Exelon Generation
4300 Winfield Road
Warrenville, IL 60555



Exelon. Nuclear

10 CFR 50.90

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject Additional Information Supporting the Request for License Amendment Regarding Elimination of Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions During Startup Mode

References:

1. Letter from Mr. Jeffrey L. Hansen (Exelon Generation Company, LLC) to U. S. NRC, "License Amendment Request to Eliminate Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions during Startup Mode," dated October 4, 2010

2. Letter from U. S. NRC to Mr. Michael J. Pacilio (Exelon Nuclear), "Dresden Nuclear Power Station, Units 2 and 3 – Request for Additional Information Related to Elimination of Main Steam Isolation Valve Closure and Low Condenser Scram (TAC Nos. ME4844 and ME4845) (RS-10-021)," dated February 4, 2011

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Renewed Facility Operating License Nos. DPR-19 and DPR-25 for Dresden Nuclear Power Station (DNPS), Units 2 and 3, respectively. Specifically, the proposed amendment revises the applicability of FOL Appendix A, Technical Specification (TS) 3.3.1.1, "Reactor Protection System (RPS) Instrumentation," Table 3.3.1.1-1, "Reactor Protection System Instrumentation," Function 5, "Main Steam Isolation Valve - Closure," and Function 10, "Turbine Condenser Vacuum – Low," to enable implementation of a modification that will eliminate these functions while in Mode 2 with reactor pressure greater than or equal to 600 psig. In addition, the proposed amendment deletes TS Table 3.3.1.1-1 footnote (c), and Required Action F.2 of TS 3.3.1.1, consistent with the revised applicability for Functions 5 and 10. Finally, the proposed amendment renames TS Table 3.3.1.1-1 footnote (d) to footnote (c).

In Reference 2, the NRC requested that EGC provide additional information in support of their review of Reference 1. The NRC request for additional information and the specific EGC responses are provided in Attachments 1 and 2 to this letter.

Attachment 2 to this letter contains proprietary information as defined by 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." GE – Hitachi Nuclear Energy Americas, LLC (GEH) as the owner of the proprietary information, has executed an affidavit (Attachment 3), which identifies that the enclosed proprietary information has been handled and classified as proprietary, is customarily handled in confidence, and has been withheld from public disclosure. The proprietary information was provided to EGC in a GEH transmittal that is referenced by the affidavit. The proprietary information has been faithfully reproduced in the enclosed such that the affidavit remains applicable. GEH hereby requests that the enclosed proprietary information in Attachment 2 be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. Attachment 4 to this letter provides a non-proprietary version of Attachment 2.

EGC has reviewed the information supporting a finding of no significant hazards consideration that was provided to the NRC in Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. No new regulatory commitments are established by this submittal.

If you have any questions concerning this letter, please contact Mr. Timothy A. Byam at (630) 657-2804.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the $6^{th}$ day of April 2011.

Respectfully,

Jeffrey L. Hansen
Manager – Licensing
Exelon Generation Company, LLC

Attachments

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|---|---|
| Attachment 1: | Response to NRC RAI Question 2 Supporting the Request for License Amendment Regarding Elimination of Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions During Startup Mode |
| Attachment 2: | Responses to NRC RAI Questions 1, 3 and 4 Supporting the Request for License Amendment Regarding Elimination of Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions During Startup Mode (GEH Proprietary Information) |

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| Attachment 3: | GE Affidavit for Withholding Portions of RAI Response from Public Disclosure |
| Attachment 4: | Responses to NRC RAI Questions 1, 3 and 4 Supporting the Request for License Amendment Regarding Elimination of Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions During Startup Mode (Non-Proprietary) |

# ATTACHMENT 1

Response to NRC RAI Question 2 Supporting the Request for License Amendment Regarding Elimination of Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions During Startup Mode

# ATTACHMENT 1

Response to NRC RAI Question 2 Supporting the Request for License Amendment Regarding Elimination of Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions During Startup Mode

