Response to Public Comments on Draft Regulatory Guide (DG)-4025
Assessment of Abnormal Radionuclide Discharges in Ground Water to the Unrestricted Area at Nuclear Power Plant Sites
Propose Revision 0 of Regulatory Guide (RG) 4.25

On December 11, 2015, the NRC published a notice in the Federal Register (80 FR 77028) that Draft Regulatory Guide, DG-4025 (Proposed Revision 0 of RG 4.25), was available for public comment. The Public Comment period ended February 9, 2016. The NRC received comments from the organizations listed below. The NRC has combined the comments and NRC staff responses in the following table.

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Commenter	Section of DG-4025	Specific Comment	NRC's Resolution
NEI-1	Introduction, page 1	Comment: "inadvertent radioactive releases" should be clarified Recommendation: This regulatory guide (RG) describes an approach that the U.S. Nuclear Regulatory Commission (NRC) staff considers acceptable for use in assessing abnormal, inadvertent radioactive releases to the on-site environs which may result in discharges of contaminated ground water from the subsurface to	The staff agrees with the comment. The "Purpose" and "Reason for Issuance" was sections were revised to address this comment. The term "inadvertent radioactive release" was replaced with "abnormal discharge." This term –"abnormal discharge" is consistent with NRC terminology found in RG 1.21, and its definition was added to the Glossary. In addition, a footnote 1 was added on page 5 that informs the reader on "normal radionuclide effluent releases" and its relationship to RG 1.21.

		the unrestricted area at commercial nuclear power plant sites. If this change is accepted, a definition for on-site environs in Regulatory Guide 1.21, Revision 2 should be added to this regulatory guide.	The phrase "on-site environs" is not used in this section because the purpose clearly states that the regulatory guide applies to abnormal releases through ground water to the unrestricted area.
NEI-2	Purpose, page 1	In the purpose section of the draft guide, it states this model is for use in "assessing abnormal, inadvertent radioactive releases which may result in discharges of contaminated GW from the subsurface to the unrestricted area at commercial nuclear power plant sites". <u>Comment</u>: Please validate the following assumptions: • Based on this guide, normal migration of water into GW onsite/offsite, from monitored ponds, settling basins, and hold up basins are excluded from this guide. Is that correct? • Therefore plants with no abnormal releases or inadvertent releases do not need to implement use of this model or something comparable? This will mean this is not required to be implemented until such an event occurs. But somehow, I get the sense that the utilities are expected to have this or something comparable in place prior to an abnormal release event….	The staff agrees with the comment. "Inadvertent radioactive releases" was replaced with "abnormal discharges" (see NRC response to NEI-1). To address the comment, a footnote was added to the "Reason for Issuance" section on page 5 in order to provide clarification regarding discharges involving on-site ponds/lakes. This RG provides an acceptable method of estimating abnormal discharges to the offsite unrestricted area. Plants that do not have abnormal discharges through ground water pathway do not need to use this simple ground-water model or other comparable ground-water models because they do not have abnormal releases through ground water.

		Recommendation: Clarify the expectation for having this tool in place.	
NEI-3	Discussion, page 5	In the "Discussion" section, under "Reason for Issuance," this guide states that due to the lack of routinely monitoring GW pathway discharges, the NRC has drafted this guide to provide guidance on how to determine liquid effluent discharges through GW pathway. Comment: This discussion on the Reason for Issuance appears to be contradictory to the Purpose statement for the guide, The reason for issuance implies all discharges of water into Groundwater should be monitored just like the liquid effluents program as described in RG 1.21. If this is the case, then this guide will be applicable to releases that migrate to GW during normal plant operations, for licensees whose licensing basis commits them to following this RG. Recommendation: Clarify the applicability of this guide.	The staff agrees with the comment. To address the comment, the sections on "Purpose" and "Reason for Issuance" were revised to clarify that the guide is intended for assessing abnormal discharges of radionuclides in ground water from the subsurface to the unrestricted area at commercial nuclear power plant sites. To clarify the applicability of the guide a footnote (as mentioned before in NEI-1 and NEI-2 comments) was added to "Reason for Issuance" on page 5 to address the comment regarding all discharges vs abnormal discharges (i.e., the RG addresses abnormal discharges through the ground-water pathway.)

NEI-4	Pages 3,4,12	Comment: DG-4025 references several Design Certification/Combined License (DC/COL) documents. Since such guidance is intended for new-construction plants, their applicability to older power plants that are "grandfathered" out of these requirements is suspect. Recommendation: Provide statement that the DC/COL documents were provided for reference in development of DG-4025, but do not apply to older-vintage power plants.	The staff disagrees with the comment and no changes were made to the RG. As indicated in Section D "Implementation" compliance with the guide is voluntary. The three DC/COL-ISGs are listed as "Related Guidance" and they do not appear in Section C "Staff Regulatory Guidance."
NEI-5	Discussion, page 5 "Background ," 3rd paragraph	Comment: The first sentence should be clarified. Recommendation: Industry took action to address inadvertent abnormal releases of radioactivity in ground water to the on-site environs.	The staff agrees with the comment. The third paragraph of the "Background" section of "B. DISCUSSION" (see page 5) was rephrased to provide clarification.
NEI-6	Discussion, page 5 "Background ," 3rd paragraph	Comment: Currently states*: "The program involves development of a ground water site model; onsite ground water monitoring, which includes installation of monitoring wells; and a remediation process and reporting requirements."* Basis: NEI 07-07 defines "communication requirements; not "reporting" requirements. Recommendation: change wording to state "…communication requirements."	The staff agrees with the comment. The sentence was revised to read: "The initiative included site characterization of geology and hydrology, a site risk assessment, an on-site ground water monitoring protocol, a remediation protocol, and communications."

NEI-7	Discussion, page 5 "Background" – Overall Comment	Comment: Make changes to the following EPRI references Basis: • EPRI Report 1016099 is the version of EPRI Report 1015118 that is available to the public; essentially EPRI Report 1016099 is the public version that doesn't include the appendices of EPRI Report 1015118. These two documents were developed to support nuclear power plant implementation of NEI 07-07, initially, but also support NEI 08-08A. • EPRI Report 1015118 was revised in October 2013 and superseded by EPRI Report 300200546 "*Groundwater Protection Guidelines for Nuclear Power Plants, Revision 1.*" Additions and revisions were made to the technical information that supported the implementation of the Guidance Statements in the EPRI Guidelines and the appendices. The Guidance Statements were not changed. EPRI Report 1016099 (Public Version) is still available in its original form. • Furthermore, for the nuclear power plant implementation of NEI 08-08A, EPRI developed report 3002000393 *"Establishing a Groundwater Protection Program for New Nuclear Generating Units: Appendix to the EPRI Groundwater Protection Guidelines for Nuclear Power Plants*" (March 2013.) This report is also reproduced in the appendix to the Revision 1 of the EPRI Groundwater Protection	

