

(810 Pages)

Group EZ

(Records Withheld
In Part)

March 25, 2011

2200 EDT

Briefing Sheet Fukushima Daiichi

Plant status updates:

- Freshwater injection to Units 1 and 3. (source is a reservoir)
- Flooding in turbine building of Unit 3. Found elevated iodine 131 and lanthanum 140 in samples indicating potential leakage from core.
- RHR pump on Unit 5 is restored.
- NISA update at 0500 EDT on 3/25, Electrical power is available up to all 6 units. For Units 1-4, the licensee is in the process of meggering and testing components to see which ones can be safely energized. Lights are on in the control room, and licensee is in the process of restoring ventilation.

PMT is working with NARAC on the right source term for dose runs. (Most plausible realistic [Tokyo] model based on information we know). Run is complete at 1400 and results are being verified.

Japanese government officials have recommended to residents living within 20 to 30 km of the site to voluntarily evacuate their homes—not because of changing conditions at the site—but because of increasingly difficult logistical issues.

DOE is taking the US lead in Japan on robotics and environmental issues.

Per NRC Japan team, one day training has been completed on the Bechtel pumping system. There will be an additional day training completed 26 March and then the Self Defense Force stands ready to move equipment out to the site.

The U.S. Navy is sending two fresh water barges to the site. One of the barges should arrive within a day—however, there are concerns about possible harbor damage from earthquake, which could make it difficult to dock.

The NRC team (and INPO representative) went to the TEPCO EOC yesterday and will continue a presence there.

The Japanese government is discussing a list of the things they would accept for use. List of 17 items provided during the cabinet meeting for discussion within Japan ministries and then US government and industry. DOD and DOE have the lead for the majority of the items listed.

The NRC Reactor Safety Team has provided a coordinated (GEH, EPRI, INPO, NR, DOE) set of recommendations pertaining to severe accident management strategies to the NRC team in Japan. List was provided to NISA and will be discussed at TEPCO tomorrow.

NRC met with representatives from the National Emergency Management Association (NEMA) today regarding ongoing business (EP Rulemaking update). The State Emergency Directors uniformly expressed the desire for a Federal official to serve as the focus for USG messaging on the potential health effects to US States and Territories. NRC understands that DOE is taking this role, however a POC has not yet been identified. The Nuclear Energy Institute has volunteered to provide the NRC with environmental sampling data from U.S. nuclear power plants. The NRC is sharing this information with the EPA who is the central point of contact for this information. The public U.S. radiation monitoring data (RADNET) is posted on EPA's public website.

EST ADMIN ASST
DAILY TO DO

Sign-in/Sign-out at LRC

Verify "Press Releases"

Print Master Roster each shift

Print A-Z (KS) and [redacted]
[redacted] (b)(5)

When staffing changes if any new
resonances need to be put
on A-Z list and email
distribution (Japanese Perk Resonances)

→ DO NOT ADD NON-NRC to email

all to sent to RST

EMAIL

OSTO2

Wind
Weather Service

PM101
PM101, PM102

Ground

PM102, PM101, PM103

Telcom

RST01

met

RST01, PM102, PM101,
PM101

Int or Press Release

LIA01, ~~LIA02~~,
LIA03

Monitoring Data

PM103, PM101, PM102

Health Contact

PM102, PM101, PM103

met, Seismic

RST01 ← C 3016 + 1105
sent to
Tost
← LEA067

SITREP's

Email Current ET
~~XXXXXXXXXX~~
email to RST01, PM101,
PM101, PM102, PM103

Data/Docs re: radiation / Pm102, Pm107, Pm108
radioactivity

re: [unclear]

(b)(6)

Intermediate phase Suprocure?

FOIA response. How many
archive 15/sets;
sent to FOIA res.

Check Volunteer list

Volunteer List

M:\OSTFILES\JAPANESE
EARTHQUAKE AND
TSUNAMI \ VOLUNTEERS
SPREADSHEET

(b)(6)

Fax #

(b)(6)

3/25 11pm-7am - Steve Campbell -

• Roggenbrodt stated he should not be on shift as RST communicator on 3/25-3/26 (11pm-7am) - strike through his name on watchbill

• Roggenbrodt stated that Denise McQueen who is scheduled for 11pm-7am shift on 3/26-27 for RST communicator. I strike through her name on the watchbill

• Kelly Guise wants to be removed from 3/31-4/1 (11p-7am) shift as EBT Action Officer. - Checked Masterlist and verified position is "N/A".

3/25 11pm-7am

- ✓ Fill in phone #s for volunteer (office and home).
- ✓ Find PMT director for next month
- Find ET handout for floors 8/26
3/31 : 4/1
- ✓ Tashy EBT to accept record 2821
for Anderson

Ask Randy Sullivan to fill 3/28 3-41
and 3/29 3-11.

Fill in empty slots with reenter on
master list.

FF. Teachers with OST 1 - ~~to~~ in units
for EDO director to move to office.
(Waiting for Jim Anderson BC for E.T.A.)

Direct Eric head
Tom Blount

Action

Waiting on Brian to respond so Matt to take these to
you

Tues/Wednes 8:00 - 7:00

R/E 2:00 - 07:00

Sign-up sheet

PMT - Lea Brandon

RS - Rich Hensel / Pete Uter

LT - Jeff Temple

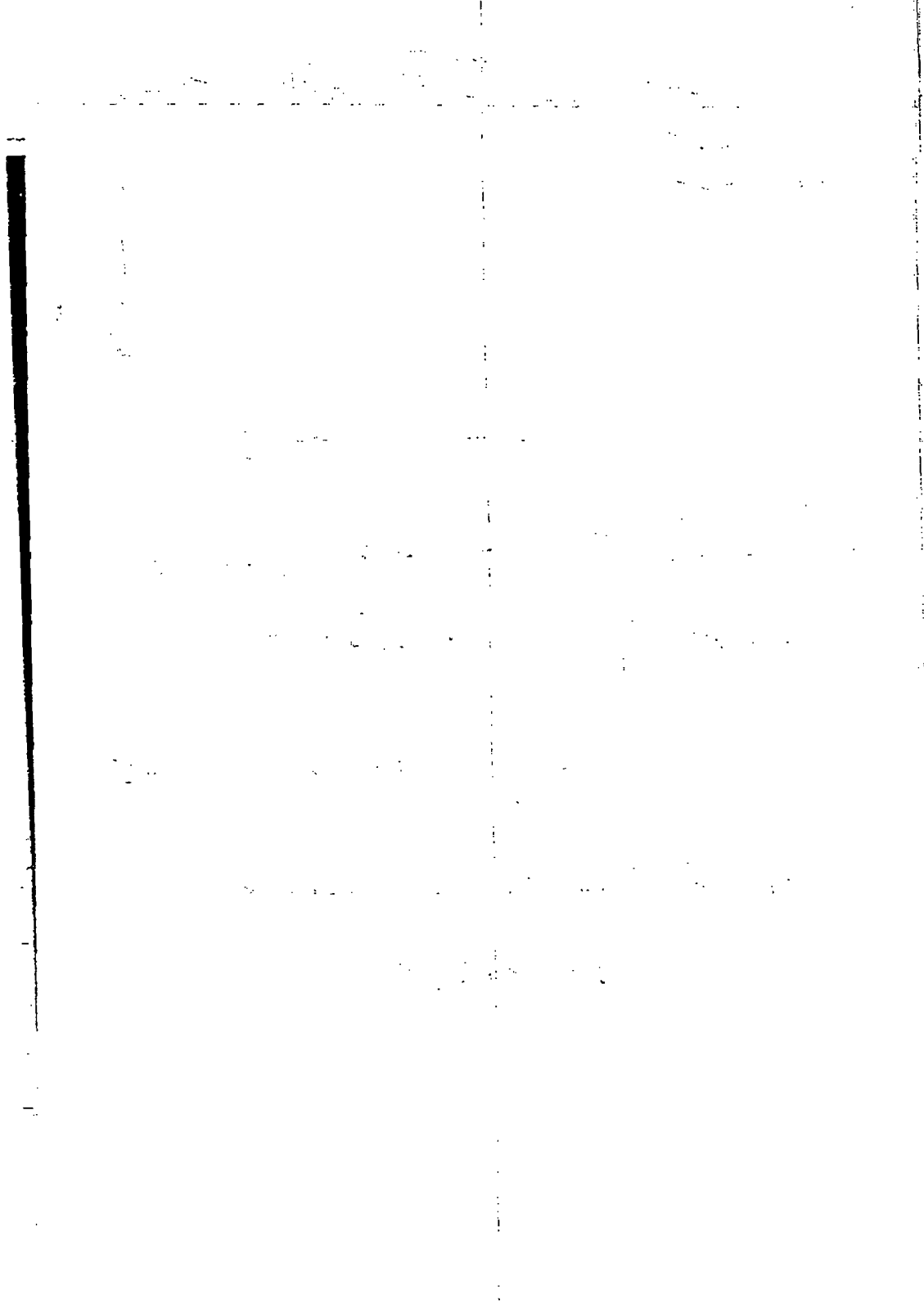
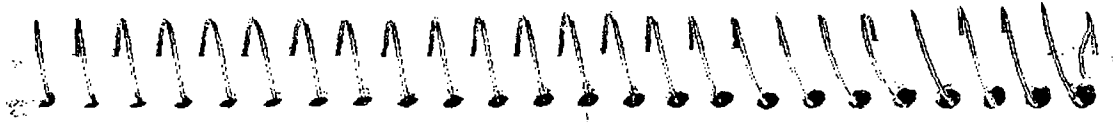
Transition
require email
from Ken
Gard

Stakeholder: John Wilson

Brian McDermott would like to have the watch list
in WebOC so that everyone can see it "live"
See email "RE: watch list & April 2.5" on 4/22/11 by Brian M.



Doc. 1000000 of Government Public
Info.



NARAC
Ambassador = John Ruse

Expecting:

① - Real Time Data on Doses on Site from NISA.

② [Redacted Box] (b)(4), (b)(5)

③

Scenarios:

- Realistic Worst Case to NARAC

Preparing Source Term

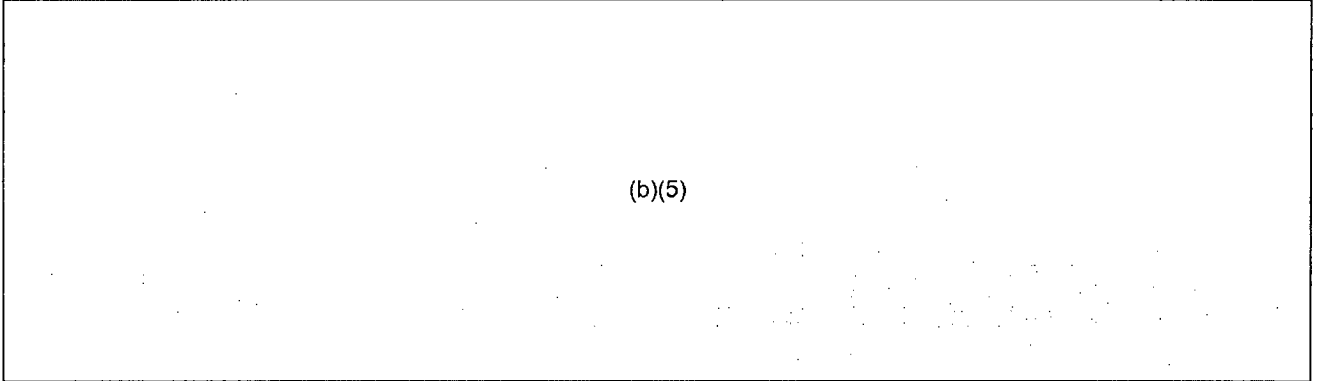
Confirm → PMT working w/ Jack Foster + DOE

Projections: 6 core melts

→ *OB-30 Jack talking to PMT

- Sea water: Heat Transfer Rate

- Estimate the altitude that a postulated plume from the Daiichi reactors can reach.



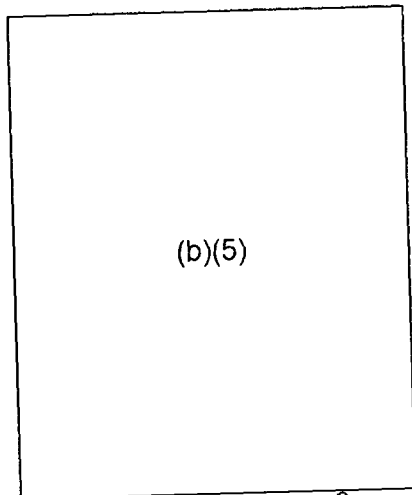
Send to ET07.hoc
to print. (Status Officer)

Recorder- ETOS.hoc

Call w/ Bill Webster

- Form a consortium

DOE
Bechtel
Areva



- Kickoff mtg tomorrow afternoon here: (2pm our time)
- Get us names (e-mail to us) HOO.HOC@nrc.gov
- Reserve set of rooms @ Marriott
 - $\frac{1}{2}$ Dozen

Call w/ Chuck Casto + John Moninger
11:30

Team Composition |
Office Space

Marty: will bring industry into this in a major way. Kick off @ 2 pm tomorrow. Ellis has delegated to Bill Webster. Pete Lyons from DOE.

∴ Start socializing this w/ Ambassador. Industry to Industry Deep Water Horizon model (change in direction).

- Concern about relationship establishment. Move as quickly as possible. Can have up to 4 people @ TEPCO HQ.

- Office space.... (b)(6)

(b)(5)

(b)(5)

No problem getting office space.

- Administrative assistance. USAID providing assistance.

- Is TEPCO keeping records of doses?

- Wage 3 - (b)(5)

EPA Monitoring - trying to get off Web

Contacted ^{Regional} ~~Officer~~ RDO - will get plant status @
4 a.m. call. If no rad
status, will call Resident.

Turnover

(Continuing)

✓ - Realistic Worst Case Scenario sent to NARAC

✓ - [Redacted] (b)(5)

✓ - Obtaining real time data on doses on site from NISA.

- Watch Task Tracker (Actions)

- Consortium

- EPA RadNet (West Coast)

Saturday AM 3/19

① Worst Case Scenario provided to NARAC - See Paper
NARAC concerned that the analyses will tie up
computers for too long
• Want to assume 24 hour release
• We will confer

②

[Redacted] (b)(5)

③ Stepping to get more on-site data - NISA, NRC Team & TEPCO

④ will further evaluate weather - wind change expected Sunday Am @ 6⁰⁰ - Duration 12 hr then back off shore.

E-MAIL TO ^{Site} TEAM - Talking R/S for Ambassador

(b)(5)

Priorities

1) NARRAC - Worst Case Scenario
Working
: 5-6 H
: Will Run as provided
* Will get back in an hour or so

Source Term
they will run
24h vs 6d release
Need to track the code

② Run in Country #'s due to wind shift ~ 12 h from now

③ 11:30 AM
• Any change in assumption requires Chem Approval
• Expect PAR's to stay the same

(b)(5)

③

④ Talking
only me do assess - Steve
Need 2 EZ 17 of 810

5 Working Will continue to run data from Japanese cities ~~at~~ 12 h intervals - ? ongoing $\frac{1}{3}$ rec # 1501

will do RASCAL Run \rightarrow Turner windshift

(b)(5)

Appointed Joe D. for more time. Needed #2 done ~~Assess~~

Record # 1501 need to FU $\frac{1}{3}$ close - ~~Back to work~~ Working it

6 Congressional Staff Call @ 3:00 pm

7 ~~ISSUE~~: 1⁰⁰ - (b)(5)

NAT
v
NAACP

May need to contact an Admiral of our tech. Contact cannot make happen.

*
John Nathan
@ NAACP

(b)(5)

Briefed Wiggins about the status -
Make call to Admiral?

A. J. Gibson
PMT
Contact \rightarrow TO Admiral

* Jerry Gerrino (w.c.)

(b)(6)

Saturday (3 pm)

- send 2 ~ 1040 ft - 369 msec / hr.

ATD call to be set up at ~ 6 pm.

3 criteria - as it necessary - as - supposedly a 2° a 3°
- to it otherwise available in country.
- will it be used.

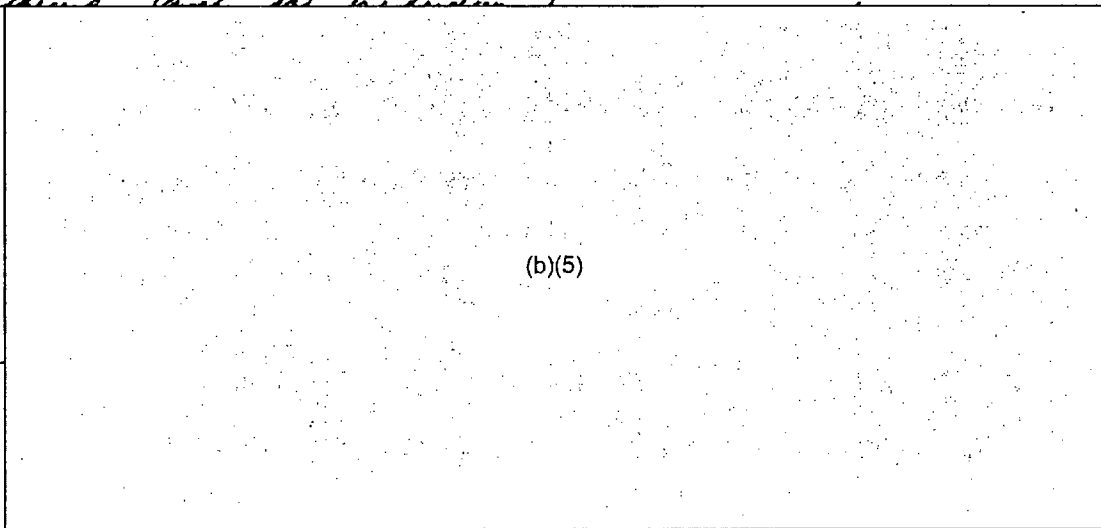
Priority

don't need to call - HDT - trial.

- 1) NHTAC - waste - cover scenarios - waiting - so that we have worked it out so that they will run the calls. - doing an
- 2) setting up RASCAL - 12 hr window of time based on to Tokyo first, then the U.S.
expected ~~with~~ methodology
number #1501

Bechtel cover - also should Bechtel work to - TEPCO ~ ATD SDF

- NCC, ^{US} H/D, US Embassy Caserna, US Embassy Japan, NCC Japan
Cathleen Martin
- second cover for implementation



- notices - 2 types - one that mark these contaminated areas - commercially available - more accurately characterize the site - non-committal to wanting to accept that

(b)(5)

3 phases of Commission meeting

- status in Japan - support
- why new plants are OK - contractual protection there
- looking forward activities

1. Support Ambassador
2. contract to NISA and TEPCO
3. gather info for NRC
4. assist ~~the~~ USG in purchasing equipment in what Japan has a monopoly for

- unit 3 is RST's highest priority as well as Japan's. - spreading
DX/clary.

- meeting to industrial expo at 2 pm.
purpose: try and discuss to encourage to mobilize
and interact to counterpart in Japan
- industry should take a lead role.

(b)(5)

- agencies call at 4pm.
- 6:00 pm - conf call w USAID re: Bechtel. - 4 teams of pumps to pump sea water
- after Aoki made decision to use super case scenario first to Tokyo then they will use an MELCOR scenario (which is case scenario) to US (HI, Maryland, FL, CA, WA)

Call from Chuck Cook

(b)(5)

meet w NISA and TEPCO jointly to go over the results.

- INTRA (group of AREVA/CENT) sent 130 tons of robots + specialized equipment to Japan
- transport anything from Yokohama to site

Actions

- arrange conference call on salt water
- identify target sites ensuring radiators done so managed
- transton wants to attend the table top

(b)(5)

- find out they are going to coordinate equipment from other countries.

3/20/11
7am - 3pm
Vonna Orszag

PMT: (John Lubinski)

① NARAC running ^{SuperCore} ~~SuperCore~~ ^{analysis} towards Takua

(b)(5)

- ② Source term for "Realistic Worst Case" under ODT/OEDO Review
③ Look @ IRSN (French) report concerning French dose estimates in Tokyo

LT: (Tom Boyce)

- ① 10am - call w/ Consortium Team
② French may have provided robotics to Japan; Mark Skaffer would like to have IAEA to coordinate the request. Have Chm. ask IAEA

7:30am - Comm. Asst. Brief:

- Units relatively stable.
 - U3+4 → adding water to bldgs.
 - water canons on U3
 - Ministry of Defense - will add water to U4 today.
 - Water soln via Bechtel en route today (expected.)
 - TEPCO getting pur back: U5 RHR pump started. Line into U1+2 connected (may give instr.)
 - Dose rate info. from NEI → trending down @ gate.
 - Wind Direction changing → toward south → onshore-day; offshore night
 - U2 secondary cont. TEPCO wants to enlarge it.
 - Mtg. yesterday w/ ind. consortium - NPPD lead.
 - NEI Reports - 1-5 RHR rad levels.
- Franchich - NHK reported U3 cont. rising pressure.

- E- Check for additional Aerial Measurement Team (AMT) results.
 Check whether there is steam in U2.
 Get comm. THs, NEI's dose rates info.

- Next call 8pm tonight.

- Canada / France / U.K - want to know our source term.

(b)(5)
source term associated

w/ 50 mi eval EZ 23 of 810

3/20/11

9:32am:

Done • Supercore results - RB#2
SFP#3- } (b)(5)
SFP#4-1008 }

Early Heads Up:

- NARAC ran supercore w/ wind shift toward Tokyo. (24 hr. wind)
This would exceed PAG > 5cm for child in Tokyo.
- Looked at AMS data → spike of 12 hr wind shift.
Looked @ data + did back calc on source term.
Addtl. info. to be provided
- (b)(5)

(b)(6)

10AM - Management Conference w/INPO

(Bill Webster) INPO
(b)(6) → Randy TRAPASSO

Jim Wiggins - ET Director

- Fukushima plant status.
- Dose rates around facility appear to be down from previously.

Industry -

Team - AREVA, GE H, W, B+W, Southern, EPRI, INPO
24/7 Support

Priorities:

1. (b)(5)
2. (b)(5)
3. Establish F/W for US to more effectively engage w/ Japa
(due this week.)

~~Contact to interview~~

EDO - any support you need from U.S. govt?
+ what role?

DOE (b)(5)

10am - daily call w/INPO Team - except 3/21 @ 2pm.
EZ 24 of 810

PMT 12

EDO said US Govt lead has to have Project management role.

LT → DHS requested
→ IAEA →

IAEA needs Japan to ask them to do it.

9:26am email

ACTION - 10d to Weber : 9

- Webster sending some industry people to Japan tomorrow.
- At Misawa, 200 miles out.
Wind is currently blowing to (N)

(b)(5)

~~Taura, RST:~~
1:30pm — [Team Debriefs]
~~INFO called...~~

RST - TEPCO stopped spraying U3 yesterday.
TEPCO will turn their attention to U4.
No news of

PMT - ① Supercore toward Tokyo show

~~if they~~
They exceed PAB. of 1 rem.

② TEPCO just
6x10⁻¹⁸ Becquerel = 10⁻⁸ Curies

③ [redacted] draft

(b)(5)

LT - Responded to DHS
 - ~~John~~ ^{Tim} Kolb is home.
 - Preps in place for site team.
 - Daily call list generated.

(b)(5)

2:30pm.

- Weather

1500 Changed Shift. Camber - D. Cool is PMT leader

Pressing Issues

- ① NAREAC is running the bounding analysis ^(MELCOR)
 - depending upon the #'s then PMT will need to Review Realistic Worst Case Scenario 1-3
 - Confer w/ Weber, Urged RE preference
 - Communicate w/ Russ. for all
- ② Depending upon bounding analysis, any changes indicated
 (b)(5) #'s/info
- ③ Does NAREAC have any ?'s on the analysis to be run etc
- ④ Interest in Current Conditions → PAG's still ok to 50 mi?
- ⑤ PMT found error with the Super Air analysis towards Tokyo.
- ⑥ PMT sent message to Jack Foster for explain Japanese awareness of γ radiation in food which is in the media
 Chms -
 - (A) Continued assessment of situation, dose & PAG's
 - (B)
- ⑦ Coordination w/ INPO group

~~Units 1-3 Stable - Seattle - Washington~~ Phone Call 3³⁰
Chairman's Interest

- 1) Inter Agency ISSUES
- 2) INP Interactions
- 3) Army Changes
- 4) Any Changes re. PAG's

Discussion = DAC

- Discussion = Congressional Staffers
Went separate way to discuss Modeling

(b)(5)

Monday 3/21/11

NRE Day Wanted Flame Modeling

Blue W. ①

~~Coat~~

Ron Brandon → knowledgeable

- Rid. Assess Dir
- Vince Holahan ②
- Wish Milligan ③

(b)(5)

PAF working to do a more realistic run given better understanding. → lower

- Safety details to make RFSOH run → PAG's. (50 mi)
- Would Make run. ~ 2 hrs a so.

* Question ~~to~~

Unit 4 Spent fuel goes into floor of pool. ~~run~~ →

Vertical text on the right edge of the page, possibly a page number or reference code.

Super Core

Discussion 2 John Morning

Wednesday

- 100% of fuel melted in unit 4
- full core off-load - pool dry
- unfiltered release damage to other units
- No steam on unit 4 :: No water?
- much water destroyed but how effective?
- PNT & RST to Center & review Super Core Model given this discussion.

Changes - outcome?

CA by ISSUES from PNT @ 19:30 Hrs

1) NARAC is running the "bounding" ^{NECOR} analyses - depending on the outcome PNT will review need to EXAMINE "Realistic Worst Case" Scenario - 3 options, would lead to Center & DEDO's & Call @ 7³⁰ PM RE Modeling. ^{Chmn before conducting this analysis}

2) PNT sent message to Jack Foster to interact with Japanese colleagues to gain insights into their understanding of the Fukushima issue which has been reported in the media - No news

3)

(b)(5)

4) PNT & RST reviewing the Super Core Model and its relationship to the situation in unit 4 what it, meltdown has occurred and melted fuel contributes with concrete and/or base mat.

5) AMS data @ 3:45 pm on time. No exceed 30 m/s/hr. Plume ~~Est 28~~ 810 - N/A

as observed on 3/15

6) Call Congressional Aides @ 3 PM - Much urgency about modeling techniques & source term issues

Will ensure that PWT leader takes part in the call given level of detail.

Basis for the Failure

RASCAL Release @ 12 hrs covered.

7) New AFMS data @ ~ 3:45 PM one time

No Sig. Change

N to NW

Exceeds U.S. guidelines for etc.

QUESTION ISSUE: Legit of contaminated H₂O - what levels? → Jack Foster will explore. →

(b)(5)

(b)(5)

Charlie Miller & Bruce Watson Jo go

Names
Options list
Bk info

original press release ~ Bkd for Super Core MelCore

Telephone Call = Team.

What about the Contamination found on speech
and milk and water Contamination level #'s.

PMT Should talk to Jack FOSTER
DOE is getting info
who has

(b)(5)

MJ to Confer = PMT Director to see
what can be done in this regard

DOE information - PMT to attempt to find
Contact = DOE Contact - JACK FOSTER
to run to ground

Sunday - Monday March 20-21

WARAC still running bounding analysis - no estimate of when they will be done.

MJV conversations with Costo:

John Moninger -

NAVY reports - Adm Thomas - south of Tokyo & north of Tokyo
150 miles

Recommendation: KI

Already briefing Ambassador

We asked John Moninger - has the plant vented lately?

Some sample in menu liter = 150 miles ~~to~~ (point to time) Japan
85 miles south

11:30 a.m. in

Ask Navy - where did they take the sample? Air samples, when corrected

PMT - Navy should have more information - EZ.30 of 870

Received Q's & A's - TEPCOM - review Q's & A's

TEPCO - new GM

U1 - No venting in past 24 hrs -	SFP - no changes
U2 - No venting " " " "	" "
U3 - No venting " " " "	" "
U4	" "

No releases; winds have shifted

4 hrs ago - instantaneous reading to the thyroid @ 90 miles south of 150 mi/hr. But no other readings.

(b)(5)

on USS George Washington
 1×10^{-9} = 170 miles from site

North of Tokyo
 10^{-7}

Specifically for I
gross activity

Particulate readings are consistent @ 1×10^{-9} $\mu\text{Ci}/\text{ml}$

Radio Iodine reading 1.6×10^{-7} $\mu\text{Ci}/\text{ml}$ but is barely detectable

backup sample taken ~ 0015 - not distinguishable

γ radiation 0.01 mhr to 0.06 mhr.

Although particulate readings ~~are~~ ^{was} high (150 mi) - it is barely ~~detectable~~ detectable

It is also raining, so bringing particulates out of plume so seeing a little higher readings.

Adm Willard - PACOM

(b)(5)

preto off call.

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This is 90 miles south of plant;

(b)(5)

level is 10 times below level that would trigger our PAG.

Not IAW PAG Guidelines

(b)(5)

→ Statement - Chairman or Deputies' call

Ask Foster looking at more info on contamination in spinach & milk
& what actions are they taking & would we take same actions? asked PMT
Verify WSJ article information on food contamination

Development of Coordinating Committee - see org chart

Plan to share, going forward, to support our calls with Congressional staffers -
the daily status updates. Will also share with NEI and INPO.

Wall Street Journal March 19 → 2^{131} in raw milk samples and spinach
samples. Both exceed Japanese limit. Also exceed US limits

Priorities: Discussion with Chairman, DOD, etc on protective actions for
US citizens ~~for~~ in Japan
Ask Foster - more info on contamination in milk & spinach -
What actions are they taking & would US take same action?

- ① 1×10^{-7} $\mu\text{Ci/ml}$. do an assessment of this value
- ② military data to get the info - look at this
- ③

Commissioner Assistant brief:

Unit 3 - smoke observed - do not know cause; did do local evacuations

U3 & U4 SFP - probably has water

DOE aerial monitoring continues to support our 50 mile recommendation

Charlie Miller - worst case

Industry Government Consortium

Chairman call ^{at 0800} is cancelled; at 9:30 at a lower level

"Modelling reading of what might have caused the 10^{-7} if it were
accidents.

ET-PMT+LT

Chm called:

Call @ 9:30am - per Chm. on doses.

Priorities:

- a) understand ~~what~~ ~~what~~ 10^{-7} reading (PMT)
- 1) Smoke on U3 (RST) - U3+U4 evacuated locally,
- 2) Focus on adequacy of PAGs (PMT)
- 3) Support Ambassador ~~for~~ team in Japan.

20:35 : on 3/20 → 2 pager

Jesh called:

(b)(5)

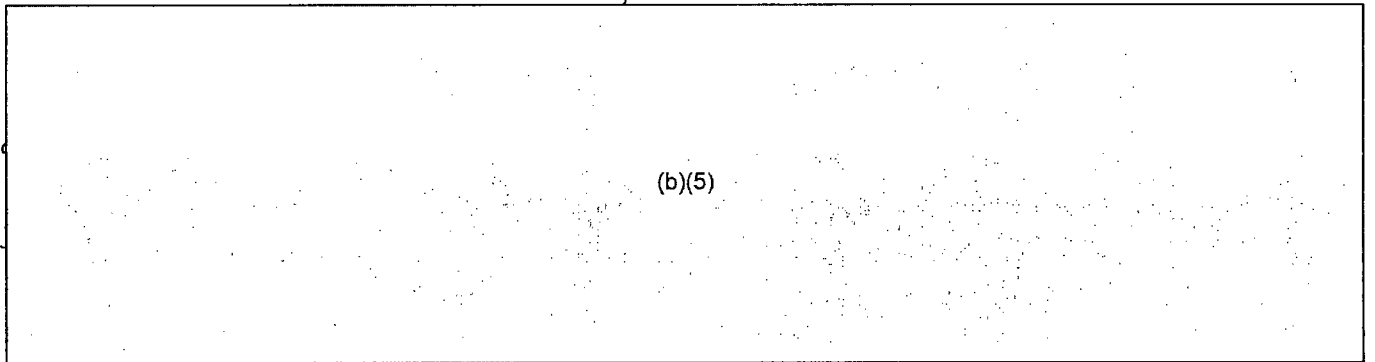
PMT Priorities:

1. Understanding 10^{-7} reading from ~~fixed~~ air samplers @ Naval Base near Tokyo.
2. Jack Foster, site team interacting w/ Japanese colleagues on food irradiation issue reported in media (re: wall st. Journal article) → I-131 in raw milk + spinach → exceed Jap + US limits
3. Charlie Miller attending mtg @ WH Sif. Room on Plume Model developments.
4. PMT + RST reviewing SuperCore model as it relates to U4 status.
5. AMS Data - continuous to support our 50 mi evacuation.

-
1. 10^{-7} is a total radiation measurement, not iodine alone. If this source came from the plant, it could be from the SFP or one of the rx's.

NY State Lt. Governor wants to see Ops Center Tues. 3/22 @ 12N. Eric Leeds is POC to coordinate mtg.

Charlie Debrier (b)(5) CDC, Public Health Services,



9:30 Deputies Call :

1. Supercore is the model
2. DOD went out w/order on KI distribution.
(LT to check + get copy)
Then, State Dept issued travel warning for travellers in Japan.
3. No addt. analysis

3/21/11 Limited Duty @ 3⁰⁰ PM



- N/AAC made the bus but we have not seen it.
- No New AIDS data
- PMT Priorities
- See down on site 3/20 @ 1500 - 1700
from AIDS #

Work - Case Analysis is very sensitive

(b)(5)

(b)(5)

Planning the SO in California?

• Review

We have intention for expanding

Act

①

PMT

1- What are we missing?

2- Finding the SO in California

• Rev'd by Chapman

• California Basis

• IN/OUT or Stay

FEMA

• Single Party

of Joseph

Fed. Gov. keeps for

NRC: Do not Relate our views

EPA: - Need actual Measurement

Improvement

Both will have 2 years

Integration moves to integrated, Phase

Report from as shown below

based upon measurement

Some may not be allowed (100%)

FEMA

Federal and State Air Program (General and Agency)

1) Do not - Core from NRC

2) FRMAP

- Injection

- Piped

- Control

1) Need Field Measurements to Plant Stations

EPA Pol Action Manual

Japanese follow - RP & EPA

What is someone can't do in to its Part 7

Vertical barcode-like markings on the right edge of the page.

PAG's

state Edge in getting out.

What have we missed?

MELCOR

Assumptions & inputs

: Core / Reactor, CONTAINERS

• WE ARE attempting to analyze

• NAVAL Reactor → RCT → Phase or Action LIST (Get answers RST to do)

• Not Covered Calculations

• MELCOR Modeling

• Uncertainty & uncertainty REVIEW) → RES WASTE DO NOTES

- PMT focused upon developing criteria for releasing over 50 mi criteria

Approach:

1) Identif. Reactors in US. to serve as a basis for a - design basis

2) From this basis, develop criteria

Above to, read design per levels on 11-7 sheet & Cont. by tomorrow AM

- Proposed Present from Japanese Style - Depositions Rad exposure Velocities around the site. Skills: TBD

- PMT position on Expansion of PAG's for US Criteria Beyond current 50 mi EAC. Release

• No basis to take further action at this time.

"If there is any thing you can do for us let us know"

Call = Check C⁶ 1000

- 1) Various issues
- 2) Annual of 4.0. 2.000.000.000
- 3) 2 People @ 11.5k
- 4)

Send the 50 mi Relocation Conference to the team in Japan

Email of Report to Don Johnson & Jack Fisher

Objective: Complete Peer Review document by

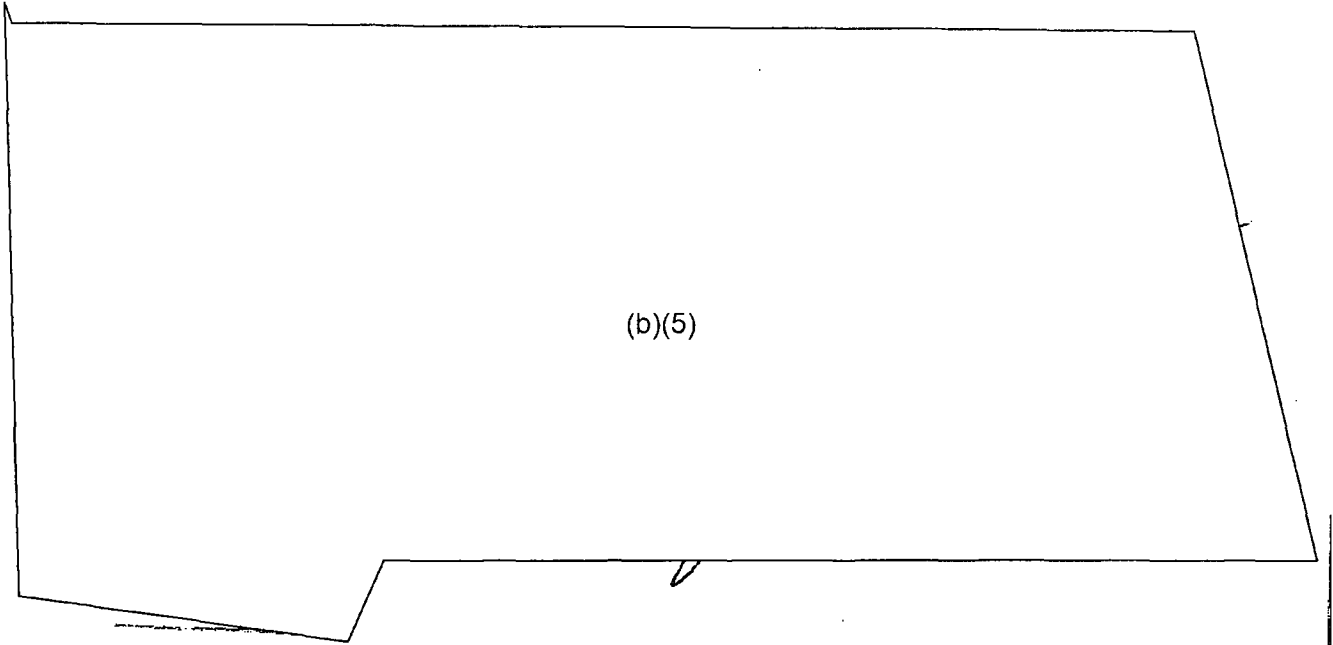
#2001 0750 - Have ready to share & show in AM.

Advise as fast but peer reviewed & reasonable appearance.

Issue: N/A advised on the 50 mi. issue so we add out of place as compared to Appendix we use. We do not make the call to Relax PAR - would need to be based upon valid field measurements.

