

The Honorable Gina McCarthy  
Assistant Administrator for Air and Radiation  
and Administrator-Nominee

The Honorable Bob Perciasepe  
Deputy Administrator and Acting Administrator  
U.S. Environmental Protection Agency  
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[a-and-r-docket@epa.gov](mailto:a-and-r-docket@epa.gov); Docket ID No. EPA-HQ-OAR-2007-0268;  
[www.regulations.gov](http://www.regulations.gov); Fax (202) 566-1741

Re: Protective Action Guides for Radionuclides  
(Docket ID No. EPA–HQ–OAR–2007–0268)

Dear Acting Administrator Perciasepe and Assistant Administrator McCarthy:

We write to express our concern about and opposition to key aspects of the revised Protective Action Guides (PAGs) for responding to releases of radioactivity. PAGs identify radiation doses that are to trigger actions to protect the public so as to avoid public exposures in excess of those doses. As such, the PAGs are critical for public protection; weak PAGs can significantly endanger the public.

On 15 April 2013 the Agency published in the *Federal Register* a request for public comment on the proposed PAG revisions. 78 FR 22257-60. Simultaneously, however, EPA made the new PAGs immediately effective, raising questions about whether the public comment opportunity is *pro forma* or serious.

Nonetheless, we respectfully submit this delineation of significant problems in the PAGs. Many of our organizations opposed efforts by EPA in the last days of the George W. Bush Administration to issue PAGs that would have substantially weakened radiation protections for the public by, for example, increasing dramatically the amount of radioactivity permitted in drinking water and in soil. We were gratified when the Obama Administration in its first days in office withdrew the Bush-era PAG proposal and promised a thorough review.

The current Obama PAGs now issued are in many respects as troubling as the Bush proposal, and in some particulars, even weaker in terms of public health protection. Some cosmetic changes have been made—e.g. vaguer language is used which may have the same disturbing effect. But at their core, rather than specifying protective actions to prevent public

exposures, the PAGs would allow massive radiation exposures without any protective actions being recommended to limit them. We recommend the PAGs be withdrawn.

Our primary concerns are: (1) the proposal to allow, for one to several years after a release, radioactive contamination of drinking water at levels orders of magnitude above EPA's longstanding Safe Drinking Water Act (SDWA) limits, (2) language contemplating long-term cleanup standards vastly less protective than EPA's historically acceptable risk range, (3) the elimination of relocation PAGs for high thyroid and skin doses and for high projected cumulative whole body doses, (4) the recommendation to permit radioactive waste to be disposed of in unlicensed disposal sites, including regular municipal garbage dumps, (5) the inappropriate expansion of the PAGs to cover essentially all radioactive releases, from the most extraordinary (e.g. nuclear weapons explosions) to those far less consequential (e.g. transportation accidents involving relatively small amounts of radioactivity), (6) relying on PAG dose limits as high or higher than those in effect decades ago despite the fact that official estimates of cancer risks from radiation have increased significantly over that period, and (7) apparently un-reviewed retention of archaic and extremely high FDA food contamination guidelines.

## Background

During the George W. Bush Administration, the Department of Homeland Security (DHS) issued PAGs for responding to the use by a terrorist group of an Improvised Nuclear Device (IND) or a "dirty bomb," a Radiological Dispersal Device (RDD). The DHS PAGs were very controversial. Many of us joined in critical comments.<sup>1</sup>

The DHS PAGs recommended not setting any standard for long-term cleanup but rather adopted a vague process called "optimization" in which the economic interest in not spending money on cleanup could outweigh the public health need to do so. No health-based standard would be established in advance in the PAGs, so decisions about how much to clean up would be made after the fact, selecting from various contradictory "benchmarks" from national or international advisory committees. Those entities are often heavily dominated by nuclear interests and have pressed for not requiring cleanup until doses reach extraordinary levels.

Among the benchmarks considered were *to not undertake cleanup* if the dose to the public were less than 1 rem (1000 mrem) per year (the equivalent of approximately 15,000 chest X-rays over thirty years) and *to only require cleanup over 10 rem per year* (roughly 150,000 chest X-rays over the same period), with discretion to not undertake cleanup when exposures are between those two doses.<sup>2</sup> According to the EPA's own current risk estimates per unit dose in its most recent "Blue Book,"<sup>3</sup> derived from the National Academy of Sciences' Report on the

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<sup>1</sup> See, e.g., group comment letter of 14 April 2006 and letters to then-EPA Administrator Leavitt of 2 December 2004 and 27 January 2005, attachments found, beginning at pg. 155, at <http://committeetobridgethegap.org/wp-content/uploads/2013/04/080509LetterToEPAbr5.pdf> and incorporated herein by reference.

<sup>2</sup> The adult dose from a PA (posterioranterior or front) view chest X-ray is typically 2 millirem.

<sup>3</sup> *EPA Radiogenic Cancer Risk Models and Projections for the U.S. Population*, EPA 402-R-11-001, April 2011.

Biological Effects of Ionizing Radiation (BEIR VII), 1 rem per year over the first thirty years of life would result in an excess cancer in every 17<sup>th</sup> person exposed.<sup>4</sup> At 10 rem/year, EPA's own estimate is that one in every 1.7 people exposed would get a cancer from the radiation.<sup>5</sup> Allowing such high numbers of cancers to be produced from exposure to contamination would obviously be orders of magnitude beyond risks EPA has ever considered acceptable.

The DHS PAGs also recommended allowing radioactive contamination of drinking water at levels far higher than the SDWA allows.<sup>6</sup> Despite the substantial public opposition, the Bush Administration adopted the DHS PAGs.

Subsequent to the issuance of the DHS PAGs, EPA attempted to extend these weakened standards from terrorist events to non-terrorist events and indeed, to all radiological releases. In the EPA proposed PAGs, "optimization" was included for long-term cleanup and actual radionuclide concentrations were put forward for drinking water. Those drinking water levels were orders of magnitude higher than EPA's Safe Drinking Water Act. For some radionuclides, EPA was proposing to allow people to drink water contaminated to such a high level that drinking a single small glass would exceed a lifetime permitted consumption under the SDWA, according to internal EPA analyses obtained under the Freedom of Information Act.<sup>7</sup> Independent analyses confirmed this, showing that the proposed drinking water levels were, depending on the radionuclide, hundreds, thousands, tens of thousands, and hundreds of thousands of times higher than the SDWA limits.<sup>8</sup>

The EPA PAGs that the outgoing Bush Administration tried to publish in its last days in office also would have adopted the deeply troubling DHS "optimization" process for long-term cleanup. Furthermore, the applicability of the PAGs would have been extended to *all* radioactive releases.

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The Blue Book sets the excess cancer risk at an age- and sex-averaged value of  $1.16 \times 10^{-1}$  per Gray, with the first 30 years of life the risk being approximately 1.8 times higher. EPA standard practice when one doesn't consider lifetime exposure is to presume exposure over the first 30 years of life for residential scenarios and over the first 40 years for farmer scenarios.

<sup>4</sup>  $1 \text{ rem/year} \times 30 \text{ years} \times 2 \times 10^{-3} \text{ cancers per rem during the first 30 years} = 6 \times 10^{-2} \text{ cancers} = 1 \text{ cancer per 17 people exposed.}$

<sup>5</sup> These are gender-averaged risk figures. Females are at even greater risk than males from the same levels of exposure meaning their risks are even higher than these estimates.

<sup>6</sup> The DHS PAGs recommended a high dose level for radiation from drinking water but did not provide specific concentrations for individual radionuclides.

<sup>7</sup> <http://www.peer.org/news/news-releases/2010/04/05/radiation-exposure-debate-rages-inside-epa/>

<sup>8</sup> See Hirsch and Marx, *Proposed Relaxation of EPA Drinking Water Standards for Radioactivity*, Committee to Bridge the Gap, October 2008, found as an attachment to the URL identified in footnote 1 above and incorporated herein by reference.

Recognizing the highly problematic aspects of these proposals by the outgoing Administration, the Obama Administration withdrew them and promised a full and careful review. We were thus hopeful that when new PAGs were released, they would be truly protective. We have been deeply disappointed.

1. The PAGs Propose Allowing Radioactive Contamination of Drinking Water That Would Be Orders of Magnitude Higher than EPA’s Longstanding Safe Drinking Water Act Limits

The Bush Administration PAGs presented a table of concentrations for specific radionuclides that it proposed would be allowed without requiring treatment or alternative water sources. These concentrations were grossly higher than the levels permitted under the SDWA. The furor they provoked contributed to the Obama Administration withdrawing the proposal.

However, rather than rejecting the Bush Administration approach, the new PAGs issued by EPA adopt a similar tack—proposing abandoning the SDWA requirements and replacing them with considerably higher values. But unlike the Bush PAGs, which expressly included a table of the extreme concentrations proposed for each radionuclide, the new PAGs bury the proposed alternatives in footnotes. (Footnotes 24-27 on p. 42). The actual values for the alternatives are not even included, only citations to other works. No comparison is provided whatsoever as to how much each of these proposed alternatives would weaken the protections in the SDWA.

We have thus undertaken that missing analysis. The results are striking and are summarized in the tables below. The first shows, for four key radionuclides, the EPA Safe Drinking Water Act limits (in becquerels per liter, bq/L) compared with the alternatives now proposed by EPA in the new PAGS, as well the values previously proposed by the Bush Administration. One sees the extraordinary weakening of protections EPA now proposes.

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 PAG 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	

The second table shows how many times more radioactivity would be permitted in drinking water under the various alternatives compared to the SDWA limits. The extraordinary degree to which EPA proposes increasing permissible concentrations of radionuclides in drinking water is also shown in graphs attached to this letter.

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

<b>Radionuclide</b>	<b>Bush Proposed Drinking Water PAG</b>	<b>Obama Proposed Drinking Water PAG Alternative I (EPA 2013 fn 26)</b>	<b>Obama Proposed Drinking Water PAG Alternative II (EPA 2013 PAG fn 25)</b>	<b>Obama Proposed Drinking Water PAG Alternative III (EPA 2013 PAG fn 27)</b>	<b>Obama Proposed Drinking Water PAG Alternative IV (EPA 2013 PAG fn 24a)</b>	<b>Obama Proposed Drinking Water PAG Alternative V (EPA 2013 PAG fn 24b)</b>
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	

It makes no sense to require people to drink water with, for example, more than 800 times the concentration of strontium-90 than the levels EPA has historically permitted, or thousands or even tens of thousands of times the permissible iodine-131 levels.<sup>9</sup> We oppose any weakening of drinking water standards for radioactivity. The SDWA limits should be complied with.

We note that the water PAGs are not designed for the immediate, early phase after a release, when actions to protect water supplies might arguably be difficult. Instead, the water PAGs are for the intermediate phase, after the emergency has passed, and are to be in place for one to several years after the emergency. Surely the position of EPA should be that drinking water for such a long period should be protected at levels EPA has deemed acceptable under the Safe Drinking Water Act.

Rather than proposing to force people to drink water contaminated at levels hundreds, thousands, or even tens of thousands of times higher than the EPA has historically considered acceptable under the Safe Drinking Water Act, the PAGs should instead do what they are supposed to do: provide protective action guidance for authorities on how to treat contaminated water or provide alternative drinking water supplies after the immediate emergency has passed. This is, of course, what EPA has historically done in the wake of other emergencies—arranged for treatment or alternative water supplies.

We recommend EPA abandon all efforts to set water PAGs that are weaker than the Safe Drinking Water Act limits, and instead, provide real, concrete guidance to authorities on how to safeguard water supplies so as to protect the public.

## 2. The PAGs Propose Dramatically Relaxing EPA’s Long-Term Cleanup Requirements

<sup>9</sup> EPA has tried to defend these proposals to dramatically increase allowable radioactivity concentrations in drinking water by asserting that the SDWA limits are “based” on a 70-year lifetime exposure. That is not really true. Under SDWA, drinking water is not to contain radionuclides at concentrations above the Maximum Contaminant Limit (MCL) averaged *over a year*. (Even were that not the case, most of the new values proposed are not seventy times higher than MCLs, but hundreds or thousands of times higher). Similarly, the claim that it is appropriate to allow far higher levels of a radionuclide like I-131 because it is relatively short-lived is misdirected. Under SDWA, as indicated above, one already can average the concentration over a year. There is no need to breach the SDWA.

EPA has historically required even the nation's most contaminated sites to be cleaned up to a level deemed protective, defined as within EPA's long-held acceptable risk range, which aims for a risk level of one in a million ( $10^{-6}$  risk) but allowing no more than one in 10,000 people exposed to get cancer (a  $10^{-4}$  risk) from that exposure. EPA has thus established Preliminary Remediation Goals (PRGs) for both radionuclides<sup>10</sup> and hazardous chemicals<sup>11</sup> and a flexible process by which, if unusual circumstances make reaching the PRGs difficult, less protective standards can be adopted so long as they are within the risk range. These risk levels have been accepted as reasonable for even huge, heavily contaminated Superfund sites (e.g. Hanford) that are half the size of a state, and thus should not be relaxed in the PAGs. The main reason for the reduction in protection is to save money and liability for industries and agencies that carry out practices that could result in large radioactive contamination, mainly the nuclear power industry and the atomic weapons fuel chain agencies and their contractors.

EPA now proposes in the PAGs that this long-followed protective approach and acceptable risk range be jettisoned and that extraordinarily higher concentrations of radionuclides be allowed to remain in soil for the long-term with no effort at cleanup. While not using the controversial term "optimization" from the Bush-era proposed PAGs, language in the PAGs could permit some to say that EPA now merely proposes optimization without calling it that. No risk-based cleanup standards for long-term cleanup would be established in the PAGs, even as a baseline, but rather a vague, undeveloped, makeshift process would be followed whereby cleanup standards would be established after the fact, based on factors other than public health. For example, the PAGs contemplate letting the desire of industry or federal agencies to not have to pay for cleaning up contamination they have created by a release override the public's need to be protected. This is unacceptable.

Just as EPA tried to relegate the proposed weakening of drinking water standards to footnotes, EPA also appears to be trying to weaken long-term cleanup standards by vague references to the DHS 2008 PAGs and by cooperating with an outside group with strong nuclear ties, the National Council on Radiation Protection and Measurements (NCRP) which recommends grossly weakened cleanup guidelines via an NCRP guidance document.

Especially troubling is the process by which EPA chose to pursue the path of weakening long-term protection of the public. For example, two EPA staffers from relevant EPA Offices<sup>12</sup> influential in developing the EPA PAGs participated in writing the NCRP guidance document which presses EPA to weaken, to an extraordinary degree, its long-term cleanup standards. This is significant because EPA staff from other Offices attempting to retain existing radiation

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<sup>10</sup> <http://epa-prgs.ornl.gov/radionuclides/>

<sup>11</sup> [http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/index.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm)  
These regional values are used nationally.

