
ES-205
PROCEDURE FOR ADMINISTERING
THE GENERIC FUNDAMENTALS EXAMINATION PROGRAM

A. Purpose

This standard describes the procedures and policies pertaining to administration of the generic fundamentals examination (GFE) section of the written operator licensing examination at power reactor facilities. It describes how the examinations are scheduled and constructed, how to solicit facility licensees for applicants to take the examinations, and how to promulgate the examination results.

B. Background

Title 10 of the *Code of Federal Regulations* (10 CFR) 55.41, "Written Examination: Operators," and 55.43, "Written Examination: Senior Operators," require that the written operator licensing examinations for reactor operators (ROs) and senior reactor operators (SROs) must include questions concerning various mechanical components, principles of heat transfer, thermodynamics, and fluid mechanics. These regulations also require that the written examinations must address fundamentals of reactor theory, including the fission process, neutron multiplication, source effects, control rod effects, criticality indications, reactivity coefficients, and poison effects.

The fundamental knowledge and abilities (K/As) required of an operator do not vary significantly between license levels or among facilities of the same vendor type. As a result, the U.S. Nuclear Regulatory Commission (NRC) implemented the GFE program to standardize the fundamental examination coverage for all applicants at pressurized and boiling-water reactors (PWRs and BWRs). Having passed a GFE as an RO or an SRO applicant, an operator will not have to take another GFE unless he or she transfers to a facility of another vendor type or discontinues, for a period exceeding 2 years (24 months), participation in an accredited licensed operator requalification training program that maintains proficiency in the GFE topics. Refer to Section D.1.k of ES-204 for guidance regarding waivers of the GFE. The GFE program does not apply to limited senior reactor operator license applicants.

The GFE examinations for BWRs and PWRs are typically administered two or more times a year, on the Wednesday following the first Sunday in either March, June, September, or December. It is anticipated starting in FY 2017, the NRC will administer the GFE in December, March, and September. Thereafter, the GFE will be administered in March and September only.

C. Responsibilities

1. Facility Licensee

- a. The facility licensee must certify that all individuals who plan to take the GFE are enrolled in a facility-sponsored training program that will satisfy the eligibility requirements for an RO or SRO license. The operator licensing trainees do not need to complete all of the training required for licensing before they take the GFE.

The facility licensee may use the sample registration letter enclosed with the NRC notification letter (Attachment 1) or any similar format letter that contains the required information and certification. If the facility licensee must add or delete an individual after submitting its registration letter, the facility licensee should inform the Office of Nuclear Reactor Regulation (NRR) or the Office of New Reactors (NRO) operator licensing program office of the change as specified in the examination cover letter, *before* the examinations are administered.

- b. Upon receiving the examinations from the GFE contractor, the facility licensee shall reproduce and safeguard the examinations as described in the examination cover letter.
- c. On the designated examination day, the facility licensee shall administer and proctor the GFE in accordance with the instructions contained in the examination package.

The facility licensee will start and stop the GFE in accordance with the time zone map contained within the examination package. Late arrivals will be allowed to take the examination; however, all examinees must hand in their examinations at the completion time designated in the proctor instructions enclosed with the examination cover letter (refer to Section C.2.d).

- d. No later than the day after the GFE is administered, the facility licensee shall send the following items by overnight mail to the name and address designated in the examination package:
 - the original answer sheets
 - the signed exam cover sheets
 - the signed security statements

2. NRR Operator Licensing Program Office and GFE Contractor

- a. The NRR operator licensing program office will designate a coordinator to oversee the GFE activities of the regional offices, the GFE contractor, and the facility licensees.
- b. At the beginning of each calendar year, the NRC will send a notification letter (Attachment 1) to each facility licensee. The letter will announce the GFE administration dates for the entire year and inform facility licensees when the registration letters are due to the NRC.
- c. The GFE contractor will prepare the examinations as described in Section D of this examination standard. The examination author assigned responsibility for developing the GFE shall submit the examinations to the NRR GFE coordinator and any other designated reviewers at least 20 calendar days before the scheduled administration date. The NRR operator licensing program office will provide comments and recommended changes to the examination author as soon as possible. The final examinations should be ready at least 14 days before the GFE administration date.