Cindy is talking & Ralph Johnson - he has concerns about the base. In an 50 mi. SWAC. Relocation. The Duty PNT - Lead - should copy & Ralph A. tomorrow: Site Relocation

#1742 Point: Yes, Ralph found suggestions about the existing the existing protection Article makes that debarking and debarking is not recommended that is counterproductive at the point



(b)(5)

3/21-22 Night shift. R. Lewis

1130

- Need a comm plan across agencies that relate to NARAC BRM runs given pass exceeded in AK, midway

1200

- ONR (DAVE) described decision not to shelter was a temporary decision. There is a sense at ONR that govt needs to look closer going forward b/c there is an ongoing release. Mike Johnson would like clarity on what this is and the extent that it is different.

200

- For the peer review of relaxation of PA's, I asked team to consider exactly what samples/measurements. Japan probably want want to take measurement in 200-500 mile range that doesn't interfere with plan PA's
- ONR update - State Dept has lead, reviewing on understanding is voluntary + dependent. But not pulling out essential personnel.

207

Chude Casto

- Tepco going to YOKOHA accepting ^{1 train of} pumps + transporting to site
- Tong met w. Tepco + NISA
- Salt water:
 - We need to know where is cable to power the pumps + status of (b)(6). Desalination unit.

- Bill Cook on route to Yokota re water cannon / Delivery
- John Moninger on additional equip list.

Data is not reliable from TEPCO

9pm Tokyo mtg w TEPCO to provide
 RX severe accident management guidelines
 For robotics RST will reach out to Inpa. + DOE

- Chuck advises not to use summary sheet

(b)(5)

(b)(5)

TEPCO data is more reliable?

On Thursday, Japan, there will be a session w/ Amb. Coos
 and ADM Willard at which the full range of expertise and views
 should be presented on:

(1) Harmonization of rad. assessments, This should look
 at the plume (close to public) and remnants of plume disposition
 as well as any other issues that warrant discussion.

(2) Clarification of the access we have to the
 command centers - there is confusion on access to sources of
 information

5³⁸: Unit 1^{RX} Temperature may be high (750F)
 passed from WANO but do not want
 source identified.

^{b⁰⁰} UPDATED Status Summary sheet.
 reduce level of DATA

- Developed exit criteria 1 pager

2:30

9:30am - lunch (1+)

met w/ Cabinet members, tried industry. Things changed from you if with highest levels of government. Roberts says we need more of a wide area capability - 2-1/2 x 50000

- what I did for...
- ... see this to finish...
- ... at ... impression - ... use.

(b)(4),(b)(5)

2:30

12:00

There was a team call chaired by ... with ... and NARAAC / NI to align on priorities in NARAAC and mutual understanding of ... spread that ... on 3/23.

Good to - course!

Continue to work PTO on this

working w/ NARAAC on super air + Miller sun.

13,000 Bq Co-137 / sq. m. / day - Hitekinaka

9:00 call - ... to PMT ... accepted Japan team, Ambassador, Naval ... why NE is recommending ... in Tokyo.

separately they will be talking to NARAAC to better understand how to the west coast

IRC - No. 30

- DOD has decided to distribute KI to ^{personnel} ~~members~~ / dependents ^{- 200,000 pkgs} distributed
- State has ~~not~~ ^{not yet} distributed ^{II} to embassy personnel -
- general American citizen public can call in and be given KI
- making it available
- have orders to be able to distribute to Japanese contacts on US bases - not done yet - ops
- PACOM has distributed KI kits to personnel/dependents - 256 to date, hope to be complete in next 30-48 hrs.
 - question as to whether they want pediatric dose.
- consider advisability of no children to shelter in place, guidance for availability of H₂O and food. - 14 day supply of KI

- DOS - ~~Learn requested to~~ ~~voluntary departures.~~
- for Kinawa - for future requests for voluntary departures
 - seats available on commercial flights - depend same there.
 - standing by Japanese colleagues
 - DOD - 1600 dependent left under voluntary departure
 - 7700 wanting to leave
 - PACOM - change to each flight - over 20% who said they wanted to depart, have departed.

- special modeling -
 - APS data - make that data public - not sensitivity to let them know particularly explicitly - processing data, to inform Japanese in advance - departures not imminent - known measurable data
 - hypothetical data so they could be used entering for planning special purposes.
- do we share this to the Japanese? - put it on agenda for meeting

- how do we utilize the SD me PPR - need field data to compare conditions at present

- observed red's boats in seawater? - no data

- securing all food coming from Japan - 4 prefectures that should be checked regarding the incident on milk, fruit & veg
- monitoring of rad in Japan
- monitoring of rad in US & territories

Recommendation -

- include consultation to provide assistance to TEPCO
- send update on ability for planning for these types of events domestically.
- departure call tomorrow at 0800
- 1. State Dept ensure the GOJ has a hypothesis request for KI and DOD go back on need for predictive KI how much
- 2. AMS modelling
- 3. Points to be coordinated
- 4. Check the boundary models
- 5. discuss the SD ms exposure zone for under what conditions
- 6. FDA -
- 7. (b)(5)

- radiological conditions are unchanged

- AMS data

- limited data on seawater - only one sampling by hull no 131
3200 pCi/l vs Part 20 limit - 100 pCi/l.

* sent input for Chairman's call @ 9:44 pm re assumptions for Trans-Pacific dose modelling

sent

Tues/Wed 11pm - 7am

some ongoing release

① our US team is asking for continuous air monitors

②

[Redacted] (b)(5)

integral / build up of dose (cumulative dose)

Yukoska 90 miles

Iodine people
EP folks

PM: needs to work through - committed dose and build up of dose. Need Tush Mulligan help.
2:00 am phone call!

PMT priorities concentration

- ① Actual % of plume that is attributed to Iodine / what other activities are in the plume? (was I modeled in the plume)
- ② Waiting for worst case modeling from NARAC. NARAC top priority
- ③ Issue above - build up of dose (Iodine)

Have asked NARAC are working

Has been asked of NARAC several times, but NARAC has yet provide to us.

KI is there, can be distributed.

[Redacted] (b)(5)

DOE & DOD have distributed to employees but instructed to not use now.

Embassy - General American citizens / public - can call Embassy and will account of

Questions from Customs & Border Patrol - luggage, etc coming in with some deposition. RE Criteria FI handling

- EPA's release table from EPA today

trucks, all type, ...

... shipment & ...

== CNN reporting Iodine in Tokyo water - restriction reports for a ...
... Doesn't ...

10/10/80

DOE Enclosure has enclosed a letterhead document - please take certain actions
prescribed by DOE. It's draft, and PMT has for review

NI is not viable for voluntary identification - anyone with a US passport can
request

Cumulative

The PAGE don't exist in chronic doses. DOE is requesting White House
to have good faith promise to review the PAGE to determine if there is a need to model. The PAGE
model is a worst case model. PAGE model is a 90 day. At present model is
to stop model to put together - NEQ schedule. What needs to be modeled?

Salt

DOE

DOE is aware on end of DOE, NE, NRC - need to get all documents
to DOE in large RAR format. DOE needs to get on with
about the long term (radiation) - needs of ensuring commitment
into schedule of that case of question - to identify
PMT will submit all the data of that case to DOE. DOE has to review NRC
action.

1 note from PMT

could copy up in detail to PMT + review. This is done

action taken by PAGE

DOE is looking for a way to get the amount of NMP & Uranium; RE obtaining more info.
Major interaction with NEI (has not processed yet) to ask industry to
voluntarily report + resume

Main R₁ concerns - not build up from per water injection. Also - damage fairly
pertains to V2 primary containment

12PM 3/25 call with NEI/DOE / some other DOE

MELCOR - transparent now completed - NRC doesn't
have

C. Miller requested receipt of results -
SAY he is not complete.

(b)(6)

MELCOR 1/10/80. In the file EZ 44 of 810

3-11 pm shift - 3/23.

- received 25-40 photos out of a total of 200 - found a dozen or so - send them to Julie Leary.
- plant status about the same - want 5 test then LTR pump - expect to get it up by 24th
- OSTP NRC
- State Dept is coming up w/ dissemination plan
 - DOE/EPA working on a dissemination plan for US citizens to Japan.
- Jim Tropp / Tony Oliver coming back tomorrow
- decision has to be made on serious people we then - Alboman, Coats, Moxiger - Obama wants to be part of that discussion.
- PMT working (b)(5) - DOD, DOE, EPA, FEMA, State, OSTP
- conf call w/ 5 w/ OSTP, NARAC, NRC, NR
- chemical nature of radiation.

(b)(4), (b)(5)

- * - PMT got on a call w/ EPA, DOE and OSTP re: sharing data
- Call to Chuck Coats - 6:30 pm
- Cabinet meeting last night At Hockaday
- State Dept was preparing minutes from cabinet meeting - industry wants a copy.
- ~~Call to Chuck Coats - 6:30 pm~~
- INPO has access to 1M doses of LI - hand that off to NRC
- HHS better than Japan team.
- Jessica Webster -

- Lmax - seamaned helicopter - Lockheed Martin - 1500 lb lift capability
- feed H₂O tanks - original H₂O from drum is not allowed as being stable therefore being on tanks.
- Bechtel pump
- Americans are only ones participating in cabinet meeting - no other countries.

- Two beach on Unit 2 - continuous volume from unit 2 & possibly unit 3
 - Learning from SAME

3/24/11

CANTON

- ① Relaxing PAF's
- NO bait
 - Working identity agreement to get full from them
 - DEPT in progress - NO due date
 - Wind → , photos
- U.S. military
 U.S. citizens
- No ongoing issues

Source team ISSUE
 - less core met, more core met?

Environmental Samples to EPA

- (NO IN) Decision
- NET will collect the information
 - will send in even if they are departing
 - EPA will analyze the data

20 pl/L = WHAT does NR 2.1 gather for - if
 Will be used and amount of

NAZC Run

- PA 2 1/2 not expected in U?
- Third day but no cars

PM
 2 pl - who will do what
 → NET will compile info

Bounding Plausible Model to Japanese

Question: Press release to what we are seeing
 Will need to coordinate with Dept State

Will Rad Net be loaded with data - EZ 46 of 810

1 μ Sv = 10^{-6} Sv

1 Rem = 10 mSv

1 Sv = 100 Rem

1 Sv = 100 Rem

1 rem = 0.01 Sv

100 Rem

Result: 1 Rem = 10 mSv

1 μ Sv = 0.1 rem

AND Flight
= broader
= all of them

- Assumption of No spent fuel pool fires
- Why No spent fuel pool fires as assumption
- Fatalities
- Containment Status
- Cost of Containment
- Rad Act is spreading
- ~~Call today?~~

Mid
White Sheet
Do = EPA

* 1 pg. Summary of PAF
Values

FWR Report
Values

* EXAMINE #1

JAPAN 200 E. 100 B/L = 500 pG

- ✓ Check Message - Sea Chen (should be)
- Accepted delivery of LTR
- Vetter U.S. - 1/2 December - by [unclear]
- Have some [unclear] on, folks like [unclear]

Do - has 5th call - we've assembled
"outside the box" - 1-2 people
maintaining [REDACTED] - [REDACTED]

Run info to [REDACTED]

No: [REDACTED]

Who: [REDACTED]

PR Director?

~~III~~ - [REDACTED] - No as [REDACTED] will take [REDACTED]

Call - Ambassade / Chan

- Went well
- Sr. Level [REDACTED]
- Ongoing
- [REDACTED] before Noon

Topic: Are we [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]

Bit [REDACTED] has done well

Need - [REDACTED] [REDACTED] [REDACTED] And how
Compare to [REDACTED] [REDACTED] Values

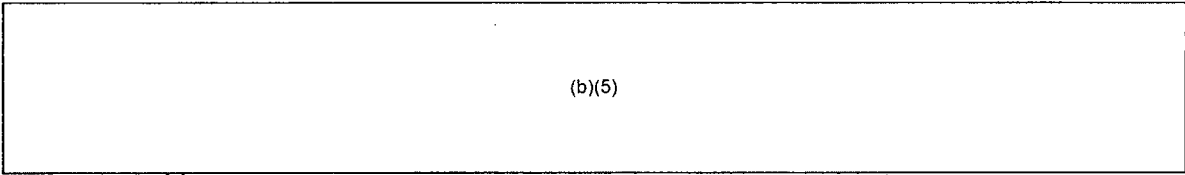
① - [REDACTED] in Water - [REDACTED] [REDACTED]
[REDACTED] [REDACTED]

② [REDACTED] - EPA re. Rad Net

RAD Net - [REDACTED] Test Box info to be integrated
And located to [REDACTED] - [REDACTED] [REDACTED]
[REDACTED] [REDACTED] [REDACTED]

③ RAD Net up [REDACTED] [REDACTED]

④ No [REDACTED] in [REDACTED] [REDACTED]



(b)(5)

In context of ...
Various Scenarios

Plausible Boundary Scenarios Super Gas 1

pm - Create ... of scenarios outlined
over the week

1/10 e.g. Super Gas
DATE:
Assumption:
ON = 2001

I LA - NAAAO Review

II - R Relationship to ... - why not
use existing ...
2008 Commission Report

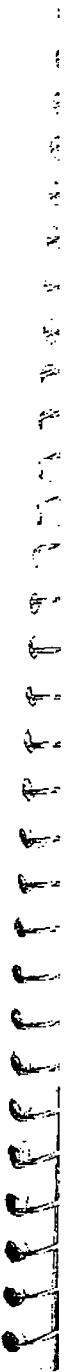
DOS Discretionary Plan (not approved)

3/24 @ 13:50 pm

A) Webber - Thermodynamic Model

- 7 Source Terms
- ... dependent ...
- ... we have ...
- ... 45 ...
- (Webber ...)

Draft -
...
Conf 2 NAAAO
to finalize



B) Tokyo - Plausible, Realistic Case

- No spent fuel here
- 33% x 3 = 3 Cols = various degrees of containment failure
- Spent fuel pool taken (minimal) :: <

See list top of page 3/24/11 :: <

John: Call - NARAC to discuss

- Any fissile material outside of plant = 6% (Pools & ...)

- Other agencies are likely to be aware of this. NO
- Post bulldozing & clean

No Awareness of any spent material here

NARAC

ISSUE: IN YES/NO

- PMT (reply to A6 Eric Kent)

What he want

- Marty V.
- W. Shivers

3-11 pm 3/24/11

- HHC has 1,000,000 cases - KZ available
- Post issue - block feed. Dr. Fischer will help dissolve some salt & flush a little out, also mechanically break a little bit & break it free

• PMT identified need to update the source terms and release rates from those that were previously provided to NARAC - 12 hours ago, based on info from the Japanese of the info (U1 core damage ~70%, vs previously assumed 30%) AND NRC has (100% containment breach in U2 & U3 vs previously assumed design containment leakage rate). NRC held teleconference with NARAC @ 1700 EDT on 03/24/11 to request these changes. Results should be available tomorrow morning.

(b)(5)

RIS being prepared to request businesses to voluntarily provide environmental data to NRC. NRC stated no IN, but RIS being prepared. NRC has the lead and plan is to have ready 2-3 weeks by 7/1/89. Some US employees have been some "13" about background (Ogata, Iwata, Ginna, NMP) that are according to reports log's (NRC) but EPA A-14-1-89. NRC will provide info to GAO info into Hazards on Gator.

(b)(4)

Development of list of all the ^{scenarios} ~~models~~ ^{scenarios} models, model names, chronology, assumptions and outcomes for each. ^{12mb/30cm} by 7/1/89 has one list with 3 models listed.

PMT working on how to reduce the to allow - people to - think of reduce personal belongings. For house - this is already in a "L-1" 20-3 FRN.

M-LCOR Model / Tokyo Model - we have designs - have engineering issues with JARAC used.

DOE preparing to move American Air - 2 light (20 micron) in 7 gals. Tasked PMT to bring in bond data.

10% release rate & 70% core melt for UI - & predicted. NARAC will make a model to work & have ready by tomorrow. NARAC made 2nd how to do a pin - 11/15 how to do a model. How to do a QA/QC.

4.5 Rem thyroid risk based on Nelson transmittable. Worst case model - 7 source terms + RIS / 3 FP's.

Day shift: 3/25/89
PMT provided draft re-entry requirements, ET provided comments, sent to site team in Japan. This is 30 min PA group, but not with Japanese 20km evacuation zone.
JARAC - only working during the day - 7:00 11:00 PM
Working with re-orientation the data already released so the JARAC

- Data base on site of 207
- Radon dump - report 3 REM

(b)(4), (b)(5)

Priorities:

Done

① Next release 12 mile / 20 km protective actions to retrieve personal effects
- decided and sent to [unclear] [unclear] No further actions

② Tokyo model - internet similar NARAC & discuss issues on draft

More realistic model

③ Transcritical Model - ~~model~~ - this is still an issue particularly b/c of the location of 4.5 R thyroid transfers in West Coast

④ List of Models - monthly list of model names, chemistry, construction and [unclear] (Cyndi Jones started) Joe DeGree doing.

⑤ Tackles to PM - to go to trend some levels, such as Rad level at main gate, etc

with known

⑥ Teru Rio de Janeiro management to collect and pass Environmental Data from Work with NARAC to get and Tokyo Run down & get a realistic non conservative assumptions w/ containment leakage.

primary
U2 Containment - 50% breach hole
U2 Release 70% core damage & 10% release

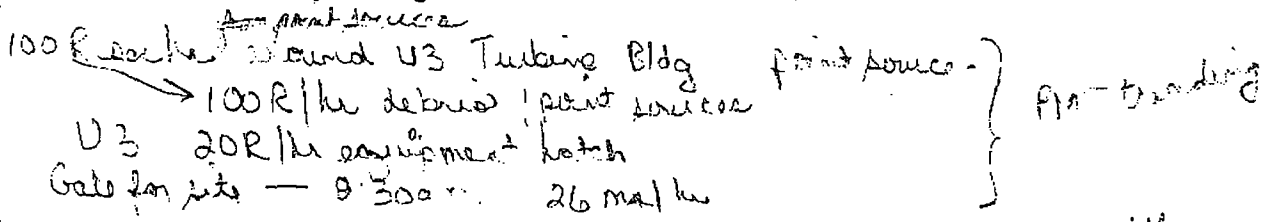
PM - currently [unclear] data from [unclear] & delivered to EPA.
[unclear] to get another [unclear] to collect [unclear] data.

Tokyo Model - (Plausible Realistic Summary)

	U1	U2	U3
Containment breach observation	10%	fully breached	fully breached
Source term	70%	33%	33%

This model is being no-run now - (Friday, but [unclear] [unclear] has a concern)

signature of U3 [unclear]



could be 14.5 or 14.5 SFP

U3 turbine building flooding - Primary system water flooding turbine bldg
 significant flooding in turbine - top

- 15 Km - evacuation zone
- 30 Km - Alerting (Stay in homes)

Adm Willard - have the PM Director brief the PACOM / Adm Willard
once a day on doses / protective actions etc rather than send
someone.

Can Do mo - tasks:

- Japanese model "boardy" & our model - narrower model?

limited values for us to run. Left it - talk to us, get to am?

NARAC running Tokyo Model - "Plausible Realistic Model"
Should rec today

PMT rec - amend keep a GIS Analyst - day shift, rather than
Sunday

Flooding in Turbine Halls - U3 - possible containment breach
& H^{31} and Cs^{137} - both of which end up in
fresh fuel and \therefore \rightarrow Rx core water - Several feet of
water in turbine bldg $\frac{3}{24}$ entry end of radiation
dos level of 40 R/hour. Skin burns ~ 18 R \downarrow

NARAC run - Tokyo model - turbine yard
PAC's surrounded out to 11 miles out - FEDE
Emilia child
So 20 km surrounding area is appropriate.

12/10/01
see above

NEMA - National Emergency Management Administration.

Water and hole in messaging -

8:00 TA call

- fresh water injection to work land 3
- flooding in western side of unit 3. - contamination of water -
don't know how it happened - myriad of possibilities
- EPA put out a press release - send data showing
before and after earthquake so Holly recommends we don't.
- 6.5 mi - J-village to Tukwila - south of site.

RECORD



[Handwritten signature]
[Handwritten text]

ET STATUS
OFFICER

7530-00-222-3525
FEDERAL SUPPLY SERVICE
(SPC)

Japan Response

16 March 2011

- Generators will be moved: (Japan reports from USAID)

- funding question is still open

* keep an eye on action requests that come in over email + make sure they get tracked in web etc.

16 MAR

1600 STATUS

RST E-6 shifted called for to go
can spend budget on ...
NR. any, not included

A-10
Cooling system 555 transfer alternative USAID
Water system has 20% been
Need date of 500 - low water

USAID 2000 staff

31

.

let her know what the law needs

60% program with auto

(20 people start -

R. H. group for unit

Research at

W.R. staff & committee then

COMMISSION on the study

Part

QA for per volume

Don't curbing models

LT

DOE + FEMA in call

0800 L. fly over computer call

also questions from DOS

H-E allow staff/pilot etc

18

FBI report etc.

Emergency contact info for collection
- procedures

Milt

1735 Division of App. Cases

Dept. of Justice, Division of App. Cases
Bldg

Used to help with cases, some work, get
some of the info, some work, get
some of the info, some work, get

1735 Division of App. Cases

1737 Raina B. Co. - 11/11/11

Bill & Assoc

Bill & Assoc

930

Small

What is the case?

11/11/11

Bruce K. Co.

LOC 64 / 1514

SPIN CALL

1804

S-... @ 630
ET ... 330

(b)(6)

1804 Coda ...

Unit 4

- SP ...
- ...
- NAC ...
- need water
- ...
- over quenching

WPA 10/11/11

11/11/11

4/11/11

STEVE TROUTMAN

(b)(6)

(b)(6)

3/16-17:

1- Josh B. call - Chairman will let
gain, to the WH for an OSOO. Josh
* needs updated book. Someone needs
to meet Josh down (P WH) also
requested a brief call prior to the OSOO.
Josh BB: (b)(6)

2- Chuck Casto call @ 1145 - Lou is
now getting involved w/ NRP response
efforts; therefore, NRC SART team members
will be introduced into those facilities.

- team agreed to start set
meeting.

3- Update from USAID

RSI {
- Pump (b) - Chuck C. - TURCO
picked the pump up and on
way to set.
- USAID needs specific part
types, regarding pumping
contractor RSI is designing.

3- Chuck C. checking-in - Update:

- Water dropouts are not affecting

SP : H001@NRC.SGOV.GOV

- (5) Pumps have been delivered to the site. (TOPCO has pumps)
- Priority 1 for the Japan (TOPCO) is US. Only Strategy that are working is water drops w/ HOLE and water cannons.
- 750' piping, Jet Pumps, etc... have also been delivered.
- TOPCO needs project management & logistics help. (~~TOPCO does not~~)
- TOPCO wants NRC Staff to help with on site pump install. H.A.
- SART team discussed having

* a IR / therm Sat image of one of our mark 1 plants (in a outage) to compare to what they are seeing.

- Request for any/all robotics, (USAID?)

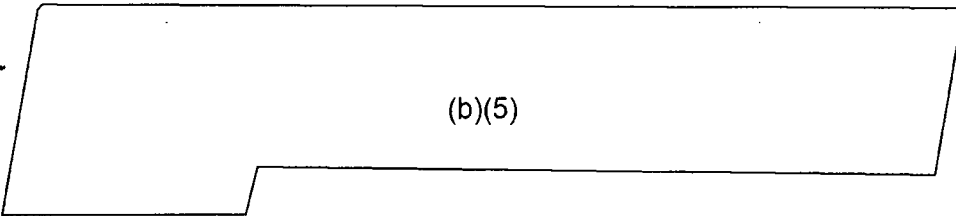
* - this page list (let) ? Supplier

4- FRED. (INPO) to discuss sending someone to be apart of NRC SART team in Japan. (RIRCI)

5- Check C. requested Marty to discuss w/ Sec Sec of DOE their request to send folks to Japan.

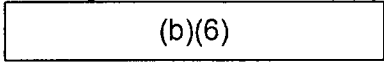
6- OWT* SCIF : 301-415-8369

7- New Sat Laser com in from
Chuck's team .. Lasers are in 400
: redswitch room.

8.  (b)(5)

9- Lin Wiggins requested that a couple
more laptops be added to the ES
table. Passed that task along to
Bob Serinsky for actions.

10- CA brief @ 0730.

- Rebecca is @ SW gate. 17th + ? (07:15)
 right in front of EECB

- Wiggins ~~asking~~ ask Boyle on
Tom Boyle

- Japan task force -
company doing pipe pumping work.

- want someone to talk thru model -
How do we get ~
• Want a decisionmaker (ET).

- SECy coordinating ET briefing w/ Chairman +
Steve Burns @ 4 pm 3/17

note: NOAA said that a "radioactive cloud"
is moving down the Japanese coast.
(reported @ 2pm call).

3/17 1533

PM - Brief

μ Sr

request from NE - detail release assessment
circumstances

NALAC reception at location
We need more

Perkins + from conf

AID call

Don K. NB D

Emergency Call 2015

(b)(6)

(b)(6)

Call of [unclear]

(b)(6)

cost for [unclear]
[unclear] [unclear]
[unclear] [unclear]
[unclear] [unclear]

USA - RST - funds [unclear]

- ~~SFP~~ SFP Planning BRIDGE (0800)

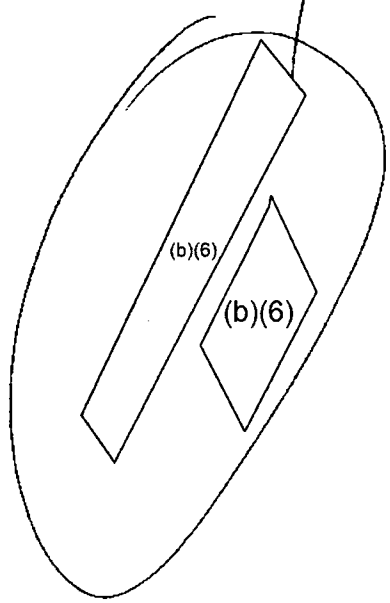
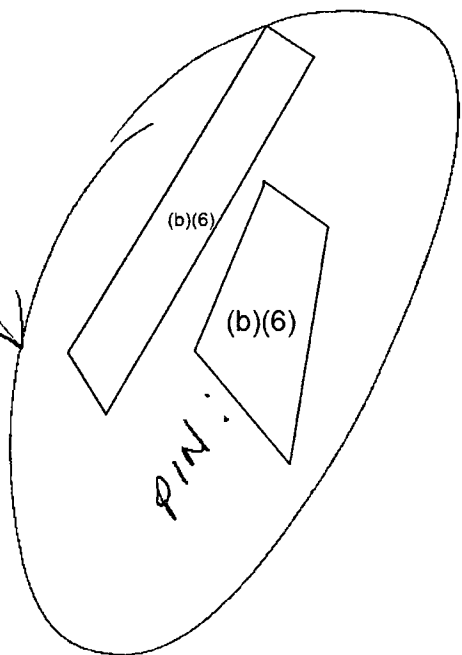
- "Requester" cat. for Task Tracker
Crescl.

- DAVID Hummer. AIR for MARY V.

- [Redacted] (b)(5)

- 0100 : ~~0500~~ : ~~0700~~ - Pumping Eng. down
0700 1100

- MDS has taken over operation.



SVITS @ 0730

CA @ 0900

- need watch bill for HQ's.
- Check Call:
 - Don't add USAID to conf call w/ Site Teams.
 - Jim Lyons Co (b)(6) (IACA)
Conf Call (b)(6)
 - John M. called to discuss HQ NRC ex team having a reg conf call w/ Gen. Military in Japan.
 - Check Call: create room conf call
 - John M / USAID - need to get B. Berger approval for pumping system before we can move forward on all fronts.

03/18/11 0700

Chairman wants Chuck cast
on the line. ↔ 415-1820

Dis Pen
Can this beef

(b)(6)

com. from him w
the right person
(a) to [unclear]

Sandi

Waka

Anna Caputo

2-2-234-7240

tel/ Valeria Katin
a email.
492-3532

Franklin

DYLA

2-2-234-7240

APR 20 BRAN

FT Brief

Q - Questions successful?

- Quality, quantity
- SFP looking
- Only bit of a reason

Cost
Time

What is expected to be done

Single domain

Becky's case - remember to go
for it

C-17 - pick up

YD 10/10 - 5/10
Numerous locations

Single flight - back from

ADD - 3

different 5 last unit

Dep admin. Nancy L. W. B. O. S.
for USFC

SAPPA, 405 Fujiwara

Area activities

Check to groups

Get back to Chairman

Any file

present with

around the neck

Cont. Brief

- last

F & WEB

more continuing work

Share photo from field - at Product 3

Area changes

Unit 3. Special but not in unit

Area changes

Col. P.
M.A. Smith

Pro-... ..

(b)(6)

Top

(b)(4)

Donald

James Ellis

770 664 3000

(b)(6)

(800) 770 3000

10

Bryan [unclear]

(b)(6)

JIM
WED
ELLIS

(b)(6)

NR
TRAVEL

(b)(6)

Atom. Harold (NR)
Home

(b)(6)

Chairman TEPCO + CNO

Asked us to ^{prioritize} ~~priority~~ ↓ Rad + Reactor Vessels
Reactors

Know something

Immediate concern on Sea Water impact
on the reactor

Salt impact on bottom head
heat transfer

Need Rad levels ↓ so they can get into and
start systems up

EOC - Site team
Office space

Cooling
Rad level
Research
Projects

100
C

① Research of behavior and sea water - heat transfer rate

EPA Don
DOE Rad

② Rad level ↓

4 Dose estimates + ~~Rad levels~~ projections + calculations

3 Project management

Need office space

Q

TIM KOLP home
Pump call

Wayne Butz

(b)(6)

Bob ~~to~~ Kapler : NRC
"UCAs"

Kathy Richard - [unclear]

Task Tracker - Team Jirs to work and
close items. (per ET) Status Officer asked
to police the list

Morning Calls 3/19/11

- 7am - ODS to read email and part @ 7⁴⁵am
- 730am - Commissioner Aost's call with ET
- 745am - ODS $\frac{1}{2}$ ET call

6am - Lt and others to discuss plans for
pumps. ET not involved at this point.

1001
(b)(6)

STATUS
ERLANG
"
"

JOLI

STATUS OFFICER	TIME	ACTION
ERLANGER	0630	TURNOVER w/ DuHoyek complete
"	0710	B. Kahler transferred to RST (Pump @ station)
"	0730	Commission Assistants call w/ET
	0745	call led by DEBO regarding 2 PM mtg
	0810	DISCUSSION / ...
JULIEN	1500	ASSUMED WATER <div style="border: 1px solid black; display: inline-block; padding: 2px;">(b)(6)</div> - C. Casto
	1507	EMAIL FROM B. McDERMOTT TO CONTACT C. CASTO TO DROP OFF CONFERENCE CALL.
	1517	UNABLE TO REACH C. CASTO'S PHONE CONTACTED J. MONINGER & HE SAID HE'D CONTACT CHUCK.
	1725	HOO WAS ABLE TO FIND C. CASTO OUT OF BRIDE AND GIVE HIM THE MESSAGE.
	1740	JOE ANDERSON - re GEORGE nozzles → Any relation to pumps - Confirmed w/ P. SKEN that the George nozzles not connected How. INFO still to T. P. ...
	1755	Set up 1600 PPL conf call in Chairman's Room.

STATUS OFF. TIME
SOLICITOR 1610

1800 - CONFERENCE CALL RE
PUMPS w/ FED LIAISON, JAPAN
EMBASSY, NR, USAID
OUR BRIDGE

STATUS
OFFICER
~~SOLIC~~
SOLIC

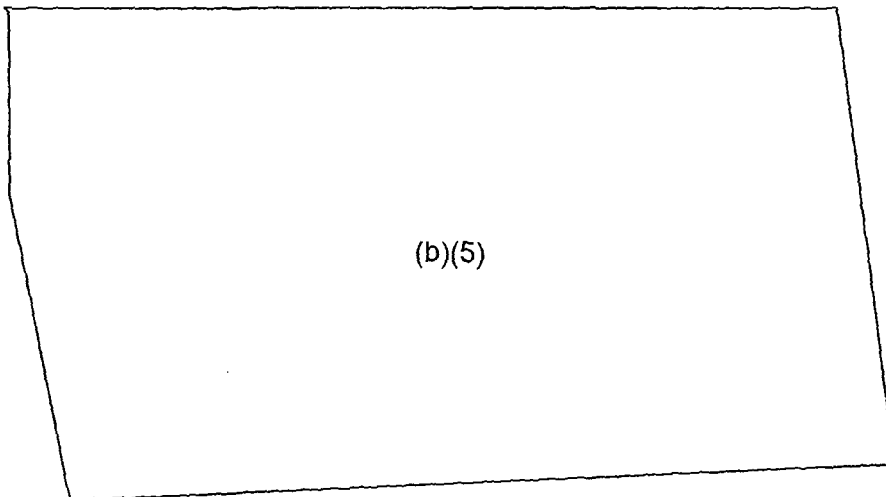
" 1645

J. DYER + S. BURNS REPORTED
ON A CALL THEY HAD w/ AID
ABOUT WHO IS PAYING FOR NRC
TRAVEL TO JAPAN. EXPLAINS
NRC POSITION IS USAID SHOULD
BE PAYING UNTIL HUMANITARIAN
RESPONSE CLOSED OUT... USAID TO
GET BACK TO US.

"
"
"
"

" 1800

Conference call on pumps
with USAID, EMBASSY JAPAN, EMBASSY
LANCERIA, NRC JAPAN



(b)(5)

"

STATUS OFFICER	TIME	
CAN #845 SOLICITOR	1845	2 MORE UPCOMING CALLS - - 8:00 AM SUNDAY - CALL w/ CHAIRMAN re. REACTORS IN HIGH SEISMIC AREAS - 11:00 AM MONDAY HNS CALL -
D ID CC	2000	TA BRIEF
)	2008	KAWLER BOB TAYLOR @ USAID CALLED re THE OCONEE NOZZLES. CONFIRMED THAT THESE NOZZLES ARE NOT TIED TO THE BECHTEL PUMPS.
SASST GARDING	2110	Received a call from Tom Frey (USAID). He said USG will go forward w/ all 4 BECHTEL pumping systems as soon as <div style="border: 1px solid black; padding: 2px; text-align: center;">(b)(5)</div>
AS w/ 3562 VC 15		He asked for a POC @ BECHTEL. I provided the only name we had available (Ned Merchant) and his email address

STATUS
OFFER

TIME

STATUS

OFF

ERLA

ERL

"

"

"

Call w/ C. Gandy (cont.)

want to set up a call with RST
NISA and TERCO to discuss call and
a call with PMT, NISA, and TERCO to
discuss rad levels.

Huyck
~~2240~~

2240

transfers complete. Huyck on station

Huyck

@
0030

HOO to schedule - connect Rep's:
from GE & INT w/ PMT & RST
to discuss long-term cooling

Huyck

0010

The LT to provide the HOO list
of names and contact info from
for the 2nd group to Inps (rec
personnel)

Huyck

0110

0543 # - ET Director / Mike
Schroter) attended call w/ info
GE & PMT, RST

Huyck

0615

Assigned telecons with ET & HOO
7:00am call w/ Commissioner Asst's
7:30am w/ Chairman

JOL

ERLANCER

0645

RELIEVED HUYCK SPOKE TO HOO'S
ABOUT 0730/0745 CALLS

status OFF. ✓	TIME		
ERLANGER	0730	COMMISSIONER TA BRIEF (CONDUCTED)	
ERLANGER	0800	Chairman Jack Telecon	
1 and 5	1000	Call w/ industry reps on their engagement for moving relationship w/ TELCO forward	
10	"	1005	Spoke to Clay Johnson, FOF Branch chief, about non-explosive means to breach SED building. This is a task from the DEED. SEE E-MAILS ON ET 7.
	*	1028	Call established for 2:00 p.m. tomorrow w/ industry reps LT is coordinating the call
	"	1215	770 366 Bill Webster called to talk to ET Director regarding industry support to TELCO + C.C.N.S.
10 Asst's.		1407	New contact # for Bill Webster 770-644-8118
JOURNAL		1440	Received C. Entangon
5		1515	Chairman briefing call. Chairman asked for update on how the 10:00 Industry Group meeting went.

STATUS OFFICER TIME

STATUS OFFICE

1535

HOO REQUESTED THAT STATUS OFFICER INFORM THEM WHEN ET. DIR. IS READY TO DO POST-TURNOVER BRIEFING W/ CHAIRMAN

2200 SOLICOR

1655

HOO CALLED TO INFORM ET THAT MARY VIRGILIO WILL BE UNAVAILABLE FROM 1700-1800. WE WILL BE HERE AT 1900.

2000

TO BRIEF

2020

(b)(5)

Hugel

Charlie Miller will go. He'll need a brief when he gets in on what we want to brief. Need car & driver ready at 0700-0715

H

H

2050

Call with John Mannerger and Dan Dorman. Discussed status of imbedding with Tepco. Language barrier and lack of authority to request info was an issue

H

STATUS
OFFICER

TIME

2
by

~~2200~~
SOLICITOR

2200

PUT TOGETHER A FOLDER FOR
C. MILLER FOR THE 8:30 WHITE
HOUSE MEETING. LARRY CAMPER HAS
THE FOLDER - HE ASKED THAT WE
ADD THE 0600 3/21 OPS CENTER
STATUS REPORT TO THE FOLDER

2215

PROBLEMS TRANSFERING TO
PLATTER PHONE IN BACK ROOM.
HOW RECOMMEND PLACING CALLS
ON MANAGEMENT BRIDGE #1
X6119 & CALL THE PLATTER
PHONE INTO MGT. BRIDGE.

11
11
11
Hms

Huyek

2250

Transfer complete

Huyek

0005

(b)(5)

W/ET.

State Dept.
talkin I

Huyck

cont'd

to include NRE personnel in Japan.

22
Jocia

Huyck

0240

ET call w/ Chuck Casto - discussion from previous call.

Huyck

0550

ET call w/ Chuck Casto - discussion from status, one-pager, which was given to the Chairman. One Pager - NRE position on PA levels and any (if) pre-cautions for US citizens.

ERLAWLER

0650

WATCH ASSUMED

ERLAWLER

0730

Commissioner TA Brief Commences

0745

Chairman to be briefed

[Redacted] (b)(5)

- CANCELED

0800

Call w/ Chairman

0830

Call from M. Dede

60

Jolicouer

1300

conference call with Federal Partners and INPO in preparation for industry call at 1400

1325

Chairman's office called - Chairman will not participate in 1400 industry call.

1400

Conference call of industry
- Still need to determine USG lead for interaction w/ industry
- Need to iron out logistics to get INPO support imbedded with NRC team in Japan

1430

LT Reported on a DHS request to participate in a 1600 DHS call m. Weber said LT can represent us on the call.

