

December 13, 2001

MEMORANDUM TO: Michael Cullingford, Special Assistant to the Director,
Office of Nuclear Reactor Regulation

FROM: */RA/*
Theodore R. Quay, Chief
Equipment and Human Performance Branch
Division of Inspection Program Management, NRR

SUBJECT: SWISS FEDERAL NUCLEAR SAFETY INSPECTORATE'S ENQUIRY
INTO NRC'S REGULATORY SURVEILLANCE PRACTICES -
QUALIFICATION/REQUALIFICATION OF A SHIFT SUPERVISOR
(TAC NO. M40735)

On July 5, 2001, the NRC's Office of Nuclear Reactor Regulation (NRR) received a letter from Mr. Thomas Sigrist, Secretary of the Swiss Federal Nuclear Safety Commission (KSA). Item five (V) of this letter asked about the U. S. Nuclear Regulatory Commission's (NRC) inspection (regulatory surveillance) practices associated with the "Qualification/requalification of a shift-supervisor". Overall, both the qualification and requalification processes utilize an essentially prescriptive approach to regulation, based on the requirements contained in Title 10, Part 55, of the *Code of Federal Regulations* (10 CFR 55). For initial qualification, the NRC directly performs an essentially independent assessment of an individual's knowledge, skills, and abilities, in accordance with 10 CFR 55. For requalification, the facility operators assess their own personnel, subject to the oversight and inspection by the NRC. Presented in the attached is a more detailed overview of NRC activities associated with operator licensing and requalification. If you have any questions, please contact David Trimble, Chief, Operator Licensing and Human Performance Section (IOHS), NRR, at (301)415-2942.

Attachment: As stated

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OFFICE	IOHS:IQPB	SC:IOHS:IQPB	BC:IQPB:DIPM	D:DIPM
NAME	DMuller	DCTrimble	TRQuay/DFT for	BABoger
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OPERATOR QUALIFICATION/REQUALIFICATION

OVERVIEW OF NRC INSPECTION (SURVEILLANCE) PRACTICES

On July 5, 2001, the NRC's Office of Nuclear Reactor Regulation (NRR) received a letter from Mr. Thomas Sigris, Secretary of the Swiss Federal Nuclear Safety Commission (KSA). Item five of this letter asked about the U. S. Nuclear Regulatory Commission's (NRC) inspection (regulatory surveillance) practices associated with the "Qualification/requalification of a shift-supervisor". Presented below is an overview of NRC activities associated with operator licensing and requalification, prepared by the Operator Licensing and Human Performance Section (IOHS) of NRR.

OPERATOR QUALIFICATION - INITIAL LICENSING

Title 10, Part 55, of the *Code of Federal Regulations* (10 CFR 55) requires individuals who manipulate the controls of a nuclear facility (or direct these manipulations, such as a shift supervisor) to be licensed by the NRC. The actual licensing of an individual (as an operator or supervisor) is composed of several steps. The key NRC action steps are discussed below, including the approximate NRC assessment method and type of regulatory requirement¹. Note that the operating experience and training of license applicants is performed by the facility operator. Applicable references for initial operator licensing are:

- 10 CFR 55.
- NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 8, Supplement 1.

1. Generic Fundamentals Examination (GFE)

The GFE is a 100 question, multiple choice examination, prepared by an NRC contractor and approved by the NRC's IOHS staff. This exam contains questions at a fundamental, non-plant specific level, associated with generic plant components, reactor theory, and thermodynamics. The GFE is typically taken shortly after the applicant begins his formal license training. There are two versions of the GFE, one version for boiling water reactors, and one version for pressurized water reactors. This exam is administered by the facility operators, graded by the contractor, and the final results approved by IOHS.

Assessment Method:

<u>Overall:</u>	A	The GFE can be considered a safety authority (NRC) developed, independent test of applicant knowledge.
<u>Exam Preparation:</u>	A	The GFE is prepared by an NRC contractor, but reviewed and approved by the safety authority (IOHS staff).

<u>Exam Administration:</u>	C	The GFE is administered by the facility operator; the safety authority (NRC) is not present.
<u>Exam Grading:</u>	A	The exam is graded by the contractor, but the final results are approved by the safety authority (IOHS staff).

Type of Regulatory Safety Requirement: 1

The GFE covers a portion of the written exam topics required by 10 CFR 55. Therefore, the GFE is an example of a formal/prescriptive approach to regulation.

2. License Application and NRC Review

Each individual must complete two forms to apply for a license:

Form NRC-398, "Personal Qualification Statement - Licensee"

AND

Form NRC-396, "Certification of Medical Examination by Facility Licensee."

