



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

The **New Unit Assistance (NUA)** Modules

In order to ensure that new nuclear units operate safely and reliably, WANO offers a New Unit Assistance (NUA) service. This new service offers bespoke and focused support to members during the transition from project phase all the way through to the operating phase of a company, ready for safe and reliable operation.

The 18 modules support WANO members in achieving safe and reliable start-up of their new units.

Full and effective engagement of new units with the NUA programme can significantly reduce the risk of a delay to start-up or a setback during the construction phase.

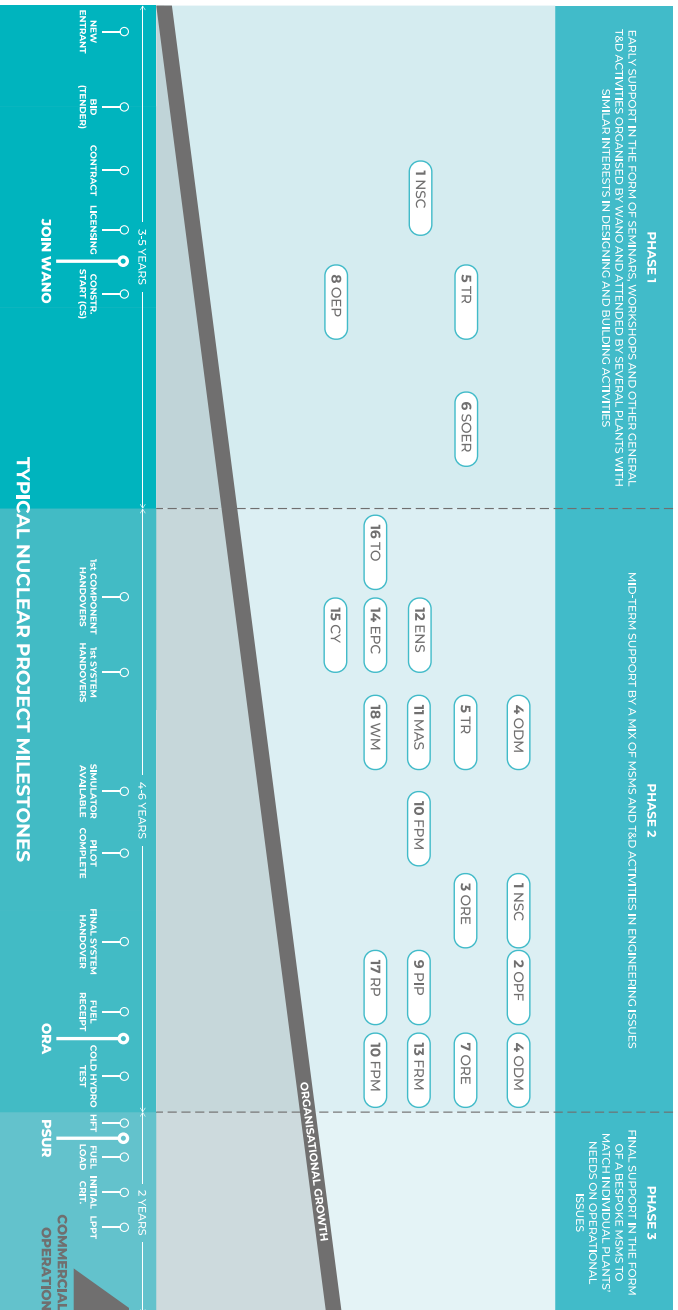
The modules include Nuclear Safety Culture, Operator Fundamentals, Organisational Effectiveness and Oversight, Operator Decision-Making and Training, and others that match typical nuclear project milestones.

Provision of the NUA modules can be tailored to members' specific needs, and the delivery methods are varied to ensure the member receives the right information for them in the most effective way - via sharing of industry best practices, benchmarking, the use of operating experience, and the delivery of targeted support missions and training.

