Mitsubishi's Quality Assurance

- Introduction of Mitsubishi
- Challenges for Achieving high-quality works
- Challenges for Integrated Quality Assurance Program As a Global Plant/Component Supplier

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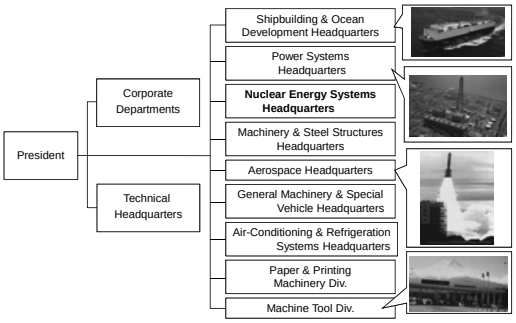
1) Overall MHI Organization



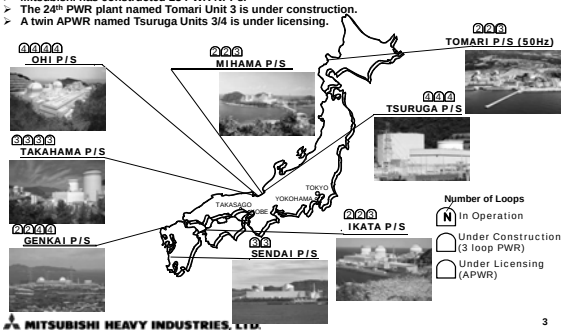
2) Nuclear Organization

Mitsubishi Heavy Industries Ltd. (MHI)	Mitsubishi Heavy Industries	PWR plant Basic Design
	MHI Kobe Shipyard & Machinery Works	Primary System Detail Design and Manufacturing
	MHI Takasago Machinery Works	Secondary System Detail Design and Manufacturing
	Mitsubishi Electric Corp.	Electric Equipment Design and Manufacturing
	Mitsubishi Nuclear Fuel Co.	Nuclear Fuel Manufacturing
	Nuclear Power Training Center	Operator Training Services
	Nuclear Plant Service Engineering Co.	Post-operational Services
	MHI Takasago R & D Center	Research and Development
	MHI Fuel Development Center	Research and Development

1. Introduction of Mitsubishi

3)MHI PWR Construction Experience in Japan

- Mitsubishi has constructed 23 PWR NPPs.
- The 24th PWR plant named Tomari Unit 3 is under construction.
- A twin APWR named Tsuruga Units 3/4 is under licensing.



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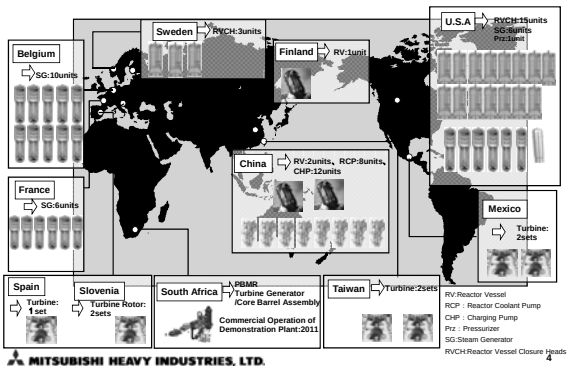
1. Introduction of Mitsubishi

4)MHI PWR Export Construction Experience



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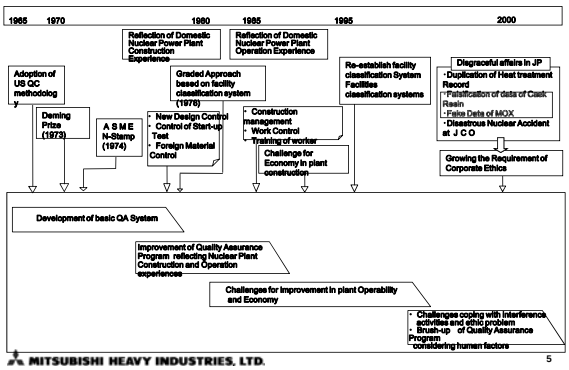
2. Challenges for Achieving high-quality works

1)History of Nuclear QA Activities in MHI



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1) History of Nuclear QA Activities in MHI

Ⅰst Era (1965-1978)
- Introduction of American Style Quality Assurance (10CFR50 App.B)
- Establishment of Nuclear Quality Assurance Program

Ⅱnd Era (1979-1985)
- Improvement of Quality Assurance Program reflecting Nuclear Plant Construction and Operation experiences

