



Doosan Heavy Industries & Construction

Supplier Evaluation Program



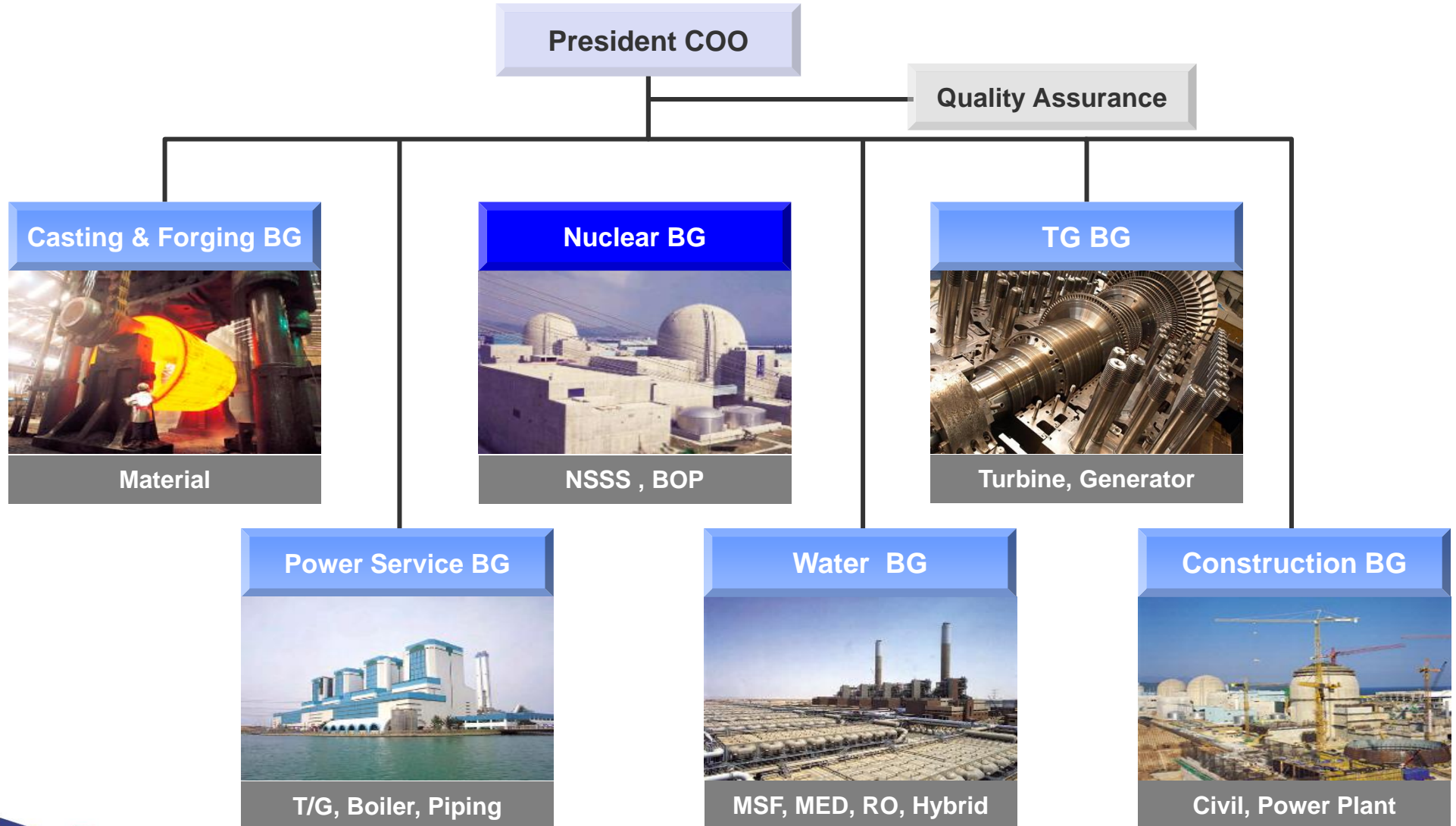
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Doosan QA Team / Jeong Sun Kim

- **Introducing of Doosan**
- **Applicable Requirements for Supplier Evaluation**
- **Supplier Evaluation and Control**
- **Challenges/ Risks for global supply chain management**
- **Recommendation for Improvement**