By completing and signing these two forms, the facility operator and the license applicant are certifying to the NRC that all education, training, operating experience, and medical requirements of 10 CFR 55 are satisfied for being licensed. These forms are typically forwarded to the appropriate NRC Regional Office (Philadelphia, Atlanta, Chicago, or Dallas) 30 days prior to the NRC plant-specific examination.

Assessment Method: A

The 398 form is given a review by an NRC Regional Examiner for completeness. No in-depth inspection is performed to verify the accuracy of the provided information, since facility operators and license applicants are required to provide factual information.

The 396 form is reviewed by an NRC-contracted physician.

Type of Regulatory Safety Requirement: 1

Submitting the completed 398 and 396 forms is required to apply for a license in accordance with 10 CFR 55. Therefore, license application and NRC review is an example of a formal/prescriptive approach to regulation.

3. NRC plant-specific examination

If the license applicant has satisfactorily completed the GFE, and his application forms (396 and 398) are satisfactory, then the NRC will allow the license applicant to take the NRC plant-specific examination.

Exam Description and Preparation:

The NRC plant-specific examination consists of a 100 question, multiple choice written test, and an operating test. The operating test, primarily performed on a plant-specific control room simulator, requires applicants to perform individual tasks and participate in crew-based dynamic simulator scenarios. The plant-specific written and operating tests are typically prepared by the facility operator and approved by the NRC. However, on occasion, these tests are prepared by the NRC, with an accuracy check performed by the facility operator.

Exam Administration:

NRC written exams are typically administered by the facility operator, with an NRC Examiner available to answer any facility operator questions that may occur during the exam.

NRC operating tests are ALWAYS administered by NRC Examiners. Although the facility operator will set up and run the simulator to support the exam, NRC Examiners are solely responsible for evaluating applicant performance during NRC operating tests.

Exam Grading

NRC written exams are typically first graded by the facility operator, and then the grading is checked and approved by an NRC Examiner.

NRC operating tests are ALWAYS graded by NRC Examiners.

If a license applicant (1) performs satisfactorily on the GFE, (2) possesses satisfactory personal qualifications (398 form), (3) is in satisfactory health (396 form), and (4) performs satisfactorily on the plant-specific exam, then the NRC will issue the applicant a license.

Assessment Method:

<u>Overall:</u>	A	The NRC plant-specific exam can be considered a safety authority (NRC) developed, independent test of applicant knowledge, skills and abilities.
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Exam Preparation:

Facility Operator prepared:	B	Typically, NRC plant-specific exams are prepared by the facility operator and approved by the NRC.
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NRC prepared:	A	On occasion, NRC plant-specific exams are prepared by the NRC, with an accuracy check performed by the facility operator.
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Exam Administration:

Written Exam:	C	Typically, NRC plant-specific written exams are administered by the facility operator; the safety authority (NRC) is not present.
Operating Test:	A	NRC plant-specific operating tests are ALWAYS administered by the NRC.

Exam Grading:

Written Exam:	A/C	Typically, NRC plant-specific written exams are first graded by the facility operator and then checked and approved by the safety authority (NRC).
Operating Test:	A	NRC plant-specific operating tests are ALWAYS graded by the NRC.

Type of Regulatory Safety Requirements: 1 and 3

The NRC plant-specific examination covers the remaining required 10 CFR 55 exam topics not covered by the GFE. In addition, the plant-specific exam should include an examination of risk significant topics. Therefore, the NRC plant-specific examination includes both a formal/prescriptive approach to regulation, and risk insights.

OPERATOR REQUALIFICATION

10 CFR 55 requires licensed operators to participate in an NRC-approved, facility operator administered requalification program. Facility requalification programs consist of various forms of instruction (e.g., classroom, control room simulator), and various forms of examination, including a required annual operating test, and a required biennial written examination. All licensed operator requalification programs are administered by facility operators. The NRC periodically monitors and inspects the facility operator requalification programs, including:

- A quarterly observation of requalification training activities, by the on-site NRC Resident Inspector.
- A yearly review of examination pass/fail rates.
- A detailed biennial review by NRC specialists/examiners.

Applicable references for licensed operator requalification are:

- 10 CFR 55.
- NRC Inspection Procedure Attachment 71111.11, "Licensed Operator Requalification Program."

Overall, licensed operator requalification can be classified as:

Assessment Methods: **B, C, and D**

Most of the operator requalification program is performed by the facility operator, without the presence of the NRC. However, a portion of the requalification program is performed in the presence of the NRC, and all aspects of the requalification program, including the working processes, are subject to NRC inspection.

Type of Regulatory Safety Requirements: **1, 2, and 3**

The majority of the NRC's requalification inspection activities focus on the facility operator's performance of prescriptive requirements, contained in 10 CFR 55 and the facility operator's requalification training process documents. However, concerning exam pass/fail rates, the NRC is primarily interested in the results and not necessarily the process. When selecting sample areas to inspect within the licensed operator requalification process, a risk-informed, performance-based regulatory approach should be considered in which risk insights, engineering analysis and judgment, including the principle of defense-in-depth and the incorporation of safety margins, and performance history are used.