		Guidelines for Nuclear Power Plants, EPRI report 3002000546, published in October 2013. <u>Recommendation</u>: (1) Based on this information, it would be helpful to users of the RG for the NRC to replace references to 1015118 with reference to 300200546. (2) Also, it would be helpful to clarify the difference between 300200546 (previously 1015118) and 1016099	1. The staff disagrees with the comment and no changes were made to the RG. EPRI Report 1016099 is specifically mentioned as providing technical basis (along with NEI 07-07) to NEI 08-08A. It is publicly available whereas the other reports identified are not publically available. The report numbers remain unchanged to provide clarity when discussing the timeline of report development (within the Background section of Part B. Discussion) 2. The staff disagrees with the comment and no changes were made to the RG. Annotating differences between these EPRI reports goes beyond the scope of the discussion section of the guide.
NEI-8	Discussion, page 5 "Background," 3rd & 4th paragraph	Comment: Currently states: *"The Electric Power Research Institute (EPRI) provided NEI supporting guidance for the …"* <u>Basis</u>: EPRI more appropriately provides the "nuclear power industry" supporting technical guidance <u>Recommendation</u>: change the wording in paragraph 3 and 4 to read: "*The Electric Power Research Institute (EPRI) provided the nuclear power industry supporting technical guidance for the …*"	The staff agrees with the comment and changes were adopted.

NEI-9	Discussion, page 5, "Background," 4th paragraph, last sentence	Comment: Currently states: "*In 2008, it issued EPRI Report 1016099, "Ground Water Protection Guidelines for Nuclear Power Plants" (Ref. 21).* Basis: EPRI Report 1016099 is the version of EPRI Report 1015118 that is available to the public; essentially Report 1016099 is the public version that doesn't include the appendices of EPRI Report 1015118 Recommendation: Change the wording to read: *In 2008, it issued EPRI Report 1016099, "Ground Water Protection Guidelines for Nuclear Power Plants: Public Edition." (Ref. 21).*	The staff agrees with the comment. Reference clarified by adding "Public Edition" to its citation in Background section. EPRI Report 1016099 is now listed as Reference 26.
NEI-10	Discussion, page 6, 1st paragraph	Comment: The reference to EPRI document 1016456 (Page 6) should be replaced with a reference to EPRI report 1021175, "Recommendations for an Effective Program to Control the Degradation of Buried and Underground Piping and Tanks (1016456, Revision 1)" Published on 12/23/2010. Recommendation: Make the suggested revision.	The staff agrees with the comment. The report number was corrected in the Background and Reference sections.
NEI-11	Discussion, page 6	Comment: (Ref. [23) should be (Ref. 23), -- by removing the unneeded bracket. Recommendation: Remove the unneeded bracket.	The staff agrees with the comment. The unneeded bracket has been removed.

NEI-12	Discussion, page 6, 2nd Paragraph	Comment: The paragraph refers to Revision 3 to NEI 09-14 Basis: Revision 4 to NEI 09-14 was published in December 2015. Recommendation: Change the reference to read Revision 4 of 09-14.	The staff agrees with the comment. The revision number was changed in text and in reference section.
NEI-13	Section C, page 7, 2nd paragraph	Comment: The glossary defines groundwater as any water in the subsurface including moisture in the vadose zone. However, the "groundwater" model assumes horizontal saturated flow. Use of this model assumes direct application of a contaminant to the saturated zone, without considering vertical infiltration through the unsaturated zone. For some sites, use of this model may be too conservative so use of this model should be used with caution, taking into consideration the site conditions as described in the site conceptual model. Recommendation: 3rd sentence, 2nd paragraph, Section C. Consider stating that the model assumes "steady-state saturated flow in homogeneous porous sand layers."	The staff agrees with the comment. Section C, items #2 and #3 were revised accordingly.

NEI-14	Section D, page 8	Comment: The last sentence in Section D second paragraph is essential to the document: *Current licensees may continue to use guidance the NRC found acceptable for complying with the identified regulations as long as their current licensing basis remains unchanged*. The use of the Appendix, while not unreasonable in its complexity, could require significant revision to some utilities existing methodologies (which may differ from the Appendix) which by this comment are deemed acceptable. Recommendation: Make no changes to these sections.	The staff agreed with the comment. No changes to the RG were made as recommended by NEI-14 comment.
NEI-15	Implementation, page 8	Comment: Title for second paragraph is missing a preceding space. Recommendation: Add a blank line between the first paragraph and the bold text "Use by Applicants and Licensees.	The staff agrees with the comment. Text reformatted after first paragraph in Part D. Implementation.
NEI-16	Glossary, pages 10 & 11	Comment: The glossary has definitions for abnormal release, controlled release, uncontrolled discharge, and uncontrolled release. Although these definitions match those in Regulatory Guide 1.21 Revision 2, none of these terms are actually used within the body of DG-4025. While these definitions might be viewed as useful, it is unclear why they are included in the glossary if they are not use within the document. Recommendation: Determine if there is a need to include these definitions in DG-4025, and consider	The staff reviewed the terms and definitions in the glossary. The terms and definitions have been retained since they are deemed useful in providing context to the RG.

		removing if not, in order to prevent potential conflicts with future revisions of RG-1.21.	
NEI-17	Glossary, page 10	Comment: The definition of "contaminant" is overly broad. It states that a contaminant is any material that has an "adverse effect" which could be construed to be almost any material. Recommendation: Revise definition to match the definition of "contamination" that is found in the NRC website glossary: *"Undesirable radiological, chemical, or biological material (with a potentially harmful effect) that is either airborne, or deposited in (or on the surface of) structures, objects, soil, water, or living organisms in a concentration that makes the medium unfit for its next intended use*."	The staff agrees with the comment. Glossary updated with new definition for "contamination" from NRC website glossary.
NEI-18	Glossary, page 10	Comment: In the draft guide, there is a definition for "uncontrolled release" that refers you to the definition for "controlled release". However, there is no definition for "controlled release" in the draft guide. There are definitions for "controlled discharge" and "uncontrolled discharge", but nothing for "controlled release". Recommendation: Add the definition of "controlled release" from Regulatory Guide 1.21 directly into the Regulatory Guide.	The staff agrees with the comment. "Controlled release" definition was added to glossary from Regulatory Guide 1.21.
NEI-19	Glossary, page 10	Comment: In the draft guide, the definition for a controlled discharge differs slightly from NRC Regulatory Guide 1.21. The word "planned" is substituted with the word "pre-planned."	The staff agrees with the comment. The word "planned" was changed to "pre-planned."

		Recommendation: Change the definition to mirror ANSI/ANI 2.17-2010.	
NEI-20	Glossary, p.10	Comment: One of the objectives of the Groundwater Protection Initiative as stated in NEI 07-07 is to "Improve management of situations involving inadvertent radiological releases that get into ground water." In the GPI and NEI 07-07, "releases" refer to leaks and spills. Recommendation: Clarify the difference between the NRC's definition of "release" versus the GPI/NEI 07-07 definition of "release."	The staff disagrees with the comment. The definition of "release" is clear in its use within the context of the regulatory guide.
NEI-21	Glossary, page 11	Comment: Include a reference for the term "residual radioactivity." Recommendation: Add NRC Regulatory Guide 1.21 as the reference.	The staff agrees with the comment. The term "Residual Radioactivity" was added to Glossary using definition from 10 CFR Part 20 and RG 1.21.
NEI-22	Glossary, page 11	Comment: The definition of a vadose zone implies that the meaning is the same as an unsaturated zone; however, ANSI/ANS-2.17-2010 provides different definitions for both terms. Recommendation: Recommend to clarify the definitions: vadose zone and an unsaturated zone.	The staff agrees with the comment. The term "vadose zone" was removed from Glossary.

