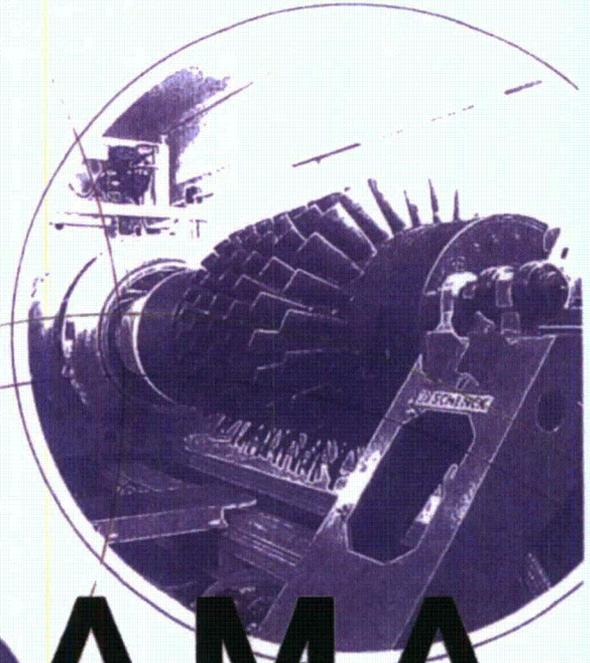
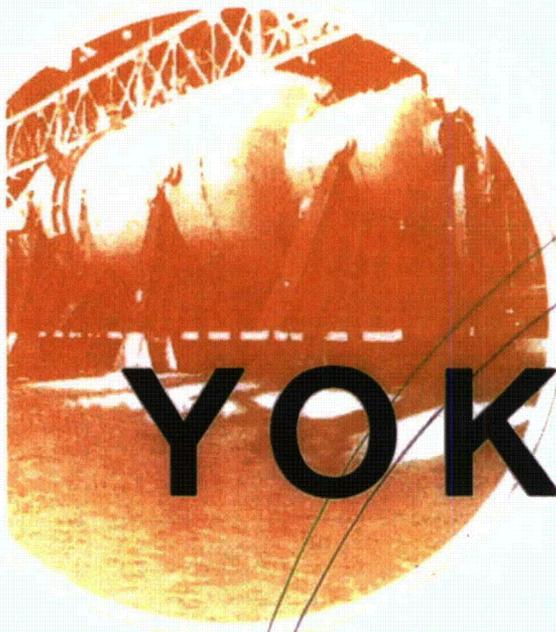
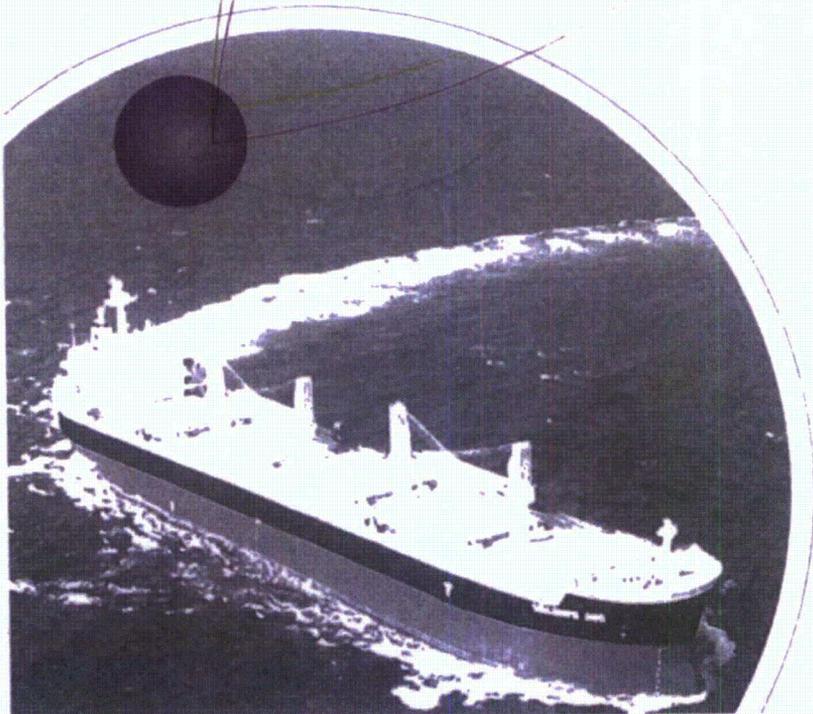


IHI

Realize your dreams



YOKOHAMA



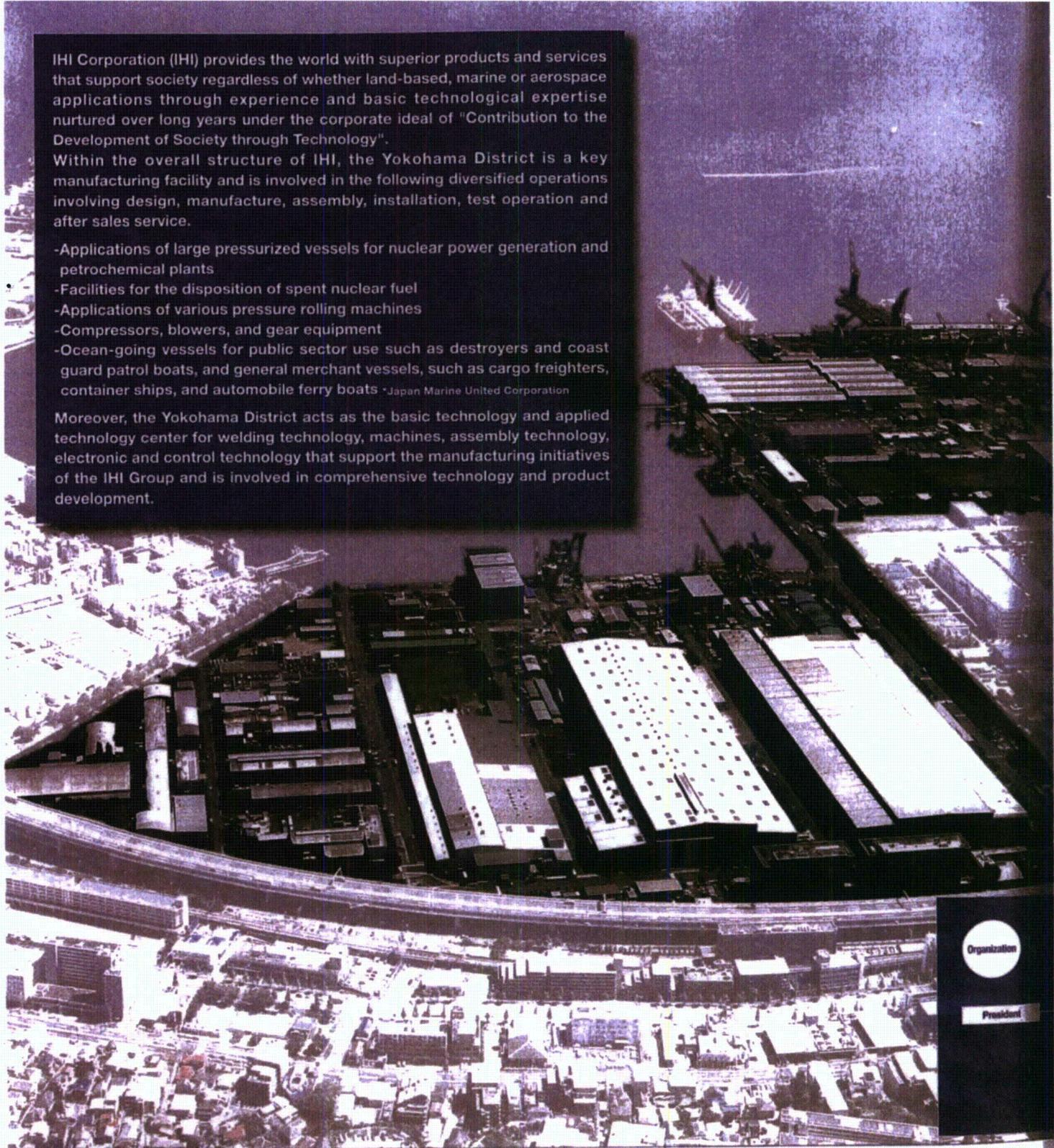
IHI Corporation

IHI Corporation (IHI) provides the world with superior products and services that support society regardless of whether land-based, marine or aerospace applications through experience and basic technological expertise nurtured over long years under the corporate ideal of "Contribution to the Development of Society through Technology".

Within the overall structure of IHI, the Yokohama District is a key manufacturing facility and is involved in the following diversified operations involving design, manufacture, assembly, installation, test operation and after sales service.

- Applications of large pressurized vessels for nuclear power generation and petrochemical plants
- Facilities for the disposition of spent nuclear fuel
- Applications of various pressure rolling machines
- Compressors, blowers, and gear equipment
- Ocean-going vessels for public sector use such as destroyers and coast guard patrol boats, and general merchant vessels, such as cargo freighters, container ships, and automobile ferry boats *Japan Marine United Corporation

Moreover, the Yokohama District acts as the basic technology and applied technology center for welding technology, machines, assembly technology, electronic and control technology that support the manufacturing initiatives of the IHI Group and is involved in comprehensive technology and product development.



Organization

President



■ Overview of IHI

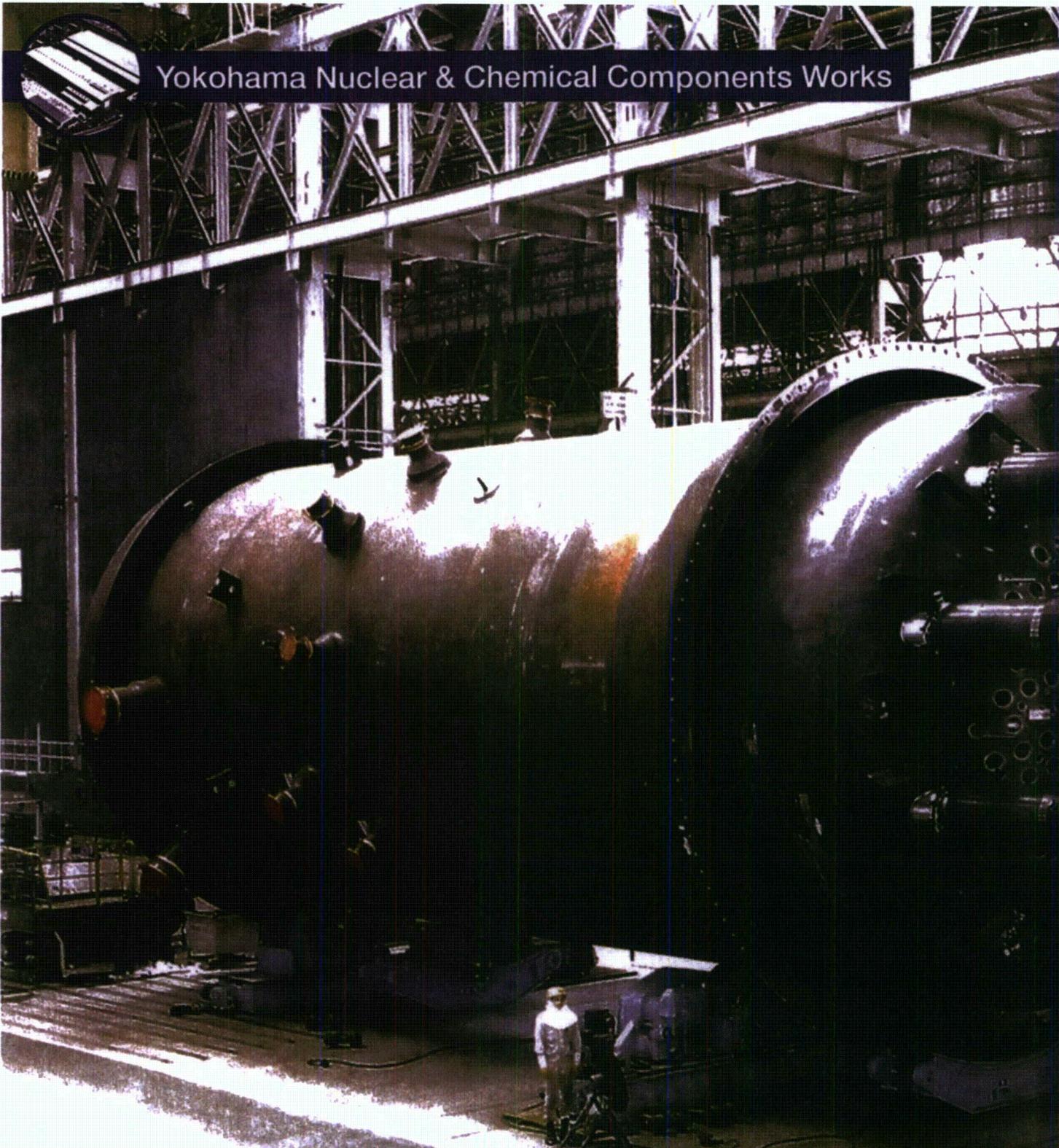
- Established : 1853
- Capital : 95,762 million yen
- Major business areas : Aero Engines & Space, Energy Systems, Storage / Processing / Pharmaceutical Plants, Social Infrastructures, Security, Industrial Machinery & Systems, Logistics Systems / Materials Handling Equipment, Separators / Compressors / Turbochargers, Construction Machinery / Agricultural and Forestry Machinery, Facilities & Products for Civil Use, Ship & Offshore technology
- Works : 10
- Branches and sales offices : 18
- Consolidated net sales : 1,256,000 million yen (as of March 2013)

■ Overview of the Yokohama District

- Established : 1964
- Total site area : about 670,000 m²*
- Total floor space : about 360,000 m²*
- Total number of employees : about 3,900 (as of January 2014)*

The district has been accredited under the Japan Quality Assurance Organization (JQA) based on ISO14001, the standard for environment management, as a model district of the entire IHI and is involved in reducing the environmental impact from operations and in the research and development of related technology towards preservation of the earth's environment.