Ⅲrd Era (1986-1995)
- Challenges for improvement in plant Operability and Economy

Ⅳth Era (1996-)
- Challenges coping with interference activities and ethic problem
- Brush-up of Quality Assurance Program considering human factors

3) Representative Activities up to now

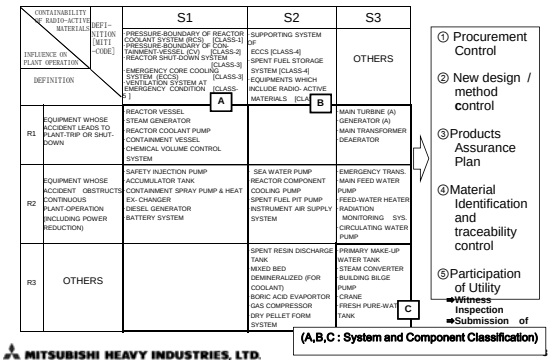
- Graded Approach for Quality Assurance
  Classification of systems and components based on nuclear safety and plant reliability ⇒Example①

-Systems to assure that approved licensing items are translated into working documents and surely inspected

- Establishment of Construction management program
  Integrate plant construction planning
  Plant scheduling
  Comprehensive design check
  Comprehensive facility inspection } ⇒Example②

- New design and construction method control
- Foreign material control
- Start-up test control
- Preventive actions from other plant experiences

3)-1 Example① (Graded Approach for Quality Assurance in Japan)



3)-2 Example② (Comprehensive Design Check and Facilities Inspection)

■ To Substantiate the non-conformity recurrence prevention activity by identification of non-conformity in early stage.

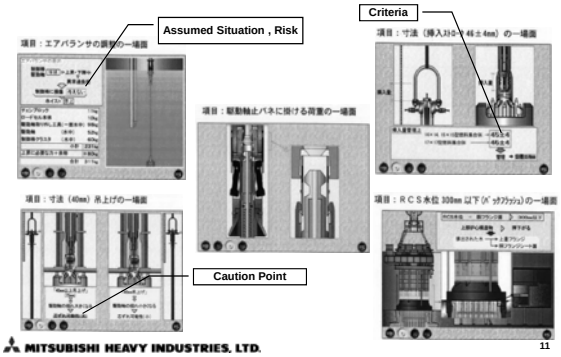
■ To improve the equipment/facilities governing operability and maintainability in early stage.

Activities	Time	Improvement
Comprehensive Design Check	Design Phase	・ To identify the new design be adequate elaborately ・ To confirm the conformity of licensing documents with design documents ・ To substantiate the plant design with model engineering improved
Comprehensive Facilities Inspection	Construction Phase	・ To substantiate the facilities inspection activities in appropriate installation stage

4) Backgrounds which support Quality Activities

- Regarding Craftsmanship as one of most important
  Feedback system from worker to engineer
- Precise and Concrete Work Instruction
  to be a practical and effective work instruction such as caution mark, failure points, figures,and numerical criteria
  to be a observable work instruction through review activities from worker's view points
- Good Communication among design, manufacturing and construction and maintenance people
  intensive kick-off meeting
  ⇒Through study for new job and brainwashing of new requirements at early stage of the job
  reading out the procedures with all participants
- High Motivation
  Meister patrol
  3 layers meeting (manager-foreman-worker)
  Award system for "Kaizen" plan
  Indoctrination for worker (CAI) ⇒Example③

4) ⇒Example③ (CAI for Worker)



2. Challenges for Achieving high-quality works

5) Challenges for next Construction

- Coping with Changes of Regulatory Inspection system in Japan
- Coping with new NRC requirements for next Construction in US
  10CFR21, CGI, ITAAC, Construction Inspection, RAP----
- New Documentation System using advanced IT tool
  Measures to assure that DC and COL items are translated into working documents and surely inspected
- MHI original personnel performance improvement program
- Improvement of Procurement Control System