For more information on WANO's NUA modules, please visit <https://www.wano.info/new-unit-assistance> or email nua@wano.org

WANO NEW UNIT ASSISTANCE TIMELINE

PREPARATION, CONSTRUCTION, COMMISSIONING AND ORGANISATIONAL DEVELOPMENT WITH NUA MODULES



WANO SUPPORT: MODULES

- 1 NSC (NUCLEAR SAFETY CULTURE - OR2)
- 2 OPF (OPERATOR FUNDAMENTALS, CREW PERFF & TEAMWORK - OP2)
- 3 ORE (ORG EFFECTIVENESS & OVERSIGHT - OR2)
- 4 ODM (OPERATIONAL DECISION MAKING - OP2)
- 5 TR (TRAINING - TO1)
- 6 SOER (SOER- OE1)
- 7 EPM (EMERGENCY PLANNING MANAGEMENT & LEADERSHIP - EP2)
- 8 OEP (OE PROGRAMME - OE1 OE2)
- 9 PIP (PERFORMANCE IMPROVEMENT PROCESSES - OE1)
- 10 FPM (FIRE PROTECTION MANAGEMENT & LEADERSHIP - FP1 FP4)
- 11 MAS (MAINTENANCE STRATEGIES - MA1)
- 12 ENS (ENGINEERING STRATEGIES - EN1)
- 13 FRM (FUEL & REACTOR MANAGEMENT - EN5)
- 14 EPC (EQUIPMENT PERFORMANCE & CONDITION - EQ1)
- 15 CV (CHEMISTRY - EQ1)
- 16 TO (TURNOVER FOR OPERATIONS EQ1)
- 17 RP (RADIOLOGICAL PROTECTION - RP2)
- 18 WM (WORK MANAGEMENT WM1)
- 19 MAS (MAINTENANCE STRATEGIES - MA1)
- 20 FPM (FIRE PROTECTION MANAGEMENT & LEADERSHIP - FP1 FP4)
- 21 MAS (MAINTENANCE STRATEGIES - MA1)



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 01
Nuclear Safety Culture

01

Nuclear Safety Culture

CONTENT / TOPICS

- Individual commitment to safety
- Establishing a nuclear safety culture (NSC)
- What is the difference between safety and safety culture
- What makes nuclear special?
- Management commitment to safety
- Leader's roles in NSC
- Management systems
- Safety culture team exercises / case studies
- Monitoring NSC
- Traits versus behaviours
- Always incorporate NSC into delivery of other modules. Target NSC behaviours relevant to that module

PLANT STATUS / DELIVERY TIME

- Early phase of project
- Operational readiness organisation staffing
- Middle of operational readiness organisation evolution

TARGET AUDIENCE

- Senior leadership team and extended leadership team
- Operations and maintenance managers
- Independent nuclear safety oversight experts
- Training personnel for NSC training for the workforce
- Construction managers

DELIVERY METHOD

- Training
- Workshop/seminar
- Benchmarking
- Assist visit

Note: Two missions or more may be adequate



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 02
Operator Fundamentals, Crew Performance and Teamwork

02

Operator Fundamentals, Crew Performance and Teamwork

CONTENT / TOPICS

- Operating margins
- Reactivity management
- Your role in operator fundamentals
- Operator knowledge and skills
- System knowledge and purpose of systems turnovers
- Procedure use and adherence
- Response to abnormal and alarm conditions
- Beyond design basis and severe accident events
- Team building

PLANT STATUS / DELIVERY TIME

- Simulator available
- Initial operator training complete and exams complete
- Operations staffed
 - Crews available as sets to observe
 - Prior to fuel load

TARGET AUDIENCE

- Operations shift crews
- Operations managers, especially shift operations manager and operations training managers
- Training department operations staff

DELIVERY METHOD

- Expert mission
- Assist visit
- Crew performance observations of ≥ 2 crews
- Table top discussions
- Walk-downs
- Simulator observations



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 03
Organisational Effectiveness and Oversight

03

Organisational Effectiveness and Oversight

CONTENT / TOPICS

- Introduction to management model
- Organisational strategy and structure
- Key programmes and processes
- Leadership development

PLANT STATUS / DELIVERY TIME

- Early phase of project, first visit - as soon as senior leadership team and heads of department are onsite
- Second visit - when head of groups, next level leaders, first line leaders are onsite
- Plant organisation is ready and staffed (phases)
- Senior leadership team, heads of groups and heads of department
- First line leaders and next level leaders
- Operational readiness organisation staffed

TARGET AUDIENCE

- Senior leadership team available for high-level alignment
- Heads of departments and heads of groups as soon as organisation is established

DELIVERY METHOD

- Expert missions
- Seminar
- Team leaders
- WANO regional centre programme manager
- WANO leadership courses information

NUA Module 04
Operational Decision Making

04

Operational Decision Making

CONTENT / TOPICS

- Operational decision making (ODM) principles
- Process to support decision makers when they have complex decisions to make
- Systematic and comprehensive process to support effective operability determination
- Systematic approach to operability assessment
- Plant nuclear safety committee process (including ODM principles)
- Case studies

