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NUCLEAR ENERGY INSTITUTE

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August 30, 1996

Mr. Michael E. Mayfield  
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U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**PROJECT NUMBER: 689**

Dear Mr. Mayfield:

The purpose of this letter is to provide you our comments on Draft Regulatory Guide DG-1053, "Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence." An advance copy of DG-1053 was placed in the NRC Public Document Room as information to support a public meeting later this year. These comments were developed by a task force representing utilities, NSSS vendors, an A/E firm, and EPRI. We believe you will find these comments constructive and beneficial as you prepare for the public meeting.

We commend the NRC staff on DG-1053; it is an improvement over its predecessor, Draft Regulatory Guide DG-1025, in its definition of criteria and discussion of methodology. We have enclosed two sets of comments, separated into technical (Enclosure 1) and editorial (Enclosure 2). Our review identified four topics which we believe are significant and warrant focused NRC staff attention. A brief summary of these are as follows:

- The NRC staff should sponsor a demonstration of DG-1053 using actual operating plant parameters. Such a demonstration will further clarify a number of provisions in the draft regulatory guide which are broadly defined. The demonstration will also assist in better qualifying the cost of implementation. This recommendation was identified during our initial comments on DG-1025 and we continue to believe that results of such an effort would significantly benefit the final document by validating scope, applicability, cost and methodology. (Comments #1, 2 and 4)

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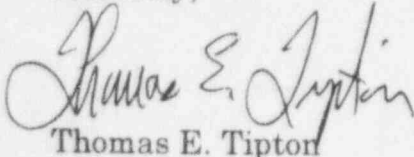
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- Use of the regulatory guide is anticipated to impact only a few licensee safety or compliance decisions. Therefore, we question the need for all licensees to use the regulatory guide and incur the large implementation expense. We recommend that criteria be developed to identify when licensees should use the regulatory guide. (Comment #2)
- The proposed regulatory guide states that measurements play an important role in a methodology's validation and that the measurement/calculational comparisons are the only way that biases can be quantified. However, DG-1053 provides limited discussion on the treatment of biases based on a combination of measurement and calculation. We recommend that the regulatory guide be revised to better clarify the treatment of biases and uncertainties using measurements and calculations. (Comments #26, 27, and 36)
- The reporting requirements defined in Section 3 are rather extensive and require submittal of information well beyond that which is required by current regulations. Considerable utility expenses will be associated with the reporting provisions of this draft regulatory guide. Therefore, we recommend that only the information necessary to demonstrate compliance with the regulations be transmitted to the NRC staff. Other information used in the fluence evaluation should be retained by the licensee or their contractor and may be reviewed on a plant-specific basis by the NRC staff. (Comments #31 and 35)

We appreciate the opportunity to review DG-1053 in advance of the forthcoming public meeting. If you have questions concerning our comments, please call either Alex Marion (202-739-8080) or Kurt Cozens (202-739-8085) of the NEI staff.

