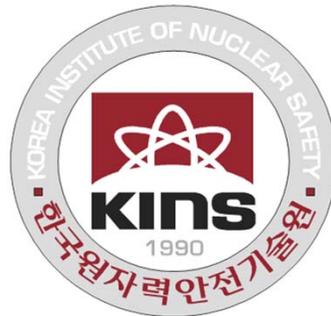


# QUALITY ASSURANCE INSPECTION OF VENDORS IN KOREA



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- Legal basis
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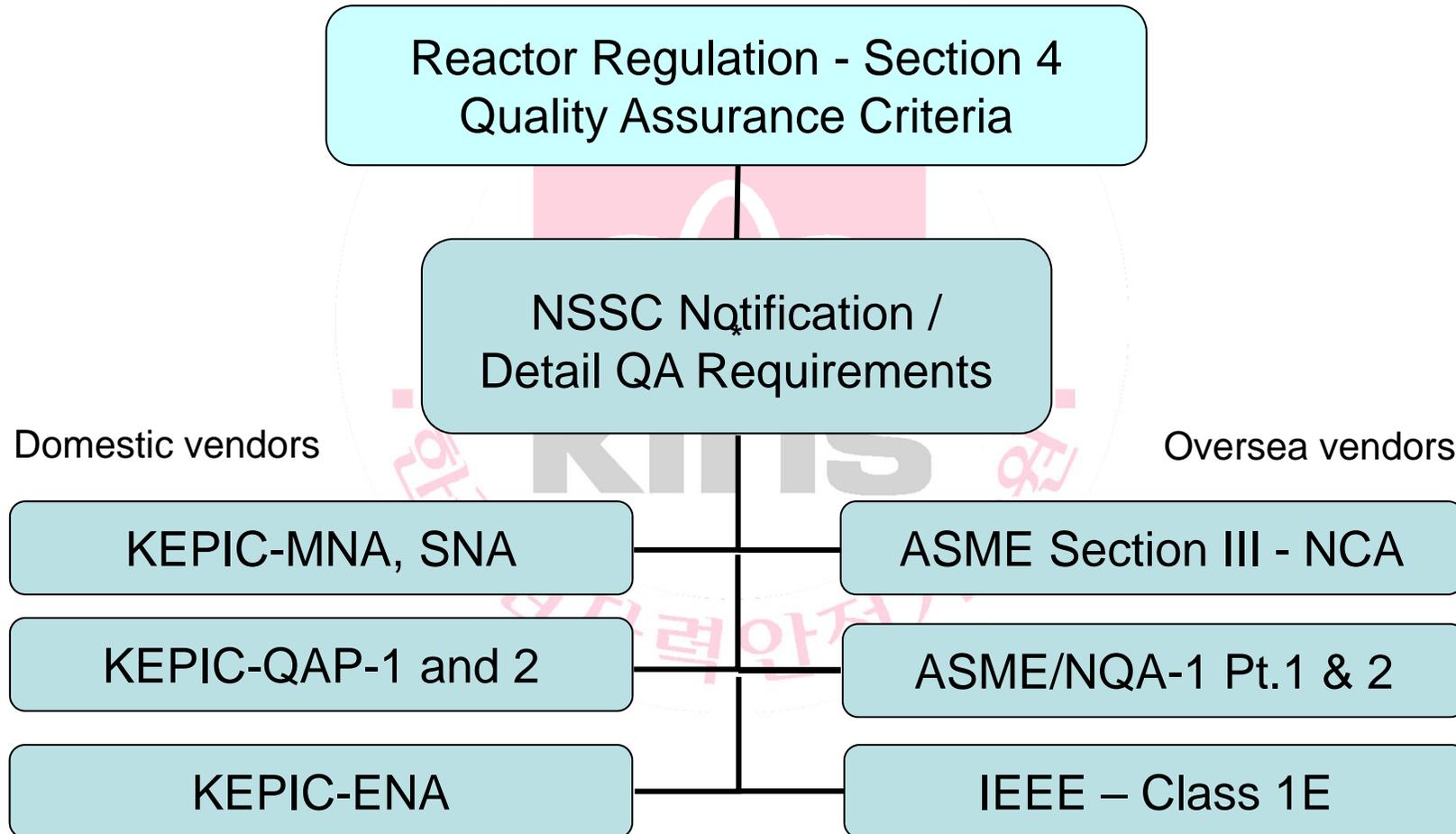
# LEGAL BASES - CP