As the result of this activity, IHI Yokohama Office has achieved the goal of zero emissions in March, 2004, for the first time in IHI.
*Including affiliate companies inside the office

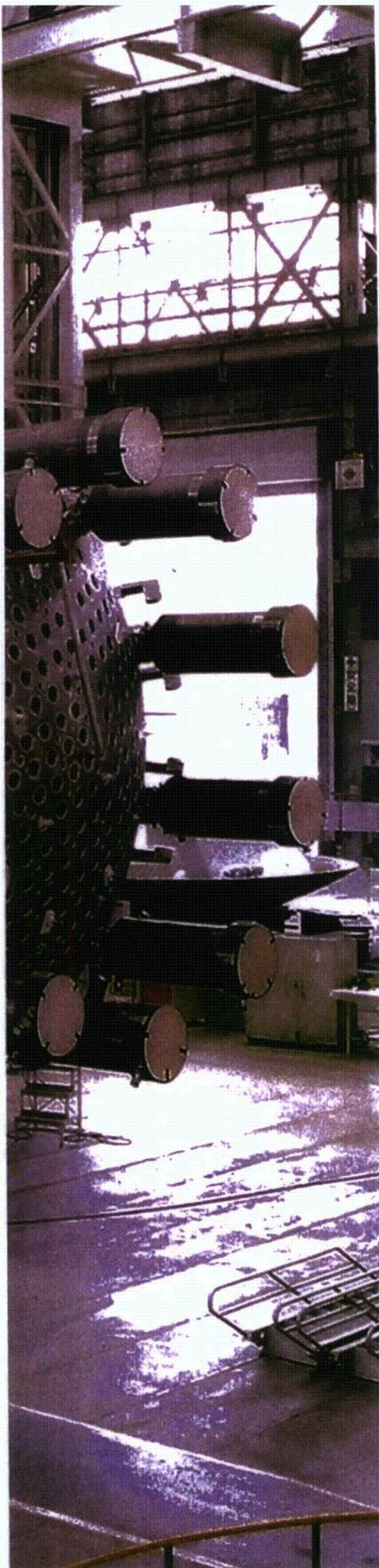
A large industrial facility, likely a nuclear power plant or refinery, featuring a massive cylindrical vessel (possibly a reactor pressure vessel) being worked on by several workers. The vessel is supported by a complex steel structure. The workers are wearing hard hats and safety gear. The scene is brightly lit, possibly by overhead industrial lights.

Yokohama Nuclear & Chemical Components Works

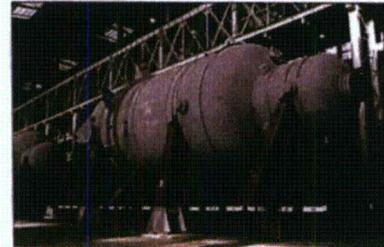
The Yokohama Nuclear & Chemical Components Works is involved in the Design, Manufacture, and On-site Installation of Nuclear Power Generating Equipment and Large Pressure Vessels and Equipment used in Chemical and Refinery Applications

The Yokohama Nuclear & Chemical Components Works specializes in the fabrication of components for a wide variety of applications, up to and including large reactor pressure vessels used in nuclear power plants and large vessels for petrochemical plants.

In particular, the fabrication of nuclear power plant components requires implementation of integrated quality assurance standards from design through installation. Our superior technical expertise and cutting edge technology are utilized to assure highly reliable equipment and products. The Yokohama Nuclear & Chemical Components works holds several widely recognized accreditations as shown on the reverse side.



Clean room for steam generator manufacturing



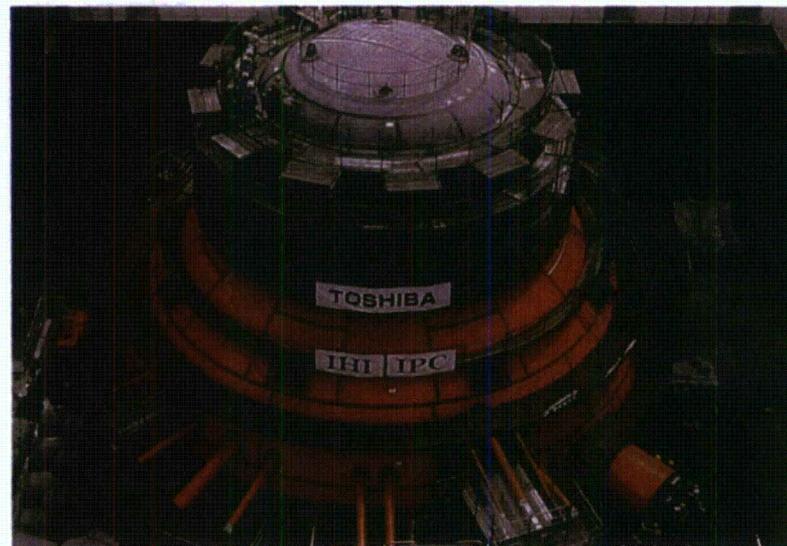
EO reactor



Petroleum refinery reactor tower



GTL reactor



Primary containment vessel of the Higashidori Nuclear Power Station Unit-1

Works Size

Total site area : 113,806 m²

Total floor space : 50,829 m²

Principal Equipment

Presses : 8,000 ton press, 1,000 ton press, 3,000 ton bending roller, others : total 3 units

Thermal processing furnace : 1,000 ton large annealing furnace, 160 ton large heating furnace,

150 ton steel plate heating furnace : total 3 units

Large machining equipment : Gantry type NC boring & milling machine, 12-meter diameter large turning machine, boring facing-and-drilling machine, Tubesheet Drilling Machine, BTA deep hole drilling machines, broaching machines : total 6 units

Welders : Various automatic welding machines, special welding equipment : total 300 units

Welding facilities : 250 ton positioner, 16 meter boom manipulator, robots, others : total 25 units

Conveyance facilities : 475 ton overhead crane 2 units, 1,200 ton conveyance vehicle, others

Testing and Inspection Capabilities : High output X-ray and Gamma Ray equipment, large radiographic exposure room, manual and automated ultrasonic instruments and scanning equipment, magnetic particle, liquid penetrant, and visual inspection equipment, tensile and bending testing equipment, others.

Others : Clean room for steam generator manufacturing

Principal Products

Nuclear related : Reactor pressure vessel, reactor primary containment vessel, steam generators, piping, heat exchangers, equipment for fast breeders, equipment and facilities for nuclear fuel cycling, equipment for high temperature gas furnaces

Chemical plants : Large pressurized vessels, large storage tanks

Qualifications possessed

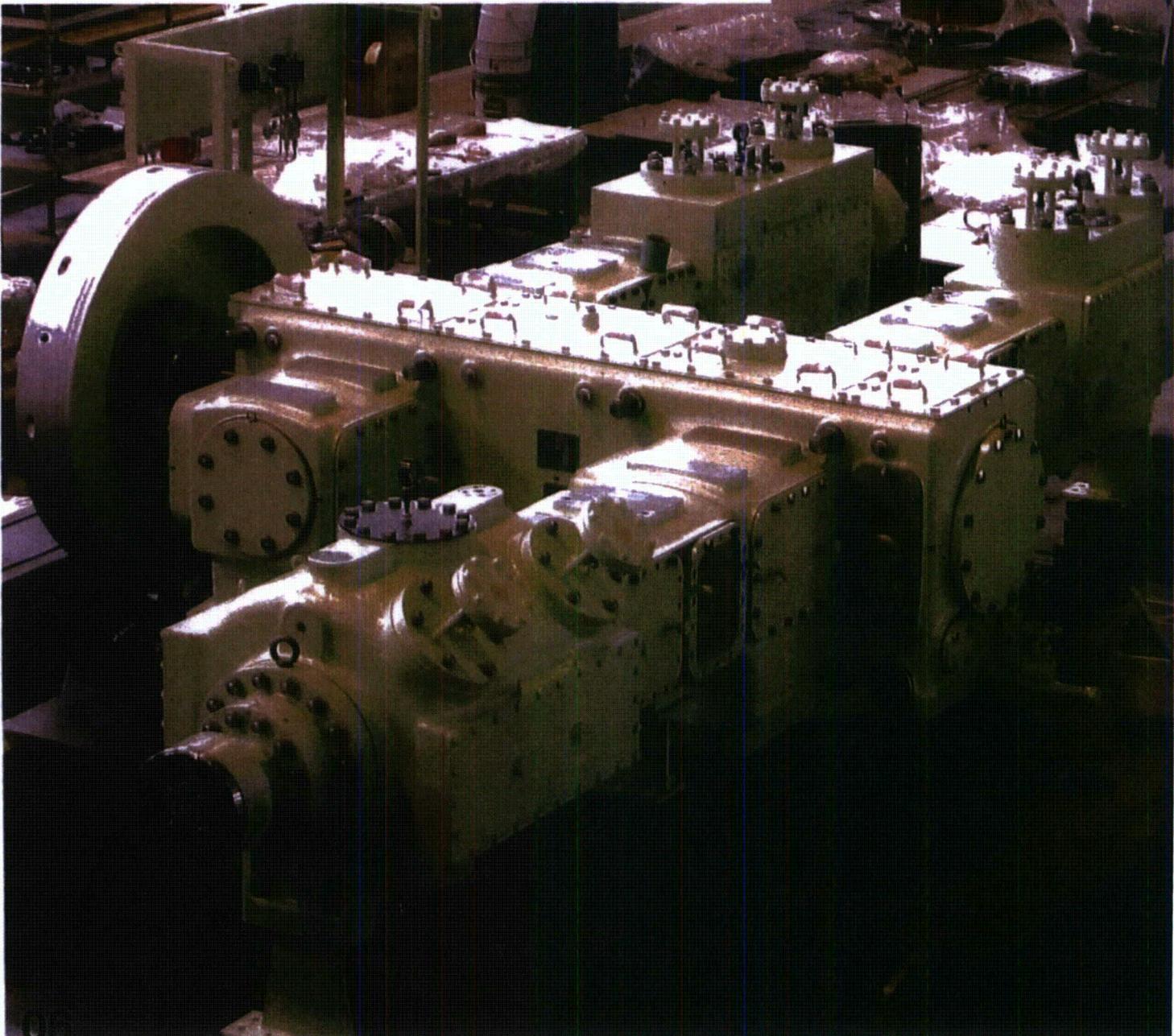
- Authorization for the manufacturer of boilers & Class 1 pressure vessels
- Authorization to use U, U2, S, N, NA, NPT & NS stamps of the American Society of Mechanical Engineers (ASME)
- Authorization for the welding works in compliance with the Nuclear Reactor Regulation Law
- Authorization for the manufacture of quality management systems in compliance with ISO 9001



Yokohama Machinery Works

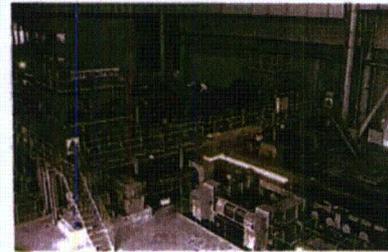
Manufacturing Rotating Machinery and Rolling Equipment -backed by the Most Advanced Equipment, Facilities and a Wealth of Technology - Our Way of Contribution to the Development of Society

As one of the very few giant precision machinery plants in Japan and for that matter, in the world, the Yokohama Machinery Works has a number of outstanding equipment and facilities including large-scale advanced machine tools, CNC machine tools, assembly test run pits for rolling machines and large machines, test run facilities for rotating machinery and a large-scale balancing machine with a vacuum chamber for various kinds of rotors and giant radio-controlled overhead travelling cranes. Supported by high-level technology and know-how accumulated over many years, the Works provides a wide variety of large precision machinery to the steel, non-ferrous metals, electric power, automobile, and plastic industries. The machinery manufactured here is shipped all over Japan and the world to major production facilities in order to meet the industrial needs of many countries.





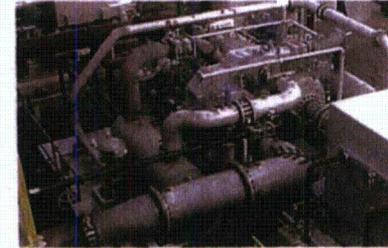
Hot strip mill



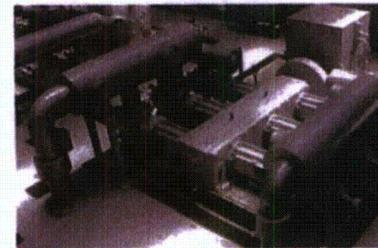
Sizing press



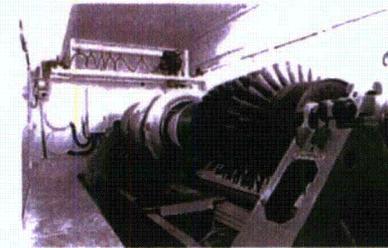
Down coiler



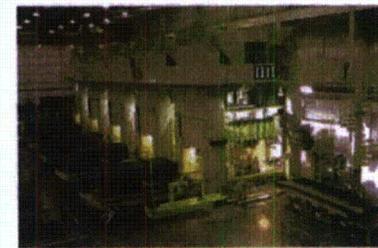
Turbo compressor



Reciprocating compressor



High-speed dynamic balancing machine



Tandem press



Marine engine propulsion unit

Works Size

Total site area : 87,240 m²
 Total floor space : 69,555 m²

Principal Equipment

Planomiller : max. L 22m x W 6.0m x H 5.4m : total 5 units
 Horizontal boring machine :
 max. L 12m x H 3.0m : total 1 unit
 Lathe : max. D 2.0m x L 10.0m : total 3 units
 Vertical lathe : max. D 4.2m x L 2.9m : total 1 unit
 Roll grinder : max. D 1.8m x L 10m : total 1 unit
 Other middle- to small-size machines : total 29 units
 Assembly pit : 13m x 60m x 6m : 1 unit
 Comprehensive test run facilities for rotating machinery : 1 unit
 Radio-controlled overhead traveling crane : 50t - 200t : 11 units
 Large-scale high-speed balancer (φ2400mm×L7500mm×22000min⁻¹)
 Vehicular Turbocharger Operations Turbo Technical Center

Qualifications possessed

- Authorization for the manufacture of quality management systems in compliance with ISO 9001



Principal Products

Plate mill
 Hot strip mill
 Sizing press
 Down coiler
 Cold strip mill
 Foil mill
 Strip caster
 Reciprocating compressor
 Turbo compressor
 Marine engine propulsion unit



Research & Development Division is involved in technical development in a variety of areas from basic research to commercial development and manages the planning and control of technology throughout the company.

Corporate Research & Development is based in the Yokohama district and is comprised of Research Laboratory, Production Engineering Center, Products Development Center, R&D Technology Center, Intellectual Property Department, Quality Assurance Department, Monozukuri Innovation Initiative Department, Technical Training Center and Administration Department. Research & Development Division conducts research and development in order to both strengthen the basic technology that supports our products and develop new products. It is also responsible for planning research projects, managing technologies and patents, organizing technical training, developing and streamlining production systems as well as planning and executing facility construction projects.