- d. The GFE contractor will assemble the approved examination packages as described below, and mail the packages to the names and addresses designated by the participating facility licensees. The examinations should normally be mailed 1 week before the examinations are scheduled to be administered.

The examination packet will contain the following information, enclosures, and attachments:

- cover letter (Attachment 2 is a sample letter)
 - proctor instructions
 - security agreement
 - single copies of appropriate exam, forms A and B
 - exam time zone map
 - sample answer sheet
 - facility docket number sheet
 - applicant docket number sheet
 - appropriate number of answer sheets
 - applicant answer sheet instructions
- e. On the day that the GFE is administered, the NRR GFE coordinator and GFE contractor shall be available to answer questions from facility proctors if the need arises.
- f. Upon receiving the examination answer sheets from the facility licensees, the GFE contractor shall score, grade, and tabulate the overall item statistics, and generate facility and regional grade reports for each GFE examination. The contractor shall forward the regional and facility grade reports, including individual scores and copies of individual answer sheets, and corrected answer keys to the applicable regional office for distribution.

The GFE contractor shall develop individual item statistics on all questions used on the GFE examinations. Questions with acceptable statistical characteristics shall be moved into the “validated” GFE question bank.

The contractor will provide copies of all grade reports to the NRR GFE coordinator, along with the following additional items:

- exam-wide item statistics (PWR and BWR)
 - analysis reports of specific items deleted or answers changed
 - corrected answer keys
 - original answer sheets
 - original signed exam cover sheets
 - signed security statements
- g. The NRR operator licensing program licensing assistant will ensure that copies of the final master BWR and PWR examinations are placed in the NRC’s Public Document Room.

3. NRC Regional Office

- a. Regional management should assign an individual to coordinate GFE administration in the region.
- b. The NRC will issue a single notification letter each year to facility licensees informing them to submit their registration letters for the scheduled GFE of choice.
- c. The regional operator licensing assistant (OLA) shall assign a docket number to each individual identified in the facility licensee's registration letter. The OLA shall then forward the list of names and docket numbers for each facility to the GFE contractor, with a copy to the NRR GFE coordinator, no later than 20 days before the examination administration date.
- d. The regional GFE coordinator should keep the NRR GFE coordinator informed of any changes in the number of applicants scheduled to take the GFE at any facility.
- e. The regional office shall distribute the GFE examination results to their participating facility licensees. A sample cover letter is provided in Attachment 3 to this examination standard.
- f. The regional OLA shall update the applicants' status (pass or fail) in the operator licensing tracking system and ensure that a hard copy of the GFE results is placed in each applicant's docket file.

4. Industry

The industry may make arrangements to review and comment on the GFEs before they are administered by contacting the NRR/NRO operator licensing program office at least 2 months before the scheduled examination date. The review will be limited to one instructor from each reactor vendor type (provided by the facility) that will not be proctoring applicants during the subject examination. These reviewers will be required to sign security agreements, in accordance with Section D.2.b of ES-201, before and after seeing the examinations. The reviewers must complete the review (including the new, modified, and previously validated questions, as desired) and provide feedback to the NRC staff within 3 working days from the date of receipt. If the NRR operator licensing program office does not receive the reviewers' comments within the allotted time, the examinations will proceed on schedule. Otherwise, the NRR operator licensing program office and GFE contractor will evaluate the reviewers' comments and make changes as deemed appropriate.

D. Examination Scope and Structure

Each GFE shall contain 50 questions covering the "Components" and "Theory" (including reactor theory and thermodynamics) sections of NUREG-1122, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized-Water Reactors," NUREG-1123, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Boiling-Water Reactors," NUREG-2103, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators:

Westinghouse AP-1000 Pressurized-Water Reactors,” or NUREG-2104, “Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Advanced Boiling-Water Reactors.” The passing grade for the GFE is 80 percent.