Sincerely,



Thomas E. Tipton

TET/KOC/ead  
Enclosures

c: Ms. C. J. Fairbanks, NRC/RES

## NEI COMMENTS ON DG-1053

## ENCLOSURE 1

| CMT # | PAGE #  | LINE #           | COMMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | PROPOSED CHANGE                                                                                                                                                                                                                                                                               |
|-------|---------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | General | -                | The original comments to DG-1025 requested the NRC staff to perform a demonstration of the draft regulatory guide with actual plant values. Such a demonstration using actual plant data has not been performed by the NRC staff. Such a demonstration would be beneficial in establishing validation of Industry requests additional discussion with NRC staff to discuss demonstration methods and cost estimations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | --                                                                                                                                                                                                                                                                                            |
| 2     | 1       | 32-34            | <p>DG-1053 recommends a detailed methodology to calculate reactor pressure vessel fluence. The methodology will enhance the fluence evaluation, but the cost to perform the analysis may not be balanced with the benefit of the enhanced evaluation. This lack of benefit is apparent for PWRs when they are significantly below the <math>RT_{NDT}</math> screening threshold criteria and for BWRs with a low fluence. We recommend the establishment of a criteria to determine when a licensee should choose to apply this regulatory guide. Examples of potential criteria may be: (1) PWR's exceed a <math>RT_{NDT}</math> of "<math>X</math>"°F or (2) BWRs exceed a fixed fluence value. The demonstration recommended in our Comment #1 may be used to establish appropriate criteria.</p> <p>The specific need for a threshold criteria is highlighted on page 1, line 34 which is vague about when the regulatory guide should be apply. The statement implies varying degrees of qualification. A fluence calculation is either consistent with the methods discussed in the regulatory guide or not. The statement in line 34 suggests otherwise.</p> | <p>Add criteria to the regulatory guide to define when its rigorous methodologies should be used by licensees.</p> <p>In addition, either delete the last sentence of the paragraph or describe which requirements of the guide may be relaxed in qualifying a "more approximate method."</p> |
| 3     | 2       | 2                | DG-1053 states that the public comments were received and "resolved." Several comments submitted by NEI (NUMARC) were dispositioned by the NRC staff, but have not necessarily been resolved with the commentor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Change "resolved" to "dispositioned."                                                                                                                                                                                                                                                         |
| 4     | 2       | 23               | The estimate of 880 hours to implement the requirements of this guide is low by a factor of at least four. Establishing valid cost estimates is one of the reasons a demonstration of the regulatory guide has been request in our Comment #1. This demonstration will also assist in defining some of the lesser defined regulatory guide requirements and the effort which their implementation will require.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | A demonstration of the use of the guide should be performed to verify the man-hours required to implement the regulatory guide.                                                                                                                                                               |
| 5     | 3<br>4  | 31 - 32<br>1 - 2 | <p>Conducting "an independent estimate of overall calculational uncertainty" is a costly evaluation. There is no independent validity to this type of uncertainty, and the suggested weighting process is arbitrary.</p> <p>With the calculational uncertainty having no defined validity and the weighting being arbitrary, we believe that this revision is unnecessary. If the NRC believes that there is a significant benefit to the calculational uncertainty, then we request that:</p> <p>(1) The cost be independently specified<br/> (2) The NRC fund an independent evaluation that industry monitors to determine the specific cost.<br/> (3) The independent evaluation be documented for industry to simply repeat the steps.</p>                                                                                                                                                                                                                                                                                                                                                                                                                     | Delete page 3 line 30 through page 4 line 2. If this text is not deleted, delete "independent" and change "uncertainty" to "precision".                                                                                                                                                       |