NEI-23	Glossary, page 11	Comment: The definition for "residual radioactivity" mentions "unlicensed sources," but does not provide an example of what constitutes an unlicensed source. Is this the same as "exempt sources"? Recommendation: Add a definition of "unlicensed source" to the Glossary.	The staff does not believe a definition for unlicensed sources is needed, because the term is self-defining; i.e., unlicensed sources are sources of radiation for which a license is not required.
NEI-24	Glossary, page 11	Comment: The term "Vadose Zone" is used a total of three times in this document and in all cases to state that it means the same as the "unsaturated zone". Since the term "unsaturated zone" is already in use in the document why not just delete the term "vadose zone" from the document? Recommendation: Delete the term "vadose zone" from the document.	The staff agrees with the comment. The term "vadose zone" was removed from this regulatory guide. The term "unsaturated zone" is used instead.
NEI-25	References, page 13	Comment: Reference 22 includes an unneeded dash after NEI (NEI-09-14). Recommendation: Replace the dash after NEI with a space (NEI 09-14).	The staff agrees with the comment. Dash removed from reference and space added.
NEI-26	Appendix, page 1, step 3	Comment: Step 3 instructs the user to "Construct a series of transects between the monitoring wells normal to the approximate direction of ground water flow leaving the site". This step does not specify that the transect must cross-through the known or inferred contaminant plume. Many US nuclear power facilities have hydrogeological settings in which groundwater flow direction varies across the power block or protected area; i.e. a portion of groundwater may discharge to canal while the remaining base flow discharges to a	The staff agrees with the comment. Step 3 in Appendix was modified to provide clarification.

		cooling lake. This would mean that groundwater flow vectors within the site's boundaries may vary relative to nearby discharge boundaries and release areas at the facility. Recommendation: Add clarification to step 3: Consider changing step 3 to read: "Construct a series of transects between the monitoring wells normal to the approximate direction of groundwater flow containing the known contaminant plume leaving the site." Multiple independent transects may be required if contaminant plumes exist in groundwater aquifers that flow in different directions.	
NEI-27	Appendix, page 1, step 3	Comment: Step 3 does not specify that the constructed transect to be modeled must fully cross-through the known or inferred plume area normal to groundwater flow. Monitoring wells at either ends of the transect(s) must define/bound the edge of the contaminant plume by exhibiting no detectable activity. If the modeled transects do not include the plume boundary, the flux calculation may underestimate contaminant flux normal to the transect. Recommendation: Add clarification to step 3 to specify that wells at either ends of the modeled transect must bound the edge of the contaminant plume. If wells do not extend beyond the extent of the transect, the user should establish block(s) in the transect beyond the plume extent using reasonable assumptions in the site's conceptual model.	The staff agrees with the comment. Step 3 was revised to indicate that the monitoring wells in the transect should encompass the plume.

NEI-28	Appendix, page 1, step 5	Comment: Step 5 does not specify that the monitoring wells to be used to estimate tritium flux must be hydraulically down-gradient of the groundwater flow direction, normal to the established transect(s), with no groundwater flow boundaries (drains etc.) or barriers to flow (building foundations etc.) between transects and boundary wells. Additionally, Step 5 does not indicate that alternative, down-gradient (near site boundary), groundwater measuring points are acceptable to establish gradient, i.e. surface water bodies such as cooling lakes, rivers etc., which are surface expressions of hydraulic head at groundwater discharge boundaries. These conditions generally occur near site property boundaries. Recommendation: Add clarification to step 5 by indicating that down-gradient (near boundary wells/measuring points) must be in hydraulic communication with transect wells with no barriers to flow or drains between the transect and boundary measuring points. Additionally, step 5 should allow for surface expressions of ground water at or near the site boundary (i.e. lakes, rivers etc.) to be used to establish a head gradient from the transect to the site boundary.	The staff agrees with the comment. Text added to Step 5 (now Step 6) to address well communication requirements and hydraulic gradient calculation.

NEI-29	Appendix, page 1	Comment: The appendix specifically states that "this appendix provides a simple ground-water flow and transport model for estimating offsite tritium activity flux at nuclear power sites." Is this model intended for estimating activity flux from other radionuclides as well? Recommendation: Clarify this in the Regulatory Guide.	The staff agrees with the comment. Step 2 was revised to address the flux of radionuclides that migrate at a rate that is different than the ground water flux (e.g., cesium-137, strontium-90, cobalt-58, and cobalt-60). Step 2 points out that they are not appropriate candidates for using this simple model.
NEI-30	Appendix, page 1	Comment: A new step needs to be added to the "model building process" as step 2. Recommendation: Add the following "Determine if nuclear power plant site hydrogeological conditions are considered simple or complex.	The staff agrees with the comment. It is incorporated in Step 2 of the Appendix.
NEI-31	Appendix, page 2, Step 7b	Comment: Clarify the definition of hydraulic gradient in step 7b. The definition provided: "(change in hydraulic head over distance to discharge point)", cannot be calculated with empirical values unless the wells (or measuring points) down-gradient of the transect are exactly at the boundary. Recommendation: Step 7b should be clarified to indicate that the hydraulic gradient measured between transect wells and near-boundary wells (or measuring points) is an estimated gradient to be projected out to the site boundary.	The staff disagrees with the comment. Gradients are estimates based on best available information. In this case the water-table elevation in the monitoring wells and the elevation of nearby large bodies of water provide an estimate of the gradient for the water-table unit.

NEI-32	Appendix, page 2, Step 9	Comment: Step 9 does not adequately describe the steps and calculations necessary to estimate the travel time for tritium activity at the transect to reach the site boundary. Although the calculation example in table 1 of the appendix calculates and provides the seepage velocity, which is required to calculate travel time, it is not defined as the value required to estimate travel time to the boundary in the draft guide. Recommendation: 1) Add Seepage velocity to the definitions section of the draft guide. 2) Consider adding detailed instructions to estimate tritium travel time from the transect to the site boundary: Example: To estimate travel time from the transect to the site boundary the following parameters must be known: Distance from transect to the site boundary (l[ft]), and the seepage velocity (v[ft/day]), which is also known as the average linear velocity of groundwater flow. Seepage velocity is calculated as follows: specific discharge (flux) (Q [ft/day]) divided by the aquifer's effective porosity (ne [dimensionless]): v = Q / ne	The staff agrees with the comment. A simplified version of these calculations has been added to the Appendix as follows: (11) To estimate the total tritium discharged to the unrestricted area, the distance and rate of the tritium plume travel and subsequent radioactive decay during the migration time to the unrestricted area needs to be addressed.

