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General Comment

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Attachments

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via *Federal Rulemaking Web Site*:
<http://www.regulations.gov>

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Washington, DC 20555-0001

RE: Docket ID NRC-2011-0297. Comments on Draft Regulatory Guide DG-4021.

Dear Ms. Bladey:

Below please find comments on the Draft Regulatory Guide DG-4021, "General Site Suitability Criteria for Nuclear Power Stations" (Proposed Revision 3 to Regulatory Guide 4.7). A notice of opportunity to comment on the draft Regulatory Guide was published in the *Federal Register* on December 30, 2011 (76 Fed. Reg. 82201). These comments are submitted on behalf of Uranium Watch and Living Rivers.

I. Draft Regulatory Guide DG-4021

1. Section A. Introduction (page 2) states:

Chapter 9 of both Regulatory Guide 4.2 and NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," (Ref. 7) discusses the selection of a site from among alternative sites; the applicant should present its site-plant selection process as the consequence of an analysis of alternatives for which environmental costs and benefits were evaluated and compared and then weighed against those of the proposed facility.

1.1. This statement ignores the possibility that proponents of a new reactor have already chosen a site and really do not have an alternative site that has been or will be seriously considered. It is misleading to think that the proponents of a new reactor are seriously considering alternative sites. By the time an application for an Early Site Permit or

Combined License Application is submitted to the NRC, the prospective licensee may already have committed resources and taken actions to secure water rights, easements, and other assets for a single site location, prior to conducting any serious analysis of other potential locations. Therefore, consideration of alternate sites are really pro-forma, and there are, in actuality, no alternative sites under consideration. For example, Blue Castle Holdings Inc., the proponent of the Blue Castle Project near Green River, Utah, is only seriously considering one site. The change applications for the appropriation of water rights for the proposed reactor are tied to that one proposed site.¹ If another site were chosen, it would require several years to obtain new water rights or change the existing water rights to a new point of diversion and place of use.

1.2. Introduction (page 3) references additional guidance developed by the International Atomic Energy Agency. The Revised Guide should also reference and incorporate information from *Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application*; Electric Power Research Institute (EPRI); No. 1996878; March 2002. The Nuclear Regulatory Commission (NRC) staff recently referred a prospective Early Site Permit (ESP) applicant to this guidance; therefore, this EPRI guidance has value to both NRC staff and an ESP applicant.² See Section II herein (below).

2. Section B, Discussion, Atmospheric Extremes and Dispersion (page 4) states:

A 30-year weather record should be considered in an evaluation of the water requirements for the ultimate heat sink. More data and studies on longer term weather cycles should be examined because of concerns about the potential impact of climate change as it relates to nuclear safety and the environment. However, the atmospheric extremes that may occur at a site are not normally critical in determining the suitability of a site because safety-related structures, systems, and components (SSCs) can be designed to withstand most atmospheric extremes with associated site-specific costs.

2.1. Here the NRC makes an unsupported assumption regarding the ability of safety-related structures, systems, and components (SSCs) to withstand most atmospheric extremes associated with drought and climate change. This kind of assumption should not be part of the Revised Guide, because it is based, primarily, on the circumstances associated with the siting of nuclear reactors in areas that have a great deal of precipitation, areas where the average rainfall is less than 10 inches per year, areas where water supply is highly dependent on snow melt and summer rains, and where water availability would be significantly influenced by natural drought cycles and impacts associated with climate change.

¹ <http://www.uraniumwatch.org/bluecastleproject.htm>

² Trip Report- October 2-6, 2011, Pre-Application Readiness Assessment (C-1) Visit for an Early Site Permit at the Blue Castle Project Site; December 15, 2011 (ML113410311).

2.2. In some circumstances the applicant and the NRC must consider more than the 30-year weather record, because the long-term weather record may contain information pertinent to long-term weather cycles that would influence water availability in the western part of the United States. For example, a year with minimal snow or circumstances where the snow melts at a faster rate (e.g., due to dust on snow), would greatly reduce the flow of a river, such as the Green River. Currently, there is a proposal to site a reactor on the Green River in Utah, where there are a number of demands on the available water which would influence the availability of water for the proposed reactor during low-flow conditions, particularly when low flow conditions coincide with high-demand from agriculture uses and the reactor project. The NRC must not assume that a 30-year record is sufficient and that any weather extremes, such as drought can be mitigated.

2.3. The applicant and NRC must also consider the actual legal availability of water at the proposed sites and any legal documents related to the appropriation of water for the proposed project.

3. Section B, Discussion, Atmospheric Extremes and Dispersion (page 5) discusses atmospheric dispersion, but does not specifically mention inversions as a factor impacting the dispersion of radionuclides and other airborne materials from the reactor operation. In some areas, local atmospheric conditions cause inversions, which severely limit local atmospheric dispersion capabilities. The likely hood of inversions should be a significant factor in siting a reactor and included in the siting criteria.