PLANT STATUS / DELIVERY TIME

- Before turnover of first systems and again before fuel receipt

TARGET AUDIENCE

- Shift manager and supervisors
- Shift technical advisors
- Operation managers
- Outage managers
- Plant decision makers
- Engineering and maintenance staff
- Operations training instructors and manager
- Management team available: senior leadership team, operations, engineering and maintenance managers

DELIVERY METHOD

- Expert mission
- Training
- Workshop
- Seminar (for wider audience)



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 05
Training

05

Training

CONTENT / TOPICS

Two NUA training modules, one for **mid-level managers** and one for **senior executives**, aimed at providing ideas/perspective on:

- Training is a key element to new units, training timeline
- What are the roles and responsibilities in training?
- What is the typical training and qualification channel?
- Key ideas of systematic approach to training (SAT) model
- What a typical training organisation is like?
- Key timeline in developing training resources
- Typical training programmes, how to build training policy
- Providing training assistance according to specific request

PLANT STATUS / DELIVERY TIME

- Training modules for senior executives:
The best time to execute the assistance is 7-8 years before first fuel loading.
- Training modules for mid-level managers:
The best time to execute the assistance is 5-6 years before first fuel loading.

TARGET AUDIENCE

Senior executives module: with the plant status that the senior leadership team is in place; training department is not established.

Mid-level managers module: with the plant status that mid-level managers are in place; training department is established.

DELIVERY METHOD

- NUA member support mission
- Expert mission
- Assist visit
- Workshop

NUA Module 06
Significant Operating Experience Reports (SOER)

06

Significant Operating Experience Reports (SOER)

CONTENT / TOPICS

- Refresher and background to Operating Experience (OE) and Significant Operating Experience Report (SOER) programmes
- Basic overview of main WANO SOER requirements
- Explanation of an SOER, typical structure, list of SOERs, supporting materials
- WANO expectations on SOER implementation, stakeholders, ownership, management oversight, SOER process, gap analysis, effectiveness review, WANO review of SOER recommendations within pre-startup peer review (PSUR), WANO SOER tracking system
- Detailed description and case studies to three SOERs, e.g.
 - SOER 1999-1 - Loss of Grid, with 2004 Addendum
 - SOER 2013-1 - Operator Fundamental Weaknesses
 - SOER 2015-2 - Risk Management Challenges

PLANT STATUS / DELIVERY TIME

- Early phase of project, before first system handover, once appropriate site organisations available
- At least one year before PSUR
- Once initial development of performance improvement programme complete

TARGET AUDIENCE

- SOER owners
- Project managers (incorporating recommendations)
- OE organisation
- Heads of department
- Safety, quality assurance (QA) managers
- Nuclear safety oversight

DELIVERY METHOD

- Expert mission
- Assist visit
- Workshop
- Training

NUA Module 07
Emergency Planning Management and Leadership

07

Emergency Planning Management and Leadership

CONTENT / TOPICS

- Planning and implementing
- Monitoring and assessing
- Emergency plan content
- Emergency response organisation
- Emergency response organisation personnel knowledge and performance
- Severe accident management
- Equipment reliability of post-Fukushima
- Equipment ownership

PLANT STATUS / DELIVERY TIME

- Emergency response organisation and procedures ready
- Emergency response facilities ready and drills ready to execute
- Before fuel receipt
- Plant organisation structured

TARGET AUDIENCE

- Emergency response organisation (consider impact of multiple units, offsite resources/agencies)
- Local responsible organisations
- Heads of department

DELIVERY METHOD

- Benchmarking
- Expert missions
- Assist visit

NUA Module 08
Operating Experience (OE) Programme

08

Operating Experience (OE) Programme

CONTENT / TOPICS

- Refresher and background to Operating Experience (OE) programme
- Basic overview of main WANO & International Atomic Energy Agency (IAEA) document requirements
- Establishing and running OE programme: requirements on management
- Example of OE programme structure and its main components – identifying, reporting, screening, analysis, corrective actions, trending. Assessing relationship between OE and performance improvement
- Overview of how OE is to be used in the operating organisation
- Means of OE programme assessment, examples of performance indicators

PLANT STATUS / DELIVERY TIME

- Early phase of project, before first system handover
- General OE/Performance Indicator (PI) and SOER training/introduction, at least a year before the pre-startup peer review (PSUR)
- Review/self-assessment of processes before PSUR
- According to the OE milestones

TARGET AUDIENCE

- Safety, individual contributors (separate modules over the same week)
- Specific training to SOER programme managers & staff
- General training
- Nuclear safety oversight
- Construction staff