Factory scale
Total site area: 112,040 m²
Floor space: 65,013 m²

Areas of research and development

- Advanced material technology, material evaluation technology manufacturing and processing technology, analysis and evaluation of materials
- Structural analysis technology
non-linear/coupling analysis, line heating, plastic forming
- Plant and facility life management
creep damage, fatigue damage, life assessment
- Vibration control technology, acoustic technology
vibration control system, seismic engineering, mechanical vibration / acoustics
- Combustion technology
gas turbine, engine, coal and biomass combustion, gasification technology
- Energy and Chemical Process Technology
energy conversion utilization technology (gasification, gas quality improvement, ethanol fermentation), pharmaceutical production process, process simulations, gene analysis and micro-organism assessment technology
- Renewable energy technology and natural energy utilization technology
energy saving technology, heat storage, carbon dioxide recovery technology
- Light and quantum measurement technology
laser analysis, radiation analysis
- Environment protection technology
emission gas purification technology, wastewater treatment technology, biological treatment technology
- Environmental assessment technology
atmospheric environmental assessment, wind stability
- Numerical simulation technology
CFD, structural analysis, impact analysis, heat analysis, combustion analysis, solidification analysis
- Production engineering
Machining, plastic working technology, coating, corrosion proofing and surface modification technology, composite molding processing technology, non-destructive inspection, measurement technology, Production systems.
- Welding and joining technology
arc welding, laser welding and material processing, special joining, evaluation technology
- Ships and offshore technology
underwater acoustics, ocean engineering
- Control and robotics engineering
Advanced control and optimization technology, real-time control software technology, information communication technology, sensing and recognition technology, next-generation robot and intelligent technology, control simulation technology
- Electric and electronic circuit technology
high-speed/special purpose embedded boards, motor and circuit analysis, battery utilization and motorization technology
- Rotating machinery technology
rotor dynamics, wing vibration analysis, oilless bearing technology, radial turbine aerodynamic design, centrifugal compressor aerodynamic design
- Reciprocating engine-related technology
diesel engine evaluation technology, combustion analysis, lubrication and wear analysis
- Machine system technology
mechatronics technology, mechanical element development technology (special mechanical elements, robot hands), production machinery design technology (vibration prediction and control, automatic welding machines), machine structure design technology for special environments, intelligent robot and FA system development technology, clean distribution system technology, material handling technology, energy-saving design technology, analysis-based machine design technology and structural optimization technology
- Mechanical elements
gear, seal, bearing, tribology, lubricant

Major equipment

- Shaking table
- Wind tunnel
- Composite laboratory
- Combustion laboratory
- Robotics laboratory
- Large clean room
- Thermostatic processing chamber
- Functional material laboratory
- Adaptive independent decentralized control laboratory
- Advanced intelligent control laboratory
- Electrically-heated powder rolling mill
- Space environment simulating equipment
- High temperature environment test facility
- Wastewater treatment test facility
- Exhaust gas heat exchanging test
- Ultra violet-infrared spectrometer
- Plasma application equipment
- Fluidized bed combustion and gasification facility
- One-dimensional laminar flow furnace
- High temperature air combustion furnace
- Material evaluation laboratory
- Material process laboratory
- Laser welding equipment
- Laser development laboratory
- Large fatigue testing machine
- Injection machine for impact analysis
- AC servo press test equipment

Control and robotics engineering



Bin picking robot system using 3D object recognition technology

IHI is promoting research and development of advanced control and system optimization technology to obtain stable and efficient operations and to draw out maximum performance from various equipment and systems such as production facilities, distribution systems and power plants. Furthermore, IHI is focusing attention on the research and development of sensing and recognition technology that is required for system automation and reduction of labor, such as next-generation robots and intelligent technology, FA and mechatronics technology, and image processing and 3D data processing. In addition, IHI promotes research and development of data mining technology and information communication technology for operations such as remote monitoring and maintenance in order to monitor system status and maintain long-term integrity.

Energy and chemical process technology



CO₂ separation and recovery bench testing device

The IHI Group's energy and chemical processing technology is applied in a variety of fields, from chemical plants, power plants, and pharmaceutical plants to the manufacturing premise. For the chemical plants, using low rank coal and biomass as raw materials, we are developing advanced processes that use catalysts to synthesize fuel and chemical products. We are working to improve the sophistication of the catalysts that constitute the core technology for those processes, as well as the reactor design technology that makes effective use of those catalysts. For the power plants, the research and development item is focusing on the carbon dioxide separation and recovery technology in exhaust gas and the prevention of ash adhesion to boiler tubes. We are also engaged in the research and development of new technologies that society will require in the future, such as oil production from micro algae and the culture technology for steam cells.

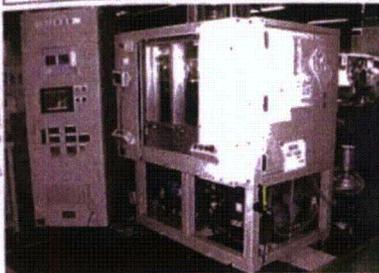
Gasification technology



Circulating fluidized bed gasifier (TIGAR) pilot plant

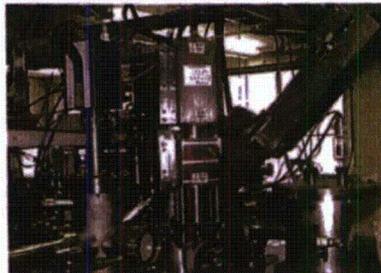
To meet growing future energy demand, IHI is developing a circulating fluidized bed gasifier that enables low-grade energy resources (e.g. brown coal), which have not been used due to technological and economical problems, to be used as chemical raw materials or fuels through gasification.

Machine system technology



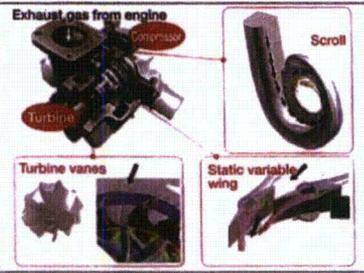
High-speed balancing machine for vehicular turbochargers
IHI is developing various machine systems to embody what customers consider ideal. We are developing robot application devices and FA systems based on accumulated mechatronics and system engineering technologies. We are also developing special mechanical elements or in-house production machinery. IHI will keep developing further advanced systems in a forward-looking manner.

New materials manufacturing and surface modification



Plasma CVD/plasma surface modification equipment
IHI is creating advanced materials with new functions using plasma CVD equipment, which provides a wide range of film-forming processes from semiconductor film such as Si to organic film. The equipment, which is also capable of irradiating various types of plasma onto the surfaces of metals, ceramics and plastics, helps us advance research on the high functionalization of surfaces.

Compressors and turbochargers



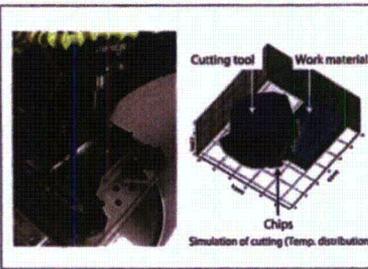
Numeric calculation for turbocharger and turbine
IHI is developing compressors and turbochargers with excellent fluidic performance. Using theoretical analysis, numerical analysis called CFD (Computational Fluid Dynamics) and experiment technology, we are conducting research and development to achieve efficient energy conversion between machine and fluid.

Welding technology



Laser-arc hybrid welder
Along with advancement and diversification of products, welding and bonding operation demands high efficiency, high quality and high performance. In response to the demands, IHI is conducting a wide range of research and development including welding technology for ultra thick steel plates for energy plants and other facilities, and special bonding technology for aerospace application.

Production engineering



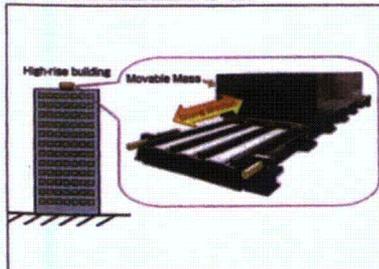
High-speed cutting work by 5-spindle machining center
With the aim of innovating the IHI Group's "Monozukuri" (manufacturing), we are working to increase the sophistication of technologies that are indispensable to "Monozukuri," such as machining, forming, painting, corrosion protection, and composite molding. For quality-related technologies, such as non-destructive inspections and shape measurements, IHI develops those with utilizing the latest ICT. In addition to these, IHI promotes production system advancement such as digital engineering to optimize the entire product process.

Material assessment technology



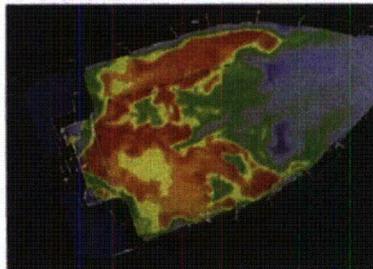
Ultrahigh resolution scanning electron microscope
Assessment technology for the nano-sized range is indispensable in order to make high performance materials with nanotechnology and to clarify the microscopic mechanisms of damage to materials. We are conducting research and development in a flexible manner by introducing a new, ultrahigh resolution scanning electron microscope that allows observation and analysis with magnification of over 200,000 times.

Vibration engineering, seismic isolation and vibration control technology



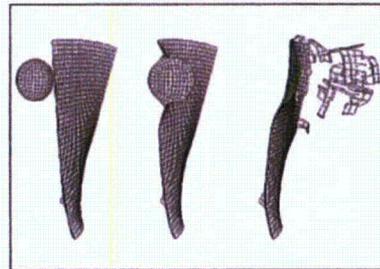
Basic conceptual mechanism of active vibration control devices
To dampen building oscillations (vibrations) caused by wind or earthquakes, IHI is conducting research and development into earthquake-resistant, seismic isolation and vibration control technologies using vibration tests with large-scale vibration equipment and vibration analysis. The outcomes of these efforts are embodied in earthquake resistance standards for atomic power facilities and container cranes, seismic isolation devices for computer floors and vibration control devices for high-rise buildings and suspension bridges, etc.

Combustion



LES combustion analysis for aero-engine combustors (temperature distribution)
Since chemical reactions and physical phenomenon occur in an extremely short period of time during combustion, combustors were commonly developed through experimentation. With advancements in numerical analysis of combustion, numerical analysis has now been adopted to develop combustors.

Numerical simulation



Impact analysis
In aircraft jet engine design, it is necessary to evaluate safety with the assumption that foreign objects such as birds could be sucked in during takeoffs and landings. IHI has developed a technique for simulating crashes that occur between a foreign object and the fan blade. This demonstrates that it is possible to simulate the effects of a birdstrike.



Japan Marine United Corporation - Yokohama Shipyard



Completion : March, 2009 "HYUGA" Completion : March, 1998 "CHOKAI"



Completion : February, 2006 "SUZUNAMI"



The first-class newbuilding and repairing yard in the world that you can fully trust through its superior technology, high productivity and quality.

IHI Marine United Inc. and Universal Shipbuilding Corp. have merged into Japan Marine United Corporation on 1st Jan. 2013.

Yokohama Shipyard has the new facilities and technology to build and repair high technology ships, such as naval and patrol ships, and other kinds of ships, such as bulk carrier "F-series", container ships, ferries, work ships, and FRP ships.

Shipyard size
 Total area : approx. 383,000 m²
 Covered area : approx. 130,000 m²

	Docks	Length (meters)	Width (meters)	Cranes
Building dock	Total length	325	45	120 tons x 1 unit
				* Can be divided with a partition
Repair dock	Total length	417	56	120 tons x 1 unit
				* Can be divided with two partitions
Floating repair dock	Repair dock (SAGAMI)	250	43	15 tons x 1 unit
	Repair dock (NEGISHI)	175	36	

Newbuilding



Coast Guard Patrol Boat "KISO"



Bulk Carrier "Future 56"



Drag suction dredger "Kairyu"

Qualifications possessed
 ISO 9001 : 2008 Quality Management System
 ISO 14001 : 2004 Environmental Management System

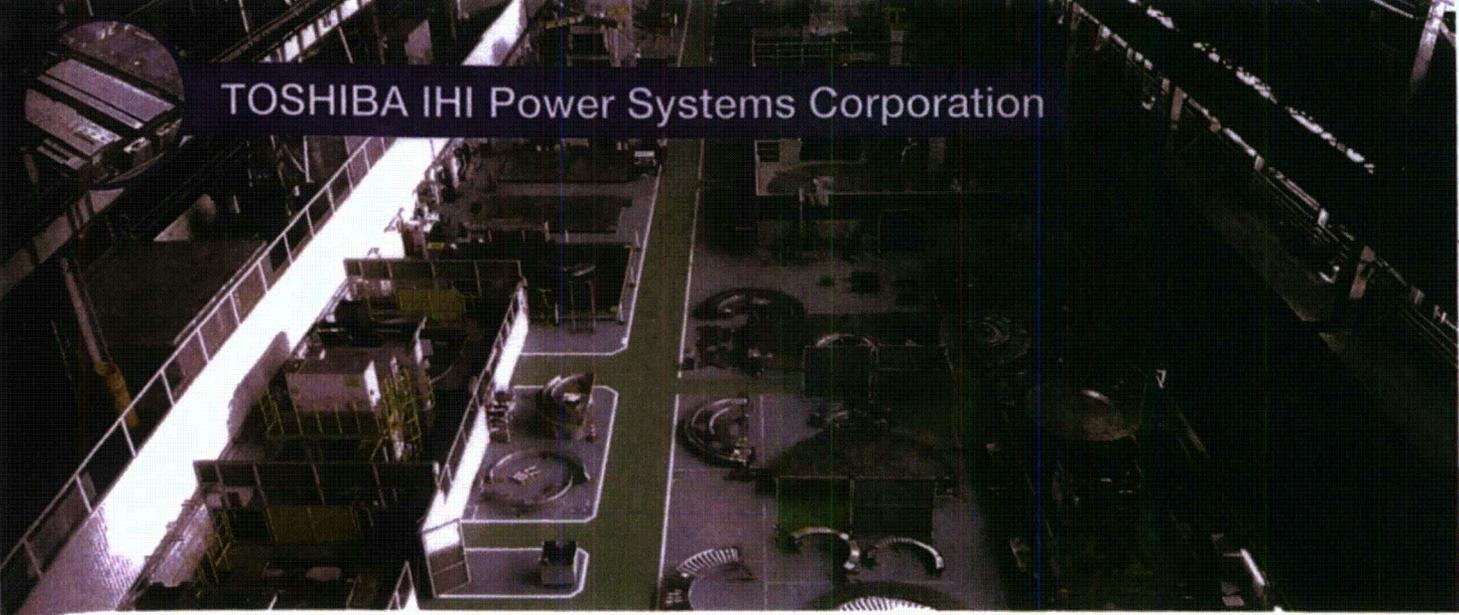
Repair ships



NIPPON MARU & KAIWO MARU under Repairing



Work ship under repair



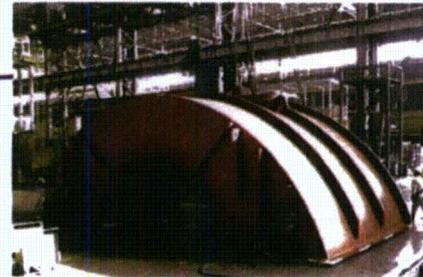
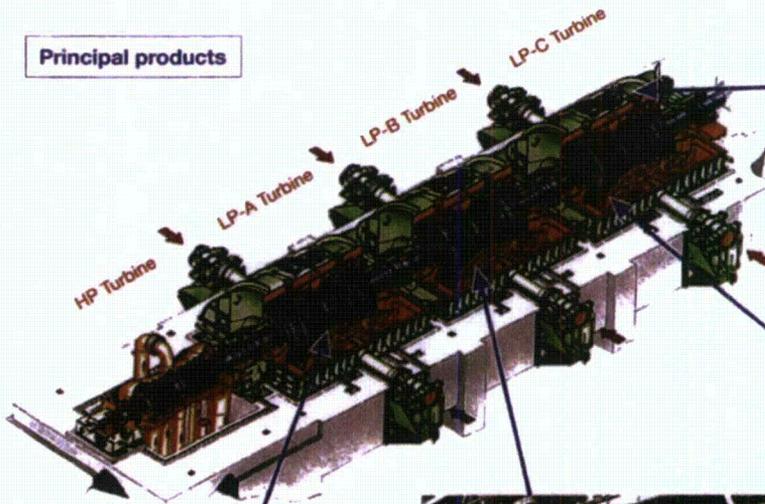
Cutting-edge technology and state-of-the-art facilities are used to manufacture turbine equipment that boasts high productivity and superior quality.