<sup>12</sup> John Edwards, head of the Office of Radiation and Indoor Air, and John Cardarelli from the Office of Emergency Management. EPA claims they participated with NCRP on their own but has not provided evidence that they took time off and that the activity was not approved by their superiors at EPA.



protection levels were not included on the NCRP team. This internal EPA conflict and the apparent conflict of interest in EPA staff participating at all in the private NCRP effort at pushing EPA to relax its cleanup goals, while representing only one side of the internal EPA debate, has been reported on in the media, pursued via Freedom of Information Act requests and a letter from Public Employees for Environmental Accountability to then-EPA Administrator Jackson<sup>13</sup> but EPA has failed to respond meaningfully.

The EPA PAGs DO NOT incorporate the full DHS PAGs on long-term cleanup, only a subsection dealing with general process matters about consultation (reprinted in section 4.1.6 of the EPA PAGs, pp. 55-59). The DHS PAGs sections on “optimization” and use of benchmarks for long-term cleanup are *not* included in the EPA PAGs. However, a single sentence elsewhere in the EPA PAGs (p. 4, para 4), mentions incorporation of guidance from DHS PAGs’ long-term cleanup section, presumably referring to the subsection that is inserted. This poorly crafted sentence, if not clarified, can create subsequent confusion as to whether EPA is incorporating all of the DHS PAGs on long-term cleanup or only the generally innocuous section that is in fact incorporated directly. Since the DHS PAGs are explicitly based on “optimization,” and the EPA PAGs are not, and since the DHS PAGs reference “benchmarks” from nuclear advocacy groups like ICRP, NCRP, and IAEA, which have pushed for “acceptable” long-term doses as high as 10 rem per year, with consequent cancer risks as high as 1 cancer per 2 people exposed, whereas the EPA PAGs do not, this potential confusion must be eliminated.

***EPA should remove any implication from its PAGs that it is incorporating the DHS PAGs’ “optimization” plan and contemplated use of “benchmarks.”*** We recommend that the sentence on p. 4 be rewritten to state, “This EPA Manual substantively incorporates in Section 4.1.6 (pp.55-59) a specific subsection of the late phase cleanup guidance provided in the 2008 DHS document and refers readers to additional planning resources.”

The NCRP report--which claims it is designed to provide guidance for both the DHS and EPA PAGs--recommends long-term cleanup standards of 100 to 2000 millirem per year (0.1 to 2 rem per year). That is the equivalent of 50 to 1000 chest X-rays annually, or one a week to three a day every day of one’s life for decades. By EPA’s own cancer risk estimates, 2 rem per year over a lifetime would result in an excess cancer in one in every six people exposed. Because of the increased risk in earlier years, EPA estimates that even just thirty years exposure from birth would result in a cancer in one in eight people exposed.<sup>14</sup> These risk levels are orders of magnitude higher than EPA’s long-accepted risk range.

Additionally, NCRP proposes specific levels of radionuclides that should be allowed to remain in soil and not cleaned up, with people exposed for decades to that radiation without protective actions having been undertaken. Those levels are extraordinarily higher than EPA’s Preliminary Remediation Goals (PRGs), or even the upper limit of EPA’s acceptable residual contamination (one hundred times the PRG). We have attached tables and figures showing the extreme exposures these proposals would produce compared to anything EPA has ever said in

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<sup>13</sup> <http://www.nti.org/gsn/article/epa-withholds-information-dirty-bomb-report-amid-cancer-concerns/>;  
[http://www.peer.org/assets/docs/epa/4\\_5\\_10\\_PEER\\_Radiation\\_ltr\\_to\\_EPA.pdf](http://www.peer.org/assets/docs/epa/4_5_10_PEER_Radiation_ltr_to_EPA.pdf)

<sup>14</sup> See footnote 3 above.

the past was acceptable. For some radionuclides, the NCRP proposed “acceptable” contamination levels would be hundreds of thousands or even millions of times higher than what EPA’s remediation goals are at the nation’s most contaminated sites, for the same exposure scenario.

We thus oppose the long-term cleanup section of the EPA PAG as written, and any potential linkage of the EPA PAG to DHS’ PAGs’ “optimization” process and/or to the NCRP recommendations or those of other bodies that push for increased radiation exposures of the public.<sup>15</sup> EPA should stick to its longstanding principles and require cleanup to its standards for the most contaminated sites in the country, CERCLA. In extraordinary circumstances, there are already provisions whereby one can make an exception if one absolutely has to, but even then one still aims to get as close to the CERCLA risk range as possible. The PAGs as written, however, suggest a concerted attack by proponents of weakening public protections, and this should not be allowed.

### 3. The Elimination Of Relocation PAGs For High Thyroid And Skin Doses And For High Projected Cumulative Whole Body Doses

EPA’s 1992 PAGs, which the current document revises, require relocation if thyroid or skin doses over certain specified limits are predicted. Again, it is important to remember that PAGs are doses that are to be *avoided* by protective actions. The new PAGs eliminate both requirements. We believe that is inadvisable.

EPA claims it is removing the skin and thyroid relocation PAGs to “avoid confusion.” This makes no sense. If predicted doses to the skin or thyroid are likely to be very large, one needs to be protecting people by getting them out of harm’s way. The fact that some people in some situations may have access to potassium iodide (KI) doesn’t obviate the need to relocate those who don’t. And KI does nothing to protect against skin cancer; its sole use is aimed at the thyroid.

Additionally, the longstanding PAGs require protective action to assure people do not get exposed to more than 5 rem over 50 years. This has been jettisoned as well. Obviously, if some within EPA are pushing to allow long-term doses as high as 2 rem per year over many decades (60 rem over 30 years, 140 rem over a lifetime), a 5 rem cumulative cap would prevent that. That apparently is behind their desire to eliminate the lifetime cap. The cap should remain and in fact be tightened considerably (see discussion in section 6 below).

### 4. The Recommendation to Permit Radioactive Waste To Be Disposed of In Unlicensed Disposal Sites, Including Regular Municipal Garbage Dumps

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<sup>15</sup> We incorporate herein by reference comments submitted on the NCRP recommendations, found at <http://committeetobridgethegap.org/wp-content/uploads/2013/04/ncrp-short-comments-from-multiple-groups.pdf> and <http://committeetobridgethegap.org/wp-content/uploads/2013/04/CBGNIRSPSRSCFS-updated.pdf>



Nuclear advocates have long pushed to deregulate significant portions of the radioactive waste stream and permit such wastes to be disposed of in sites neither licensed nor designed for radioactive materials, including municipal garbage dumps. This has largely been driven by a desire to cut safety corners so as to save money for industry and government.

The PAGs strongly push for elimination of the existing requirements that radioactive waste go to sites licensed and designed for radioactive waste. We oppose such an effort. Again, EPA seems intent on weakening protections. PAGs are supposed to be guides for *protective action*, not an effort to eliminate protections.

The section on waste disposal issues in Chapter 4 of the PAGs, *Guidance for the Late Phase*, appears to have been written with little or no historical knowledge about the widespread public opposition over past decades in the United States to proposals for deregulation, free release, clearance or below-regulatory-concern (BRC) designation of radioactive waste from both nuclear power and weapons facilities. The suggestion to allow nuclear waste into RCRA C and D Hazardous and Solid waste facilities is both cavalier and dangerous. Allowing the waste to go into and contaminate or poison commercial recycling has also been soundly rejected. We oppose sending nuclear waste to facilities that are not specifically licensed for radioactive materials, including but not limited to solid and hazardous landfills, incinerators, processors and recycling facilities.

Some of the reasons to keep nuclear waste out of facilities not specifically licensed for radioactive materials include inevitable leakage, the potential intermixing of radioactive materials with chelating and organic complexing agents that greatly enhance the migration of the radioactivity into groundwater and surface water, risk of fire in a landfill with both radioactive and regular wastes as is currently occurring at the West Lake landfill in Missouri, failure to consider the ability of RCRA facilities to isolate the wastes they are licensed to dispose, shorter institutional control periods, failure to inform and protect workers, and lack of detailed radiation monitoring of air, soil, and water. Recycling radioactively contaminated materials into the consumer metal supply rather than disposing of them in licensed radioactive sites is not acceptable.

EPA should have reviewed the public comments which clearly rejected their previous efforts<sup>16</sup> in the mid 1990's, 2001 and 2003 to allow nuclear waste into solid and hazardous facilities and into recycling to make consumer goods.

EPA gives lip-service to inclusivity in the PAGs, ignoring the reality that deregulating (or never requiring radioactive regulation) of nuclear waste from incidents and releases will disproportionately impact people of color and low income communities which is where the solid and hazardous waste facilities frequently are located and where new ones tend to get sited.

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<sup>16</sup>1996-1998 EPA consideration, publication and rejection of rules to legalize contaminating metal recycling with radioactive metal; 2001 66 Fed Reg 27218 May 16, 2001 to allow mixed waste to go to nuclear waste sites; 2003 ANPR 65120 68 Fed Reg 222, Nov 18, 2003 to consider "non-regulatory approaches" for radioactive waste management.

We encourage EPA, the other federal agencies and states to focus their efforts on *preventing* nuclear power incidents rather than pushing to relax cleanup and disposal safety requirements.

5. The Inappropriate Expansion of the PAGs to Cover Essentially All Radioactive Releases, from The Most Extraordinary (e.g. Nuclear Weapons Explosions) to Those Far Less Consequential (e.g. Small Transportation Accidents)

The DHS PAGs mixed the absolutely extraordinary event—detonation by a terrorist of a nuclear weapon in the U.S.—with vastly less consequential events involving “dirty bombs” of a range of sizes, including very small ones. It was inappropriate to suggest the same standards for such varying incidents. If a nuclear bomb explodes, all bets are off. If a small dirty bomb is detonated, normal response procedures and cleanup requirements can take care of it. By mixing the huge and the small and requiring the same lax standards, a disservice is being done.

EPA has now greatly compounded that problem by expanding its PAGs from dealing with a catastrophic release from a nuclear power plant meltdown to covering all radioactive releases, including such events as transportation accidents and incidents at radiopharmaceutical facilities.<sup>17</sup> Indeed, under the PAGs definition of its scope—dealing with any radioactive release for which a protective action may be required—it is hard to see what might not be covered or how CERCLA, which is EPA’s longstanding statutory program for dealing with such releases would still exist, despite *pro forma* language in the PAG to the contrary.

By creating a single set of standards to address both a Fukushima-type event and a truck carrying a shipment of medical isotopes that goes off the road, one creates a useless PAG and the prospect of greatly relaxed cleanup and protection standards for many events for which there is no question that current standards and response approaches under CERCLA are fully adequate. We oppose this effort to expand the PAGs to essentially encompass every radioactive release.

6. Relying on PAG Dose Limits As High As Or Higher Than Those In Effect Decades Ago Despite the Fact That Official Estimates of Cancer Risks from Radiation Have Increased Significantly Over That Period

In addition to eliminating some important dose triggers for protective action in the older PAGs, EPA carries forward old limits that have been in place for decades, despite EPA’s own official estimates of radiation risk per unit dose having markedly increased during that time. The updated official consensus is that radiation is considerably more harmful than was known when the earlier levels were established. EPA fails to improve protection based on the newer, higher risk, and in fact allows for reduced protection instead. For example, the 1992 PAG values incorporated into the newest PAG are based on the National Academy of Sciences’ BEIR III study (and in fact, go even far further back than that). But BEIR V increased those risk estimates three- or four-fold, and BEIR VII increase those an additional 35%. EPA has adopted those

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<sup>17</sup> EPA PAG Manual 2013, page 4 section 1.3.4 “This updated Manual applies PAGs and protective actions to an expanded range of sources of potential radiological releases, include commercial nuclear power facilities, uranium fuel cycle facilities, nuclear weapons facilities, transportation accidents, radiopharmaceutical manufacturer and users, space vehicle launch and reentry, RDDs and INDs.”

values in its most recent Blue Book. So, despite officially acknowledging that radiation is four or five times more dangerous than assumed when the 1992 PAGs were established, EPA now merely uses the same dose limits without any effort to tighten them by a factor of four or five.

We recommend that all parts of the PAGs that weaken or eliminate existing protections be abandoned, and all dose limits be tightened by at least the increased risk EPA now acknowledges for radiation.

#### 7.) The PAGs Incorporate Archaic and Extremely High FDA Food Contamination Guidelines, Apparently Without Updated Review.

EPA simply by reference incorporates old FDA guidelines for food contamination. These food radiation exposures would be on top of doses from other exposures (e.g., inhalation, groundshine) adding significantly to cumulative doses to the public. The old FDA guidelines are based on even older guidance, and none of the dose limits have been reduced over time to reflect the increased official risk estimates discussed above.

The old FDA guidance allows—from the food pathway alone—500 millirems exposure per year. This means that the food one eats each day would produce a radiation dose equivalent a chest X-ray every day. The FDA food guidance limits appears to have no time limit; food contaminated at these levels would be permitted to be consumed over a lifetime. At these dose levels, EPA's risk estimates indicate a lifetime risk of  $4 \times 10^{-2}$ , or every 25<sup>th</sup> person eating food contaminated at those levels getting a cancer from it. This is simply unacceptable, and EPA should reject any such proposed guidance. At minimum, if EPA really intends to accept such doses, it should be candid with the public and say that those “acceptable” levels, by its own estimate, would produce an excess cancer in 4% of the public. We think that would be a hard sell ethically, and EPA should thus rethink adoption of such extraordinarily lax protection levels.

### SUMMARY of RECOMMENDATIONS

We recommend the April 2013 draft PAGs be withdrawn.

We oppose any weakening of drinking water standards for radioactivity. The Safe Drinking Water Act limits should be complied with. The PAGs should do what they are supposed to do: provide protective action guidance for authorities on how to treat contaminated water or provide alternative drinking water supplies over the one to several years after the immediate emergency has passed. This is, of course, what EPA has historically done in the wake of other emergencies—arranged for treatment or alternative water supplies.

We recommend EPA abandon all efforts to set water PAGs that are weaker than the Safe Drinking Water Act limits, and instead, provide real, concrete guidance to authorities on how to safeguard water supplies so as to protect the public to those levels or better.

The PAGs contemplate letting the desire of nuclear industry and federal agencies to not have to pay for cleaning up contamination they have created by radioactive releases override the public's need to be protected. This is unacceptable.