		Travel time (T[days]) is calculated by dividing the distance from transect to the boundary (l) by the seepage velocity (v): $T = l / v$	
NEI-33	Appendix – General Comment	<u>Comment:</u> No plan or methodology is provided if well data is not available at the site boundary (either <LLD at boundary but a leak in progress inside OCA or no wells at all). The appendix appears to only be relevant if you have actual detected tritium at the boundary wells. <u>Recommendation:</u> Provide clarification of when to use the Appendix and how to handle plumes which are wholly contained onsite (not exiting the plant property.)	We agree with the comment. The licensee must select the monitoring wells to be used. The conceptual site model will guide placement of the wells. To address the sommcent Step 6 of the Appendix was revised to read: *Select the monitoring wells to be used in calculating gradients (∇h) for estimating the specific ground water discharge rate (or flux). These monitoring wells for estimating the gradient should be as close to the site's boundary as possible given the available data (i.e., geologic borings and monitoring "points" or intervals). These monitoring wells should be in hydraulic communication with each other.* *Steps 9 and 10 were added as follows:* *Multiply the tritium flux in each block by the time period to estimate the tritium discharge in that time period (see Figure 6).* *Add up the tritium discharges in each time period to obtain the annual tritium discharge (see Figure 6).* If the plume is wholly contained onsite (not exiting the plant property), then the answer is that there is no discharge to the unrestricted area.

NEI-34	Appendix – General Comment	Comment: DG-4025 does not address how to consider non-detectable activity results. In all rights, they should be treated as zero. However, the data in Tables 4 and 5 of the Appendix are not consistent with this assumption. Table 4 indicates that all results for the shallow and deep sections of W1-s and W1-d are <MDL. However, Table 5 indicates a tritium flux from this segment based on an assumed concentration of 500 pCi/L, as indicated at the bottom of Table 4. Is there a technical basis for 500 pCi/L? Why not zero? Why not the MDC achieved on the individual analysis? Recommendation: Provide discussion and guidance regarding acceptable approaches to handle non-detectable concentration values.	The staff agrees with the comment. Non-detect concentrations of 500 pCi/L in the example were removed from the Appendix model and replaced with 0 pCi/L. This change is now consistent with the approach described in RG 1.21 (non-detectable activity is considered as zero effluent release).
NEI-35	Appendix – General Comment	Comment: The model does not: 1. Address onsite pumping of wells for either production or to remove contaminated water, mitigation of a known plume. 2. Address infiltration rates from precipitation. 3. Take into account dynamics of the environment (floods, droughts, etc.). The flux is only instantaneous and does not represent the entire year. 4. Does not account for vertical velocity or aquitards-aquicludes.	The staff disagrees with the comment and made no changes to the RG. These complexities are beyond the scope of the guide.

		5. Atmospheric temperature changes with regard to frost zones, deserts or areas of high evapotranspiration. 6. Water table fluctuates over time are variations that a flux model cannot replicate. 7. No standard for hydraulic conductivity is stated. What is the standard? EPA, DOA, Academic. 8. No accuracy standard for the cross section. Can I use Google Earth, professional survey, a ruler, or laser to determine cross section? Recommendation: Provide additional guidance with standards. One recommendation -- USGS groundwater standards.	
NEI-36	Spreadsheet	Comment: The width and thickness of each transect stack and the blocks of aquifer within the stacks affect the calculated bulk ground water flux and total transect activity flux. The spreadsheet provided in DG-4025 calculates the width and thickness of each aquifer block. The calculations are valid for the simplified example provided in the Draft Regulatory Guide where the monitoring wells on either end of the transect contain no contamination and, therefore, there is no need to consider the cross-sectional area of contaminated aquifer that lies beyond the ends of the transect. Recommendation: If contamination is detected in a well at either end of the transect, the spreadsheet	The staff agrees with the comment. The RG has clarified the use of blocks and a monitoring well is centered in each block. The tritium concentrations used for each block apply over the entire width of the block. The user (e.g. professional hydrogeologists) setting up CSM and model parameters would consider these issues and should modify the model spreadsheet as needed.

		should allow entry of an estimate of the width and thickness of aquifer flowpath blocks that extend beyond the well. That estimate could be based on the spacing of other site wells in which contamination is detected, or some default distance (of perhaps 20 feet) could be assumed.	
NEI-37	Spreadsheet	Comment: The spreadsheet is simple, but fails to address aquitards or aquicludes within the transect or the impact the site construction might have on gradient flow. For example, excavation of native soil and backfilling with clay. In addition, the wells along the transect should be spaced evenly with borehole data (logs) to support strata identification. Recommendation: The model mirrors a surface-water slope conveyance discharge model. Each partition should not represent more than 8% of the total discharge in order for the measurement or discharge determination to be considered fair. Anything over 8% per section is considered poor.	The staff disagrees with the comment and no changes were made to the RG. Complexities are discussed in ANSI/ANS 2.17-2010 (2016). Site data from CSM should be implemented by user (e.g. professional hydrogeologist) while setting up the simple flux model in the spreadsheet model.
NEI-38	Spreadsheet	Comment: There is currently no guidance on how to use the spreadsheet. Recommendation: Develop a "user's guide" with instructions on how to use supplemental spreadsheet. Consider including guidance as an additional Appendix in DG-4025, or as a separate worksheet within the supplemental spreadsheet.	The staff agrees with the comment that additional guidance should be provided on use of the Appendix. The Appendix narrative was revised to include guidance on use of the spreadsheet.

NEI-39	Spreadsheet	Comment: Has the spreadsheet been subjected to appropriate software verification and validation? Recommendation: Subject the spreadsheet to NRC-acceptable levels of V&V and provide a statement in the user's guide.	The staff disagrees with the comment. The spreadsheet is an example of a spreadsheet that can be used to assess discharges of radioactive material to the unrestricted area. However, the spreadsheet is not a computer model that requires validation. The spreadsheet was tested on three existing NPP sites using real monitoring data. Both the data input and numerical calculations in the Appendix example were verified as correct.
NEI-40	Spreadsheet	Comment: The excel spreadsheet contains titles of the factors used to calculate groundwater flux as identified in the equations in the DG 4025 appendix. Rows 9 & 10 of the "Overview" worksheet identifies the factor names but does not include the associated mathematical symbols as provided in DG 4025 (e.g. ∇hj = hydraulic gradient) Recommendation: Insert the mathematical symbols associated with the factor names found in rows 9 & 10 of the Overview worksheet.	The staff disagrees with the comment, and no changes were made to the RG. Symbols are unnecessary since listed variables are fully spelled-out and unabbreviated.
NEI-41	Spreadsheet	Comment: The excel spreadsheet contains the substitute value of 500 pCi/L for any non-detect. It's unclear if this substitute value has any basis, or if it is intended that the site would revise this value based on the actual LLD used in the analysis. Recommendation: Provide guidance on deriving substitute values for any non-detect sample result	The staff agrees with the comment. Non-detect concentrations of 500 pCi/L were removed from the Appendix model and replaced with 0 pCi/L. This change is now consistent with the approach described in RG 1.21 (non-detectable activity is considered as zero effluent release).

