

# NUCLEAR FUEL MANUFACTURING OVERSIGHT

## *Improving Nuclear Fuel Reliability Training Module*

Although much progress has been made, the elimination of fuel defects remains on the list of challenges. We must remain diligent and dedicate oversight resources to oversee fuel suppliers with the goal of assuring supplier performance and product quality, but...

### DOES YOUR OVERSIGHT HAVE THE RIGHT FOCUS?

Maybe not. With NAC's training in performance-based oversight of nuclear fuel manufacturing you will understand the factors that directly affect fuel performance. You will be better positioned to focus your resources in the right areas and on the right things. This is essential for achieving effective oversight and meeting zero-defect goals.

### HOW EFFECTIVE IS THE MANUFACTURER?

Some manufacturers claim to have Six Sigma programs. Most claim to have the best processes and practices. When it comes to critical fuel reliability attributes, you need to know if the supplier lives up to its claims. With NAC's training, you will be better positioned to identify strengths and weaknesses in your manufacturer's shop using knowledge gained regarding fuel performance, manufacturing, quality, and Six Sigma statistical tools and techniques.

### WHAT DOES THE TRAINING COVER?

Nuclear fuel is complex and the relationships between design, manufacturing, and performance can be complicated.

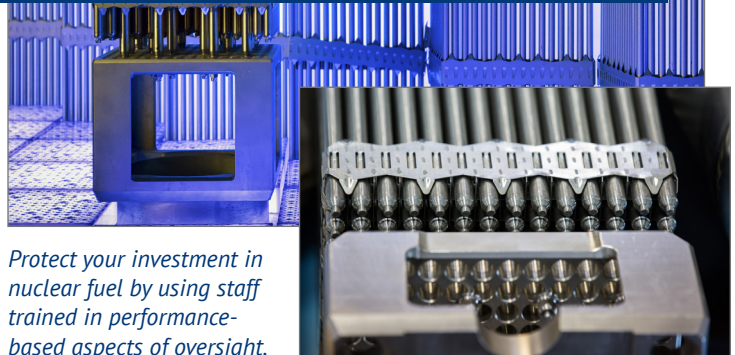
To address this, the 2.5-day training begins by reviewing basic fuel mechanical design, materials, and performance considerations. It uses this foundation and draws on proven methods to define the elements and approach for building a performance-based oversight program. Manufacturing processes are reviewed in detail using flow diagrams, and performance-based attributes are identified and ranked. Six

Sigma tools and other statistical techniques used to evaluate equipment capability and inspector/inspection effectiveness are discussed. Methods for handling and trending non-

### NUCLEAR FUEL MANUFACTURING OVERSIGHT

*A 2.5-day virtual event for technical and quality professionals seeking key insights on performance-based oversight of nuclear fuel manufacturing*

**MAY 18-20, 2021**



*Protect your investment in nuclear fuel by using staff trained in performance-based aspects of oversight.*

conformances are reviewed. The roles of Engineering and Quality Assurance (QA) oversight staff and implementation methods for achieving effective oversight are discussed.

Current challenges to oversight of nuclear fuel manufacturing caused by COVID-19 travel restrictions and shop access limitations by suppliers are discussed, as well as concepts, techniques, and considerations for remote monitoring.

### WHO CAN BENEFIT FROM THE TRAINING?

Engineers, technical personnel, and QA oversight staff at the manager or individual contributor level that are involved with nuclear fuel design, manufacturing, receiving-inspection, handling, performance, and reliability will benefit from this training. The training is applicable to individuals at all levels of experience, from new hires to your most seasoned nuclear professional.

### CONTACT:

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## COURSE CONTENTS

### INTRODUCTION TO PERFORMANCE-BASED OVERSIGHT

- Regulatory basis for oversight
- Approaches to oversight
- Performance-based concepts/history/program development

### FUEL MECHANICAL DESIGN CONSIDERATIONS

- Fuel assembly component basic functions
- PWR/BWR fuel assembly designs
- Safety classification determination
- Pertinent design criteria and sources
- Materials and irradiation effects

### FUEL PERFORMANCE CONSIDERATIONS

- Fuel failure causes and mechanisms
- Non-failure performance issues

### PERFORMANCE-BASED OVERSIGHT PROGRAM DEVELOPMENT

- Performance-based approach
- Ranking system for key attributes
- Key performance categories
- General manufacturing processes and equipment
- Process details/process flow maps
- Identification of critical attributes (activities/processes/components)

### STATISTICAL TECHNIQUES IN MANUFACTURING

- Basic statistics and sampling
- Process capability
- Inspection and measurement system analysis
- Statistical process control
- Acceptance sampling plans

### NONCONFORMING PROCESS OR PRODUCT

- Evaluation and disposition
- Trending and corrective action program

### APPROACHES FOR IMPLEMENTATION

- QA Programs and 10CFR50 App B
- ISO gap analysis
- Split scope and interfaces
- Control of suppliers
- Roles for QA and technical staff
- Surveillance planning
- Remote monitoring considerations
- Surveillance implementation
- Graded approach
- Joint/shared approach

### ACADEMY FEES

**A 2.5-day Virtual Event**

**May 18-20, 2021 . . . . . \$2200**

## ABOUT THE INSTRUCTOR



*Mr. John Rivera is NAC's Director of Fuel Performance Consulting. He has more than 35 years of experience providing nuclear fuel design,*

*materials, manufacturing oversight, performance, procurement, and quality assurance services to the nuclear utility industry. He has developed nuclear fuel mechanical design review expert programs and software tools and has developed fuel performance models for the assessment of fuel ramp rates, growth and creep behavior, and corrosion. He has substantial onsite power plant experience that includes pool-side inspections, design of tooling, and repair of fuel and core components. He has authored numerous programs for performance-based oversight of BWR and PWR fuel manufacturing. He is Six Sigma and Lead QA Auditor certified.*

*Mr. Rivera holds advanced degrees in Nuclear Engineering and Nuclear Materials.*

*Prior to joining NAC, Mr. Rivera held management positions at Yankee Atomic Electric Company, Duke Engineering and Services, and Florida Power and Light.*

## NUCLEAR FUEL MANUFACTURING OVERSIGHT

*An online learning experience for nuclear professionals*

**To register, please visit: <https://www.nacintl.com/seminars>**