DELIVERY METHOD

- Expert mission
- Assist visit
- Workshop
- Training

NUA Module 09
Performance Improvement Processes

09

Performance Improvement Processes

CONTENT / TOPICS

- Introduction to performance improvement
- Identifying and monitoring
- Analysing (investigate and plan actions)
- Correcting
- Management and leadership roles and responsibilities

PLANT STATUS / DELIVERY TIME

- Performance improvement programme initial development
- Performance improvement programme managers in role

TARGET AUDIENCE

- Department heads
- Quality assurance (QA) manager
- Safety managers
- Development managers
- Nuclear safety oversight

DELIVERY METHOD

- Expert mission
- Workshop
- Seminar



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 10
Fire Protection Management and Leadership

10

Fire Protection Management and Leadership

CONTENT / TOPICS

- Fire protection (FP) programme
- General plant design
- FP systems and equipment
- Station fire brigade
- Specific consideration for nuclear risks
- Specific FP guidelines
- FP system inspection, testing and maintenance

PLANT STATUS / DELIVERY TIME

- Before first fire protection system handover, and then again prior to fuel receipt (timing)
- Validation that all required FP systems are operable

TARGET AUDIENCE

- FP organisations in both construction and operations
- Fire marshal and fire protection system (FPS) engineers, FP training staff, local responding services
- Local responsible organisations/authorities

DELIVERY METHOD

- Benchmarking
- Expert missions
- Assist visits (for drills)



NUA Module 11
Maintenance Strategies

11

Maintenance Strategies

CONTENT / TOPICS

- Maintenance expectations, management, leadership, planning
- Contractor/vendor management and monitoring
- Maintenance technical fundamentals
- Maintenance staffing and structures
- Preparations for integrated testing and commissioning maintenance, transfer to operational organisation
- Predictive, preventive, corrective etc. maintenance programmes
- Foreign material exclusion during maintenance
- Rigging and lifting activities

PLANT STATUS / DELIVERY TIME

- Before first system turned over to maintenance
- Well in advance of fuel load (Pre-Startup Performance Objectives & Criteria)
- Conduct of maintenance programme available
- Preventive maintenance, long-term asset management/life cycle management programmes available
- Equipment management available
- Preparations for integrated testing and commissioning maintenance

TARGET AUDIENCE

- Maintenance executives and department heads
- Key maintenance/work management managers, team leaders and engineering programme managers, team leaders

DELIVERY METHOD

- Expert mission on strategies
- Assist visit



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 12
Engineering Strategies

12

Engineering Strategies

CONTENT / TOPICS

- Organisation of engineering (corporate versus site versus service providers/engineering as part of maintenance organisation)
- Technical conscience
- Design authority
- Procurement specification and quality control
- Engineering service provider qualification
- Engineering permanent and temporary modifications management
- Design and beyond design analyses
- Configuration management
- Graded approach to quality assurance

PLANT STATUS / DELIVERY TIME

- Engineering leaders/managers available
- Before first handover
- Consider impact of engineering staff participation on development of safety assessment reports and other licensing bases

Note: A good practice could be to associate future station engineers to the new built structure so that they can analyse some technical options, and endorse the design base at the beginning.

TARGET AUDIENCE

- Engineering managers
- Engineer training instructors
- Maintenance managers
- Chemistry engineers
- Shift managers operators

DELIVERY METHOD

- Benchmarking
- Assist visit
- Training
- WANO Member support mission (assist visit, exchange visit)
- WANO Representative or performance monitoring leader interaction



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 13
Fuel and Reactor Management

13

Fuel and Reactor Management

CONTENT / TOPICS

- Fuel management milestones and context in new build
- Initial core design controls and analysis
- New fuel receipt, storage and inventory controls
- Fuel handling procedures, human factors and limiting conditions for operation
- Fuel handling roles, responsibilities, training and operating experience
- Control of foreign material exclusion during fuel handling operations
- Reactivity management and criticality controls
- Readiness for fuel loading and first plant operability
- Approach to loading of the first reactor core
- Low power physics testing and fuel limited condition of operations management

PLANT STATUS / DELIVERY TIME

- Initial discussions before the core design
- Support well in advance of the initial fuel load
- Trained and qualified operations shift personnel and fuel engineering personnel are ready

TARGET AUDIENCE

- Reactor physicists, fuel engineers
- Operators, safety and safeguards personnel
- Maintenance/outage planning staff
- Fuel handling and lifting personnel
- Shift supervisor(s), operations managers
- Training department