EPA SHOULD REMOVE ANY IMPLICATION FROM ITS PAGs THAT IT IS INCORPORATING THE Department of Homeland Security PAGs “OPTIMIZATION” PLAN AND CONTEMPLATED USE OF “BENCHMARKS” THAT WOULD BE OUTSIDE EPA’S HISTORICAL ACCEPTABLE RISK RANGE.

We oppose the long-term cleanup section of the EPA PAG as written, and the potential linkage of the EPA PAG to DHS’ PAGs’ “optimization” process, and to the NCRP recommendations or those of other bodies that push for increased radiation exposures of the public. EPA should stick to its longstanding principles and require cleanup to its standards for the most contaminated sites in the country, CERCLA. The PAGs as written suggest a concerted attack by proponents of weakening public protections, and this should not be allowed.

Do not remove, but instead retain and strengthen, relocation PAGs for thyroid and skin doses.

Do not remove, in fact EPA should strengthen, the longstanding PAGs that require protective action to assure people do not get exposed to more than 5 rem over 50 years.

The outdated FDA food contamination guidelines should be replaced with markedly lower permissible concentrations of radioactivity in food.

We oppose sending nuclear waste to facilities that are not specifically licensed for radioactive materials including but not limited to solid and hazardous landfills, incinerators, processors and recycling facilities. We encourage EPA, the other federal agencies and states to focus on *preventing* nuclear power incidents rather than weakening protection of the public in case of such releases.

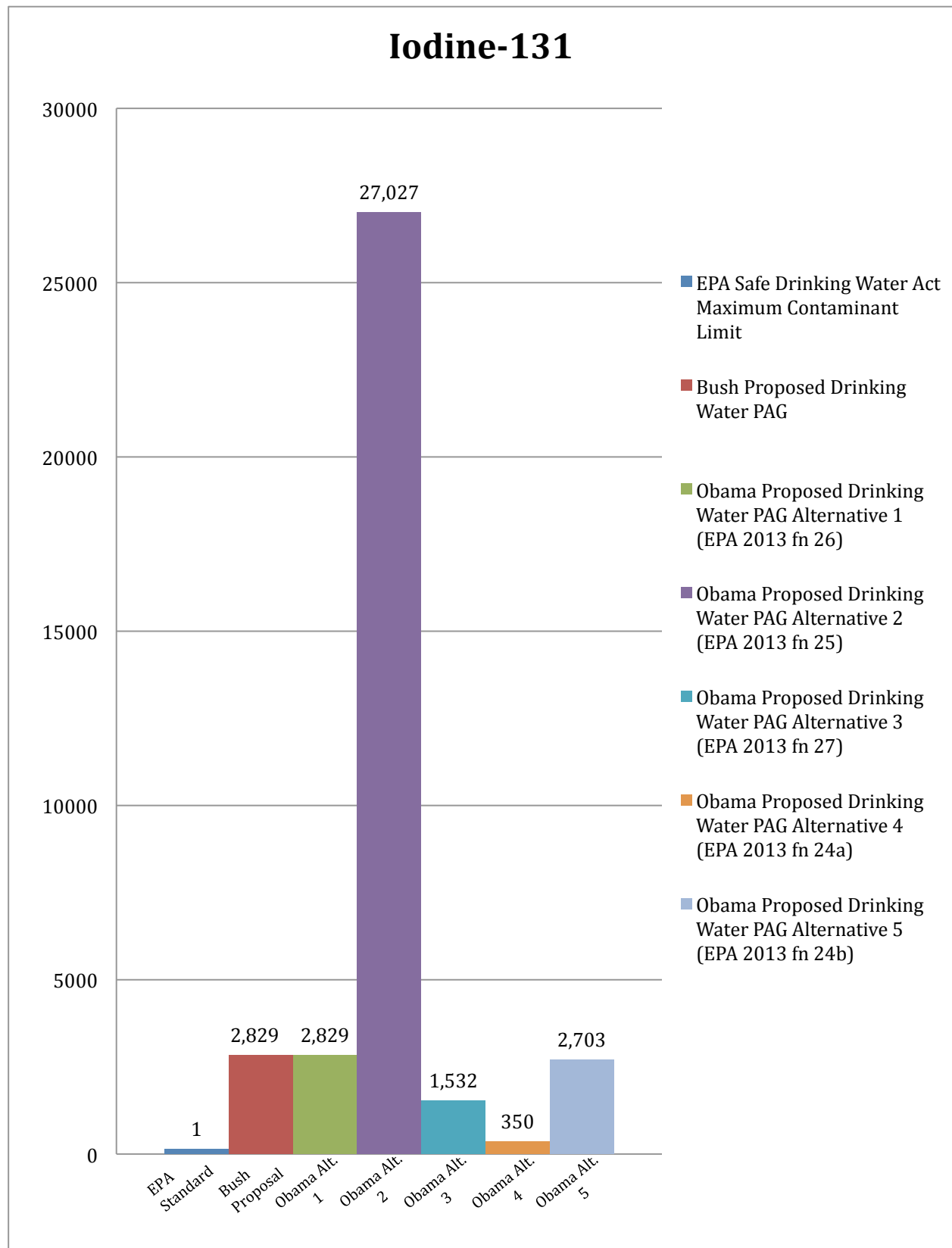
We oppose the effort to expand the PAGs to essentially encompass every radioactive release.

We recommend that all parts of the PAGs that weaken or eliminate existing protections be abandoned, and all dose limits be tightened by at least the increased risk EPA now acknowledges for radiation.

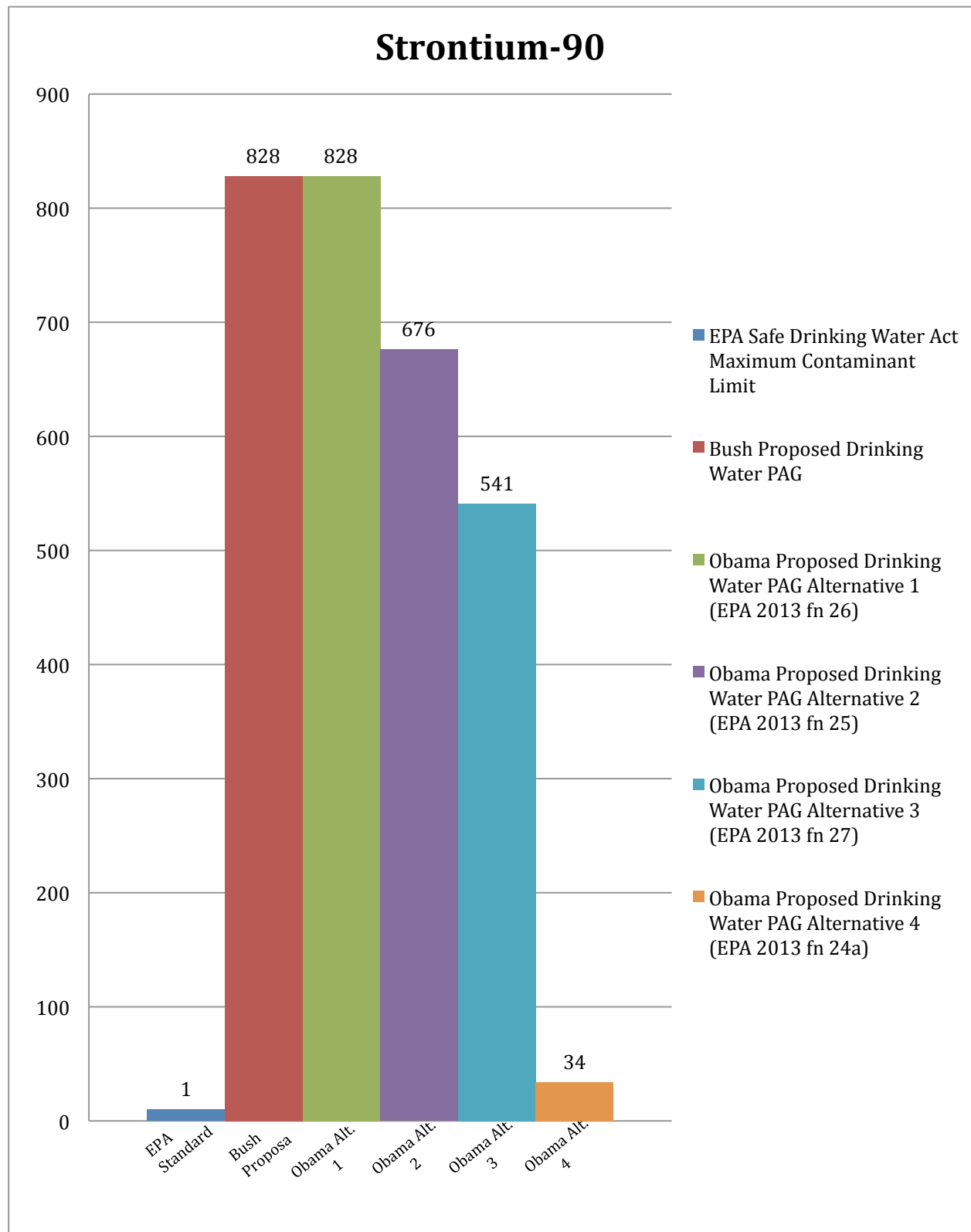
### Conclusion

Protective Action Guides are supposed to provide guidance for actions to protect the public from radiation. The current PAGs do the opposite—recommend grossly increased risks to the public without protection. We urge that the PAGs be withdrawn.

**Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted**

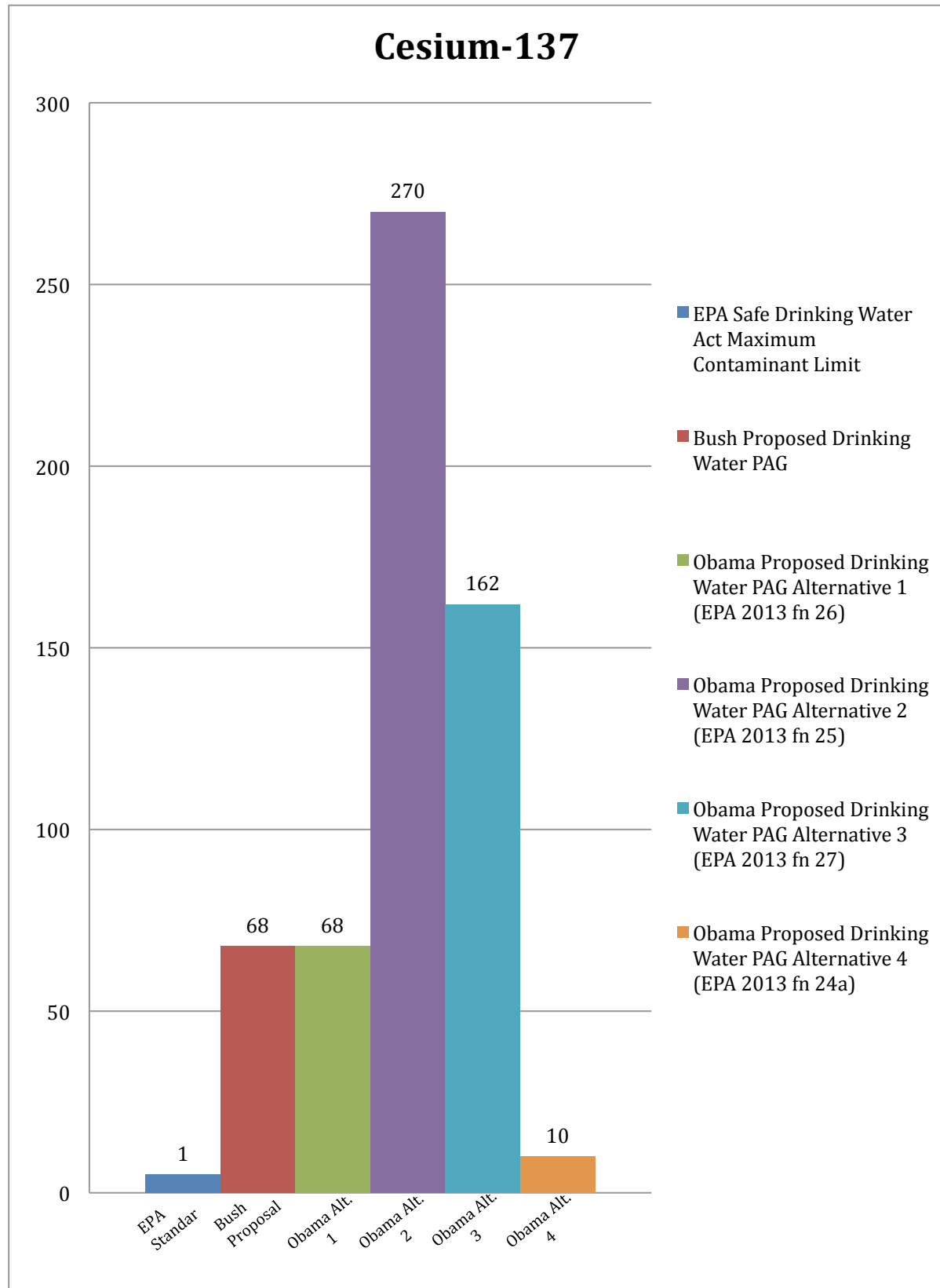


# Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted

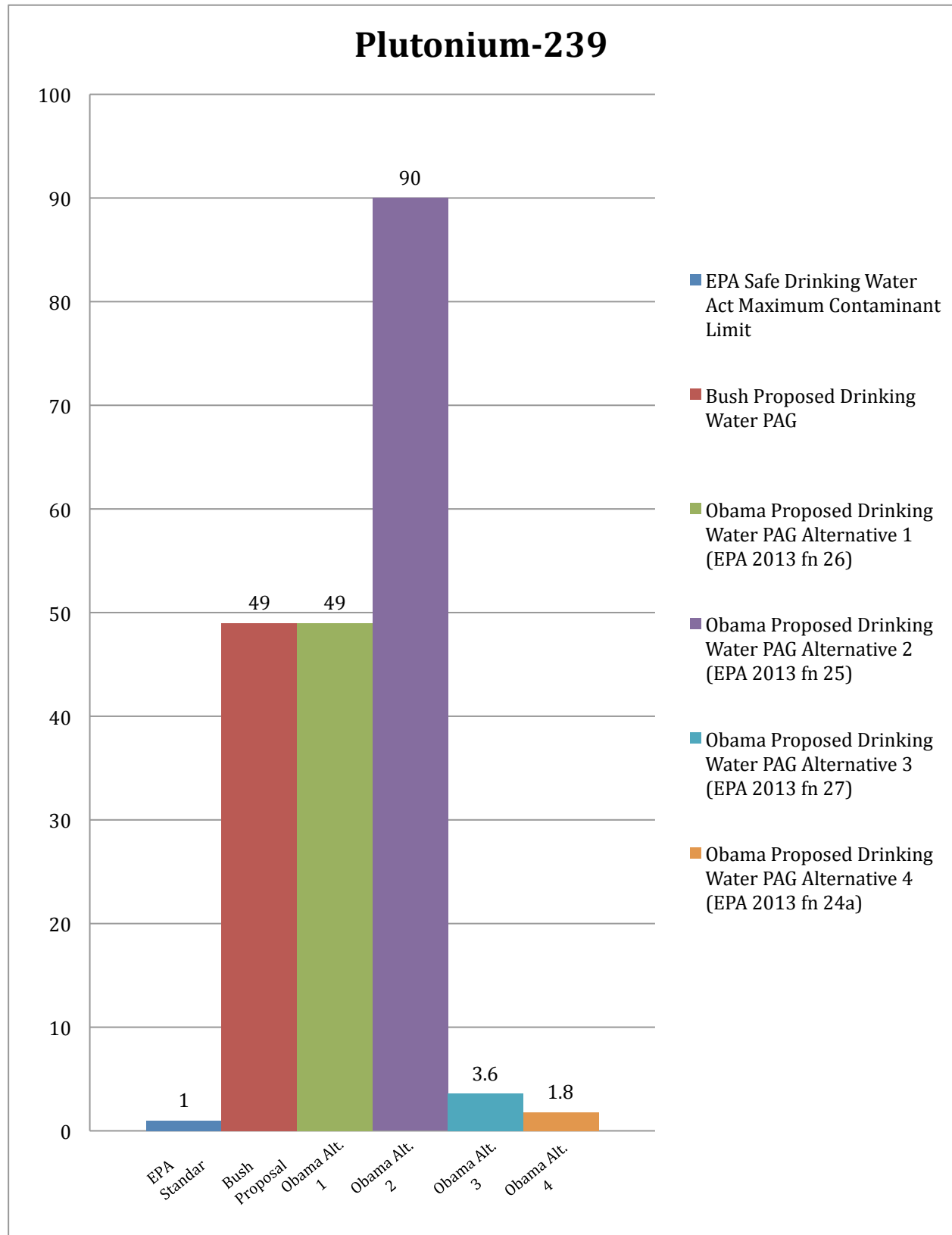




**Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted**

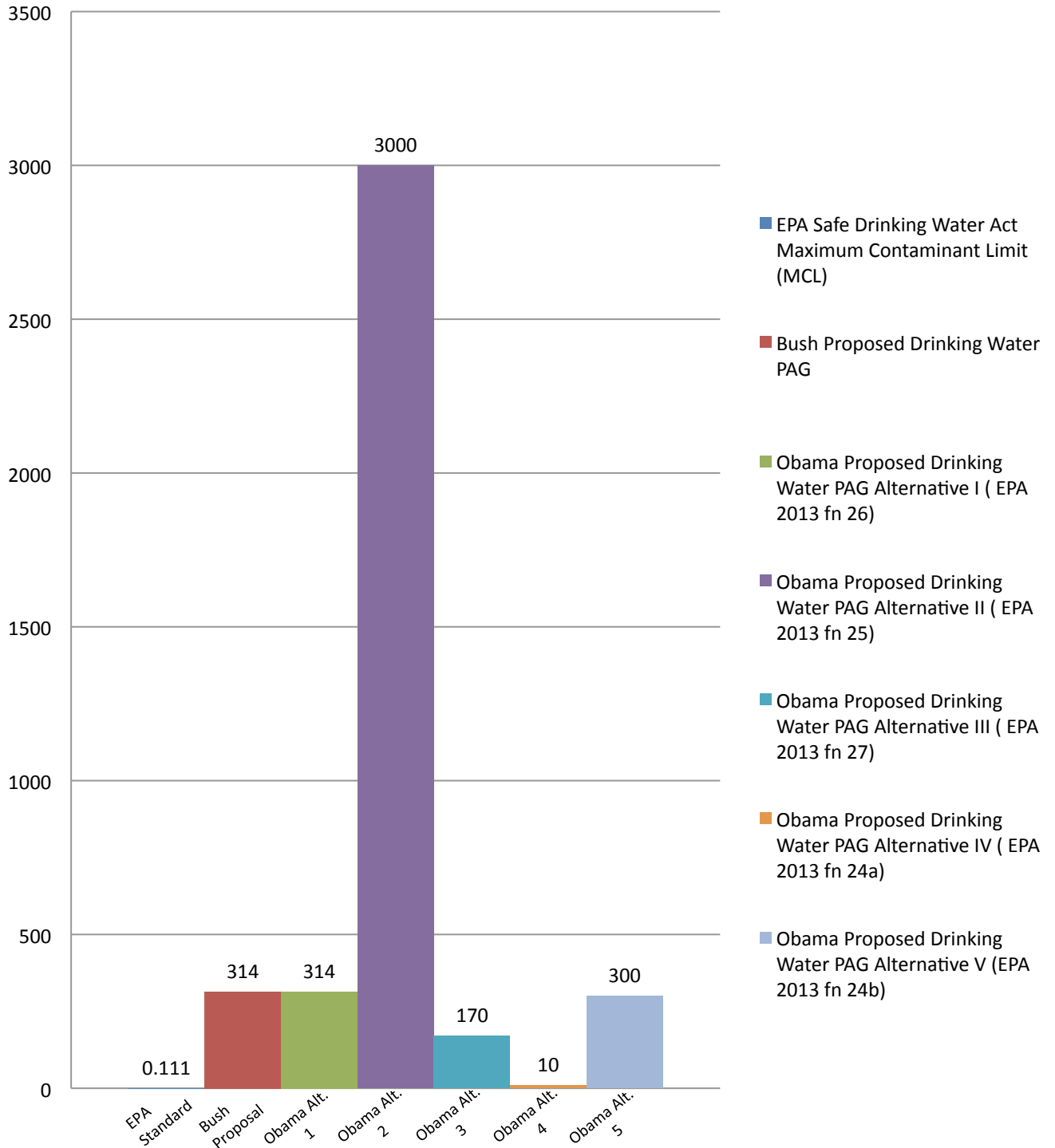


**Factors by Which Radionuclide Concentrations in Drinking Water Would Exceed EPA's Safe Drinking Water Act Levels if the Alternatives Identified in 2013 Proposed Protective Actions Guides Were Adopted**