- Atomic Energy Safety Act – Article 11  
Construction Permit  
(2) A CP Applicant shall submit to the NSSC an application together with the Radiation Environmental Report, the PSAR, and QAP regarding construction as prescribed by the NSSC Ordinance.
- NSSC Ordinance – Article 7 Preparation of Attached Documents for a CP  
(3) The PSAR shall contain each of the following:  
17. Quality Assurance: Principal contractors' QAPD

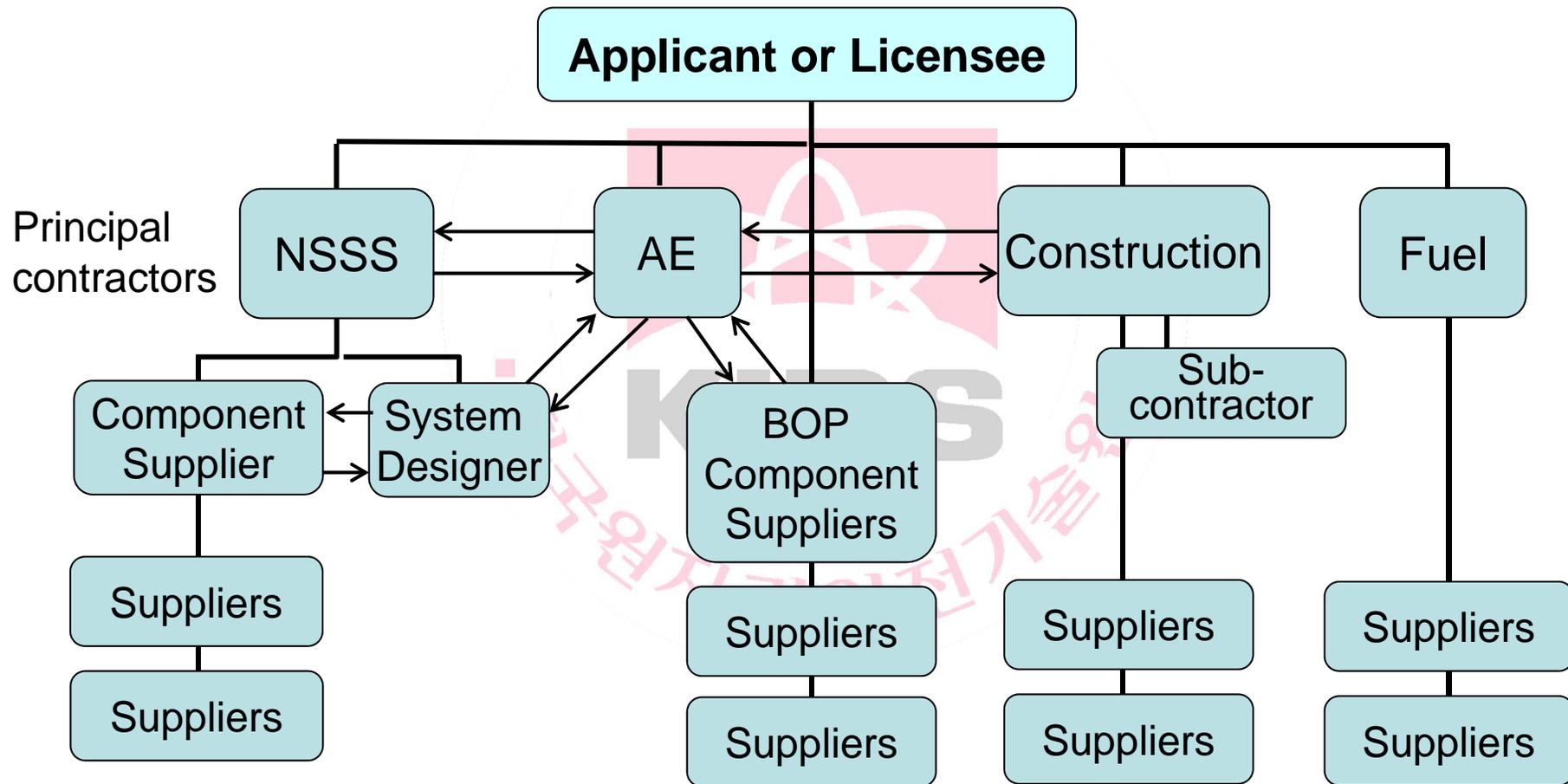
# LEGAL BASES - Inspection

- Atomic Energy Safety Act – Article 16 Inspection  
The installer shall undergo inspections of the NSSC with respect to the construction of the nuclear power reactor and reacted facilities ..... under the conditions as prescribed by the presidential decree.
- Presidential Decree – Article 31, QA Inspection  
The NSSC may conduct an inspection, under provision of Article 16(1) of the Act, to verify whether the installer of nuclear power reactor carries out the quality assurance activities according to the QAP submitted under Article 11(2) of the Act

