



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

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RECEIVED APR 24 2006

Directorate of Power Reactor Regulation

April 18, 2006

Your file Votre référence

Our file Notre référence

1-1-16-4

Mr. Shawn-Patrick Stensil
Energy Campaigner
Greenpeace Canada
250 Dundas St. W., Suite 605
Toronto, Ontario, Canada
M5T 2Z5

Dear Mr. Stensil:

Thank you for your March 24, 2006 e-mail requesting information about regulatory documents for licensing of new nuclear power plants.

Your request, I understand, follows up on the public information meeting hosted by the CNSC on February 24 on the topic of the licensing process for new power plants.

As I noted in my reply to your questions at the meeting, the CNSC is studying what documents may be needed to complete a clear and pragmatic regulatory framework for new nuclear power plants. Those plans are yet finalized.

CNSC staff recently carried out an internal review of the new regulatory standards and guides that may be needed to complete the regulatory framework for new nuclear power plants, taking account of existing and planned documents, and drawing upon the standards framework of the International Atomic Energy Agency and the established practices of other national nuclear regulatory bodies. The results of that review are found in the attached memorandum (Reference 1).

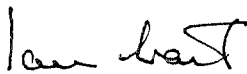
Please note that this memorandum was prepared for the purposes of estimating the number of documents needed to complete the regulatory framework for new nuclear power plants and the resources needed to produce them. It's important also to note that proposed document framework suggested in the report has not yet been fully reviewed by CNSC management.

Preliminary work has advanced in a few key areas. As I believe you know, staff prepared a preliminary draft standard for design requirements. This document is now being redrafted as part of the CNSC's formal regulatory documents program and will be published for public consultation in due course. Options for a siting guide are currently being examined.

Looking ahead, I expect that the list of titles and the draft documents themselves will be available through the CNSC regulatory documents program. The CNSC maintains an open and transparent consultative process for the development of regulatory documents, in which all stakeholders have the opportunity to provide comments.

Ms. Beverly Ecroyd would be pleased to provide further information regarding the regulatory documents program. You can contact Ms. Ecroyd at (613) 947-3349 or by email at ecroydb@cnscccsn.gc.ca.

Sincerely,



Ian M. Grant
Director General

Reference:

1. CNSC Memorandum, D. G. Miller to I. Grant and G. Rzentkowski, "Estimate of Resource Requirements and Regulatory Documents Needed to Support Licensing of New Nuclear Power Plants", November 4, 2005, File 1-1-21-1-3, BITS 999034.

cc: CNSC: J. Clarke, B. Ecroyd, B. Howden, L. J. Keen, R. Jammal, K. Pereira,
A. Regimbald, T. Viglasky

Canadian Environmental Law Association: Theresa McClenaghan



MEMORANDUM

CNSC

CCSN



999034

To
A
I. Grant & G. Rzentkowski
c.c.: M. Dallaire, A. Faya, B. Duff, B. Ecroyd

From
De
D. Miller

Security Classification - Classification de sécurité

Our File - Notre référence

1-1-21-1-3

Your File - Votre référence

Date
November 4, 2005

Tel. No. - No de tél.

Subject
Objet
**Estimate of Resource Requirements and Regulatory Documents Needed to Support
Licensing of New Nuclear Power Plants**

It is possible that new nuclear power plants may be built in Canada to replace ageing electricity generation facilities and in response to increased electricity demands. In view that any new nuclear power plant would be the first to be licensed under the *Nuclear Safety and Control Act* (NSCA), the CNSC is updating the process for licensing of new nuclear power plants in Canada, and is examining various options to make this process more efficient.

As such, licensing of a new nuclear power plant will require significant regulatory oversight. It is important for the CNSC to be prepared to fulfill its regulatory mandate with respect to this potentially large, complex, and important undertaking.