- TOSHIBA IHI Power Systems Corporation was established on January 17, 2011 as a joint venture between IHI and Toshiba. It is located within the Yokohama Machinery Works, where it works on the manufacture of low pressure inner/outer casings and high pressure to low pressure nozzles, etc., for steam turbine devices for power plants.
- In order to effectively manufacture large casings and stationary turbine nozzles, cutting-edge manufacturing technology (remote monitored narrow gap welding, 3D CAD/CAM, etc.), global state-of-the-art facilities (large machine tools, laser processing machines, etc.), and expert skills (for welding, machining, and finishing) are used.

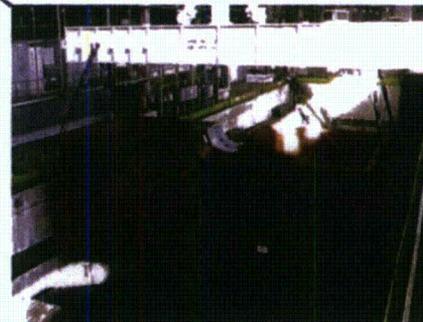
Works Size
 Production space : approx. 23,000 m²

Principal Equipment
 Gantry type turn miller : max. L 15m x W 10m x H 6.5m
 Gantry miller: max. L 15m x W 8.5m x H 6m
 Horizontal boring machine : max. L 15m x H 6m
 Vertical lathe : max. D 6m x H 1.5m
 5-axis plano miller
 Narrow gap welding device
 Stress relief furnace

Principal products



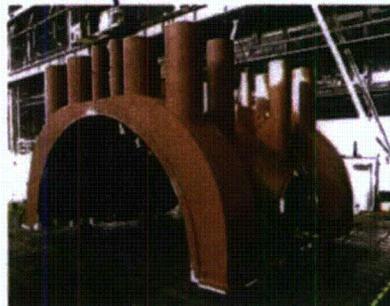
LP OUTER CASING UPPER



LP OUTER CASING LOWER

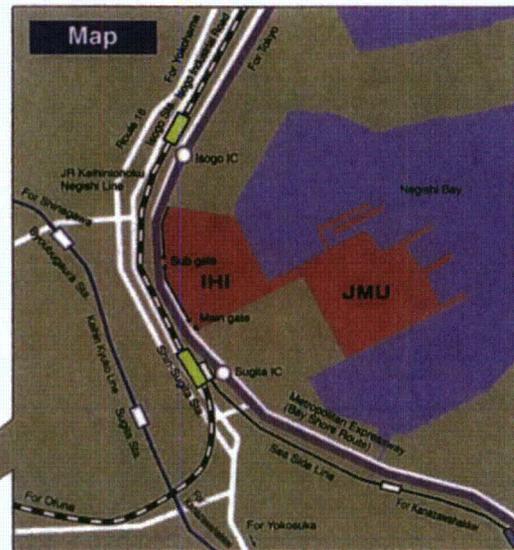
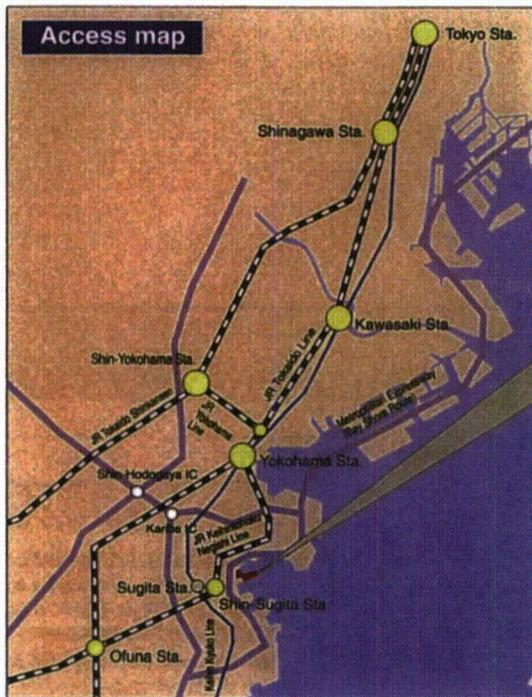


LP NOZZLE LOWER HALF



LP INNER CASING LOWER

● Access to Yokohama office



- 1, Shin-Nakahara-cho, isogo-ku, Yokohama, 235-8501
- Access
 - JR Keihin-tokai Negishi Line: five-minute walk from Shin-Sugita Station (Approximately 60 minutes from Tokyo Station)
 - JR Yokohama Line: change trains at Higashi-Kanagawa Station to Keihin-tokai Negishi Line, five-minute walk from Shin-Sugita Station
 - Keikyū Line: approximately 15-minute walk from Sugita Station
 - Bay Shore Route, Metropolitan Expressway: from Yokohama area, get off at Isogo Interchange, then approximately two minutes on Route 357 from Yokosuka area, get off at sugita Interchange, then approximately two minutes on Route 357

IHI and its surrounding areas

IHI Yokohama office actively participates in activities in the local community in a cooperative manner.



Participation in Isogo Clean Day
Collection of rubbish around the office



Work study experience
Middle school students spent part of their class time as a work study experience.

Local road race

Runners ran through IHI Yokohama office.



Kanagawa road race



Sugita road race



Isogo road race

IHI Corporation

1, Shin-Nakahara-cho, Isogo-ku, Yokohama, 235-8501, JAPAN
Tel: +81-45-759-2111
URL : www.ihl.co.jp/en/index.html



Our Professional Welders Are Honing Their Skills to Become World-Class Welders

In this era of automation, we firmly cling to workmen's skills and manufacturing that makes our customers feel reassured

In our technical training center, which is independent from other organizations and has been renovated in terms of equipment, facilities, and training programs, young welders are trying hard to learn skills from veteran welders and veteran welders are aiming for world-class welding skills.



New technical training center



Tubular reactor, a typical product of
Yokohama Nuclear & Chemical Components Works

A day at the technical training center

IHI's Yokohama Nuclear & Chemical Components Works produces nuclear and chemical plant equipment as its core

products. This plant is a world-leading factory that excels at producing large pressure vessels with wall thicknesses of over 200 mm and masses of over 2 000 tons, and has been offering high-quality equipment both domestically and

overseas for over 40 years.

IHI's welders, who have the most advanced skills, are essential in producing these products. Let's take a look at how they train.

New employee

I joined IHI in April, and now it passed two months, I have been taking safety training, welding training, and other training courses, been paid to do so, and am beginning to feel less like a student and more like a productive member of society. Recently, I have been making sparks fly from morning to night to get certified as a welder through JIS (Japanese Industrial Standards), which is the first qualification I am required to acquire. Today, I had a rehearsal in the presence of my bosses and experienced welders. With their support and encouragement, I am working hard to keep my part of the promise I made with the 10 fellow trainees



New employee training



New employee training booths

who joined this company the same year. We promised each other that we would all obtain the qualification.

I heard that last year, new employees performed cold water ablutions in a waterfall at their training camp. This year's new employees are looking forward to joining the training camp, hoping to bond and deepen our sense of unity.

Mid-level welder

Welding for actual products requires many advanced skills, some of which cannot be learned from textbooks. Before such welding, having a lot of practice to brush up my skills is important. I practiced welding special materials, bent joints and welding in a small space over and over again and now I am becoming more and more confident that I can weld anything.

Young welder who entered a welding skills contest

Last year, I won an excellence award at Kanagawa Prefecture's welding skills contest, but was far from winning first place. I swore to myself that I would enter the contest again. For the second year in a row, I have qualified to enter the prefectural contest. Now, I'm trying hard to overcome my weaknesses to win first place in the prefectural contest and then the national welding skills contest. I am confident and look forward to the contests.

Instructor (Foreman)

Welders of different levels each with their own goals visit this training center. I am always thinking about how I, as a veteran welder, can pass my skills down to these welders. In order to do so, I always try to understand their personalities and habits and provide training appropriate to each individual.

I coached a young welder who had difficulty welding in small spaces. I was able to experience the joy only a teacher knows when I heard he passed the qualification test.



Welding qualification training in a small space



Samples welded by the winner of the welding skills contest



Contestant being given advice by an instructor



Veteran welder coaching a young welder

Goals of this technical training center

This technical training center, where these welders are training, was opened in a new building last year. It was made independent from other organizations in 2011 and has its own staff.

This technical training center provides various trainings as described below, with the aim of developing welders, improving welding technology, and improving welded product quality. The center provides every form of support to achieve this aim. For example, air conditioners were provided at the training site so that welders can practice to

their heart's content, without worrying about heat stroke. In addition, they are urged to thoroughly practice 5S (*Seiri* (tidiness), *Seiton* (orderliness), *Seiso* (sweep), *Seiketsu* (cleanliness), *Shitsuke* (discipline)) to keep the training environment tidy and clean so that they can concentrate on their training.

(1) Enhancing customer trust with improved welding quality

Providing various kinds of training and tangible and intangible support means improving the QCD (Quality, Cost, Delivery) of the final product. The primary goal of our training and support is to reduce the defect rate through qualification training, special pre-training, and feedback on defects, in order to stabilize schedule and cost and obtain customer trust.

Special pre-training is provided for sharing lessons learned and know-how is provided for carrying out welding work that welders typically have difficulty with to prevent problems with similar types of welding.

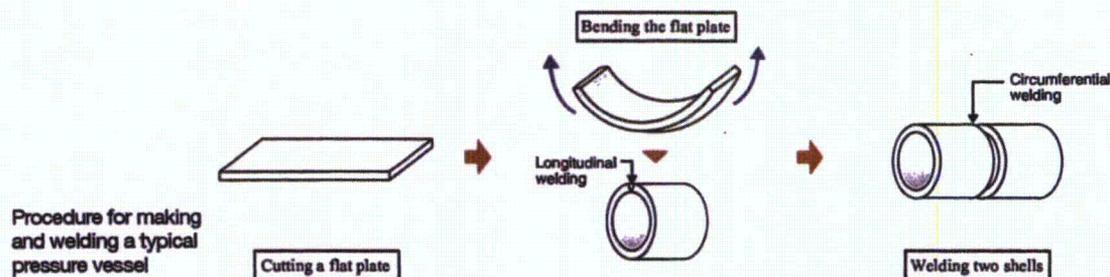
This center arranges training to prepare for never-before-seen welding work in order to contribute to improving product quality and customer satisfaction.

(2) Continually developing the best welders in Japan

Over the past 15 years, this plant has won first place at the national welding skills contest nine times and second place three times. In addition, this plant won first place in the category of thick plates at the national boiler welding contest in 2012 and won the Minister of Health, Labour and Welfare Award. The results for this year (2013) are out with the plant winning first place in the two categories of thick plates and medium plates at the same national boiler welding contest. In addition, this plant won first place at Kanagawa Prefecture's welding skills contest, which means this plant has won first place three times in one year. We will keep striving to establish the reputation of IHI's welders as "The best welders in Japan."

(3) Keeping the new employee retention rate high

To be honest, welding is hard work. In new employee training, new employees are given guidance from veteran welders to develop various skills, so they can sense their own growth everyday even though the training is tough. This helps develop a feeling of unity among those who joined the company at the same time





Left: Chairperson of Japan Boiler Association Award
Right: Minister of Health, Labour and Welfare Award

and it helps keep the retention rate of these highly skilled "rookies" high.

(4) Developing other technicians and engineers

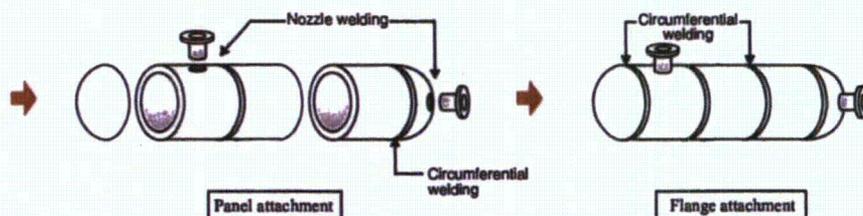
In Yokohama Nuclear & Chemical Components Works, welding is the most important skill, but other skills are also required to ensure product quality. One of the trainings this technical training center provides is training for national qualification for machining technicians. In addition, this center provides education on welding engineering and ASME (American Society of Mechanical Engineers) standards for engineers for welding technology, which constitutes the foundation of the skills used on-site.

To meet increasingly diversified needs

This new training center has just been established, but is already developing highly skilled welders with its excellent training. Yokohama Nuclear & Chemical Components Works plans to expand its product lineup, and therefore, this training center will work to respond to increasingly diversified needs.

By integrating training on machining and measurement with the training on welding, this training center will become a comprehensive training center in the Yokohama area for IHI.

The need to improve the skills of local welders is



Virtual welding simulator



I am an employee of IHI. I am female and I graduated with an arts degree. My image of welding was bright lights and loud noises with enough heat to melt iron, yet I was able to experience welding work.

Holding the torch, which contains the welding electrode, with my right hand, I pull the mask over my head to protect my eyes from the bright welding arc, but I can see nothing but pitch black darkness. I wonder whether the world of welding exists in such darkness. The thought fills me with anxiety. The moment I touch the electrode to the iron plate, only a small area around the contact point lights up with the light of the welding arc. The torch vibrates and makes a crackling sound. "Wow, this is welding!" My image turns into reality in an instant. Holding my breath, I concentrate my gaze at the tip of the electrode, but it moves randomly forming a zigzagged line like a snake.