Since the majority of the NRC's requalification inspection activities are performed during the detailed, biennial review, the following sections will examine these activities in more detail.

Biennial NRC Requalification Inspection

Approximately every two years, the NRC performs a detailed inspection of facility operators' requalification programs, utilizing NRC Examiners and/or training specialists. This detailed inspection is scheduled to correlate with when each facility operator will be administering the annual requalification operating test and biennial requalification written examination. The primary activities of this NRC inspection include:

- Review the facility's operating history
- Review the facility operator's requalification examinations
- Review the facility operator's administration of requalification examinations
- Review the facility operator's training feedback system
- Review the facility operator's remedial training program
- Review conformance with operator license conditions

Each of these activities will be discussed in more detail below.

Review the facility's operating history

The NRC inspector will assess licensed operator performance since the last requalification program evaluation (inspection or examination), to determine if these performance deficiencies have been addressed through the requalification training program. This activity involves reviewing past NRC inspection reports, facility operator event reports, and other indications of licensed operator performance, and then examining the facility operator's training records, to determine if performance deficiencies have been addressed.

Assessment Methods: A and D

This activity is primarily a paperwork review for the NRC inspector, but also includes interviewing facility operator personnel. This activity includes inspecting the facility operator's processes for incorporating licensed operator performance deficiencies into the requalification training program.

Type of Regulatory Safety Requirements: 1 and 3

10 CFR 55 and facility operator process documents require facility operators to incorporate operator performance deficiencies into the requalification program. As with all requalification inspection activities, risk insights should be utilized by the inspector where applicable.

Review the facility operator's requalification examinations

The NRC inspector will assess the adequacy, quality, and content of the facility operator's written examinations, operating tests, exam sample plans and other examination materials associated with requalification. Some of the items checked during this assessment include:

- Exam level of difficulty.
- Operationally validity of examination items.
- The methodology (i.e., sample plan) used by the facility operator to construct its requalification examinations, including the incorporation of materials trained on, plant modifications, industry events, operator performance deficiencies, and risk insights.

Assessment Methods: A and D

This activity is primarily a paperwork review for the NRC inspector, but also includes interviewing facility operator personnel. This activity includes inspecting the facility operator's processes for developing requalification examination materials.

Type of Regulatory Safety Requirements: 1 and 3

10 CFR 55 and facility training process documents contain certain requirements pertaining to the content and quality of requalification examination materials. As with all requalification inspection activities, risk insights should be utilized by the inspector where applicable.

Review the facility operator's administration of requalification examinations

The NRC inspector will observe requalification examinations and tests conducted by the facility operator, and interview facility personnel. These activities are performed to assess the facility operator's effectiveness in conducting written examinations and operating tests to ensure licensed operator mastery of the requalification training program content. Some of the key items for the NRC inspector to check during the exam observations include:

- Examination planning - exams conducted as planned?
- Errors in exam administration, and detecting and correcting these errors for subsequent examinations.
- Simulator performance deficiencies noted during the inspection, particularly while observing the dynamic simulator operating tests.
- Examination security measures in place to prevent the compromise of the integrity of any portion of the requalification examination.
- Use of performance standards and examination grading by the facility operator's exam administrators. This activity is accomplished by the NRC inspector grading selected written exam and operating test items in parallel with facility operator exam administrators.

Assessment Methods: A, B, and D

This activity consists primarily of the facility operator administering the requalification exams in the presence of the NRC, as well as confirming the results by NRC parallel grading. This activity includes interviewing selected facility operator personnel, and inspecting the facility operator's processes for administering requalification examinations.

Type of Regulatory Safety Requirements: 1 and 3

10 CFR 55 and facility training process documents impose certain requirements on the administration of requalification examinations. As with all requalification inspection activities, risk insights should be utilized by the inspector where applicable.

Review the facility operator's training feedback system

The NRC inspector will assess the effectiveness of the facility operator's process for revising and maintaining its licensed operator continuing training program up to date, including the use of feedback from plant events and industry experience information. This activity consists of the following two evaluations:

- Evaluate whether the facility operator's use of employee feedback from licensed operators, instructors, and supervisors associated with the requalification program is effective.
- Evaluate the facility operator's ability to assess the effectiveness of its requalification program and to implement appropriate corrective actions.

Assessment Methods: A and D

This activity is primarily a paperwork review for the NRC inspector, but also includes interviewing facility operator personnel. This activity includes inspecting the facility operator's processes for requalification program feedback.