NEI-42	General Comment	Comment: For licensees who are committed to this guide, in the event of a spill and leak, based on the discussion in this guide, the NRC would expect that site to implement this model or something comparable, to describe the flow of contaminants to GW. Despite the fact that this is supposed to be used during abnormal events, it appears the NRC, based on the calculation in the spreadsheet, expects that the sites will develop the transect cross section and maintain the spreadsheet, prior to or without an abnormal event occurring. Recommendation: For licensees committed to follow this guide, please clarify if the spreadsheet needs to be revised for each spill and leak event? Or are they expecting the spreadsheet to be dynamic over time, which negates the write up in the "Purpose" section about applicability?	The staff agrees with the comment that the RG describes an acceptable approach for modeling abnormal discharges; and the staff agrees that the approach described may entail collection and organization of information even when no abnormal discharge has occurred. The spreadsheet model outlined in the Appendix is an optional approach for a simple site. The user of the simple model (e.g. professional hydrogeologist) has flexibility to modify the simple model as additional data become available (e.g. additional wells or new leaks or spills). The licensee should determine when and how the spreadsheet is used, based on the CSM and the spills and leaks that occur at that site to determine the timing and amount of radioactive material discharged to the unrestricted area.
NEI-43	General Comment	Comment: The document provides a methodology for calculating the flux of groundwater and contained radioactivity from the site. However, it does not specify how that discharge/release is to be characterized for reporting purposes. Per the definitions in RG-1.21 Rev 2, would it be characterized as an abnormal discharge, abnormal release, uncontrolled discharge, uncontrolled release, unplanned discharge, or unplanned release? Should this "discharge" be included in the Supplemental Information Table, Table 2A, or Table 2B of the ARERR? As it now stands, there is no linkage to the ARERR.	The staff disagrees with the comment and no changes were made to the RG. Although this RG addresses assessing discharge to offsite environs, it is beyond its scope to go into details as to how to report releases. The reporting of abnormal releases should be in accordance with RG 1.21, Section 8.5.1, "Abnormal Releases or Abnormal Discharges" using the following thresholds for reporting abnormal releases and abnormal discharges in the RG 1.21 annual effluent report: a. abnormal releases or abnormal discharges that are voluntarily reported to local authorities under NEI 07-07, "Industry Ground Water Protection Initiative—Final Guidance Document," (Ref.50);

		Recommendation: Provide clarification on how to characterize and report the calculated "discharge".	b. abnormal releases or abnormal discharges estimated to exceed 100 gallons (380 liters) of radioactive liquid where the presence of licensed radioactive material is positively identified (in either the on-site environs or in the source of the leak or spill) as greater than the minimum detectable activity (the minimum detectable activity is a post-analysis calculation of sensitivity level based on the actual sample measurement) for the laboratory instrumentation. c. abnormal discharges to an unrestricted area. In accordance with RG 1.21, licensees may provide bounding analyses in lieu of performing detailed analyses.
NEI-44	General Comment	Comment: While having a simplistic model is useful, the simplicity of the approach limits its applicability to tritium. Since the approach relies on water flux, soluble and ionic radionuclides other than tritium would likely not be characterized correctly due to soil adsorption, exchange processes, Kd factors, etc. Recommendation: Provide appropriate cautionary statements to describe the limitations of the model used in DG-4025 as applied to other radionuclides.	The staff agrees with the comment. Limitations of the simple spreadsheet model have been added to Part C., page 7, paragraph 3. The RG endorses ANSI/ANS 2.17-2010 (2016) which does address this issue.

NEI-45	General Comment	Comment: The document does not recognize the importance of additional dilution that may be provided by other water sources that the groundwater enters into. For example, if the groundwater leaving the site enters a pond, canal, river, lake, or ocean, the additional dilution provided would reduce the impact. Although the purpose of DG-4025 is to provide an estimate of the groundwater that would leave the site and enter the other water body, the consideration of dilution should be recognized. Recommendation: Provide discussion about the importance of additional sources of dilution.	The staff disagrees with the comment and no changes were made to the RG. The dilution effects associated with groundwater release into water bodies off-site are beyond the scope of the guide.
NEI-46	General Comment (re: page 18)	Comment: The described method and illustration on Page 18 implies all wells are of equal importance with regard to concentration leaving the site. However, if one has a perimeter well close to the site boundary and downgradient of an indicator or sentinel well that is located farther onsite, the perimeter well should carry more "weight" with regard to its concentration contribution. For example, if a sentinel well located 300-feet from the site boundary shows 5000 pCi/L, whereas a downgradient perimeter well located 50-feet from the boundary indicates 500 pCi/L, the flux through that sector of the boundary transect should be calculated using primarily the data from the perimeter well. The upgradient sentinel well should carry little or no contribution. Recommendation: Provide discussion and guidance on how to handle sentinel and perimeter wells in the model.	The staff disagrees with the comment and made no changes to the RG. The model provides that blocks are defined based on the location of the monitoring wells. In each block, a simplistic flow model is assumed, which combined with the concentrations in each block's monitoring well, is used to calculate that blocks contribution to the total annual discharge to the unrestricted area.

NEI-47	General Comment	Comment: Several licensees have already developed methods to estimate the flux of water and entrained radioactivity offsite through groundwater. It should be stated clearly in DG-4025 that continued use of these site-developed models is an acceptable alternative to the approach described in DG-4025. Recommendation: Explicitly clarify that alternate methods and site-developed models are an acceptable alternative to this guide.	The staff agrees with the comment that site-specific models may be used to estimate the discharge of radioactivity to the unrestricted area. The RG Section C, Regulatory Position 1. now states: (1) Licensees should develop a site-specific ground-water flow and transport model for their sites. The model should be based on the complexity of geologic and hydrologic conditions, the types of radioactive materials and facility design, the types and effectiveness of engineered and natural barriers, and the proximity to surface water and ground-water receptors.

Diane D'Arrigo	General Comment	This is request for an extension on time to comment. In general, the goal should be to prevent any release of radioactive materials into water. In no case should the federal MCLs or Maximum Contamination Levels, promulgated by the Environmental Protection Agency under the Safe Drinking Water Act, be exceeded for ground water, surface water, any water. Since all water could at some point become drinking water, these levels should be applied as the maximum contamination to all releases, unless stricter (more protective i.e. lower concentrations) levels are applicable in which case, those should be applied. NRC's 10 CFR 30 and 10 CFR 50 levels are not protective enough especially for females and all young. Nuclear Information and Resource Service advocates for constant real time monitoring and public real time reporting in an understandable user-friendly way, of all radioactive releases into water (and air) in terms of amounts and concentrations radioactivity (not a calculated dose averaged over time). This should be at the expense of the polluter. Harmonizing standards should only be done if it strengthens the standards: should not be used to justify weaker protections (higher allowable releases).	The comment did not provide a basis for the request to extend the comment period, therefore no extension was provided. Minimization of radioactive effluents to as low as is reasonably achievable is a nuclear power plant general design criteria, regulatory requirement, and a license condition. This RG addresses the discharge of radioactivity into the unrestricted area after a release has already occurred from the plant into ground water. The comment addresses issues beyond the scope of the RG and therefore no changes were made.