"Hmm..." I don't feel any heat or smell anything from the melting electrode. "Amazing!" I experienced this in a virtual world created by the welding technical training center's virtual training system, which does not require the use of protective equipment such as work clothes, gloves, or helmets. Anyone can safely experience welding in just a few moments. Why don't you try it when you visit our plant?

increasing, especially because of increasing orders for overseas plants. We will expand our business overseas through globalized training by accepting more trainee welders from other countries.

Inquiries:

Technical Training Center,
Yokohama Nuclear and
Chemical Components
Works, IHI Corporation
Phone: +81-45-759-2646
Fax: +81-45-759-2649
Website: www.ihico.jp/en/

Background

In Japan, safety regulation on nuclear facilities does not require sound off-site emergency plans. But there are some opinions to involve the off-site plan as a legal requirement.

*STATE / LOCAL governments
have primary off-site response*

Fact-finding

- Is there any legal framework in which NRC order the suspension of operation/restart simply because of poor off-site plan, even though all of other regulatory requirements are satisfied?
- How should the operators be strained or restricted on their plant operation where off-site plan is not exercised biennially against the regulations?
- How does NRC evaluate the off-site plan and exercise? Are there any quantitative and/or tangible standard or guidelines to refer?

*FEMA
+
NRC
- responsible
- assessment
- 180 days to
report to a*

*- need for more interactions
in this area - they are
very interested in the
NRC's explanation of how we*

Dapas, Marc

From: Dapas, Marc
Sent: Wednesday, April 09, 2014 8:30 AM
To: Johnson, Michael
Cc: Rosales-Cooper, Cindy
Subject: FW: OPA Edited 1-pagers plus working intro.docx
Attachments: Japan_Trip_one_pager_revised.docx

I revised the write up (attached) to incorporate your point. Thanks.

From: Dapas, Marc
Sent: Wednesday, April 09, 2014 6:51 AM
To: Johnson, Michael
Subject: Re: OPA Edited 1-pagers plus working intro.docx

That's a good point, will revise the write up to include it and resend. Thanks.
Marc Dapas
Sent from NRC Blackberry

From: Johnson, Michael
Sent: Wednesday, April 09, 2014 06:26 AM
To: Dapas, Marc
Cc: Rosales-Cooper, Cindy
Subject: RE: OPA Edited 1-pagers plus working Intro.docx

Thanks Marc. Looks good. Minor question/comment. My impression was that the difficulty (associated with not having knowledge or skills) cost them valuable time and limited the effectiveness of some activities. Do you recollect as well? If so, can you make that point as well?

Mike

From: Dapas, Marc
Sent: Tuesday, April 08, 2014 9:44 PM
To: Johnson, Michael
Cc: Rosales-Cooper, Cindy
Subject: RE: OPA Edited 1-pagers plus working Intro.docx

Mike, I revised my writeup in an attempt to address your observation while still capturing the essence of the impact the discussions with our Japanese counterparts/direct observations had on me. I do think I need to make some reference to the importance of being "prepared for the unexpected" in providing context for the key message that we do not have any significant gaps in the approach we are exercising here in the U.S. Hope I struck the right balance and welcome your thoughts. Thanks.

From: Johnson, Michael
Sent: Saturday, April 05, 2014 9:08 PM
To: Dean, Bill; McCree, Victor; Dapas, Marc; Pederson, Cynthia; Leeds, Eric; Wiggins, Jim; Tracy, Glenn; Skeen, David; Flanders, Scott; West, Steven; Rosales-Cooper, Cindy; Hannah, Roger; Foggie, Kirk
Subject: FW: OPA Edited 1-pagers plus working intro.docx

Hi Everyone. The attached is the latest version of the 1 pagers plus intro materials.

Thanks for taking the time to pull together your thoughts. I find each to be insightful and well written.

As I read the complete collection of 1 pagers, I am a little concerned that there is considerable overlap in some areas and on some messages and other areas aren't touched at all. Of course, it is expected that we would have similar perspectives and insights given our common backgrounds and experiences, and thus a certain amount of overlap is unavoidable. But I think we want to avoid creating a document that appears repetitive.

I ask that you spend a few minutes and read the complete collection of 1 pagers.

I think one thing we might do is minimize detailed discussion of the 3 messages in each of our writeups and focus primarily on related areas or supporting topics. Many of these came out in our discussions on Saturday in Japan and were assigned to you based on the points you raised. Please look at your individual writeup and revise it if needed (some are fine as is).

Also, I have a few specific suggestions in order to broaden the topics covered.

Cindy - would you add further discussion regarding your point that (licensees, industry, NRC) must act to prevent and prepare to mitigate. You cover well what will happen if we don't.

Vic - please expand your messages regarding exercising appropriate vigilance. Also, would you touch on the thought that we should not rely on personal heroism. I think you felt strongly about this and it is a strong message.

Steve - can you talk about the importance of improving the international body of knowledge based through research and capturing OE. We will continue to learn not just as we get greater insights into what happened and why, but also as the Japanese deal with waste water issues, etc.

Dave - you and Kirk have the best perspectives regarding progress made by the Japanese over the 3 years. You also have the best real-time knowledge about current challenges. Please touch on those topics.

All - please endeavor to keep your writeups to no more than 2 pages.

I know we are all very busy, but given the importance of the product and the investment made to date, I ask that we go a little further.

Please send in your revisions by the end of this coming week.

Thanks in advance!

Mike

From: Rosales-Cooper, Cindy
Sent: Friday, April 04, 2014 5:45 PM
To: Johnson, Michael
Subject: OPA Edited 1-pagers plus working intro.docx

Here is the entire document. The intro reflects your and Bill Dean's edits and the 1 pagers reflect OPA edits.

The trip to Japan in February was a remarkable experience for me. It was highly informative and particularly rewarding in terms of the insights provided by our Japanese counterparts with respect to the impact of the East Japan Earthquake and associated tsunami on the Fukushima sites, the significant safety measures being put in place at all of the operating reactor sites, the tremendous recovery efforts underway to clean up the land contamination from the Fukushima accident, and the country's revised regulatory structure. Of particular note, the description by the various TEPCO operators and site management directly involved in the event response to the East Japan Earthquake/Tsunami at both Fukushima Daiichi and Daini, was compelling in terms of the almost unimaginable challenges faced by TEPCO in trying to prevent core damage to the associated reactors.

Many of the insights derived from our discussions with the various TEPCO employees, Japanese regulators, and industry/vendor representatives were reinforced by our direct observations. Even though it has been three years since the East Japan Earthquake occurred, the extent of devastation caused by that earthquake and resulting tsunami is clearly visible. Driving through the surrounding towns of Tomioka and Naraha, one of which had been a vibrant seaside village and resort community, we saw countless houses and businesses that had been reduced to mere rubble, evidence of large landslides and uprooted trees, and as a result of the extensive ongoing land decontamination efforts, huge piles of top soil cleared from fields under large green tarps, police enforcing access restrictions at various checkpoints, and numerous workers wearing protective clothing to prevent personal contamination. For me, one of the more striking visuals, was a roadside café where I could still see coffee cups and plates on the counter, almost as if people were in the midst of having breakfast or lunch when they had to get up and evacuate due to the natural disaster and associated radioactive releases from the plant.

I was also struck by the resiliency and perseverance of the TEPCO operators, shift management, and emergency response center staff in responding to the Fukushima accident despite daunting challenges, the almost continual setbacks encountered, the risk of personal injury/death in dealing with the extreme plant conditions, and their not knowing for weeks if their families were safe. Hearing these TEPCO employees describe what they faced, and then getting to see the actual physical configuration of equipment at the Fukushima sites, left an indelible impression on me regarding the importance of being prepared for the unexpected. In that context, I considered what safety measures/enhancements the NRC has required of the U.S. industry, in terms of both accident prevention and mitigation, in follow up to the recommendations of the Near-Term Task Force that was chartered to identify lessons-learned from the Fukushima accident. I concluded from what I saw and heard, that we do not have any significant gaps in the approach we are exercising here in the U.S. to ensure both the regulator and the industry are prepared for the unexpected. The key in my view is to ensure that these safety measures are rigorously implemented and maintained.

Another important lessons-learned shared with us by TEPCO relates to over-reliance on contractors. The extensive use of contractors by TEPCO to accomplish work activities presented an unanticipated challenge in that after contractors had been directed to evacuate the site, the remaining onsite staff did not possess the knowledge or skills to accomplish critical recovery actions. These included installing/connecting instrumentation and temporary power supplies, terminating cable ends, and operating fire trucks/portable equipment. This previously unrecognized lack of skills by the onsite staff limited the effectiveness of some recovery actions such that alternative approaches had to be pursued, all of which cost TEPCO valuable time in responding to the accident. This lessons-learned underscores the importance of ensuring event

response staff have the requisite skills to complete required actions in a timely manner to ensure the public health and safety is not put in jeopardy.

**Reactor and Preparedness Programs Senior Leadership Team
Visit to Japan and** Outside of
Scope

Travelers: Michael Johnson, Eric Leeds, Glenn Tracy, James Wiggins, Bill Dean, Victor McGree, Cindy Pederson, Marc Dapas, Steve West, Scott Flanders, David Skeen, Roger Hannah, Cindy Rosales-Cooper, and Kirk Foggie.

Outside of Scope

Dates: Feb. 15-23, 2014- Japan

Outside of Scope

Purpose: Japan: To provide an opportunity for the Senior Leadership of the Reactor and Preparedness programs to gain first-hand experiences and insights into the events that led up to accident and the actions taken by the operators at the Fukushima sites.

Outside of Scope

Japan:

The Senior Leadership Team's visit to Japan was successful and desired outcomes were accomplished. The team brought back many lessons and insights from this trip which will be shared with the staff over the next few weeks through written material and video. One of the key insights gained as a result of the visit to Japan focuses on the need to ensure that the nuclear industry and the NRC are prepared for the unexpected.

The Team returned home with a greater resolve to ensure that licensees fully implement, maintain, and appropriately exercise the measures that will be put in place associated with the post-Fukushima actions directed by the NRC. As a result of the visit to Japan, the team also developed a greater appreciation of the importance of making sure that licensees have a deep understanding of their plants and that both NRC and the industry maintain technical expertise.

In Japan, the Senior Leadership team had a full week of site visits and meetings that included visits to the seven-unit Kashiwazaki Kariwa site (on the west side of the island and which had suffered a very large earthquake in 2007); the four-unit Fukushima Daini site; the six-unit Fukushima Daiichi site; the recently created Japanese Nuclear Regulation Authority (our counterpart agency); the newly created Japanese Nuclear Safety Institute (JANSI), which is modeled after the U.S. industry's Institute of Nuclear Power Operations (INPO); the Tokyo Electric Power Company (TEPCO) headquarters office; JNES (which will be incorporated into JNRA as their Office of Research); and three manufacturing sites in the Yokohama area, Toshiba, IHI, and Keihin.

The Senior Leadership Team committed to capturing the key messages and insights from this visit in written 1-2 page documents that will be published in a NUREG as well as in a Knowledge Management video and seminar to be rolled out to the NRC staff in April 2014.

The Team also committed to following up on requests from the JNRA for interactions on technical topics of interest, such as regulatory applications for PRA, and to pursuing the exchange of resident inspectors between the NRC and JNRA.

Attached to this Trip Report are the individual reflective messages from the Senior Leadership Team. These messages are part of the agency official trip report for this visit.

Outside of Scope

From: Michael Johnson
Subject: Back From Japan!!

I recently had the opportunity to visit Japan with the leadership of the reactor and preparedness programs of the agency which included the 4 Regional Administrators: Bill Dean, Victor McCree, Cindy Pederson, and Marc Dapas; Eric Leeds, Director of NRR; Glenn Tracy, Director of NRO; Jim Wiggins, Director of NSIR; Steven West, Deputy Director of RES; Scott Flanders, Director of NRO/DSEA; and David Skeen, Director of NRR/JLD. This was an extremely significant and timely visit for this team of senior managers as it provided an opportunity for us to gain first-hand experiences and insights into the events that led up to accident and the actions taken by the operators at the Fukushima sites. The visit was also precedent setting in that it was the first time the entire contingent of agency senior managers responsible for the operating reactor program travelled together to a foreign country. We were supported by EDO, OIP, and OPA staff.

We brought back many lessons and insights from this trip and many of these the team and I will share with the staff over the next few weeks through written material and video. One of the key insights that we gained as a result of this visit is that we have to assure that the nuclear industry and the NRC are prepared for the unexpected. While we recognized the importance of this within days of the accident, the experiences and insights gained on this trip reemphasized its significance. For me, insights from first-hand discussions with both the Daiichi and Daini control room operators gave me greater appreciation of the importance of installed equipment at plants in addition to portable equipment and mitigating strategies.

We also returned home with a greater resolve to ensure that our licensees fully implement, maintain, and appropriately exercise the measures that will be put in place associated with the post-Fukushima actions directed by the NRC. Finally, we have a greater appreciation of the importance of making sure that licensees have a deep understanding of their plants and that both NRC and the industry maintain technical expertise.

We had a full week of site visits and meetings that included visits to the seven-unit Kashiwazaki Kariwa site (on the west side of the island and which had suffered a very large earthquake in 2007); the four-unit Fukushima Daini site; the six-unit Fukushima Daiichi site; the recently created Japanese Nuclear Regulation Authority (our counterpart agency); the newly created Japanese Nuclear Safety Institute (JANSI), which is modeled after the U.S. industry's Institute of Nuclear Power Operations (INPO); the Tokyo Electric Power Company (TEPCO) headquarters office; JNES (which will be incorporated into JNRA as their Office of Research); and three manufacturing sites in the Yokohama area, Toshiba, IHI, and Keihin.

I had many impactful interactions while in Japan, but the most moving experience was hearing the personal accounts of operators and managers who were at Daiichi and Daini during the tsunami and subsequent core melt accident. The personal accounts of these operators were gut wrenching yet inspiring as I listened to how many of them worked for days without sleep or without knowing if their families were safe. I return home knowing that the Japanese operators at Daiichi are heroes who showed immense character in their efforts to save the units at the site despite the situation and conditions they were dealt. There are still concrete reminders of the destruction caused by the tsunami and earthquake. And although many of these areas won't be inhabitable for almost 30 years because of contamination, I am still very inspired by the progress made in the Fukushima prefecture and the resilience of that community.