3. Challenges for Integrated Quality Assurance Program As a Global Plant/Component Supplier

1) QA Codes and Standards in the World

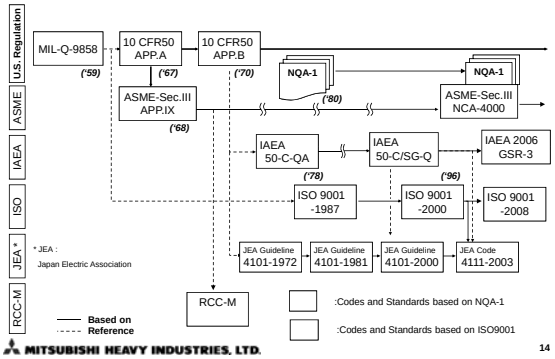
Products		Country	Number	Applied QA code & Standard
Domestic	Plant/ Components	Japan	23 Plants	JEAC 4111
Oversea	Reactor Vessel Closure Head	USA	11 Plants	ASME SecⅢ /NPT
		Europe	3Plants	ASME SecⅢ/-
	Reactor Vessel	Europe	1Plants	RCC-M , EN/-
		China	2Plants	ASME SecⅢ/-
	Steam Generator	USA	2Plants	ASME SecⅢ /N
		Europe	3Plants	ASME SecⅢ/-
			2Plants	RCC-M/-
	Pressurizer	USA	1Plant	ASME SecⅢ /N
	Reactor Coolant Pump	China	2Plants	ASME SecⅢ/- ASME SecⅢ + RCC-M/-
	Containment Vessel	Mexico	1Plant	ASME SecⅢ/-
	Main Turbine	Mexico	2Plants	-
		Europe	2Plants	ISO9001
		Taiwan	2Plants	ISO9001

Diverse QA Code & Standard

ASME NQA-1
ISO9001
RCC-M
JEAC4111
EN

3. Challenges for Integrated Quality Assurance Program As a Global Plant/Component Supplier

2) Relationship of Codes & Standards



3) Reconciliation of ISO9001 & NQA-1

ISO9001: (QMS) The target of ISO9001 is to make a strong organization by assessing the organization's ability to meet customer, regulatory and the organization's own requirements and performing the continuous improvement.

NQA-1: (QA) The target of NQA-1 is to achieve nuclear safety and NQA-1 requires "organization" to establish quality assurance program to assure that all necessary works are properly done.

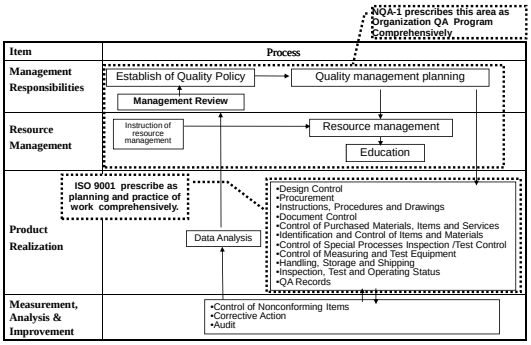
In order to initiate more effective QA activities than the past, it is important to develop and integrate the concepts of the above two standards.

Ref. Sector Standard

In each industry, global standard is made as the sector standard by adding the industrial specific requirements to ISO9001.

Automotive Industry	ISO/TS 16949
Medical Industry	ISO 13485
Aviation Industry	AS 9100

4) ISO9001 & NQA-1 QA Requirements



5) Now in MHI

-MHI developed integrated Quality Assurance Program in 2007. The new QA Program is now being applied for next 1100MWe reactor .

-MHI is still trying to reconcile JEAC4111(JAPAN) and NQA-1.

-Quality Assurance Requirements for vendor are determined based on graded approach (under consideration)

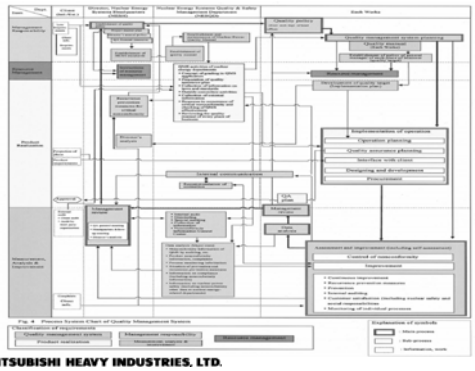
Grade	Applied to;	QA Requirements	Comply with :	
A	Safety Related	Newly Developed QA Requirements for Grade A	NQA-1 & ISO9001	10CFR50 Appendix B
B	Supplemented Grade Availability Related Safety Related (excluding A)	Newly Developed QA Requirements for Grade B	Applicable Code (ASME Sec.I, VIII, API ect) With some of QA elements	
C	Non-Safety Related Non-Availability Related	Manufacture's Standard	(ISO9001)	

Details are determined by quality classification system

-IAEA Code 2006 "GS-R-3" requires comprehensive management system including safety ,healthy, environmental , security , quality and economy elements.

3. Challenges for Integrated Quality Assurance Program As a Global Plant/Component Supplier

6) MHI'S integrated QA Program



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