Any new nuclear power plant would be the first to be licensed under the *Nuclear Safety and Control Act* (NSCA) and the *Canadian Environmental Assessment Act* (CEAA). A very important part of the preparation for new reactor licensing in Canada is the provision of clear and consistent regulations, and technology-neutral standards and guides for design, siting, construction, and operation. Another consideration is the need to simplify and streamline the licensing process. Also, it is the CNSC expectation, as a reflection of public expectations in Canada and in the international community, that new designs must be safer than existing plants. With these factors in mind, the regulatory framework for new plants must be updated.

In this context, and to ensure that the appropriate regulatory framework is developed, the CNSC needs to invest in the drafting of updated regulatory documents, international bench-marking, and training of staff. While the CNSC has made much progress in this area (as confirmed by the Office of the Auditor General in its follow-up report on nuclear power plant regulation), without additional resources to invest in its regulatory framework for new power plants, the CNSC will be unable to provide clear, consistent direction to licensees in line with emerging international standards and "Smart Regulation".

This document provides an estimate for resources required for preparatory activities in advance of receipt of an application, and for updating and modernizing the regulatory framework.

A. Resources for Preparatory Activities in Advance of Receipt of an Application

Resources are required for familiarization of new CNSC staff with the regulatory process and the regulatory framework, for familiarization with the design, for support of Environmental Assessments, and for generic planning for the review of a licence application.

It is estimated that 35 FTEs will be required over a five year period (7 FTE per year) for preparatory activities in advance of receipt of a licence application.

B. Resources for Regulatory Documents to Support Licensing of New Nuclear Power Plants

The regulatory document framework has been reviewed prior to estimating the number of documents required, and the associated resources required to develop the documents.

The following information was reviewed in the preparation of this estimate:

- the list of published CNSC regulatory documents;
- CNSC regulatory documents currently under production;
- proposed and unfunded/new CNSC regulatory documents; and
- IAEA documents for Siting, Design, Operation, Commissioning, Decommissioning. The IAEA documents are presented in a well organized framework on their website (<http://www-ns.iaea.org/standards/>), and makes it easy to identify the IAEA standards and guides for Siting, Design, Operation, etc. The IAEA document framework is reproduced in Figure 1.

The information can be categorized as follows:

- Regulatory documents to support licensing of new nuclear power plants (Appendix 1). This list contains CNSC documents to enable licensing of new nuclear power plants, and IAEA documents to support new reactor licensing; and
- Regulatory documents to support licensing of operating nuclear power plants (Appendix 2). This list consists of draft documents on external CNSC website, documents currently under production, proposed documents, and unfunded/new documents.

The first group of documents is predominantly applicable to siting and construction of a new plant, while the second is applicable to its operation. Note that the documents listed in Appendices 1 and 2 are categorized as High, Medium and Low priority. The priority is a blend of the timing with respect to the licensing process, and the overall importance of the subject/topic to assuring nuclear safety. The prioritization criteria that were employed in this assessment are listed below:

- an emphasis is placed on the requirements for the Environmental Assessment, Site Preparation, and Construction and Design;

- the requirements in the Nuclear Safety and Control regulations were taken into account; i.e., when is specific information required, at Site Preparation, Construction, Operation, etc.; and
- low priority documents are “nice-to-have”, or are not needed until well into the licensing process.

In many cases, there is overlap between existing and proposed CNSC documents, IAEA documents, and CSA standards. The overlap was judged on a “case-by-case” basis, and a judgement was made to use the existing or proposed CNSC document, or adapt the IAEA document (the details of this assessment are available upon request). Appendix 3 contains the comparative analysis of the CNSC and IAEA documents.

Where CNSC documents do not exist, the IAEA documents for Siting, Design, Operation, Commissioning, Decommissioning be adapted for application in Canada. This approach is consistent with that outlined in the briefing note titled “Use of IAEA Standards in the Development of the Canadian Regulatory Framework, 2005”.