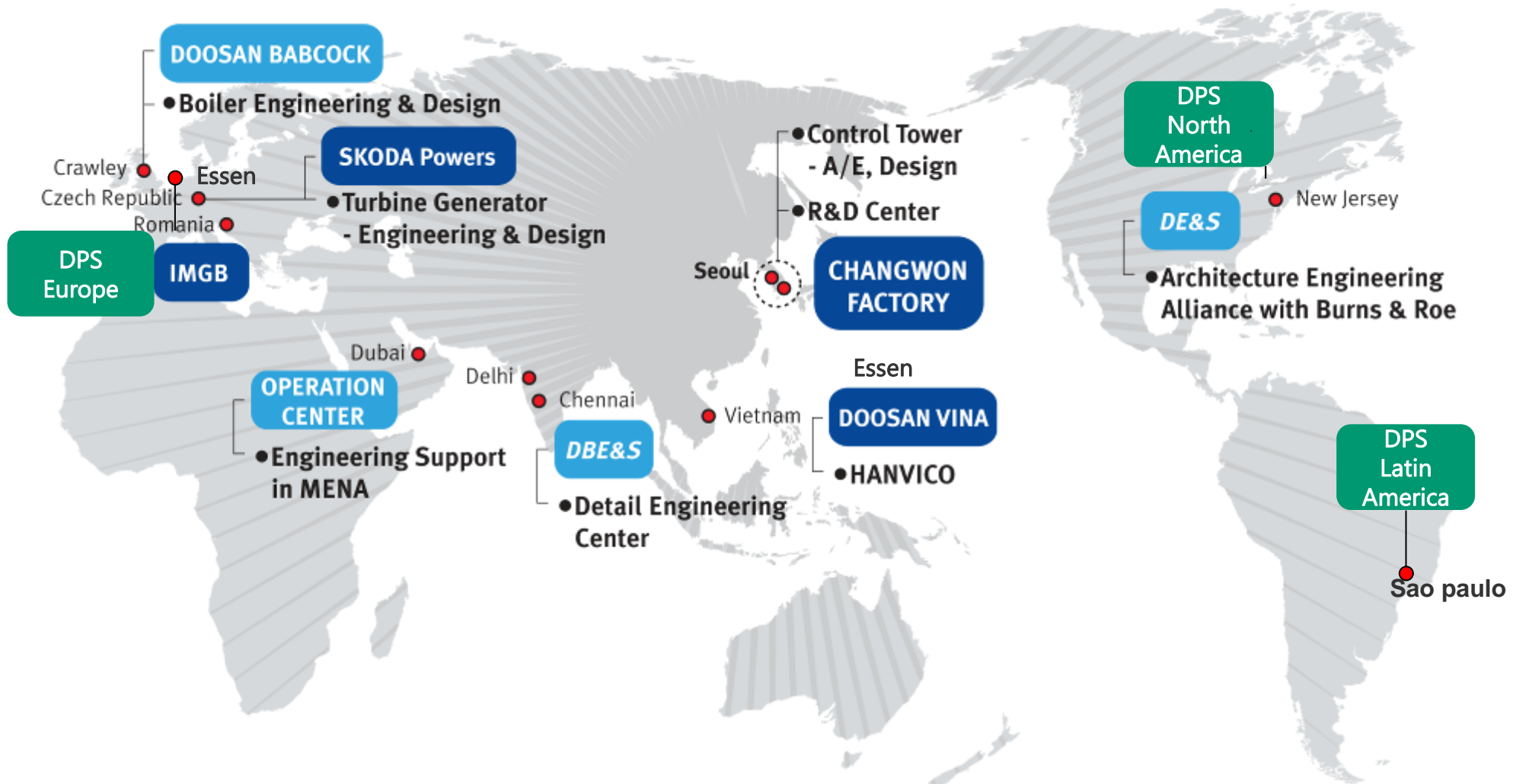
Introducing of Doosan

● Business Overview



Introducing of Doosan

Power Business Global Network



Introducing of Doosan

Changwon Facility

Doosan has an integrated manufacturing facility in Changwon, Korea which is capable from raw material production to final assembly of nuclear components.