NRC RAI Question 2:
*In 1974, when the tests were conducted at the Browns Ferry Nuclear (BFN) plant, the BFN plant was not operating within the Maximum Extended Load Line Limit Analysis (MELLLA) domain and at Extended Power Uprate (EPU). Whereas, Dresden is currently operating at EPU within MELLLA domain. Given significant differences between the operating condition and design of the two plants, please justify how the test data obtained for BFN is applicable for comparison to Dresden.*

EGC Response:
Dresden Nuclear Power Station (DNPS) recognized that additional engineering analysis of the BFN test report would be required to demonstrate the applicability of the BFN conclusions to DNPS Units 2 & 3. GEH was contracted to perform the necessary engineering analysis. GEH did perform the stand alone analysis for DNPS Units 2 & 3 which was submitted as Attachment 4 to the Exelon Generation Company, LLC license amendment request dated October 4, 2010 (ADAMS Accession No. ML102800136). The subject GEH analysis was performed for low power phenomena since the functions in question are associated with scram requirements in MODE 2 with reactor pressure vessel dome pressure greater than 600 psig. Therefore, the GEH analysis was limited to startup operation only (i.e., Mode 2) with reactor thermal power less than 5 percent of rated power and reactor pressure vessel dome pressure greater than 600 psig, but less than 1005 psig. This operating condition is significantly different than the operating conditions in the MELLLA region and clearly not near the licensed power limit of 2957 megawatts thermal.

Based on the above, the fact that the BFN plant was not licensed to operate in the MELLLA region does not impact the applicability of the test data to the DNPS.

ATTACHMENT 3

GE Affidavit for Withholding Portions of RAI Responses from Public Disclosure

# GE-Hitachi Nuclear Energy Americas LLC

## AFFIDAVIT

**I, Edward D. Schrull, PE** state as follows:

(1) I am the Vice President, Regulatory Affairs, Services Licensing, GE-Hitachi Nuclear Energy Americas LLC ("GEH"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GEH letter, 7491-1-2M27SZ-1, "Dresden Mode 2 High Pressure Scram Elimination RAI Responses," dated April 4, 2011. The GEH proprietary information in Enclosure 1, which is entitled "Dresden RAI Response - Proprietary" is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] Figures and large equation objects containing GEH proprietary information are identified with double square brackets before and after the object. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for trade secrets (Exemption 4). The material for which exemption from disclosure is here sought also qualifies under the narrower definition of trade secret, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F2d 871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F2d 1280 (DC Cir. 1983).

(4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. Some examples of categories of information that fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information that discloses trade secret and/or potentially patentable subject matter for which it may be desirable to obtain patent protection.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary and/or confidentiality agreements that provide for maintaining the information in confidence. The initial designation of this information as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in the following paragraphs (6) and (7).

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited to a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary and/or confidentiality agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains the detailed results, including the process and methodology, for application of TRACG to the performance of evaluations for BWRs. This TRACG code has been developed by GEH for over fifteen years. The development, reporting, evaluation and interpretations of the results, as they relate to the BWR, were achieved at a significant cost to GEH.

The development of the evaluation processes along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH. The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial. GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 4th day of April 2011.

Edward D. Schrull, PE
Vice President, Regulatory Affairs
Services Licensing
GE-Hitachi Nuclear Energy Americas LLC
3901 Castle Hayne Rd.
Wilmington, NC 28401
Edward.Schrull@ge.com

ATTACHMENT 4

Responses to NRC RAI Questions 1, 3 and 4 Supporting the Request for License Amendment Regarding Elimination of Main Steam Isolation Valve Closure and Low Condenser Vacuum Scram Functions During Startup Mode
(Non-Proprietary)

**Enclosure 2**

**GEH Letter – 7491-1-2M27SZ-1**
**GEH Responses to Dresden RAIs**

Non-Proprietary Information - Class I (Public)

**Non-Proprietary Notice**

This is a non-proprietary version of the Enclosure 1 of GEH Letter – 7491-1-2M27SZ-1 which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[ ]].