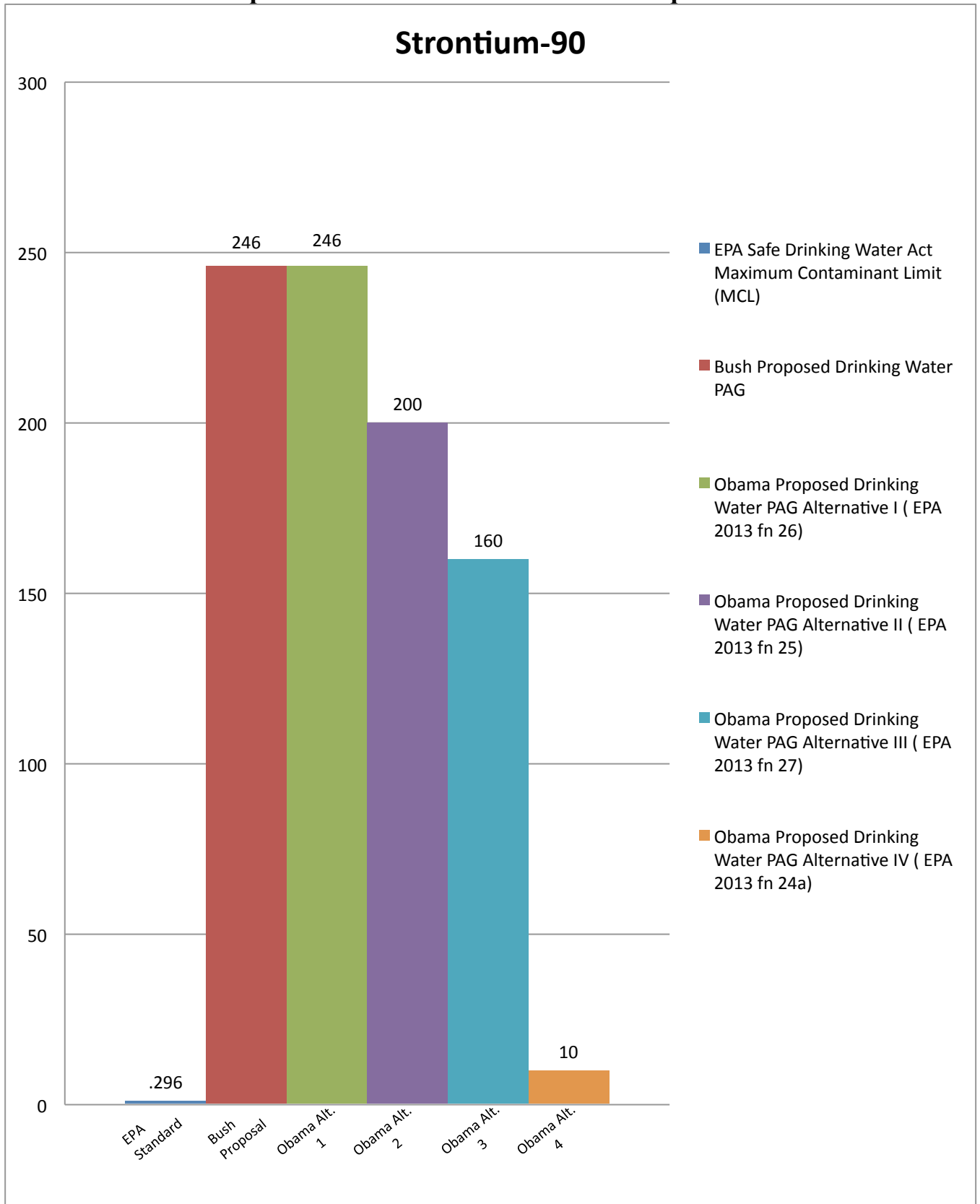


**Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides in Bq/L**

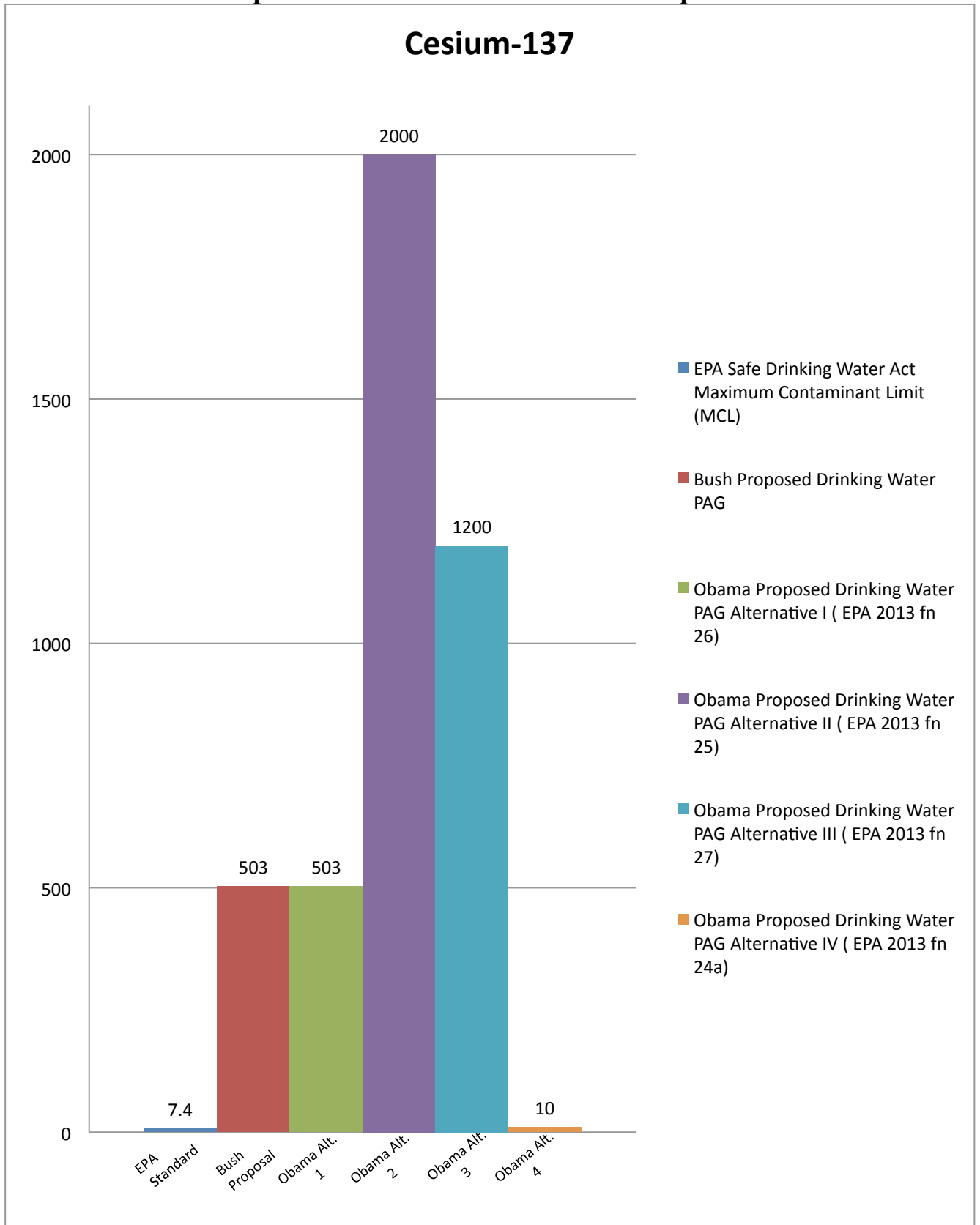
**Iodine-131**



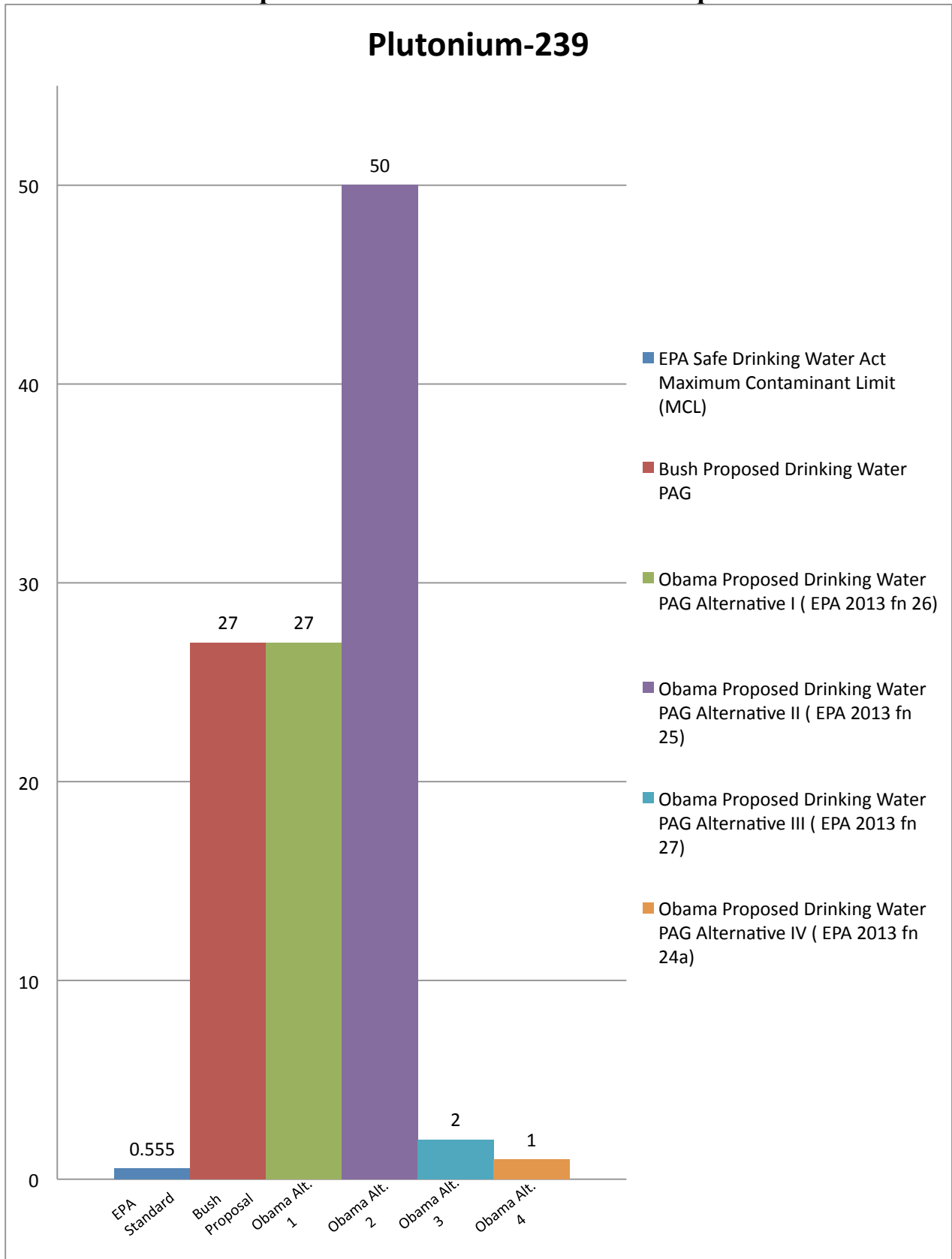
**Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides in Bq/L**



**Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides in Bq/L**



**Allowable Radionuclide Concentrations in Water Under the EPA's Safe Drinking Water Act Limits Compared with Alternatives Identified in Proposed Protective Action Guides in Bq/L**





## **NCRP is Proposing Cleanup Levels Hundreds of Thousands of Times Less Protective Than EPA's Preliminary Remediation Goals for the Nation's Most Contaminated Sites**

NCRP is proposing that cleanup standards for radioactive contamination be dramatically weakened compared to longstanding EPA cleanup standards (Preliminary Remediation Goals, or PRGs) used for the nation's most contaminated sites. Under the NCRP recommendation, people would be sent back to their homes, farms, and offices to live and work in contaminated settings with radioactive concentrations that could be as high as tens of millions of times higher than EPA's PRGs.

EPA requires cleanup to aim for the PRG, tied to a one in a million risk of cancer from the remaining contamination. In some circumstances, it will allow contamination to remain up to a one in ten thousand risk but no higher. Its acceptable risk range therefore is one in a million to one in ten thousand.

NCRP by contrast is recommending an acceptable range of 1 mSv/year of radiation to 20 mSv/yr. To put that in perspective, 20 mSv/year is the equivalent of 1000 chest Xrays a year, every year of your life, or 3 Xrays a day from birth to death. According to the National Academy of Sciences and EPA, 2 mSv/year over a lifetime would result in a cancer in every sixth person exposed. That is thus a thousand to a hundred thousand higher risk than EPA's longstanding acceptable risk range.

We have here compared the upper and lower ends of NCRP recommended cleanup range, 1 and 20 mSv/year, against EPA's PRGs for the same exposure scenarios—farmers and urban residents. The ratio of NCRP cleanup value to EPA's tells you how many times more contamination NCRP would allow to remain in place to expose people compared to EPA's goals for the nation's most contaminated sites.

Because EPA's PRGs are based on one in a million risk, one can readily estimate how much cancer risk EPA says each of those NCRP recommended contamination levels would produce. For example, strontium-90 at NCRP's 20 mSv/yr level and 95% confidence level would be 225,220 times as high as EPA's Preliminary Remediation Goal, and thus carry with it a cancer risk of 2 cancers per 10 people exposed—orders of magnitude higher risk than anything EPA has ever tolerated before.

**Comparison of NCRP Proposed Cleanup Values and EPA's Longstanding Preliminary Remediation Goals (PRGs)  
Farmer Scenario**

Radionuclide	NCRP Farmer @ 95% in Bq/g at 1 mSv/y	NCRP Farmer 50% in Bq/g at 1 mSv/y	EPA Farmer PRG in pCi/g	EPA Farmer PRG in Bq/g	Ratio NCRP Farmer @ 95% at 1 mSv / EPA PRG	Ratio NCRP Farmer @ 50% at 1 mSv / EPA PRG	Ratio NCRP Farmer at 95% @20mSv / EPA PRG	Ratio NCRP Farmer at 50% @20mSv / EPA PRG
Am-241	36	92	0.0137	0.0005069	71,020	181,495	1,420,400	3,629,900
Cf-252	1.9	3.2	0.101	0.003737	508	856	10,160	17,120
Cm-244	90	300	0.316	0.011692	7,698	25,659	153,960	513,180
Co-60	0.34	57	0.000918	0.000033966	10,010	1,678,149	200,200	33,562,980
Cs-137	1.4	2.3	0.00119	0.00004403	31,797	52,237	635,940	1,044,740
Ir-192	3.7	6.3	1.62	0.05994	62	105	1,240	2,100
Po-210	6.9	20	19.9	0.7363	9	27	180	540
Pu-238	41	160	0.00762	0.00028194	145,421	567,497	2,908,420	11,349,940
Pu-239	37	140	0.00635	0.00023495	157,480	595,871	3,149,600	11,917,420
Ra-226	0.06	0.099	0.000611	0.000022607	2,654	4,379	53,080	87,580
Sr-90	1.1	9.3	0.00136	0.00005032	21,860	184,817	437,200	3,696,340

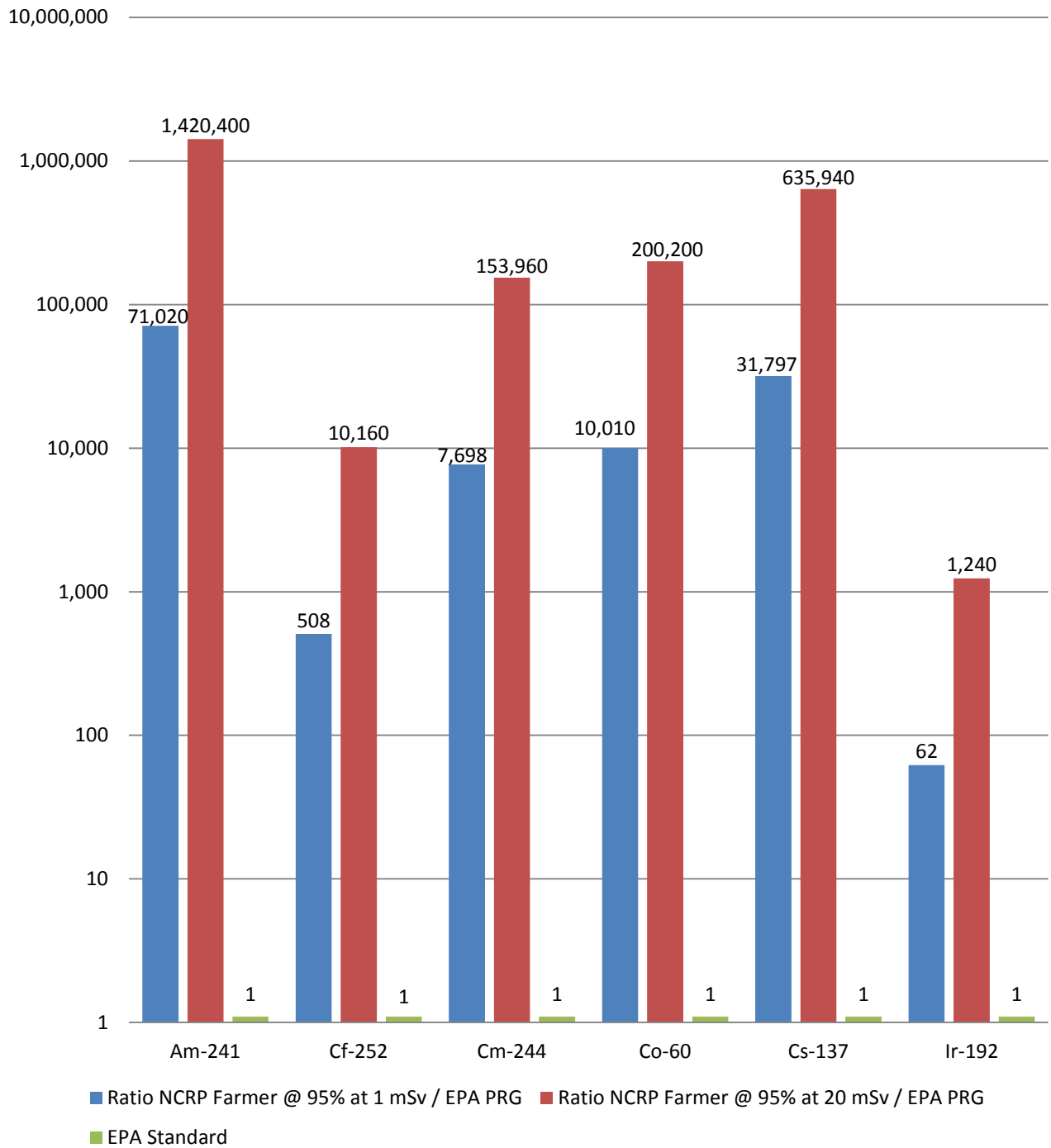
**Comparison of NCRP Proposed Cleanup Values and EPA's Longstanding Preliminary Remediation Goals (PRGs)  
Residential Scenario**

Radionuclide	NCRP Resident 95% in Bq/g at 1 mSv/y	NCRP Resident 50% in Bq/g at 1 mSv/y	EPA Resident PRG pCi/g	EPA Resident PRG Bq/g	Ratio NCRP @ 95% /EPA PRG	Ratio NCRP @ 50% /EPA PRG	Ratio NCRP @ 95% @20mSv / EPA PRG	Ratio NCRP @ 50% @20mSv /EPA PRG
Am-241	73	120	1.8	0.0666	1,096	1,802	21,920	36,040
Cf-252	1.9	3.2	0.197	0.007289	261	439	5,220	8,780
Cm-244	250	570	6.65	0.24605	1,016	2,317	20,320	46,340
Co-60	0.34	0.58	0.0389	0.0014393	236	403	4,720	8,060
Cs-137	1.5	2.5	0.0615	0.0022755	659	1,099	13,180	21,980
Ir-192	3.7	6.3	3.15	0.11655	32	54	640	1,080
Po-210	70	170	38.2	1.4134	50	120	1,000	2,400
Pu-238	130	290	2.95	0.10915	1,191	2,657	23,820	53,140
Pu-239	120	270	2.58	0.09546	1,257	2,828	25,140	56,560
Ra-226	0.061	0.1	0.0121	0.0004477	136	223	2,720	4,460
Sr-90	100	170	0.24	0.00888	11,261	19,144	225,220	382,880

**FIGURE 1a**

**How Many Times More Radioactivity Would be Permitted in Soil for Farmers Under NCRP Proposal Compared to EPA's Remediation Goals**

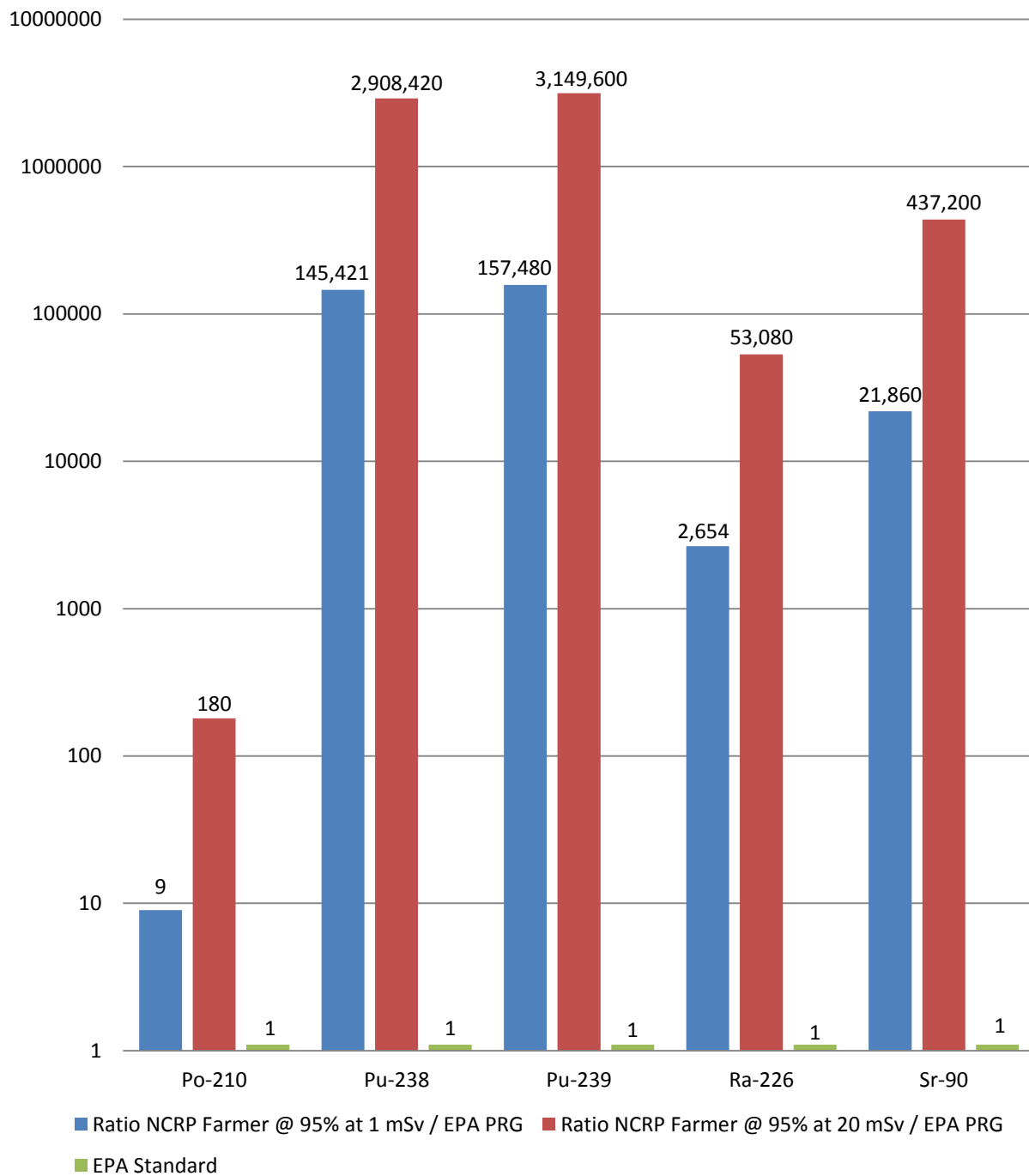
(@ 95% Confidence Level)