I was also very impressed with the Kashiwazaki-Kariwa (KK) site where TEPCO has nearly completed implementing numerous defense in depth measures to fully secure the site, including the construction of massive sea walls and embankments to protect against a tsunami; installation of two containment filtering systems (one underground); acquisition of a massive fleet of fire trucks, emergency power vehicles and heavy equipment; and the construction of a huge reservoir high above the plants that can provide water via gravity drainage. Even though the KK site may be the safest plant on earth as a result of these additional measures, the loss of public confidence and trust in the industry and the regulator makes it unclear that they will ever operate again.

We were able to share some key vendor oversight messages at the three Toshiba and IHI facilities that are manufacturing components for the Vogtle and Summer sites; and was equally impressed with some of the technologies Toshiba created for use in the clean-up of the Daiichi site.

I look forward to discussing the visit in an upcoming staff meeting and will share pictures when they are available.

From: Eric Leeds

Subject: Have I Got News For You – Feb 24, 2014

Last week I traveled to Japan with a group of senior NRC executives, including all four RAs, the ODs for NRO and NSIR, our DEDO, Dave Skeen, Scott Flanders, and others. We spent an extremely busy week meeting with representatives from various Japanese organizations involved in nuclear activities, as well as touring the Kashiwazaki Kariwa, Fukushima Dai-ichi and Fukushima Dai-ni nuclear power plants. At the end of almost every day, we took time to reflect, to discuss what we learned, and to record our thoughts. We are preparing a record of our insights that will include pictures and film from the trip that we will share with the staff when it's complete. But, in the meantime, I want to provide you with a few personal insights from what I found to be a profound experience. In this HIGNFY, I will focus my remarks specifically on the accident and its aftermath, although there were learnings from all the week's activities.

On the bus ride to the Fukushima Dai-ichi NPP, the site of the accident, we passed through the town of Tomioka, about 7 to 10 km south of the site. Before the accident, Tomioka had been a vibrant seaside village of approximately 16,000 residents. It was a resort town, with its own train stop, beachfront, restaurants, hotels, etc. The town is now empty, uninhabitable because of radiological contamination (about 1 microsievert an hour). There are no inhabitants, no electricity, no running water. The damage caused by the earthquake and tsunami remains. Those who had lived in the town are now allowed to enter to visit their homes, but they can't stay overnight. The authorities are currently decontaminating the town and plan to have it inhabitable in about 3 years. Thinking about the people who, for all this time, have lost their homes, lost their jobs, and lost their community causes me great emotional pain. For me, a career safety regulator, the feeling is very personal.

When we reached the site, we boarded a different bus, a bus prepared for a contaminated site, with plastic herculite covering the seats and more plastic and duct tape covering the floor. We donned a full set of anti-contamination clothing, shoe covers, and respirators. There are about 250 cars, trucks, and buses on site, ferrying a site workforce of about 4,000 workers. As we passed workers at the site and in other vehicles, it struck me that everyone was wearing full anti-Cs, respirators, and helmets. It left me with an eerie feeling, like I was in a science fiction movie.

We toured the site, often leaving the bus to see specific site areas. Recall that there are six reactors on the site, with Units 1, 2, and 3 having damaged cores. While a great deal of work has already been accomplished, much of the damage from the earthquake and tsunami remains, if only pushed to the side. Broken buildings, twisted metal, crushed concrete and smashed vehicles still litter the site. TEPCO is currently moving the spent fuel from the Unit 4 spent fuel pool to the common pool for the site, and we toured both pools. We went inside the Unit 5 containment to see where the valves were that the operators had tried to open to cool the torus. I tried to picture the challenge that the operators faced, going into this confined area in pitch black, the heat stifling, the dose rate steadily increasing, looking for the valves they'd have to operate manually. The descriptions of the accident from the operators who lived through the ordeal will stay with me forever. Many of them truly believed they were going to die. They had no idea if their families survived the tsunami or where their families were. Yet they stayed and fought the accident. They were incredibly courageous.

I am more convinced than ever that the Fukushima lessons learned that we are requiring the industry to implement are critical to ensure an accident like the one at Fukushima doesn't happen here. We have to ensure that the licensees fully implement, maintain, and exercise the Fukushima lessons learned. We have to make sure the licensees prepare their facilities and are ready to confront the unexpected. We are the ones who are accountable to and responsible for protecting the American public. It's our job. For me, it's personal. It's what I'm here to do.

I'd like to specifically thank Kirk Foggie (OIP), Cindy Rosales-Cooper (OEDO), Roger Hannah (RII OPA), and Mary Carter (OIP) for arranging all the logistics, shepherding us through this trip, making sure we were at the right place at the right time and for all the work they did in terms of general care and feeding of our group. Kirk, Cindy, and Roger came with us to Japan, and they made sure this trip was a success. I'll never forget this trip, and they made it happen. They did an outstanding job.

From: Glenn Tracy
Subject: message from Glenn

I want to share the insights from my travels in Japan last week along with other senior NRC executives associated with reactor programs, including the Deputy Executive Director for Reactors and Preparedness, the ODs for NRR and NSIR, all four Regional Administrators, the Deputy OD of Research, the Director of the Japan Lessons-Learned Directorate, and our own Scott Flanders, currently leading the NRC team assessing seismic and flooding hazards at U.S. reactors. This was the first time that the entire contingent of agency senior managers responsible for reactor programs traveled together to a foreign country. The primary focus of this trip was to witness first-hand the impacts of the March 11, 2011 Great East Japan Earthquake upon the Fukushima Dai-ichi and Daini reactors, interact directly with the superintendents, operators and responders at the affected reactor sites, and observe ongoing recovery and regulatory activities. Let me open with my bottom line: *Without question, this experience ranks as the most impactful I have had in my 32 years in the nuclear field.*

Of special interest to NRO and vendor oversight, we began the week by receiving comprehensive presentations and tours of the Yokohama Toshiba and IHI manufacturing facilities. We provided key messages to senior executives of those companies regarding our ongoing AP1000 module fabrication and component inspections, including our interactions and issues regarding CB&I. We had the chance to discuss the corrective actions IHI had undertaken in response to a previous NRO/DCIP vendor inspection at the facility. During the tours, we witnessed Toshiba Isogo laser-CAD development and application to the Fukushima Dai-ichi spent fuel pools' recovery, the Toshiba Liquid Sodium Test Facility, IHI safety-

related work including AP1000 containment vessels and steam generators, and Toshiba Keihin work on AP1000 reactor core barrels and steam-turbine electrical generators. IHI will soon be fabricating AP1000 modules for Vogtle and Summer under contract with CB&I.

On Tuesday, we visited the world's largest reactor site, the 7-unit Kashiwazaki Kariwa Nuclear Power Plant in Western Japan, which, as you may remember, experienced the powerful Niigataken Chuetsu-Oki Earthquake in 2007. There, we observed TEPCO's comprehensive efforts in the implementation of numerous permanent and portable defense-in-depth measures, including the construction of massive sea walls and embankments to protect against a tsunami; the installation of redundant containment filtering systems (one underground); the acquisition of a massive fleet of fire trucks, emergency power vehicles and heavy equipment; and the construction of a huge reservoir high above the plants that can provide water via gravity.

On Wednesday, we met with Japanese regulatory and industry executives, including key officials at JNRA HQ (the recently-formed Japan Nuclear Regulation Authority and NRC counterpart) and senior officials of JANSI (a recently formed INPO-like organization) and discussed their ongoing initiatives and issues. That afternoon we received a highly informative, candid, and emotional presentation from the TEPCO officials who directly led and implemented the heroic efforts at Fukushima Dai-ichi amidst their attempts to prevent core damage and mitigate the consequences of the ensuing multiple unit accidents stemming from the 50-foot tsunami.

On Thursday, we visited the Fukushima Daini NPP (a site with four nuclear reactors about 7 km south of Fukushima Dai-ichi), which avoided core damage from the Tsunami's flooding waters, primarily as a result of the heroic efforts of the operators and management. During the bus ride to Fukushima Daini, we passed through the town of Tomioka, about 10 km south of Fukushima Dai-ichi. This formerly vibrant seaside village is uninhabitable as a result of radiological contamination (about 1 microsievert an hour) from the core meltdowns at Fukushima Dai-ichi. The damage caused by the earthquake and tsunami is clearly visible. Those who had lived in the town are currently allowed to enter to visit their homes, but they can't stay overnight due to radiation dose restrictions. I found it highly disturbing to watch the ongoing efforts to decontaminate the town, which authorities hope will be inhabitable in a few years. I saw a Japanese blue road sign for a crosswalk, illustrating a dad, his daughter and a bicycle, amidst this village of empty parks, schools, stores and homes. This juxtaposition struck a deep personal chord in me. I took a picture of the sign and have the photo hanging in my office to serve as a reminder of our vital mission in *protecting people and the environment*.

Our activities culminated on Friday at Fukushima Dai-ichi, the site which experienced massive destruction from the tsunami, lost core cooling resulting in the sequential core damage to three of the six reactors over three days, the ultimate the loss of containment and uncontrolled release of radioactivity. We donned full anti-contamination clothing and respirators, and observed the 4,000 site workers diligently addressing their daunting challenges in their own full anti-Cs, respirators, and helmets. Twisted buildings, tanks and metal, crushed concrete and smashed vehicles littered the site. We watched as they constructed and commenced filling a new enormous water tank every two days amidst their ever-growing tank farm to capture radioactive liquid. We observed the spent fuel pool recovery and the movement of the spent fuel from the Unit 4 spent fuel pool into a common site pool. We ventured inside the Unit 5 containment to experience where operators had tried to open valves to vent the suppression pool and cool the core. I will never forget these images, nor the courage and conviction of the operators in entering this confined, high-radiation area to manually operate components in the pitch black, stifling heat, and increasing radiation levels.

At the end of each day, we devoted time to reflect on what we had seen and heard. These discussions were particularly valuable. The members of our delegation had many different perspectives of what resonated most with them about what we saw and heard, but we all aligned on certain themes. Specifically, that we have to assure that the nuclear industry and the NRC are prepared for the unexpected. We also returned home with the clear sense that we must ensure that our licensees fully implement, maintain, and realistically exercise the measures that will be put in place to implement the post-Fukushima actions directed by the NRC, and that both we and the industry need to maintain an appropriate depth and breadth in technical expertise within our respective organizations. Additionally, the insights I gained emphasized for me the importance of time in a crisis and the importance of achieving a proper balance between hardened, permanent safety components and portable equipment, when adding defense-in-depth to nuclear power plants.

I feel very fortunate to work for an agency that provided me this unique experience as a regulator. The energy source we oversee commands respect, as the consequences to communities, the loss of public trust, and costs for cleanup are enormous - as enormous as our duty to the public. The images and key messages from the managers and operators of the damaged reactors will remain with me forever. The images of the heroism, anguish and resilience of the people of Japan are indelible. In the coming weeks, you will see more about this precedent-setting trip in videos and other agency communications that are being developed. I would like to conduct a lunchtime seminar after I have a chance to review the thousands of pictures that were taken and prepare a presentation for those who are interested in a more detailed description of what our team learned and observed. I have been chatting with several of you since my return and even shared my photo with a future applicant, as they raised the topic of emergency preparedness.

From: Jim Wiggins

Subject: FYI: some early info on the trip to Japan

As many of you are aware, I visited Japan last week with a cadre of senior NRC executives. The delegation was led by Mike Johnson, the Deputy EDO for Reactor and Emergency Preparedness Programs, and included all the RAs, the Office Directors of NRR, NRO, and NSIR, as well as the Deputy OD for RES and other agency managers involved in post-Fukushima related activities. This was the first time the entire corps of agency senior managers responsible for the operating reactor program has travelled together to a foreign country. It was a very interesting and highly rewarding trip that provided us all with some great insights into the current status of Japan's recovery from the earthquake and tsunami that occurred on March 11, 2011, especially as it pertains to the Fukushima Daiichi and Daini sites and the country's revised regulatory structure.

The trip included visits to nuclear industrial facilities in the Yokohama area; the 7-Unit Kashiwazaki Kariwa site in Western Japan; the Tokyo offices of JANSI (Japanese Nuclear Safety Institute - a recently formed INPO-like organization) and JNRA (the recently formed Japan Nuclear Regulation Authority); and the two Fukushima sites. The delegation members had many different perspectives of what resonated most with them about what we saw and heard, but we all aligned on the some central themes including need to ensure that (a) our licensees fully implement, maintain, and appropriately exercise the measures that will be put in place associated with the post-Fukushima actions directed by the NRC; (b) the nuclear industry and NRC are both prepared for the unexpected; and (c) both we and the industry need to maintain an appropriately deep level of technical expertise within our respective organizations.

One of the delegation's visits was to Kashiwazaki Kariwa where TEPCO (Tokyo Electric Power Company) has nearly completed implementing numerous defense in depth measures to fully secure the site including acquisition of a massive fleet of fire trucks, emergency power vehicles and heavy equipment; the construction of massive sea walls and embankments to protect against a tsunami; installation of two

containment filtering systems (one underground); and the construction of a huge reservoir high above the plants that can provide water via gravity drainage. The delegation also visited the large uninhabited/uninhabitable areas around the two Fukushima sites. (Daini is about 7.5 miles south of the Daiichi complex.) Good progress is being made in decontaminating many of the areas and our understanding is that there is a village (Naraha) not too far from Daini which will be resettled sometime in the spring.

Additionally, the delegation heard first-hand accounts of the events of March 11th and its aftermath. The descriptions from several shift managers and operators who were at Fukushima Daini and Daiichi during that time were compelling in terms of the daunting challenges and risk of personal injury/death in dealing with the extreme plant conditions and in trying to prevent core damage to the associated reactors, how these individuals responded, the almost continual setbacks encountered, and their not knowing for weeks whether their families were safe. While there were many acts of heroism displayed by the TEPCO employees, hearing the various stories reinforced in our minds that we must ensure we do all we reasonably can to prevent situations from occurring where the only recourse to prevent core damage is some sort of heroic action. Our collective view was that if a licensee found itself in that situation, it represents a failure on part of both the industry and regulator.

In the coming weeks, you will have the opportunity to more about this precedent setting trip in videos and other agency communication tools that we are developing. I also plan to conduct a lunch time seminar in the next week or so after I have a chance to review the thousands of pictures that were taken and prepare a good slide show for you. This way, I can reach a broader audience and give those who are interested a more detailed description of what our team learned and observed.

Following Japan, Mike Johnson, Cindy Rosales-Cooper, and I continued on to Seoul and Daejeon, ROK, for bilateral discussions with the Korean Nuclear Commission - NSSC- and its regulating arms of KINS and KINAC.

While it was a great trip, I'm happy to be back home and working with all of you again as we implement our mission. Your efforts make a difference!