**NRC RAI 1**

*In General Electric Nuclear Energy Service Information Letter (SIL) 107, "Increasing Flexibility of Reactor Startups," dated October 31, 1974 (SIL-107), section titled, "Recommended Action" for boiling water reactor (BWR)/1, 2 and 3 plants, it stated,*

> *Any utility with a plant in this group who wishes to further explore the possibility of "bottled-up" startups should contact its normal General Electric service representative for a quotation concerning engineering analysis and testing.*

*It is not clear from the language used in SIL-107 that its recommendation gives the licensee a choice between performing either an engineering analysis or a test, as was suggested by the licensee in its submittal dated October 4, 2010 (the submittal). Rather, the SIL appears to recommend the performance both testing and analysis to justify "bottled-up" startups for BWR/1, 2 and 3 plants. Explain why performing an engineering analysis alone is sufficient justification for "bottled-up" startups for Dresden.*

**GEH Response**

The following discussion includes three elements pertinent to this question. First the background on the basis for the SIL –107 recommendation for BWR/3, second the background for the analytical only approach for Dresden, and last the industry application of elimination of the isolation scram in Mode 2. The aim of this discussion is to document the reason for excluding application of the test results to non-BWR/4 plants as stated in both the SIL and the Test report; however, application to later BWRs has been made based on common design considerations. This is possible because under low power start-up conditions no significant difference exists for BWR/3 to ABWR plant designs.

(a) In order to understand the stated requirements in SIL-107, discussions were held with GE personnel involved with the original test performance and SIL development. The desire to operate at higher than 600 pounds per square inch gauge (psig) reactor pressure prior to establishing the pressure control function was identified following the startup of BWR/2 and BWR/3 type plants. Studies were performed to understand the phenomena for these later direct-cycle BWR/2 and BWR/3 plants, concluding that although reactor dynamic behavior at this low power could not be analytically calculated at that time, system stability at such low power was not expected to be a problem as it was for the BWR/1 plant. Thus a test was proposed to demonstrate the system stability, and was performed for the startup of a BWR/4 (i.e., Browns Ferry Unit 1). The BWR/4 plant types were regarded as the first standardized designs, whereas the earlier BWR/1, BWR/2 and BWR/3 plants were regarded as plants of unique designs. This standardized plant concept made it difficult to generically extend the test results to earlier BWRs, as well as to potentially different future BWR designs. Therefore, SIL-107 recommended that each earlier BWR plant must be considered on an individual basis to determine bottled-up operating capability by a similar test procedure. In practice, the test results described in SIL-107 have been applied to all BWR/4 plants, including smaller sized reactor vessels, and all later BWR designs (i.e., BWR/5, BWR/6 and ABWR) without specific test contrary to what is stated in the NEDO-20697 Test report.

(b) The rationale for an analytical only approach in justifying the BWR/4 test results to other BWR designs, including later BWRs and Dresden, is based on the understanding of the key phenomena responsible for the 1966 pressure-power oscillations in the BWR/1 plant. The undesirable behavior was experienced during the startup of the Gundremmingen (KRB-A) Nuclear Power Station, which is a dual cycle BWR/1 plant. The phenomenon is described in the start-up report as a pressure-power oscillation during heatup near rated temperature with no primary steam flow. As reactor pressure is increased, the voids are collapsed which provides a pressure coefficient with a positive feedback effect on reactor power. The pressure coefficient is equivalent to the void coefficient and the pressure/void relationship applies to these terms. The phenomenon was corrected by allowing flow to the pressure regulator thus eliminating the pressure-power feedback. The pressure coefficient is not significantly different between different BWR core and fuel designs for these low void start-up conditions to prevent this phenomenon from occurring. Therefore, the primary factor expected to cause the phenomenon (i.e., undesirable power/pressure increase) is the relatively high pressure increase due to a normal power increase from control rod withdrawal. [[

]] During testing of the BWR/4 significant pressure and power perturbations were introduced at the typical startup power conditions for the pressure range of interest. [[

]] Additionally, a large pressure perturbation was introduced by opening and closing bypass valves to verify stability with respect to pressure and power behavior without pressure control. The BWR/4 test was simulated using a TRACG model of the Dresden plant to further demonstrate that the expected behavior would be similar to that of the test, namely that significant pressure perturbations will be acceptably damped.

