EDO Principal Correspondence Control

FROM: DUE: 02/09/12 EDO CONTROL: G20120024
DOC DT: 01/05/12
FINAL REPLY:

Tom Gurdziel

TO:

Chairman Jaczko

FOR SIGNATURE OF : ** GRN ** CRC NO: 12-0013

DESC:

Fukushima Related Comments - Operating Improvements (EDATS: SECY-2012-0006)

ROUTING:

Borchardt
Weber
Virgilio
Ash
Mamish
OGC/GC
Dean, RI
McCree, RII
Pederson, RIII
Collins, RIV
Bowman, OEDO

DATE: 01/17/12

ASSIGNED TO: NRR

CONTACT: Leeds

SPECIAL INSTRUCTIONS OR REMARKS:

Template: SECY-017

ERIDS: SECY-01

EDATS

Electronic Document and Action Tracking System

EDATS Number: SECY-2012-0006 **Source:** SECY

General Information

Assigned To: NRR **OEDO Due Date:** 2/9/2012 11:00 PM

Other Assignees: **SECY Due Date:** NONE

Subject: Fukushima Related Comments - Operating Improvements

Description:

CC Routing: RegionI; RegionII; RegionIII; RegionIV

ADAMS Accession Numbers - Incoming: NONE **Response/Package:** NONE

Other Information

Cross Reference Number: G20120024, LTR-12-0013 **Staff Initiated:** NO

Related Task: **Recurring Item:** NO

File Routing: EDATS **Agency Lesson Learned:** NO

OEDO Monthly Report Item: NO

Process Information

Action Type: E-mail **Priority:** Medium

Sensitivity: None

Signature Level: No Signature Required **Urgency:** NO

Approval Level: No Approval Required

OEDO Concurrence: NO

OCM Concurrence: NO

OCA Concurrence: NO

Special Instructions:

Document Information

Originator Name: Tom Gurdziel **Date of Incoming:** 1/5/2012

Originating Organization: Citizens **Document Received by SECY Date:** 1/17/2012

Addressee: Chairman Jaczko **Date Response Requested by Originator:** NONE

Incoming Task Received: E-mail

OFFICE OF THE SECRETARY
CORRESPONDENCE CONTROL TICKET

Date Printed: Jan 12, 2012 14:21

PAPER NUMBER:	LTR-12-0013	**LOGGING DATE:**	01/12/2012
ACTION OFFICE:	EDO		
AUTHOR:	Tom Gurdziel		
AFFILIATION:			
ADDRESSEE:	Gregory Jaczko		
SUBJECT:	Fukushima related comments for 1/5/2012		
ACTION:	Appropriate		
DISTRIBUTION:	Chairman, Comrs		
LETTER DATE:	01/08/2012		
ACKNOWLEDGED	No		
SPECIAL HANDLING:			
NOTES:			
FILE LOCATION:	ADAMS		
DATE DUE:		**DATE SIGNED:**	

EDO --G20120024

Joosten, Sandy

From:	Tom Gurdziel [tgurdziel@twcny.rr.com]
Sent:	Thursday, January 05, 2012 7:46 PM
To:	CHAIRMAN Resource
Cc:	hillsc@INPO.org; 'Tom Henry'; paul_eddy@dps.state.ny.us; 'Vanags, Uldis'; P.Kaiser@iaea.org; jicc@ws.mofa.go.jp; Screnci, Diane; 'Clary, Gregory'; Bowman, Gregory; Knutson, Ed
Subject:	Fukushima-related Comments for 1-5-2012
Attachments:	Wrenches.JPG

Good morning,

At more than 9 months after the multiple disasters at the Fukushima-Daiichi (BWR) nuclear plants, I continue to fail to see any public identification by the U.S. Nuclear Regulatory Commission's approximately 4000 employees, (including 1 Chairman and 4 Commissioners), of necessary operating improvements. (I realize that approximately one dozen recommendations have resulted from a 90 day (near term) study of the matter. I fully support each one. However, I consider them administrative or design-based in nature. I am interested, here, in those considerations that make the plant operators' actions during an accident more likely to be successful.)