# CRITERIA AND REQUIREMENTS



# TYPICAL CONTRACT STRUCTURE - A NEW REACTOR

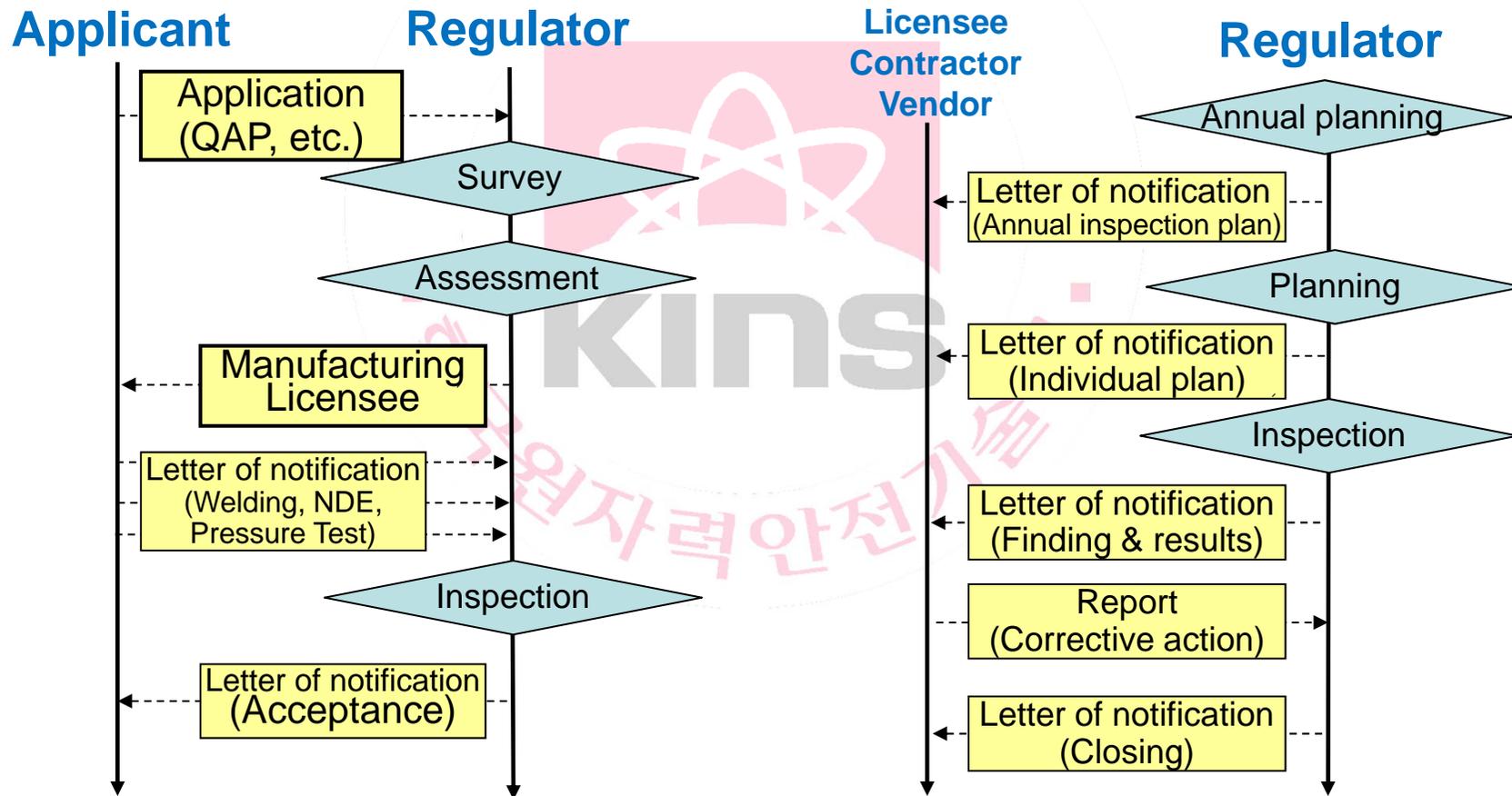


# REGULATOR EXPECTATION

- Applicant or Licensee
  - Supply chain oversight (inspection, surveillance, audits) commensurate with importance to safety
- Principal Contractor
  - Quality control (inspection by QCI) and audit
  - Vendor qualification, inspection and audit
- AIA (for pressure retaining components)
  - ANI activities pursuant to the Code (inspection and audit)
- Vendor
  - Quality control (inspection by QCI) and audit
  - Vendor qualification, inspection and audit