| CMT # | PAGE # | LINE #  | COMMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | PROPOSED CHANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|       |        |         | (4) The application of the results be specifically defined and related to the uncertainties in $\Delta T_{NOT}$ through Regulatory Guide 1.99, Rev. 2 and the generic PTS Safety Analysis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 6     | 4      | 8       | To be complete, add an extra statement after (4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Add "and (5) preparation of the basic nuclear cross sections."                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 7     | 5      | 3-5     | The 20% uncertainty value has been included explicitly, NUREG/CR-4183 "Pressurized Thermal Shock Evaluation of the H.B. Robinson, Unit 2 Nuclear Power Plant", Sept. 1985 pp. 277 and 647, states that the value should be 30% rather than the 20% used in DG-1053.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Revise the "20%" to "30%."                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 8     | 5      | 32 - 35 | The concept of using a conservative estimate seems to be a reasonable statement. However, the problem with such an open ended statement in a regulatory guide is subject to diverse interpretation. Too many times in the past, the industry has struggled to determine a "conservative" value and the NRC has arbitrarily defined and re-defined the value to provide additional conservatism. Furthermore, plant-specific information for compositions and dimensions are required by 10 CFR 50 and retained at the plant. Therefore, the NRC must either (a) define acceptable conservative variations in compositions and dimensions and the acceptable confidence level, or (b) require plant-specific information, or (c) require plant-specific variations and define acceptable confidence levels. | <p>1. Nominal compositions and design dimensions may be used, however, conservative estimates of the variations in the compositions and dimensions should be made and accounted for in the determination of the fluence uncertainty (Regulatory Position 1.4.3). Add acceptable variations for example:</p> <ul style="list-style-type: none"> <li>Composition, variations are acceptable if the standard deviation is a minimum of 10% and the confidence level is 68% with a normal distribution.</li> <li>Dimensional variations are acceptable if the standard deviation is a minimum of 15% and the confidence level is 68% with a normal distribution.</li> </ul> <p>2. In the absence of plant-specific information on biases, or non-conformance to fabrication specifications, nominal compositions and design dimensions may be used. However, in this case the variations in the compositions and dimensions should include the biases and tolerance deviations as well as the appropriate confidence levels in defining the uncertainties. The uncertainties and confidence levels should be accounted for in the determination of the fluence uncertainty (Regulatory Position 1.4.3).</p> |
| 9     | 6      | 10 - 11 | Section 1.1.2 states "The calculational method... should apply the latest version of the Evaluated Nuclear Data File (ENDF/B-VI). Page 2 defines "should" as: "Provisions that are expected to be complied with unless it is not possible..." Section 1.1.2.2 provides references 7-12 as examples of fine-group and collapsed multi-group libraries which satisfy the provisions of DG-1053. However, only Reference 12 is derived from ENDF/B-VI data. This is a conflict with the above mentioned statement in Section 1.1.2.                                                                                                                                                                                                                                                                           | Clarify 1.1.2 to assure that other cross section files are considered.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 10    | 6      | 15 - 18 | Changing to a new cross section library indicates that the industry's                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Remove this provision since no benefit exists if the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

| CMT # | PAGE # | LINE #     | COMMENT                                                                                                                                                                                                                                                                                                                                                                   | PROPOSED CHANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|       |        |            | methodologies will need to be re-qualified. The only method to determine whether or not use of a revised cross section set will result in "significant differences" will be to implement the cross section library and perform the benchmark analysis. This is very costly analysis.                                                                                      | cross section set has been qualified per the regulatory guide.<br><br>A parenthetical expression could be inserted which notes: "When the evaluated cross-section data change, the NRC will evaluate the changes relative to their 'standard problems' (Ref. 27) and advise industry of revised set's significance."                                                                                                                                                                                              |
| 11    | 8      | 2          | The meaning of the term "any atypical application" is vague.                                                                                                                                                                                                                                                                                                              | Add an example or two to clarify "any atypical application."                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 12    | 8      | 7 - 8      | There is no reference to the neutron source coming from qualified (safety and licensing approved) calculations or qualified measurements. How can detailed methods for calculating the fluence and measuring the dosimeter activities be described, but the source term have no qualification description? This implies that the source may be arbitrary and unqualified. | Replace the sentence on page 8, lines 7 and 8 with the following:<br><br>"The source as a function of three dimensional space must be based on qualified calculations and measured data. The calculations must incorporate design and, or operational data. The uncertainties in the source defined by the qualification of the calculations and, or the measurements must be the same as those used in Section 1.4.1, the "Analytic Uncertainty Analysis"."                                                      |
| 13    | 9      | 8-10       | When a method is prescribed in the DG for calculating a certain parameter and it refers to the method by example of reference i.e., (Ref. 16, 17) then the term "for example" should be in lieu of "may."                                                                                                                                                                 | In line 10, add "e.g.," before "(Ref. 16, 17)."                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 14    | 10     | 10         | Giving an upper bound for the number of meshes is not appropriate.                                                                                                                                                                                                                                                                                                        | Add "at least" to be consistent with page 9, line 23.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 15    | 10     | 18         | "at least 3 intervals per inch in water" is adequate for slow neutrons. For neutron energy above 1.0 MeV, mean free path is large.                                                                                                                                                                                                                                        | Change to 2 intervals per inch in water.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 16    | 11     | 22         | The word "many" is not appropriate except for cross sections, most other issues require at least 2-dimensional analyses.                                                                                                                                                                                                                                                  | Change "many" to "some".                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 17    | 14     | 29-31      | From "In addition..." We are unaware of any reference which could substantiate this statement.                                                                                                                                                                                                                                                                            | Please provide the reference which substantiates this statement or delete it from the DG.                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 18    | 11-12  | 33-38, 1-5 | The discussion regarding a spectral lead factor is vague. The Regulatory Guide 1.99 attenuation function that is referred to is a generic slope which is based on a dpa response function obtained from 2-dimensional transport calculations.                                                                                                                             | If the intent of the discussion in DG-1053 is to say:<br><br>a) Do not use fluence ( $E > 1.0$ MeV) to evaluate $RT_{NDT}$ or $RT_{PTS}$ at locations interior to the pressure vessel wall.<br><br>b) The spectrum shape within the pressure vessel wall should be accounted for in the assessment of $RT_{NDT}$ or $RT_{PTS}$ .<br><br>then, DG-1053 should state what energy dependent parameter is acceptable to the NRC for this "extrapolation". If dpa is acceptable, this guide should state this clearly. |