It is estimated that the following documents are required:

- **54 CNSC documents** (Appendix 1) to support licensing of new nuclear power plants (these are regulatory documents to enable the Environmental Assessment process and licensing process under the *Nuclear Safety and Control Act*). This includes adaptation of **42 IAEA documents** to meet Canadian licensing requirements. The number of documents in the High, Medium and Low categories is provided below.

New Reactors	# of Documents
High	36
Medium	6
Low	12

- **54 documents** (Appendix 2) to support the licensing of operating nuclear power plants (compiled from the lists on draft documents on external CNSC website, currently under production, proposed, and unfunded/new). **Production of these documents is supported by the existing budget for the production of regulatory documents.** The number of documents in the High, Medium and Low categories is provided below.

Operating Reactors	# of Documents
High	30
Medium	10
Low	14

Five options are presented here for the estimate of resources required to strengthen the regulatory framework.

1. High, Medium and Low Priority documents required to support licensing of new nuclear power reactors (all of Appendix 1). The current list of regulatory documents to be produced, as produced by the Regulatory Standards and Research Division remains unchanged.
2. High and Medium Priority documents required to support licensing of new nuclear power reactors. The current list of regulatory documents to be produced, as produced by the Regulatory Standards and Research Division remains unchanged.
3. High Priority documents required to support licensing of new nuclear power reactors. The current list of regulatory documents to be produced, as produced by the Regulatory Standards and Research Division remains unchanged.
4. High Priority documents required to support licensing of New and Operating nuclear power plants. This involves a revision of the current list of regulatory documents to be produced, as produced by the Regulatory Standards and Research Division.
5. High and Medium Priority documents required to support licensing of New and Operating nuclear power plants. This involves a revision of the current list of regulatory documents to be produced, as produced by the Regulatory Standards and Research Division.

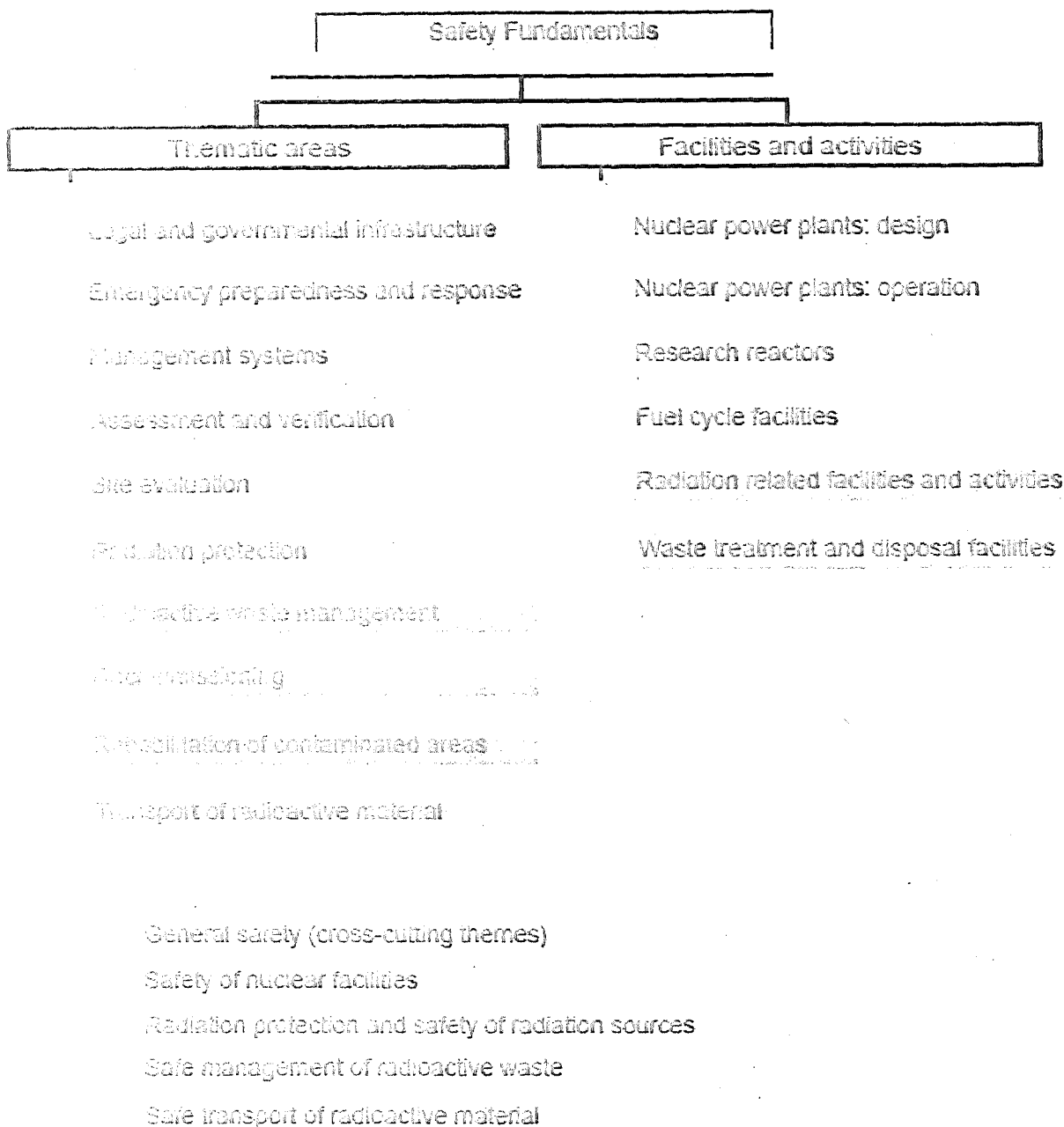
It is assumed that 1.5 FTE is required per document to develop new CNSC regulatory documents (this estimate is based on the best available time accounting information and has a high uncertainty, Appendix 3). In addition, one Regulatory documents officer is required per 5 documents published.