(c) Quad Cities had the scram removed during the original Technical Specification development. The basis used was that this phenomenon was not expected to occur, as had been demonstrated in the BWR/4 test. Furthermore, it was noted that any significant oscillation would result in a high pressure or high flux Scram to terminate the event, the resulting Start-up Mode 2 event would be significantly less than the limiting design basis at Run Mode 1 rated power event. When the Start-up Mode 2 high pressure isolation Scram is removed, BWR plants may start-up isolated and reach operating pressure at very low power; however, this is in practice not a desirable procedure since the balance of plant systems would be brought on line simultaneously with the reactor systems. Start-up isolation and low condenser vacuum scram removal eliminates unnecessary scrams in Mode 2 as systems are being brought online at higher pressures. Therefore, it is desirable for Dresden to eliminate the Start-up scram and conform to the Quad Cities configuration.

**NRC RAI 3**

*In Section 1.1 of the NRC staff's safety evaluation for NEDE-32906P "Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS [anticipated transient without scram] Overpressure Transients," dated July 10, 2009 it states:*

> *...the NRC staff review is limited to the application of the methodology to AOO [abnormal operating occurrence], ASME overpressure, and ATWS overpressure transient analyses. Therefore, the NRC staff approval of the subject LTR does not constitute generic approval of the TRACG04/PANAC11 methodology to all transient applications.*

*Since the transient analyzed in Attachment 4 of the submittal is not classified as a typical AOO, and that the NRC staff's approval of the TRACG04/PANAC11 methodology does not constitute generic approval for all transient applications, provide detailed technical justification regarding applicability of the methodology to support elimination of main steam isolation valve closure and low condenser vacuum scram functions during startup mode for Dresden.*

**GEH Response**

In this response, report refers to GEH 0000-0090-6825-R0 titled "Dresden Units 2 and 3 TRACG Analysis to Support Elimination of Mode 2 Scram Requirement." It is correct, as the NRC staff points out, that NEDE-32906P "Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients" is not relied upon and is therefore not referenced in this report. Although the scenarios analyzed in the report are not the same as for AOO transients that were previously approved by the NRC, the important phenomena are the same. It is this fact that allows the qualification basis referenced for AOO transients to also apply to the scenarios analyzed in the report. The following paragraphs of this response describe how the application ranges of all key quantities related to important phenomena considered in the report are bounded by AOO transients. The report itself was intended to provide the technical justification regarding the applicability of the TRACG methodology for the stated application through the presentation of many sample calculations to demonstrate that the TRACG code provides a reasonable and realistic simulation of the Dresden plant over the operating conditions range of interest.

NEDE-32177P, Rev. 3 "TRACG Qualification" documenting the qualification for the TRACG code is cited as Reference 9 in the report. This is the same reference that was used to support NEDE-32906P titled "Migration to TRACG04/PANAC11 from TRACG02/PANAC10 for TRACG AOO and ATWS Overpressure Transients." We acknowledge that the current application is not an AOO transient; however, the current use of TRACG to support elimination of the Mode 2 scram requirement is well within the qualified range of the code which supports many other applications that also are not AOO transients. The conclusion that the documented code qualification ranges are adequate for our particular application has further been supported by the additional comparisons of TRACG calculations to the data from a particularly relevant pressure perturbation test performed at Browns Ferry. Section 5.2.1 of the report contains the details for the simulation and discusses how the calculated results compare to the Browns Ferry transient test data. The test data is tabulated in Table 5.2.1 and is plotted on the comparison plots in Figures 5.2.1-4, 5, 6, 10, 11, and 12 of the report. The tabulated test data are representative of the ranges of application for the dome pressure, level, and core flow that are addressed to support elimination of the Mode 2 scram requirement. Since these are the key quantities, they can be compared to the broader ranges covered in AOO applications.