GOTT

1500

Relieved the workload

5081

2000

Japan of IN... HQ
CA Brief

2130

Briefing from Site Team

Meeting

2300

Water assumed

✓ 2315

ET requested Chairman Commission that went to Commission today for vote. (CBT Coord - Jim A)

Formo

2330

ET / Director brief - what are we missing (i.e. what aren't we focused on that we should be asking)
- Dave Sheen started and will cont... tonight
- Cost of request from Japan. We need results that Dave's stated for Dept meeting tomorrow.

0030

Requested by ET to send actions list to Site team. Need their input on cleaning up that list of tasks.

0210

Site team briefing

0305

Received e-mail from Don A.
regarding needed info from HQ.
Input into TASK STACKED. and
followed-up w/ RST.

0540

Section Conf Call / C. Castro.
*Basic updates.

January

0717

Chairman's briefing

0730

CA Briefing

0900

Call from R. Deversally - Indicated
that based on discussions with
Major Grana and Col. Monahan, NRC
will be asked to brief Adm.
Willard at PACOM some time
tomorrow. Japan team thinking
HQ should do this briefing.

Discussed w/ M. Weber. He said
briefing is set up for Thursday and
that C. Castro will do briefing.
Expect email from
Deversally. We'll need to
get alignment on who is
doing briefing.

0930

- C. Castro called in to discuss outcomes of cabinet level meetings
- support on robotics
 - support on wide area rad monitoring
 - UZ STI full
 - Shift from SeaWatch to Great Waters
 - First pumping system arrived

22
607

608

Meeting at 8:20 of Cab. Ministers - priorities

- wide area rad monitoring
- robotics

• INPO is working robotics... hesitant because French had some ready and were told to hold.

4

1000

M. Weber + N. Mannick held industry call in back room.

1245

NY STATE Delegation toured OR CTX.

609

1520

Retired G. Water

1518

Et. Director briefed Chairmen

2000

CA final

2000

CA > BC IFS P

605

2045

RICK DERLELY HAS PROJECTS TO SEND TO HQ
TRANSFERRING RESPONSIBILITY TO THE WHO WILL
TRANSMIT TO HQ IN MORNING & HE WILL FLY
TO HQ A DIST. OF ~~THE~~ DAVS
JPF LONDON AT TTT

605

2300

Assumed the watch

0001

ET / team director brief.

0030

Began initiative to clean-up
"TASK TRACKER" for all the teams
open items.

0120

Received e-mail from C. Casto
for M. Visillo regarding DOE's
assessment of salt on reactors.

0200

Received e-mail from C. Casto
(see team) regarding DOE
Assistance to Japan on Robotics.
dest to: ET, RST, LT.

0245

Received e-mail from C. Casto
regarding JIS's path forward for
Fukushima. dest to: ET, RST, PMS

0250 Received yet another e-mail from C. Costo regarding briefing of Adm Willard for tomorrow. dist to: CT, RST, PMT.

0325 Received e-mail from Site team regarding their daily team schedule. dist to all teams.

0330 CT / PMT / Mael Reactors briefing

0430 - ET / Site team brief (C. Costo)

0500 * main concern was over jobs write-up to TEPCO regarding Salt water issues; concern was over RHR.

* U2 SFP (54°C) good - however; steam is still steadily coming out, leading us to believe a breach of primary containment had occurred.

602

620

0515 Received e-mail regarding hold of Pump system (Bechtel) & Yokata would further notice. dist to: CT, RST, LT.

0600 Spoke to Joe Lawson @ ITC regarding the transfer of pictures from Site team. Asked him and Rebecca Stone to see if we could use our "youSendIt" account to facilitate transfer.

- Joe Lawson: 423-855-6645

0700 Turnover

1430 Request from chairman to share photos with CAs from other offices.

440 KE Car travelers brought to ops center. B-Stronsky put it with the other responder equipment.

6001 1500 Richard H. Waters
Photo
Who came with water? Assumed?

Grant 2245 Assumed the watch

0001 ET / term Director brief.

0030 C. Costo / Site team Conf call.

- Concern over yesterday DOE
"salt assessment letter" not
going to NRCO. See Chen app det.?

605

0140

Discussed future Staffing needs for ET. Marty ✓ made the decision to eliminate the "ET Post measure/State Coord" member for back shift.

- also decided to eliminate the 685 Adm Assant ; 685 actions officer on the 11-7 shift. (Starting tomorrow).

0350

Conf Call w/ Don D. and C. Costo - Marty ; Bruce took call in back room.

Marshall

copy

Report out from Chairman collo w/ PERS and Chm. Actions

1) Add Steve Hoki + Peter Lyons to MRC 10:00 call

2) Find "outside the box" thinkers to add to DOE'S 5 to 6 pm call.

12:50

Chairman Spozello called to notify the E-7 that the 90-day "quick look" team has been approved by the Commission. He further noted that MRC should not "popen" the Japanese with questions to support the 90-day review team.

u

657

1500
1520
1612

Redmond's watch

CHAIRMAN BRIEF

Team Briefing

RES - [unclear] [unclear] [unclear]
[unclear] [unclear] [unclear] [unclear]

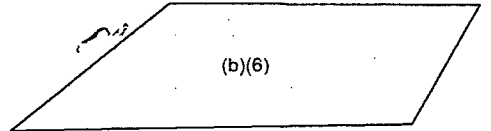
1615

Tasked from OIP (Dop) [unclear] [unclear]
Chairman's [unclear] [unclear] [unclear]
NISA [unclear] [unclear]

NOA Redmy Caputo
Geo spacial [unclear] [unclear]
[unclear] [unclear]

CIP →

NSTS



short phase [unclear] [unclear]
[unclear] [unclear]

10ACED

TE 2:16P

2245

Assumed [unclear] the watch.

0000

Sanifex requested a team director
brief.

0315 AUR 1816 the need for more
space on all AUR e-mail accounts.
they are all at their limit

0350 C: Costo called to brief the
ET. asked to make up an
distribution of the SITROX to 0430.
He needs it for his meeting w/
the Ambassador. CBT Agreed.

0750

(b)(5)

MATSL

1335 2PM call canceled for today
(congressional call)

2245 Resumed the watch ...

0000 Team director brief..

0232

Marty requested that

(b)(5)

available in the Ops Center on
Coast shift

(b)(5)

0240

AST Director update to ET.

0330

HR discussed the changes to the RST recommendation / Status doc and future strategies.

0532

C. Castro (Section) Conf Call.

(b)(5)

(b)(5)

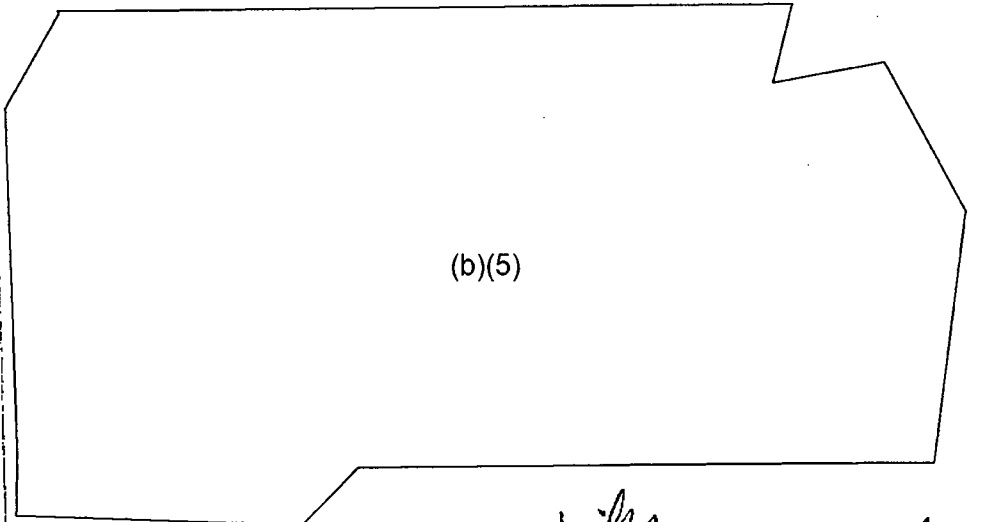
/ wants NRC to host a dept call. 21 December.

MARSHALL

0650

reviewed the watch

1020



(b)(5)

1114

LT trying to end ^{daily} coordination calls. ~~maintaining~~ maintaining calls

10001

ET / team director brief-

* major topics:

- SFP / Day last storage. RG has a draft write-up and will have it cleaned-up by day shift.
- RASCAL Run error. Got Dan Sorman on phone to discuss options.
- What's the status of the re-entry guidelines RMS developed. (LT)

152

0335

Dan Sorman called to brief ET on issues related to source term issues.

0421

C. Costo called in to brief ET.

0610

RST brief to ET - Recommendation doc. - question from ST regarding all parties blessing this doc.

0630

Assumed watch

1055

(b)(5)

from Japan
team no comments from E.T.

1133

Added daily call to the list -
PMT will participate for now. other
participants include NEI, EPA, DOE, and
OSTP

1500 returned the watch

John Holdren D OSTB

Ken

2245

assumed the watch

2300

(b)(5)

Jim ?

Marty to review doc.

0000

ET / team director's briefing

0500

ET / team director's brief

1206

Seabrook US - bridges had
some difficulty, had to move
ET to 6:20 pm HOO.

3/3

Consortium daily call has been
restored.

1245

Assumed the water

0000

Team director brief

0600

Team director brief.

1045

Consortium call moved to 7pm EDT
Starting tomorrow... MRC will
Send an email to confirm
Want to include Japan team.

1225

NEI Data Collection Website

<http://environmental.nei.org>

Login

Password:

	(b)(6)
--	--------

3/30/11

1100

Guard re-installed because a few
folks couldn't badge through the
doors (sally took the call).

3/3
Mar

3/30/11

13:16 Per CHAIRMAN'S request 3:15 update will be at 3:25 today

14:45 VINCE (old) contact info @ PACOM

Direct: [redacted (b)(6)]
if no answer, try [redacted (b)(6)]
if desperate, call Sr. watch desk [redacted (b)(5),(b)(6)]

15:51 informed HOOs of change in daily CA calls
- Per CAs. cancel evening calls
- Adjust time of AM calls
- They proposed 0900 or 0930 but, due to conflicts with 0900 Deputies call and ~ 0930 call w/ Chuck / Site team, ET proposed 1000 calls. HOOs to send ANS message to inform participants of this change.

14:00 THE 0715 (3/31) CHAIRMAN SPEC IS CANCELLED

NEXT CALL IS AT 15:15 (3/1)

3/31/11
Marshall

10:25 CA brief - question came up as to who CMC staff can send Q's to. Gave them ET 07 so the status EFCR can get to Right team + get ET APPROVAL before responding!

3/31/11
Marshall

1422 US AID calls w/ E.T. will be weekly from now on: Tuesdays @ 1400.

4/1.

1852 Change shift on guard...
Change shift from ... → 0200

2019 Chairman's meeting...
21 calls... 17:00

Supper

3/31

2245 Assumed watch

4/1.

0000

ET / Team director tested. /
Site team called in.
- They provided a heads-up regarding recommendations doc to Sitcom.

0015

Rep 2 USAID will only be manned from 7AM - 7PM starting tomorrow.

4/1/11

1030

CAMP CALL for Saturday & Sunday will be @ 08:30 both days.

4/1

S

4/1/11

1330

The EBT will not be staffed
7AM - 3 PM this weekend (SAT - SUN)

RS-

SIT REP

Plan w/ Tech industry. Relative guidelines for
continuum...

APR 7 N₂ on site - Btts to rest of unit
- Spent fuel pool assessment - structural
- thermal
- centrality

1700 PACOM phone call

4/1-2/11

2230

Assumed watch

0000

EST / Team Director brief

0500

Site Team (C. Casto) Call.

0600

EST / Team Director brief.

* Pilot ahead EST turnover log.

4/2/11

0740

Check Casto called in regarding
the "Elmo" questions

1.

2.

(b)(5)

3. PA6₀ - when would we need
to expand or when would
we release PA6₀ (50 miles)

4/3-4

4/2/11

0830

CA Briefing

- Need to get current Source Term
estimates to CA.

4/2/11

1745

Age of fuel in P-19 in question

50 mile EP₀ relocation

RF₀ NE

NOAA OPERATIONAL

SANDIA - 0.5% PARTICULATES

PP60 AND BILKED VS FLOOD

4/2-3/11

2230

assumed water

4/3/11

2000

MW Chairman wants us to
say - T-2000

4/3/11

1000

TRs have requested daily AMS data.
Look like the best way to do that is
to forward the DOE daily report.

4/3-4/11

2230

S. Billings Assumed Watch

4/10

1500

Assumed watch

1508

Webb briefed for watch

- Review of skipper equipment to senior leader
- Review of all watch duties & assignments
- WEEF ocean plane model
- Training points
 - explains contents of procedures
 - assesses skills
 - explains importance of watch
 - actual practice
- DOE lead for the birding project (DOE, ... lead)
- Train @ 15:00 - local requests
- 4 steps to authorization

4 kg / km² β 8 α 8 γ 8 δ 8 ϵ 8 ζ 8 η 8 θ 8 ι 8 κ 8 λ 8 μ 8 ν 8 ξ 8 \omicron 8 π 8 ρ 8 σ 8 τ 8 υ 8 ϕ 8 χ 8 ψ 8 ω 8

IACA limit is 0.5 kg / km²

WEEF ...

- Media 101.7 Radiation
- 150.000 ...
- 150.000 ...

QST

Optim ...

Def ...

SEP ...

4/4-5/11

2300 S. Billings assumed watch

0230 Reviewed "Salary Cap" list + recommended changes to Kevin Williams

0630 DEZ SITREP + AMS slides

- UP loaded to SharePoint

- [Redacted] (b)(5)

02000 Bal on 1-2

Annual report suggested in 10/10

a third annual report would be

Check w/RS to ensure resources to complete report

R... - 2 reports - continue with 1/2010
injection into the atmosphere into future

- additional components

- data collection

investor release is low

SEP investment

4/10

1417 DEZ SITREP - sharp and old C's

4/6/10

1655 E. Collins called in to discuss NYT article and the communication strategy.

125 ...
No NY contact ...
for C. Davis

- 15 to discuss on 1980 and then call
- Update on 58 document (waiting for comments)
- Need to do 1982 document preparation
- Do a few REV of notes
- 94 588 completed assessment, 1982 and 83
- 61 588 assessment of 1982 and 83
- 1982 and 83 assessment of 1982 and 83
- Preps for 1982 and 83 assessment

4/6

1910

Document discussion w/ Vanden
Relax 50 mile 582

Grab - 6

Recat 1 - 1/2

58 1/2

4A 1 page

20 3 pages support, 1/2 page

1958

Permit 1/2 1/2

2000

0715 Chairman call canceled
0815 Chairman call on - but short on
1830 Chairman call w/Book at 11:00

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 Not for further distribution without approval of NRC.
 March 23, 2011

Reported Measurements from various NRC operating reactors between
 3/18/2011 and 3/23/2011

Date	Plant	Isotope	Concentration
3/18/2011			
3/18/2011			
3/19/2011			
3/19/2011			
3/19/2011			
3/19/2011			
3/20/2011			
3/20/2011			
3/20/2011			
3/21/2011			
3/21/2011			
3/21/2011			
3/21/2011		(b)(4)	
3/21/2011			
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3/22/2011			
3/22/2011			
3/22/2011			
3/22/2011			
3/22/2011			
3/22/2011			
3/22/2011			
3/22/2011			
3/23/2011			
3/23/2011			
3/23/2011			

* These values are slightly above the NRC reporting requirements of 20 pCi/L for NRC operating reactors.

U.S. Department of Health and Human Services
 Food and Drug Administration Recommended
 Derived Intervention Level (DIL)
 (August 13, 1998)
 For All Components of the Diet

I-131	167 (Bq/kg)	4.60E-06 µCi/cc
	(infant = 1 year old)	(4600 pCi/L)

Note:

- 1) Assumes 33% of dietary intake over 60 days is assumed contaminated.
- 2) For a 3 month old and a 1 year old, the entire diet intake over 60 days is assumed contaminated.
- 3) DILs are based on the most limiting Protective Action Guidelines (PAGs) and age group for the radionuclide set and correspond to intervention levels of doses at which introduction of protective actions should be considered (ICRP 1984b).

NRC Licensees I-131 Reporting Levels
 [Ref: NUREG-1301 (PWRs) and NUREG-1302 (BWRs)]

	I-131	Units	I-131	Units
Drinking Water	2	pCi/L	2.00E-09	uCi/ml
Non-Drinking Water	20	pCi/L	2.00E-08	uCi/ml
Air	0.9	pCi/m ³	9.00E-13	uCi/cc

Summary: None of the measurements reported by U.S. reactor licensees are above the FDA recommended DIL for I-131.

*Copy of NUREG-1301 & NUREG-1302
 saved to: M:\PMT\FURUSHMA\23 March files*

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 March 23, 2011

03/23/2011 9:28PM

M:\PMT\FURUSHMA\12 march files\Com. of US Nuclear Plant Reported 03/23/2011.XLSX

m:\pmt\Fukushima\ DHS FDA Derived
Intervention Levels.pdf

3/21/2011 1:10pm

ACCIDENTAL RADIOACTIVE CONTAMINATION
OF HUMAN FOOD AND ANIMAL FEEDS:
RECOMMENDATIONS FOR STATE AND LOCAL AGENCIES

This document is intended to provide guidance. It represents the Agency's current thinking on the above. It does not create or confer any rights for or on any person and does not operate to bind FDA or the public. An alternative approach may be used if such approach satisfies the requirements of the applicable statute, regulations or both.

Radiation Programs Branch
Division of Mammography Quality and Radiation Programs
Office of Health and Industry Programs

Document issued on: August 13, 1998

Comments and suggestions may be submitted at any time for Agency consideration to: Radiation Programs Branch (HFZ-240), Center for Devices and Radiological Health, 1350 Piccard Drive, Rockville, MD 20850. Comments may not be acted upon by the Agency until the document is next revised or updated. For questions regarding the use or interpretation of this guidance document contact Donald Thompson at 301-827-0012 or DLT@cdrh.fda.gov.

Additional Copies: World Wide Web/CDRH home page: <http://www.fda.gov/cdrh> or CDRH Facts on Demand at 1-800-899-0381 or 301-827-0111, specify number when prompted for the document shelf number.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration
Center for Devices and Radiological Health
Rockville, MD 20850

DILS



Iodine prophylaxis



- BSS recommends use if avertable dose to thyroid is $100 \text{ mSv} = 10 \text{ Rem}$
- WHO recommends use for children if avertable dose is 10 mSv , but does not recommend for adults over 40 1 Rem
- 130 mg KI tablet daily for 1-2 days to adults
- Potassium perchlorate (400 mg) for people with iodine sensitivity

Table G-1. Early phase Protective Action Guides (PAGs)

Protective action	PAGs (projected dose)	Comments
Evacuation (or sheltering) ^a	1-5 rem ^b (10-50 mSv)	Evacuation (or for some situations, shielding) ^a should normally be initiated at 1 rem (10 mSv)
Administration of stable iodine	25 rem thyroid ^c (250 mSv)	Requires approval of State medical officials.

^a Sheltering may be the preferred protective action when it will provide protection equal to or greater than evacuation, based on consideration of factors such as source term characteristics, and temporal or other site-specific conditions. For further guidance, see EPA 400-92-001, Sect.2.3.1.

^b The sum of the effective dose equivalent (EDE) resulting from exposure to external sources and the committed effective dose equivalent (CEDE) incurred from all significant inhalation pathways during the early phase. Committed dose equivalent (CDE) to the thyroid and to the skin may be 5-50 times larger, respectively.

^c Committed dose equivalent (CDE) to the thyroid from radioiodine.

Source: adapted from EPA 400-R-92-001, P. 2-6.

M:\PMT\Fukushima\EPA Table G-1 Protective Action.doc

Potential Questions from NISA Chairman to Chairman Jaczko of the USNRC

1. I understand you are working on a technical document that provides your assessment of conditions at the Fukushima Daiichi plants, and possible recommendations to address current concerns. When do you think you will have this document available for us?

A: Our response center staff is busy pulling together the finishing touches on this document, in coordination with the representatives of several other agencies in the U.S. government in coordination with industry representation on nuclear issues.

2. What do you believe should be our highest priority?

A: Keeping the reactor cores cooled is most important, then shifting the source of your cooling water to the reactor cores to a fresh water source is quite important. Additional details will be provided in the document being finalized for you.

3. Has your agency identified any other recommendations or contingency planning we should consider during our recovery?

A: We believe it is of paramount importance to assist our friends in Japan. To that end, our emergency response center staff, members of other agencies, and representatives in industry are working around the clock, examining all facts that we have been able to gather on this event, and are prepared to provide technical assistance in any manner you would need.

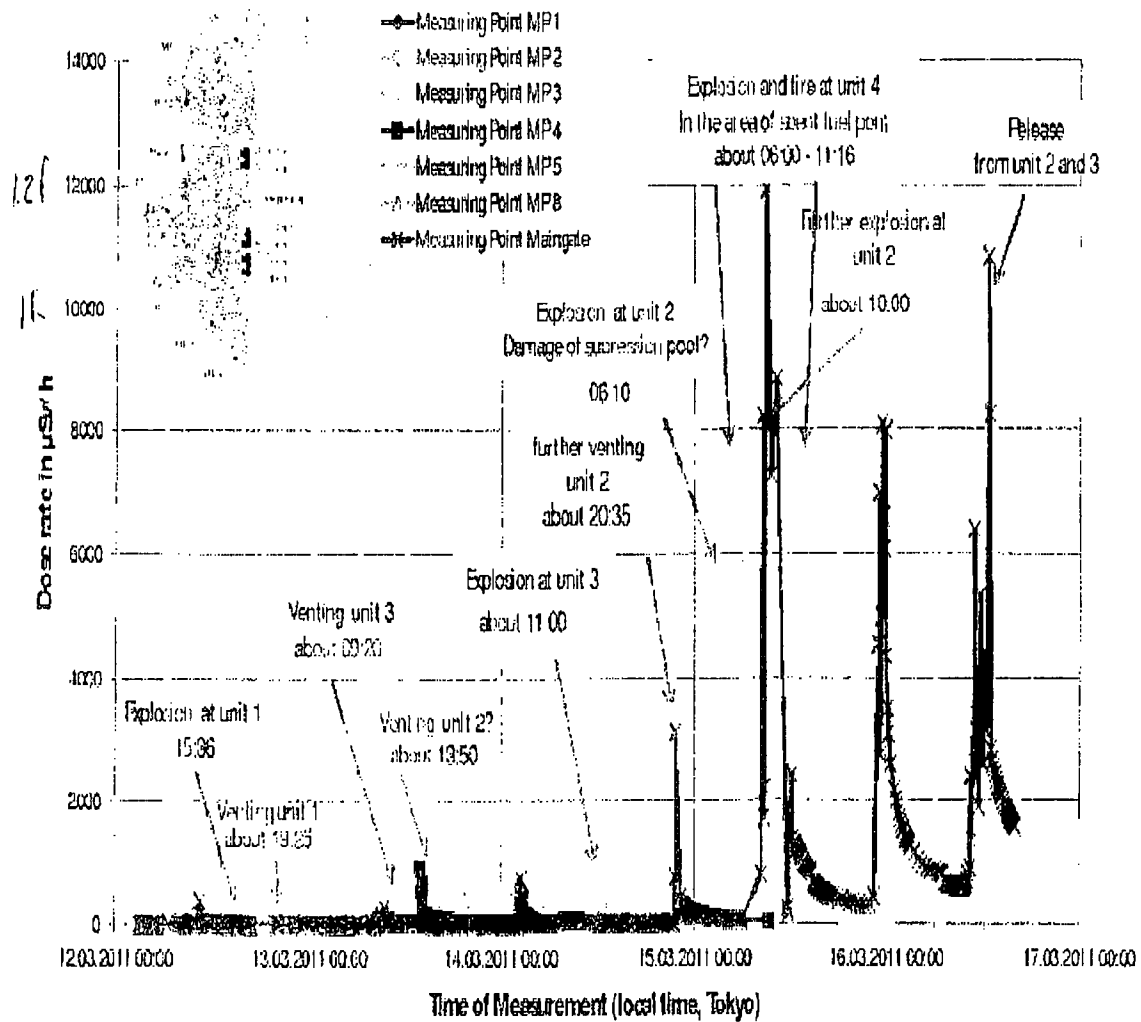
4. Can you describe the purpose of the U.S. presence in Japan?

A: NRC has a team of individuals providing advice and assistance to the U.S. Ambassador in Tokyo. The team is also supporting U.S. efforts to assist Japan in dealing with the challenges associated with bringing Fukushima Daiichi to a safe and secure state.

A group of U.S. industry representatives are also being assembled in Japan with support from INPO offices in Atlanta to facilitate the location and delivery of supplies, services, and materials. A technical support organization is also in place in Atlanta to facilitate the timely response to requests for technical support during the mitigation and stabilization phase of the Fukushima Daiichi event. (Question was suggestion from Chuck Casto).

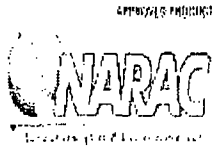
Radiation release chronology – Fukushima Dai-ichi

Measured Dose Rates for Selected Measuring Points
Fukushima Daiichi - Data of Operator TEPCO



UC Berkeley

Source: OECD Nuclear Energy Agency



Consequence Report

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release

Issued: March 25, 2011 15:18 UTC

SUMMARY:

This report describes the health effect consequences associated with a hypothetical unknown release to the atmosphere from a radiological source. This is an initial, automated NARAC product, not a final recommendation. Initial predictions are for a limited time period and areas affected may change at later times. Please consult NARAC staff (925-422-7627) for refined, quality assured predictions. Predictions should be confirmed and refined using measurements.

PRODUCTS:

Early Phase Dose (0-4d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (4-8d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (8-12d) : (Total Effective Dose)

NARAC Contact Information email: narac@nrc.gov or phone (925) 424-6465

-1-

Early Phase Dose (0-4d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 1.8 km 2.3 km ²	2,380
Exceeds 1 rem total effective dose.	>1 8.6 km 41.2 km ²	10,200

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 16, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:51 UTC

Model: LODI

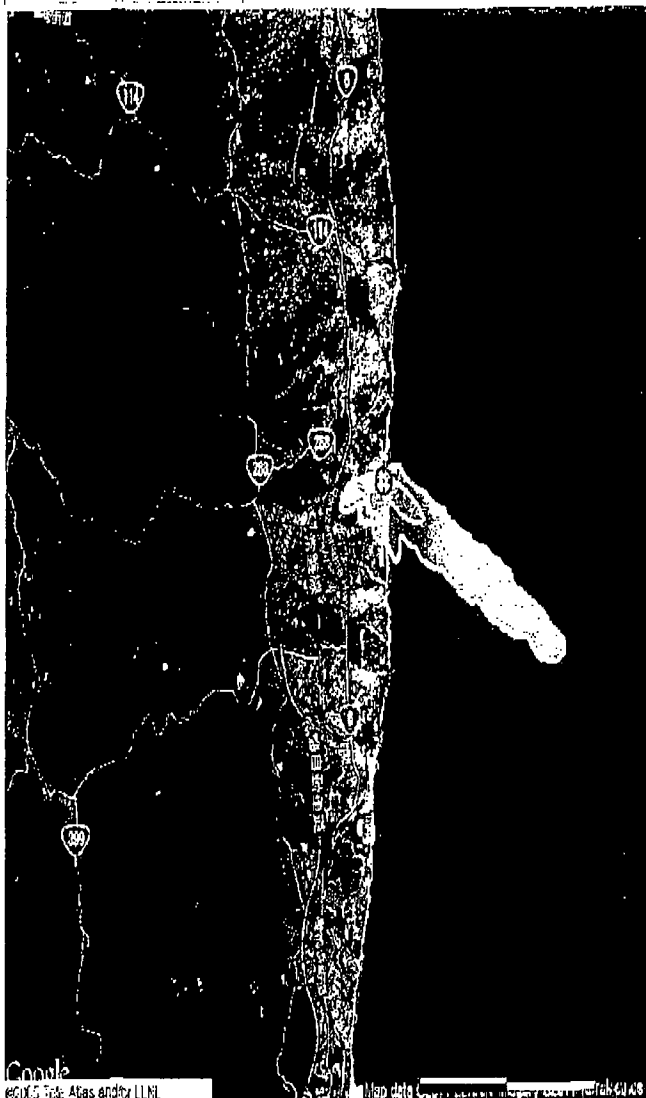
Comments:

Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario

Early Phase Dose (4-8d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 2.6 km 1.7 km ²	730
Exceeds 1 rem total effective dose.	>1 11.6 km 21.6 km ²	3,080

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 16, 2011 06:25 UTC to March 20, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:52 UTC

Model: LODI

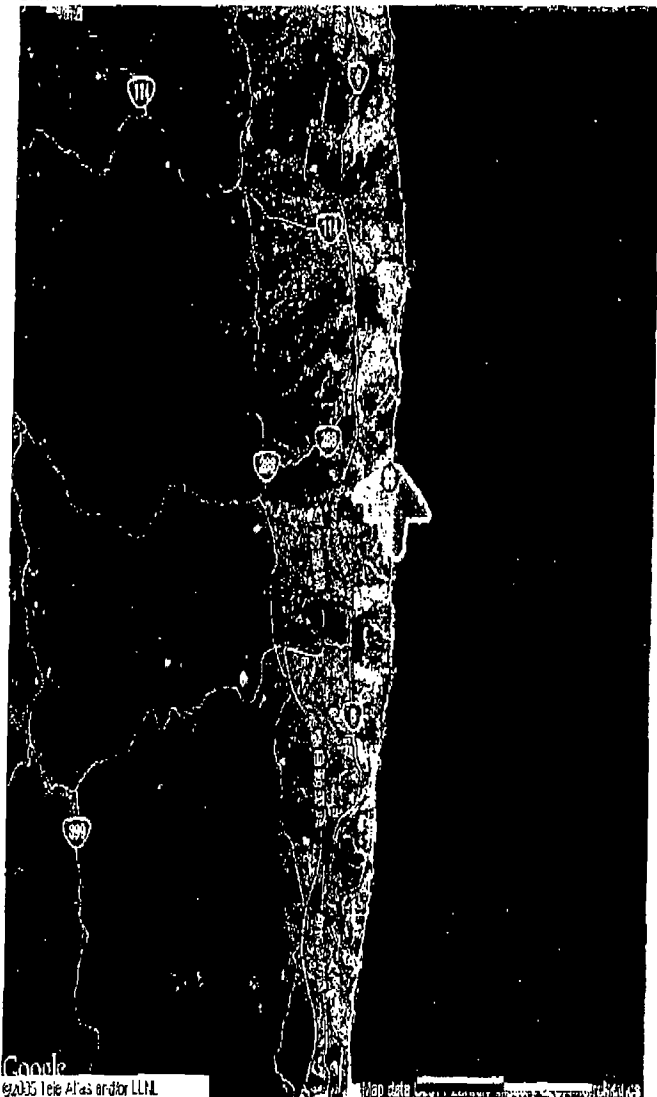
Comments:

Doses shown are accrued after 03/16/2011 06:25:00 UTC and can be avoided by protective actions

Plausible Realistic Scenario

Early Phase Dose (8-12d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 0.5 km 0.4 km ²	540
Exceeds 1 rem total effective dose.	>1 2.7 km 6.0 km ²	2,970

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 20, 2011 06:25 UTC to March 24, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:52 UTC

Model: LOD1

Comments:

Doses shown are accrued after 03/20/2011 06:25:00 UTC and can be avoided by protective actions

Plausible Realistic Scenario

NARAC Operations: { onDuty Assessor }; narac@llnl.gov; 925-424-6465

Requested by: {none none; DOF.NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Early Phase Dose (0-14d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 3.2 km 8.5 km ²	3,220
Exceeds 1 rem total effective dose.	>1 12.6 km 98.2 km ²	14,900

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-133 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

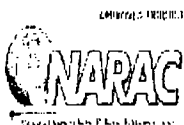
Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario



Early Phase Guidance (Radioiodine) (0-14 d)
 (KI Administration based on Thyroid Radioiodine Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
 NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: { onDuty Assessor }; narac@llnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Effects and Actions		
Description	(rem) Extent Area	Population
Adult thyroid Committed Equivalent Dose - Early Phase FDA Guidance for KI administration to adults	>10 8.4 km 34.7 km ²	8,580
Child thyroid Committed Equivalent Dose - Early Phase PAG for KI administration to children.	>5 17.8 km 252 km ²	27,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: I-131 + I-132 + TE-132 + I-133 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario

Worker Protection Dose Rate at 4 d
(Groundshine Dose Rate at 03/16/2011 15:25:00 JST)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@inl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC: 925-422-9100)

Acute (Short-Term) Effects		
Description	(mrem/hr) Extent Area	Population
Limit for all occupational exposures exceeded by exposure for 50 hours or less.	>100 0.2 km 0.02 km ²	50
U.S. NCRP radiological control boundary.	>10 3.5 km 7.1 km ²	3,120
U.S. NRC public exclusion zone	>2 10.2 km 76.3 km ²	13,600

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 16, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

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Worker Protection Dose Rate at 8 d
(Groundshine Dose Rate at 03/20/2011 15:25:00 JST)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production:3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Acute (Short-Term) Effects

Description	(mrem/hr) Extent Area	Population
U.S. NCRP radiological control boundary.	>10 2.9 km 5.5 km ²	2,910
U.S. NRC public exclusion zone	>2 11.9 km 64.7 km ²	10,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 20, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario



Worker Protection Dose Rate at 12 d
(Groundshine Dose Rate at 03/24/2011 15:25:00 JST)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Acute (Short-Term) Effects

Description	(mrem/hr) Extent Area	Population
U.S. NCRP radiological control boundary.	>10 2.3 km 3.9 km ²	2,560
U.S. NRC public exclusion zone	>2 8.8 km 48.7 km ²	10,100

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 24, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rc1

NARAC Operations: { onDuty Assessor }; narac@lnl.gov, 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Deposition at 14 d
(Surface Contamination from Deposited Radionuclides)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@lnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Effects and Actions

Description	(Ci/m ²) Extent Area	Population
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.01 0.2 km 0.07 km ²	120
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0010 3.5 km 8.3 km ²	3,150
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0001 16.4 km 217 km ²	25,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario



Consequence Report

Issued: March 25, 2011 15:18 UTC

Japan Impacts - NRC PRC V3 (U1Exp)

NARAC Report - Potential Release

SUMMARY:

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PRODUCTS:

Early Phase Dose (0-4d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (4-8d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

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Early Phase Dose (8-12d) : (Total Effective Dose)

NARAC Contact Information email: narac@hnl.gov or phone (925) 424-6465

-1-

Official Use Only - Not Approved for Further Distribution

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

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Early Phase Dose (0-14d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

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Early Phase Guidance (Radioiodine) (0-14 d) : (KI Administration based on Thyroid Radioiodine Dose)

Material: I-131 + I-132 + TE-132 + I-133 + TE-129M

The U.S. Environmental Protection Agency (EPA) and Department of Homeland Security (DHS) have proposed or accepted similar sets of Protective Action Guides (PAGs) to indicate when protective actions should be considered/implemented to protect the population. These Guides correspond to specific dose levels and are primarily based on an assessment of the risk in developing cancer over an exposed individual's lifetime. Thus the health effects produced by these doses may develop over a period of years. In the event radioiodines are released into the atmosphere, the PAG level is based on the projected dose to a child's thyroid which may be avoided by the administering of potassium iodide. Additional levels based on guidance from the U.S. Food and Drug Administration for adults may also be shown. (Note that the PAG level for potassium iodide administration to pregnant women is 5 rem to the adult thyroid.) These model predictions are based on the effects of radiation from the material inhaled and retained by the body, and use the conservative assumption that individuals are unsheltered and remain in the area during the time period specified in the figure's legend. Health effects could be significantly different for sheltered individuals or for those exposed in these areas for different time periods. Estimates of the number of exposed individuals expected to experience these effects may be given in the legend. If so, the counts given for all illnesses include those leading to pre-mature death. Note that the counts and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 4 d : (Groundshine Dose Rate at 03/16/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health

NARAC Contact Information email: narac@hlnl.gov or phone (925) 424-6465

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effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 8 d : (Groundshine Dose Rate at 03/20/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 12 d : (Groundshine Dose Rate at 03/24/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Deposition at 14 d : (Surface Contamination from Deposited Radionuclides)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the more highly contaminated areas due to fallout and deposition of the radioactive material. This material, depending upon the type of radiation emitted, may continue to give significant doses to individuals in these areas through inhalation of resuspended radioactive material or from direct external radiation. These levels of deposited radioactivity should be confirmed by monitoring surveys.