| CMT # | PAGE #   | LINE #             | COMMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | PROPOSED CHANGE                                                                                                                                                                                                                                                                |
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|       |          |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | If an acceptable parameter cannot be specified, this discussion should be deleted from DG-1053.                                                                                                                                                                                |
| 19    | 15       | 15                 | "Cross section" may be added to the list.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Add to list.                                                                                                                                                                                                                                                                   |
| 20    | 15       | 32                 | The analytical sensitivity study cannot, by itself, demonstrate accuracy, but only precision.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Change "accuracy" to "precision".                                                                                                                                                                                                                                              |
| 21    | 16<br>19 | 28-31<br>28        | NRC Figure 2 - Implication to evaluate an "Analytical Bias" Factor $B_a^c$ . There is no way to quantify systematic biases from this phase of the qualification procedure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Delete discussion of the determination of biases and eliminate $B_a^c$ .                                                                                                                                                                                                       |
| 22    | 17       | 13                 | Fluences at T/4 and 3T/4 can be obtained from Eq. (3) of RG 1.99 Rev. 2. The proposed benchmark is not needed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Change (2) to be optional.                                                                                                                                                                                                                                                     |
| 23    | 17<br>19 | 10 - 11<br>15 - 18 | <p>Page 17, Lines 10 and 11, contradicts Page 19, Lines 15 through 18. Page 17 states that calculational methods <u>must be</u> validated by comparison with calculational benchmarks. Page 18 states that the vessel fluence standard problem and shielding calculational benchmarks <u>may be</u> used for <u>Calculational Benchmarks</u>.</p> <p>As noted in our original comments to DG-1025, calculational benchmarks, with methods of the same quality (for example, DORT/BUGLE-93 test comparisons to DORT/BUGLE-93 reference results), do not provide benchmark verification unless the uncertainties and biases in the reference results are specified. Therefore, it is assumed that DG-1053 has changed the requirements to perform calculational benchmarks.</p> | <p>Page 17, Lines 10 and 11 should read as follows:</p> <p>"Calculational methods should be validated by comparison with measurement benchmarks and may be validated by calculational benchmarks."</p>                                                                         |
| 24    | 18       | 14 - 15            | The first part of this statement is not valid for the vendor laboratories. Quality verification, industry review, and reference field validation of the laboratory shows small uncertainties in the capsule and cavity measurements. However, the remaining part of the statement is valid independent of the first part.                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>Delete: "Recognizing the relatively large uncertainties in typical capsule and cavity measurements, ..."</p> <p>Revise to: "The measurements should not..."</p>                                                                                                             |
| 25    | 18       | 14 - 22            | Plant-specific biases in calculational inputs (dimensions, temperatures, and sources) can only be determined using measured data from the plant in question. The use of measured data to assess these biases should be recommended when reliable data is available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Delete the word "sufficient" from line 18.                                                                                                                                                                                                                                     |
| 26    | 18       | 19 - 22            | <p>While this requirement has some technical merits, it infers that following each fluence analysis the entire database shall be processed and that new biases and uncertainties shall be calculated. Even though DG-1053 has included the caveat "updated as necessary," it is not possible to determine if the biases and uncertainties should be updated without re-performing the complete analysis.</p> <p>If the benchmark requirements of DG-1053 are followed, the biases will be functionally constant and the uncertainties will be, by definition, constant. Thus there is no cost-benefit justification for updating the calculational biases and the corresponding uncertainties.</p>                                                                            | In line 18, eliminate the sentence starting with "Similarly ..." and replace with the following sentence, "The existence of plant-specific biases should be evaluated using reliable plant measurement data as available, and when appropriate this biases should be applied." |
| 27    | 19       | 31                 | There is a possibility of double counting uncertainties.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Insert after "... estimates.", the following sentence: "A component of $\sigma_a^c$ may be included in $\sigma_b^c$ , but should not be counted                                                                                                                                |