Changwon Manufacturing Complex

Introducing of Doosan

Nuclear Steam Supply System

- Reactor Vessel and Internals
- Steam Generator
- Reactor Coolant Pump
- Control Element Drive Mechanism
- Pressurizer
- Integrated Head Assembly
- Fuel Handling System

Balance of Plant

- Containment Post-tensioning System
- Containment Liner Plates
- Stainless Steel Liner Plates
- Condenser and Heat Exchangers
- Pressure Vessels & Tanks
- Gas Stripper, Boric Acid Concentrator
- Containment Polar Crane, etc.
- New and Spent Fuel Racks
- Spent Fuel Transportation Cask

Nuclear Service

- Replacement Service
 - RSG, RRVCH
- Repair & NDE Service
 - RVCH, SG, PZR
- Maintenance
 - RCP Internal & Refueling System
- Upgrade & Modification
 - FHS, IHA, High Density Fuel Rack, etc.
- Technical Advisory Service

Turbine / Generator System

- Turbine
- Generator
- Moisture Separator Reheater, etc.

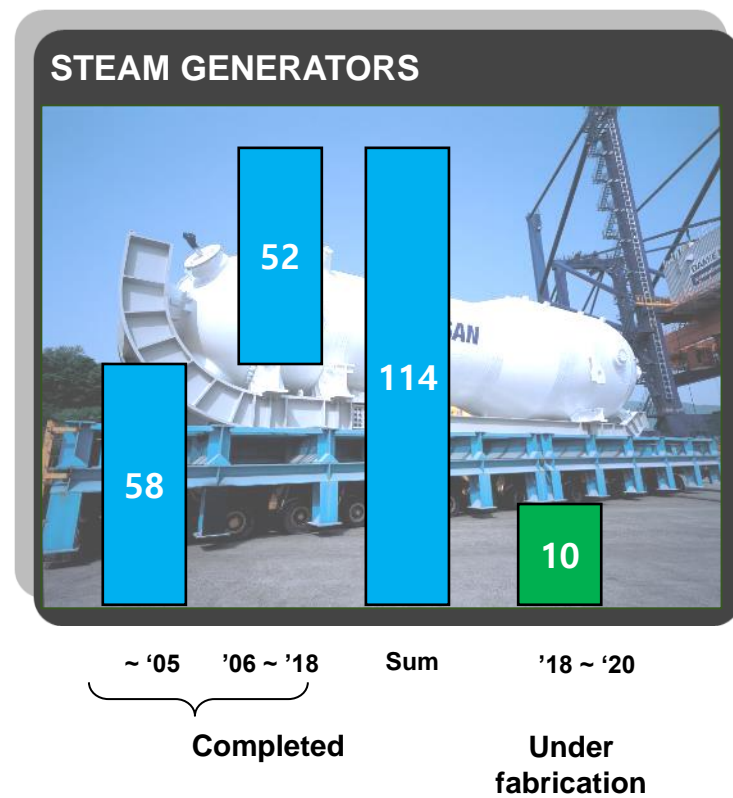
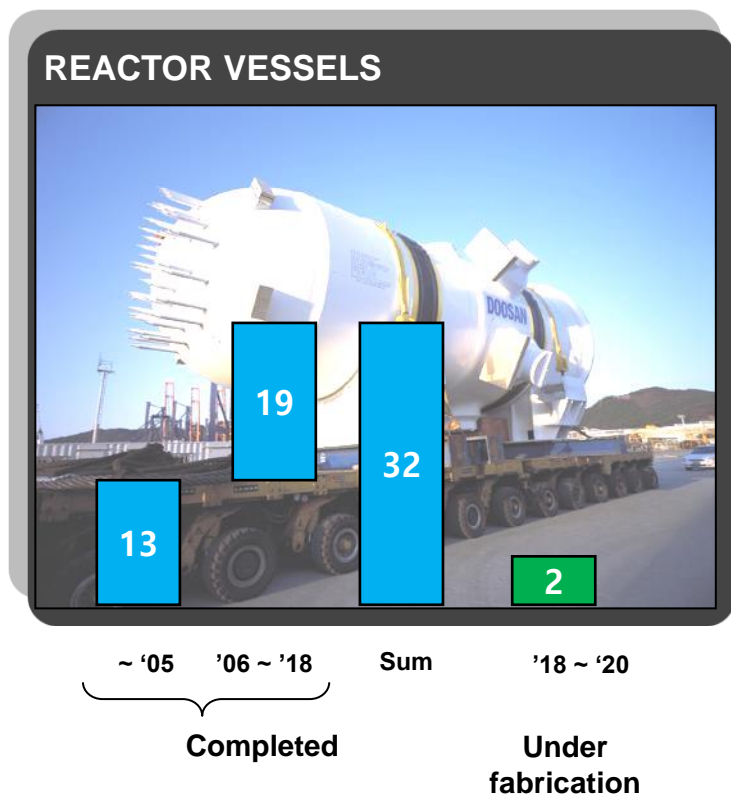
I&C