SOURCE INFORMATION:

Release Start Time: March 12, 2011 06:25 UTC
Release Stop Time: March 26, 2011 06:25 UTC
Release Location: (37.421389, 141.0325) Fukushima 1
Source Material and Amount: Early Phase Dose (0-4d)
NARAC Contact Information email: narac@hhl.gov or phone (925) 424-6465

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Early Phase Dose (4-8d)

Early Phase Dose (8-12d)

Early Phase Dose (0-14d)

138969 Ci of BA-140 (100% respirable) over 1036800 sec

3162.34 Ci of CE-144 (100% respirable) over 1036800 sec

40.1641 Ci of CM-242 (100% respirable) over 1036800 sec

177591 Ci of CS-134 (100% respirable) over 1036800 sec

61424.6 Ci of CS-136 (100% respirable) over 1036800 sec

129073 Ci of CS-137 (100% respirable) over 1036800 sec

1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec

743463 Ci of I-132 (100% respirable) over 1036800 sec

312127 Ci of I-133 (100% respirable) over 1036800 sec

305.666 Ci of PU-241 (100% respirable) over 1036800 sec

2277.81 Ci of RB-86 (100% respirable) over 1036800 sec

18478.1 Ci of RU-103 (100% respirable) over 1036800 sec

5395.12 Ci of RU-106 (100% respirable) over 1036800 sec

12057.3 Ci of SB-127 (100% respirable) over 1036800 sec

83562.2 Ci of SR-89 (100% respirable) over 1036800 sec

6698.63 Ci of SR-90 (100% respirable) over 1036800 sec

3537.12 Ci of TE-127M (100% respirable) over 1036800 sec

14672.2 Ci of TE-129M (100% respirable) over 1036800 sec

177062 Ci of TE-132 (100% respirable) over 1036800 sec

8.3307e+07 Ci of XE-133 (100% respirable) over 1036800 sec

Early Phase Guidance (Radioiodine) (0-14 d)

1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec

743463 Ci of I-132 (100% respirable) over 1036800 sec

312127 Ci of I-133 (100% respirable) over 1036800 sec

14672.2 Ci of TE-129M (100% respirable) over 1036800 sec

177062 Ci of TE-132 (100% respirable) over 1036800 sec

Worker Protection Dose Rate at 4 d

Worker Protection Dose Rate at 8 d

Worker Protection Dose Rate at 12 d

Deposition at 14 d

138969 Ci of BA-140 (100% respirable) over 1036800 sec

3162.34 Ci of CE-144 (100% respirable) over 1036800 sec

40.1641 Ci of CM-242 (100% respirable) over 1036800 sec

177591 Ci of CS-134 (100% respirable) over 1036800 sec

61424.6 Ci of CS-136 (100% respirable) over 1036800 sec

129073 Ci of CS-137 (100% respirable) over 1036800 sec

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1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec
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 312127 Ci of I-133 (100% respirable) over 1036800 sec
 305.666 Ci of PU-241 (100% respirable) over 1036800 sec
 2277.81 Ci of RB-86 (100% respirable) over 1036800 sec
 18478.1 Ci of RU-103 (100% respirable) over 1036800 sec
 5395.12 Ci of RU-106 (100% respirable) over 1036800 sec
 12057.3 Ci of SB-127 (100% respirable) over 1036800 sec
 83562.2 Ci of SR-89 (100% respirable) over 1036800 sec
 6698.63 Ci of SR-90 (100% respirable) over 1036800 sec
 3537.12 Ci of TE-127M (100% respirable) over 1036800 sec
 14672.2 Ci of TE-129M (100% respirable) over 1036800 sec
 177062 Ci of TE-132 (100% respirable) over 1036800 sec
 gaussian cloud top at 200 m

Source Geometry:

Particle Size Distribution:

All particulate is in the respirable range from 0.1 to 10 microns

METEOROLOGY:

ADAPT Gridded Metdata from 03/11/2011 21:00:00 JST to 03/26/2011 15:00:00 JST at 2 hr intervals were used in this calculation

Gridded Met	Obs Time
Source	
ADAPT	March 11, 2011 12:00 UTC
ADAPT	March 11, 2011 14:00 UTC
ADAPT	March 11, 2011 16:00 UTC
ADAPT	March 11, 2011 18:00 UTC
ADAPT	March 11, 2011 20:00 UTC
ADAPT	March 11, 2011 22:00 UTC
ADAPT	March 12, 2011 00:00 UTC
ADAPT	March 12, 2011 02:00 UTC
ADAPT	March 12, 2011 04:00 UTC
ADAPT	March 12, 2011 06:00 UTC
ADAPT	March 12, 2011 08:00 UTC
ADAPT	March 12, 2011 10:00 UTC
ADAPT	March 12, 2011 12:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 12, 2011 13:00 UTC
ADAPT	March 12, 2011 15:00 UTC
ADAPT	March 12, 2011 16:00 UTC
ADAPT	March 12, 2011 18:00 UTC
ADAPT	March 12, 2011 20:00 UTC
ADAPT	March 12, 2011 22:00 UTC
ADAPT	March 13, 2011 00:00 UTC
ADAPT	March 13, 2011 02:00 UTC
ADAPT	March 13, 2011 04:00 UTC
ADAPT	March 13, 2011 06:00 UTC
ADAPT	March 13, 2011 08:00 UTC
ADAPT	March 13, 2011 10:00 UTC
ADAPT	March 13, 2011 12:00 UTC
ADAPT	March 13, 2011 14:00 UTC
ADAPT	March 13, 2011 16:00 UTC
ADAPT	March 13, 2011 18:00 UTC
ADAPT	March 13, 2011 19:00 UTC
ADAPT	March 13, 2011 22:00 UTC
ADAPT	March 14, 2011 00:00 UTC
ADAPT	March 14, 2011 02:00 UTC
ADAPT	March 14, 2011 04:00 UTC
ADAPT	March 14, 2011 06:00 UTC
ADAPT	March 14, 2011 08:00 UTC
ADAPT	March 14, 2011 10:00 UTC
ADAPT	March 14, 2011 12:00 UTC
ADAPT	March 14, 2011 14:00 UTC
ADAPT	March 14, 2011 16:00 UTC
ADAPT	March 14, 2011 18:00 UTC
ADAPT	March 14, 2011 20:00 UTC
ADAPT	March 14, 2011 22:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 15, 2011 00:00 UTC
ADAPT	March 15, 2011 02:00 UTC
ADAPT	March 15, 2011 04:00 UTC
ADAPT	March 15, 2011 06:00 UTC
ADAPT	March 15, 2011 08:00 UTC
ADAPT	March 15, 2011 10:00 UTC
ADAPT	March 15, 2011 12:00 UTC
ADAPT	March 15, 2011 14:00 UTC
ADAPT	March 15, 2011 16:00 UTC
ADAPT	March 15, 2011 18:00 UTC
ADAPT	March 15, 2011 20:00 UTC
ADAPT	March 15, 2011 22:00 UTC
ADAPT	March 16, 2011 00:00 UTC
ADAPT	March 16, 2011 02:00 UTC
ADAPT	March 16, 2011 04:00 UTC
ADAPT	March 16, 2011 06:00 UTC
ADAPT	March 16, 2011 08:00 UTC
ADAPT	March 16, 2011 10:00 UTC
ADAPT	March 16, 2011 12:00 UTC
ADAPT	March 16, 2011 14:00 UTC
ADAPT	March 16, 2011 16:00 UTC
ADAPT	March 16, 2011 18:00 UTC
ADAPT	March 16, 2011 20:00 UTC
ADAPT	March 16, 2011 22:00 UTC
ADAPT	March 17, 2011 00:00 UTC
ADAPT	March 17, 2011 02:00 UTC
ADAPT	March 17, 2011 04:00 UTC
ADAPT	March 17, 2011 06:00 UTC
ADAPT	March 17, 2011 08:00 UTC
ADAPT	March 17, 2011 10:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 17, 2011 12:00 UTC
ADAPT	March 17, 2011 14:00 UTC
ADAPT	March 17, 2011 16:00 UTC
ADAPT	March 17, 2011 18:00 UTC
ADAPT	March 17, 2011 20:00 UTC
ADAPT	March 17, 2011 22:00 UTC
ADAPT	March 18, 2011 00:00 UTC
ADAPT	March 18, 2011 02:00 UTC
ADAPT	March 18, 2011 04:00 UTC
ADAPT	March 18, 2011 06:00 UTC
ADAPT	March 18, 2011 08:00 UTC
ADAPT	March 18, 2011 10:00 UTC
ADAPT	March 18, 2011 12:00 UTC
ADAPT	March 18, 2011 14:00 UTC
ADAPT	March 18, 2011 16:00 UTC
ADAPT	March 18, 2011 21:00 UTC
ADAPT	March 18, 2011 23:00 UTC
ADAPT	March 19, 2011 01:00 UTC
ADAPT	March 19, 2011 03:00 UTC
ADAPT	March 19, 2011 05:00 UTC
ADAPT	March 19, 2011 07:00 UTC
ADAPT	March 19, 2011 10:00 UTC
ADAPT	March 19, 2011 12:00 UTC
ADAPT	March 19, 2011 14:00 UTC
ADAPT	March 19, 2011 16:00 UTC
ADAPT	March 19, 2011 17:00 UTC
ADAPT	March 19, 2011 21:00 UTC
ADAPT	March 19, 2011 23:00 UTC
ADAPT	March 20, 2011 01:00 UTC
ADAPT	March 20, 2011 03:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 20, 2011 05:00 UTC
ADAPT	March 20, 2011 07:00 UTC
ADAPT	March 20, 2011 09:00 UTC
ADAPT	March 20, 2011 11:00 UTC
ADAPT	March 20, 2011 13:00 UTC
ADAPT	March 20, 2011 15:00 UTC
ADAPT	March 20, 2011 17:00 UTC
ADAPT	March 20, 2011 19:00 UTC
ADAPT	March 20, 2011 21:00 UTC
ADAPT	March 20, 2011 23:00 UTC
ADAPT	March 21, 2011 01:00 UTC
ADAPT	March 21, 2011 03:00 UTC
ADAPT	March 21, 2011 05:00 UTC
ADAPT	March 21, 2011 07:00 UTC
ADAPT	March 21, 2011 09:00 UTC
ADAPT	March 21, 2011 11:00 UTC
ADAPT	March 21, 2011 13:00 UTC
ADAPT	March 21, 2011 15:00 UTC
ADAPT	March 21, 2011 17:00 UTC
ADAPT	March 21, 2011 19:00 UTC
ADAPT	March 21, 2011 21:00 UTC
ADAPT	March 21, 2011 23:00 UTC
ADAPT	March 22, 2011 01:00 UTC
ADAPT	March 22, 2011 03:00 UTC
ADAPT	March 22, 2011 05:00 UTC
ADAPT	March 22, 2011 07:00 UTC
ADAPT	March 22, 2011 09:00 UTC
ADAPT	March 22, 2011 11:00 UTC
ADAPT	March 22, 2011 13:00 UTC
ADAPT	March 22, 2011 15:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 22, 2011 17:00 UTC
ADAPT	March 22, 2011 19:00 UTC
ADAPT	March 22, 2011 21:00 UTC
ADAPT	March 22, 2011 23:00 UTC
ADAPT	March 23, 2011 00:00 UTC
ADAPT	March 23, 2011 02:00 UTC
ADAPT	March 23, 2011 04:00 UTC
ADAPT	March 23, 2011 06:00 UTC
ADAPT	March 23, 2011 08:00 UTC
ADAPT	March 23, 2011 10:00 UTC
ADAPT	March 23, 2011 12:00 UTC
ADAPT	March 23, 2011 14:00 UTC
ADAPT	March 23, 2011 16:00 UTC
ADAPT	March 23, 2011 18:00 UTC
ADAPT	March 23, 2011 20:00 UTC
ADAPT	March 23, 2011 22:00 UTC
ADAPT	March 24, 2011 00:00 UTC
ADAPT	March 24, 2011 02:00 UTC
ADAPT	March 24, 2011 04:00 UTC
ADAPT	March 24, 2011 06:00 UTC
ADAPT	March 24, 2011 08:00 UTC
ADAPT	March 24, 2011 10:00 UTC
ADAPT	March 24, 2011 12:00 UTC
ADAPT	March 24, 2011 14:00 UTC
ADAPT	March 24, 2011 16:00 UTC
ADAPT	March 24, 2011 18:00 UTC
ADAPT	March 24, 2011 20:00 UTC
ADAPT	March 24, 2011 22:00 UTC
ADAPT	March 25, 2011 00:00 UTC
ADAPT	March 25, 2011 02:00 UTC

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Gridded Met	Obs Time
Source	
ADAPT	March 25, 2011 04:00 UTC
ADAPT	March 25, 2011 06:00 UTC
ADAPT	March 25, 2011 08:00 UTC
ADAPT	March 25, 2011 10:00 UTC
ADAPT	March 25, 2011 12:00 UTC
ADAPT	March 25, 2011 14:00 UTC
ADAPT	March 25, 2011 16:00 UTC
ADAPT	March 25, 2011 18:00 UTC
ADAPT	March 25, 2011 20:00 UTC
ADAPT	March 25, 2011 22:00 UTC
ADAPT	March 26, 2011 00:00 UTC
ADAPT	March 26, 2011 02:00 UTC
ADAPT	March 26, 2011 04:00 UTC
ADAPT	March 26, 2011 06:00 UTC

No precipitation is included in this calculation

ASSUMPTIONS:

Unless otherwise stated ICRP60 series DCF's were used for dose plots.

CONTACT INFORMATION:

Calculation requested on March 25, 2011 04:00 UTC by:

none none, DOE NIT
202-586-8100

Approved by: NARAC Operations
Approver organization: NARAC
Phone: 925-422-9100

NARAC Contact Information email: narac@hnl.gov or phone (925) 424-6465

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Email: narac@llnl.gov

Approved on: March 25, 2011 04:14 UTC

Classification: Official Use Only - Not Approved for Further Distribution

DISCLAIMER:

These model predictions are intended to be guidance, and are not final recommendations. The accuracy of any prediction will be limited by the accuracy of the input data, such as estimates of the amount of material that becomes airborne and the available meteorological data for the area and time of the incident. Plume predictions may be for a limited time period, and may change at later times if new input data becomes available. Predictions should be confirmed and refined using field measurements. Air and ground concentration may be higher than predicted by this plume model simulation due the limited resolution of this particular simulation. For actual incidents or exercises, consult incident command and subject matter experts from the appropriate coordinating agency before making any decisions based on this model prediction.

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Early Phase Dose (0-4d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@lnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC: 925-422-9100)

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 1.8 km 2.3 km ²	2,380
Exceeds 1 rem total effective dose.	>1 8.6 km 41.2 km ²	10,200

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 16, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:51 UTC

Model: LODI

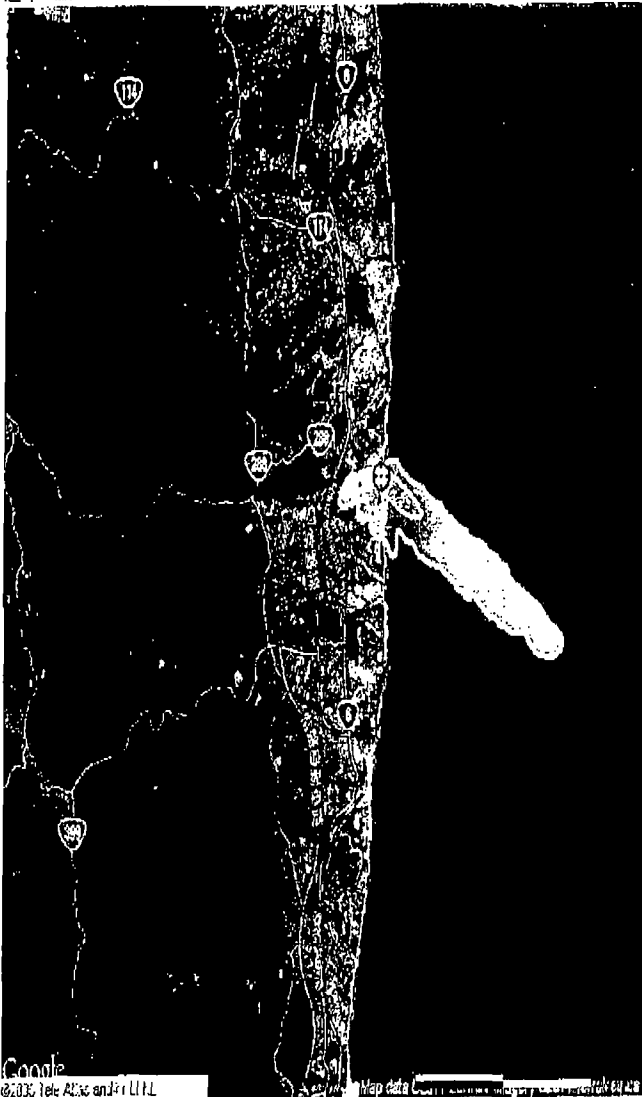
Comments:

Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario

Early Phase Dose (4-8d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@inl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 2.6 km 1.7 km ²	730
Exceeds 1 rem total effective dose.	>1 11.6 km 21.6 km ²	3,080

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 16, 2011 06:25 UTC to March 20, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are accrued after 03/16/2011 06:25:00 UTC and can be avoided by protective actions

Plausible Realistic Scenario

Early Phase Dose (8-12d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@hnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 0.5 km 0.4 km ²	540
Exceeds 1 rem total effective dose.	>1 2.7 km 6.0 km ²	2,970

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 20, 2011 06:25 UTC to March 24, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are accrued after 03/20/2011 06:25:00 UTC and can be avoided by protective actions

Plausible Realistic Scenario

Early Phase Dose (0-14d)
(Total Effective Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor), narac@llnl.gov; 925-424-6465
 Requested by: (none none; DOE NIT; 202-586-8100)
 Approved by: (NARAC Operations; NARAC; 925-422-9100)

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 3.2 km 8.5 km ²	3,220
Exceeds 1 rem total effective dose.	>1 12.6 km 98.2 km ²	14,900

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario

Early Phase Guidance (Radioiodine) (0-14 d)
 (KI Administration based on Thyroid Radioiodine Dose)

Japan Impacts - NRC PRC V3 (U1Exp)
 NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@lnl.gov; 925-424-6465
Requested by: (none none; DOE NIT; 202-586-8100)
Approved by: {NARAC Operations; NARAC; 925-422-9100}

Effects and Actions		
Description	(rem) Extent Area	Population
Adult thyroid Committed Equivalent Dose - Early Phase FDA Guidance for KI administration to adults	>10 8.4 km 34.7 km ²	8,580
Child thyroid Committed Equivalent Dose - Early Phase PAG for KI administration to children.	>5 17.8 km 252 km ²	27,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: I-131 + I-132 + TE-132 + I-133 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario

Worker Protection Dose Rate at 4 d
(Groundshine Dose Rate at 03/16/2011 15:25:00 JST)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km td: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Acute (Short-Term) Effects		
Description	(mrem/hr) Extent Area	Population
Limit for all occupational exposures exceeded by exposure for 50 hours or less.	>100 0.2 km 0.02 km ²	50
U.S. NCRP radiological control boundary.	>10 3.5 km 7.1 km ²	3,120
U.S. NRC public exclusion zone.	>2 10.2 km 76.3 km ²	13,600

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 16, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

Official Use Only - Not Approved for Further Distribution

Worker Protection Dose Rate at 8 d
(Groundshine Dose Rate at 03/20/2011 15:25:00 JST)

Japan Impacts - NRC PRC V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@inl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Acute (Short-Term) Effects		
Description	(mrem/hr) Extent Area	Population
U.S. NCRP radiological control boundary.	>10 2.9 km 5.5 km ²	2,910
U.S. NRC public exclusion zone	>2 11.9 km 64.7 km ²	10,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 20, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

Worker Protection Dose Rate at 12 d
 (Groundshine Dose Rate at 03/24/2011 15:25:00 JST)

Japan Impacts - NRC PRC V3 (U1Exp)
 NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: {onDuty Assessor}; narac@llnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Acute (Short-Term) Effects		
Description	(mrem/hr) Extent Area	Population
U.S. NCRP radiological control boundary.	>10 2.3 km 3.9 km ²	2,560
U.S. NRC public exclusion zone	>2 8.8 km 48.7 km ²	10,100

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 24, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

Deposition at 14 d
(Surface Contamination from Deposited Radionuclides)



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Effects and Actions		
Description	(Ci/m2) Extent Area	Population
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.01 0.2 km 0.07 km2	120
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0010 3.5 km 8.3 km2	3,150
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0001 16.4 km 217 km2	25,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario



Consequence Report

Japan Impacts - NRC Plausible Realistic Case V3 (U1Exp)

NARAC Report - Potential Release

Issued: March 30, 2011 00:29 UTC

SUMMARY:

This report describes the health effect consequences associated with a hypothetical unknown release to the atmosphere from a radiological source. This is an initial, automated NARAC product, not a final recommendation. Initial predictions are for a limited time period and areas affected may change at later times. Please consult NARAC staff (925-422-7627) for refined, quality assured predictions. Predictions should be confirmed and refined using measurements.

PRODUCTS:

Early Phase Dose (0-4d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (4-8d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (8-12d) : (Total Effective Dose)

NARAC Contact Information email: narac@hnl.gov or phone (925) 424-6165

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effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 8 d : (Groundshine Dose Rate at 03/20/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 12 d : (Groundshine Dose Rate at 03/24/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Deposition at 14 d : (Surface Contamination from Deposited Radionuclides)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the more highly contaminated areas due to fallout and deposition of the radioactive material. This material, depending upon the type of radiation emitted, may continue to give significant doses to individuals in these areas through inhalation of resuspended radioactive material or from direct external radiation. These levels of deposited radioactivity should be confirmed by monitoring surveys.

SOURCE INFORMATION:

Release Start Time: March 12, 2011 06:25 UTC
Release Stop Time: March 26, 2011 06:25 UTC
Release Location: (37.421389, 141.0325) Fukushima 1
Source Material and Amount: Early Phase Dose (0-4d)
NARAC Contact Information email: narac@hhl.gov or phone (925) 424-6465

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1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec
 743463 Ci of I-132 (100% respirable) over 1036800 sec
 312127 Ci of I-133 (100% respirable) over 1036800 sec
 305.666 Ci of PU-241 (100% respirable) over 1036800 sec
 2277.81 Ci of RB-86 (100% respirable) over 1036800 sec
 18478.1 Ci of RU-103 (100% respirable) over 1036800 sec
 5395.12 Ci of RU-106 (100% respirable) over 1036800 sec
 12057.3 Ci of SB-127 (100% respirable) over 1036800 sec
 83562.2 Ci of SR-89 (100% respirable) over 1036800 sec
 6698.63 Ci of SR-90 (100% respirable) over 1036800 sec
 3537.12 Ci of TE-127M (100% respirable) over 1036800 sec
 14672.2 Ci of TE-129M (100% respirable) over 1036800 sec
 177062 Ci of TE-132 (100% respirable) over 1036800 sec
 gaussian cloud top at 200 m

Source Geometry:

Particle Size Distribution:

All particulate is in the respirable range from 0.1 to 10 microns

METEOROLOGY:

ADAPT Gridded Metdata from 03/11/2011 21:00:00 JST to 03/26/2011 15:00:00 JST at 2 hr intervals were used in this calculation

Gridded Met	Obs Time
Source	
ADAPT	March 11, 2011 12:00 UTC
ADAPT	March 11, 2011 14:00 UTC
ADAPT	March 11, 2011 16:00 UTC
ADAPT	March 11, 2011 18:00 UTC
ADAPT	March 11, 2011 20:00 UTC
ADAPT	March 11, 2011 22:00 UTC
ADAPT	March 12, 2011 00:00 UTC
ADAPT	March 12, 2011 02:00 UTC
ADAPT	March 12, 2011 04:00 UTC
ADAPT	March 12, 2011 06:00 UTC
ADAPT	March 12, 2011 08:00 UTC
ADAPT	March 12, 2011 10:00 UTC
ADAPT	March 12, 2011 12:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 15, 2011 00:00 UTC
ADAPT	March 15, 2011 02:00 UTC
ADAPT	March 15, 2011 04:00 UTC
ADAPT	March 15, 2011 06:00 UTC
ADAPT	March 15, 2011 08:00 UTC
ADAPT	March 15, 2011 10:00 UTC
ADAPT	March 15, 2011 12:00 UTC
ADAPT	March 15, 2011 14:00 UTC
ADAPT	March 15, 2011 16:00 UTC
ADAPT	March 15, 2011 18:00 UTC
ADAPT	March 15, 2011 20:00 UTC
ADAPT	March 15, 2011 22:00 UTC
ADAPT	March 16, 2011 00:00 UTC
ADAPT	March 16, 2011 02:00 UTC
ADAPT	March 16, 2011 04:00 UTC
ADAPT	March 16, 2011 06:00 UTC
ADAPT	March 16, 2011 08:00 UTC
ADAPT	March 16, 2011 10:00 UTC
ADAPT	March 16, 2011 12:00 UTC
ADAPT	March 16, 2011 14:00 UTC
ADAPT	March 16, 2011 16:00 UTC
ADAPT	March 16, 2011 18:00 UTC
ADAPT	March 16, 2011 20:00 UTC
ADAPT	March 16, 2011 22:00 UTC
ADAPT	March 17, 2011 00:00 UTC
ADAPT	March 17, 2011 02:00 UTC
ADAPT	March 17, 2011 04:00 UTC
ADAPT	March 17, 2011 06:00 UTC
ADAPT	March 17, 2011 08:00 UTC
ADAPT	March 17, 2011 10:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 20, 2011 05:00 UTC
ADAPT	March 20, 2011 07:00 UTC
ADAPT	March 20, 2011 09:00 UTC
ADAPT	March 20, 2011 11:00 UTC
ADAPT	March 20, 2011 13:00 UTC
ADAPT	March 20, 2011 15:00 UTC
ADAPT	March 20, 2011 17:00 UTC
ADAPT	March 20, 2011 19:00 UTC
ADAPT	March 20, 2011 21:00 UTC
ADAPT	March 20, 2011 23:00 UTC
ADAPT	March 21, 2011 01:00 UTC
ADAPT	March 21, 2011 03:00 UTC
ADAPT	March 21, 2011 05:00 UTC
ADAPT	March 21, 2011 07:00 UTC
ADAPT	March 21, 2011 09:00 UTC
ADAPT	March 21, 2011 11:00 UTC
ADAPT	March 21, 2011 13:00 UTC
ADAPT	March 21, 2011 15:00 UTC
ADAPT	March 21, 2011 17:00 UTC
ADAPT	March 21, 2011 19:00 UTC
ADAPT	March 21, 2011 21:00 UTC
ADAPT	March 21, 2011 23:00 UTC
ADAPT	March 22, 2011 01:00 UTC
ADAPT	March 22, 2011 03:00 UTC
ADAPT	March 22, 2011 05:00 UTC
ADAPT	March 22, 2011 07:00 UTC
ADAPT	March 22, 2011 09:00 UTC
ADAPT	March 22, 2011 11:00 UTC
ADAPT	March 22, 2011 13:00 UTC
ADAPT	March 22, 2011 15:00 UTC

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Gridded Met

Source	Obs Time
ADAPT	March 25, 2011 04:00 UTC
ADAPT	March 25, 2011 06:00 UTC
ADAPT	March 25, 2011 08:00 UTC
ADAPT	March 25, 2011 10:00 UTC
ADAPT	March 25, 2011 12:00 UTC
ADAPT	March 25, 2011 14:00 UTC
ADAPT	March 25, 2011 16:00 UTC
ADAPT	March 25, 2011 18:00 UTC
ADAPT	March 25, 2011 20:00 UTC
ADAPT	March 25, 2011 22:00 UTC
ADAPT	March 26, 2011 00:00 UTC
ADAPT	March 26, 2011 02:00 UTC
ADAPT	March 26, 2011 04:00 UTC
ADAPT	March 26, 2011 06:00 UTC

No precipitation is included in this calculation

ASSUMPTIONS:

Unless otherwise stated ICRP60 series DCF's were used for dose plots.

CONTACT INFORMATION:

Calculation requested on March 25, 2011 04:00 UTC by:

none none, DOE NIT
202-586-8100

Approved by: NARAC Operations
Approver organization: NARAC
Phone: 925-422-9100

NARAC Contact Information email: narac@llnl.gov or phone (925) 424-6465

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Early Phase Dose (0-4d)
(Total Effective Dose)

Japan Impacts - NRC Plausible Realistic
Case V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcG1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 1.8 km 2.3 km ²	2,380
Exceeds 1 rem total effective dose.	>1 8.6 km 41.2 km ²	10,200

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 16, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:51 UTC

Model: LODI

Comments:

Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario

Official Use Only - Not Approved for Further Distribution

Early Phase Dose (8-12d)
(Total Effective Dose)

Japan Impacts - NRC Plausible Realistic
Case V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@lml.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Actions and Long-Term Effects

Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 0.5 km 0.4 km ²	540
Exceeds 1 rem total effective dose.	>1 2.7 km 6.0 km ²	2,970

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 20, 2011 06:25 UTC to March 24, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are accrued after 03/20/2011 06:25:00 UTC and can be avoided by protective actions

Plausible Realistic Scenario

Early Phase Guidance (Radioiodine) (0-14 d)
 (KI Administration based on Thyroid Radioiodine Dose)

Japan Impacts - NRC Plausible Realistic
 Case V3 (U1Exp)
 NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100}

Approved by: {NARAC Operations; NARAC; 925-422-9100}

Effects and Actions		
Description	(rem) Extent Area	Population
Adult thyroid Committed Equivalent Dose - Early Phase FDA Guidance for KI administration to adults	>10 8.4 km 34.7 km ²	8,580
Child thyroid Committed Equivalent Dose - Early Phase PAG for KI administration to children.	>5 17.8 km 252 km ²	27,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: I-131 + I-132 + TE-132 + I-133 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

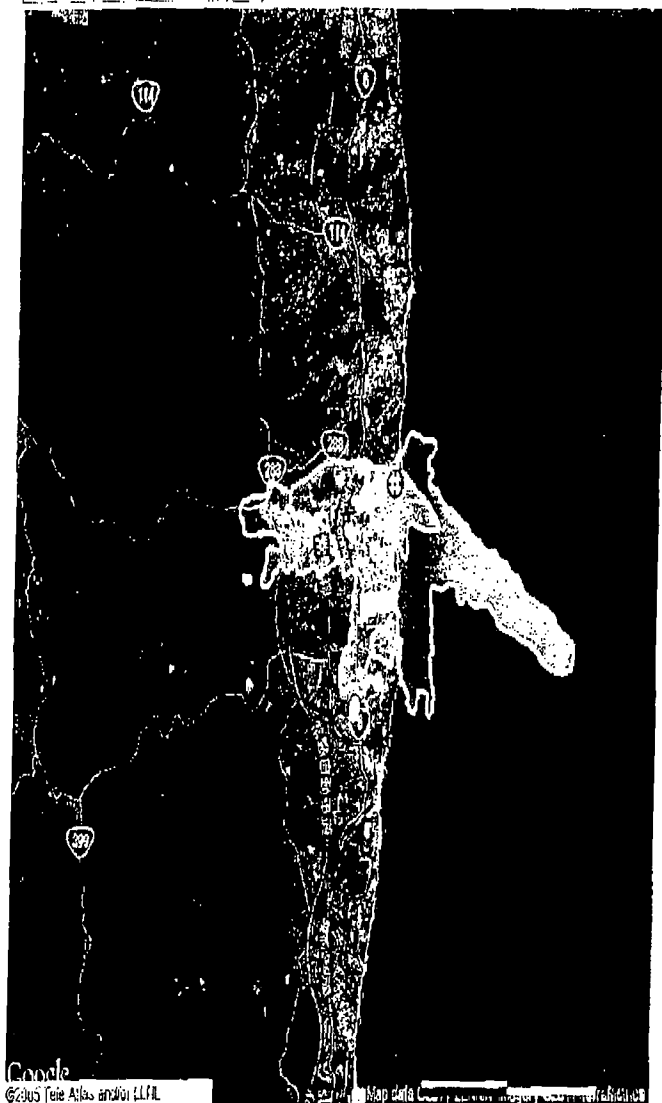
Doses shown are total accumulated from the beginning of release.

Plausible Realistic Scenario

Official Use Only - Not Approved for Further Distribution

Worker Protection Dose Rate at 8 d
(Groundshine Dose Rate at 03/20/2011 15:25:00 JST)

Japan Impacts - NRC Plausible Realistic
Case V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Acute (Short-Term) Effects		
Description	(mrem/hr) Extent Area	Population
U.S. NCRP radiological control boundary.	>10 2.9 km 5.5 km ²	2,910
U.S. NRC public exclusion zone	>2 11.9 km 64.7 km ²	10,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 20, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

Deposition at 14 d
(Surface Contamination from Deposited Radionuclides)

Japan Impacts - NRC Plausible Realistic
Case V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Effects and Actions		
Description	(Ci/m2) Extent Area	Population
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.01 0.2 km 0.07 km2	120
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0010 3.5 km 8.3 km2	3,150
No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0001 16.4 km 217 km2	25,800

Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.

Effects or contamination at March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

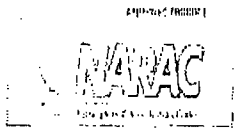
Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario



Consequence Report

Japan Impacts - NRC PRC V3 - Relocation NARAC Report - Potential Release

Official Use Only - Not Approved for Further
Distribution
Issued: April 03, 2011 09:48 UTC

SUMMARY:

This report describes the health effect consequences associated with a hypothetical unknown release to the atmosphere from a radiological source. This is an initial, automated NARAC product, not a final recommendation. Initial predictions are for a limited time period and areas affected may change at later times. Please consult NARAC staff (925-422-7627) for refined, quality assured predictions. Predictions should be confirmed and refined using measurements.

PRODUCTS:

Intermediate Phase Relocation PAGs : (Relocation based on Avoidable Groundshine and Resuspension Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

The following figure illustrates the model-predicted regions in which individuals are projected to have an elevated risk of developing fatal and non-fatal cancers due to radiation exposure over a period of many years from the radioactive material that has been deposited on the surface. There are two primary pathways by which individuals will continue to receive a radiological dose while they remain in these areas. Individuals in these regions will be exposed to radiation by direct exposure from radioactive material on surfaces and by exposure from material that has been resuspended into the air and subsequently inhaled. The U.S. Environmental Protection Agency (EPA) and Department of Homeland Security (DHS) have proposed or accepted similar sets of Protective Action Guides (PAGs) to indicate when relocation (long-term removal) of individuals should be considered. These Guides are primarily based on an assessment of the risk in developing cancer over an exposed individual's lifetime, and thus the health effects produced by the doses may develop over a period of several years. Note that the PAGs were developed based on avoidable dose (i.e. the dose that will be avoided once protective actions have been implemented). These model predictions are based on the conservative assumption that individuals are unsheltered and remain in the area during the time period specified in the figure's legend. If protective actions have not been implemented by the beginning of this exposure period, the avoidable dose will be less than that shown for the unsheltered population, and accumulated dose will continue to rise at an undiminished rate. Health effects could be significantly different for sheltered individuals or for those exposed in these areas for different time periods. The contours that may be displayed include the first-year relocation contour where individuals are projected to receive a dose in excess of 2 rem over the remainder of the first year following the release, and the second-year relocation contour where individuals are projected to receive a dose in excess of 0.5 rem during the second year following the release. (Doses received over each of the subsequent years are normally less than those received during the second-year.)

SOURCE INFORMATION:

Release Start Time: March 12, 2011 06:25 UTC
 Release Stop Time: March 26, 2011 06:25 UTC
 Release Location: (37.421389, 141.0325) Fukushima 1
 Release Mechanism: Generic
 Source Material and Amount: 138969 Ci of BA-140 (100% respirable) over 1036800 sec
 3162.34 Ci of CE-144 (100% respirable) over 1036800 sec
 40.1641 Ci of CM-242 (100% respirable) over 1036800 sec
 177591 Ci of CS-134 (100% respirable) over 1036800 sec
 61424.6 Ci of CS-136 (100% respirable) over 1036800 sec
 129073 Ci of CS-137 (100% respirable) over 1036800 sec
 1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec
 743463 Ci of I-132 (100% respirable) over 1036800 sec
 312127 Ci of I-133 (100% respirable) over 1036800 sec
 305.666 Ci of PU-241 (100% respirable) over 1036800 sec
 2277.81 Ci of RB-86 (100% respirable) over 1036800 sec
 18478.1 Ci of RU-103 (100% respirable) over 1036800 sec
 5395.12 Ci of RU-106 (100% respirable) over 1036800 sec
 12057.3 Ci of SB-127 (100% respirable) over 1036800 sec
 83562.2 Ci of SR-89 (100% respirable) over 1036800 sec
 6698.63 Ci of SR-90 (100% respirable) over 1036800 sec
 3537.12 Ci of TE-127M (100% respirable) over 1036800 sec
 14672.2 Ci of TE-129M (100% respirable) over 1036800 sec
 177062 Ci of TE-132 (100% respirable) over 1036800 sec
 Source Geometry: gaussian cloud top at 200 m
 Particle Size Distribution: All particulate is in the respirable range from 0.1 to 10 microns

METEOROLOGY:

ADAPT Gridded Metdata from 03/11/2011 21:00:00 JST to 03/26/2011 15:00:00 JST at 2 hr intervals were used in this calculation

Gridded Met

Source	Obs Time
ADAPT	March 11, 2011 12:00 UTC
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No precipitation is included in this calculation

ASSUMPTIONS:

Unless otherwise stated ICRP60 series DCF's were used for dose plots.

CONTACT INFORMATION:

Calculation requested by:

none none, DOE NIT
202-586-8100

Approved by:
NARAC Operations, NARAC
925-422-9100
narac@llnl.gov

Approved on: March 26, 2011 02:24 UTC

Classification: Official Use Only - Not Approved for Further Distribution

DISCLAIMER:

These model predictions are intended to be guidance, and are not final recommendations. The accuracy of any prediction will be limited by the accuracy of the input data, such as estimates of the amount of material that becomes airborne and the available meteorological data for the area and time of the incident. Plume predictions may be for a limited time period, and may change at later times if new input data becomes available. Predictions should be confirmed and refined using field measurements. Air and ground concentration may be higher than predicted by this plume model simulation due the limited resolution of this particular simulation. For actual incidents or exercises, consult incident command and subject matter experts from the appropriate coordinating agency before making any decisions based on this model prediction.

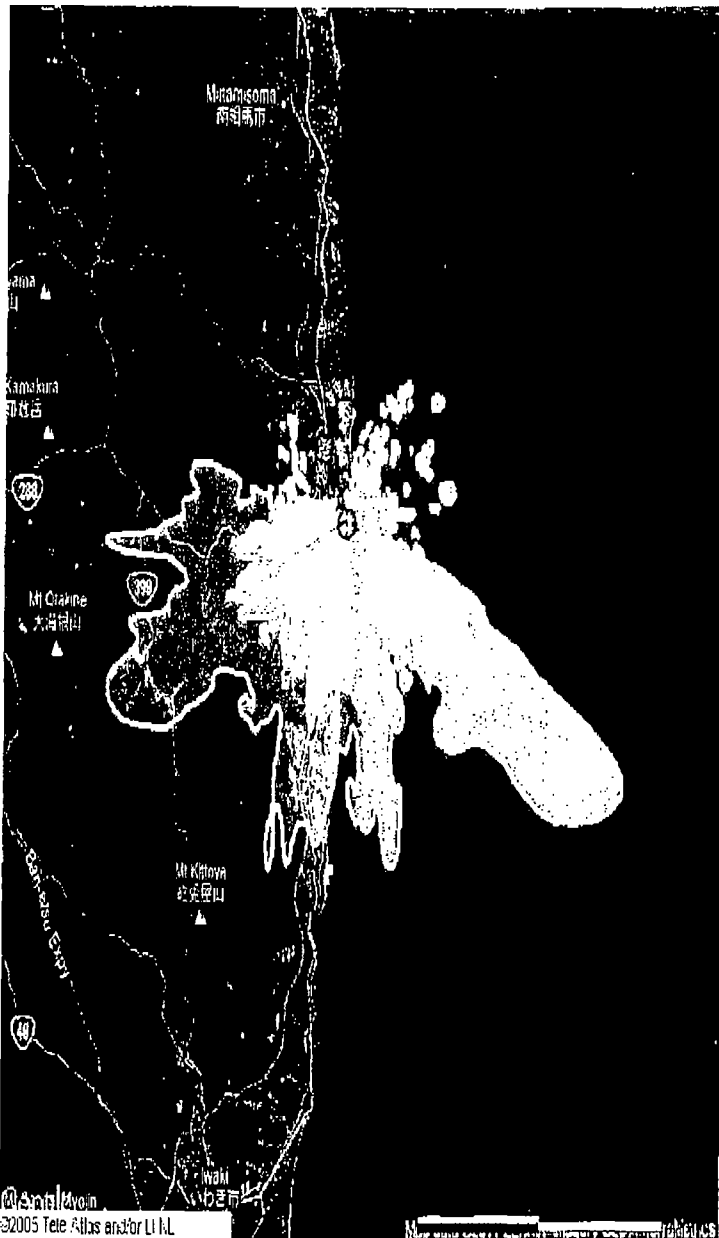
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This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.