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|       |        |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (included) when defining $\sigma^c$ .                                                                                                                                                                                                                                                                                                                        |
| 28    | 20     | 3 - 11              | <p>Our Comment # 7 explains that the PTS fluence uncertainty was 30%.</p> <p>If the NRC staff has justification for the 20% fluence uncertainty, the <math>\phi_{BE}</math> term in Equation 5 is only valid if <math>\sigma^c</math> is less than or equal to 20%. If <math>\sigma^c</math> is greater than 20%, <math>\phi_{BE}</math> will be a bounding fluence. Therefore <math>\phi_{BE}</math> is an inappropriate term and should be eliminated from the equation.</p>                                  | On line 3, change "20%" to "30%". On lines 3 through 11, delete the text which begins "In ..."                                                                                                                                                                                                                                                               |
| 29    | 21     | 14-15               | <p>The regulatory guide should focus only on the analysis of existing data, not the definition of appropriate dosimeters.</p> <p>Most BWR surveillance capsules contain only Cu, Fe, and Ni dosimeters. These three sensors do not provide spectrum coverage "equivalent" to the sensor set listed in Table 2. This sentence would seem to disqualify BWR dosimetry from meeting the requirements of this regulatory guide.</p>                                                                                 | Change "must" to "should".                                                                                                                                                                                                                                                                                                                                   |
| 30    | 23     | 25 - 27<br>34 - 35+ | For Davis Besse's 306 dosimeters, it required a 475 page report ("Cavity Dosimetry Benchmark Experiment") to provide the measurement uncertainty data requested in DG-1053 evaluation. The NRC has the authority to audit the benchmark measurement uncertainty data at any time. Therefore, the cost benefit to submit such a large volume of data is unwarranted.                                                                                                                                             | Revise line 25-27 from "...included in an uncertainty table that identifies the specific components of uncertainty contributing to each detector response." to: "...maintained in the licensee's record center."                                                                                                                                             |
| 31    | 24     | 6 - 8               | Measurement techniques will be validated in a reference field as part of the methodology benchmark. If nothing changes, it is not cost effective to perform the validation more than once.                                                                                                                                                                                                                                                                                                                      | Change the two sentences on lines 6 through 10 to:                                                                                                                                                                                                                                                                                                           |
|       | 24     | 8 - 10              | The dosimetry measurement uncertainties have not shown any evidence of increasing with time. Furthermore, each fluence evaluation will have benchmarks of calculations and measurements which will provide evidence of measurement uncertainty increases. In addition, the laboratories have valid quality programs that appropriately consider procedures, equipment, and personnel. Therefore, no measurement benchmarking in a reference field (beyond the initial validation discussed above) is necessary. | "To ensure long-term measurement consistency and confirm measurement uncertainties the dosimeter set being used should be irradiated in a reference field and the resulting specific activity (determined by the operator of the reference field facility) should be compared to the specific activities of the same dosimeters determined by the licensee." |
| 32    | 24     | 26 - 28             | Reporting the C/E ratios for the individual detectors used in the measurement validation process neither support the calculation-based fluence methodology, nor is there reason to validate fluence values determined from the measurement.                                                                                                                                                                                                                                                                     | <p>In line 27, revise the term "C/E ratios" to "M/M ratios".</p> <p>The definition of M/M ratio is: Measured specific activity as determined by the laboratory divided by the measured specific activity as measured by the reference field facility.</p>                                                                                                    |
| 33    | 25     | 6-11                | Industry comments to DG-1025 recommended the addition of this paragraph. Other changes made in DG-1053 have made the addition of this paragraph unnecessary.                                                                                                                                                                                                                                                                                                                                                    | Delete the paragraph.                                                                                                                                                                                                                                                                                                                                        |
| 34    | 27     | 2                   | The best estimate fluence is discussed in Sections 1 and 2 of the regulatory guide, but is not discussed in Section 3, the reporting requirements.                                                                                                                                                                                                                                                                                                                                                              | <p>Add to the sentence ending on line 2, the following:</p> <p>"... all values of the neutron fluence that are to be reported, as defined in Section 3.3, should be reported as "best estimate" values, i.e., <math>\phi_{BE} = (1 + B^C) \phi_C</math> (See</p>                                                                                             |