DELIVERY METHOD

- Expert mission
- Assist visit
- Training



NUA Module 14
Equipment Performance and Condition (EPC)

14

Equipment Performance and Condition (EPC)

CONTENT / TOPICS

- Scoping & identification of critical systems, structures & components
- Seismic qualification
- Establishment of maintenance programmes (predictive, preventive)
- Obsolescence management
- Ageing management
- Flow accelerated corrosion
- Condition based maintenance tools
- In service inspection techniques (non-destructive testing)
- Engineering operating experience
- Trend monitoring
- Transient analysis
- Advance pattern recognition (e-monitoring)
- System health monitoring and reporting
- Component health report
- International equipment reliability index (IERI)
- Engineering role in decision making

PLANT STATUS / DELIVERY TIME

- Engineering and maintenance management available
- Before first handover (initial tests to get 'fingerprints'/reference condition of the systems)

TARGET AUDIENCE

- Maintenance managers and team leaders
- Work management/ equipment performance and condition managers, work management/ engineering managers and team leaders
- Chemistry engineers
- Shift manager, operators

DELIVERY METHOD

- Training and workshops
- Benchmarking
- WANO member support mission (assist visit, exchange visit, benchmark visit)
- WANO representative or performance monitoring leader interaction



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 15
Chemistry

15

Chemistry

CONTENT / TOPICS

- Your role in chemistry fundamentals
- Introduction to chemistry
- Chemistry strategies
- Conduct of chemistry (documents & processes)
- Chemistry and radiochemistry parameters
- Changes and risks in chemistry
- Chemistry influence on reactivity
- Component ageing, material behaviour/ system corrosion
- Early implementation of asset preservation strategies

PLANT STATUS / DELIVERY TIME

- Chemistry personnel available (according to chemistry strategy and milestones)

TARGET AUDIENCE

- Chemistry managers
- Chemistry superintendents
- Chemistry supervisors

DELIVERY METHOD

- Benchmarking
- Expert mission
- Assist visit



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 16
Turnover for Operations

16

Turnover for Operations

CONTENT / TOPICS

- Phases of handover
- Roles and responsibility in handover process
- Construction supervision
- Composition of system handover packages
- Acceptance criteria for handover
- Equipment/system performance supervision
- Handover schedule and resource
- Tip for system handover and walk down
- Work management and analysis for open deficiencies
- Department role in handover
- Participation in construction and commissioning
- Protection equipment during construction and commissioning

PLANT STATUS / DELIVERY TIME

- One year prior to first system turnover to operations

TARGET AUDIENCE

- Department heads
- Quality assurance manager
- Nuclear safety oversight
- Engineering, operations, maintenance and commissioning staff involved in turnover process.

DELIVERY METHOD

- Training
- Benchmarking
- Expert mission
- Workshops



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 17
Radiological Protection

17

Radiological Protection

CONTENT / TOPICS

- Radiological Protection (RP) fundamentals
- RP Work Management
- Skills and knowledge, plant status control
- As low as reasonably achievable (ALARA) implementation
- Dose management
- Radioactive source control
- Radioactive waste (RW) management

PLANT STATUS / DELIVERY TIME

- RP and RW personnel available
- Radiation monitoring systems installed
- Adherence to plant industrial safety programme requirements by radiation protection staff, as well as supplemental personnel and vendors

TARGET AUDIENCE

- Training instructors
- RP personnel and manager
- Heads of operations, maintenance, equipment and chemistry

DELIVERY METHOD

- Benchmark
- Assist visit
- Expert mission



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

NUA Module 18
Work Management

18

Work Management

CONTENT / TOPICS

- Warning flags
- Work management history
- Industry tools
- Execution phase and fix it now teams, work management process overview
- New work screening process
- Managing risk
- Meeting management
- Excellence in work management

PLANT STATUS / DELIVERY TIME

- Six months prior to systems turnover to maintenance

TARGET AUDIENCE

- Department heads
- Quality assurance manager
- Nuclear safety oversight
- Work management staff
- Engineering, operations, maintenance staff

DELIVERY METHOD

- Training
- Benchmarking
- Expert mission
- Workshops



WANT TO KNOW MORE?

For more information, contact
one of our experts at nua@wano.org



WANO

GLOBAL LEADERSHIP IN NUCLEAR SAFETY

ATLANTA
LONDON & SHANGHAI
MOSCOW
PARIS
TOKYO

WANO.INFO

CONNECT WITH US