Official Use Only - Not Approved for Further Distribution
Intermediate Phase Relocation PAGs
 (Relocation based on Avoidable Groundshine and Resuspension Dose)

Japan Impacts - NRC PRC V3 -
 Relocation
 NARAC Report - Potential
 Release



Actions and Long-Term Effects			
	Description	(rem) Extent Area	Population
	Exceeds first-year relocation PAG (5 d to 1 yr 5 d).	>2 15.2km 149km ²	19,300
	Exceeds second-year relocation PAG.	>0.5 32.0km 553km ²	36,700

Note: Areas and counts in the table are cumulative.
 Population Source = LandScan2005.

Effects or contamination from March 17, 2011 06:25 UTC to
 March 17, 2012 06:25 UTC at or near ground level.
Release Location: 37.421389 N, 141.032500 E
Material: BA-140 + GE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M
Generated On: March 26, 2011 00:27 UTC
Model: LODI
Comments:
 Doses shown are accrued after 03/17/2011 06:25:00 UTC and can be avoided by protective actions
 Tokyo Supercore 63 nuclides for U2 U3 U4a U4b



Consequence Report

Japan Impacts - NRC Plausible Realistic Case V3 (U1Exp) NARAC Report - Potential Release

Official Use Only - Not Approved for Further
Distribution
Issued: April 03, 2011 09:46 UTC

SUMMARY:

This report describes the health effect consequences associated with a hypothetical unknown release to the atmosphere from a radiological source. This is an initial, automated NARAC product, not a final recommendation. Initial predictions are for a limited time period and areas affected may change at later times. Please consult NARAC staff (925-422-7627) for refined, quality assured predictions. Predictions should be confirmed and refined using measurements.

PRODUCTS:

Early Phase Dose (0-4d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (4-8d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or

producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (8-12d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Dose (0-14d) : (Total Effective Dose)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133

This product identifies areas that could exceed doses of 5 and 1 rem over a 4-day exposure period, which begins at the start of the release. If used to project doses from a potential future release, these levels correspond to the EPA/DHS guidelines for the Early Phase based on the dose that may be avoided if shelter and evacuation guidance can be implemented prior to the beginning of the release. These Protective Action Guideline (PAG) limits are based on an assessment of the long-term risk of developing cancer in exposed individuals over their lifetime or producing genetic disorders in subsequent generations. These risks result from the projected combined dose caused by radiation from the material deposited onto the surface, radiation from the material as it is carried in the air, and radiation from the material that has been inhaled and retained by the body. Upon request, estimates of the total number of people exposed, and (after accounting for estimated deaths from acute, short-term effects) the number of expected subsequent fatal cancers and combined number of expected subsequent fatal and non-fatal cancers may be displayed. These are computer model estimates assuming unprotected exposure and no mitigating action (such as evacuation or sheltering) for the entire time period of this prediction, and therefore may be over-estimates of the actual effects.

Early Phase Guidance (Radioiodine) (0-14 d) : (KI Administration based on Thyroid Radioiodine Dose)

Material: I-131 + I-132 + TE-132 + I-133 + TE-129M

The U.S. Environmental Protection Agency (EPA) and Department of Homeland Security (DHS) have proposed or accepted similar sets of Protective Action Guides (PAGs) to indicate when protective actions should be considered/implemented to protect the population. These Guides correspond to specific dose levels and are primarily based on an assessment of the risk in developing cancer over an exposed individual's lifetime. Thus the health effects produced by these doses may develop over a period of years. In the event radioiodines are released into the

atmosphere, the PAG level is based on the projected dose to a child's thyroid which may be avoided by the administering of potassium iodide. Additional levels based on guidance from the U.S. Food and Drug Administration for adults may also be shown. (Note that the PAG level for potassium iodide administration to pregnant women is 5 rem to the adult thyroid.) These model predictions are based on the effects of radiation from the material inhaled and retained by the body, and use the conservative assumption that individuals are unsheltered and remain in the area during the time period specified in the figure's legend. Health effects could be significantly different for sheltered individuals or for those exposed in these areas for different time periods. Estimates of the number of exposed individuals expected to experience these effects may be given in the legend. If so, the counts given for all illnesses include those leading to pre-mature death. Note that the counts and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 4 d : (Groundshine Dose Rate at 03/16/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 8 d : (Groundshine Dose Rate at 03/20/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Worker Protection Dose Rate at 12 d : (Groundshine Dose Rate at 03/24/2011 15:25:00 JST)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the locations where the Federal Radiation Protection Guidance occupational upper limit dose may be exceeded for

various exposure periods by unprotected workers performing emergency services. These limits are based on the risk of workers developing cancer over their lifetimes, and ensure that exposures will not result in detrimental acute or early health effects. Although these doses may be expressed in terms of the EPA Response Worker Guidelines, these contours may also be used to estimate the ongoing dose received by the unsheltered general population. NCRP and NRC administrative control areas are also shown. Note: EPA and NRC guidelines are based on a total dose limit. These contoured dose rate values, if constant over the indicated exposure period, will deliver the equivalent limiting dose. For rapidly-decaying dose rates, these predictions will be conservative. The dose associated with potential inhalation of resuspended material is not included in these estimates. The relative importance of any committed inhalation dose from resuspended material is dependent on a variety of factors (e.g. weather, radionuclides, etc.). Note that the population count and area covered by each contour are cumulative such that outer contours include the counts and areas of all inner contours.

Deposition at 14 d : (Surface Contamination from Deposited Radionuclides)

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

This product identifies the more highly contaminated areas due to fallout and deposition of the radioactive material. This material, depending upon the type of radiation emitted, may continue to give significant doses to individuals in these areas through inhalation of resuspended radioactive material or from direct external radiation. These levels of deposited radioactivity should be confirmed by monitoring surveys.

SOURCE INFORMATION:

Release Start Time:	March 12, 2011 06:25 UTC
Release Stop Time:	March 26, 2011 06:25 UTC
Release Location:	(37.421389, 141.0325) Fukushima 1
Release Mechanism:	Generic
Source Material and Amount:	<p>Early Phase Dose (0-4d)</p> <p>Early Phase Dose (4-8d)</p> <p>Early Phase Dose (8-12d)</p> <p>Early Phase Dose (0-14d)</p> <p>138969 Ci of BA-140 (100% respirable) over 1036800 sec</p> <p>3162.34 Ci of CE-144 (100% respirable) over 1036800 sec</p> <p>40.1641 Ci of CM-242 (100% respirable) over 1036800 sec</p> <p>177591 Ci of CS-134 (100% respirable) over 1036800 sec</p> <p>61424.6 Ci of CS-136 (100% respirable) over 1036800 sec</p> <p>129073 Ci of CS-137 (100% respirable) over 1036800 sec</p> <p>1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec</p> <p>743463 Ci of I-132 (100% respirable) over 1036800 sec</p> <p>312127 Ci of I-133 (100% respirable) over 1036800 sec</p> <p>305.666 Ci of PU-241 (100% respirable) over 1036800 sec</p> <p>2277.81 Ci of RB-86 (100% respirable) over 1036800 sec</p> <p>18478.1 Ci of RU-103 (100% respirable) over 1036800 sec</p> <p>5395.12 Ci of RU-106 (100% respirable) over 1036800 sec</p> <p>12057.3 Ci of SB-127 (100% respirable) over 1036800 sec</p> <p>83562.2 Ci of SR-89 (100% respirable) over 1036800 sec</p>

6698.63 Ci of SR-90 (100% respirable) over 1036800 sec
 3537.12 Ci of TE-127M (100% respirable) over 1036800 sec
 14672.2 Ci of TE-129M (100% respirable) over 1036800 sec
 177062 Ci of TE-132 (100% respirable) over 1036800 sec
 8.3307e+07 Ci of XE-133 (100% respirable) over 1036800 sec
 Early Phase Guidance (Radioiodine) (0-14 d)
 1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec
 743463 Ci of I-132 (100% respirable) over 1036800 sec
 312127 Ci of I-133 (100% respirable) over 1036800 sec
 14672.2 Ci of TE-129M (100% respirable) over 1036800 sec
 177062 Ci of TE-132 (100% respirable) over 1036800 sec
 Worker Protection Dose Rate at 4 d
 Worker Protection Dose Rate at 8 d
 Worker Protection Dose Rate at 12 d
 Deposition at 14 d
 138969 Ci of BA-140 (100% respirable) over 1036800 sec
 3162.34 Ci of CE-144 (100% respirable) over 1036800 sec
 40.1641 Ci of CM-242 (100% respirable) over 1036800 sec
 177591 Ci of CS-134 (100% respirable) over 1036800 sec
 61424.6 Ci of CS-136 (100% respirable) over 1036800 sec
 129073 Ci of CS-137 (100% respirable) over 1036800 sec
 1.1998e+06 Ci of I-131 (100% respirable) over 1036800 sec
 743463 Ci of I-132 (100% respirable) over 1036800 sec
 312127 Ci of I-133 (100% respirable) over 1036800 sec
 305.666 Ci of PU-241 (100% respirable) over 1036800 sec
 2277.81 Ci of RB-86 (100% respirable) over 1036800 sec
 18478.1 Ci of RU-103 (100% respirable) over 1036800 sec
 5395.12 Ci of RU-106 (100% respirable) over 1036800 sec
 12057.3 Ci of SB-127 (100% respirable) over 1036800 sec
 83562.2 Ci of SR-89 (100% respirable) over 1036800 sec
 6698.63 Ci of SR-90 (100% respirable) over 1036800 sec
 3537.12 Ci of TE-127M (100% respirable) over 1036800 sec
 14672.2 Ci of TE-129M (100% respirable) over 1036800 sec
 177062 Ci of TE-132 (100% respirable) over 1036800 sec

Source Geometry:

gaussian cloud top at 200 m

Particle Size Distribution:

All particulate is in the respirable range from 0.1 to 10 microns

METEOROLOGY:

ADAPT Gridded Metdata from 03/11/2011 21:00:00 JST to 03/26/2011 15:00:00 JST at 2 hr intervals were used in this calculation

Gridded Met

Source	Obs Time
ADAPT	March 11, 2011 12:00 UTC
ADAPT	March 11, 2011 14:00 UTC
ADAPT	March 11, 2011 16:00 UTC
ADAPT	March 11, 2011 18:00 UTC
ADAPT	March 11, 2011 20:00 UTC
ADAPT	March 11, 2011 22:00 UTC
ADAPT	March 12, 2011 00:00 UTC
ADAPT	March 12, 2011 02:00 UTC
ADAPT	March 12, 2011 04:00 UTC
ADAPT	March 12, 2011 06:00 UTC
ADAPT	March 12, 2011 08:00 UTC
ADAPT	March 12, 2011 10:00 UTC
ADAPT	March 12, 2011 12:00 UTC
ADAPT	March 12, 2011 13:00 UTC
ADAPT	March 12, 2011 15:00 UTC
ADAPT	March 12, 2011 16:00 UTC
ADAPT	March 12, 2011 18:00 UTC
ADAPT	March 12, 2011 20:00 UTC
ADAPT	March 12, 2011 22:00 UTC
ADAPT	March 13, 2011 00:00 UTC
ADAPT	March 13, 2011 02:00 UTC
ADAPT	March 13, 2011 04:00 UTC
ADAPT	March 13, 2011 06:00 UTC
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ADAPT	March 13, 2011 18:00 UTC
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ADAPT March 25, 2011 16:00 UTC
ADAPT March 25, 2011 18:00 UTC
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ADAPT March 25, 2011 22:00 UTC
ADAPT March 26, 2011 00:00 UTC
ADAPT March 26, 2011 02:00 UTC
ADAPT March 26, 2011 04:00 UTC
ADAPT March 26, 2011 06:00 UTC

No precipitation is included in this calculation

ASSUMPTIONS:

Unless otherwise stated ICRP60 series DCF's were used for dose plots.

CONTACT INFORMATION:

Calculation requested by:

none none, DOE NIT

202-586-8100

Approved by:

NARAC Operations, NARAC

925-422-9100

narac@llnl.gov

Approved on: March 25, 2011 04:14 UTC

Classification: Official Use Only - Not Approved for Further Distribution

DISCLAIMER:

These model predictions are intended to be guidance, and are not final recommendations. The accuracy of any prediction will be limited by the accuracy of the input data, such as estimates of the amount of material that becomes airborne and the available meteorological data for the area and time of the incident. Plume predictions may be for a limited time period, and may change at later times if new input data becomes available. Predictions should be confirmed and refined using field measurements. Air and ground concentration may be higher than predicted by this plume model simulation due the limited resolution of this particular simulation. For actual incidents or exercises, consult incident command and subject matter experts from the appropriate coordinating agency before making any decisions based on this model prediction.

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imply its endorsement, recommendation, or favoring by the United States government or Lawrence Livermore National Security, LLC. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or Lawrence Livermore National Security, LLC, and shall not be used for advertising or product endorsement purposes.

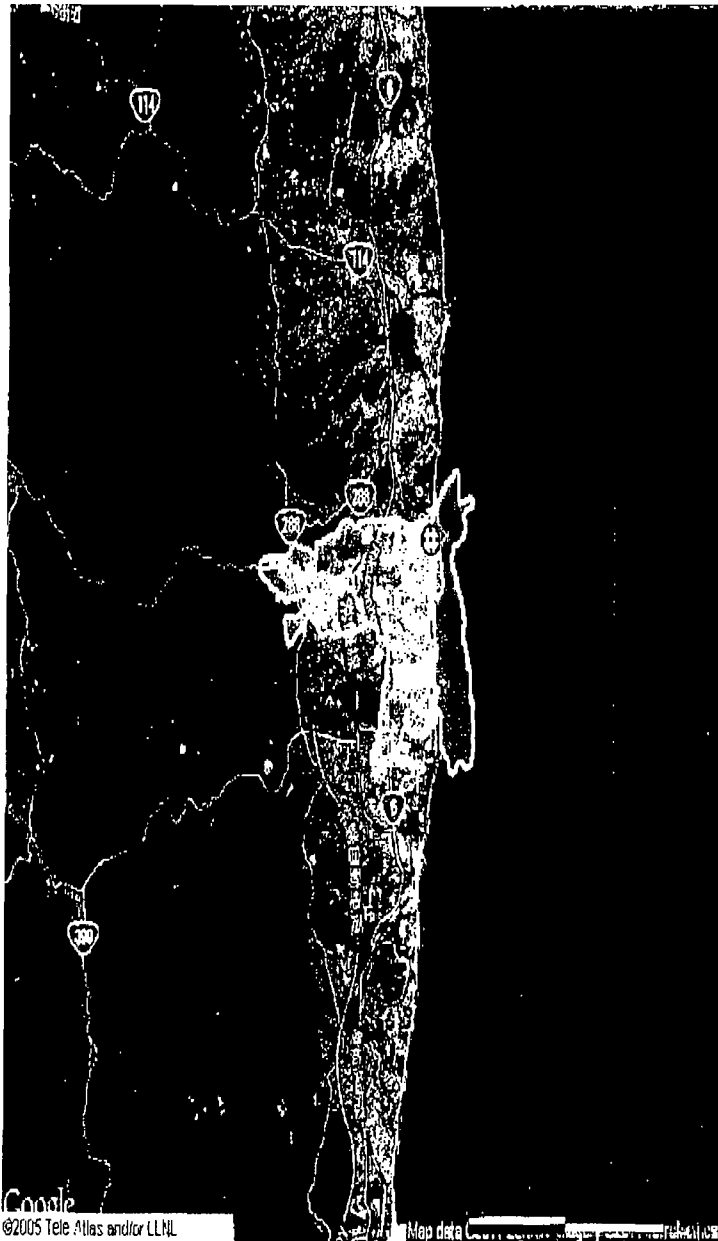
This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.



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Distribution

**Early Phase Dose (0-4d)
(Total Effective Dose)**

Japan Impacts - NRC Plausible Realistic Case V3
(U1Exp)
NARAC Report - Potential Release



Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 1.8km 2.3km ²	2,380
Exceeds 1 rem total effective dose.	>1 8.6km 41.2km ²	10,200

Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to March 16, 2011 06:25 UTC at or near ground level.
Release Location: 37.421389 N, 141.032500 E
Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133
Generated On: March 25, 2011 03:51 UTC
Model: LODI
Comments:
 Doses shown are total accumulated from the beginning of release.
 Plausible Realistic Scenario

Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: (onDuty Assessor); narak@lInl.gov; 925-424-6465

Requested by: (none none; DOE NIT: 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

Official Use Only - Not Approved for Further Distribution



Official Use Only - Not Approved for Further Distribution

**Early Phase Dose (4-8d)
(Total Effective Dose)**

Japan Impacts - NRC Plausible Realistic Case V3
(U1Exp)
NARAC Report - Potential Release



Actions and Long-Term Effects			
	Description	(rem) Extent Area	Population
	Exceeds 5 rem total effective dose.	>5 2.6km 1.7km ²	730
	Exceeds 1 rem total effective dose.	>1 11.6km 21.6km ²	3,080

Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.

Effects or contamination from March 16, 2011 06:25 UTC to
March 20, 2011 06:25 UTC at or near ground level.
Release Location: 37.421389 N, 141.032500 E
Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133
Generated On: March 25, 2011 03:52 UTC
Model: LODI
Comments:
Doses shown are accrued after 03/16/2011 06:25:00 UTC and can be avoided by protective actions
Plausible Realistic Scenario

Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rc1

NARAC Operations: { onDuty Assessor }; narac@hnl.gov; 925-424-6465

Requested by: {none none; DOE NIT; 202-586-8100 }

Approved by: {NARAC Operations; NARAC; 925-422-9100}

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Distribution
Early Phase Dose (8-12d)
(Total Effective Dose)

Japan Impacts - NRC Plausible Realistic Case V3
(U1Exp)
NARAC Report - Potential Release



Actions and Long-Term Effects		
Description	(rem) Extent Area	Population
Exceeds 5 rem total effective dose.	>5 0.5km 0.4km ²	540
Exceeds 1 rem total effective dose.	>1 2.7km 6.0km ²	2,970

Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.

Effects or contamination from March 20, 2011 06:25 UTC to
March 24, 2011 06:25 UTC at or near ground level.
Release Location: 37.421389 N, 141.032500 E
Material: BA-140 + CE-144 + CM-242 + CS-134 +
CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 +
PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE
-127M + SR-89 + SR-90 + TE-129M + XE-133
Generated On: March 25, 2011 03:52 UTC
Model: LODI
Comments:
Doses shown are accrued after 03/20/2011 06:25:00
UTC and can be avoided by protective actions
Plausible Realistic Scenario

Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcG1

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

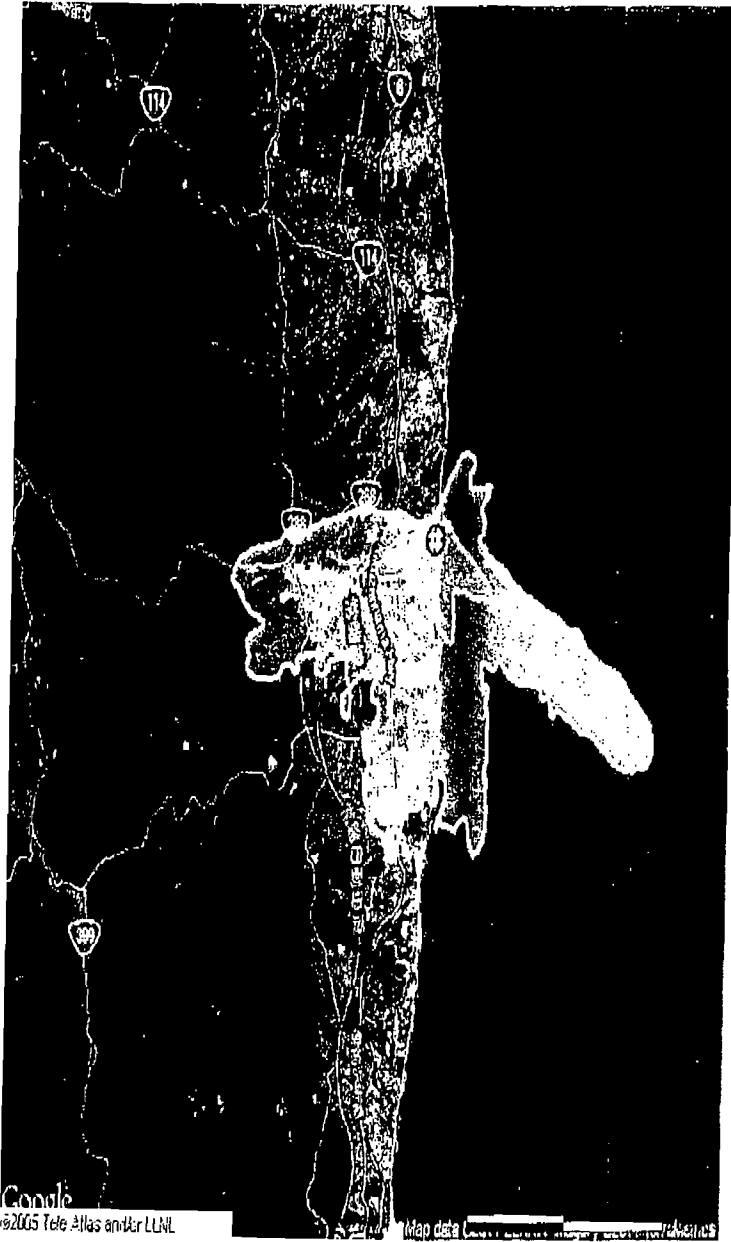
Approved by: (NARAC Operations; NARAC; 925-422-9100)

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Distribution
Early Phase Dose (0-14d)
(Total Effective Dose)

Japan Impacts - NRC Plausible Realistic Case V3
(U1Exp)
NARAC Report - Potential Release



Actions and Long-Term Effects			
	Description	(rem) Extent Area	Population
	Exceeds 5 rem total effective dose.	>5 3.2km 8.5km ²	3,220
	Exceeds 1 rem total effective dose.	>1 12.6km 98.2km ²	14,900

Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.

Effects or contamination from March 12, 2011 06:25 UTC to
March 26, 2011 06:25 UTC at or near ground level.
Release Location: 37.421389 N, 141.032500 E
Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M + XE-133
Generated On: March 25, 2011 03:52 UTC
Model: LODI
Comments:
Doses shown are total accumulated from the beginning of release.
Plausible Realistic Scenario

NARAC Operations: { onDuty Assessor }; narac@llnl.gov; 925-424-6465

Requested by: { none name; DOE NIT; 202-586-8100 }

Approved by: { NARAC Operations; NARAC; 925-422-9100 }

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Early Phase Guidance (Radioiodine) (0-14 d)
(KI Administration based on Thyroid Radioiodine Dose)

Japan Impacts - NRC Plausible Realistic Case V3 (U1Exp)
 NARAC Report - Potential Release



Effects and Actions		
Description	(rem) Extent Area	Population
Adult thyroid Committed Equivalent Dose - Early Phase FDA Guidance for KI administration to adults	>10 8.4km 34.7km ²	8,580
Child thyroid Committed Equivalent Dose - Early Phase PAG for KI administration to children.	>5 17.8km 252km ²	27,800
Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.		

Effects or contamination from March 12, 2011 06:25 UTC to March 26, 2011 06:25 UTC at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: I-131 + I-132 + TE-132 + I-133 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Doses shown are total accumulated from the

NARAC Operations: { onDuty Assessor }; narac@llnl.gov, 925-424-6465
Requested by: {none none; DOE NIT; 202-586-8100 }
Approved by: {NARAC Operations; NARAC; 925-422-9100}

beginning of release.
Plausible Realistic Scenario

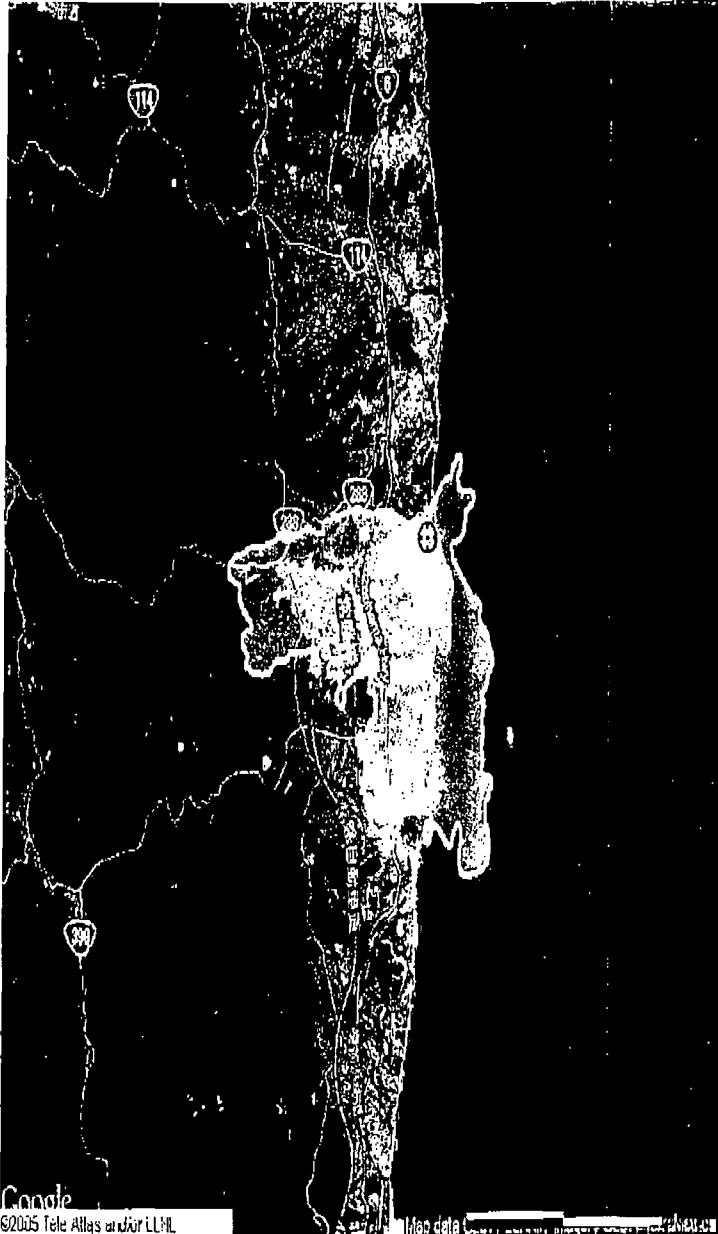
Official Use Only - Not Approved for Further Distribution

Official Use Only - Not Approved for Further Distribution



**Worker Protection Dose Rate at 4 d
(Groundshine Dose Rate at 03/16/2011
15:25:00 JST)**

Japan Impacts - NRC Plausible Realistic Case
V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rc1

Acute (Short-Term) Effects		
Description	(mrem/hr) Extent Area	Population
Limit for all occupational exposures exceeded by exposure for 50 hours or less	>100 0.2km 0.02km ²	50
U.S. NCRP radiological control boundary.	>10 3.5km 7.1km ²	3,120
U.S. NRC public exclusion zone	>2 10.2km 76.3km ²	13,600
Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.		

Effects or contamination at March 16, 2011 06:25 UTC

at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT, 202-586-8100)

Approved by: (NARAC Operations; NARAC; 925-422-9100)

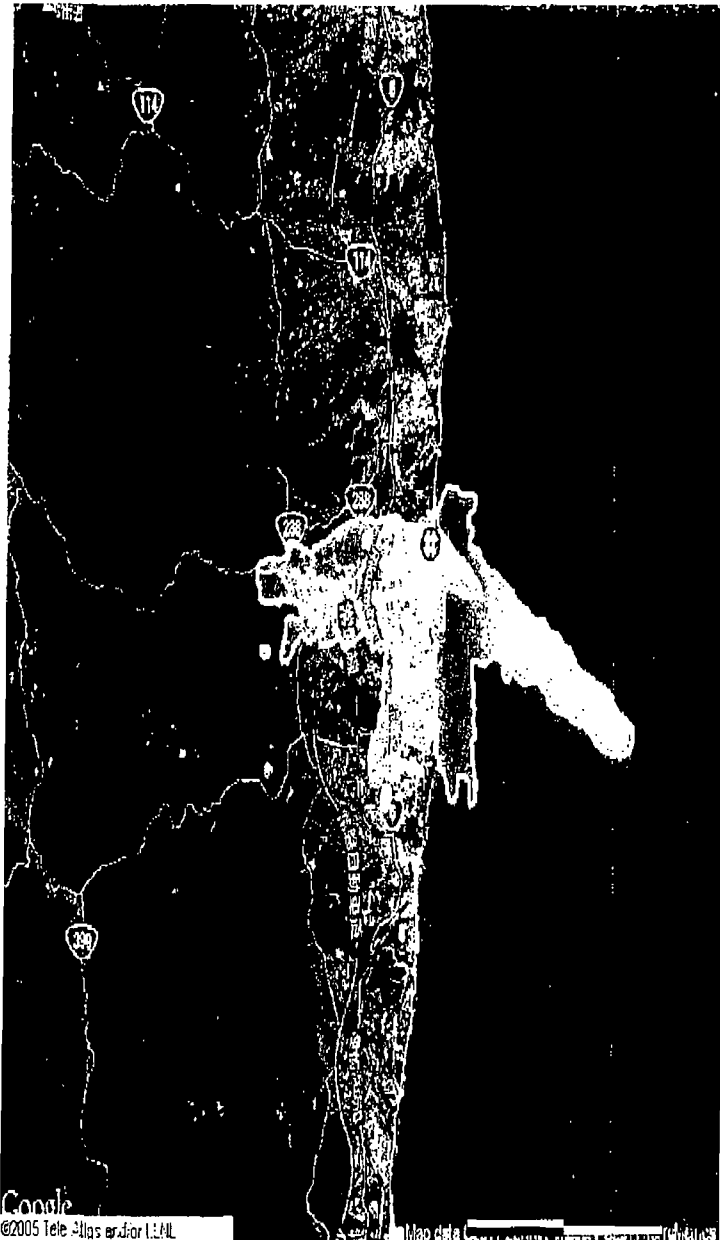
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**Worker Protection Dose Rate at 8 d
(Groundshine Dose Rate at 03/20/2011
15:25:00 JST)**

Japan Impacts - NRC Plausible Realistic Case
V3 (U1Exp)
NARAC Report - Potential Release



Acute (Short-Term) Effects		
Description	(mrem/hr) Extent Area	Population
U.S. NCRP radiological control boundary.	>10 2.9km 5.5km ²	2,910
U.S. NRC public exclusion zone	>2 11.9km 64.7km ²	10,800

Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.

Effects or contamination at March 20, 2011 06:25 UTC

at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: { onDuty Assessor }; narac@llnl.gov; 925-424-6465

Requested by: { none none; DOE NIT; 202-588-8100 }

Approved by: {NARAC Operations; NARAC; 925-422-9100}

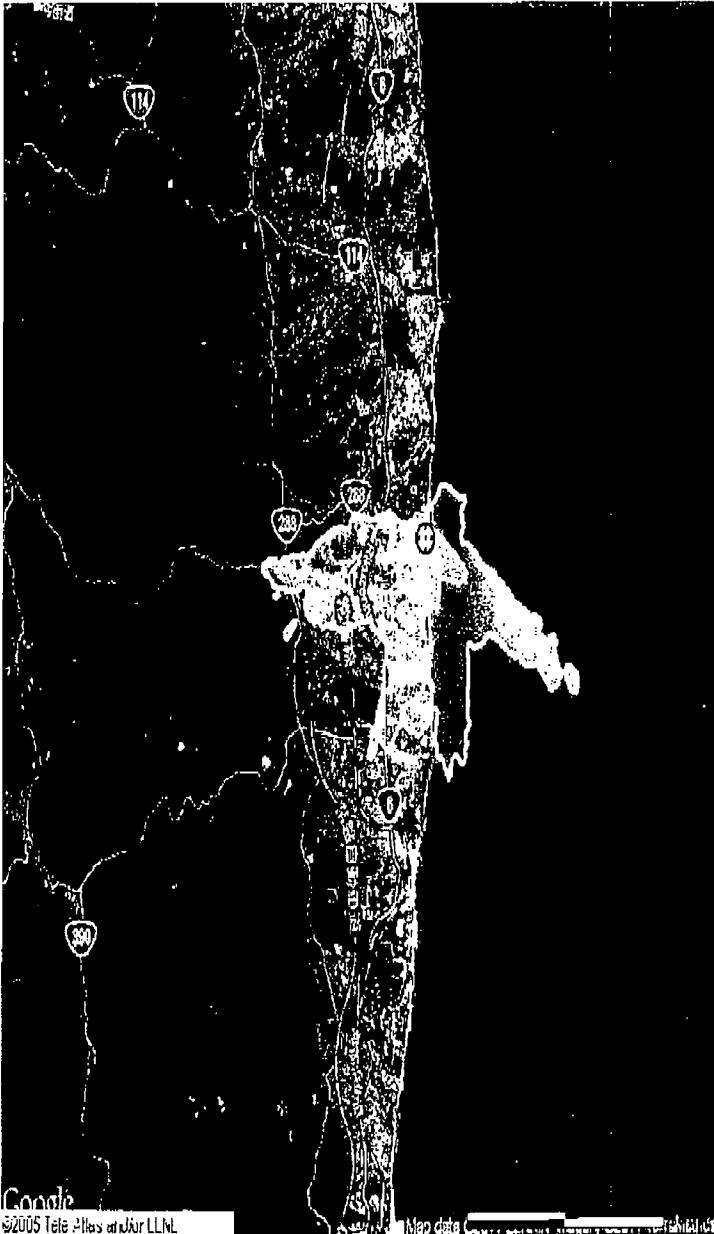
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**Worker Protection Dose Rate at 12 d
(Groundshine Dose Rate at 03/24/2011
15:25:00 JST)**

Japan Impacts - NRC Plausible Realistic Case
V3 (U1Exp)
NARAC Report - Potential Release



Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

Acute (Short-Term) Effects			
	Description	(mrem/hr) Extent Area	Population
	U.S. NCRP radiological control boundary.	>10 2.3km 3.9km ²	2,560
	U.S. NRC public exclusion zone	>2 8.8km 48.7km ²	10,100

Note: Areas and counts in the table are cumulative.
Population Source = LandScan2005.

Effects or contamination at March 24, 2011 06:25 UTC

at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE-127M + SR-89 + SR-90 + TE-129M

Generated On: March 25, 2011 03:52 UTC

Model: LODI

Comments:

Plausible Realistic Scenario

NARAC Operations: (onDuty Assessor); narac@llnl.gov; 925-424-6465

Requested by: (none none; DOE NIT; 202-586-8100)

Approved by: (NARAC Operations, NARAC, 925-422-9100)

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**Deposition at 14 d
(Surface Contamination from Deposited
Radionuclides)**

Japan Impacts - NRC Plausible Realistic
Case V3 (U1Exp)
NARAC Report - Potential Release



Effects and Actions			
	Description	(Ci/m ²) Extent Area	Population
	No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.01 0.2km 0.07km ²	120
	No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0010 3.5km 8.3km ²	3,150
	No guidelines specified. Possibly contaminated area. Use to confirm with monitoring surveys.	>0.0001 16.4km 217km ²	25,800
<p>Note: Areas and counts in the table are cumulative. Population Source = LandScan2005.</p>			

Effects or contamination at March 26, 2011 06:25 UTC

at or near ground level.