- NPP I&C total Package
 - Safety / Non-Safety System
 - Cable Assembly, etc.
- Upgrade of I&C in operating NPPs
 - I&C Digital Upgrade
 - Control Rod Control System



Introducing of Doosan

- 22 New Nuclear Power Plants (8 Overseas Projects)
- 17 Replacement Projects (10 Overseas Projects)



Introducing of Doosan

◆ Qinshan Phase III #1&2 Steam Generator (China)



◆ BNPP#1~4 Steam Generator (UAE)



◆ V.C Summer #2,3 Reactor Vessel (USA)

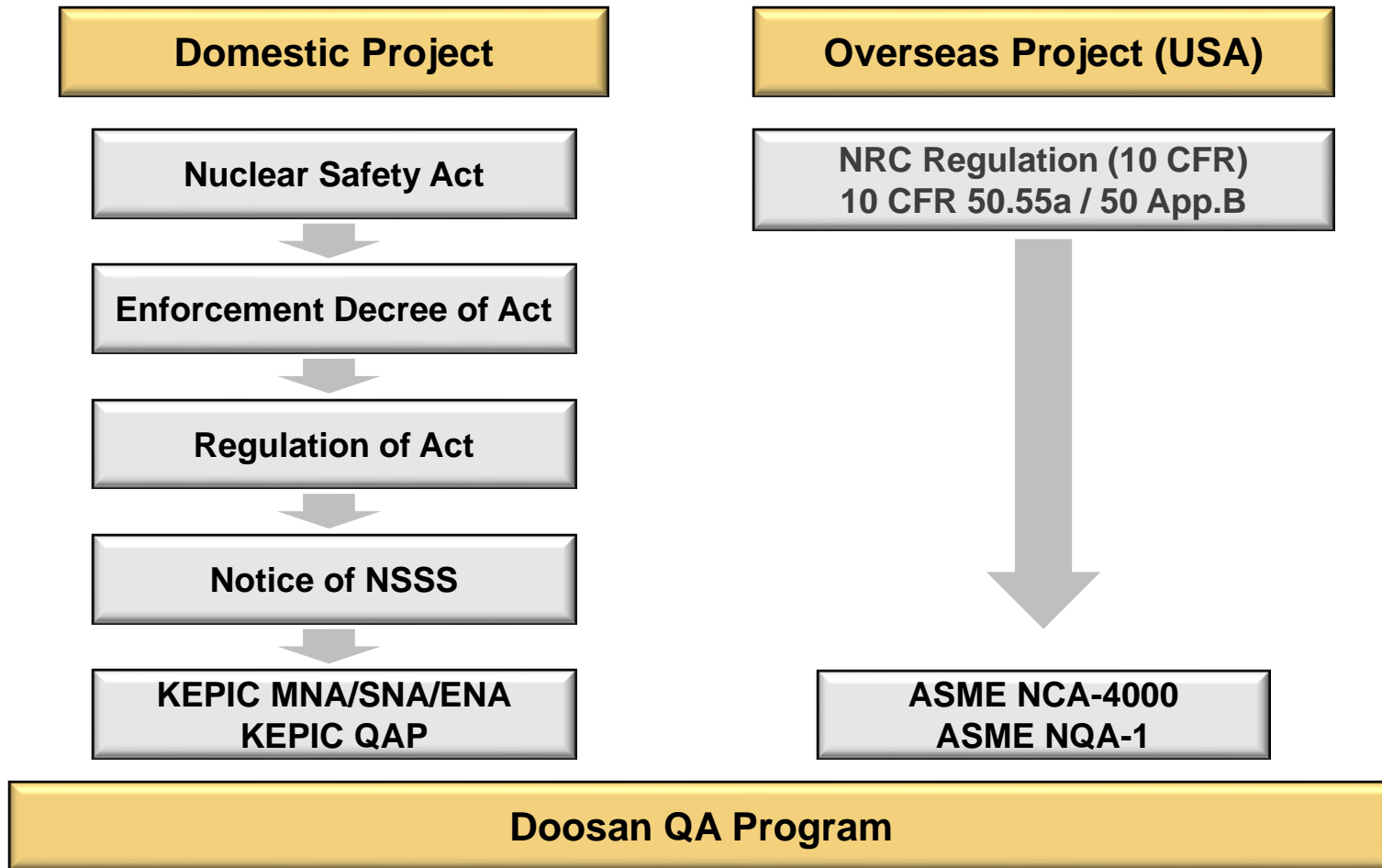


◆ Shinhanul#1,2 Reactor Vessel (Korea)



Applicable Requirements for Supplier Evaluation

Supplier evaluation program is normally based on applicable Nuclear Safety Act, ASME/KEPIC Code, ISO 9001 etc., and contract requirements.