4. Section B. Discussion, Atmospheric Extremes and Dispersion (page 6) states:

A cooling system designed with special consideration for reducing drift might be needed because of the sensitivity of the natural vegetation or the crops in the vicinity of the site to damage from airborne salt particles. The vulnerability of existing industries or other facilities in the vicinity of the site to corrosion by drift from cooling tower or spray system drift should be considered. Not only are the amount, direction, and distance of the drift from the cooling system important, but the salt concentration above the natural background salt deposition at the site is also important in assessing drift effects. None of these considerations is critical in evaluating the suitability of a site, but they could result in special cooling system design requirements or in the need for a larger site to confine the effects of drift within the site boundary. The environmental effects of salt drift are most severe where saline water or water with high mineral content is used for condenser cooling.

4.1. Again, the NRC minimizes the potential for a siting criteria to influence site suitability. This kind of language should not be in the Revised Guide. In some areas, one of the primary economic base is agriculture, so that any negative impact to crops due to airborne salt particles could have a significant impact. Further, some crops would be impacted more than others. If a nearby community is highly dependent on the one

particular food crop and/or the grazing of domestic animals on natural and domestic vegetation, the influence of airborne salt particles could be an important site suitability factor.

4.2. In this section, the NRC should also include the uptake of radionuclides by domestic crops, natural vegetation, native and domestic animals, aquatic environments, and all the various elements in native and domestic animal food chains as a siting criteria that must be considered.

4.3. This section should also include criteria associated with the impact of salt, radionuclides, and other materials that will be dispersed in the atmosphere from a reactor on transportation corridors, including nearby highways, railroads, and waterways. In areas where there are specific salinity considerations associated with a waterway, such as in the Colorado River Basin,³ the release and dispersion of airborne salt particles could have significance.

5. Section B. Discussion, Exclusion Area and Low-Population Zone (page 6) states:

10 CFR 50.34(a)(1)(ii)(D)(1) requires the exclusion area to be of such a size that an individual assumed to be located at any point on its boundary would not receive a radiation dose in excess of 25 rem total effective dose equivalent (TEDE) over any 2-hour period following a postulated fission product release into the containment.

5.1. The determination of an exclusion area boundary (EAB) for a proposed reactor is a major siting criteria consideration, because the amount of land needed would influence the site or sites under consideration and the possibility that a larger exclusion zone would be required for a proposed site. The significance of this criteria should be emphasized the the Revised Guide.

5.2. The extent of the exclusion zone is dependent on a "postulated fission product release into the containment." However, the guidance does not discuss how the postulated fission product release into the containment is determined, how the dose to the a site boundary due to a release into the containment (and not outside the containment) is calculated, and how the extent of the exclusion zone is determined. The draft Guidance references 10 CFR 50.34(a)(1)(ii)(D)(1), which references, 10 CFR. Part 100, which references Technical Information Document 14844, "Calculation of Distance Factors for Power and Test Reactor Sites," dated March 22, 1962. So, a technical document that will soon be 50 years old could be used to determine the postulated fission product release and exclusion zones.

³ <http://www.crb.ca.gov/Salinity/2008/2008%20Review.pdf>

5.3. Though not mentioned in the Revised Guide or in 10 C.F.R. 100.11, the NRC has developed alternate guidance for determining the EAB and emergency planning zones (EPZs). Apparently, "the instantaneous source term of TID-14844 was replaced in 1995 with a time-dependent source term of another set of US NRC guidelines called NUREG-1465, which covers the accident source terms for all light water reactor plants."⁴ NUREG-1465 was issued in 1995. In 1999, the NRC issued draft Reg. Guide DG-1081, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors. In 2001, NRC staff acknowledged problems with the documentation of design basis radiological analyses submitted in conjunction with license amendment requests.⁵

5.4. Clearly, the NRC should develop a new technical guidance for determining the EAB and EPZs. Such guidance must take into consideration the experience of the NRC and the industry over the past 50 years and the accident, releases of radioactivity, and dispersion amounts and patterns at the Fukushima Daiichi nuclear reactors in Japan. The technical guidance must consider fission product releases from spent fuel pools, releases from fires and explosions, releases due to extended periods of loss of cooling water, cumulative releases from more than one reactor source, proliferation of radioactive "hot spots" offsite, and other potential sources of radioactivity from an expanded list of possible accident scenarios. The technical guidance must also consider fission releases from postulated accidents associated with the short-term and long-term presence of high-level waste storage casks and low-level nuclear waste at the reactor site and also the impacts on the release of radionuclides due the inability of plant workers to work in or near the reactor during an accident. Considering the fact that the NRC recommended the evacuation of US citizens within 50 miles of the Fukushima Daiichi nuclear reactors last March, one can only conclude that there is the possibility that such an evacuation (beyond the NRC's 10-mile evacuation zone) might be necessary at a US reactor site.

5.5. The NRC should not review any new ESP applications until it has developed new technical guidance, including an opportunity for public comment, to be used to determine a postulated fission product accident and the parameters of the exclusion and other zones established to be protective of the public health and safety.