Edward Johnson		The DG entitled "Assessment of Radioactive Discharges in Ground Water to the Unrestricted Area at Nuclear Power Plant Sites" Page 2 the following is found: GDC 60, "Control of Releases of Radioactive Materials to the Environment," states the nuclear power unit design shall include means to control suitably the release of radioactive materials in gaseous and liquid effluents and to handle radioactive solid wastes produced during normal reactor operation including anticipated operational occurrences. Sufficient holdup capacity shall be provided for retention of gaseous and liquid effluents containing radioactive materials particularly where unfavorable site environmental conditions can be expected to impose unusual operational limitations upon the release of such effluents to the environment. Comment 1: It is most bothersome when radioactive contaminates are produced at all considering the devastation of past nuclear plant operations as well as testing. For that reason "Control of Releases of Radioactive Materials to the Environment" is a nonstarter & should not be allowed period. Today Feb .9 found the following evolving situation in New York https ://www.rawstory.com /2016/02/new-york -orders-probe-after-nuclear-plant-leaks-radioactive-water-north-of-the -city/ New York orders probe after nuclear plant leaks radioactive water north of the city "Cuomo said in a statement the plant's operator, Entergy Corp, has informed him the contaminated water has not migrated off the site and poses no public health risk. "Though claimed by the operator that "contaminated water has not migrated off the site,"	The comments address issues beyond the scope of the RG and therefore no changes were made.

		it is my assumption based on reading what is being proposed this plant would be allowed to discharge radionuclide laden waters into the area adjacent to this or any nuclear plant. Totally Objectionable. Comment: The admission that beyond normal preventative “holdup capacity" which in & of itself should be the limit to anything allowable. A secondary provision is being established which allows a further intrusion of the lethal contaminate radionuclides’ into the public underground water table is unacceptable. The following articles establish clearly of the past when undesirable levels of these same radioactive substance penetrated the entire Columbia River below Hanford including the Estuarial areas of the Columbia as well Willapa Bay, Wash. Radioactive oysters in Willapa Bay. WA updated by Daniel (Mar 23, 2011) http://www.toxipedia.org/display/wanmec/Radioactive+oysters+in+Willapa+ Bay-WA "During the 1950's and 1960's, radioactivity from Hanford was found at high concentrations in shellfish in Willapa Bay at the mouth of the Columbia which extended for at least 200 miles into the Pacific Ocean. Beginning in 1959 zinc-59 levels in the oysters at Willapa Bay were being monitored. At that time levels of zinc-65, a radioactive byproduct of plutonium production, in Pacific coast oysters were 300 times greater oysters from Japanese and Atlantic waters. In the 1960's a Hanford employee set off radiation alarms when he entered the Hanford Site. Upon investigation it was determined that he had become radioactive from	

		eating a can of oyster stew that contained oysters harvested from Willapa Bay. " Additional Comment: Granted what happened in the above situation was resolved when those early version Type 1 reactors were phased out. However these new guidelines would create the possibility of such events reoccurring. The difference being a timeline for leakage would extend over 100's of years rather than direct impact as was the case in Willipa Bay oysters in 1959.	
Eileen Mahoud-Jose	General Comment	Whereas there is no known remediation possible once ground water is contaminated and whereas three –quarters of our aged, domestic reactors already leak tritium, the discovery of radioactive discharges in onsite test wells should be reason enough to shutter and decommission a plant. As case and point: I name Indian Point, just upriver from Manhattan and 29 miles from where I lie in Jew Jersey. I applaud Governor Cuomo's call for an investigation and ask the Commission to shut down this plant. It has operated for over 40 years and despite the utility's efforts to maintain and repair parts, this plant sits on miles of corroded irreplaceable underground pipes. It he Nuclear Regulatory Commission truly were committed to protecting people and the environment, it would have shut down 75% of our plants—those that leak tritium and will, at some point, contaminate drinking water. It would also have never agreed to relicense reactors with miles of corroded, irreplaceable underground pipes for 20-40 years beyond their design basis. Lastly, it would have shuttered all 23 domestic GE BWRs after the start of the triple ongoing nuclear melt-through at	The comment addresses issues beyond the scope of the RG and therefore no changes were made.

		Fukushima Dai-Ichi and required the filters your staff recommended to protect air, water, soil, milk, agriculture, and all living things from contamination from radioactive plumes.	
Erica Gray	General Comment	[February 8, 2016] Leaking radioactive substances into the environment is unacceptable! Considering the recent news, these old facilities should be shut down. 2/6/16 A leak at the Indian Point nuclear facility in New York has sent contamination into area groundwater causing radioactivity levels 65,000% higher than normal, the Gov. Andrew Cuomo said on Saturday. The groundwater beneath the nuclear plant, which does not contribute to drinking water, flows into the Hudson River at a point about 25 miles north of New York City. http://cnn.com/2016/02/06/us/nuclear-facility-gound-contamination-new-york/ Many nuclear power plants around the country are leaking. North Anna has had a radioactive tritium leak for years and they have not been able to find the leak to be able to fix it. http://www.richmond.com/business/article_6bd5b666-c2df-5b9d-89a-13e09db78e98.html	The comment addresses issues beyond the scope of the RG and therefore no changes were made.

Erica Gray	General Comment	Re: D: NRC-2015-0272-0002 [February 9, 2016] Assessment of Radioactive Discharges in Ground Water to the Unrestricted Area at Nuclear Power Plant sites: Request of comment on Draft Regulatory Guide Many of the nuclear power plants are leaking and with levels that exceed the EPA drinking water standards. North Anna has been leaking for years and yet Dominion has not been able to locate the leak, to be able to fix it. The draft guide should include: It the leak cannot be found and fixed the reactors(s) should be shut. And 10 CFR 50.75(g) should mandate cleanup while "operating". This is not acceptable: Although 10 CFR 50.75(g) discusses the requirements for records of any remaining residual contamination, there are no regulatory requirements which require remediation while the e power plant is operating. A licensee's decision to remediate contamination before the plant is decommissioned is typically based on several factors, including ALARA considerations for potential worker and public does, cost, feasibility, disposal options, and external stakeholder considerations. Like reply 2 hrs.	The comments address issues beyond the scope of the RG and therefore no changes were made.

Richard Burk	General Comments	While power plant safety should always be the highest priority, I think any assessment of groundwater contamination should be aligned with the latest recommendation of the Health Physics Society which rightly states that low levels of radiation should be considered "below regulatory concern". *Specific comments* *In accordance with current knowledge of radiation health risks, the Health Physics Society recommends against quantitative estimation of health risks below an individual dose of 5 rem*[1] *in one year or a lifetime e dose of 10 rem above that received from natural sources. Doses from natural background radiation in the United States average about 0.3 rem per year. A dose of 5 rem will be accumulated in the first 17 years of life and about 25 rem in a lifetime of 80 years. Estimation of health risk associated with radiation doses that are of similar magnitude as those received from natural sources should be strictly qualitative and encompass a range of hypothetical l health outcomes, including the possibility of no adverse health effects at such low levels.* *There is substantial and convincing scientific evidence for health risks following high-dose exposures. However, below 5-10 rem (which includes occupational and environmental exposures), risks of health effects are either too small to be observed or are nonexistent.*	The comment addresses issues beyond the scope of the RG and therefore no changes were made.