***FIGURE 1b***

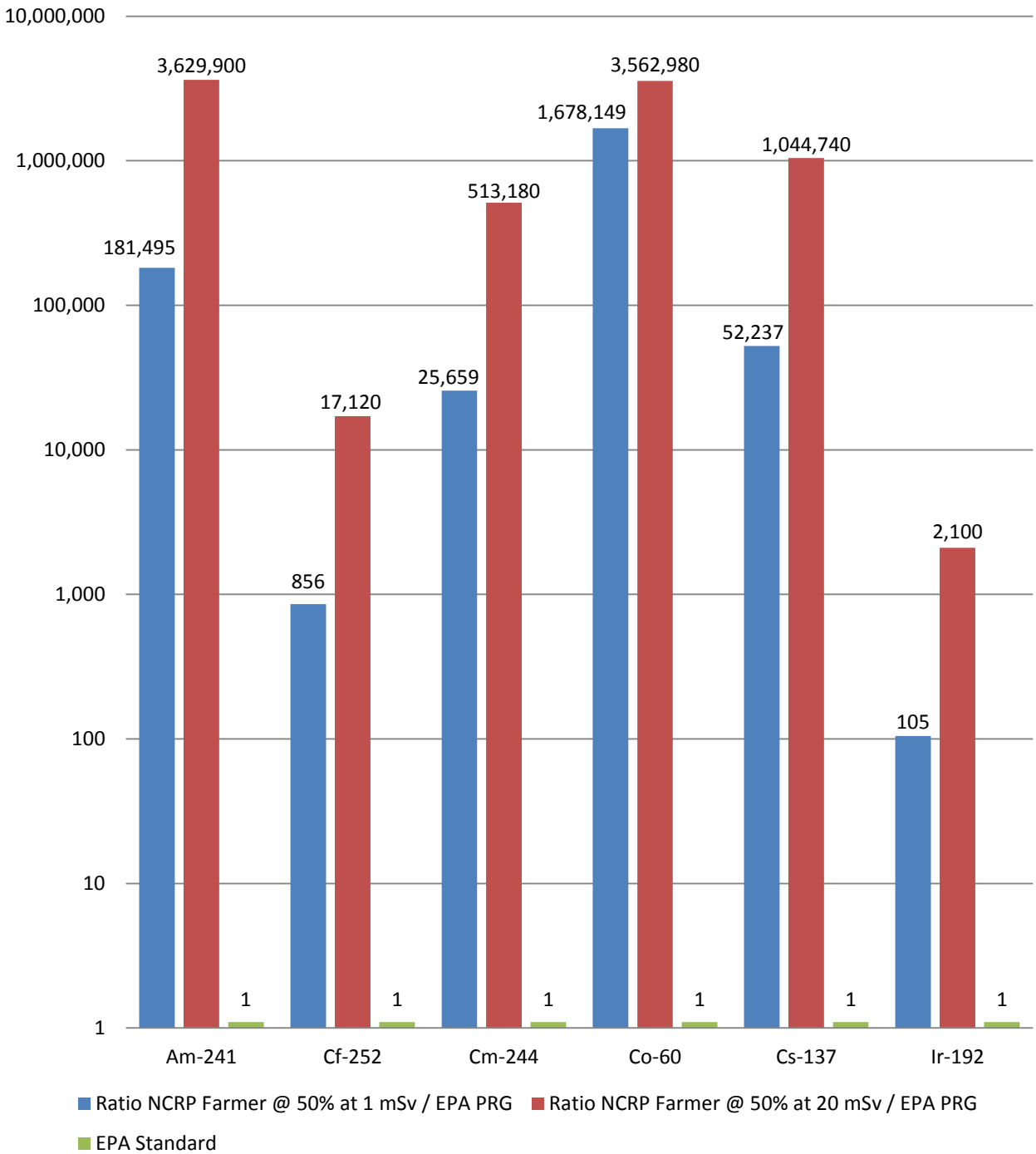
**How Many Times More Radioactivity Would be Permitted  
in Soil for Farmers Under NCRP Proposal Compared to EPA's  
Remediation Goals**

(@ 95% Confidence Level)



**FIGURE 2a**  
**How Many Times More Radioactivity Would be Permitted in Soil for Farmers Under NCRP Proposal Compared to EPA's Remediation Goals**

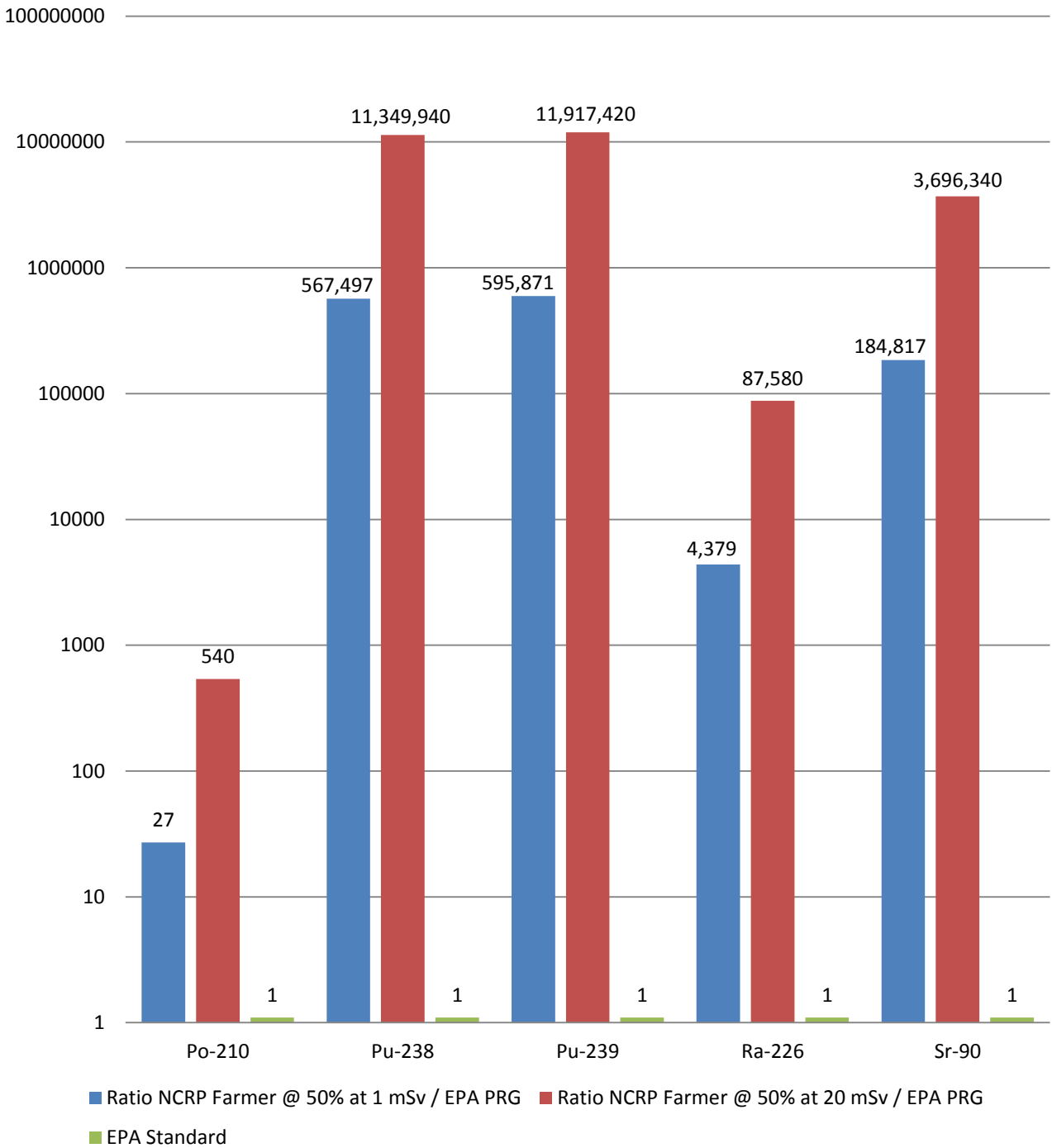
(@ 50% Confidence Level)



**FIGURE 2b**

**How Many Times More Radioactivity Would be Permitted in Soil for Farmers Under NCRP Proposal Compared to EPA's Remediation Goals**

(@ 50% Confidence Level)

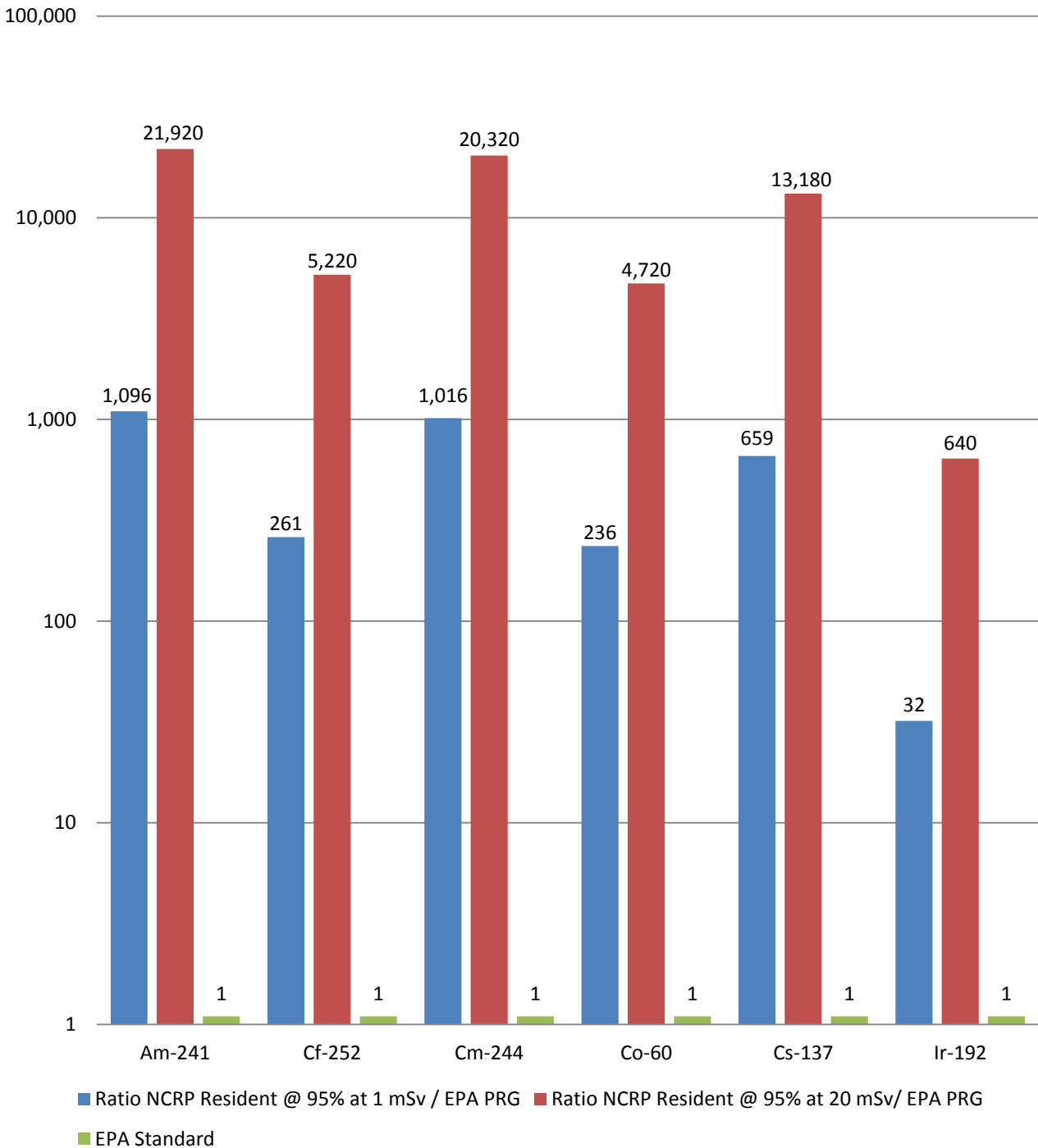




**FIGURE 3a**

**How Many Times More Radioactivity Would be Permitted in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remediation Goals**