# HISTORY OF VENDOR OVERSIGHT IN KOREA

Manufacturing license → 2000 → QA Inspection of vendor

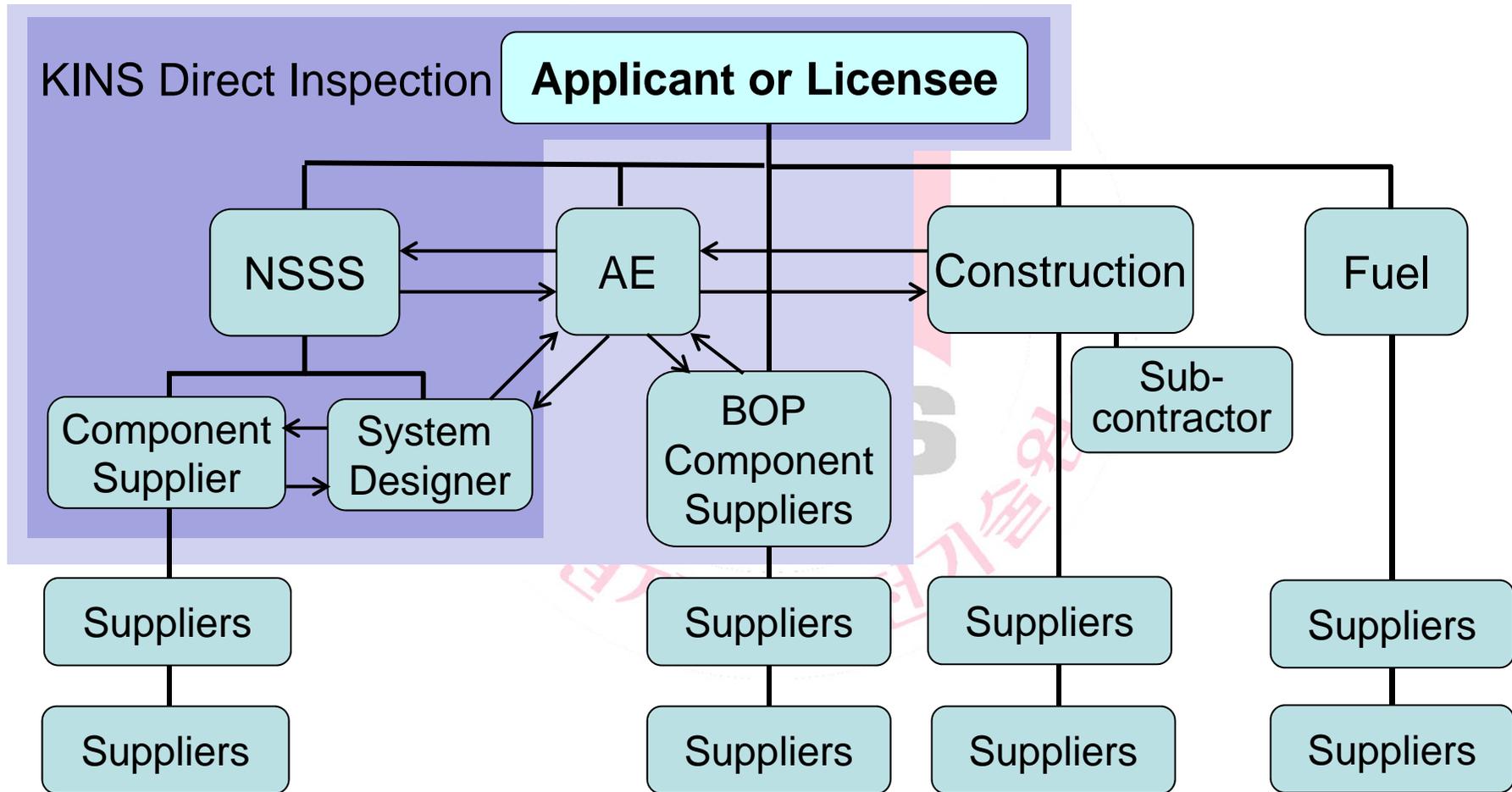


# CURRENT PRACTICE IN VENDOR OVERSIGHT

The scope of vendor inspection pursuant to the current regulations includes

- **Licensee QAP** covering overall QA controls
- **QA Commitments in PSAR** covering QA controls of the NSSS principal contractor
- **Technical Commitments in PSAR** covering technical data per each NSSS (incl. SIS) and ESF components (*such as design, material, welding control, and test performance*)

# REGULATORY OVERSIGHT OF SUPPLY CHAIN



# INSPECTION PROGRAM - Procedure

**PI-QE02** Quality assurance inspection procedure regarding manufacture of the reactor facility major components

**This procedure** covers

- NSSS principal contractor's QA controls in system design and component manufacturing
- NSSS component suppliers' QA controls in component design and manufacturing
- Definition of major components

# MAJOR COMPONENTS

	Components subject to KINS direct inspection
<b>NSSS Main Components</b>	Reactor pressure vessel (including CEDM), Steam Generator, Pressurizer, Reactor Coolant Pump, Reactor Coolant piping (including Surge Line)
<b>Piping</b>	Piping of Reactor Coolant System (RCS), Chemical and Volume Control System (CVCS), Safety Injection System(SIS), Shutdown Cooling System (SCS)
<b>Pumps</b>	High Pressure Safety Injection (HPSI) Pump, Shutdown Cooling Pump, Charging Pump, Reactor Makeup Water Pump, Boric-Acid Makeup Water Pump
<b>Valves</b>	Valves of Reactor Coolant System (RCS), Chemical and Volume Control System (CVCS), Safety Injection System(SIS), Shutdown Cooling System (SCS)
<b>Tanks</b>	Volume Control Tank, Ion Purification Exchanger, Deborating Ion Exchanger, Chemical Additive Tank, Refueling Water Storage Tank, Safety Injection Tank, Reactor Makeup Water Tank
<b>Heat Exchangers</b>	Regenerative Heat Exchanger, Letdown Heat Exchanger, Shutdown Cooling Heat Exchanger, Reactor Coolant Pump Seal Leak-off Heat Exchanger