		In part because of the insurmountable intrinsic and methodological difficulties in determining if the health effects that are demonstrated at high radiation doses are also present at low doses, current radiation protection standards and practices are based on the premise that any radiation dose no matter how small, may result in detrimental health effects, such as cancer and hereditary genetic damage. Further, it is assumed that these effects are produced in direct proportion to the dose received, that is, doubling the radiation dose results in a doubling of the effect. These two assumptions lead to a dose-response relationship, often referred to as the linear, no-threshold model, for estimating health effects at radiation dose levels of interest. There is, however, substantial scientific evidence that this model is an oversimplification. It can be rejected for a number of specific cancers, such as bone cancer and chronic lymphocytic leukemia, and heritable genetic damage has not been observed in human studies. However, the effect of biological mechanisms such as DNA repair, bystander effect. and adaptive response on the induction of cancers and genetic mutations are not well understood and are not accounted for by the linear, no-threshold model. **Radiogenic Health Effects Have Not Been Consistently Demonstrated Below 10 Rem** Radiogenic health effects (primarily cancer) have been demonstrated in humans through epidemiological studies only at doses exceeding 5-10 rem delivered at high dose	

		rates. Below this dose, estimation of adverse health effect remains speculative. Risk estimates that are used to predict health effects in exposed individuals or populations are based on epidemiological studies of well-defined populations (for example, the Japanese survivors of the atomic bombings in 1945 and medical patients) exposed to relatively high doses delivered at high dose rates. Epidemiological studies have not demonstrated adverse health effects in individuals exposed to small doses (less than 10 rem) delivered in a period of many years. **Limit Quantitative Risk Assessment to Doses at or Above 5 Rem per Year or 10 Rem Lifetime** In view of the above, the Society has concluded that estimates of risk should be limited to individuals receiving a dose of 5 rem in one year or a lifetime dose of 10 rem in addition to natural background. In making risk estimates, specific organ doses and age-adjusted and gender- adjusted organ risk factors should be used. Below these doses, risk estimates should not be used. Expressions of risk should only be qualitative, that is, a range based on the uncertainties in estimating risk (NCRP 1997) emphasizing the inability to detect any increased health detriment (that is, zero health effects is a probable outcome). **Impact on Radiation Protection** Limiting the use of quantitative risk	

		assessment, as described above, has the following implications for radiation protection: (a) The possibility that health effects might occur at small doses should not be entirely discounted. The Health Physics Society also recognizes the practical advantages of the linear, no-threshold hypothesis to the practice of radiation protection. Nonetheless, risk assessment at low doses should focus on establishing a range of health outcomes in the dose range of interest and acknowledge the possibility of zero health effects. These assessments can be used to inform decision making with respect to cleanup of sites contaminated with radioactive material, disposition of slightly radioactive material, transport of radioactive material, etc. (b) Collective dose (the sum of individual doses in a defined exposed population expressed as person-rem) has been a useful index for quantifying dose in large populations and in comparing the magnitude of exposures from different radiation sources. However, collective dose may aggregate information excessively, for example, a large dose to a small number of people is not equivalent to a small dose to many people even if the collective doses are the same. Thus, for populations in which almost all individuals are estimated to receive a lifetime dose of less than 10 rem above background, collective dose is a highly speculative and uncertain measure of risk and should not be used for the purpose	

		of estimating population health risks. **Footnotes** [1] The rem is the unit of effective dose. In international units 1 rem = 0.01 Sievert (Sv)= 10 mSv. **References** National Council on Radiation Protection and Measurements. Uncertainties in fatal cancer risk estimates used in radiation protection. Bethesda, MD: NCRP; NCRP Report No. 126; 1997.	
Jon Warren Lentz	General Comment	Per Gofman & others there is no safe dose, therefore there is no acceptable level of discharge of radioactive substances into the environment, especially groundwater. If this basic criteria cannot be met then there is not reasonable basis (random murder aside) to continue, much less extend, the licenses for any and all nuclear generation stations.	The comment addresses issues beyond the scope of the RG and therefore no changes were made.
Lea Foushee	General Comment	No leachate to ground water should be allowed. Water is all we have between life and death and the death of all living things that require water, two leggeds, four leggeds, plants and forests. No exceptions, no stipulations, no excuses. If the nuclear industry cannot contain the poison zero discharge then SHUT THEM DOWN ALL of them.	The comment addresses issues beyond the scope of the RG and therefore no changes were made.

Maureen Roy	General Comment	In 2006, the US National Academy of Sciences concluded that there is no safe level of human exposure to ionizing radiation. Therefore no leakage of radioactive discharges in ground water is acceptable to the citizens of the United States of America	The comment addresses issues beyond the scope of the RG and therefore no changes were made.
Carol de Sa Campos	General Comment	At this time, considering climate change and drought vs flood conditions in different areas of the United States, I submit that the public needs to know nuclear waste sites' locations and whether or not there is any possibility, however remote, of contamination of our potable water whether above surface or underground. A shortage of water is imminent on the planet and the utmost care and caution must be taken to protect the people's "right to life." I submit that this in not only a Constitutional right, but a human right. Sincerely, A Citizen of the United States of America	The comment addresses issues beyond the scope of the RG and therefore no changes were made.
Ninette Jones	General Comment	The planet's lifeblood is water and without it we all die. I would rather sit in the dark with a glass of clean water than die of thirst under electric isotope light. The public ought to be made aware of all nuclear contamination and the ground water of the planet needs to be protected at all costs at all current sites in unrestricted areas or not. The public ought to be made aware of any possible threat and there is no room for error here.	The comment addresses issues beyond the scope of the RG and therefore no changes were made.

Patricia Borchmann	General Comment	The proposed Draft Regulatory Guidance as currently written appears to exclusively benefit NPP Licensees, contractors and subs, industry insiders, by forming an overly-lenient, and a careless guidance approach for use in assessing abnormal, inadvertent radioactive releases, that may result in discharges of contaminated groundwater from subsurface to unrestricted areas at commercial nuclear power plant sites. From a public stakeholders perspective, the proposed draft Regulatory Guidance provides no technical assurances, protective measures, or industry accountability that should require Licensees to fully demonstrate that radioactive discharges to groundwater were not caused by contractor's (retained by Licensee) negligence, or failure to apply all best engineering practices, modern real time monitoring, and best available control technology (BACT), to prevent radioactive discharges to groundwater from occurring tin the first place, or containment systems to capture, remove and transport contaminated discharges, if such were to be allowed to occur, either inadvertently or otherwise, normal or abnormal radioactive release to groundwater. From a stakeholder's perspective, it appears obvious the proposed Draft Regulatory Guidance only reflects views from nuclear industry experts, industry insiders, and industry experts in legal matters to minimize potential exposure to legal liabilities which may be caused by damages to groundwater, or agency failure to fully apply mandates for protection of public health and safety.	The comment addresses issues beyond the scope of the RG and therefore no changes were made.