Type of Regulatory Safety Requirements: 1 and 3

10 CFR 55 and facility training process documents contain certain requirements on the implementation of feedback for the requalification program. As with all requalification inspection activities, risk insights should be utilized by the inspector where applicable.

Review the facility licensee's remedial training program

The NRC inspector will verify the adequacy and effectiveness of the remedial training² conducted since the last requalification examinations and the training planned for the current examination cycle to ensure that it addresses weaknesses in licensed operator or crew performance identified during training and plant operations. This inspection item includes the following activities:

- Review examples of licensed operator and crew performance weaknesses since the last inspection and determine whether the facility operator identified their root causes and implemented appropriate corrective actions.
- Determine if the facility operator confirms the effectiveness of its corrective actions at the completion of retraining with a suitable evaluation method.
- Review the remediation plans (e.g., lesson plans, reference materials, and attendance documentation) to assess the effectiveness of the remedial training.
- When possible, observe applicable simulator instruction to assess the effectiveness of the remedial training.

Assessment Methods: **A, B, and D**

This activity is primarily a paperwork review for the NRC inspector, but also includes, if possible, the NRC observing the facility operator conducting remedial training. This activity includes inspecting the facility operator's processes for remedial training.

Type of Regulatory Safety Requirements: **1 and 3**

10 CFR 55 and facility training process documents contain certain requirements on the conduct of remedial training. As with all requalification inspection activities, risk insights should be utilized by the inspector where applicable.

Review conformance with operator license conditions

The NRC inspector will review the facility operator's program for maintaining active operator licenses and ensuring the medical fitness of its licensed operators in accordance with 10 CFR 55.53. This inspection item includes the following activities:

- Sample records for at least one operating crew to determine if crew members are maintaining active licenses.
- Determine if all requalification training is completed on schedule or made up in accordance with the facility operator's program. Sample training attendance records to include the end of the last 2-year requalification cycle.
- Review a representative sample (i.e., approximately 10 percent) of the licensed operators' medical records to verify that the required physical examinations are being performed and documented.
- Verify that operator licensees are complying with special license conditions, as applicable, and that those operators who do not meet medical standards are precluded from performing licensed duties.

Assessment Methods: **A and D**

This activity is primarily a paperwork review for the NRC inspector, but also includes interviewing facility operator personnel. This activity includes inspecting the facility operator's processes for maintaining an active license and ensuring the medical fitness of licensed operators.

Type of Regulatory Safety Requirements: **1 and 3**

10 CFR 55 contains specific requirements for maintaining an active license and ensuring the medical fitness of licensed operators. As with all requalification inspection activities, risk insights should be utilized by the inspector where applicable.

1. This overview will utilize the classification schemes for assessment method and type of regulatory requirement contained in Mr. Sirgist's letter:

"Type of regulatory safety requirements:

- 1 Features of the plant or of the operation of the plant:** The regulatory authority requires specific features of technical systems and/or operational processes, including their implementation in technical specifications and operating procedures. (So-called formal/prescriptive approach of regulation).
- 2 Performance of plant operation:** The regulatory authority bases its activities on the results of the operation and does not care on how these results were achieved. - Required is adherence to operational/safety indicators and the existence of measurable or calculable indicators to evaluate safe operation as well as precise ideas on how to proceed if the predefined area of acceptable values is left. (So-called performance based approach of regulation).
- 3 Risk of plant operation:** The regulatory authority bases its activities on risk figures and focuses inspections on aspects that contribute to risk. - Beside core damage frequency, other risk figures to evaluate the safety of the plant are examined as well. (So-called risk based approach of regulation).
- 4 Protection goals:** The regulatory authority bases its activities on the four elementary protection goals, namely control of the radioactivity, cooling of the fuel, confinement of radioactive material, limitation and control of radiation exposure or on other protection goals derived from the elementary goals. - Plant safety is demonstrated by proving the fulfillment of the relevant protection goals. (So-called protection goal oriented approach of regulation).

Ways to assess:

- A Direct inspections/analyses by the safety authority or by its experts,** using own measuring devices or methods of analysis.
- B Inspection/analyses by the operator in the presence of the safety authority or its experts.**
- C Inspections/analyses by the operator; the safety authority is not present.**
- D Inspection/analysis of the operator's working process by the safety authority;** required are well-described processes including criteria of fulfillment. (So-called process based surveillance)."

NOTE: Operator licensing and requalification are unique NRC processes, and are different from other types of NRC inspections. Assigning regulatory requirements and assessment methods per Mr. Sirgist's classification scheme was often difficult for operator licensing and requalification.

2. Remedial training includes the additional training provided to licensed operators to correct deficiencies that prevent them from successfully passing the requalification examination and the training provided to licensed operators to correct generic or individual weaknesses observed during the previous requalification cycle examination.