

April 15, 2013

EPA has issued new Protective Action Guides (PAGs) for dealing with radioactive releases. The new PAGs are much worse than the extremely weak PAGs Bush tried to push out in the last days of that Administration which Obama pulled back. Although EPA is supposedly taking comments on these PAGs, *they are effective immediately.*

Additionally, the National Council on Radiation Protection and Measurements (NCRP) has published a report http://www.ncrponline.org/Docs_in_Review/NCRPM1302.pdf serving as draft guidance for implementing the long-term cleanup portions of the PAGs. The NCRP guidance would allow the public to be exposed to extraordinarily higher levels of radiation than previously permitted.

1. The PAGs eliminate the existing requirements from the 1992 PAGs triggering evacuation when thyroid or skin doses exceed specified limits.
2. The PAGs eliminate the existing relocation level of 5 rem (5000 millirems or 50 mSv) cumulative dose over 50 years, saying it might conflict with their long-term cleanup approach, which in the new associated guidance from NCRP would allow cumulative 50-year doses of 100 rem, twenty-fold higher. Even thirty years exposure at the 2 rem (2000 millirems or 20 mSv)/year figure would, by EPA's own official risk estimates, result in an excess cancer in every eighth person exposed; orders of magnitude higher risk than EPA has ever considered acceptable.
3. The PAGs say the Safe Drinking Water Act Maximum Contaminant Limits (MCLs) may not be appropriate and propose five alternatives far more lax (they do this in footnotes!). Those proposed weaker limits would allow concentrations of radionuclides in drinking water orders of magnitude higher than allowed by EPA under the Safe Drinking Water Act. See tables below prepared by Dan Hirsch comparing the new proposed drinking water PAGs with existing Safe Drinking Water limits for four key radionuclides.

Obama Drinking Water PAG proposals vs. Existing EPA Safe Drinking Water Levels and Bush Administration PAG Proposal
units = Bq/L

Radionuclide	EPA Safe Drinking Water Act Maximum Contaminant Limit (MCL)	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water Page Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water PAG Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water PAG Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	0.111	314	314	3000	170	10	300
Strontium-90	0.296	246	246	200	160	10	
Cesium-137	7.4	503	503	2000	1200	10	
Plutonium-239	0.555	27	27	50	2	1	

Factors by Which Obama Drinking Water PAG Proposals Would Exceed Existing EPA Safe Drinking Water Levels

Radionuclide	Bush Proposed Drinking Water PAG	Obama Proposed Drinking Water Page Alternative I (EPA 2013 fn 26)	Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)	Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)	Obama Proposed Drinking Water Alternative IV (EPA 2013 PAG fn 24a)	Obama Proposed Drinking Water Alternative V (EPA 2013 PAG fn 24b)
Iodine-131	2829	2829	27027	1532	90	2703
Strontium-90	828	828	676	541	34	
Cesium-137	68	68	270	162	1.35	
Plutonium-239	49	49	90	3.6	1.8	

The new PAG proposals are frequently as bad as the Bush water PAG proposal and in some cases worse. Generally, they are proposing allowing hundreds to tens of thousands of times higher concentrations of radioactivity in drinking water than EPA has historically allowed under the Safe Drinking Water Act. Internal EPA review of the earlier proposal complained that it would in some cases allow concentrations of radioactivity in drinking water so high that drinking one glass would provide a lifetime's permissible exposure under current safe drinking water standards. http://www.peer.org/assets/docs/epa/4_5_10_Radionuclide_Tables.pdf

4. The PAGs incorporate 1998 Food and Drug Administration (FDA) guidance allowing extremely high contamination of food, despite internal EPA criticism of doing so which said it would produce a cancer in every fiftieth person so exposed. http://www.peer.org/assets/docs/epa/4_5_10_OSRTI_Comments.pdf

5. The EPA 2013 PAGs incorporate the Department of Homeland Security (DHS) PAGs for dealing with long-term cleanup from a nuclear weapons explosion and apply it to any kind of release. The DHS PAGs are based on "optimization" and contemplated permitting long-term doses as high as *several rem per year*. The new EPA PAGs are also tied to the NCRP new guidance which would allow cleanup levels of 0.1 to 2 rem (100 to 2000 millirems or 1 to 20 mSv) per year over a lifetime (the equivalent of about 1000 extra chest Xrays every year, or 3 Xrays every day of your life from birth to death). EPA's estimate of a 70-year lifetime exposure at 2 rem per year is that **1 in every 6 people** exposed would get a cancer (the risk coefficient they use is different for exposure over a lifetime than for earlier years because of the elevated risk at younger ages.)* Even at the 0.1 lower end of possible cleanup levels, the risk would be 1 cancer for every 123 people exposed. EPA historically has required cleanup sufficient to prevent exposure to contaminants outside a risk range of one in a million to one in ten thousand; these new recommendations would permit risks orders of magnitude higher.