The total incremental increase to support licensing of new nuclear power reactors, for the three scenarios proposed, is provided in Table 1. The table also includes resources required to support preparatory activities. The number of persons required per year is indicated in this table.

Table 1: Incremental Resources Required to Support Licensing of New Nuclear Power Plants

Scenario	Number of Regulatory Documents Required Over 5 Years	Technical Staff FTE per Year	Regulatory Documents Officers FTE per Year	Preparatory Activities FTE per Year	<u>TOTAL</u> <u>per</u> <u>YEAR</u>
1. High, Medium and Low Priority documents for New Reactors	54	16	3	7	26
2. High and Medium Priority for New Reactors	42	13	3	7	23
3. High Priority Documents for New Reactors	36	11	2	7	20
4. High Priority for New and Operating Reactors	12	4	1	7	12
5. High and Medium Priority Documents for New and Operating Reactors	28	9	2	7	18

Figure 1 IAEA Safety Standards (<http://www-ns.iaea.org/standards/>)



APPENDIX 1

REGULATORY DOCUMENTS TO SUPPORT LICENSING OF NEW NUCLEAR POWER PLANTS

CNSC Documents

High

1. EA Guidelines for New NPPs
2. EA Review Plan
3. S-xxx Site Preparation Requirements for NPPs (based on Siting Requirements IAEA NS-R-3)
4. Review Guide for Assessment of Application for a Site Preparation Licence
5. S-xyz Construction Requirements for NPPs (in part based on Design Requirements, IAEA NS-R-1)
6. Review Guide for Assessment of Application for a Construction Licence

Medium

1. S-xyx Operating Requirements for NPPs (based on IAEA NS R2, and use IAEA Commissioning Guide NS-G-2.9)
2. Process Instructions for Verification of Site Preparation Activities
3. Process Instructions for Verification of Construction Activities
4. Process Instructions for Verification of Commissioning Activities