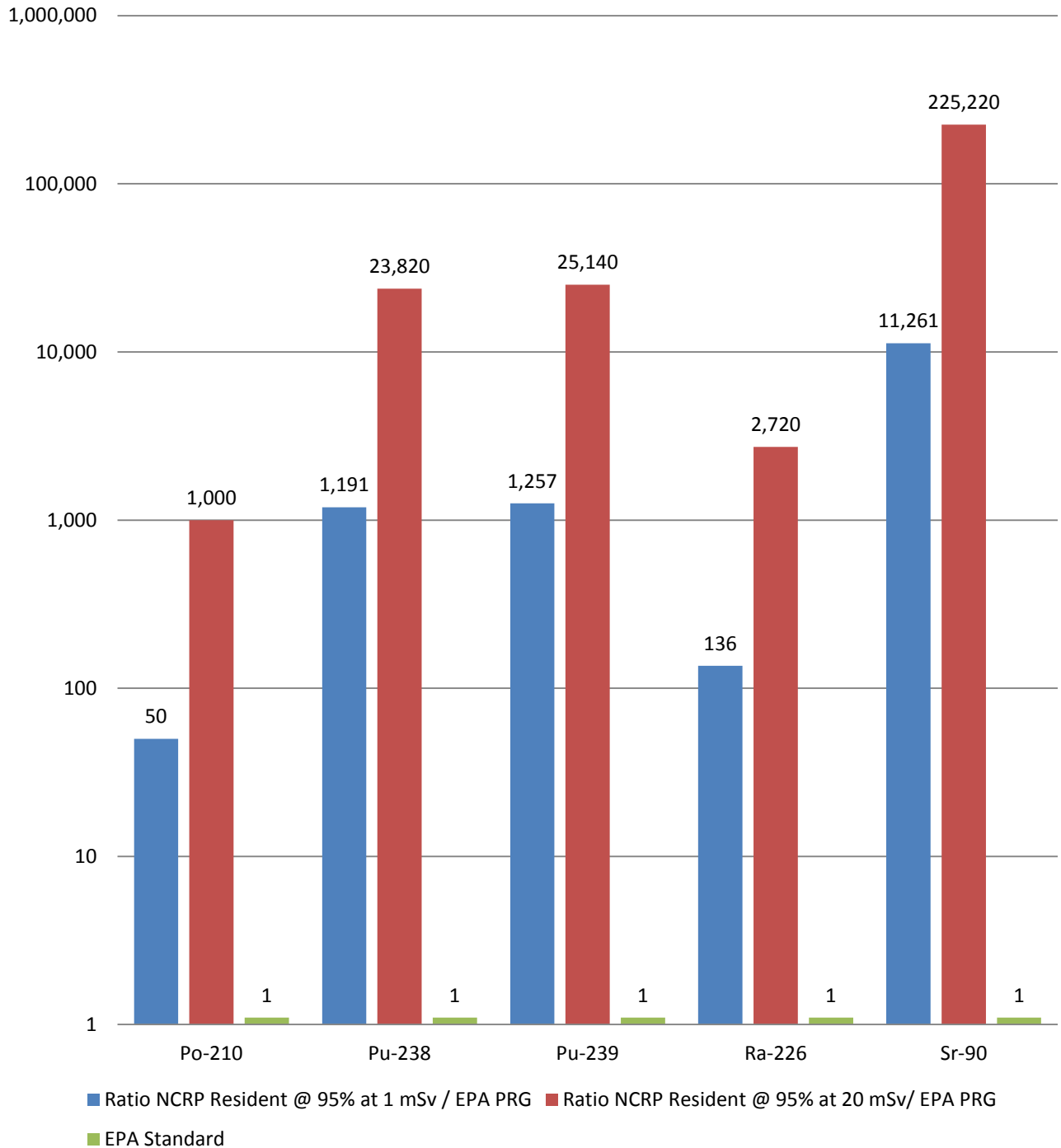
(@ 95% Confidence Level)



**FIGURE 3b**

**How Many Times More Radioactivity Would be Permitted in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remediation Goals**

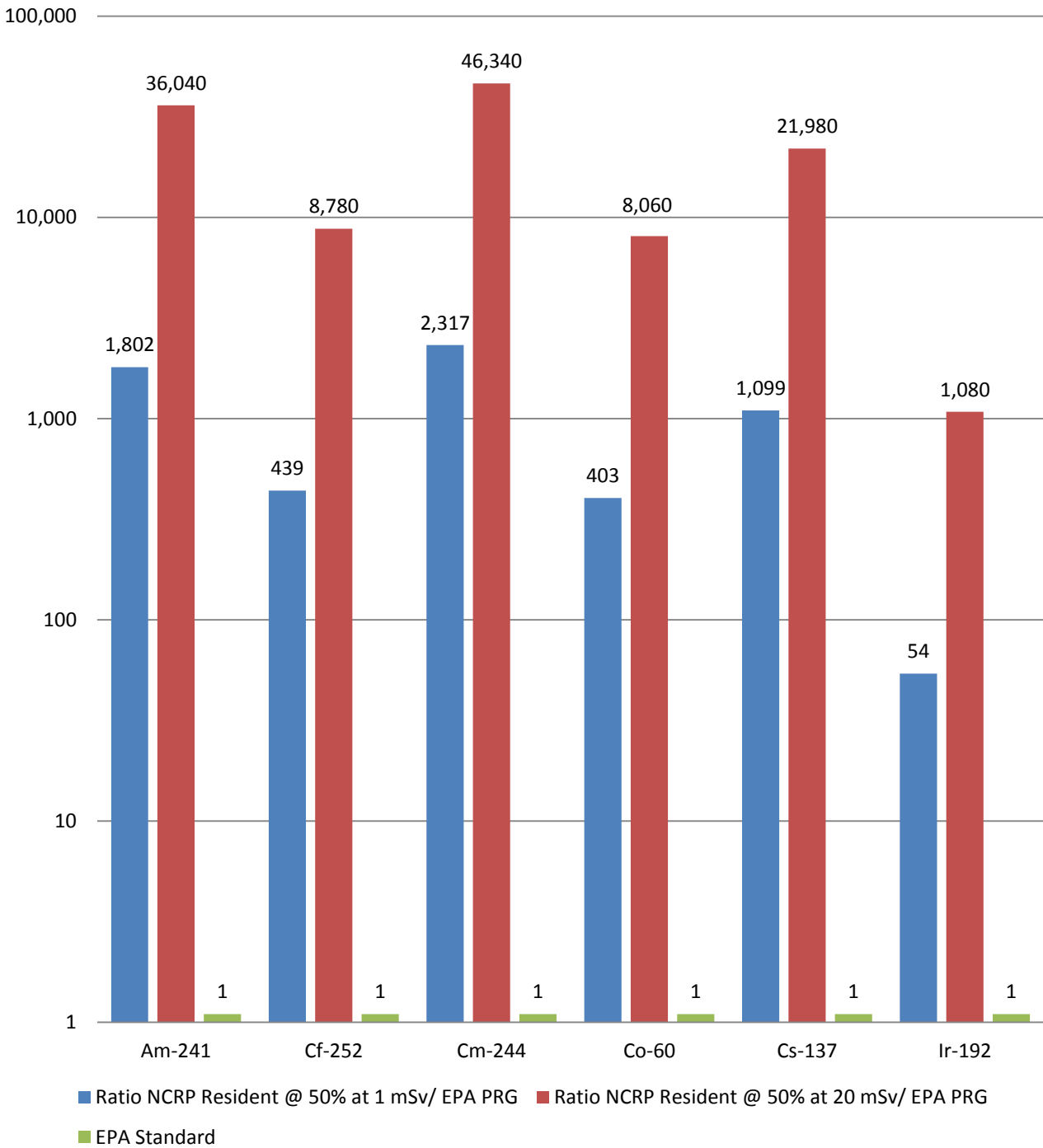
(@ 95% Confidence Level)



**FIGURE 4a**

**How Many Times More Radioactivity Would be Permitted in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remediation Goals**

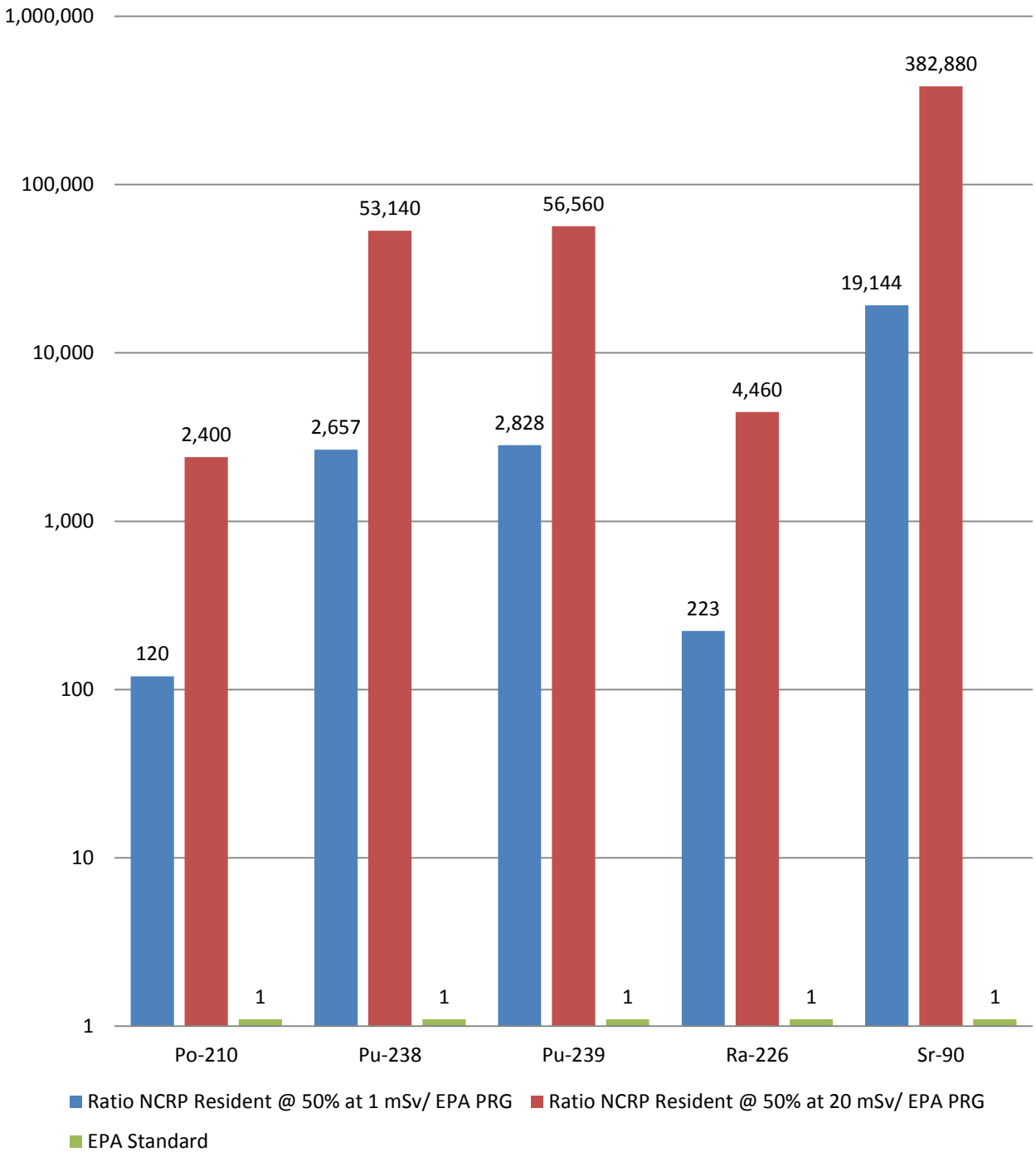
(@ 50% Confidence Level)



**FIGURE 4b**

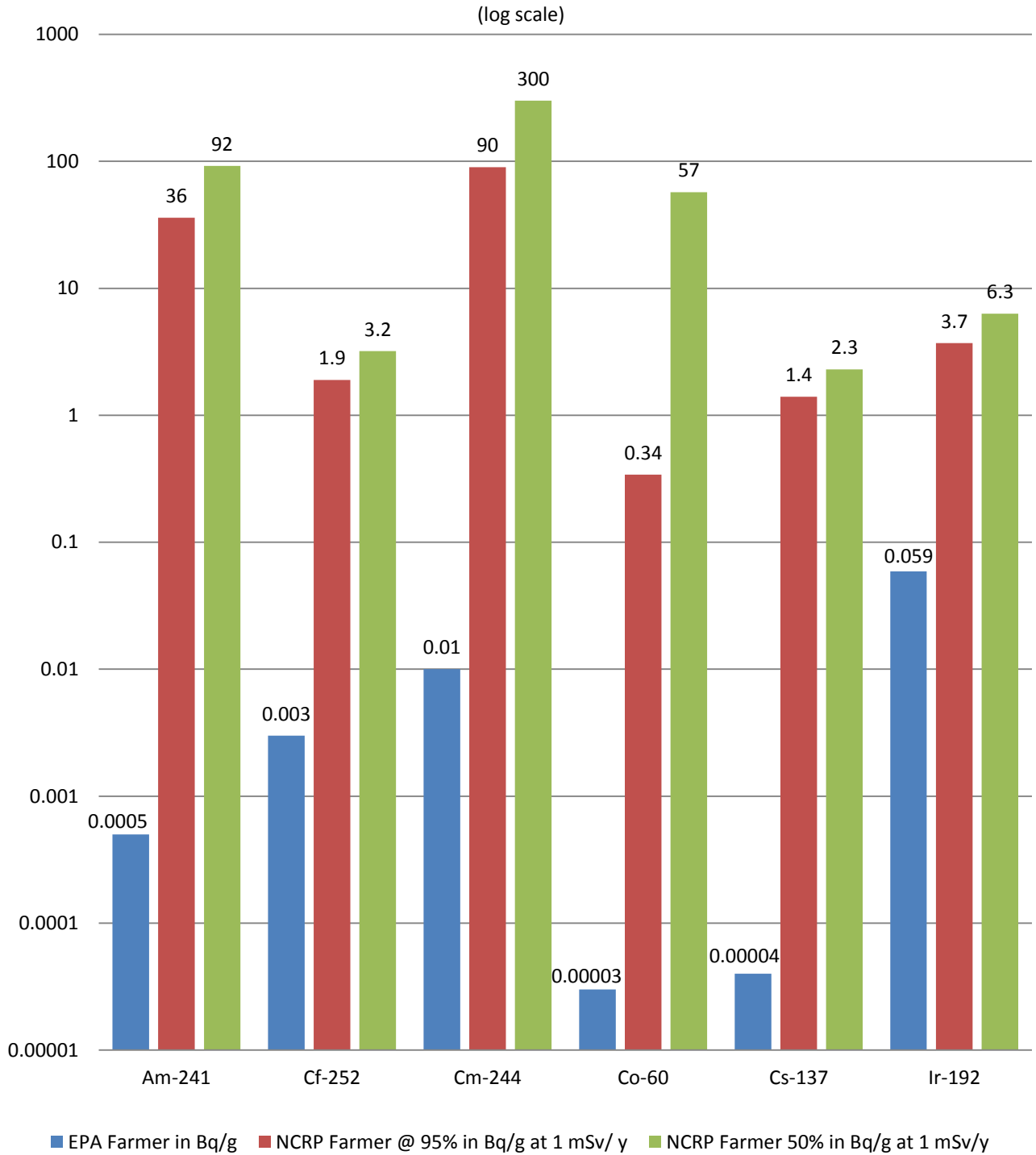
**How Many Times More Radioactivity Would be Permitted in Soil for Urban Residents Under NCRP Proposal Compared to EPA's Remediation Goals**