# INSPECTION PROGRAM - Guidance

- GI-N021-01** Quality assurance program review
- GI-N021-02** Authorized inspection
- GI-N021-03** NCR & CAR
- ⋮
- GI-N021-21** Non-destructive examination
- GI-N021-22** Casting and forging inspection
- GI-N021-23** Material forming inspection
- GI-N021-24** Inspection of product testing

# QA INSPECTION EMPHASIS

Assess QA programmatic aspects of the licensee, contractor and vendor to determine

- procedures are provided to identify, evaluate, dispose of any exposed or potential product/design deficiencies
  - corrective actions on exposed deficiencies are implemented and appropriate measures to prevent recurrence are established implemented
  - Activities such as design, fabrication and tests are adequately controlled according to relevant QA program
  - licensee reacts and utilizes properly the information regarding product/design provided from manufacturer
- \* *KINS direct vendor QA inspection does not supersede or alleviate the licensee's responsibility to oversight vendors*

# PLANNING

## NSSS principal contractor

Inspection Guidance		Months after the initial inspection						
Guidance	Inspection area	0M	6M	12M	18M	24M	30M	36M
(Phase 1) Quality Assurance Program Review								
KINS/GI-N021-01	Quality assurance program	○○						
KINS/GI-N021-02	Authorized nuclear inspection		○		○		○	
(Phase 2) Quality Assurance Program Implementation								
KINS/GI-N021-04	Control of purchasing items and services			○		○		○
KINS/GI-N021-05	Design process and document control		○		○		○	
KINS/GI-N021-06	Quality audit			○		○		○
KINS/GI-N021-07	Personnel indoctrination and training			○		○		○
KINS/GI-N021-08	Control of manufacturing documents			○		○		○
KINS/GI-N021-09	Process control			○		○		○
KINS/GI-N021-10	Identification and control of materials			○		○		○

## NSSS Principal Contractor

Procedure No.	Inspection area	0M	6M	12M	18M	24M	30M	36M
KINS/GI-N021-11	Handling and storage of items			⊙		⊙		⊙
KINS/GI-N021-12	Control of M&TE			⊙		⊙		⊙
KINS/GI-N021-13	Quality assurance records			⊙		⊙		⊙
(Phase 3) Quality Assurance Program Validity								
KINS/GI-N021-01	QA Program (Modification)			○		○		○
KINS/GI-N021-03	Nonconformance and corrective action		○	○	○	○	○	○
(Phase 4) Compliance of Technical Aspects to the SAR and Applicable Industry Code								
KINS/GI-N021-14	Review of WPS and its qualification		⊙		⊙		⊙	
KINS/GI-N021-15	Welding material control		⊙		⊙		⊙	
KINS/GI-N021-17	Post-weld heat treatment		⊙		⊙		⊙	
KINS/GI-N021-19	Special welding process application		⊙		⊙		⊙	
KINS/GI-N021-20	Welding performance qualification		⊙		⊙		⊙	
KINS/GI-N021-21	MT, PT, RT, UT, SG tube ECT		⊙		⊙		⊙	
KINS/GI-N021-22	Casting and forging		⊙		⊙		⊙	
KINS/GI-N021-23	Material forming		⊙		⊙		⊙	
KINS/GI-N021-24	Production testing		⊙		⊙		⊙	