The K/A topics applicable to the GFE for PWRs and BWRs have been categorized into various component, reactor theory, and thermodynamics groups as shown in Attachment 4 to this examination standard. That attachment also identifies the number of test questions required to evaluate each topic.

The questions used on the GFE examination shall conform with the applicable construction and style guidelines in Appendix B. The examination shall include 40 questions taken directly from the NRC’s GFE question bank for the applicable vendor type, 5 questions that are derived from existing bank questions by making one or more significant modifications, and 5 questions that are newly developed.

E. Attachments/Forms

Attachment 1	Sample Notification and Registration Letter
Attachment 2	Sample Examination Cover Letter
Attachment 3	Sample Results Letter
Attachment 4	GFE Test Item Distribution

NRC Letterhead

(Date)

(Name, Title)

(Facility name)

(Street address)

(City, State ZIP code)

Dear (Name):

The U.S. Nuclear Regulatory Commission (NRC) plans to administer the generic fundamentals examination (GFE) section of the written operator licensing examination on the following dates during this calendar year:

March ##, 201#

June ##, 201#

September ##, 201#

December ##, 201#

To register personnel to take the GFE, an authorized representative of your facility must submit a letter to the appropriate regional administrator with a copy addressed as follows:

Chief, Operator Licensing and Training Branch
Mail Stop O 7 E1
U.S. Nuclear Regulatory Commission
Washington, DC. 20555-0001

Your letter should identify the individuals who will take the examination, and it should state that they are enrolled in a facility licensee-sponsored program leading to NRC operator or senior operator licensing and that they will have completed their fundamentals training by the date of the examination. The letter should also identify the personnel who will have access to the examinations before they are administered (e.g., proctors) and the address to which the examinations are to be sent. To allow the NRC to assign docket numbers, your letter should be received by both the NRC regional administrator and the Chief, Operator Licensing and Training Branch **30 days before each desired examination date** shown above. A sample registration letter is enclosed.

Copies of the administered GFEs and their answer keys will be available for review in the NRC's Public Available Records System (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS) approximately 90 days following the next scheduled GFE administration to allow facilities to use them for audit examination purposes. ADAMS is accessible from the Electronic Reading Room page of the NRC's public web site at <http://www.nrc.gov/reading-rm/adams.html>. The NRC's GFE Web page (which is available at <http://www.nrc.gov/reactors/operator-licensing/generic-fundamentals-examinations.html>) will be updated approximately 90 days following the next scheduled GFE for the same reason.

Sincerely,

(Appropriate regional representative)

Docket No. 50 or 52 - (Number)

Enclosure: As stated

Enclosure

(Name)
 Regional Administrator
 U.S. Nuclear Regulatory Commission
 Region (Number)
(Street address)
(City, State ZIP code)

Dear (Name),

(Facility name) requests approval from the U.S. Nuclear Regulatory Commission (NRC) to have the following (number) individuals take the (BWR or PWR) generic fundamentals examination (GFE) section of the written operator licensing examination to be administered on (date):

<u>Name</u>	<u>Date of Birth</u>	<u>Previous Docket No.</u>
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(Insert the name, date of birth, and previous Title 10 of the Code of Federal Regulations (10 CFR) Part 55 Docket Number (if applicable) for each person.)

All of the listed personnel are enrolled in the (facility name) operator licensing training program and will have completed the generic fundamentals portion of the program by the examination date.

The following personnel will have access to the examinations before they are administered:

<u>Name</u>	<u>Title</u>
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(Insert the name and title of each person who will have access to the examinations before they are administered (e.g., proctors).)

Please address the examinations to the **overnight mail** address, as follows (note that home addresses are not acceptable):

Name, Title
Street address
City, State ZIP code

If you have any questions, please contact (facility contact name) at (telephone number).