Release Location: 37.421389 N, 141.032500 E

Material: BA-140 + CE-144 + CM-242 + CS-134 + CS-136 + CS-137 + I-131 + I-132 + TE-132 + I-133 + PU-241 + RB-86 + RU-103 + RU-106 + SB-127 + TE

Map Size: 36.4 km by 36.4 km Id: Production3.rcE12815.rcC1

NARAC Operations: { onDuty Assessor }; narac@llnl.gov; 925-424-6465
Requested by: {none none; DOE NIF; 202-586-8100 }
Approved by: {NARAC Operations; NARAC; 925-422-9100}

-127M + SR-89 + SR-90 + TE-129M
Generated On: March 25, 2011 03:52 UTC
Model: LODI
Comments:
Plausible Realistic Scenario

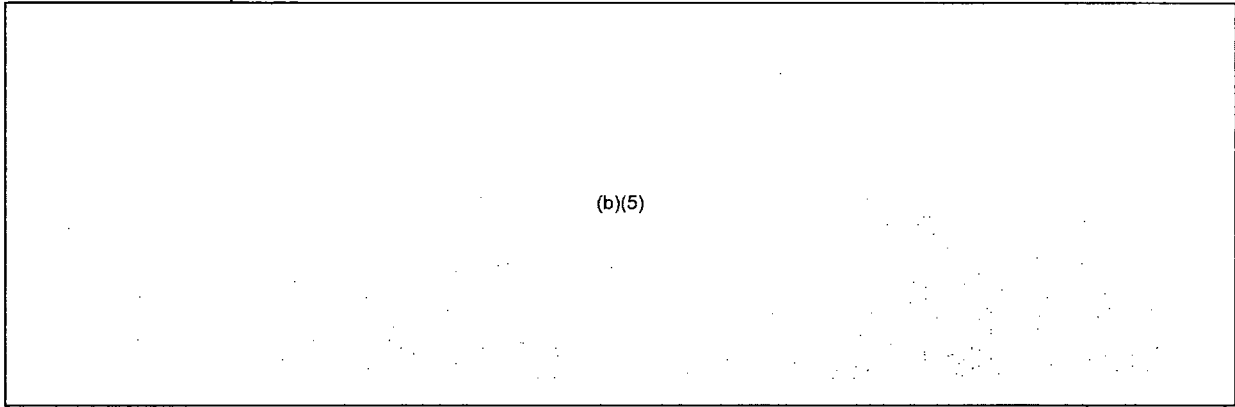
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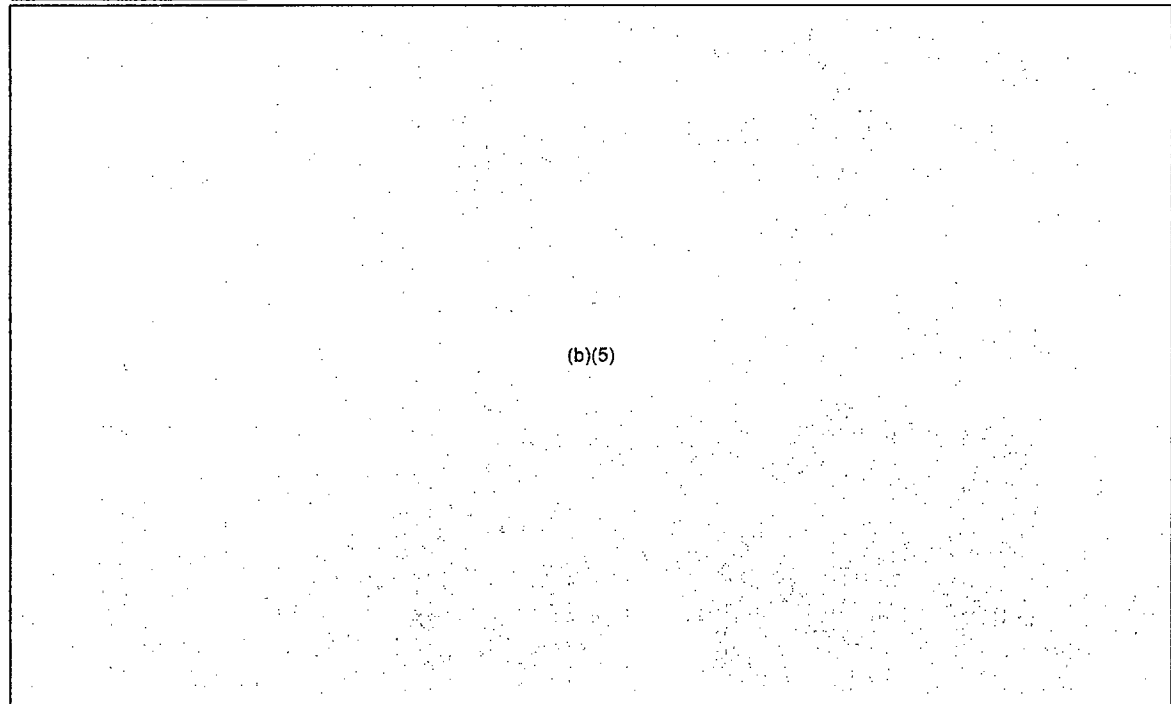
NARAC Plume Projections: Arrival Times on US Soil, Estimated Deposition Levels and Dose Projections

Issue Date: March 17, 2011, Revision 2

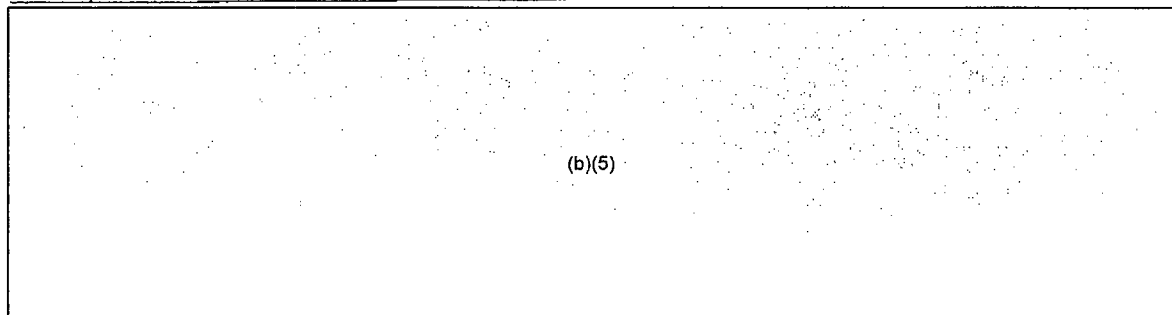
Source Term Assumptions



Release Assumptions



NARAC/CMHT Method Used to Calculate Potential Dose



NARAC Plume Arrival Times on US Soil with Estimated
Deposition Levels for Cesium and Iodine
March 17, 2011



PMT02 Hoc

From: PMT02 Hoc
Sent: Friday, March 18, 2011 3:57 AM
To: PMT02 Hoc; 'narak@lnl.gov'; 'nitops@nnsa.doe.gov'
Cc: 'cmht@nnsa.doe.gov'; Brandon, Lou
Subject: RE: NRC RASCAL estimations
Attachments: Unit 3 SFP 100 percent 17MAR 2330.csv; Unit 4 SFP 17 MAR 2330 one batch.csv; Unit 4 SFP 17 MAR 2330 4 old batches.csv; Unit 4 SFP Case Summary 17 MAR 2330 four old batches.doc; Unit 2 Case Summary 17MAR 2330.doc; unit 2 33 percent 17MAR 2330.csv; Unit 3 SFP Case Summary 17MAR 2330.doc; Unit 4 Case Summary one batch 17 MAR 2330.doc

Tracking:

Recipient	Read
PMT02 Hoc	Read: 3/18/2011 4:14 AM
'narak@lnl.gov'	
'nitops@nnsa.doe.gov'	
'cmht@nnsa.doe.gov'	
Brandon, Lou	

*Shift turnover:
According to
Enlist -
recovered w/
NARAC*

-- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN -- *Blm 3/18/11*

This is a MONITORING OPERATION FOR THE JAPAN EARTHQUAKE TSUNAMI AFTERMATH.

Attached are the following source terms (.CSV and Case Summary files) :

-Unit 2, source term provided for a 33% core melt RASCAL run (25% core activity actually released), no containment. ✓

-Unit 3, **100%** spent fuel pool inventory available for release, no containment ✓
- NARAC should divide in half to represent 50% actually released.

Unit four is modeled in two pieces: a single batch for which the activity needs to be multiplied by three (three fresh batches) and a second run that models four older batches in the spent fuel pool.

-Unit 4A, **100%** spent fuel pool inventory available for release, no containment*
-one fresh batch modeled. NARAC needs to multiply by three to obtain one full core load inventory available for release and **100%** actual release.

-Unit 4B, 100% spent fuel pool inventory available for release, no containment*
- four old batches available for actual release

***NARAC needs to sum three times unit 4A plus unit 4B to obtain the total Unit 4 load which contains a total of seven batches, three new batches and four older batches. Total inventory = 3(4A) + 4B** ✓

RASCAL models a spent fuel pool release as a long protracted release. Only the first 48 hours of a potential two week release is captured in these spent fuel source terms. The release from unit 3 and unit 4 spent fuel pools may continue for approximately two

--- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN ---

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-one fresh batch modeled. NARAC needs to multiply by three to obtain one full core load inventory available for release and 100% actual release.

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- four old batches available for actual release

***NARAC needs to sum three times unit 4A plus unit 4B to obtain the total Unit 4 load which contains a total of seven batches, three new batches and four older batches. Total inventory = 3(4A) + 4B**

RASCAL models a spent fuel pool release as a long protracted release. Only the first 48 hours of a potential two week release is captured in these spent fuel source terms. The release from unit 3 and unit 4 spent fuel pools may continue for approximately two weeks. To capture the full inventory and to exhaust all the source term, model for two weeks.

NRC Protective Measures Team
301-816-5419

Please reply to this email to acknowledge receipt.

This information should not be released at this time.

NO PARTICIPATION OR RESPONSE BY CMHT IS EXPECTED

--- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN

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301-816-5419

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NO PARTICIPATION OR RESPONSE BY CMHT IS EXPECTED

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Planning: Model of a Nuclear Reactor Incident in Japan as a result of an earthquake

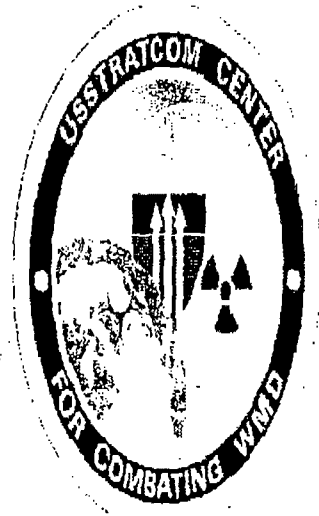
RFI - 216U

13MAR2011

Requestor:

(b)(6)

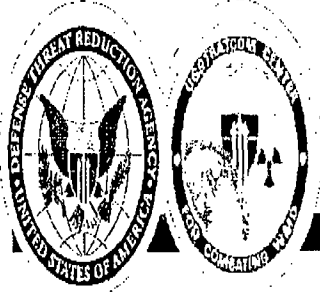
As of 131630ZMAR11



Distribution: Limited to DoD and authorized contractors. Further distribution contact DTRA.
Derived From: Navy
Reason: E.O. 12958 sections 1.4 (e), (g) and (h).

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R&D Enterprise
Innovation & Systems Engineering Office
Reachback Division
(703) 767-3448, DSN 427-



Request Summary

- **(FOUO) Request data**

- Requestor: (b)(6)

- Contact: (b)(6)

- Request: A model of a nuclear incident at the Fukushima Daiichi - 1 nuclear power plant in Japan.

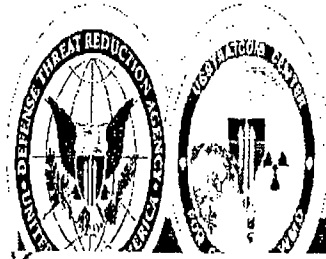
Location: Fukushima Daiichi-1 Latitude: 37.42139° N Longitude: 141.0325° E
Time: 0530Z Date: 12MAR2011
Hazard: Accident at nuclear power plant in Japan
Weather: High Resolution Numerical Weather Prediction: 15 km WRF from AFWA
Comments: Comments: Plots based on assessment of plant conditions at time of analysis.

- **(FOUO) Solution**

- Summary: Integrated dose plots provided on the following slides
- Employment: Real World
- Reachback: Team

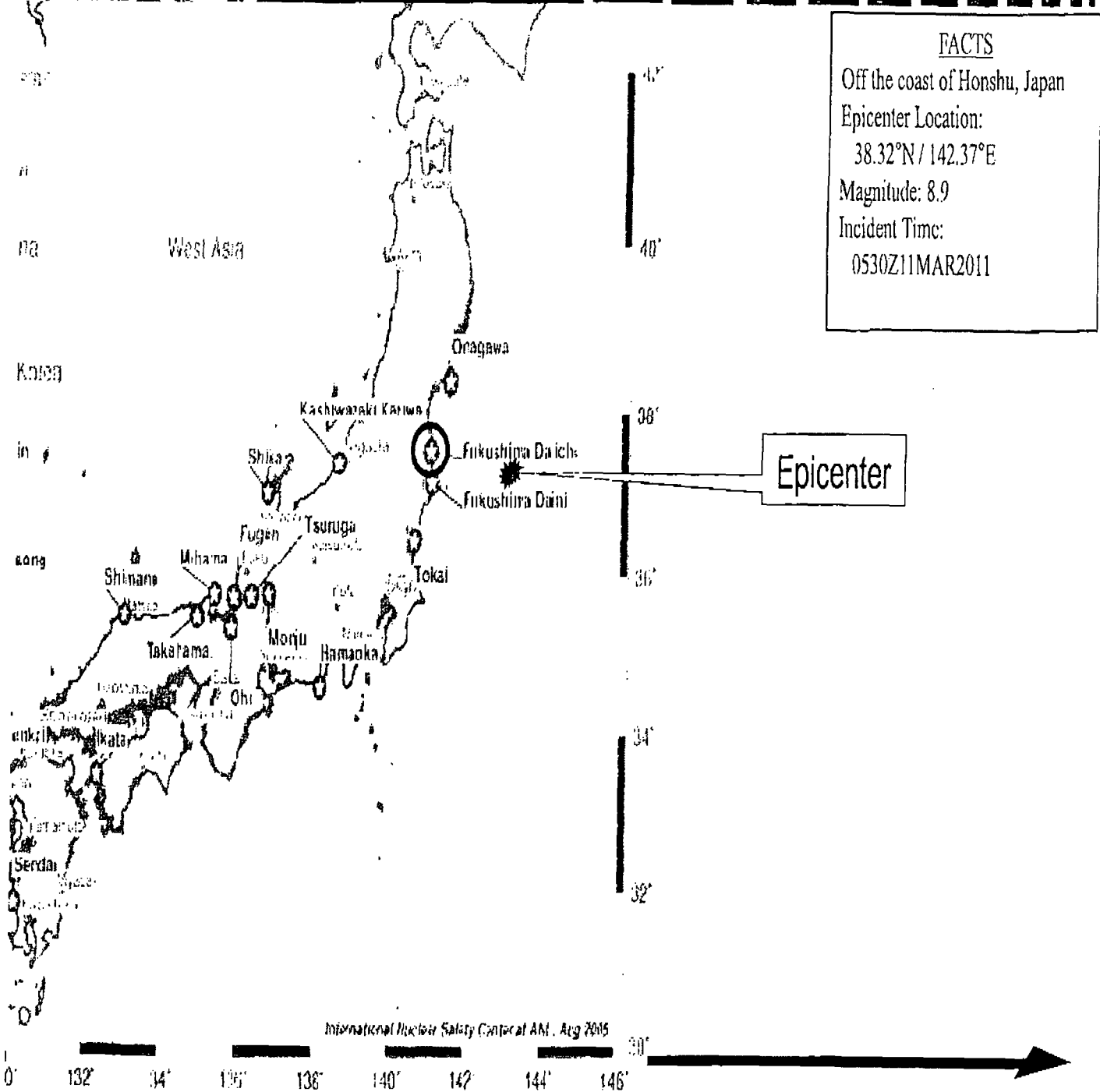
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Possible Release – Situational Details Unknown



Nuclear Power Plants

SCOPING PURPOSES ONLY



FACTS
 Off the coast of Honshu, Japan
 Epicenter Location:
 38.32°N / 142.37°E
 Magnitude: 8.9
 Incident Time:
 0530Z11MAR2011

Epicenter

As of 131630ZMAR11

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Possible Release – Situational Details Unknown



Fukushima Daiichi-1 DTRA Modeling

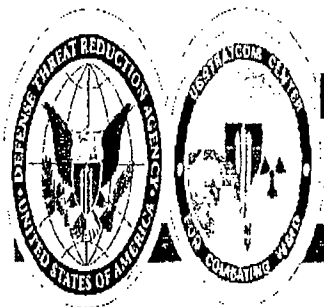
- **Summary of Models Provided in this Briefing**
- Assumption 1 – Fukushima Daiichi #1 suffers moderate release incident at time 12 Mar 2011 0530 Z. This release was 12 hours in duration. With this modeling assumption, as of 1800 Z 13 March, there would be minimal airborne radionuclides.
- Assumption 2 – A continuous release with (see next slide)
- *Important Note: There are also reports that there may be similar problems at Fukushima Daiichi #3. Plumes would be similar (location almost identical, reactors very similar) assuming the accident parameters are similar.*

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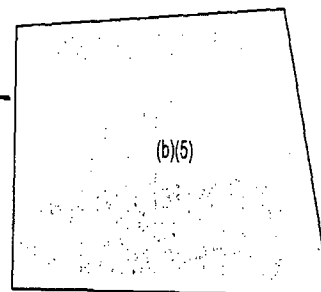
Possible Release – Situational Details Unknown

Fukushima Daiichi-1 DTRA Modeling Assumptions –

Most Likely



- **Scenario: some core damage; primary containment building integrity in tact; venting occurring to reduce core temperature and pressure**
- Continuous Release – Steam released for decay heat removal
- HPAC –Release Assumptions:
 - ✓ Shut down time of reactor concurrent with earthquake
 - ✓ Release time concurrent with explosion
 - ✓ NFAC Reactor Accident
 - ✓ Containment monitor reading: 10 Rem/hr (unconfirmed) ←
 - ✓ Sprayers: Off (unconfirmed)
 - ✓ Filters: On (unconfirmed) ←
 - ✓ Weather 15 km WRF – Mesoscale Numerical Weather Prediction (FNMOC)

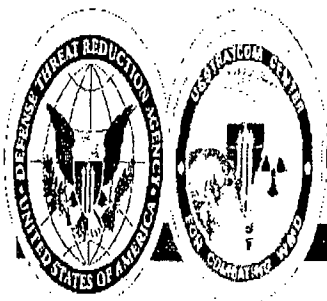


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Possible Release – Situational Details Unknown

Fukushima Daiichi-1 (Impacts) – Most Likely

Assumed Core Damage & Venting



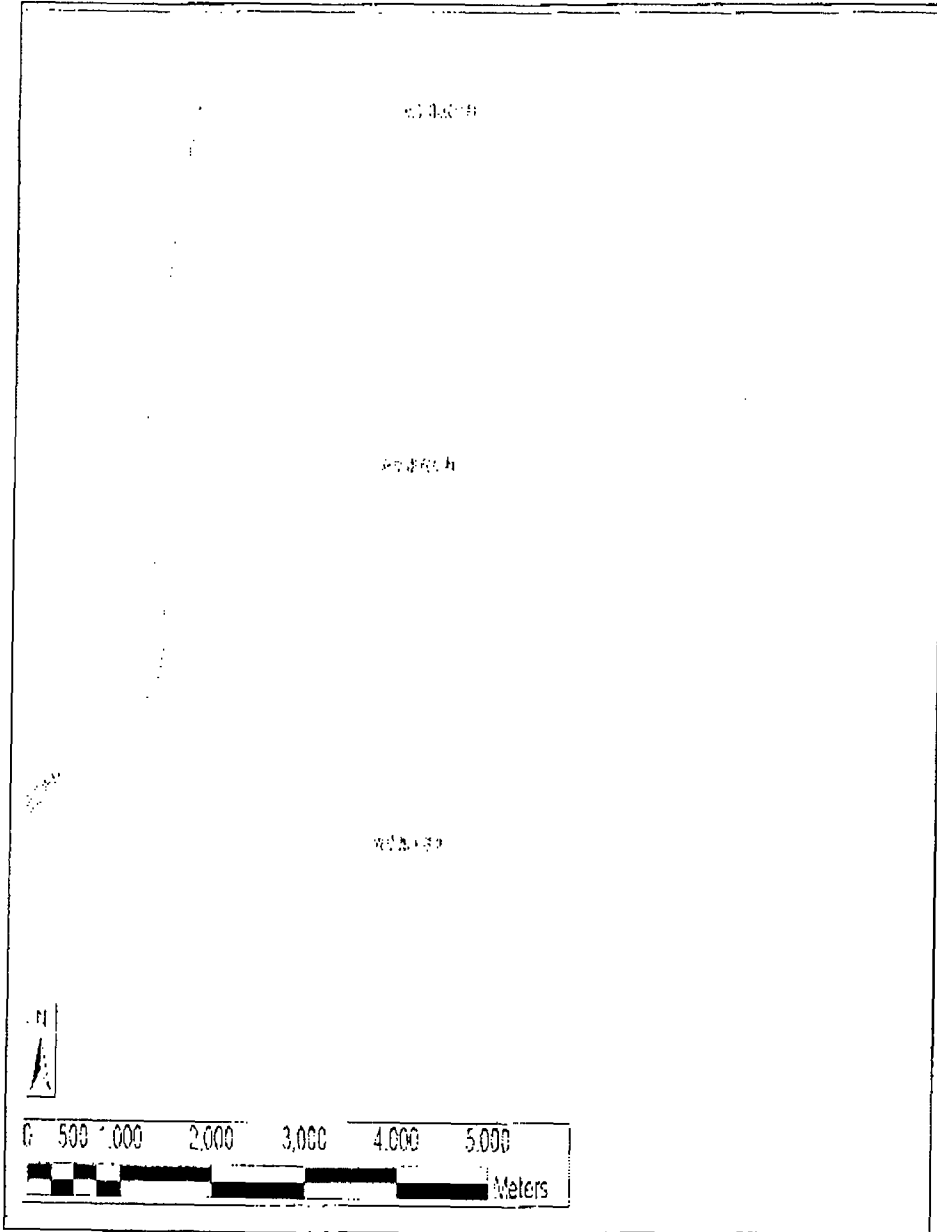
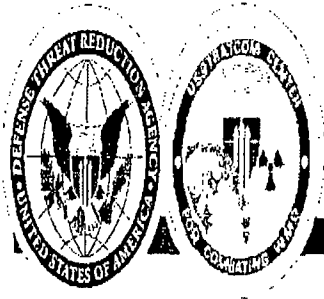
- Weather uncertainty is significant; spreading of the plume in multiple directions is possible. Wind is shifting: NW to SE
- Japan has evacuated out to 12 miles around site; ground operations should carefully monitor conditions within this zone.
- Operations in the area of the facility should include monitoring equipment.
- Air operations minimally impacted, but coordination with local authorities recommended
- Radiation hazard is above background. Level of concern is 0.1 Rem integrated dose (see next slides)
- As core pressure and temperature lower and stabilize, radiation levels will lower accordingly.

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Fukushima Daiichi-1 (Effect at Ground Level)

Assumed Core Damage & Containment Bypass - Most Likely



ALLEXTEFF (Rate)
 RTH Radiation Field
 13-Mar-11 17:40:00Z (36.000 hr)
 RFM/hr

<input type="checkbox"/>	1E-7	1.0E-07
<input type="checkbox"/>	1E-8	1.0E-08

(b)(5)

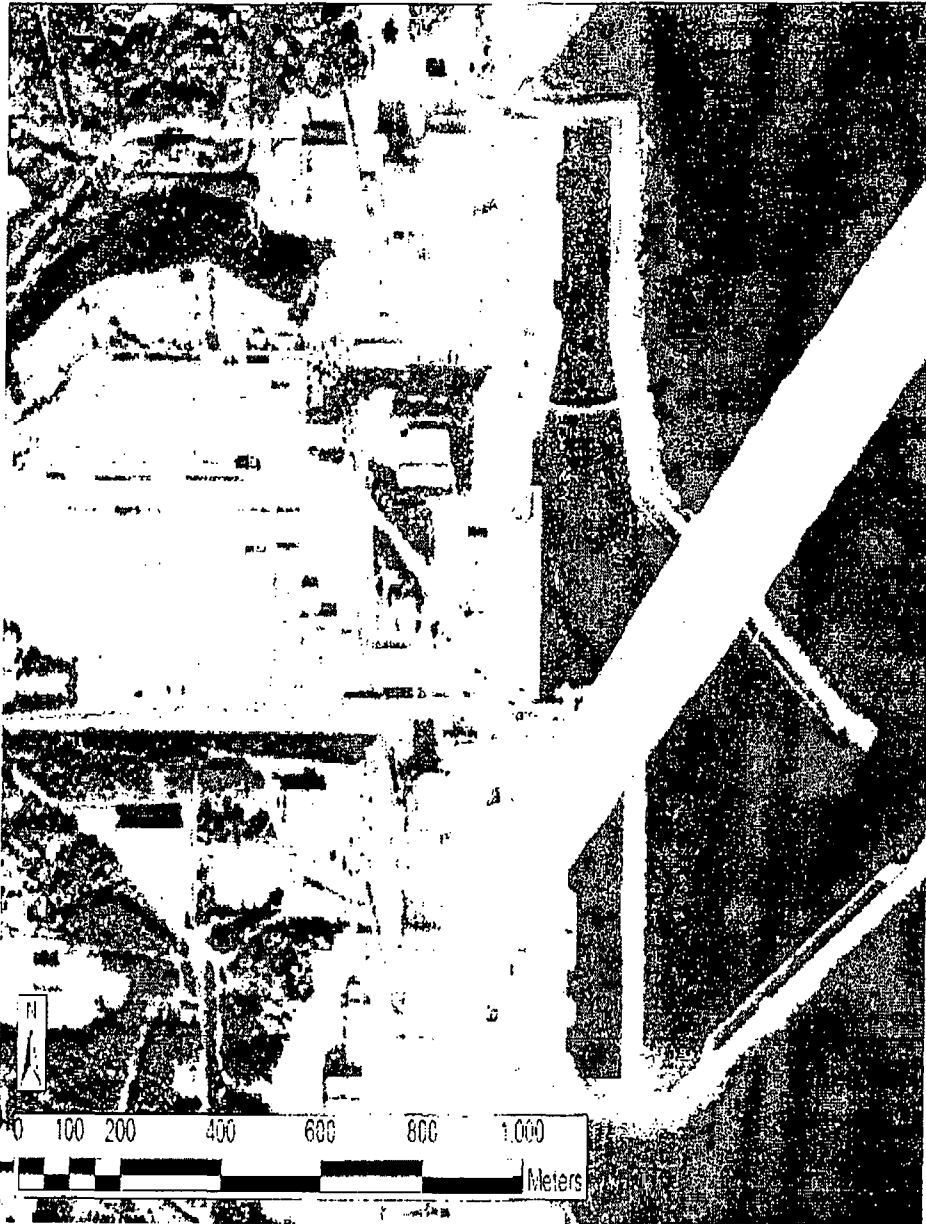
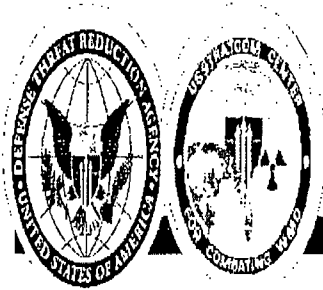
FACTS
 Fukushima Daiichi
 37.42139°N/ 141.0325°E
 0530Z 12MAR2011
 Type: Nuclear Facility Accident
 Weather: 15 km WRF
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

For Official Use Only

Possible Release - Situational Details Unknown

Fukushima Daiichi-1 (Effect at Ground Level)

Assumed Core Damage & Containment Bypass - Most Likely



ALLEXTEFF(Rate)	
RTH Radiation Field	
13-Mar-11 17:40:00Z (36,000 hr)	
	REM/hr
<input type="checkbox"/> 1E-7	1.0E-07
<input type="checkbox"/> 1E-8	1.0E-08

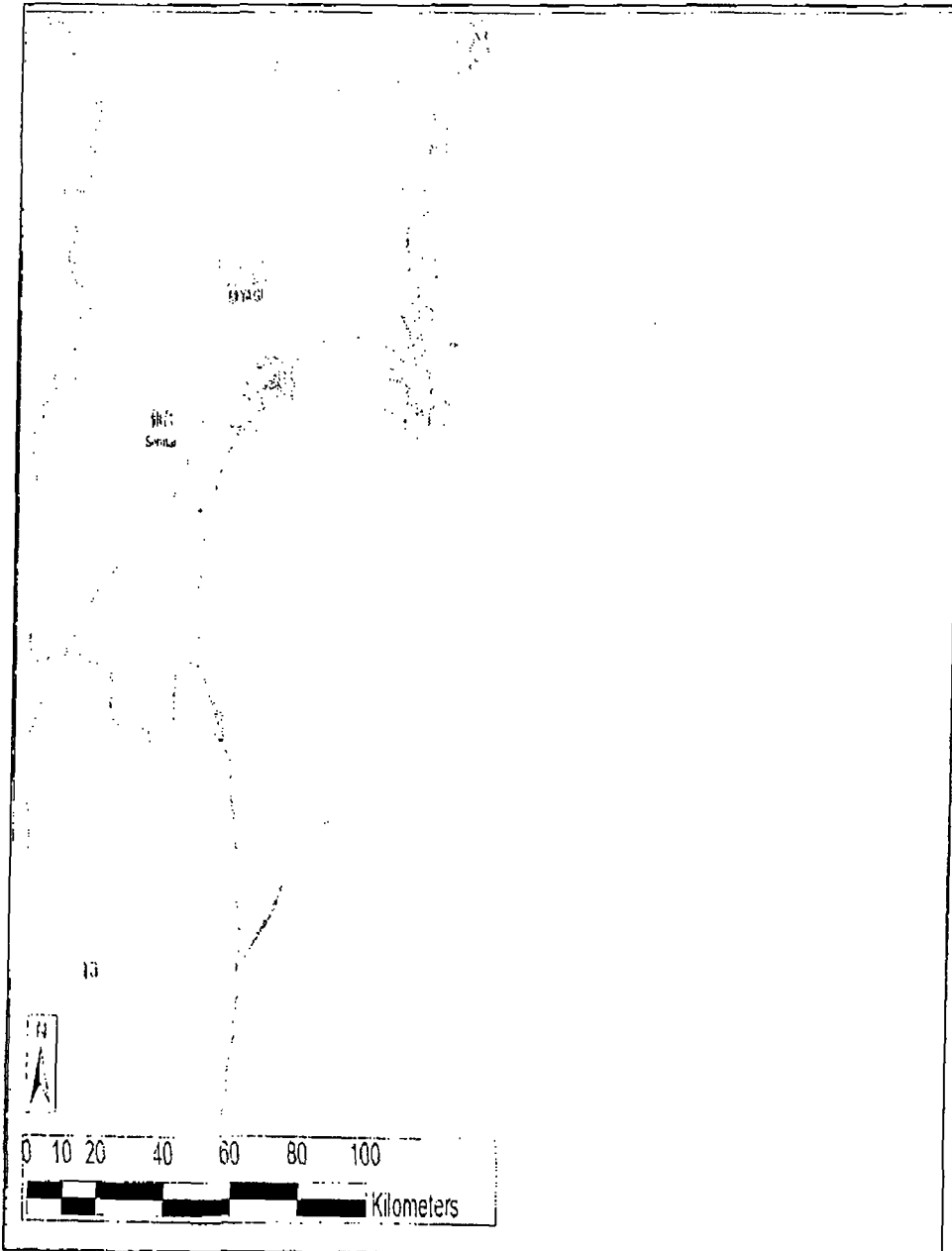
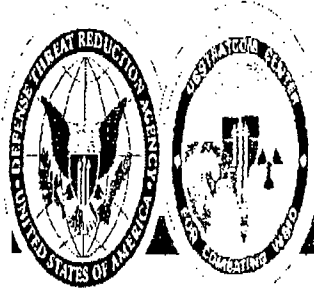
FACTS
Fukushima Daiichi
37.42139°N/ 141.0325°E
0530Z 12MAR2011
Type: Nuclear Facility Accident
Weather: 15 km WRF
Model: HPAC 5.0 SP1
Static Population Estimates:
LandScan 2009

For Official Use Only

Possible Release - Situational Details Unknown

Fukushima Daiichi-1 (Concentration at Ground Level)

Assumed Core Damage & Containment Bypass - Most Likely



Total Activity	
Isotope Air Concentration	
13-Mar-11 17:40:00Z (36.000 hr)	
C/m ³	
■ 1E-11	1.0E-11
□ 1E-12	1.0E-12
□ 1E-13	1.0E-13

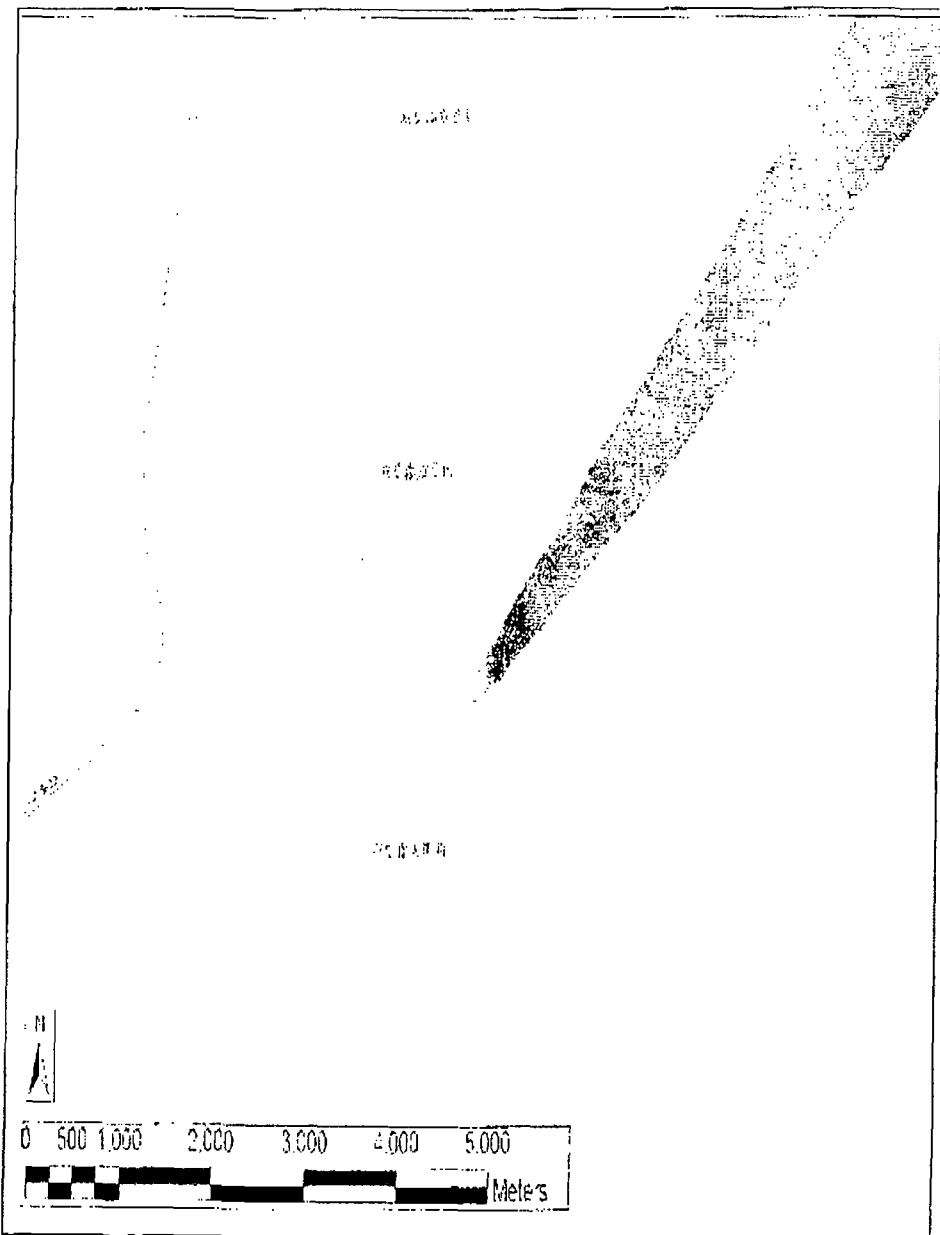
FACTS
Fukushima Daiichi
37.42139°N/ 141.0325°E
0530Z 12MAR2011
Type: Nuclear Facility Accident
Weather: 15 km WRF
Model: HPAC 5.0 SP1
Static Population Estimates:
LandScan 2009

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Possible Release - Situational Details Unknown

Fukushima Daiichi-1 (Concentration at Ground Level)

Assumed Core Damage & Containment Bypass - Most Likely



Total Activity	
Isotope Air Concentration	
13-Mar-11 17:40:00Z (36.000 hr)	
Ci/m3	
■ 1E-11	1.0E-11
□ 1E-12	1.0E-12
□ 1E-13	1.0E-13

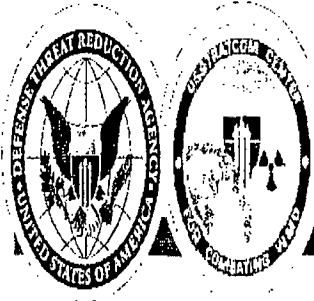
FACTS
 Fukushima Daiichi
 37.42139°N/ 141.0325°E
 0530Z 12MAR2011
 Type: Nuclear Facility Accident
 Weather: 15 km WRF
 Model: IIPAC 5.0 SP1
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 LandScan 2009

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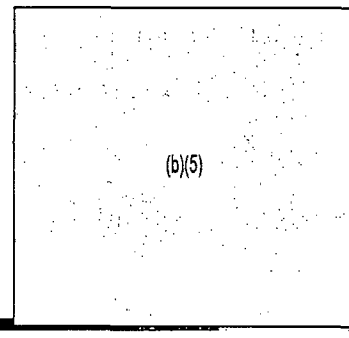
Possible Release – Situational Details Unknown

Fukushima Daiichi-1 DTRA Modeling Assumptions –

Most Dangerous



- **Scenario:** Modeled as a moderate reactor accident. These types of incidents involve core damage from the result of a reactor accident but assume that the core containment is not breached. As a result, the source terms mainly involve the noble gas components of the reactor inventory. **(There is no evidence this scenario has occurred)**
- Partial Core Melt – Heat Induced Fuel Element Failure (Core was Uncovered)
- Continuing Release – Steam released for decay heat removal
- HPAC –Release Assumptions:
 - ✓ Shut down time of reactor concurrent with earthquake
 - ✓ Release time concurrent with explosion
 - ✓ NFAC Reactor Accident (moderate pre-defined for plant)
 - ✓ Weather 15 km WRF – Mesoscale Numerical Weather Prediction (FNMOC)



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Fukushima Daiichi-1 (Ground Impact)

Assumed Core Damage & Containment Bypass – Most Dangerous



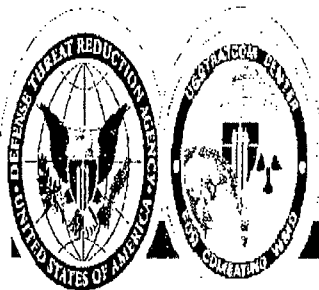
- Weather uncertainty is significant; spreading of the plume in multiple directions is possible.
- Japan has evacuated out to 12 miles around site; ground operations should carefully monitor conditions within this zone.
- Operations in the area of the facility should include monitoring equipment.
- 1.0 rem level for shelter and 5.0 rem level for evacuation on next slide are based on US Protective Action Guidelines (PAG).
- Best protection is time (minimize exposure), distance (away from site), and shielding.