So, let's get started.

Command & Control

The size and structure of Fukushima-Daiichi plant crews is a problem to me. In order to control manual or local action necessary in the plant, a single-line chain of command is needed. Look at the dotted lines in INPO Report 11-005, page 62, to see that it did not exist. It appears to me that the 4 Auxiliary Operators assigned to the two (at once) plants are more or less free agents. You probably need 4 or 5 per plant. And, I hate the idea of one control room for 2 plants. Think about this: when Unit 1 tripped and alarms are coming in all over the place, the same things happened at Unit 2 IN THE SAME ROOM. What is the benefit of all this confusion and noise? Use separate control rooms: one for each plant.

Off-site Electric Power

Now take a look at INPO Report 11-005, page 59. As I read this diagram, circuit breakers must change position to continue supplying power to the emergency diesel powerboards EVERY TIME a plant trips. I don't like this. It would be much better if this equipment was carried either by off-site power or the emergency diesels, but never the plant generator.

And, as best I can tell, all their off-site power comes in from one direction only. I expected to see off-site power supplied from two different directions.

(For example, I recall that one of our 5 reactor recirculation pumps was always on one of 2 possible off-site power supplies. One came from the southwest of the plant; one came from the northeast.)

Saving Unit 1

Having held an unrestricted Senior Reactor Operator's license at a Mark I containment BWR with emergency condensers, and having worked on shift for over 6 years as a Shift Technical Advisor, I could not believe that the emergency condensers at Unit 1 did not save the reactor nuclear fuel from melting. Then I found out how that system was (inadequately) equipped to handle a station blackout.

First let me explain how this system works. Steam from the isolated reactor vessel enters tubes in the emergency condenser tank, gives off some heat energy to water outside those tubes (boiling it), condenses to water and returns to the reactor vessel. The boiled off water exits the emergency condenser tank through an approximately 2 foot diameter vent pipe extending to outside the reactor building. Note that here the ultimate heat sink is air in the environment, (which is diverse from water in the harbor, the ultimate heat sink of the other destroyed Fukushima-Daiichi units.)

To replace the boiled off water, we used an 8 hour supply of water already stored in make-up water storage tanks at an elevation suitable to allow gravity feed to the emergency condensers. Unit 1 apparently did not have make up water storage tanks. Unit 1 apparently could not supply water for make-up (with no AC power and, in my opinion, inadequate crew size and crew command/control.) We could supply fire protection system water provided by the plant's diesel powered fire pump.

Their Unit I emergency condensers had I & C logic to isolate them on loss of power. We INITIATED our emergency condensers on loss of AC power. (We did this by using an air operated valve (that failed Open on loss of Instrument Air pressure (provided by AC powered compressors) for the condensate return function. Also, not clearly apparent for them from the INPO report, we intentionally REMOVED system isolations that would prevent the emergency condenser system from operating in an accident. Specifically, we removed the high area radiation isolation.)

So, what I have been describing is the system equipment, configuration, crew size, system operation, and the command & control that existed at Nine Mile Point, Unit I when I got there in 1980. It was (and probably still is), a passive system. Especially, note that, (with no pipe breaks), reactor coolant does not disappear and thus, does not need to be replaced.

So, I conclude that, if our equipment, people and procedures were there, with no pipe breaks, the reactor core probably would have been saved.

But wait, suppose a primary coolant pipe did break. Is there anything that could have been done? Well, the answer is: yes, (though I don't know how successful it would be.)

Vent the top of the drywell (the upper part of the primary containment), (I am NOT talking about a vent from the torus here), and flood it with water provided by the diesel fire pump. I don't know if enough water could be provided to get up to top-of-fuel level before nuclear fuel melting would begin. Additionally, there is the problem that, even if water could enter from the bottom of the reactor vessel through a broken pipe, the reactor vessel itself probably would need to be vented.

However, it is all that you can do that I can think of.

A few more considerations, although important here, I have decided to cover in the next section.