Low

1. Review Guide for Assessment of Application for a Operation Licence
2. Process Instructions for Verification of Operations (Heavy Water Load, Fuel Load, Removal of GSS, Power increases up to Commercial Operation)

Other IAEA Documents to be Adapted

High

1. External Human Induced Events in Site Evaluation for Nuclear Power Plants Safety Standards Series No. NS-G-3.1 2002
2. Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants Safety Standards Series No. NS-G-3.2, 2002
3. Evaluation of Seismic Hazards for Nuclear Power Plants Safety Standards Series No. NS-G-3.3 2002
4. Meteorological Events in Site Evaluation for Nuclear Power Plants Safety Standards Series No. NS-G-3.4 2003
5. Flood Hazard for Nuclear Power Plants on Coastal and River Sites Safety Standards Series No. NS-G-3.5 2003
6. Geotechnical Aspects of Site Evaluation and Foundations for Nuclear Power Plants Safety Standards Series No. NS-G-3.6, 2005
7. IAEA Document Commissioning for Nuclear Power Plants Safety Standards Series No. NS-G-2.9, 2003
8. IAEA Document The Operating Organization for Nuclear Power Plants Safety Standards Series No. NS-G-2.4, 2002
9. IAEA Document Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants Safety Standards Series No. NS-G-2.2, 2000
10. IAEA Document Core Management and Fuel Handling for Nuclear Power Plants Safety Standards Series No. NS-G-2.5, 2002
11. IAEA Document Operation of Spent Fuel Storage Facilities Safety Series No. 117, 1995
12. Format and Content of the Safety Analysis Report for Nuclear Power Plants Safety Standards Series No. GS-G-4.1, 2004
13. Safety Assessment and Verification for Nuclear Power Plants Safety Standards Series No. NS-G-1.2, 2002
14. Safety of Nuclear Power Plants: Design Safety Standards Series No. NS-R-1 2000 - (see cross-reference to Construction, and to S-337)
15. Software for Computer Based Systems Important to Safety in Nuclear Power Plants Safety Standards Series No. NS-G-1.1, 2000
16. Instrumentation and Control Systems Important to Safety in Nuclear Power Plants Safety Standards Series No. NS-G-1.3, 2002

17. Design of Fuel Handling and Storage Systems in Nuclear Power Plants Safety Standards Series No. NS-G-1.4, 2003
18. External Events Excluding Earthquakes in the Design of Nuclear Power Plants Safety Standards Series No. NS-G-1.5, 2003
19. Seismic Design and Qualification for Nuclear Power Plants Safety Standards Series No. NS-G-1.6, 2003 (some overlap with CSA N289 standards)
20. Protection Against Internal Fires and Explosions in the Design of Nuclear Power Plants Safety Standards Series No. NS-G-1.7, 2004
21. Design of Emergency Power Systems for Nuclear Power Plants Safety Standards Series No. NS-G-1.8 2004
22. Design of the Reactor Coolant System and Associated Systems in Nuclear Power Plants Safety Standards Series No. NS-G-1.9, 2004.
23. Design of Reactor Containment Systems for Nuclear Power Plants Safety Standards Series No. NS-G-1.10, 2004 (some overlap with CSA N287 standards)
24. Protection against Internal Hazards other than Fires and Explosions in the Design of Nuclear Power Plants Safety Standards Series No. NS-G-1.11 2004.
25. Design of the Reactor Core for Nuclear Power Plants Safety Standards Series No. NS-G-1.12, 2005
26. Design Aspects of Radiation Protection for Nuclear Power Plants Safety Series No. 50-SG-D9 1985
27. Design of Radioactive Waste Management Systems at Nuclear Power Plants Safety Series No. 79, 1986
28. Design of Spent Fuel Storage Facilities Safety Series No. 116, 1995
29. Planned Safety Standard DS44 - Criteria for Use in Planning Response to Nuclear and Radiological Emergencies (to supersede Safety Series 109)
30. Preparedness of the Operating Organization (Licensee) for Emergencies at Nuclear Power Plants Safety Series No. 50-SG-O6, 1982

