Peer Review of USEPA Building Preliminary Remediation Goals (BPRG) for Radionuclides
By Thomas E. Widner, C.H.P., C.I.H.

General questions

1a. Are the purpose and scope of the guidance document clear?

Response: Yes, the documentation clearly states that the BPRGs are intended to be used for screening-level assessment of sites and as initial cleanup goals.

Given the anticipated use of the tool in screening, it might be wise to remind the user of the basic strategy for use of "conservative" screening to identify areas, contaminants, and/or conditions that do not warrant further attention. See the response to Item 2c.

1b. Does the document accurately represent existing guidance regarding risk-based PRGs and explain how it fits within this existing context?

Response: Yes, I believe it does. I am aware of no guidance regarding risk-based PRGs that is misrepresented or that the tool and supporting information do not reflect.

1c. Does the document clearly state for what purposes it is applicable and for what purposes it should not be used? Please explain.

Response: Yes. The documentation clearly states that the BPRGs are intended to be used for screening-level assessment of sites and as initial cleanup goals. Used in screening, they can be used to identify areas, contaminants, and conditions at a particular site that *do not* require further attention under the Superfund program, provided the exposure assumptions used in the calculations match the actual conditions at the site in question. It is also made clear that when contamination exceeds a BPRG, it should be viewed as indication that further evaluation of the potential risks that may be posed by site contaminants is warranted.

The documentation makes it clear that BPRGs are not actual cleanup standards, but rather long-term targets to use in establishing cleanup levels (based on "nine criteria analysis" and site-specific information) and in analysis of remedial alternatives.

2a. Is the intended audience of the BPRG calculator clear?

Response: Yes, it is. The BPRG Home page clearly states that the purpose of this BPRG calculation tool is to assist risk assessors, remedial project managers, and others involved with risk assessment and decision-making at sites with contaminated buildings.

2b. Can the calculator be effectively used as is currently presented for site-specific BPRG calculations?

Response: The calculator can be used as currently presented, but I would recommend a number of refinements as outlined in the response to Item 2d.

2c. Does the supporting material provide the appropriate level of detail, technical content, and referencing for the intended audience?

Response: The level of detail and extent of referencing is good, but in some cases it would be helpful if there was more discussion of the implications of some references that are cited, or how they impact use of the tool. For example, Section 3.2 of the User's Guide says that "additional information on radioactive materials present in building materials can be found here," but it is not made as clear as it could be there or in the reference document if BPRGs should be applied to concentrations found *above* these concentrations, or *including* these concentrations.

Some additional guidance regarding use of the tool in screening should be provided. When screening is performed to identify contaminants, areas, or conditions that do not warrant further attention, exposure parameter values are typically selected that are expected to not lead to underestimation of risk to any real person. If risks associated with an area, contaminant, or condition fall below the Target Risk even with this level of conservatism applied, it is clear that further attention is not warranted.

If risk assessors attempt to select values for parameters that are specific to their site without keeping this approach in mind, the likelihood that doses to real persons will be underestimated or that BPRGs will not be adequately protective of all persons increases. And if a user does not examine the equations used in calculating BPRGs, it may not be obvious whether lowering or raising a given parameter will raise or lower the BPRG value (i.e., make the BPRG more protective or less protective).

2d. Please explain and identify specific recommendations for improving the BPRG calculation tool.

Response: I recommend the following refinements:

- It may not be obvious to all users that multiple contaminants are selected by holding down the Ctrl key while clicking on contaminant names. A note to that effect would be helpful.
- It would be good to show how CDI ends up with units of cm^2.
- I would recommend a more descriptive label than "BPRG Search" for the tab that the user selects to get to the calculator; "BPRG Calculator" would have helped me find it easier.

- Section 3 of the User Guide, "Using the BPRG Table," discusses how the PBRG *(sic)* Download Area tables provides generic concentrations for use in the absence of site-specific exposure assessments, and how screening concentrations can be used for prioritizing multiple sites within a facility, setting risk-based detection limits for contaminants of potential concern, and focusing further assessment or response actions for the site or building. Numerous references to the table are contained in the User's Guide and the Web site, for example as a way to document changes in generic BPRGs over time. Despite the impression that the documentation gives that the tables are a widely used aspect of PRG information, when I tried to access those tables, the indication is that "this tool is restricted to EPA users."

  I was told that no one can open that table at this time– that the table contains information related to generic $1x10^{-6}$ numbers and is not deemed necessary for the peer review.

  The table should be made available or the text promoting its use should be removed.

3a. Is the approach reflected in the BPRG calculator consistent with existing risk-based PRG guidance and practice and does the calculator adequately account for differences between:

i) outdoor and indoor environments; and

ii) chemical and radiological contaminants?

Response: Default assumptions regarding indoor exposures do appear to be plenty conservative for screening calculations, considering children of all ages 0-11 on average spend at least four hours per day at places other than indoors at home. I am concerned that screening using all the default values may lead to excessive selection of areas for further investigation or action, particularly since point estimates are used for variables and input parameters and conservatism gets compounded.

Once one gets beyond the screening assessment, it is important that site specific conditions be reflected before final cleanup levels are selected. Since the importance of house dust in overall exposures to residents near contaminated sites has been demonstrated, it is important that valid samples of indoor dust and building materials be analyzed. House dust can contain significantly higher levels of a contaminant than exterior soil, house dust is composed of smaller particles than soil, adheres to skin more effectively, and is generally more bioavailable.

