

					than the threshold that would require monitoring (EDF-9474). Therefore, no air sampling for radionuclides is required.
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*My response to DOE’s response: Since no sampling was required and no sampling was conducted and since 10 rem/yr would be an enormous amount of internal radiation that the health harm is not correctly predicted, I can conclude that it’s been a shit show of chemical and radiological airborne emissions from TAN.*

**Q: Regarding Test Area North monitoring of the aquifer down gradient from the contaminated plumes – What report(s) document the VOC and radiological monitoring? (i.e. within 30 miles)**

Response: The TAN annual reports addressed in the response above contain information on the VOC and radionuclide monitoring of contaminants from the TAN site. Radionuclide contamination occurs mainly around the TSF-05 injection well. Wells outside of this radionuclide plume are monitored to ensure concentrations are non-detect and that the plume is not expanding. If the plume does show expansion, wells will be added to the sampling plan to provide continued information on the plume. For the TCE contamination, wells at the southern extent of the plume are used to monitor TCE concentrations to ensure they are decreasing to below the MCL. In FY 2023, TCE was not detected in wells below the 5µg/L contour of the plume, as shown in DOE/ID-12096.

One of the wells below the plume (TAN-56) is a FLUTE well which allows different depths to be sampled, no TCE has been detected above the detection limit in any of the different depths within this well. The monitoring results are documented annually in the previously mentioned annual reports. The annual reports are available on the Administrative Record/Information Repository (ARIR Home - ARIR (idahoenvironmental.com)).

Additionally, downgradient monitoring is performed at and around ATR, INTEC, CFA, and RWMC. Groundwater monitoring is also performed along the southern boundary of the INL as part of the OU 10-08 groundwater monitoring plan. These monitoring events are focused on the contaminants associated with the specific facility. Although monitoring for VOCs is performed at CFA, RWMC and the OU 10-08 groundwater monitoring, these are associated with facility specific concerns rather than potential migration of contaminants from TAN. As noted in the OU 10-08 monitoring plan, groundwater contaminants from TAN are not anticipated to comingle with the down gradient contaminants at other facilities. As with the TAN annual reports, all groundwater monitoring reports are available on the Administrative Record/Information Repository (ARIR Home – ARIR (idahoenvironmental.com)).

*My response to DOE’s response: When contaminants are detected in the aquifer, the contaminants flow in the aquifer downgradient. When those contaminants have a long half-life,*

*they are diluted as they flow but the contamination is just spread out, as in “dilution is the solution to pollution.”*

**Q: The USGS well monitoring at INL seems to be shrinking. Please explain changes/trends in USGS funding levels over the last 25 years. (For INL and SE Idaho.)**

Response: The USGS water quality monitoring program at the INL has been consistently fully funded by the DOE-Idaho Operations Office over the last 25 years. Funding provided by the Department allows the monitoring program to be consistent and effective. While USGS has sampled 429 wells on and around the INL over the period of record (1949-present), the network of wells that makeup the monitoring program has historically been 200 wells. An optimization of the monitoring network was completed in 2021 to reduce well monitoring redundancy while retaining sufficient data to reliably characterize water-quality conditions in the aquifer. This reduced USGS’s monitoring network from 200 wells to 155 wells analyzed annually. While the monitoring network may be shifting to a more efficient network presentation, the effectiveness of the program remains the same. The analysis tools and techniques USGS is employing continue to push the state-of-the science within the USGS.

*My response to DOE’s response: USGS funding and coverage has been decreasing and the state-of-the-coverup of Snake River Plain aquifer contamination on the INL and downgradient of the INL won’t be disclosed.*

**Q: Was the ~\$3 plus million dollars of SEP money that was given to IDWR given in order to make up for USGS shrinkage? What benefit is the SEP money to IDWR? It seems like an inappropriate SEP grant.**

Response: No, the SEPs awarded to the Idaho Department of Water Resources allow for hydrogeologic investigation of the Snake River Plain Aquifer to achieve IDWR mission scope. The Idaho Department of Environmental Quality reviews and approves all SEPs. These SEPs met the requirements of the DEQ Policy and were determined to meet the key characteristics and categories of the Policy.

*My response to DOE’s response: In other words, the SEP money giveaways that benefited mining companies is the Idaho DEQs doing.*

#### ***Articles by Tami Thatcher for August 2024.***

*Thatcher has a Bachelor of Science degree in Mechanical Engineering and worked as an Advisory Engineer for a Department of Energy contractor, specializing in nuclear facility probabilistic risk assessment and safety analysis. For over a decade, she has studied and written about nuclear energy accidents and risks, Department of Energy nuclear facility accidents and risks, environmental contamination around the Idaho National Laboratory, radiation protection issues for workers and the public, INL legacy cleanup issues, and spent nuclear fuel and high-level waste storage and disposal issues.*

*This newsletter was edited and reposted on August 7, 2024 for minor editing and for clarity.*