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Fukushima Daiichi-1 (Effect at Ground Level)

Moderate Reactor Incident - Most Dangerous



Population estimates are approximate only - population distribution almost certainly disrupted by incident

Combined HPAC Integrated Banatum Dose
 "Best Estimate" Mean Contours
 11 Mar 11 06:30:00Z (24,000 t)

Protection Action Regions
 50 Year TEDI Dose

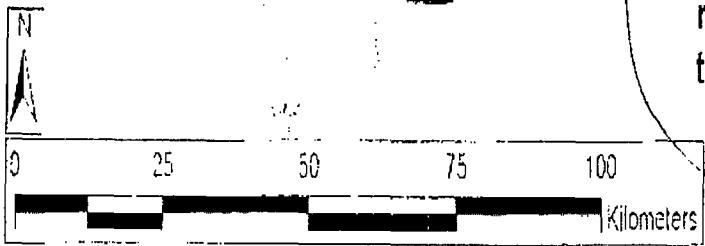
	eSv (Rem)	In contour population
Enter I de Safety	25.0	1,096
Evacuate	5.0	2,577
Shelter	1.0	4,257
Monitor	0.1	10,512

Exceedance Contour
 50 Year TEDI Dose

	eSv (Rem)	In contour population
10%	1.0	44,274

Assumes loss of containment accident due to reduced capability to cool the core

FACTS
 Fukushima Daiichi
 37.42139°N/ 141.0325°E
 0530Z 12MAR2011
 Type: Nuclear Facility Accident
 Weather: 15 km WRF
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

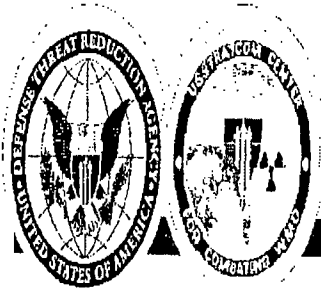


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Possible Release - Situational Details Unknown

Fukushima Daiichi-1 (Effect at Ground Level)

Moderate Reactor Incident - Most Dangerous



Population estimates are approximate only - population distribution almost certainly disrupted by incident

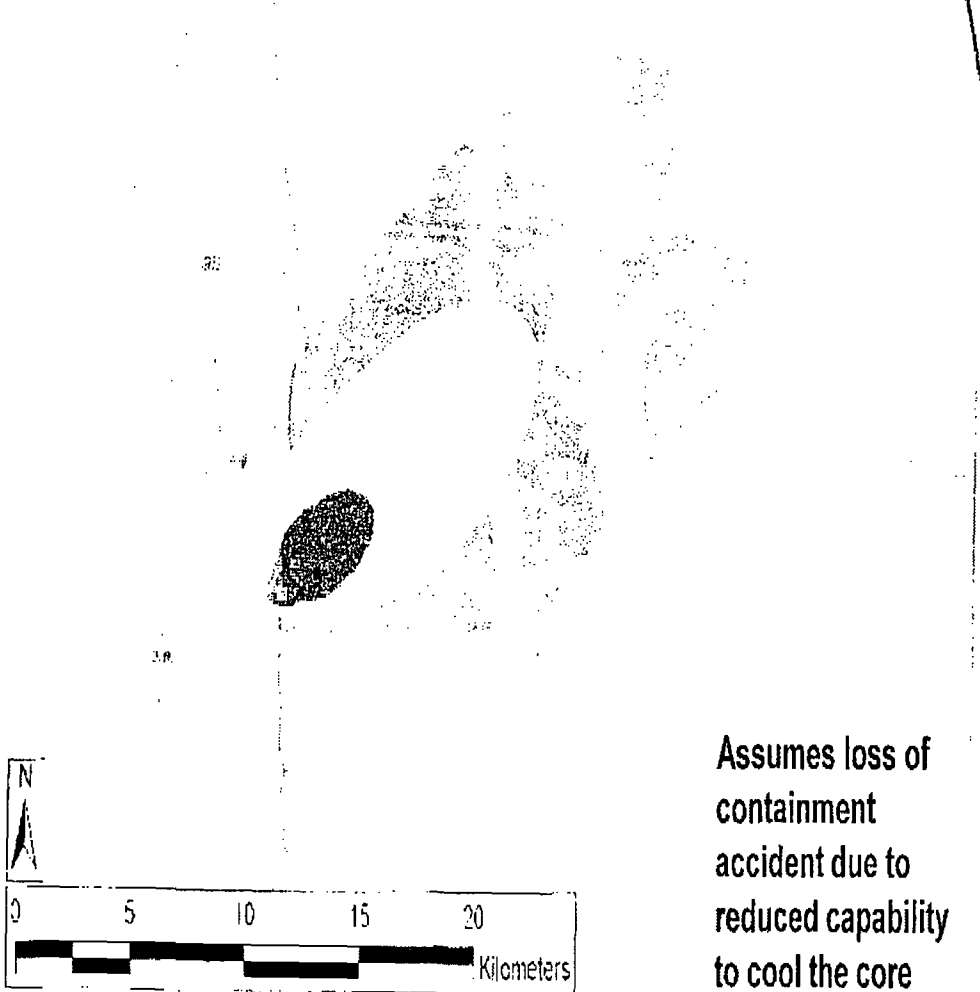
Combined (DPA) Integrated Population Dose
"Best Estimate" - Mean Contours
14 Mar 11 06:00:00Z (24,000 h)

Protective Action Regions
50 Year HDE Dose

	eSv (Rem)	In contour population
Under Life Saving	25.0	1,895
Evacuate	5.0	2,577
Shelter	1.0	3,257
Monitor	0.1	10,512

Exceedance Contour
50 Year HDE Dose

	eSv (Rem)	In contour population
40%	1.0	141,271



Assumes loss of containment accident due to reduced capability to cool the core

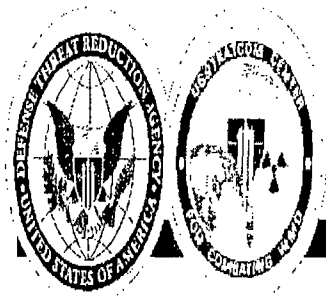
FACTS
 Fukushima Daiichi
 37.42139°N/ 141.0325°E
 0530Z 12MAR2011
 Type: Nuclear Facility Accident
 Weather: 15 km WRF
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

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Possible Release – Situational Details Unknown

Fukushima Daiichi-1 (Air Operations Impacts)

Moderate Reactor Incident – Most Dangerous



- The vertical extent of the radiation hazard is based on our worse case scenario.
- Based on our forecasted winds, radioactive cloud extends to a height of 3,500 ft, and ~35 miles downwind.
- Higher radiation levels may be encountered closer to the facility and the plume centerline.
- Recommend aircraft stay above 3,500 ft in the vicinity of the plume.
- Operations close to the facility should include monitoring equipment.

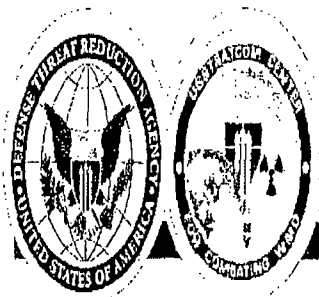
(b)(5)

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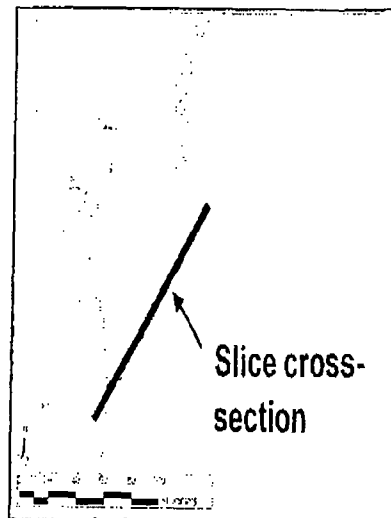
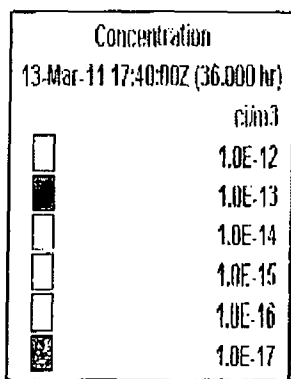
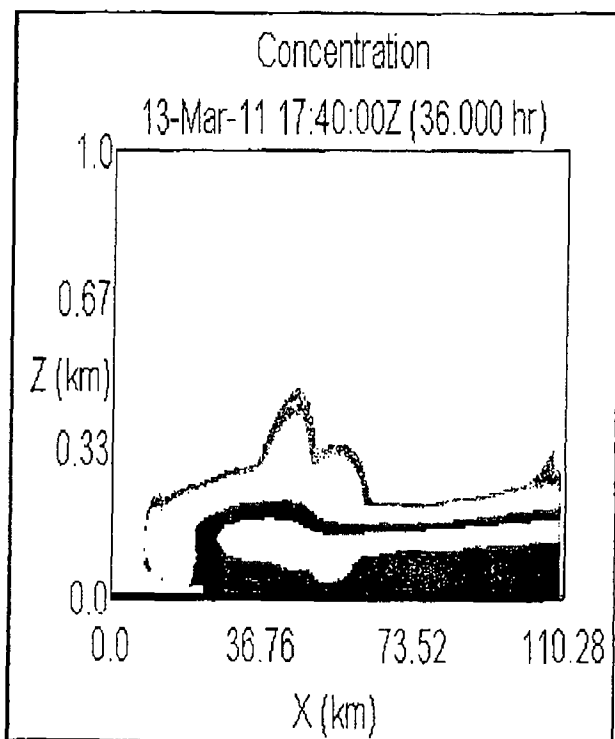
Possible Release – Situational Details Unknown

Fukushima Daiichi-1

Most Likely Release Scenario



Vertical Slice @ 1740Z 13 March



Assumes loss of containment accident due to reduced capability to cool the core

Note: The plume will change shape and structure as a function of time – slices at other times were similar or smaller. Higher concentrations were generally at or below 0.5 km elevation, lower concentrations up to approx 1 km.

FACTS
 Fukushima Daiichi
 37.42139°N/ 141.0325°E
 0530Z 12MAR2011
 Type: Nuclear Facility Accident
 Weather: 15 km WRF
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

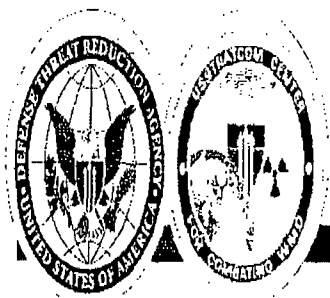


Possible Release - Situational Details Unknown
Backup: Radiation Human Effects - Military
Application

Human Effects Contours (Integrated): These holistic effects are designed to facilitate Warfighter decisions and application.
Combined HPAC Integrated Radiation Dose

Human Effects Contour Description	Probable Acute Effects All External Effective Dose	In contour population
50% of the population in the contour may experience nausea and vomiting	50% Fatalities (LD50/60)	410.0
5% of the population in the contour may experience nausea and vomiting	50% Vomiting	240.0
Maximum dose allowed for life saving (25 cSv (Rem))	5% Vomiting	75.0
Personnel within the 5.0 cSv (Rem) contour may need to be evacuated	Protective Action Regions 50 Year TEDE Dose	
Personnel within the 1.0 cSv (Rem) contour may need to shelter	Einor Life Saving	25.0
Personnel within the 0.1 cSv (Rem) contour may need to be monitored	Evacuate	5.0
90% confidence level that 1.0 Rem exposure is possible. Accounts for atmospheric uncertainties	Shelter	1.0
	Monitor	0.1
	Exceedance Contour 50 Year TEDE Dose	
	10%	1.0

Notes: Casualty numerical figures are based upon a population database (LandScan). LandScan is based on the 2000 census for the U.S. (other nations vary), overhead imagery, geo-economic, and other observable data and was updated in 2009. Population is assumed static for calculations. The population numbers next to associated hazard levels are the people contained within the entire contour based upon LandScan 2009 or otherwise noted. For planning purposes, estimates are assumed to be accurate within +10/-5%. Validation testing indicates agreement within 20% for select examined areas. The population data will not predict major shifts in personnel such as relocations (i.e.: religious pilgrimages, refuges, evacuations), events (i.e.: inaugurations, Olympics), or other population shifts. In such cases the population database needs to be updated to reflect actual conditions.



Backup: Radiation Unit Conversions

- Activity
 - 1 Curie (Ci) = 3.7×10^{10} Becquerels (Bq) = 3.7×10^{10} disintegrations/sec
 - Activity is a measure of atomic disintegrations per second.
 - Exponentially decays with age and is relative to specific radio-nuclide and age.
- Exposure or Dose Rate
 - 1 Gray (Gy) = 100 centi-Gray (cGy)
 - 1 centi-Gray (cGy) = 1 radiation absorbed dose unit (rad)
 - Dose is a measure of the energy deposited into a given mass.
 - Exposure when integrated over a time combined with an estimate of human tissue damage yields dose. Radiation detectors usually display instantaneous dose rate (e.g., cGy/hr, rad/hr).
- Dose Equivalent
 - 1 Sievert (Sv) = 100 centi-Sievert (cSv)
 - 1 centi-Sievert (cSv) = 1 Roentgen Equivalent to Man (REM)
 - An equivalent measurement or estimation of possible damage from ionizing radiation to human tissue. Dose Equivalent varies with type of human tissue exposed, ingestion, shielding, time, radiation type and energy.
- Exposure
 - 1 roentgen (R) = 2.58×10^{-4} Coulombs (C) per kg (in air)
 - Used to measure x and gamma ray radiation. 1 R ~ 1 rad ~ 1 rem for x and gamma.

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Backup: Radiation Exposure Reference



<u>Exposure</u>	<u>cGy / Rad / REM / cSv</u>	<u>Reference</u>
Cross Country Civilian Flight (cosmic radiation)	0.004	
Medical X-Ray (Chest)	0.01	Mettler FA, et al: Effective Doses in Radiology and Diagnostic Nuclear Medicine, 2008
Mammogram	0.4	Mettler FA, et al: Effective Doses in Radiology and Diagnostic Nuclear Medicine, 2008
CT (Chest, Abdomen, and Pelvis)	1.8	Mettler FA, et al: Effective Doses in Radiology and Diagnostic Nuclear Medicine, 2008
Chernobyl Evacuation Zone	10	
Hiroshima Survivor Inside Structure	78	
Nagasaki Survivor Inside Structure	156	
Average Background Annual Exposure in U.S. (Total)	0.62	NCRP No. 160 (2006)

<u>U.S. Civilian Standards</u>	<u>cGy / Rad / REM / cSv</u>	
Maximum Annual Public Exposure	0.1	(10 CFR 20.1301)
Maximum Radiation Worker Annual Dose	5	(10 CFR 20.1201)
General Emergency	1	(NUREG-0654/FEMA REP 1)
Protective Actions (shelter or evacuate)	1.0-5.0	(EPA 400-R-92-001, 1992)
Evacuation required	5	(EPA 400-R-92-001, 1992)
1st Responder Dose Protecting valuable property 1	10	(EPA 400-R-92-001, 1992)
1st Responder Dose Lifesaving or protection of large populations 1	25	(EPA 400-R-92-001, 1992)
Maximum 1st Responder Dose	25	(EPA 400-R-92-001, 1992)

<u>Military OEG*</u>	<u>cGy / Rad / REM / cSv</u>	
Wartime high-priority missions, to include life-saving	125	NATO STANAG-2473, 3 May 2000; USAFRRI, SP 03-1, April 2003
Operations other than war based on mission priorities and risk analysis	75	NATO STANAG-2473, 3 May 2000; USAFRRI, SP 03-1, April 2003

Note: Sieverts=Grays and Rad=REM for beta and gamma radiation as the Quality Factor is one.

*FEMA: Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents

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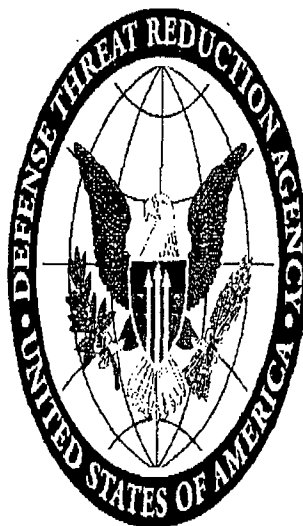
***Requested Slides for OSSJ:
Model of a Nuclear Reactor
Incident in Japan as a result of an
earthquake***

RFI - 216U

14MAR2011

Requestor: (b)(6)

As of 140825ZMAR11



Distribution: Limited to DoD and authorized contractors. Further distribution contact DTRA.
Derived From: Navy
Reason: E.O. 12958 sections 1.4 (e), (f) and (h).

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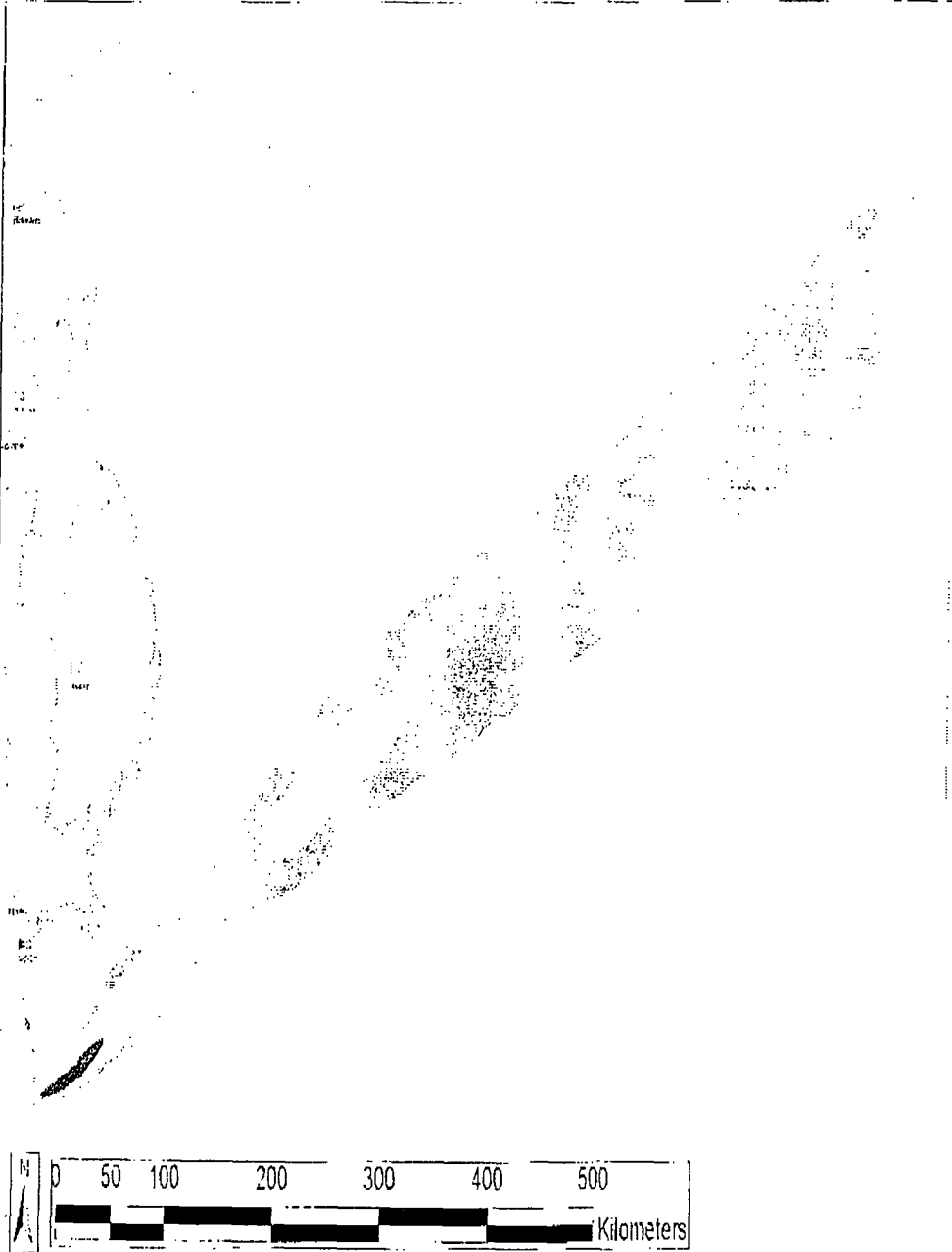
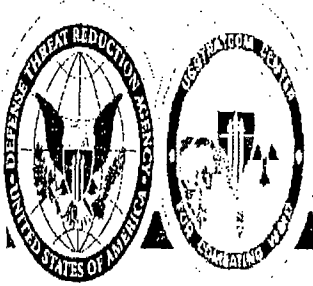
R&D Enterprise
Innovation & Systems Engineering Office
Reachback Division
(703) 767-3448, DSN 427-

EZ 219 of 810

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Possible Release - Situational Details Unknown

Fukushima Daiichi - 0600Z 14MAR2011 (Far)



Total Activity	
Isotope Air Concentration	
14-Mar-11 05:30:00Z (7,000 day)	
	C/m3
[White Box]	1.0E-08
[Light Gray Box]	1.0E-09
[Medium Gray Box]	1.0E-10
[Dark Gray Box]	1.0E-11
[Black Box]	1.0E-12
[White Box]	1.0E-13
[White Box]	1.0E-14

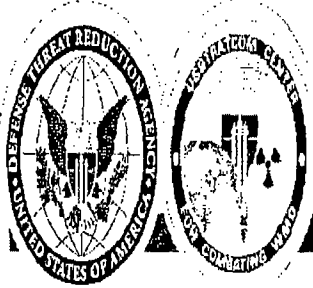
FACTS
Fukushima Daiichi
37.42139°N/ 141.0325°E
0530Z 12MAR2011
Type: Nuclear Facility Accident
Weather: 15 km WRF
Model: HPAC 5.0 SP1
Static Population Estimates:
LandScan 2009

As of 140825ZMAR11

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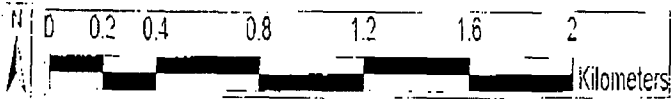
For Official Use Only

Possible Release - Situational Details Unknown Fukushima Daiichi - 0600Z 14MAR2011 (Near)



Total Activity	
Isotope Air Concentration	
14-Mar-11 05:40:00Z (2.000 day)	
Ci/m3	
	1.0E-08
	1.0E-09
	1.0E-10
	1.0E-11
	1.0E-12
	1.0E-13
	1.0E-14

FACTS
 Fukushima Daiichi
 37.42139°N/ 141.0325°E
 0530Z 12MAR2011
 Type: Nuclear Facility Accident
 Weather: 15 km WRF
 Model: HIPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009



As of 140825ZMAR11

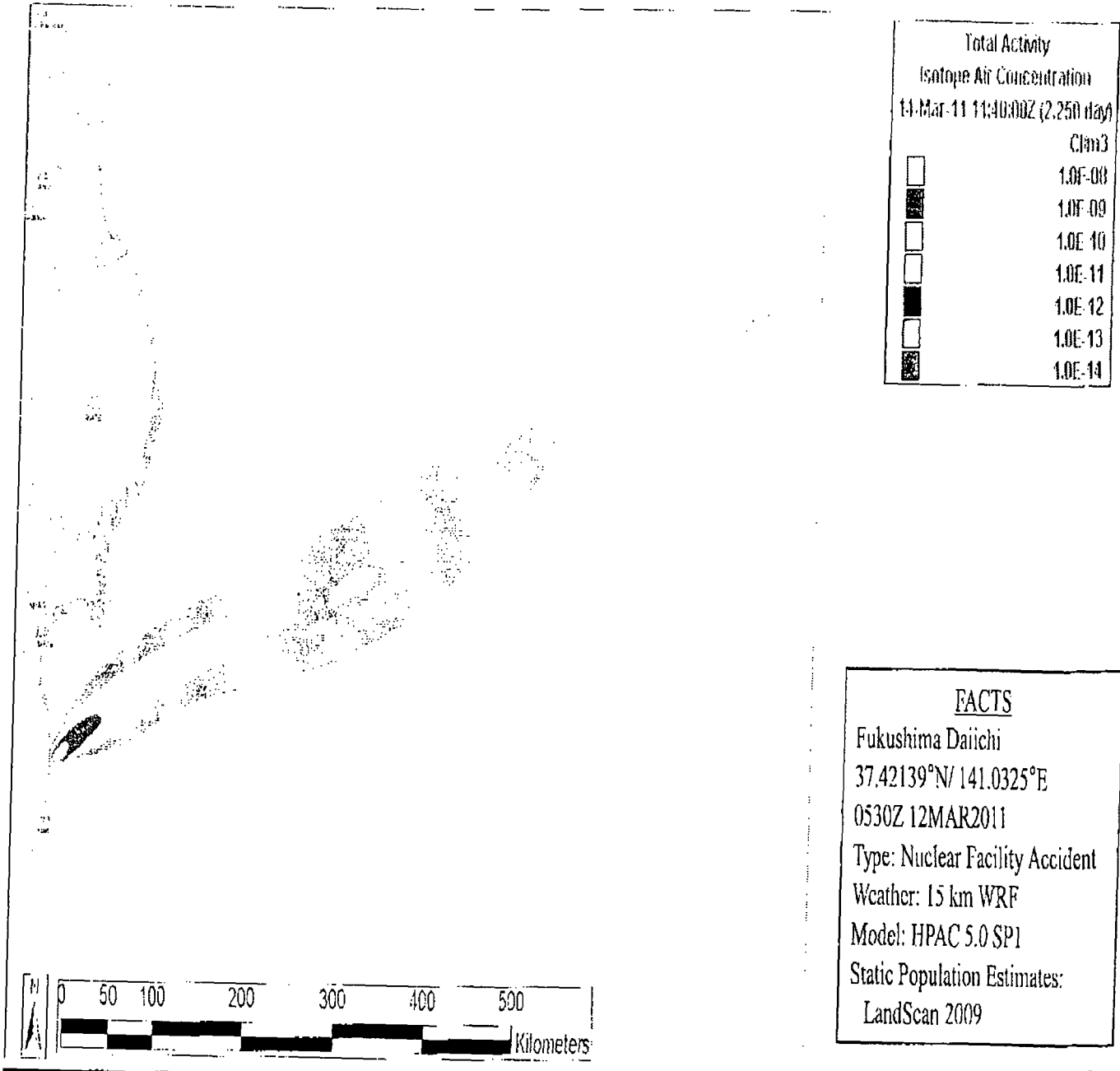
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Possible Release - Situational Details Unknown



Fukushima Daiichi - 1200Z 14MAR2011 (Far)



As of 140825ZMAR11

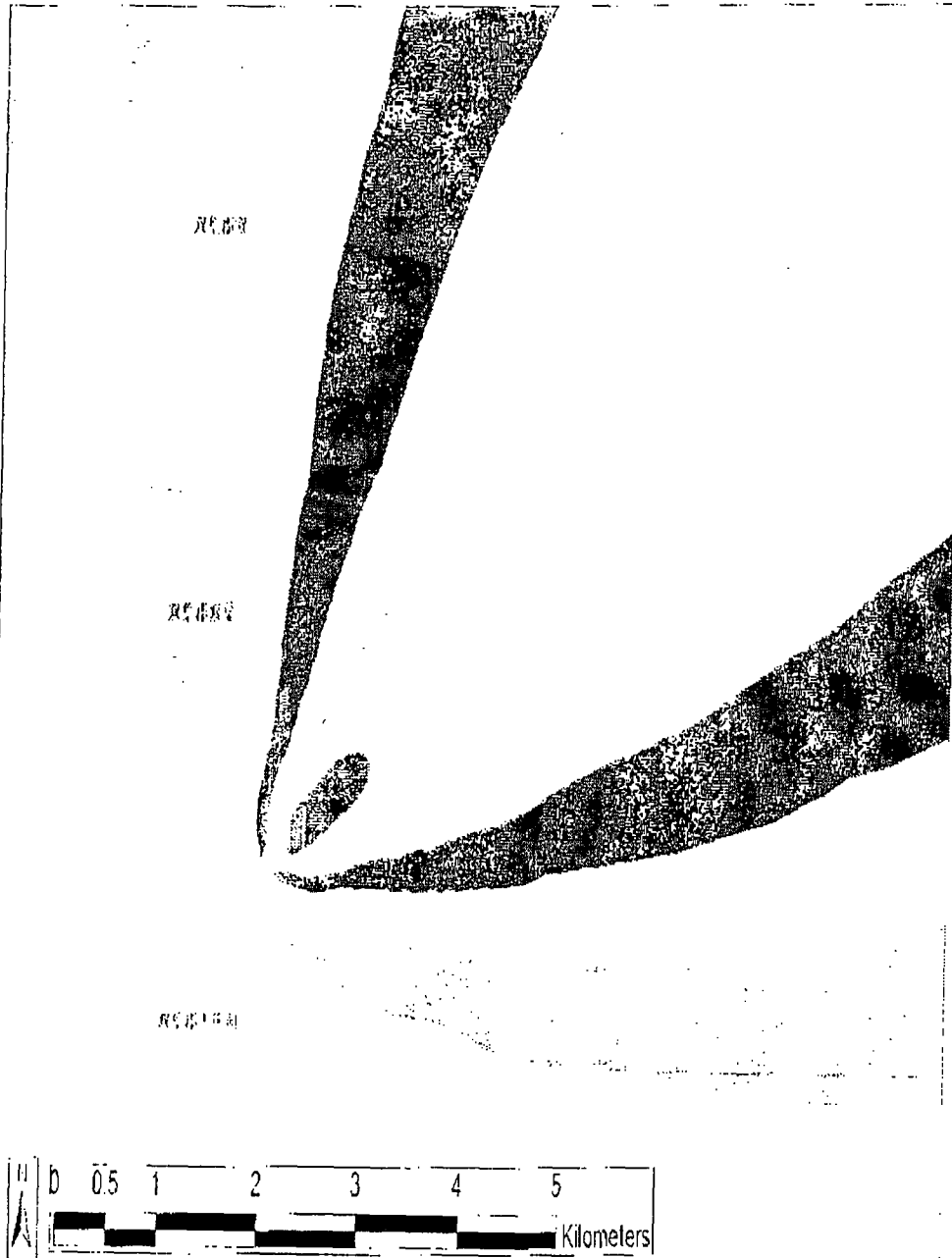
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Possible Release - Situational Details Unknown

Fukushima Daiichi - 1200Z 14MAR2011

(Near)



Total Activity	
Isotope Air Concentration	
14-Mar-11 11:40:00Z (2.250 day)	
	Bq/m ³
[White Box]	1.0E-08
[Light Gray Box]	1.0E-09
[Medium Gray Box]	1.0E-10
[Dark Gray Box]	1.0E-11
[Black Box]	1.0E-12
[White Box]	1.0E-13
[Dark Gray Box]	1.0E-14

FACTS
 Fukushima Daiichi
 37.42139°N/141.0325°E
 0530Z 12MAR2011
 Type: Nuclear Facility Accident
 Weather: 15 km WRF
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

As of 140825ZMAR11

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IAEA-CN-178/KN27

Operating Experience in Spent Fuel Storage Casks

3 June 2010

**T.Aida, T.Hara, Y.Kumano
Tokyo Electric Power Company**

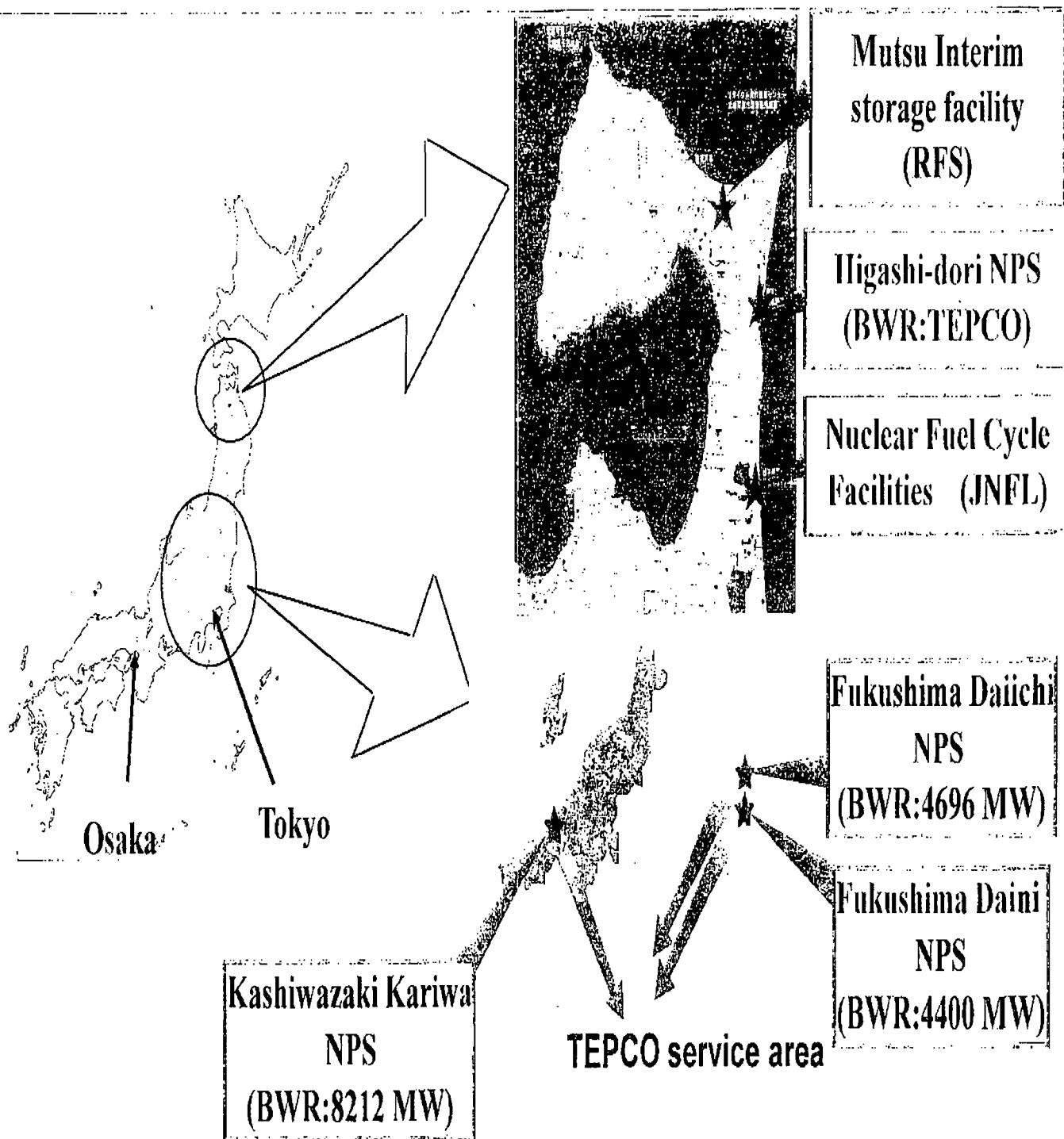


TOKYO ELECTRIC POWER COMPANY

Introduction

- In Japan, currently 54 nuclear power plants are in operation.
- The general strategy for the management of spent fuels is “to store spent fuels safely until being reprocessed”.
- Japanese utilities are coping with safe storage of spent fuels / operation of Rokkasho reprocessing facility.

Site Location



Storage Status of Spent Fuel at TEPCO's NPSs

	Number of NPPs	Storage amount (ton-U) (as of Mar/2010)	Storage capacity (ton-U)	Occupancy (%)
Fukushima- Daiichi	6	1,760	2,100	84%
Fukushima- Daini	4	1,060	1,360	78%
Kashiwazaki- Kariwa	7	2,190	2,910	75%
Total	17	5,010	6,370	

Measures for increasing Storage Capacity

	Already done	Additional measures
Fukushima-Daiichi Unit 1-6	<ul style="list-style-type: none"> ✓ Increase in the capacity of spent fuel pools by re-racking ✓ Installation of common spent fuel pool ✓ Installation of dry cask storage facility 	Installation of additional dry casks
Fukushima-Daini Unit 1-4	<ul style="list-style-type: none"> ✓ Increase in the capacity of spent fuel pools by re-racking 	—
Kashiwazaki-Kariwa Unit 1-7	<ul style="list-style-type: none"> ✓ Increase in the capacity of spent fuel pools by re-racking 	Increase in a fuel pool capacity * at Unit 5

TEPCO's Decision for Further Storage

In order to increase the flexibility for coping with increasing amount of the spent fuels, TEPCO decided to construct an off-site interim spent fuel storage facility.



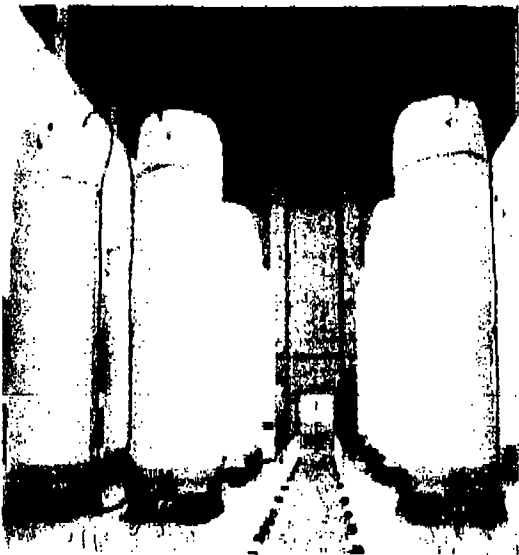
Establishment of RFS, Recyclable-Fuel Storage Company
(a joint company with JAPC)



RFS will begin operation of the Japanese first off-site interim spent fuel storage facility at Mutsu in 2012.

Storage Capacity of the RFS Facility

	TEPCO	JAPC
Amount of spent fuels generated every year (A)	500ton-U	100ton-U
Amount of spent fuels reprocessed every year (B)	300ton-U	50ton-U
(A)-(B)	200ton-U	50ton-U



The size of the interim storage facility has been designed to meet this amount which will be generated over the next 20 years.



$$250\text{ton-U} \times 20 \text{ year} = 5,000\text{ton-U}$$

Dry cask storage at Tokai#2

Outline of Mutsu Facility

- **Final Storage Capacity : 5,000tU**
- **Storage Period : up to 50 years**
- **Construction :**
 - First building: 3,000 tU capacity
 - ⇒ License for operation was permitted on 13/May/2010
 - Second building: 2,000tU capacity
- **Cask type: Dry metal dual-purpose cask**
- **Main Equipment & Devices:**
 - Equipment for carrying in, storing and carrying out recyclable fuels
 - Metal Casks
 - Storage buildings
 - Metal cask handling equipment, etc.

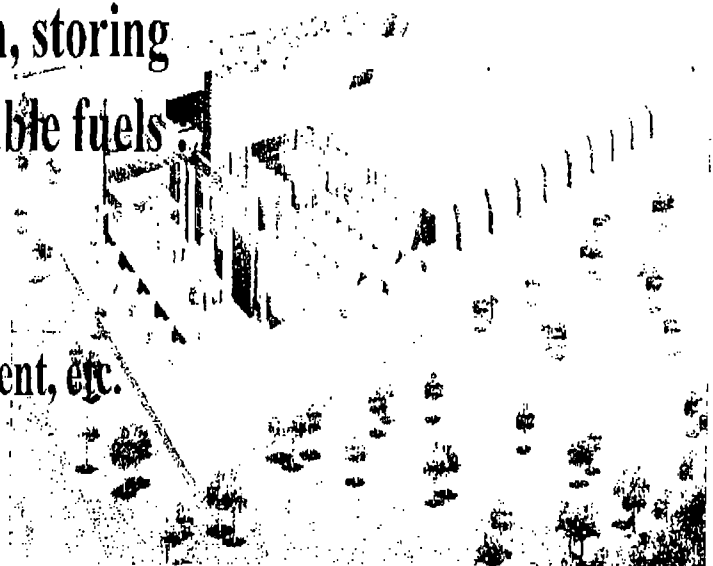




Table
NIT

NARAC/CMHT Calculated Potential Dose

Location	Surface Arrival (Days after Release)	96-hour Projected Dose (mrem)	1-Year Old Child Thyroid Dose Based Upon I-131 Deposition (mrem)
Southern Alaska	4	4.79E-2	1.94E+3
Hawaii	4	7.99E-3	2.78E+2
Midway	3	3.09E-3	1.26E+2
Southern California	5	7.52E-2	4.00E+3
Northern California	5	7.64E-2	4.06E+3
Oregon	5	6.04E-2	3.06E+3
Washington (state)	5	5.24E-2	2.76E+3

u Rem

*went to the
states
↓
press*

Summary: Maximum deposition DOES NOT exceed EPA guidelines for taking public protection measures or the protective action guide for food established by the FDA

Notes:

1. *Typical US citizen exposure from natural background radiation is ~1.0 mRem/day.*
2. *Typical personal exposure from round-trip flight from New York to London is 10 mRem, which is over 1 million times the expected dose to personnel in Hawaii or US mainland from the Fukushima radioactive release.*
3. *US Protection Action Guidance recommends action at 10 mR*

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Planning:

***Model of a Nuclear Reactor Incident in
Japan as a Result of an Earthquake --
Update 0600Z 16MAR2011***

RFI - 216U

16MAR2011

Requestor: (b)(6)

As of 0610Z 16MAR11



Distribution: Limited to DoD and authorized contractors. Further distribution contact DTRA.
Derived From: USFJ
Reason: E.O. 12958 sections 1.4 (e), (g) and (h).