[[

]] The results from pressure perturbations imposed upon these so-called "low pressure analysis" are presented in Section 5.2.2 of the report.

When considering the qualification ranges of TRACG it is useful to consider as representative the ranges for the Browns Ferry test data in Table 5.2.1. The dome pressures in Table 5.2.1 are on the lower end of the spectrum of AOO applications. Nevertheless, they are still well above the minimum pressure one would expect from a representative AOO pressure regulator failed open (PRFO) transient (see Table 8-4 of NEDE-32906P-A, Revision 3). The elimination of the Mode 2 scram requirement concerns raising the pressure range that is allowed in startup prior to establishing condenser vacuum so even lower pressure ranges that are already allowed are not a concern.

The level data in Table 5.2.1 vary substantially around the middle of the ranges covered by AOO transients. [[

]]

The core flow data in Table 5.2.1 are on the lower end of the spectrum of AOO applications. [[

]]

AOO transients mainly focus on the calculation of the transient critical power ratio (CPR). CPR is not relevant during startup because thermal limits are far from limiting and in fact are not required to be monitored provided the total core power is below a value of about 20% to 25% (depending on specific Technical Specifications). [[

]]

**NRC RAI 4**

*As NEDE-32906P-A (Supplement 3), does not provide full justification for each specific individual plant application for TRACG, provide the following information:*

- *a) The specific guidelines used to develop the plant-specific nodalization. Any deviations from the reference plant should be described and defended, and*
- *b) Sensitivity studies showing the effects of any plant-specific parameters which have been identified as being outside the range used in demonstrating acceptable code performance deviation.*

**GEH Response**

In this response, report refers to GEH 0000-0090-6825-R0 titled "Dresden Units 2 and 3 TRACG Analysis to Support Elimination of Mode 2 Scram Requirement".

The specific guidelines used to develop the plant-specific nodalization for the current TRACG application to support elimination of the Mode 2 scram requirement are the same as those applied when performing plant-specific AOO transient applications. [[

]]. The response to RAI #3 further supports this conclusion.

Guidelines for constructing the TRACG inputs for an AOO application are described in NEDE-32906P-A, Revision 3. All TRACG applications utilize guidelines established by applying standard BWR nodalization strategies for each TRACG application as an integral part of the qualification of the code. Chapter 6 of NEDE-32177P, Revision 3 (cited as Reference 9 in the report) describes the process.

Section 4.2.1 of the report describes how an AOO plant-specific base deck for Dresden Unit 3 obtained from Reference 5 was the starting point for the current application. The modifications to the base deck were limited to those inputs needed to define the thermal-hydraulic initial conditions. The response to RAI #3 indicates how such modifications are within the qualified range of thermal-hydraulic conditions that are treated when performing AOO analyses.

The base deck was obtained from Reference 5 cited in the report because it had already been benchmarked against two turbine trip events that occurred at Dresden in January 2004. As stated in Section 4.2.2 of the report, this benchmarking provided additional validation and demonstrated evidence that the TRACG model to be used in the current analysis provided a realistic simulation of the Dresden plant.

*None of the inputs for the plant-specific parameters are outside the range used in demonstrating acceptable code performance for AOO transient applications.* Furthermore, the extension of the qualification basis to include the specific application of TRACG to support elimination of

Mode 2 scram requirement has been demonstrated in Section 5.2.1 of the report by comparison of the calculated results to relevant Browns Ferry transient test data. Those plant-specific items that are different between Dresden and Browns Ferry are also discussed in Section 5.2.1 of the report.