Medium

1. Preparedness of Public Authorities for Emergencies at Nuclear Power Plants Safety Series No. 50-SG-G6, 1982
2. On-site Habitability in the Event of an Accident at a Nuclear Facility: Guidance for Assessment and Improvement Safety Series No. 98, 1989

Low

1. Planned Safety Standard DS384 - Source Term Evaluation for Nuclear Facilities
2. Intervention Criteria in a Nuclear or Radiation Emergency Safety Series No. 109, 1994
3. Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material Safety Standards Series No. TS-G-1.2 (ST-3), 2002
4. Predisposal Management of Radioactive Waste, Including Decommissioning Safety Standards Series No. WS-R-2 2000 (combine pre-disposal guides)
5. Predisposal Management of Low and Intermediate Level Radioactive Waste Safety Standards Series No. WS-G-2.5, 2003 (combine pre-disposal guides)
6. Predisposal Management of High Level Radioactive Waste Safety Standards Series No. WS-G-2.6, 2003 (combine pre-disposal guides)
7. Decommissioning of Nuclear Power Plants and Research Reactors Safety Standards Series No. WS-G-2.1 1999
8. Draft Safety Standard DS332 - Release of Sites from Regulatory Control upon Termination of Practices
9. Draft Safety Standard DS333 - Decommissioning of Nuclear Facilities
10. Planned Safety Standard DS376 -Safety Assessment for Decommissioning of Nuclear Facilities

APPENDIX 2

REGULATORY DOCUMENTS TO SUPPORT LICENSING OF OPERATING NUCLEAR POWER PLANTS

CNSC Documents (Draft, In Progress, Proposed, New/Unfunded)

High

1. P-319 Financial Guarantees for Nuclear Facilities and Licensed Activities
2. G-152 Deterministic and Probabilistic Criteria in Decision-Making for Nuclear Power Plants
3. C-204 Certification of Persons Working at Nuclear Power Plants 6 (in progress, S-204 Certification of Persons Working at a Nuclear Power Plant)
4. G-323 Ensuring the Presence of Sufficient Qualified Staff at Class I Facilities – Minimum Staff Complement (October 2005)
5. S-323 Ensuring the Presence of Sufficient Staff at Nuclear Power Plants
6. G-317 Developing and Conducting Simulator-based Examinations for Certification at Nuclear Power Plants
7. G-318 Developing and Conducting Written Examinations for Certification at Nuclear Power Plants
8. G-144 Trip Parameter Acceptance Criteria for the Safety Analysis of CANDU Nuclear Power Plants (2005)
9. S-310 Safety Analysis for Nuclear Power Plants (2005) 13 – OVERLAP/CONFLICT with S-337 Requirements for Design of Nuclear Power Plants (2005)
10. P-324 Safety Goals for Nuclear Power Plants
11. G-42 Attributes of a Probabilistic Safety Assessment
12. C-138 Software in Protection and Control Systems (1999)
13. G-306 Severe Accident Management (SAM) Programs for Fission Reactors (2004) 18 (could be in Emergency Preparedness as well)
14. S-233 Configuration Management Programs for Nuclear Power Plants
15. G-311 Fire Protection at Nuclear Facilities and Uranium Mines and Mills

16. S-337 Requirements for Design of Nuclear Power Plants (2005) 21 (based on Safety of Nuclear Power Plants: Design Safety Standards Series No. NS-R-1 2000)
17. S-335 Pressure Retaining Components OVERLAP with CSA N285 standards
18. S-210 Maintenance Programs for Nuclear Power Plants
19. P-325 Nuclear Emergency Management (2005)
20. S-296 Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills (2004)
21. G-296 Developing Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills (2004)
22. S-224 Environmental Monitoring Program at Class I Nuclear Facilities and Uranium Mines and Mills (2004)
23. G-224 Environmental Monitoring Program at Class I Nuclear Facilities and Uranium Mines and Mills (2004)
24. S-321 Technical and Performance Requirements for Certain Security Systems and Equipment
25. S-322 Security Requirements for the Storage and Transportation of Selected Nuclear Substances
26. G-350 Threat and Risk Assessment for Licensed Facilities
27. S-348 Access Control Systems
28. S-347 Security Drill/Exercise Planning and Evaluation
29. S-336 Reporting Requirements to Satisfy IAEA Safeguards and Canadian Nuclear Non-Proliferation Commitments
30. Regulatory Guide for Life Extension (not sure if it is on any lists, but DG-DPRR requests this to be produced)