For guidance marked ⊙, inspectors conducts sampling aspects depending on scope and status of vendor

## Supplier and Licensee organization (indirect, BOP)

Procedure No.	Inspection area	0M	12M	24M	36M
(Phase 1) Quality Assurance Program Review					
KINS/GI-N021-01	Quality assurance program	○●			
KINS/GI-N021-02	Authorized inspection		○	○	○
(Phase 2) Quality Assurance Program Implementation					
KINS/GI-N021-04	Control of purchasing items and services	●	○	●	○
KINS/GI-N021-05	Design process and document control		○		○
KINS/GI-N021-06	Quality audit	●		●○	
⋮					
KINS/GI-N021-12	Control of measuring and test equipment		○		○
KINS/GI-N021-13	Quality assurance records	●	○	●	○
KINS/GI-N021-18	Quality inspection	●		●	
(Phase 3) Quality Assurance Program Validity					
KINS/GI-N021-01	Quality assurance program (modification)		○	○●	○
KINS/GI-N021-03	Nonconformance and corrective actions	●	○	○●	○

○ stand for inspection of vendors

● for the reactor licensee responsible for vendor oversight (Changwon, NY, Paris)

## Vendor Inspection Plan – Year 2012

Vendor Inspection No. (MCM-12XX)	Vendor Name, Location	Date	No. of Inspectors	Main Scope of Inspection	Systems, Parts, and Components	Primary Language
2012-1	KHNP/QS Team	March	3	QA Program	Vendor oversight	Korean
2012-2	KEPCO E&C	March	3	QA Program	APR1400 Design	Korean
2012-3	DOOSAN, Changwon, Korea	April	3	PSAR commitment	PWR Mechanical Components	Korean*
2012-4	Ilshin Valves	April	2	QA Program	Valves	Korean
2012-5	Hyosung Goodsprings	April	2	QA Program	Pumps	Korean
2012-6	Sempel, Germany	May	2-3	QA Program & PSAR Commitment	Valves	English
2012-7	Andritz, Graz, Austria	May	2-2	QA Program & PSAR Commitment	RCP	English
2012-8	KHNP/Paris Office	June	1	QA Program	Vendor oversight	Korean
2012-9	KSB, Frankenthal, Germany	July	2-3	QA Program	Pumps	English
2012-10**	Curtiss-Wright Target Rock Div. NY USA	Sep	2	QA Program & PSAR Commitment	Valves	English
2012-11	KHNP/New York Office	Sep	2	QA Program	Vendor oversight	Korean
2012-12	Samshin Valves	Oct	2	QA Program & PSAR Commitment	APR1400 Valves	Korean
2012-13	Seong-Il SIM	Oct	2	QA Program & PSAR Commitment	Piping	Korean
2012-14	DOOSAN, Changwon, Korea	Nov	4	QA Program	PWR Mechanical Components	Korean*

\* If other regulator participate or witness, English will be the primary language.

\*\* MDEP Joint inspection (NRC lead – KINS active participation)



# CHALLENGES

- Recent increase in noncompliance of non-NSSS items requires;
  - Expanding the scope of inspection to all safety related components
  - Enacting regulation regarding reporting of noncompliance (cf. Part 21)
  - Preventing from inclusion of CFSI
- Oversight of international supply chain needs
  - Increased budget and manpower
  - Efficiency enhancement through international cooperation

# INTERNATIONAL COOPERATION

- **Bilaterally with the USNRC (2007~2008)**
  - Sharing of inspection program and inspection results
  - Witnessed and parallel inspection for common vendor
- **MDEP / VICWG (2008~)**
  - Seeking harmonization of QA/QM requirements
  - Observation of each others' inspection (witnessed)
  - Sharing of vendor inspection results
  - Joint inspection for common vendors
  - ➔ Maximizing the use of other regulator's inspection results
  - ➔ Forwarding to multinational vendor inspection (Goal)