Applicable Requirements for Supplier Evaluation

Applicable Code & Standards, customer requirements, regulation requirements are included in Doosan quality specification and transferred to suppliers as a part of Purchase Order.

Quality Class		Description	Evaluation Method	General Quality Specification
Complete Items	Q	Safety Related Items - Code items : ASME III + NQA-1 - Non-code items : NQA-1	- Audit prior to initial purchase order - Triennial audit for renewal - Annual evaluation	NQAPS-001 PQAP-1602 NPS-11101V
	T/ R/ A	Safety Impact/ Reliability Item - Contract Requirements (Appendix 4A1 etc.)	- Audit or document evaluation for initial evaluation and renewal every three years	NPS-TRI001
Material	N	ASME III Code Materials - ASME NCA-3800	- Audit prior to initial purchase order - Triennial audit for renewal - Annual evaluation by document review (Cert. Holder) - Annual audit or performance evaluation including sample test (Qualified Material Organization)	NPS-11101F
Services	NS	Services for Safety Related Item - ASME NCA-3800, 4000	- On-site audit prior to initial purchase order - Annual evaluation by document review	NPS-11102-NS

Applicable Requirements for Supplier Evaluation

In addition, customers are requesting Doosan to reflect the requirements to prevent CFSI cases especially into the vendor evaluation and/ or procurement process.

Applicable requirements reflected in the Audit Checklist

SECTION 8 - Counter Measures for Counterfeit/ Fraudulent or Suspect Items

8.1 Verify that applicable measures have been established and implemented to identify the counterfeit/ fraudulent or suspect items when there is any indication as below during the inspection or test of the purchased item, material, or services? (referring the Doosan Heavy QAI-0701 Appendix 1-4)

(If not, it is required to establish and implement the appropriate measures)

8.2 Verify if the established countermeasure of vendor is appropriate to prevent/ identify the counterfeit/ fraudulent or suspect items.

8.3 Verify if there is any counterfeit/ fraudulent case or suspected case of items or activities of the vendor to the current audit/survey period since the last audit/survey.(referring the QAI-0701)

(If there is any activity or case of counterfeit/ fraudulent and suspected item, it should be checked to confirmed take appropriate action*.)

* Appropriate action: notify to the Doosan immediately, and submit related information and counter-measures within 3 working days including followings at least,

- 1) Vendors responsible for counterfeit, fraudulent or suspect cases with description of such cases.
- 2) Verification result on items ordered by Doosan against counterfeit or fraudulence
- 3) Follow-up action plan and recurrence prevention measures
- 4) Evidences in support of the description of counterfeit, fraudulent or suspect cases and the verification result thereon.