6. The associated NCRP guidance on implementing the PAGs for long term cleanup recommends radionuclide concentration levels so high that they would allow concentrations at the 2000 millirem/year level for strontium-90, for example, that are a hundred thousand times higher than the EPA's official Preliminary Remediation Goals for the same exposure scenarios. Those concentrations would produce cancer risks, using EPA's risk figures, of several cancers per ten people exposed, orders of magnitude outside the long-held acceptable risk range.

7. In essence, the PAGs and the documents associated with them are saying nuclear power accidents could be so widespread and produce such immense radiation levels that the government would simply abandon most cleanup obligations and force people to live with exposures so high that extremely large fractions of the exposed population would get cancer from the exposure.

8. Troubling in a different fashion, by trying to bury the bad stuff in footnote references to a whole series of other documents so it is hard for a lay reader to see the troubling things they have done, they have made the PAG manual itself essentially useless in a real accident. It was supposed to be a stand-alone, clear document that a first-responder could take off the shelf, look up a table in it, see if a radiation level exceeded a PAG and if so undertake the protective action described therein. But all of that is now removed from the PAG document. Instead, there are footnotes to URLs for numerous referenced documents, most of which are contradictory, that the PAG says "may" be useful in providing some guidance. Furthermore, EPA is statutorily mandated to produce the PAGs and other radiation guidance for the rest of the federal family and historically has viewed DOE and NRC as not sufficiently protective in radiation matters.

The PAG now abdicates EPA's responsibility to come up with guidance to protect the public from ionizing radiation and instead references, almost exclusively, documents from the nuclear promoter Department of Energy (DOE) that EPA has historically opposed. For example, it now directs the use of DOE's Operational Guidance document which uses cleanup concentrations hundreds of thousands of times higher than EPA's official concentrations. Rather than use its own conversions from concentration to risk, EPA now defaults to DOE's models, documents, and values with which it has long disagreed as technically not defensible and not sufficiently protective.

But at the end of the day, no emergency responder will have a Protective Action Guide that is useable. And if it were used, however, it would allow doses to the public so far outside the range ever considered acceptable as to be deeply disturbing.

* Radiation Risk Calculations:

EPA Blue Book <http://epa.gov/radiation/docs/bluebook/bbfinalversion.pdf> **EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population** is EPA's most up-to-date official estimate of cancer risk per unit dose, based largely on the National Academy of Sciences' Report on the Biological Effects of Ionizing Radiation (BEIR VII). The risk from ionizing radiation, which incorporates a Dose and Dose Rate Effectiveness Factor (DDREF) at "low" doses over long times, is 1.16×10^{-3} cancers per person-rem (1.16×10^{-1} cancers per gray). Approximately 1 in 1000 people exposed to a rem will get cancer. See p. iv. This is age-averaged. BEIR VII's figure was almost identical-- 1.14×10^{-3} cancers per person-rem.

Risk per unit dose of exposure for the first thirty years derived from the EPA report as about 2×10^{-3} per rem because of the increased sensitivity at earlier ages.

Therefore,

2 rem per year over 70 year lifetime = $2 \times 70 \times 1.16 \times 10^{-3} = 1$ cancer per every 6th person exposed (i.e., cancers produced above and beyond the number that would occur if there had been no exposure.)

2 rem year over 30 years (1st 30 years) = $2 \times 30 \times 2 \times 10^{-3} = 1$ cancer per every 8th person exposed.

0.1 rem per year over 70 year lifetime = $0.1 \text{ rem/yr} \times 70 \text{ years} \times 1.16 \times 10^{-3} = 1$ cancer in every 123rd person.

0.1 rem per year over 1st 30 years = $0.1 \times 30 \times 2 \times 10^{-3} = 1$ cancer in every 167 persons exposed.

The normal acceptable EPA risk range has always been 1 cancer per 1,000,000 people exposed, to 1 in 10,000, with the goal being the lower number. Thus the 'optimization' range in the NCRP report would be orders of magnitude outside that acceptable range. At the 2000 millirem/year level, we are talking risks a thousand to a hundred thousand times higher than EPA normally allows at the most contaminated sites in the country.

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