Sincerely,

(Name, title)

cc:
 Chief, Operator Licensing and Training Branch, NRR

(Date)

(Name, Title of designated addressee)

(Facility name)

(Street address)

(City, State ZIP code)

Dear (Name):

The U.S. Nuclear Regulatory Commission (NRC) has scheduled your facility to administer the generic fundamentals examination (GFE) section of the NRC's written operator licensing examination on (date). (Name of contractor) is authorized to support the NRC under contract in the administration of GFE-related activities.

Note: For security reasons, please open the sealed envelope now and -check the examination pages using the enclosed checklist. Then, immediately and no later than (date), contact one of the persons listed below informing (him or her) that you have received this package and noting any discrepancies:

(Name), (Telephone Number)

(Name), (Telephone Number)

This letter and its enclosures provide the instructions and guidelines for administering the GFE and returning the completed exams and related materials to (Name of contractor). Please read this letter **now**, and follow the directions in the accompanying enclosures.

Enclosure 1. Security Agreement. Please refer to the enclosed NRC Security Agreement. A copy of this agreement must be completed by each and every exam administrator and/or proctor who sees or has knowledge of the GFE contents. For security reasons, the number of persons who see or have knowledge of this exam's contents before the exam must be limited to **three** persons who **have a need to know**.

The top portion of the security agreement is expected to be completed **now**, and the bottom portion immediately **after** the exam has been completed. Fill in the spaces for each individual's **name** and the **name of the facility** for both portions, and have the individual(s) sign the form(s).

Please note: The signed security agreements **must** be returned to (Name of contractor) along with the completed exam answer sheets before any scoring will be performed.

Enclosure 2. Exam Copies. Two single copies of Forms A and B of the exam are provided. These alternative forms are identical in content; however, for security purposes, the test item sequence on each form is different to reduce the possibility of an applicant copying any answers from a nearby test answer sheet. (See the separate Proctor Instructions in Enclosure 3 for further exam administration instructions.)

You are responsible for reproducing the number of exam copies required for the number of individuals taking the exam. Prior to the exam, store the original copies in a locked cabinet or safe and reproduce the necessary number of copies **only** on the day immediately preceding the exam; in this case, copies should be made on (date). Please note that your total number of copies should consist of one half Form A and one half Form B. After making the necessary number of copies, secure the original and all copies from view of unauthorized persons, storing them in a locked cabinet or safe until the exam date.

Each individual who takes the exam must sign the security statement on the exam cover page. This page must be removed from the exam copy and mailed to (Name of contractor) along with the answer sheets and administrator/proctor security agreements.

After the exam has been given, the exam copies become public knowledge and no longer need security. Therefore, exam copies may subsequently be kept or disposed of as desired.

Enclosure 3. Proctor Instructions. The proctor instructions detail the guidelines for administering the exam. Please note that the specific instructions presented are designed to be adhered to and followed identically by each proctor at **all** facilities. This process will ensure uniform administration and equity of results nationwide. As noted in the Proctor Instructions, all GFE exams will be administered at the same time in accordance with the local time zone in which the facility is located.

Enclosure 4. Exam Answer Sheets. The appropriate number of answer sheets (extra copies included) is enclosed for the number of applicants you identified to take the exam. All applicants must use the original enclosed answer sheets for recording answers during the exam.

Summary of Items to be Returned to (Name of Contractor)

The following items must be mailed via ***Overnight Delivery Service*** to (Name of contractor) and postmarked no later than (date).

- completed answer sheets
- applicant-signed exam cover sheets
- administrator/proctor-signed security statement(s)

Mail all of the above exam-related materials addressed as follows:

(Name)

(Name of contractor)

(Street address)

(City, State ZIP code)

For further questions regarding the specifics of this exam, please contact (Name) at (telephone number). For questions regarding the GFE in general, please contact (Name), NRC, at (telephone number).