Actions for Unit 2 and Unit 3

Actions for Unit 2 and Unit 3 are different than for Unit 1 because Unit 1 depends on the emergency condenser system and has no steam driven pumps. Unit 2 and Unit 3 have steam driven pumps and no emergency condensers.

I do not have operating experience with plants using reactor steam energy to power pumps. I believe these pumps, (HPCI, RCIC), usually start off taking suction from water in condensate storage tanks already at each unit and probably holding at least 200,000 gallons. When this water runs out, the suction is supposed to be switched to water inside the primary containment. I don't know what control power is needed for these pumps. However, when pumping from water in the primary containment, if that water is not being cooled, it is my understanding that inadequate net positive suction head (pressure), (NPSH), will result and the pumps will not be able to send the (hot) water back into the reactor vessel, even if they are still turning. In the case of Fukushima-Daiichi, the water in the primary containment would have required AC power to other pumps to get cooled. This AC power was not available.

Suppose, then, we have used up the cool condensate storage tank water and no longer have sufficient NPSH to pump from the water in the primary containment.

It is now time to vent the upper part of the primary containment and start filling it with water provided by the diesel driven fire pump. As mentioned above, there is no assurance that this will work, (but it is all that I see is left.)

Problem. The decision to vent the primary containment needs to be made promptly. This means that the decision MUST be made only by people at the plant site assigned to the unit in question.

Problem. A rupture disk in parallel with the valved & "hardened" ventilation path might assist in getting the primary containment vented in the event of loss of power to the valves (like a station blackout). However, that is NOT the configuration in use at Fukushima-Daiichi.

Problem. A rupture disk cannot have too high a failure pressure. This prevents an early start to venting and may prevent later ventilation to outside the reactor building (if rupture pressure at the disk cannot be reached there.) At Fukushima-Daiichi, early venting was not possible. The rupture disk failure pressure was too high. On at least one plant, the rupture disk never did fail.

Problem. Valves in the ventilation path could not be kept open (even with power, such as compressed gas), and, apparently could not be manually left open.

Problem. Explosive gas intended to be sent to an outside exit at high level apparently went, instead, to Unit 4 through a connection to the same outside exit (stack). Unit 4 eventually exploded.

Problem. It appears to me that the provided primary containment vent path size or configuration was inadequate. Otherwise, I would have expected operators would not have been constrained to opening vent valves less than 100% open.

Problem. The diesel fire pump initially had such a small amount of fuel (at the start of the accident) that when it was started in advance of need and run at idle, it ran out of fuel. (It should have enough fuel for the hours it takes to flood the primary containment.)

Problem. The diesel fire pump did not start itself automatically on what should have been low fire water system pressure (with no AC to the electric fire pump.)

Problem. Nobody on site knew that you have to bleed the air that gets into the fuel lines to each injector when you run a diesel engine out of fuel (before you can start it again.) Special wrenches may be helpful.

Saving Unit 4

(The reactor vessel of this Fukushima-Daiichi plant had no nuclear fuel in it.)

If the hardened ventilation system from Unit 4 was connected to its own high level exit, (stack), instead of being connected to that of Unit 3, no explosion would have occurred: there would have been no Unit 4 plant damage.

A Different Way of Thinking

You are in the control room of a BWR and the crew tells you that cooling the reactor core is no longer possible. Probably this is when the emergency condensers are not removing heat from the reactor core or, in another type of BWR; the steam driven pumps do not have DC power or cool water they can pump. Should you think: when we flood the primary containment we will damage a lot of expensive equipment? Or, should you think: if we don't vent and flood the primary containment now, damage outside the plant will greatly exceed the cost of damage to the plant?

In other words, I think we have to be a whole lot quicker in venting the drywell & flooding up.

A Final Question

Do common or shared facilities save you as much money during construction as they cost you in an accident? (Is the money saved by not building a separate ventilation stack for Unit 4 equal to the cost of a destroyed Unit 4?)

Thank you,

Tom Gurdziel

The special wrenches are the two on the bottom of the attached picture.