From: Bill Dean

Subject: Summary of my recent trip to Japan

As many of you are aware, I visited Japan last week with a cadre of agency senior managers. The delegation was led by Mike Johnson, the Deputy EDO for Reactor and Emergency Preparedness Programs, and included all the RAs, the Office Directors of NRR, NRO, and NSIR, as well as the Deputy OD for RES and other agency managers involved in post-Fukushima related activities. It was a very interesting and highly rewarding trip that provided us all with some great insights into the current status of Japan's recovery from the horrible earthquake and tsunami that occurred on March 11, 2011, especially as it pertains to the Fukushima Daiichi and Daini sites and the country's revised regulatory structure.

The trip included visits to nuclear industrial facilities in the Yokohama area; the 7-Unit Kashiwazaki Kariwa site in Western Japan; the Tokyo offices of JANSI (a recently formed INPO-like organization) and JNRA (the recently formed Japan Nuclear Regulation Authority); and the two Fukushima sites. The delegation members had many different perspectives of what resonated most with them about what we saw and heard, but we all aligned on some pretty central themes. Specifically, that we have to assure that the nuclear industry and the NRC are prepared for the unexpected. We also returned home with the clear sense that we must ensure that our licensees fully implement, maintain, and appropriately exercise the measures that will be put in place associated with the post-Fukushima actions directed by the NRC, and that both we and the industry need to maintain an appropriately deep level of technical expertise within our respective organizations.

For me personally, there were a handful of experiences that I valued highly. One was our visit to Kashiwazaki Kariwa, where TEPCO has nearly completed implementing numerous defense in depth measures to fully secure the site, including the construction of massive sea walls and embankments to protect against a tsunami; installation of two containment filtering systems (one underground); acquisition of a massive fleet of fire trucks, emergency power vehicles and heavy equipment; and the construction of a huge reservoir high above the plants that can provide water via gravity drainage. Secondly, our visit to the areas around the two Fukushima sites (Daini is about 7.5 miles south of the Daiichi complex) and the somberness of seeing large areas still uninhabited/uninhabitable. There is good progress being made in decontaminating many of the areas and our understanding is that there is a village not too far from Daini (Naraha is the village name) which will be resettled sometime in the spring. And thirdly, the powerfully moving first-hand accounts of the events of March 11 and its aftermath from individuals who were at each of the sites during that time, including several shift managers and operators. The heroism and resiliency displayed by these individuals and the others whom they served with is just amazing and reinforced in all of our minds that we cannot find ourselves in a situation again where such heroic measures are needed to try and save a facility from a core meltdown event.

In the coming weeks, you will see more about this precedent setting trip (this was the first time the entire corps of agency senior managers responsible for the operating reactor program have travelled together to a foreign country) in videos and other agency communication tools that we are developing. However, I also plan to conduct a lunch time seminar in the next week or so after I have a chance to review the thousands of pictures that were taken and prepare a good "slide show" for you. This way, I can give those who are interested a more detailed description of what our team learned and observed. I have already chatted with several of you in the office today who had great interest in what we saw and experienced, so I hope in this way, I can reach a broader audience. I will keep you informed. It was a great trip, but I am happy to be back home with all of you.

From: Victor McCree
Subject: My recent trip to Japan

As many of you are aware, I visited Japan last week with a cadre of agency senior managers. The delegation, led by Mike Johnson, the Deputy EDO for Reactor and Emergency Preparedness Programs, and included all the RAs, the Office Directors of NRR, NRO, and NSIR, as well as the Deputy OD for RES and other agency managers involved in post-Fukushima related activities. It was a very interesting and highly rewarding trip that provided us all with some great insights into the current status of Japan's recovery from the horrible earthquake and tsunami that occurred almost three years ago, on March 11, 2011, including a major revision to the country's regulatory structure.

The trip included visits to nuclear industrial facilities in the Yokohama area; the 7-Unit Kashiwazaki-Kariwa site in north-western Japan; the Tokyo offices of JANSI (a recently formed INPO-like organization) and JNRA (the recently formed Japan Nuclear Regulation Authority); and the two Fukushima sites. The delegation members had many different perspectives of what resonated most with them about what we saw and heard, but we all aligned on some pretty central themes. Specifically, that we have to *assure that the nuclear industry and the NRC are prepared for the unexpected*. We also returned home with the clear sense that we must *ensure that our licensees fully implement, maintain, and appropriately exercise the measures that will be put in place associated with the post-Fukushima actions directed by the NRC*, and that *both we and the industry need to maintain an appropriately deep level of technical expertise within our respective organizations*.

There were many experiences that I valued highly: Firstly, our visit to Kashiwazaki-Kariwa (a site that I visited twice before in the early 90's), where TEPCO has nearly completed implementing numerous defense in depth measures to fully secure the site, including the construction of a massive (15 meter high) sea wall and embankments to protect against a tsunami; installation of two containment ventilation filtering systems (one underground); acquisition of a massive fleet of fire trucks, emergency power vehicles and heavy equipment; and the construction of a huge reservoir high above the plants that can provide fresh water via gravity drainage; Secondly, our visit to the areas around the two Fukushima sites (Daini is about 7.5 miles south of the Daiichi complex), where we experienced somber in seeing widespread areas that will remain uninhabited/uninhabitable for years. The full scope of decontamination and site decommissioning is estimated to take 30 to 40 years, however, progress has been made in decontaminating a number of public areas, including a village not too far from Daini (Naraha is the village name) which will be resettled sometime in the spring; And thirdly, the powerfully moving first-hand accounts of the events of March 11 and its aftermath from individuals who were at each of the sites during that time, including the Site Superintendent at Fukushima Daiichi, and several shift managers and operators from Daiichi and Daini. The courage and perseverance displayed by these individuals, and others with whom they served, was truly inspirational. When the delegation members reflected on our visits, each of us acknowledged the need to assure U.S. plants have an appropriate balance of preventive and mitigative capability to avoid the need for "heroic" measure to prevent a core meltdown event.

In the coming weeks, you will hear and see more about this precedent setting trip (this was the first time the entire corps of agency senior managers responsible for the operating reactor program have travelled together to a foreign country) in videos and other agency communication tools. However, I also plan to conduct several lunch time seminars in the coming weeks, after I have a chance to review the thousands of pictures that were taken, and prepare a good "slide show" for you. This way, I can give those who are interested a more detailed description of what our team learned and observed. I have already chatted with several of you in the office today who had great interest in what we saw and experienced, so I hope in this way, I can reach a broader audience.

From: Cynthia Pederson

Subject: Summary of my trip to Japan last week

As many of you heard at today's 8:15 meeting, I visited Japan last week as part of a delegation of senior agency executives led by Mike Johnson, including the four Regional Administrators, Office Directors from the NRR, NSIR, and NRO, the Deputy Office Director of Research, the Director of the Japan Lessons-Learned Directorate and the Director for the Division of Site Safety and Environmental Analysis in NRO. This was the first time that the entire contingent of agency senior managers responsible for the operating reactor program travelled together to a foreign country.

It was an exhausting week for us with visits to the seven-unit Kashiwazaki Kariwa site (on the west side of the island and which had suffered a very large earthquake in 2007); the four-unit Fukushima Dai-ri site; the six-unit Fukushima Da-ichi site; the recently created Japanese Nuclear Regulation Authority (our counterpart agency); the newly created Japanese Nuclear Safety Institute (JANSI), which is modeled after the U.S. industry's Institute of Nuclear Power Operations (INPO); the Tokyo Electric Power Company (TEPCO) headquarters office; and three manufacturing sites (Toshiba and IHI) where large nuclear components are made. The trip was highly informative and very rewarding in terms of the significant insights shared with us with respect to the impact of the March 2011 East Japan Earthquake and associated tsunami on the Fukushima sites, the significant safety measures being put in place at the reactor sites, the tremendous recovery efforts underway by the Japanese to clean up the land contamination from the Fukushima accident, and the country's revised regulatory structure.

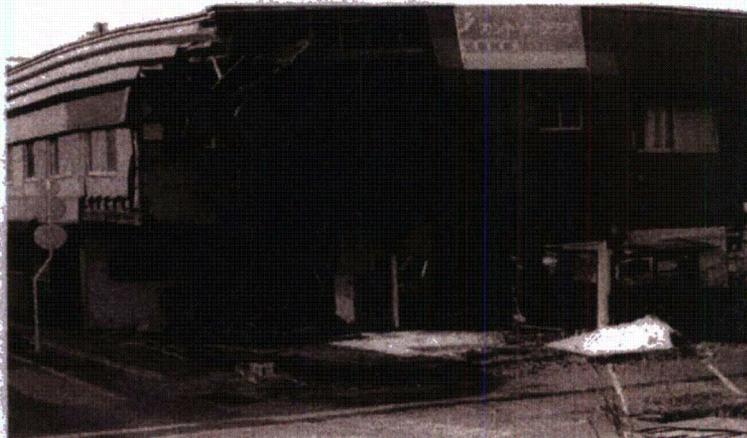
The delegation members had many different perspectives of what resonated most with them about what we saw and heard, but we all aligned on some pretty central themes. Specifically, that we have to assure that the nuclear industry and the NRC are **prepared for the unexpected**. We also returned home with the clear sense that we must ensure that **our licensees fully implement, maintain, and appropriately exercise the measures** that will be put in place associated with the post-Fukushima actions directed by the NRC, and that both we and the industry need to maintain an **appropriately deep level of technical expertise** within our respective organizations.

Many things will remain with me but a few to share include the impact of driving through the evacuated areas such as Tomioka and Naraha where the homes and businesses sit empty, some of which will never be re-occupied. You could still see the product on the shelves and cars in the driveways. They were man-made ghost towns. The Dai-ichi accident was a huge breach of public confidence. These people trusted the licensee and regulator to keep them safe but did not expect to have to leave their family homes and businesses to do so.

And visiting the Dai-ichi site. Donning a respirator and anti-contamination clothing just to take a tour of the site. And to think 4000 people do so everyday just to go to work. It was very impactful to look out over Units 1-4, nearly three years after the accident, and envision all the work that is yet to be done. Temporary structures built over Units 1 and 4, and Unit 3's spent fuel pool being open to the air while they remove debris, are hard to take in. And to see the many 100s of temporary storage tanks for contaminated water, which is a huge distraction to focusing on three damaged cores.

But the most moving were the personal accounts of those involved at Dai-ni and Dai-ichi. To hear the anguish in their voices as they re-live the events with each telling. Some of these people worked for days without knowing if their families had survived the earthquake and tsunami. The heroism and determination displayed by these individuals and many others reinforced for us that we cannot find ourselves in a situation where such heroic measures are needed to try and save a facility from a core meltdown and release.

We were very fortunate to have had this opportunity to see first-hand the power and destructive forces of what we regulate. We learn about these concepts and even practice them during exercises, but to see the real effects is very sobering. As I mentioned this morning, I plan to do a longer session after I have access to some of the good photos from the trip. (I included just a couple of my shots from the bus window below – tsunami destruction followed by the calm). I hope you will join me then for further discussion and reflection. Additionally, we were accompanied by staff who did a great job in facilitating all of our activities and they will be putting together a Knowledge Management video of the trip to share with the agency.



From: Steven West
Subject: Thoughts about Japan with photographs

"Before Fukushima, we assumed that if our plants met all of the requirements, they were safe. We learned that this was a big mistake."

-A senior representative of the Japanese Nuclear Safety Institute

"Fukushima was very complicated, with so many back stories."

-A senior representative of TEPCO

"We thought our training had prepared us for anything that could happen."

-One of the Fukushima 50

"We should not expect our operators to be heroic."

-A senior manager at Fukushima Dai-ichi

These are but a few of the frank and powerful statements I heard in Japan last week from a virtual who's who of Fukushima. I was fortunate to have had the opportunity to represent the Office of Nuclear Regulatory Research on a trip to Japan with a team of NRC senior executives led by Mike Johnson. The team also included the directors of NRR, NSIR, and NRO; the four regional administrators; the director of the Japan Lessons-Learned Directorate; and the director of NRO's Division of Site Safety and Environmental Analysis. Notably, this was the first time all of the senior executives responsible for our reactor programs had visited a foreign country together. I likened our trip to a safety mission of sorts. In plain language, we learned a lot and we shared a lot about safety.



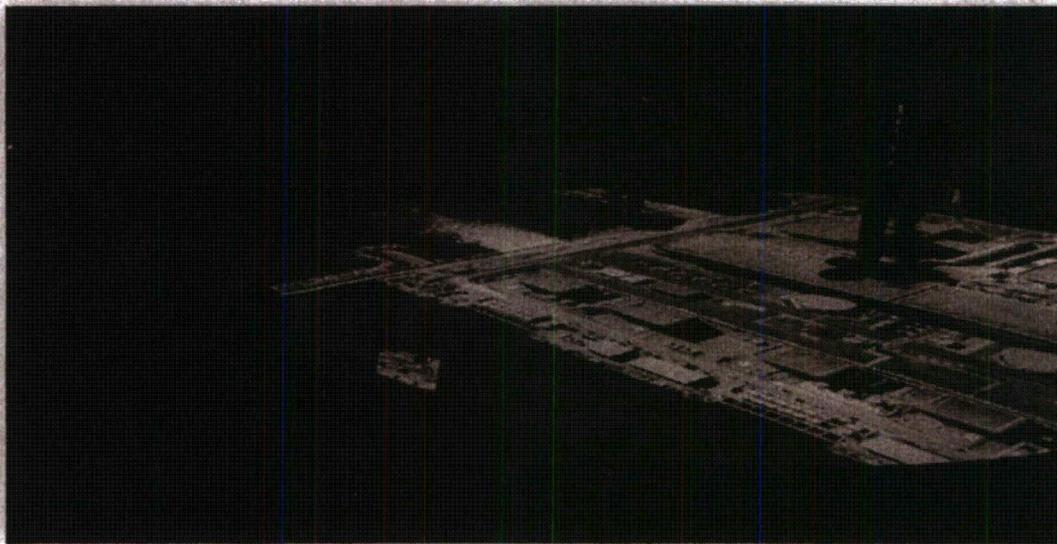
Mike Johnson and his senior management team with Cindy Rosales-Cooper (OEDO), Kirk Foggie (OIP), Christopher Hulick (State); and Takeyuki Inagaki (Fukushima 50) and Takafumi Anegawa, both of TEPCO. Roger Hannah (RII/OPA) also supported the team and took this photograph. TEPCO headquarters, Tokyo, Japan, February 19, 2014.

My overall experience was both personally and professionally rewarding for many reasons. Among other things, I heard firsthand some of the back stories about Fukushima Dai-ri and Fukushima Dai-ichi. I gained new insights into the Japanese nuclear regulator's and the nuclear industry's lessons learned from the Great East Japan Earthquake and Tsunami of March 11, 2011, the events it initiated, and its

aftermath, as well as their perspectives on reactor safety and how they have changed in response to those events. I left Japan with a sense that everyone we met from both the regulator and the industry appreciated the opportunity to share their stories and their experiences with us and to answer our questions. I also feel that they valued our perspectives and insights on such subjects as reactor safety and regulation, safety culture, and event response.