8.4 ~~~~~

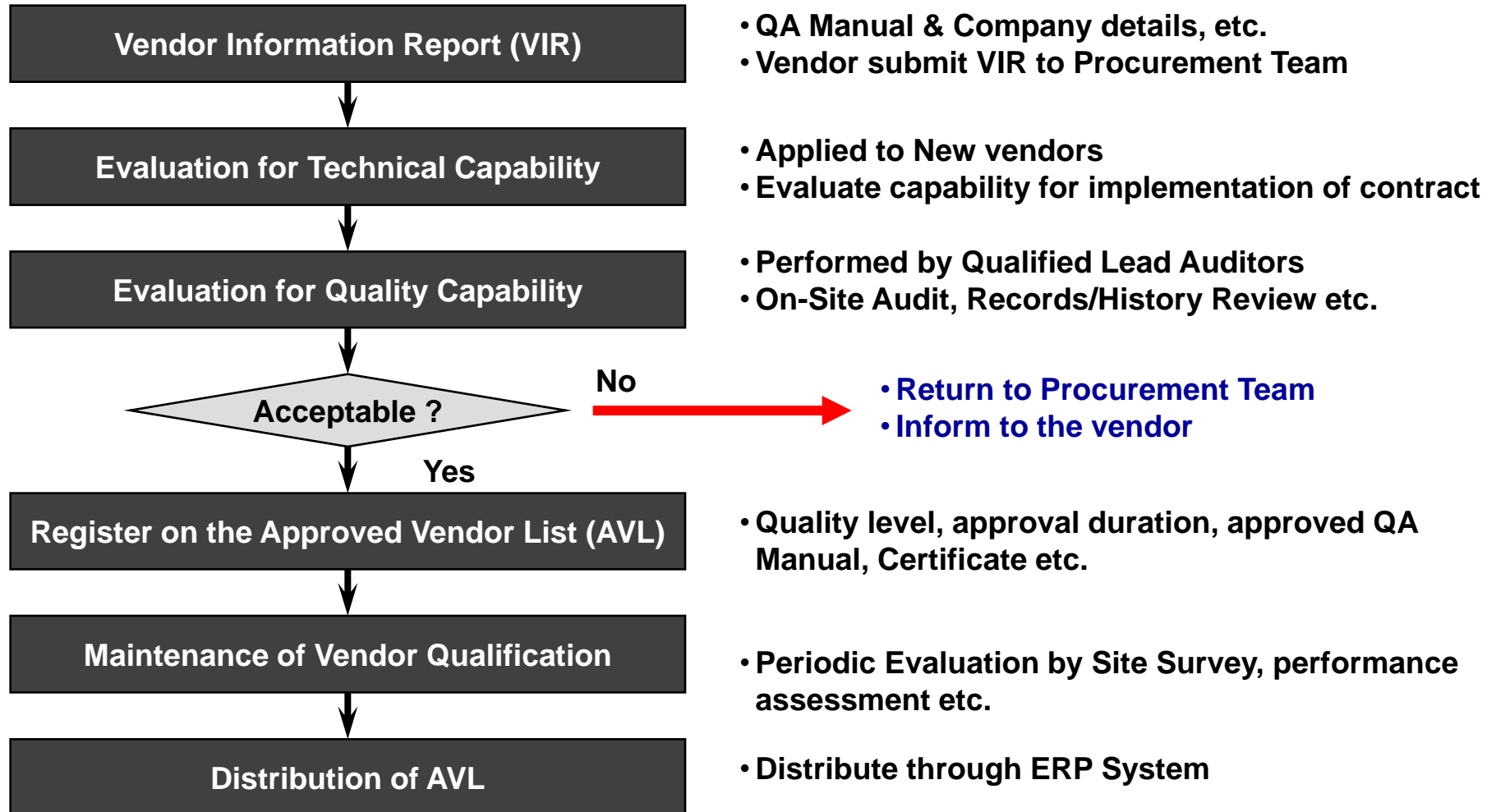
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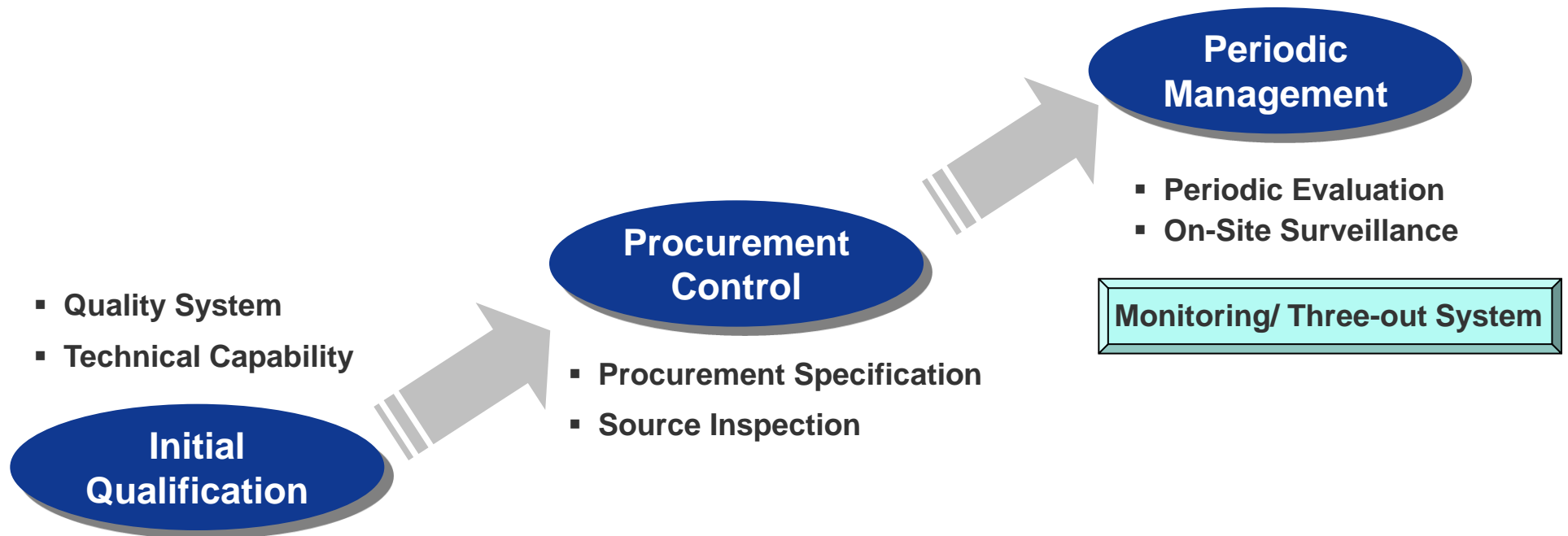
Supplier Evaluation and Control _ Evaluation Process