(@ 50% Confidence Level)



**FIGURE 5a**

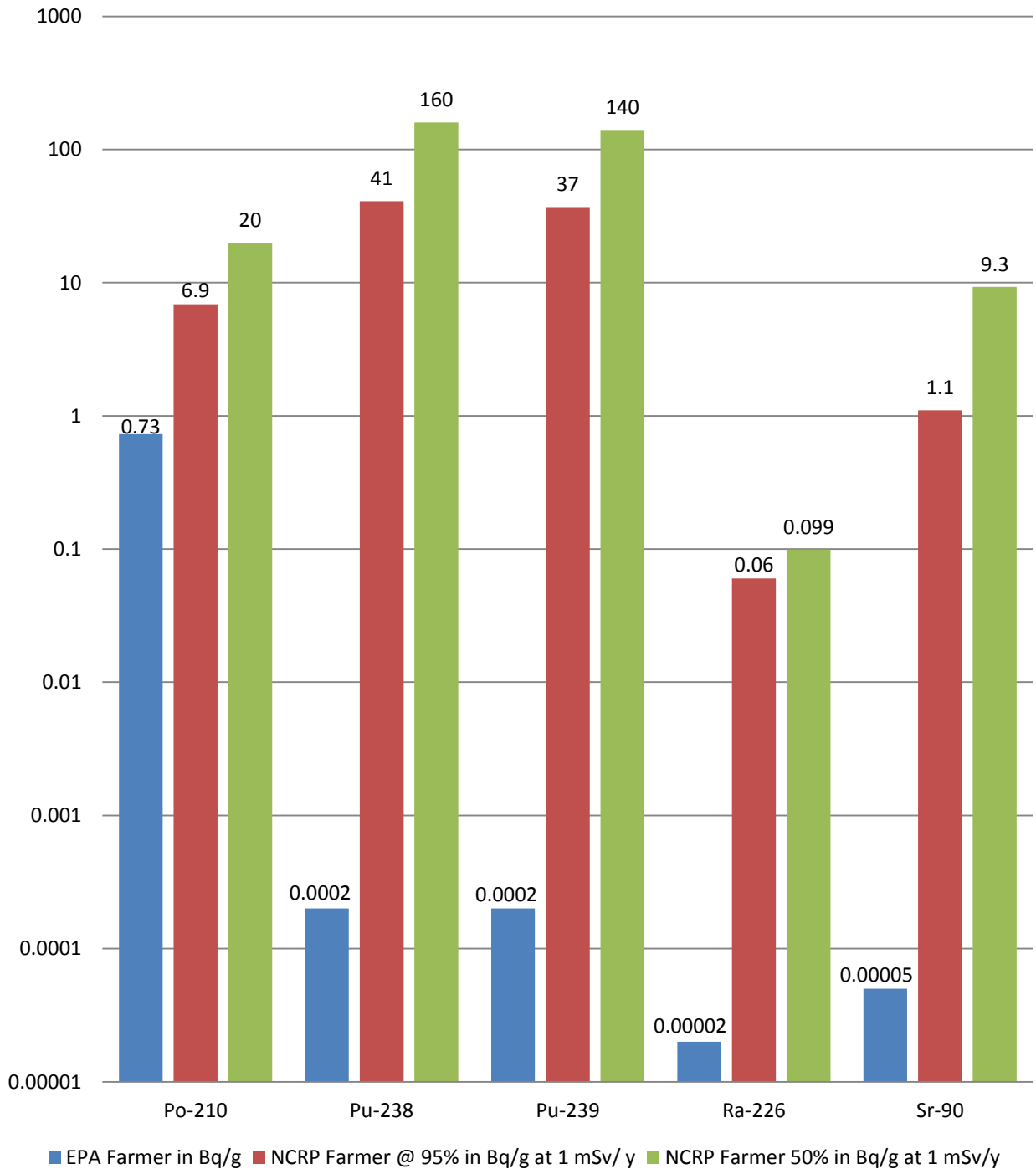
**Comparison of NCRP Proposed Permissible Concentrations of Radioactivity in Farmer's Soil in Bq/g Compared to EPA Remediation Goals**



**FIGURE 5b**

**Comparison of NCRP Proposed Permissible Concentrations of Radioactivity in Farmer's Soil in Bq/g Compared to EPA Remediation Goals**

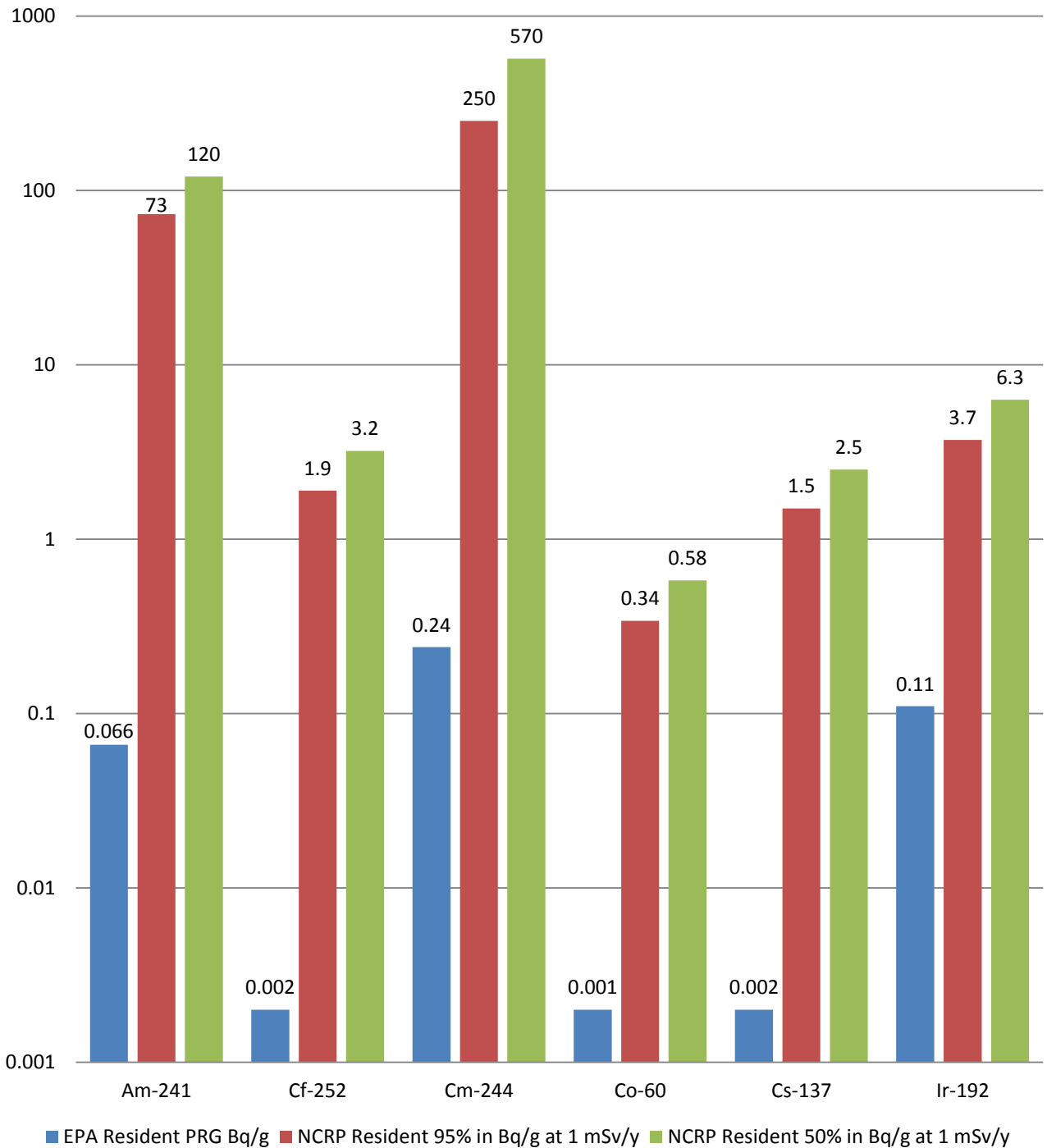
(log scale)



***FIGURE 6a***

**Comparison of NCRP Proposed Permissible Concentrations of Radioactivity in Resident's Soil in Bq/g Compared to EPA Remediation Goals**

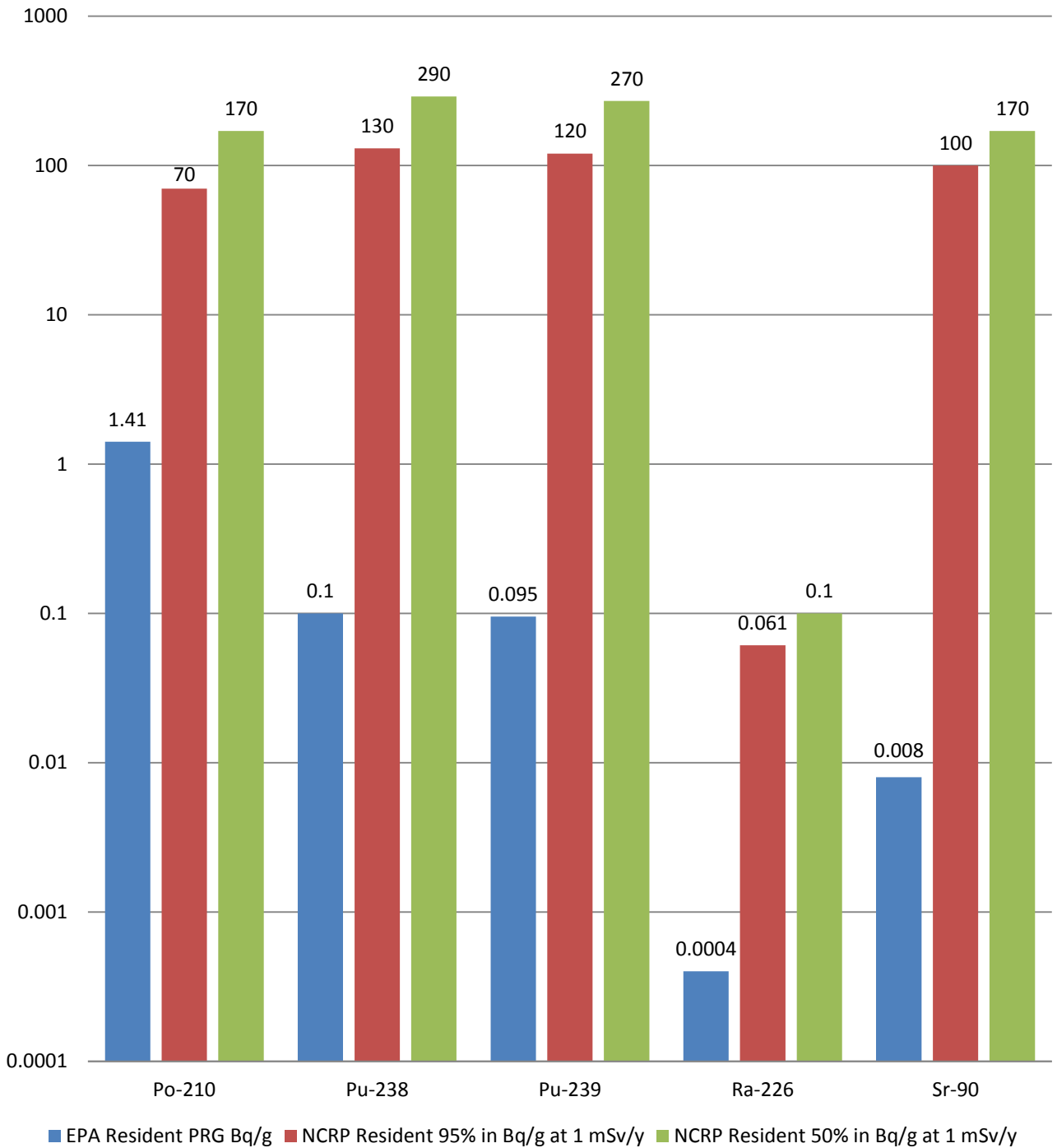
(log scale)



**FIGURE 6b**

**Comparison of NCRP Proposed Permissible Concentrations of Radioactivity in Resident's Soil in Bq/g Compared to EPA Remediation Goals**

(log scale)





## Notes

The NCRP's suggested long-term cleanup levels are found in NCRP SC 5-1 Draft Report, "Decision Making for Late-Phase Recovery from Nuclear or Radiological Incidents," February 25, 2013, National Council on Radiation Protection and Measurements.

Table 6.4 of the report identifies levels of contamination below which no cleanup would occur based on a 1 mSv/yr dose, for resident farmer, urban resident, and industrial/commercial exposure pathways, and for 95<sup>th</sup> and 50<sup>th</sup> confidence intervals. The NCRP report recommends cleanup choices based on a dose range of 1 mSv/yr to 20 mSv/yr (100 mrem to 2000 mrem/yr) and indicates that one just scale up the values in Table 6.4 for the 20 mSv/yr limit.

We have taken the NCRP values and compared them to EPA's Preliminary Remediation Goals (PRGs) for the same exposure scenarios—resident farmer and urban resident. We have compared the EPA PRGs to both the 50<sup>th</sup> and 95<sup>th</sup> confidence levels concentrations identified by the NCRP report.

It should be noted that EPA PRGs are the remediation goals, and that in unusual circumstances where one can't meet the goal one can fall back from them, but no more than by two orders of magnitude. In other words, EPA's remediation levels are a range of the PRG to no more than 100 times the PRG. Thus, at the upper end of the NCRP proposed acceptable risk range, for example, for a resident farmer and a 50% confidence interval, NCRP proposed plutonium-239 levels nearly 12 million times higher than EPA's PRG for the same scenario. That would be 120,000 times higher than the upper limit of EPA's risk range.

As to the water PAGs, please note that EPA's Alternative 1, identified in 26 of the PAG, is for the same high dose limit that was put forward in the Bush EPA PAG. EPA had previously identified in the Bush PAG radionuclide concentrations associated with that dose, so we used here those concentrations. Secondly, Alternative 4, the first alternative in footnote 24 of the PAG, is really not a set of proposed water limits for emergencies but a set of weaker standards for normal consumption of drinking water and not really relevant to the PAG discussion.

We gratefully acknowledge the work of Ryan Forster in producing the graphs.