Medium

1. G-319 Financial Guarantees for Nuclear Facilities and Licensed Activities
2. G-242 Cost-Benefit Analysis
3. S-327 Requirements for Nuclear Criticality Safety
4. G-349 Safe Use of Nuclear Fuel

5. S-213 Draft Regulatory Standard: Quality Assurance Program Requirements for Nuclear Facilities
6. G-310 Safety Analyses for Nuclear Power Plants 16 – OVERLAP/CONFLICT with S-337 Requirements for Design of Nuclear Power Plants (2005)
7. S-334 Ageing Management Programs for Nuclear Power Plants
8. G-98 Reliability Programs for Nuclear Power Plants
9. G-320 Assessing the Long term Safety of Radioactive Waste Management (2005)
10. P-357 Dissemination for Prescribed/Classified Information

Low

1. G-99 Reporting Requirements for Operating Nuclear Power Plants
2. G-329 Safety Culture Self-Assessments
3. S-326 Criteria for the Release of Nuclear Facilities from Licensing after Decommissioning
4. S-52 Radioisotope Laboratory Design, Classification and Radiation Protection Requirements
5. Criteria for Evaluation of Licensee Emergency Management Plans 28 (Compliance document)
6. S 106, Rev. 1 Technical and Quality Assurance Standards for Dosimetry Services in Canada (2005)
7. S-116 Requirements for Leak Testing Sealed Sources Containing Nuclear Substances
8. S-117 Calibration of Gamma Radiation Detection Instruments
9. G-136 Reporting Occupational Doses to the National Dose Registry When More Than One Organization is Involved
10. G-150 Designing and Implementing a Bioassay Program
11. G-153 External Dosimetry for Non-Uniform Radiation Exposures
12. S-307 Disposing of Nuclear Substances In Accordance With a Licence
13. G-351 Guide for Evaluation of the Licensee Security Program
14. Update of Design-basis Threats

APPENDIX 4

ESTIMATE OF RESOURCES REQUIRED FOR PREPARATION OF REGULATORY DOCUMENTS

Information gathered from finance (in an e-mail from D. Miller to B. Ecroyd, B. Duff, M. Dworschack, October 21, 2005)

All Reg Docs (82A series) 12.249 FTE \$257,749 directs (this would be to work on a program consisting of 36 documents, of which 4 were published,

However, of these 36 were expected to be produced over 3 years, then the estimate should be 12 being produced per year - this in fact is consistent with the text in the incremental funding estimate for the TB (2/3 of the 40 have been completed, over the past 2 years = 12 per year), this would amount to 1 FTE per published document

However, only 4 were published in 2004/05, and much less than 24 have been published since 2003

So using the global numbers (for 82A) I will assume that we spent 1 FTE per published/completed document, but we have to keep in mind that not all charges may have been billed to the regulatory documents cost code. T

Power Reactors ONLY (82A11N series) 5.77 FTE \$157,416

For production of the draft Safety Analysis standard S-310 (MDC 310) 0.195 FTE - seems really low when review /dispositions of comments is taken into account

For production of the draft PSA standard S-294 (MDC 294) 0.079 FTE + \$23230 - seems really low when review /dispositions of comments is taken into account

Hence, given the uncertainty in the time accounting information, the starting assumption is that the average FTE per document is 1.5.