		The proposed Draft Regulatory Guidance fails to reflect credible criticisms articulated by technical experts and health professionals outside the nuclear industry, regarding methods necessary to be applied in credible risk assessment of contaminated groundwater discharges. Based upon the apparent public health and safety breaches, and the apparent degradation of highly valued public safety margins, public stakeholders herby assert the proposed Draft Regulatory Guidance is a grossly unacceptable method to address abnormal, inadvertent radiological releases that may result in discharges of contaminated groundwater from subsurface to unrestricted areas at commercial nuclear power plant site(s) in the United States. Stakeholder also note that during preparation of the proposed Regulatory Guidance document, there does not appear to have been an extensive alternatives analysis, or comparison with methods applied elsewhere beyond the United States, to control radioactive discharges and release of contaminated groundwater from subsurface to unrestricted areas at nuclear power plants operating globally, to protect public health and safety of its. citizens.	
David Helker	General Comment	Exelon Generation Company, LLC (Exelon) appreciates the opportunity to comment on this subject. Exelon fully supports the comments submitted by the Nuclear Energy Institute (NEI) on behalf of the nuclear power industry related to this draft RG.	The staff takes no position on this comment and no changes were made to the RG.

T. Huber		Dominion has reviewed draft Regulatory Guide DG-4025 and provides the following comments. 1. DG-4025 provides a simple ground water flow and transport model for estimating offsite tritium from site releases. Initial review indicates the four Dominion nuclear sites, Surry, Millstone, Kewaunee, and North Anna, would not likely fit this simple model, and further adjustments to these sites' models would have to be made in accordance with guidance set forth in ANSI/ANS-2.17-2010. This proposed model does not provide the flexibility to accommodate site variables. This model should be expanded to include variables such as non-homogeneous sand layers, underground piping, etc. to accommodate more licensee sites. 2. Section C states that this guide is intended for use in a steady state flow in homogeneous sand layers. That is difficult to find in the restricted area of a site, based on the building and piping disturbances, unless the site has significant acreage. Unrestricted areas of a site or near the site may also be highly variable, depending on the distance from the plant, canal/lake locations, etc. Based on this, the model may apply to only specific areas of a site. 3. Tidal flux for two Dominion sites, Surry and Millstone, would complicate the proposed simple model, as it is not clear how the model accounts for the impact of tidal flux.	1. 1. The staff agrees with the suggestions in this comment. Use of this provided model is voluntary as outlined in Part D. "use by applicants and licensees." RG 4.25, Section C.4 provides this flexibility to adjust the model as follows: "If the site complexity and radionuclide release scenario do not permit simple analysis, the model provided in the appendix should be adjusted or a site-specific model should be used to account for site-specific characteristics using the guidance in ANSI/ANS-2.17-2010 (R2016)." 2. The staff agrees with the arguments in this comment. Limitations of the model are addressed in Part C, paragraph 2 and in Appendix, Step 1. 3. Please see resolution to Dominion Resources comment 1.

		4. DG-4025 states the site conceptual site model should be developed as specified in ANSI/ANS-2.17-10. Dominion sites have developed conceptual site models in conjunction with independent hydro geological studies/evaluations. It is recommended that an option or alternative to ANSJ/ANS-2.17-10 be included in DG-4025 to accommodate individual site evaluations.	4. The staff agrees with the comment. Part D. addresses this concerns of this comment. Use of the provided model is voluntary.
		5. The spreadsheet referenced in DG-4025 that describes a ground water flow and transport model for estimating offsite tritium activity flux is not available in the guide or from the NRC website. A valid review of this model is not possible without the spreadsheet, as it would provide the applied equations, assumptions, and relationships used to assess a discharge to the unrestricted area. The spreadsheet should be made available for a more thorough and meaningful evaluation of the model.	5. The staff agrees with the comment. The spreadsheet model file is available on the NRC web site with the Regulatory Guide.
		6. This model addresses total Curies released. A dose assessment to the maximally exposed individual, as performed for radiological effluents in accordance with licensees' Offsite Dose Calculation Manual following guidance such as R.G. 1.109, would be more meaningful in assessing the impact of releases to the unrestricted area. The effluent dose assessment should also be applied in the final Regulatory Guide.	6. Proposed text: The comment addresses issues beyond the scope of the RG and therefore no changes were made althought the staff agrees that RG 1.109 and the ODCM may be used to perform a dose assessment.
		7. DG-4025 should be considered in the context of NRC's Project AIM. The benefits of this DG in the context of improving regulatory efficiency and streamlining NRC processes to use resources more	7. The staff disagrees with the comment and no changes were made to the RG. This regulatory guide is specific to abnormal releases which may result in discharge to unrestricted areas. RG 1.21 does not provide a numerical model

		wisely should be evaluated. An alternative method for achieving the same goal is revising R.G. 1.21 to provide the guidance for assessing releases and groundwater discharges, including the modeling. Section 3.6 of RG 1.21 already addresses spills and leaks to ground water. The following question could be asked "Is creation of DG-4025 really necessary?"	that can be used to assess abnormal releases to the unrestricted area.
		8. The purpose statement in DG-4025 uses the term "abnormal" with inadvertent radioactive releases. It is suggested the term "abnormal" be defined or at least some boundaries/parameters be used to indicate when the model described in DG-4025 would be implemented. Is the intent of the Reg. Guide to apply to all radioisotopes in groundwater outside the Protected Area? It is not clear if it also applies to the licensee's final monitoring point, e.g. at the end of a discharge canal.	8. The staff agrees in part to this comment. The RG provides a definition of abnormal releases and abnormal discharges. This regulatory guide applies to all radioisotopes, not just tritium. It applies to inadvertent releases — not normal discharges from the licensee's normal discharge points.
		9. Reg. Guide 1.21 should be listed in the Related Guidance section as it is a primary reference most licensees are bound to for purposes of performing effluent dose calculations and evaluating various radiological effluent pathways. R.G. 1.21 is also one of the key references cited in the glossary of DG-4025.	9. The staff agrees with the comment. Regulatory Guide 1.21 is listed as the first item in the Related Guidance section.
		10. While it appears from the applicability statement that DG-4025 applies to plants in decommissioning/Safestor status, as 1OCFR20 and 1OCFR50 licensed sites, clarification of this would be beneficial.	10. The staff disagrees with the comment. Narrative in the "Applicability" section is sufficient since plants in decommissioning status retain their Part 50 licensees until terminated (after decommissioning is completed).

		11. Recognizing DG-4025 supports the NEI 07-07 program using existing guidance for performing liquid effluent dose pathway assessments, it is recommended DG-4025 include definitions of "inadvertent, “unplanned," and "controlled."	11. The staff agrees in part with the comment. The term “inadvertent” is not a regulatory term. Note: NEI 07-07 is not a licensing basis document and does not establish any regulatory requirement. However, the glossary does define related terms as used in the RG.