After the RIC, I'll arrange a brown bag lunch (or some other suitable forum) to talk more about what the NRC team experienced and observed and to answer your questions. In the meantime, I'd like to share the following highlights and pictures from the trip.

First, from Tokyo we traveled to Yokohama and visited several industrial facilities of Toshiba and IHI. We then traveled to western Japan and toured the seven-unit Kashiwazaki-Kariwa nuclear power station (NPS). Back in Tokyo, we met separately with the Japan Nuclear Regulation Authority, Tokyo Electric Power Company (TEPCO), and the INPO-like Japanese Nuclear Safety Institute. Then, we visited areas of Fukushima Prefecture that had been shattered by the earthquake, the tsunami, and the radioactive contamination, including areas that had been rendered uninhabitable and abandoned. Finally, and the highlight of the trip for me, we visited and toured the four-unit Fukushima Dai-ni NPS and the six-unit Fukushima Dai-ichi NPS.



Team briefing prior to visiting the Fukushima Dai-ni NPS. TEPCO visitors' center, Tomioka, Fukushima Prefecture, February 19, 2014.

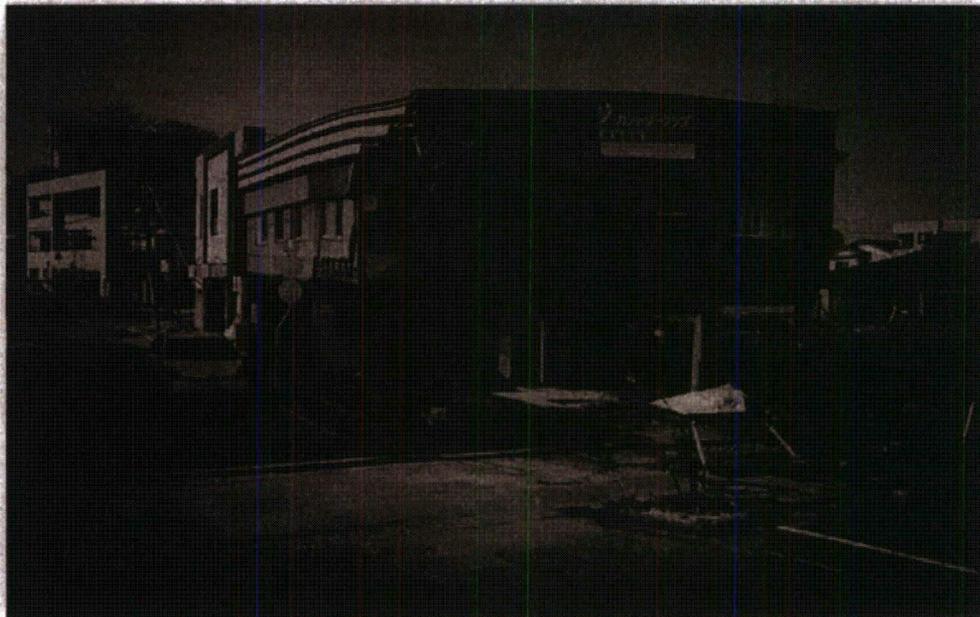
As you might expect from such a diverse group of NRC managers, we had many different views about what we had seen and heard. Nevertheless, we easily aligned on several central themes. They included the importance of ensuring (1) that our licensees implement, maintain, and exercise all of the NRC-directed post-Fukushima actions; (2) that both the NRC and the nuclear industry are prepared for the unexpected; and (3) that both the NRC and the nuclear industry maintain appropriate technical expertise. I'll provide context about these overarching themes when we meet.

Especially sobering was driving through the towns and areas of Fukushima Prefecture that were rendered uninhabitable 3 years ago as a result of radioactive releases from Fukushima Dai-ichi. The extent of the devastation caused by the earthquake, the tsunami, and the contamination was clearly visible. We saw evidence of landslides, uprooted trees, downed transmission towers and other structural damage. In an

effort to decontaminate the countryside, workers had cleared soil and vegetation from fields and rice paddies and left it piled under large tarps in fields along the side of the road and in the distance. The police manned checkpoints and enforced access restrictions, and many workers wore protective clothing to guard against personal contamination. In these uninhabited areas, homes, businesses, churches, and schools sat empty and the playgrounds were quiet. Many will never be reoccupied or used again by the displaced population. We saw abandoned goods and products on store shelves, cars and trucks abandoned in crumbling driveways and parking lots, and over-grown and unkempt yards, gardens, and parks.



A damaged and abandoned home seen while driving up the coast in Fukushima Prefecture. February 19, 2014

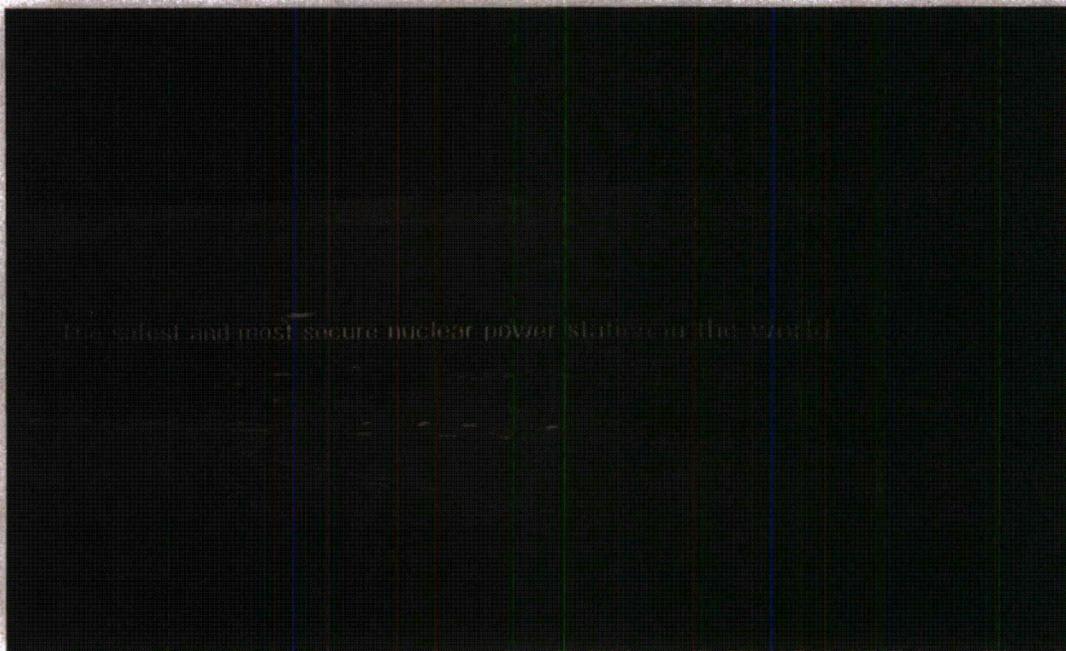


Damaged restaurant and businesses in the abandoned town of Tomioka, Fukushima Prefecture. February 19, 2014.



Earthquake damage and the effects of abandonment in the town of Tomioka, Fukushima Prefecture. February 19, 2014.

Before touring Tomioka, one of the uninhabitable towns in Fukushima Prefecture, we first stopped at the TEPCO visitors' center. We became the first and only visitors to the center since TEPCO had abandoned it after the Fukushima Dai-ichi accident. That stop is a story unto itself.



TEPCO visitors' center in the abandoned and uninhabitable town of Tomioka, Fukushima Prefecture. This is the closing segment of TEPCO's pre-Fukushima video about nuclear energy, the Fukushima NPSs, and Fukushima Prefecture. February 19, 2014.

The team was taken by the personal stories of several of the individuals who experienced the earthquake and tsunami at Fukushima Dai-ni and Dai-ichi and who stayed on site and participated in the response to the ensuing events. Their tales about the unexpected and ever-changing plant conditions, extreme working conditions including total darkness and elevated radiation levels, fears of injury and death, frequent setbacks, external interference, and in many cases, not knowing for up to 2 weeks the fate of

family members, were both moving and inspiring. One responder at Fukushima Dai-ichi reported afterwards that he "asked for volunteers to manually open the vent valves. Young operators raised their hands as well. I was overwhelmed." Another responder said, "Unit 3 could explode anytime soon, but it was my turn to go to the main control room. I called my dad and asked him to take good care of my wife and kids should I die." There were many other such testimonials.

I could tell you about many other stories and observations from my trip—visiting J-Village, the "tsunami water" still visible in lighting globes in the overhead of a switchgear room at Fukushima Dai-ni, and the seemingly fortuitous completion of a seismically isolated emergency response center at Fukushima Dai-ichi mere months before the tsunami and the events it caused—but I'll stop here for now. I look forward to sharing more with you soon.



The entrance to J-Village. February 19, 2014.

1. Prepare for the unexpected by: ...
 [consequence of losing Public Trust]
2. ENSURE OUR LICENSEES fully implement, maintain, care FUKU L.L. (Deeper appreciation...)

DO NOT Disincentivize operators to make improvements
 → Focus on the importance of the Regulatory Regime.
 e.g. CER

- MD^(?) Never be beholden to Contractors; Licensees need to have the skill sets.
- ✓ Importance of Having expertise in house / industry / NRC.
 (deepening)
- BD² Don't be complacent with status quo / vigilance
 (by...) Sustain an inquisitive mind?

Costs are too high (people, environment, economy)

- Socio-economic
- economic consequence
- installed vs. Flex

Noteable mentions:

- Disincentivize.. (Fire protection, CALs)
 don't
- Should we Revisit FUKU L.L. (a ReLook)
 [Loss of heat sync... (Mitigating strategies... DC Power)
 containment... hydrogen ignition - Containment filtered Vent for
 other designs.]
- Reconfirm that the staff made the Right Recommendation on Filtered Vents.
- What do these lessons mean to our Incident Response System. [MC]
- Reinforce the Decision making Regime with our Federal Partners.
- How are we going to inspect our FUKU Requirements. Look at it programmatically.
- Consider lessons we can share w/ other industries. Fuel cycle facilities / Other Federal Agencies.
- Situation is not as dire as it could have been.
- The Japanese did their best!
- Flex is only part of the answer!
- Industry could benefit from using a similar 'visit or better approach like what is at Fukushima and

ENSURE OUR LICENSEES fully implement FURU GC.

NO Significant Gaps in OUR Approach?

Industry Sell of Flex is Overstated / Over Simplified

- Not convinced we need to Regulate more
- Right Direction + Degree of DID

Reinforce the need for Seismic Robustness -

Value in Comparing Situation at both sites.

Filled Vents: Not convinced that the Footprint is not that Significant

What does it mean to "Rely on People"?

- Don't expect Heroism.

Cannot divorce Socio-Economic Impacts.

Focus on / Assess Flooding Evacs.

Leadership Capacity within Decision Making in an event.

Shape importance of "Character / Operator Excellence" in our interactions with Industry.

Focus on OUR E.P. Regime

* Focus on Japan's L.L - Their Regs - harder to

Preserving Public Trust

Can't Rely on Just Prevention

This can never happen in the U.S.

Daini was $\xrightarrow{\text{not to be used}}$ a "Close Call" an answer.

Prepare for the Unexpected

- overselling Flex?
- Need actual systems
- Need to stop acting like we always have the answer \rightarrow Hardened Core approx

Continued vigilance of OUR Regs + Practice

Incentivising industry Safety + Security improvements \rightarrow importance of Regs + how we can do this.

Owners + Operator need broad skill set and relying on contractors.

2/22/14

#1 Key Message

Your Number 1?

[As a result of our visit, we have a renewed sense that.....] 3 Key Messages

SW: Achieving the appropriate balance between Prevention and Mitigation.

JW: Resilience: Preparing for the Unexpected by focusing on leadership, Tech Skills, and equipment + infrastructure.

CP: Act to Prevent; Prepare to Mitigate; to Protect the Public Trust.

VM: Make sure we implement Fuku U. for early NPP.

MO: Time is the most valuable asset. + maintain

EL: ENSURE our licensees fully implement Fuku U. + Rigorously (timely) exercise the Learnings.

[We have added assurance that what we are asking our licensees to do is Right on the f

SF: We can't let this happen; Reinforce that we are on the Right Path.

BO: We have chosen the Right things/lessons to fix + (E.L)

GT: SF/CP/BO: Balance B/W design + installed equipment vs. Flex.

MS: Prepare for the Unexpected but make sure the plants can handle a Range of Situations but striking the Right balance/P vs. M.

VM-2: What are we doing to Challenge ourselves - internal vigilance.

DS: Need to be prepared for the Unimagined

2/22/14

Brainstormed ideas on key messages

- L
- FI + F2 - importance of making sure the FUKU LL are completely implemented at every USNPP.

- MD
- Didn't see any significant gaps in our approach to U.S. plants

- VM
- KK Reinforced Seismic Robustness of NPPs.

- * BD
- Our E.P. & Exercise Regime is important in Sustaining in light of what happened here Challenges in Decision Making; How are other parts of the country will be integrated etc.

- CP.
- Breach of Public Trust - walked away with that "this can't happen here". We need to prevent but prepare for - Can't rely on just prevention.

MS: Make sure this never happens in the U.S

D

- Prepare for the Unexpected

SF

- Continual evaluation of the practices we have in place.

Survival of Essential Control Facilities.
Can Command & Control Systems Really Survive?

Need to be Prepared for the Unimaginable

Post TMI We went to a Symptom based System

Have we done what we think are the right things?

Given everything that happened - impressed by their
Rehabilitation and it's not as dire as we thought.

Maintaining expertise in both OWNERS + Regulators.

Need to consider the event related stress + its effects on
emotions + mental state. (not in our Regs)

We shouldn't lose focus on preventing vs. mitigating the accident.

Our changes should take into account American Culture.

Require licensees to practice implementing Flex, Rigorously.

3 Yrs Later Still NO Focus on the importance
of D.C. Power

Capability of the installed equipment.

Time - most valuable asset.

Has to be good enough + last
long enough to allow operators
to do what they need to do.

Will strengthen
+ Add margin

We need to ~~reconsider~~ ^{consider} how other ~~countries~~ ^{countries (Japan)} ~~are~~ ^{are}
hardened, safety equipment + facilities ~~are~~ ^{are}
vs. non-safety plants

NRA's New Regs Are Causing Some plants
never Restart.

- for our flood Re-evals will cause some
plants to not operate.

We can face the situation that our
Regs will shutdown plants.
ARE WE PREPARED for that!