| CMT # | PAGE # | LINE #  | COMMENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | PROPOSED CHANGE                                                                                                                                                                                                                                                                                               |
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|       |        |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Figure 1)"                                                                                                                                                                                                                                                                                                    |
| 35    | 27     | 17 - 20 | Reporting of multi-group fluences is not cost effective because there are no technical benefits or uses for multi-group fluences. This is particularly true for the T/4 or 3T/4 fluence calculation requirement since in-vessel fluences are prescribed by the inside surface fluence as prescribed in 10 CFR Part 50, Appendix G, not from DORT calculations.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Delete lines 17 - 19 and the first 8 words of line 20.                                                                                                                                                                                                                                                        |
| 36    | 28     | 1 - 7   | The qualification of the calculational methods using the greater than 1.0 MeV fluence is an obsolete and poor technical approach when compared to the approach of using the activities (reaction rates) from each dosimeter type. The fluence is determined by processing several dosimeter types in the energy range above 1.0 MeV. Comparing calculated and measured fluences then compares a weighted average of the dosimeter results. If the fluences were determined by copper and uranium dosimeters, and the copper activities were 10% high and the uranium activities 10% low, the fluence comparison would suggest no bias and no uncertainty. However, if the copper activities are independently compared to the calculations and likewise the uranium activities, then there would be a clear indication of a spectrum bias in the calculations and an indication of some uncertainty. | The calculated and measured reaction rates (or other responses as described in Regulatory Position 2.3) must be reported. If the qualification of the calculational method is also performed using fluence comparisons, the measured and calculated [E > 1 MeV] integral neutron fluences should be reported. |
| 37    | 28     | 23-24   | (Last word) It might be more appropriate to use an alternative phrase rather than "thermal shield".                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Change to "detector cover."                                                                                                                                                                                                                                                                                   |
| 38    | 35     | Fig. 1  | Several transport codes are available.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Add a note that the DOT code listed here is for illustrative purposes only.                                                                                                                                                                                                                                   |

| CMT # | PAGE # | LINE # | COMMENT                                                                              | PROPOSED CHANGE                                   |
|-------|--------|--------|--------------------------------------------------------------------------------------|---------------------------------------------------|
| 1     | 1      | 20,30  | The last letter in the subscripts for RT-NDT and RT-PTS appears to be superscripted. | Correct                                           |
| 2     | 3      | 4      | For consistency, change "PWR" to "pressurized water reactor (PWR)".                  | Correct                                           |
| 3     | 3      | 13     | Change RT <sub>PTS</sub> to RT <sub>PTS</sub>                                        | Correct                                           |
| 4     | 5      | 23     | The "baffle" component is called a "shroud" at some plants.                          | Revise the term "baffle" to read "baffle/shroud". |
| 5     | 6      | 21     | Change "con-tained" to "contained"                                                   | Correct                                           |
| 6     | 8      | 22     | The term "neutron-damage" is not consistent within the DG.                           | Delete the term "damage".                         |
| 7     | 9      | 28     | A parenthesis is missing before "θ".                                                 | Correct                                           |