For matters regarding candidate withdrawals or cancellations, contact either (Name) or (Name) at (telephone numbers) for specific guidance.

(Name), Chief
Operator Licensing and Training Branch
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

Enclosures:

As stated

Distribution: w/o enclosures
Director, DIRS
Chief, Operator Licensing and Training Branch
NRR GFE Coordinator
Project Manager
Public

NRC Letterhead

(Date)

(Name, Title)

(Facility name)

(Street address)

(City, State ZIP code)

Dear (Name):

On (date), the U.S. Nuclear Regulatory Commission (NRC) administered the generic fundamentals examination (GFE) section of the written operator licensing examination to employees of your facility. Enclosed with this letter are copies of both forms of the examination, including answer keys, the grading results for your facility, and copies of the individual answer sheets for each of your employees. Please forward the results to the individuals along with the copies of their respective answer sheets. A "P" in the RESULTS column indicates that the individual achieved a passing grade of 80 percent or better on the GFE, while an "F" indicates that the individual failed the examination.

If you have any questions concerning this examination, please contact (Name of the NRR GFE coordinator) at (phone number).

Sincerely,

(Appropriate regional representative)

Docket No. 50 or 52 - (Number)

Enclosures:

1. Examination Form "A" and "B" with answers
2. Examination Results Summary for (Facility Name)
3. Individual Answer Sheets

K/A	Pressurized-Water Reactors Topic	No. of Items
	<u>Components</u>	
191001	Valves	2
191002	Sensors and Detectors	4
191003	Controllers and Positioners	3
191004	Pumps	4
191005	Motors and Generators	2
191006	Heat Exchangers and Condensers	2
191007	Demineralizers and Ion Exchangers	2
191008	Breakers, Relays, and Disconnects	3
	<u>Reactor Theory</u>	
192001	Neutrons	1
192002	Neutron Life Cycle	1
192003	Reactor Kinetics and Neutron Sources	1
192004	Reactivity Coefficients	2
192005	Control Rods (Full and/or Part Length)	2
192006	Fission Product Poisons	2
192007	Fuel Depletion and Burnable Poisons	1
192008	Reactor Operational Physics	4
	<u>Thermodynamics</u>	
193001	Thermodynamic Units and Properties	1
193003	Steam	2
193004	Thermodynamic Processes	1
193005	Thermodynamic Cycles	1
193006	Fluid Statics and Dynamics	2
193007	Heat Transfer	1
193008	Thermal Hydraulics	4
193009	Core Thermal Limits	1
193010	Brittle Fracture and Vessel Thermal Stress	1
<u>Total Items</u>		50

K/A	Boiling-Water Reactors Topic	No. of Items
	<u>Components</u> 291001 Valves 291002 Sensors and Detectors 291003 Controllers and Positioners 291004 Pumps 291005 Motors and Generators 291006 Heat Exchangers and Condensers 291007 Demineralizers and Ion Exchangers 291008 Breakers, Relays and Disconnects	 3 4 2 4 2 3 2 2
	<u>Reactor Theory</u> 292001 Neutrons 292002 Neutron Life Cycle 292003 Reactor Kinetics and Neutron Sources 292004 Reactivity Coefficients 292005 Control Rods 292006 Fission Product Poisons 292007 Fuel Depletion and Burnable Poisons 292008 Reactor Operational Physics	 1 1 1 2 2 2 1 4
	<u>Thermodynamics</u> 293001 Thermodynamic Units and Properties 293002 Basic Energy Concepts 293003 Steam 293004 Thermodynamic Process 293005 Thermodynamic Cycles 293006 Fluid Statics 293007 Heat Transfer and Heat Exchangers 293008 Thermal Hydraulics 293009 Core Thermal Limits 293010 Brittle Fracture and Vessel Thermal Stress	 1 0 1 1 1 2 1 3 3 1
<u>Total Items</u>		50