Radiological contaminants are assessed in this tool by appropriate inclusion of special parameters that reflect their properties, such as the Surfaces Factor and decay constants, and inclusion of pathways for external exposure from settled dust, submersion in ambient air, and from radioactive contaminants in building materials.

I would be interested in seeing the assessment that was performed to justify the exclusion of the dermal absorption pathway for radionuclides, on the basis that "the radiation doses caused by this pathway would be

much smaller than the doses caused by the other potential pathways already considered for most radionuclides." I would think that the dermal absorption behavior of radioactive material would depend largely on the compound the radioactive material was present in and its chemical properties.

3b. What other important factors, if any, should be considered in the BPRG equations? Please explain.

Response: I recognize no factors that should be added.

4a. Are the BPRG equations, sources of toxicity information, and exposure parameter default variables and values supported by risk assessment literature, existing guidance, and/or site-specific BPRG experience?

Response: Yes, they appear to be supported, in the case of default variables, as conservative default values for preliminary screening.

4b. Does the BPRG calculator address the most important and appropriate exposure scenarios, exposure pathways, and exposure routes?

Response: Yes, I believe it does. I would like to see the data behind the exclusion of the dermal absorption pathway for radionuclides.

4c. Is the construction of the calculator appropriate and reasonable given the available methods, documented experience, and current practice? Please explain.

Response: Yes, the design is appropriate and reasonable. I think that the generic BPRG tables should be made available to support the applications that are noted in the User's Guide and FAQ text.

5a. In addition to comments provided in response to the above questions, are there any shortcomings of the guidance that diminishes its effectiveness?

Response: Nothing comes to mind beyond what I have mentioned above.

5b. Is anything missing that, if included, would improve its effectiveness? Please explain and identify specific recommendations for improving the calculator.

Response: Nothing comes to mind beyond what I have mentioned above.

Specific topics

1. Is the discussion of background sources of radionuclide contamination complete and are adequate guidance and citations provided to account for background in BPRG calculations?

   Response: My first thought was that there should be more guidance given regarding inclusion or exclusion of background radionuclides from concentrations that are compared to BPRGs or cleanup levels that are established. After additional consideration of OSWER 9285.6-07P ("The Role of Background in the CERCLA Cleanup Program") and the Hobbs (2000) paper of radioactivity measurements on glazed surfaces, I believe that it is better to not be too prescriptive in this area. Rather, it is good to follow the guidance of OSWER 9285.6-07P when it describes how, when background concentrations are high relative to the concentrations of released contaminants, a comparison should be presented of site-related and background concentrations. This characterization and comparison can be used by risk managers to make decisions concerning appropriate remedial actions.

The following peer review questions relate to BPRGs for specific exposure pathways.

2. BPRGs for Settled Dust

   a. Are the equations, default values, and other input parameters appropriate for establishing risk-based BPRGs for this pathway?

      Response: Yes, in my judgment, they are appropriate.

   b. Do the equations, default values, and other input parameters adequately account for risks to children?

      Response: Yes, in my judgment, the equations used with the default values and parameters provided adequately account for risks to children on a screening-level basis. Once assessments get beyond the screening level, more rigorous representation of actual exposure conditions should be incorporated to the extent possible.

   c. Is the use of the external ground plane slope factor appropriate?

      Response: Yes, in my judgment, it is appropriate considering the fact that the settled dust layer is likely quite thin.

d. Is the use of the dissipation rate, including a default input parameter of 0, appropriate?

Response: The term appears to be appropriate and important to include, if it can be identified that the contamination resulted from a discrete event. The presence or absence of a contaminant reservoir can be complicated, given that studies have shown that remediation of external soil can have little or no impact on levels in household dust.

It is not clear to me if the method is set up to reflect time that may have passed since that discrete contaminating event, if that time was not part of the Exposure Duration for any real person. The User's Guide indicates that "*t* is equal to ED in all equations."

3. BPRGs for Indoor Air

a. Are the equations, default values, and other input parameters appropriate for establishing risk-based BPRGs for this pathway?

Response: Yes, in my judgment, they are appropriate.

b. Do the equations, default values, and other input parameters adequately account for risks to children?

Response: Yes, in my judgment, the equations used with the default values and parameters provided adequately account for risks to children on a screening-level basis. Once assessments get beyond the screening level, more rigorous representation of actual exposure conditions should be incorporated to the extent possible.

c. Is the use of the external submersion slope factor appropriate?

Response: Yes, in my judgment, its use is appropriate.

4. BPRGs for External Exposure

a. Are the equations, default values, and other input parameters appropriate for establishing risk-based BPRGs for this pathway?

Response: Yes, in my judgment, they are appropriate.

b. Do the equations, default values, and other input parameters adequately account for risks to children?

Response: Yes, in my judgment, the equations used with the default values and parameters provided adequately account for risks to children on a screening-level basis. Once assessments get beyond the screening level, more rigorous representation of actual exposure conditions should be incorporated to the extent possible.

c. Is the adjusted dose rate in for using the external infinite source slope factor in a contaminated room appropriate?

Response: Yes, the method is appropriate for the tool in its intended applications. I have reviewed the cited reference, "Dose Rate in Contaminated Rooms" by Keith Eckerman and agree with its methods and conclusions; i.e., it was determined that position-specific and room-specific surfaces factors were not needed because emitted photons are not abundant in the low energy band, photons in this energy band contribute little to the risk effective dose, and the existing variations are likely within the uncertainty of the method used to derive them.