6. Other Land Requirements. The draft Guide fails to discuss other possible land requirements outside the exclusion zone; for example, land for intake structures, pumps, sediment removal ponds, and other structures at the point(s) of diversion on a water source, where the point of diversion and equipment necessary to transfer the water from the water source to the reactor are not part of the reactor site and within the exclusion zone. Limits on the availability of land next to the water source could affect the

⁴ *Key Impact Parameters for Application of Alternative Source Term to Kori Unit 1*; Seung-Chan Lee. September 2009. <http://article.nuclear.or.kr/jknsfile/v42/JK0420394.pdf>

⁵ "Deficiencies in the Documentation of Design Basis Radiological Analyses Submitted in Conjunction with License Amendment Requests," October 18, 2001. <http://www.nrc.gov/reading-rm/doc-collections/gen-comm/reg-issues/2001/ri01019.html>

feasibility of a site under consideration. An applicant should assess the land requirements at the point(s) of diversion to ascertain whether there is sufficient land available to support the required structures.

7. Water Availability (page 10).

7.1. The Revised Guide should discuss the need to address and analyze the conditions under which increased water usage and/or decreased water availability would precipitate forced curtailment of the operation of the proposed reactor. The criteria should require a quantitative analysis of the “hydrologic factors,”—duration and frequency of low-flow conditions—that would cause curtailment of reactor operations.

7.2. The Revised Guide should not assume that the parameters associated with the water supply for the reactor project will not have already been established under a water right appropriation request and approval process by the time that an applicant submits an ESP application.

7.3. The Revised Guide must clearly require an applicant to identify all factors that could cause the curtailment of the amount of water that is legally available for use at the proposed site for the reactor. These would include low-flow conditions, priority uses of available water, new use of previously appropriated (but unused) senior water rights, other legal commitments (such as the Colorado River Compact), required minimum stream flows to support navigation and river ecology (including threatened and endangered species), long term impacts of changing weather patterns, ice, flooding, high water velocity, and any other factor that has the potential to curtail the availability of water from the designated source of surface water for the reactor.

7.4. The Revised Guide should discuss the need to determine the circumstances under which the use of water from the proposed water source could amount to 10% of the water flow. There should be a discussion of the suitability of a site where the the withdrawal of water for a reactor may exceed 10% of the water flow on a regular basis.

7.5. The Revised Guide should include a discussion of various temperature requirements.

8. Water Quality (page 11). The draft Guide states that the quality of surface water is generally not a determining site-feasibility factor. These kinds of generalized statements about what may or may not be significant siting criteria are not helpful. They may reflect past NRC experience, but might not apply to new reactor sites in very different environments. What could be a minor factor for one site could be a significant factor at another proposed site. The examples of potential environmental effects of site construction and operation listed in the draft Guide can be significant impacts that are not easily mitigated; for example, chemical alternations can include increased salinity of a whole river basin and threaten recovery of endangered and threatened species.

II. OTHER SITE SELECTION AND EVALUATION CRITERIA

1. The Draft Guide should include more detailed information, such as is found in the *EPRI Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application*, in Section 3. This Siting Guide is focused on comparing and screening various potential sites based on weighted siting criteria. However, it may be the case that an applicant has, in reality, chosen a site, made a commitment of resources to that site (e.g., acquiring water rights for use at that site only), and is using site selection criteria to justify the suitability of that site for an ESP, rather than conducting a fair evaluation of alternative sites.

The various weighting criteria contained in the *EPRI Siting Guide* may be helpful in identifying potential site characteristics that should be avoided or would require additional in-depth study. However all criteria might not have the same significance for the assessment of potential reactor sites.

2. The Revised Guide should more clearly identify those features and conditions that would not be consistent with requirements of obtaining a site permit.

3. The Revised Guide should include more detailed information on the need to determine the ability of the water source to supply the facility's water requirements though the life of the ESP permit, construction, and operation periods (up to 100 years). Some of the information in Section 3.1.2.1 of the *EPRI Siting Guide* would provide additional elements to be included in the Revised NRC Guide. This would include a determination of the circumstances when use of water from the proposed water source could amount to 10% of the water flow.

4. The draft Guide does not contain a detailed discussion of transportation and transmission related criteria. There may be challenges related to transportation, construction of railroad spurs and new or upgraded roadways that should be discussed in the site evaluation criteria. There may be additional challenges in the siting of new transmission lines to transmit the electricity to the electrical users, including the costs and siting issues (easements, permits, environmental impacts) associated with the construction of new transmission lines to and from the site. These issues associated with site selection criteria should be included in the Revised Guide.

5. The Revised Guide should include a discussion of the evaluation of costs related to transportation, transmission of electricity to and from site, land rights, water rights, labor rates, power pricing, and other site-specific cost factors.

Thank you for providing this opportunity to comment.

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Sincerely,

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