Supplier evaluation system is based on ASME NCA/ NQA-1, ISO 9001, and customer requirements to maintain competitive supply chain.



Supplier Evaluation and Control _ Management steps

Doosan applies three steps for supplier evaluation/ monitoring and management as below.



Supplier Evaluation and Control _ Three-out System

Doosan performs monitoring and surveillance to suppliers during the fabrication of items or services, and impose the restrictions as below according to the impact of the issues.

Purpose

- Monitor/Coach Vendors to decrease sourcing risk
- Follow-up for corrective action and prevention of recurrence
- Restrict vendors that make the serious quality problems

Serious Problems

- Sub-contracting without approval from Doosan
- Use of Un-qualified personnel
- Arbitrary fabrication/ repair without approval
- Counterfeiting of quality document and/ or product
- Use of inappropriate material
- Excessive quality problems/quality cost
- Poor corrective action for quality problems

Restriction

- 1 Out : Warning and request corrective action
 - 2 Out : Restrict participation to bid evaluation for more than one month
 - 3 Out : Cancel the approval and prohibit placing order permanently
- * 2, 3 out shall be under the decision of Sub-contract Control Committee

Challenges Related to Supply Chain Management

Doosan is also facing the same difficulties as competent suppliers are leaving the nuclear industry because of the recessions of nuclear industry and the severe requirements than the other industries.

Suppliers

- Many audit/ survey as required by regulatory or contract requirements though it is not required for the Certificate Holders by Code.
 - Certification Body : initial and triennial audit/ survey
 - Utility Owner : initial audit and annual or triennial audit
 - Regulatory Body : Periodic inspection for major equipment suppliers
- In addition, establishment and implementation of QA Program for service suppliers is very weak.

Utilities/ Major Manufacturers

- Hard to maintain Supply Chain
 - many QA Audit to suppliers
 - suppliers are leaving from the nuclear industry
- Procurement cost is going up
- CGI Dedication, USM Utilization are expected to be increased.

Recommendations for Improvement

So, it shall be considered to focus on the activities that directly affect safety and/or quality of the product to keep reliable suppliers in nuclear industry as below.

Reducing of QA Audit

- **Periodic Audit may be exempted for the Certificate Holders**
 - applicable org. : component manufacturers, material organizations
 - alternative control measure may be established by Certificate Holders considering the importance, supply history, surveillance system etc.
- **Evaluation for Service suppliers may be simplified**
 - Initial survey/ audit and periodic evaluation may be exempted, and Equipment manufacturers may establish the evaluation and control measures
 - Considering the capability of the service suppliers, direct control and verification of the service performance could be more effective.

Utilization of evaluation result by others

- **Evaluation result by other organization may be utilized**
 - Inspection result by regulatory body, and audit result by utility owner and Certificate Holders may be reviewed and used for supplier evaluation.
ex) NUPIC*, NIAC**
 - If there is any insufficient area of the evaluation result, or areas not covered, additional evaluation method should be applied.

* NUPIC : Nuclear Procurement Issues Committee

** NIAC : Nuclear Industry Assessment Committee