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R&D Enterprise
Innovation & Systems Engineering Office
Reachback Division
(703) 767-3448, DSN 427-

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Request Summary

- **(FOUO) Request data**

- Requestor: [redacted] (b)(6)
- Contact: [redacted] (b)(6)
- Request: A model of a nuclear incident at the Fukushima Daiichi nuclear power facilities in Japan.

- **(FOUO) Solution**

- Summary: Air isotope concentrations and dose rates are provided
- Employment: Real World
- Reachback: Team

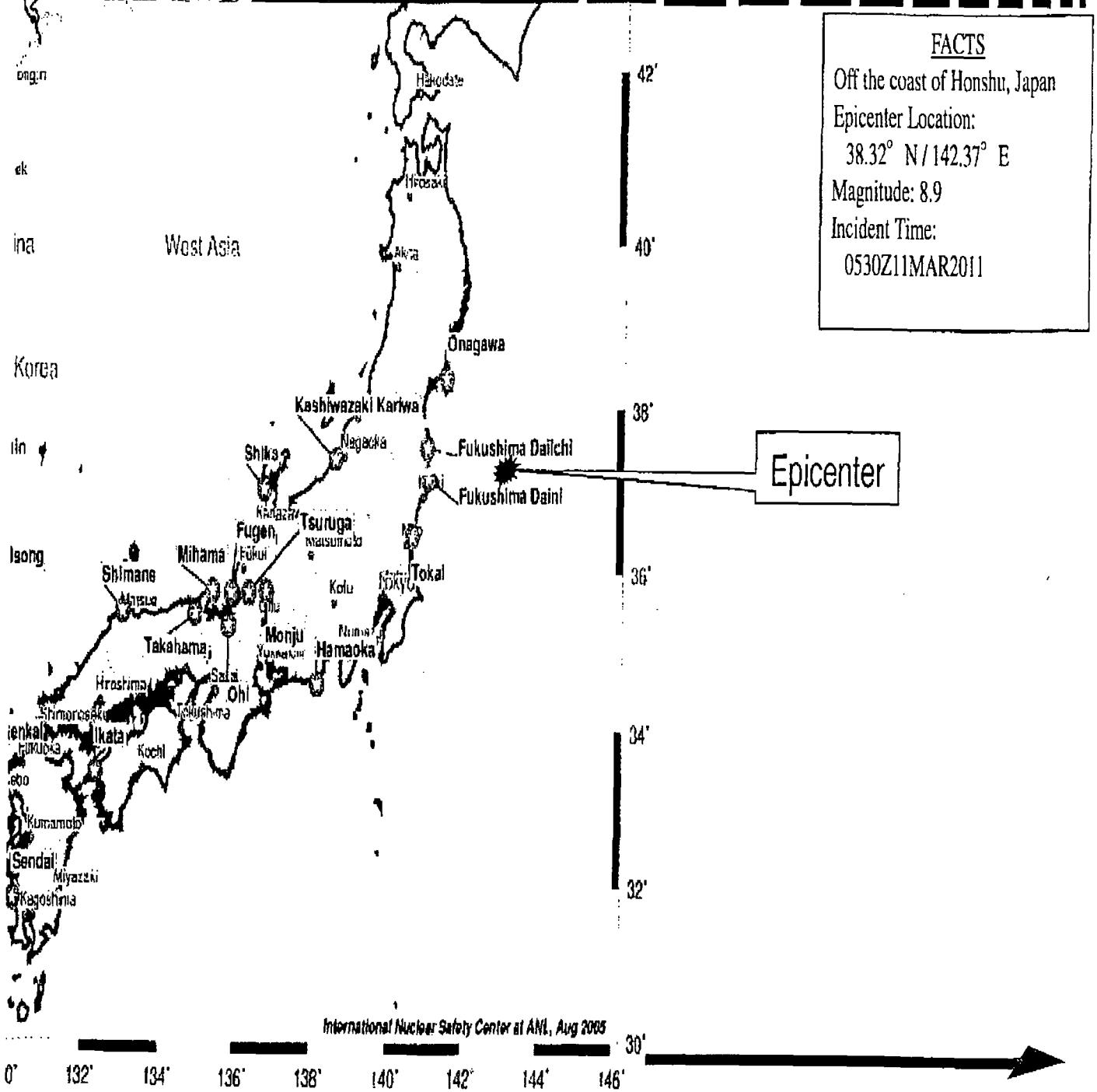
Location: Fukushima Daiichi, Japan Latitude: 37.42139° N Longitude: 141.0325° E
Release Time: 2100Z Date: 16MAR2011
Hazard: Accident at nuclear facility in Japan
Weather: Global Numerical Weather Prediction: 0.5° × 0.5° resolution GFS from NCEP
Comments: This is a periodic update. We will continue to update this product with any additional information that becomes available.
Models indicate no impact on Yokota AB or Misawa AB during this period of interest. These are not shown for clarity.

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Possible Release – Situational Details Unknown

Nuclear Power Plants

SCOPING PURPOSES ONLY



FACTS
 Off the coast of Honshu, Japan
 Epicenter Location:
 38.32° N / 142.37° E
 Magnitude: 8.9
 Incident Time:
 0530Z11MAR2011

Epicenter

As of 0610Z 16MAR11

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Fukushima Daiichi-1 Status

- Core damage occurred due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following tsunami
- As of 2200 JST 14MAR2011, it is reported that sea water is being injected
- Containment described as “functional”
- Hydrogen explosion from overheated fuel-water reaction damaged the reactor building
- Sea water is being injected with reported stable cooling
- The spent fuel pool level is unknown
- High radiation levels reduced to 600 mSv/hr (60 mrem/hr) at 0600Z 15MAR2011 at site gate

Source: USNRC Emergency Operations Center Status Update, 1730Z 14MAR2011

As of 0610Z 16MAR11

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Fukushima Daiichi-2 Status

- Core damage occurred due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- Reactor Core Isolation Cooling (RCIC) has failed
- Hydrogen explosion from overheated fuel-water reaction damaged the reactor building
- Sea water injection restarted with reports of non-stable conditions
- There are reports of a loud sound at Unit 2 in the vicinity of the suppression chamber. It is reported at 1130Z 15MAR2011 that containment is intact (better than previously thought)
- High radiation levels reduced to 600 mSv/hr (60 mrem/hour) at 0600Z 15MAR2011 at site gate (same gate for all units)
- The spent fuel pool level is unknown

Source: USNRC Emergency Operations Center Status Update, 2330Z 15MAR2011

As of 0610Z 16MAR11

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Fukushima Daiichi-3 Status

- Core damage due to insufficient cooling water caused by loss of offsite power and onsite diesel generators following the tsunami
- Sea water is being injected with reported stable cooling
- Hydrogen explosion from overheated fuel-water reaction has damaged reactor building roof
- Primary containment described as “functional”
- There is no spent fuel pool information
- High radiation levels reduced to 600 mSv/hr (60 mrem/hour) at 0600Z 15MAR2011 at site gate (same gate for all units)

Source: USNRC Emergency Operations Center Status Update, 2330Z 15MAR2011

As of 0610Z 16MAR11

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Fukushima Daiichi-4 Status

- First fire in the reactor building was a small generator lube oil fire. IAEA reports that fire was put out at 0200 15MAR2011
- High radiation levels reduced to 600 mSv/hr (60 mrem/hour) at 0600Z 15MAR2011 at site gate (same gate for all units)
- Second fire began 2045Z 14MAR2011 in reactor building. Reports indicate that this fire is not yet contained. TEPCO is determining whether to use helicopter or fire truck to fight fire. Fuel reported to be uncovered
- Radiation level in the area of unit 4 reported to be 30R/hr following second fire
- There is a possible water loss from the spent fuel pool and operators are having difficulty providing adequate cooling and water level to the pool
- There are reports of possible hydrogen explosion due to uncovered fuel in the spent fuel pool (awaiting visual confirmation)
- High radiation dose rates measured between units 3 and 4, source is suspected to be the partially uncovered Unit 4 fuel pool

Source: USNRC Emergency Operations Center Status Update, 2330Z 15MAR2011

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Status of additional reactors

- Fukushima Daiichi-5, and -6
 - The reactors are stable
 - Spent fuel pools are reported to be heating up
- Daini-1, -2, -3, and -4
 - All units have stable offsite power
 - All units are reported to be in cold shutdown with stable water level
 - Latest TEPCO reports do not mention any problems with the ultimate heat sink
- Onagawa-1, -2, and -3
 - All units are shutdown and stable
 - The fire in the turbine building has been extinguished

Source: USNRC Emergency Operations Center Status Update, 2330Z 15MAR2011

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Fukushima Daiichi DTRA Modeling Assumptions

Most Likely

- **Scenario: some core damage; primary containment building integrity intact; venting occurring to reduce core temperature and pressure**

- Continuous Release – Steam released for decay heat removal
- HPAC –Release Assumptions:
 - ✓ Shut down time of reactor concurrent with earthquake
 - ✓ Continuous Small Release starting at 2100Z
 - ✓ NFAC Reactor Accident
 - ✓ Containment monitor reading: 10 R/hr (unconfirmed)
 - ✓ Sprayers: Off (unconfirmed)
 - ✓ Filters: On (unconfirmed)
 - ✓ Weather 40 km GFS

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Fukushima Daiichi DTRA Modeling

- **Summary of Models Provided in this Briefing**
- Assumption – Fukushima Daiichi #1, 2, and #3 suffered damage resulting in a continuous release/leak of a small portion of its inventory. Release occurs consistently throughout times shown in this product. (Precise details of this release are highly uncertain and time-varying)

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Fukushima Daiichi (Impacts) – Most Likely

Assumed Core Damage & Venting

- Weather

- Surface winds in the vicinity of the power plant are currently from the NW through N and gusty. Northwesterly (offshore) winds between 15-25 kts are forecasted for Wednesday (16MAR). **This means that any possible release through Wednesday will move to the SE and later to E**
- Japanese national government instructed evacuation for local residents within a 20km radius of the site boundary and sheltering in place out to 30km for residents who stayed behind. IAEA confirms a no fly zone out to 30km around Fukushima Daiichi plant.
 - Operations in the area of the facility should include monitoring equipment.
- As core pressure and temperature lower and stabilize, radiation levels will lower accordingly.

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Fukushima Daiichi -- Plume at 2100Z 16MAR2011 (Far)

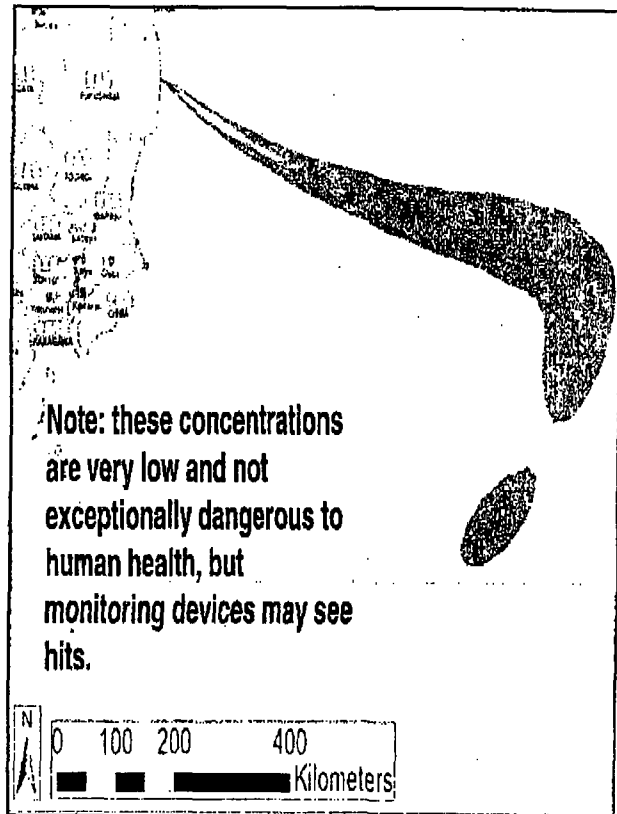
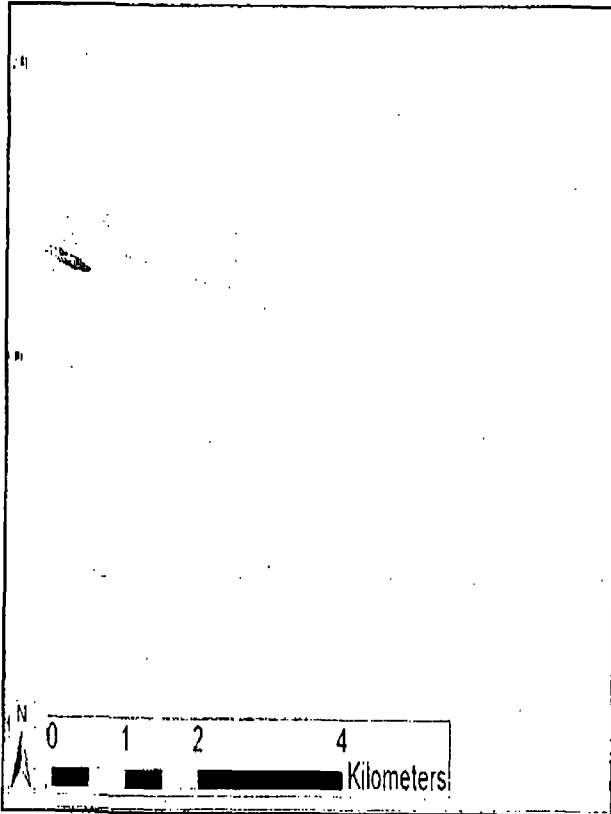
GFS Forecast valid @ 2100Z 16MAR2011 From 1800Z 15MAR2011 Run



ALLEXTEFF(Rate)	
RTH Radiation Field	
16-Mar-11 21:00:00Z	
	REM/hr
1 urem/hr	1.0E-06
100 nrem/hr	1.0E-07
10 nrem/hr	1.0E-08
1 nrem/hr	1.0E-09

FACTS
 Fukushima Daiichi
 37.42139° N/ 141.0325° E
 0900Z 16MAR2011
 Type: Nuclear Facility Accident
 Weather: 40 km GFS
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

Total Activity	
Isotope Air Concentration	
16-Mar-11 21:00:00Z	
	CI/m3
10 nCI/m3	1.0E-08
1 nCI/m3	1.0E-09
100 pCI/m3	1.0E-10
10 pCI/m3	1.0E-11
1 pCI/m3	1.0E-12
100 fCI/m3	1.0E-13
10 fCI/m3	1.0E-14



As of 0610Z 16MAR11

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Possible Release – Situational Details Unknown

Fukushima Daiichi – Plume at 0300Z 17MAR2011 (Far)

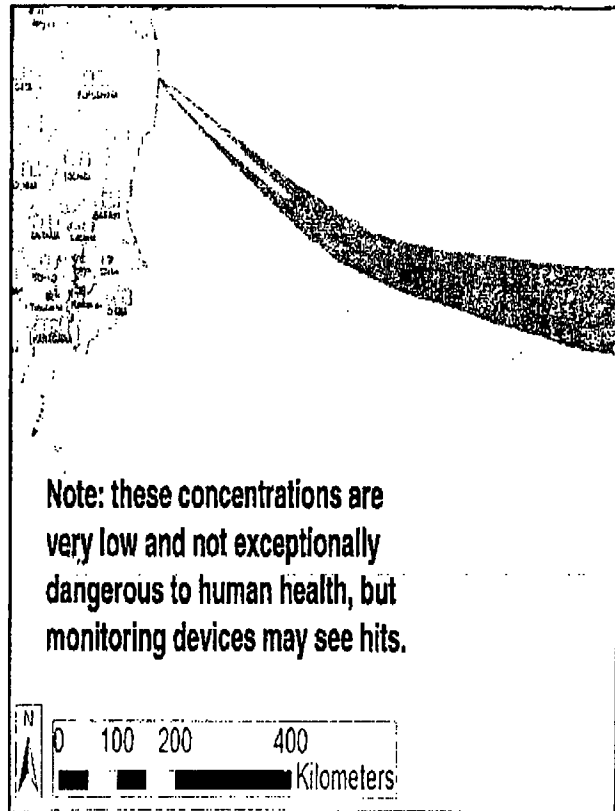
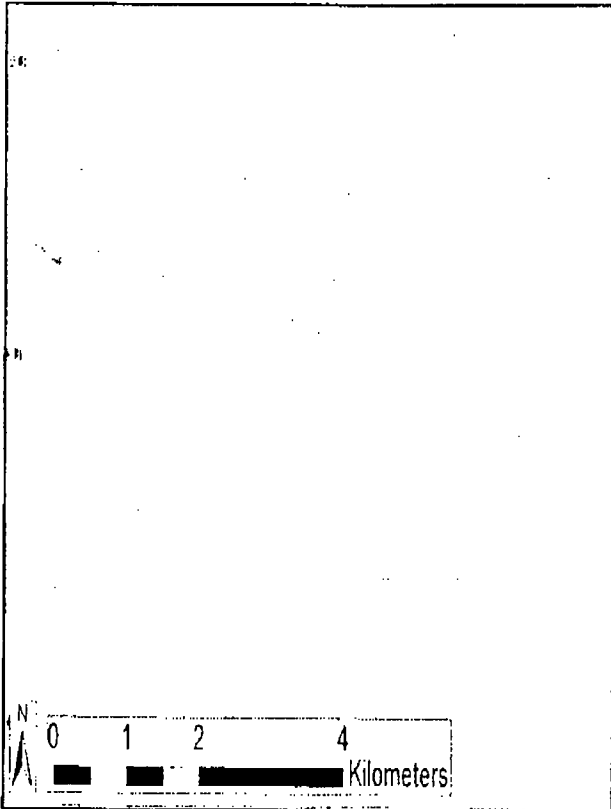
GFS Forecast valid @ 2100Z 16MAR2011 From 1800Z 15MAR2011 Run



ALLEXTEFF(Rate)	
RTH Radiation Field	
17-Mar-11 03:00:00Z	
1 urem/hr	1.0E-08
100 nrem/hr	1.0E-07
10 nrem/hr	1.0E-08
1 nrem/hr	1.0E-09

FACTS
 Fukushima Daiichi
 37.42139° N/ 141.0325° E
 0900Z 16MAR2011
 Type: Nuclear Facility Accident
 Weather: 40 km GFS
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

Total Activity	
Isotope Air Concentration	
17-Mar-11 03:00:00Z	
10 nCi/m3	1.0E-08
1 nCi/m3	1.0E-09
100 pCi/m3	1.0E-10
10 pCi/m3	1.0E-11
1 pCi/m3	1.0E-12
100 fCi/m3	1.0E-13
10 fCi/m3	1.0E-14



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Possible Release - Situational Details Unknown

Fukushima Daiichi - Plume at 0900Z 17MAR2011 (Far)

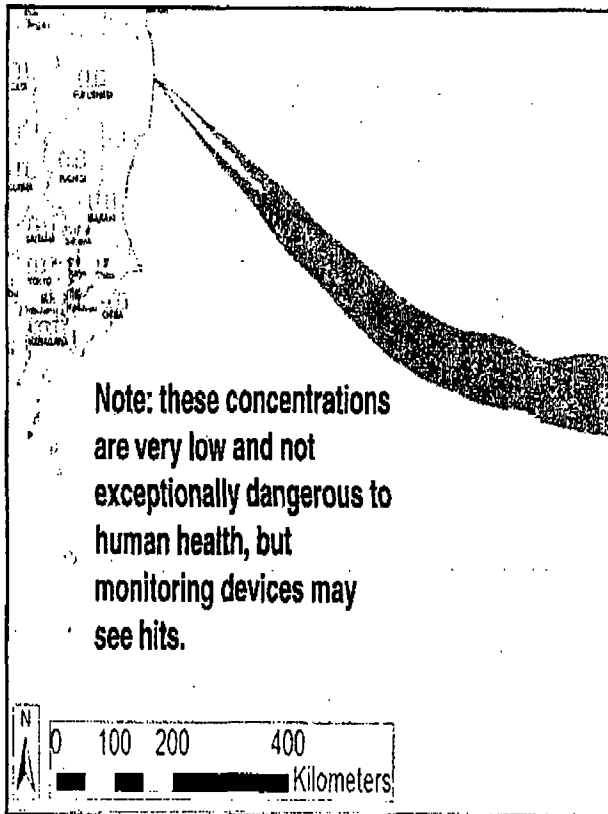
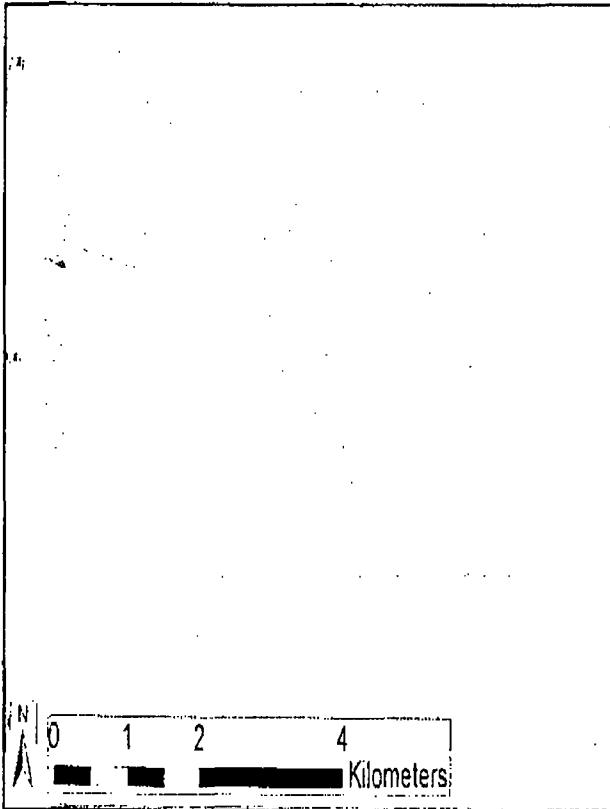
GFS Forecast valid @ 0300Z 17MAR2011 From 1800Z 15MAR2011 Run



ALLEXTEFF(Rate)	
RTH Radiation Field	
17-Mar-11 09:00:00Z	
	REM/hr
1 urem/hr	1.0E-06
100 nrem/hr	1.0E-07
10 nrem/hr	1.0E-08
1 nrem/hr	1.0E-09

FACTS
 Fukushima Daiichi
 37.42139° N/ 141.0325° E
 0900Z 16MAR2011
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 LandScan 2009

Total Activity	
Isotope Air Concentration	
17-Mar-11 09:00:00Z	
	CI/m3
10 nCI/m3	1.0E-08
1 nCI/m3	1.0E-09
100 pCI/m3	1.0E-10
10 pCI/m3	1.0E-11
1 pCI/m3	1.0E-12
100 fCI/m3	1.0E-13
10 fCI/m3	1.0E-14



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Possible Release -- Situational Details Unknown

Fukushima Daiichi -- Plume at 1500Z 17MAR2011 (Far)

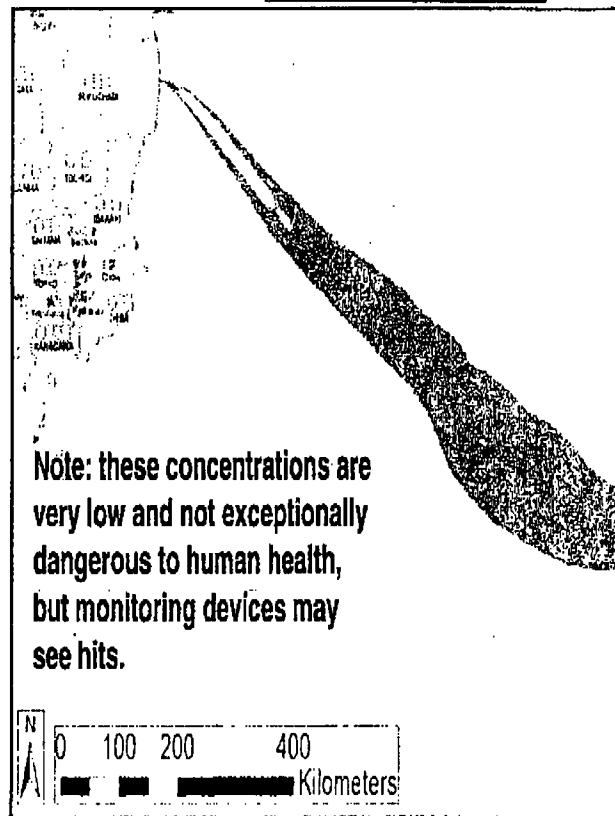
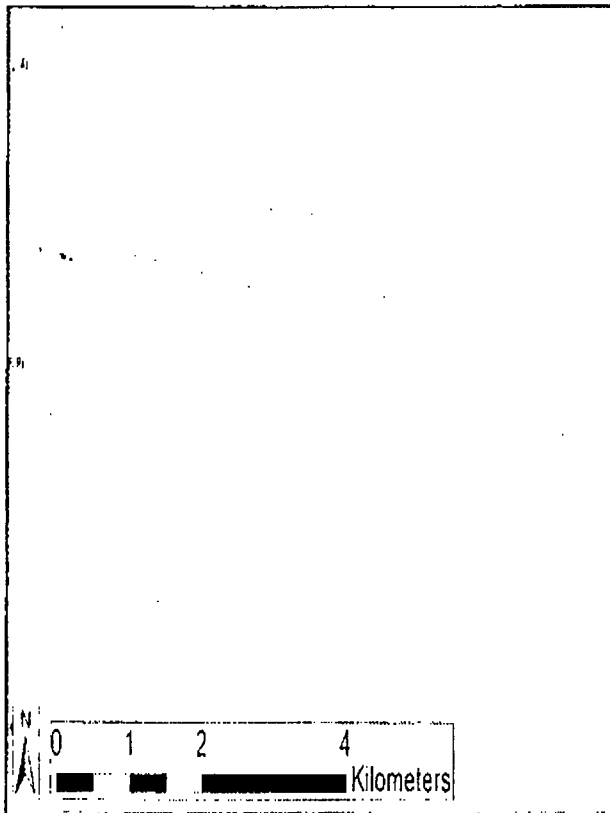
GFS Forecast valid @ 0900Z 17MAR2011 From 1800Z 15MAR2011 Run



ALLEXTEFF(Rate)	
RTH Radiation Field	
17-Mar-11 15:00:00Z	
	REM/hr
1 urem/hr	1.0E-06
100 nrem/hr	1.0E-07
10 nrem/hr	1.0E-08
1 nrem/hr	1.0E-09

FACTS
 Fukushima Daiichi
 37.42139° N/ 141.0325° E
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Total Activity	
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17-Mar-11 16:00:00Z	
	CI/m3
10 nCI/m3	1.0E-08
1 nCI/m3	1.0E-09
100 pCI/m3	1.0E-10
10 pCI/m3	1.0E-11
1 pCI/m3	1.0E-12
100 fCI/m3	1.0E-13
10 fCI/m3	1.0E-14

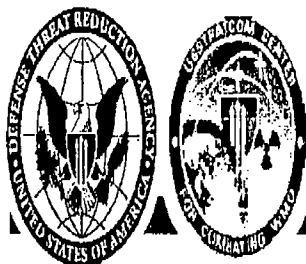


For Official Use Only

Possible Release - Situational Details Unknown

Fukushima Daiichi - Plume at 2100Z 17MAR2011 (Far)

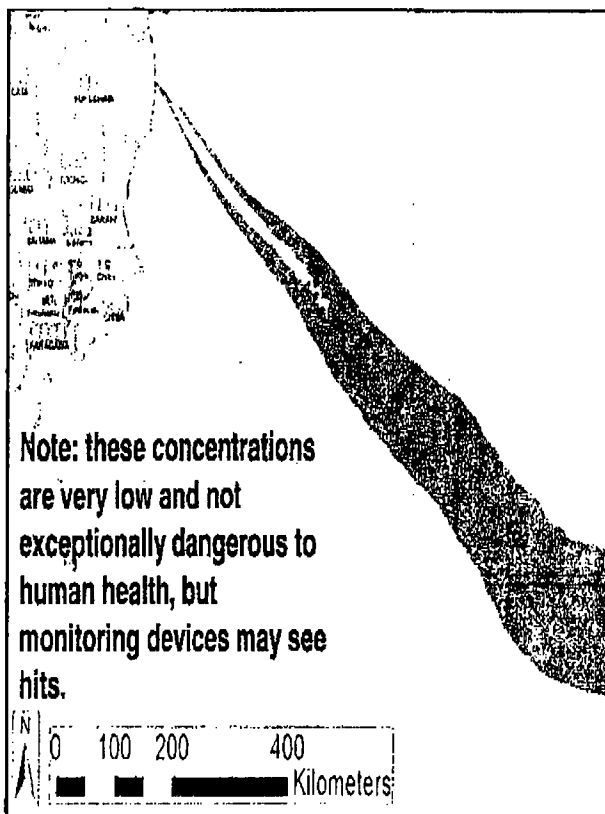
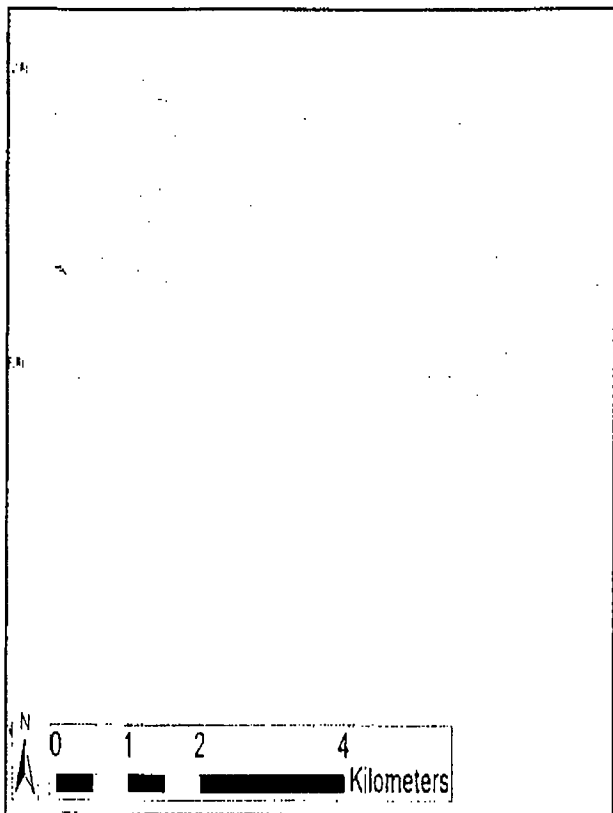
GFS Forecast valid @ 1500Z 17MAR2011 From 1800Z 15MAR2011 Run



ALLEXTEFF(Rate)	
RTH Radiation Field	
17-Mar-11 21:00:00Z	
	REM/hr
1 urem/hr	1.0E-06
100 nrem/hr	1.0E-07
10 nrem/hr	1.0E-08
1 nrem/hr	1.0E-09

FACTS
 Fukushima Daiichi
 37.42139° N/ 141.0325° E
 0900Z 16MAR2011
 Type: Nuclear Facility Accident
 Weather: 40 km GFS
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

Total Activity	
Isotope Air Concentration	
17-Mar-11 21:00:00Z	
	CI/m3
10 nCI/m3	1.0E-08
1 nCI/m3	1.0E-09
100 pCI/m3	1.0E-10
10 pCI/m3	1.0E-11
1 pCI/m3	1.0E-12
100 fCI/m3	1.0E-13
10 fCI/m3	1.0E-14



For Official Use Only

Possible Release - Situational Details Unknown

Fukushima Daiichi - Plume at 0300Z 18MAR2011 (Far)

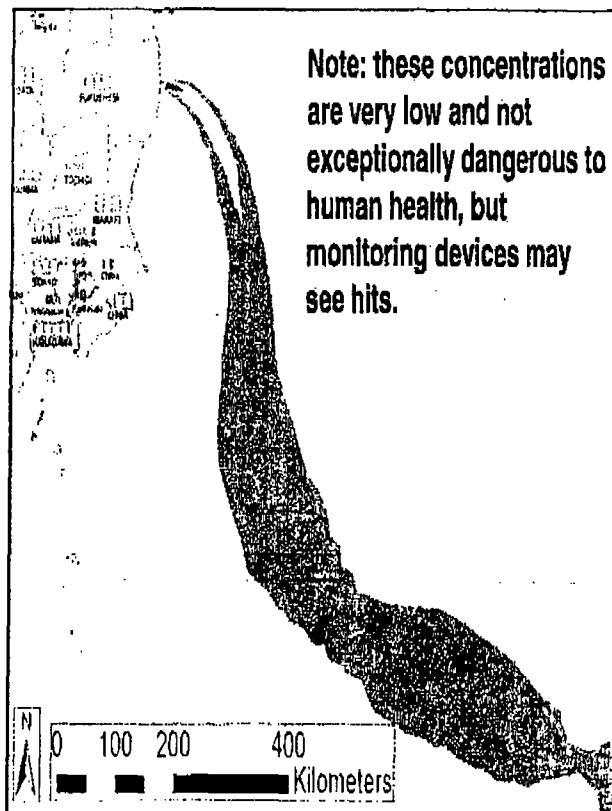
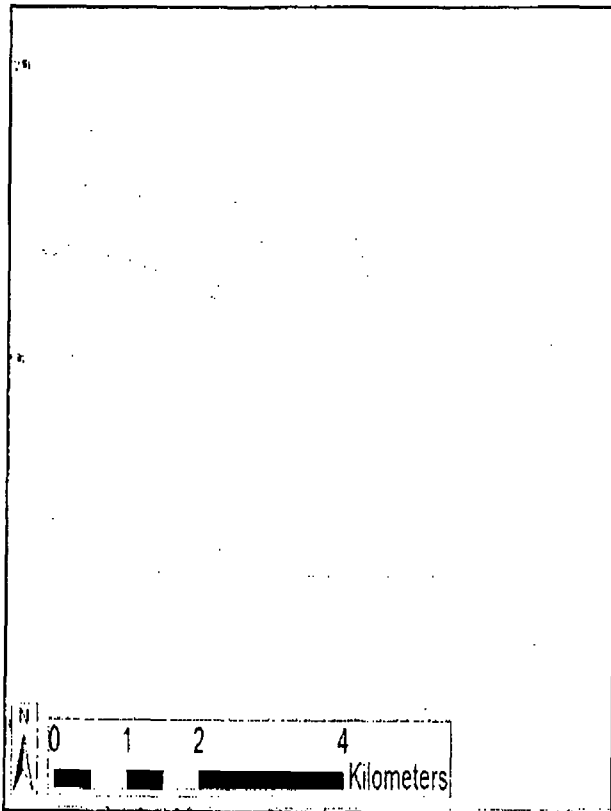
GFS Forecast valid @ 2100Z 17MAR2011 From 1800Z 15MAR2011 Run



ALLEXTEFF(Rate)	
RTH Radiation Field	
18-Mar-11 03:00:00Z	
	REM/hr
1 urem/hr	1.0E-06
100 nrem/hr	1.0E-07
10 nrem/hr	1.0E-08
1 nrem/hr	1.0E-09

FACTS
 Fukushima Daiichi
 37.42139° N/141.0325° E
 0900Z 16MAR2011
 Type: Nuclear Facility Accident
 Weather: 40 km GFS
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

Total Activity	
Isotope Air Concentration	
18-Mar-11 03:00:00Z	
	CI/m3
10 nCI/m3	1.0E-08
1 nCI/m3	1.0E-09
100 pCI/m3	1.0E-10
10 pCI/m3	1.0E-11
1 pCI/m3	1.0E-12
100 fCI/m3	1.0E-13
10 fCI/m3	1.0E-14



Note: these concentrations are very low and not exceptionally dangerous to human health, but monitoring devices may see hits.

For Official Use Only

Possible Release - Situational Details Unknown

Fukushima Daiichi - Plume at 0300Z 18MAR2011 (Far)

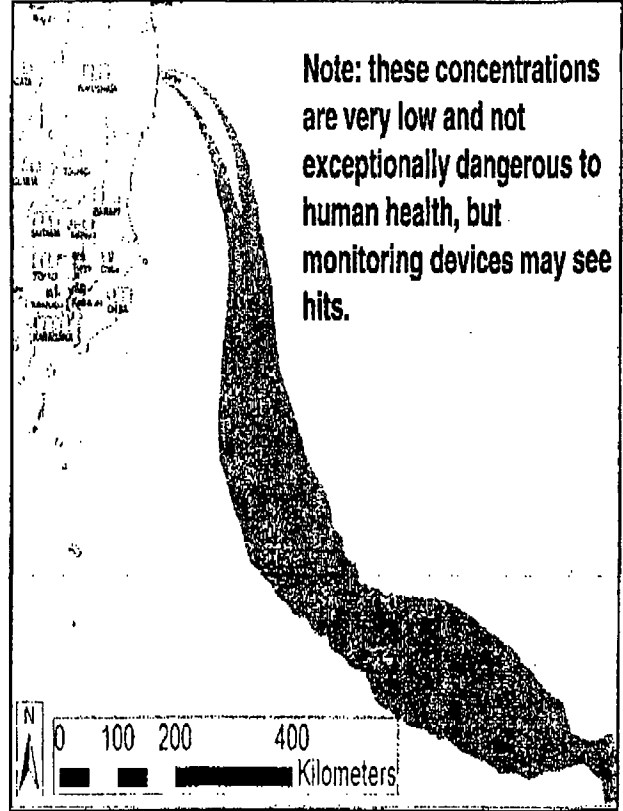
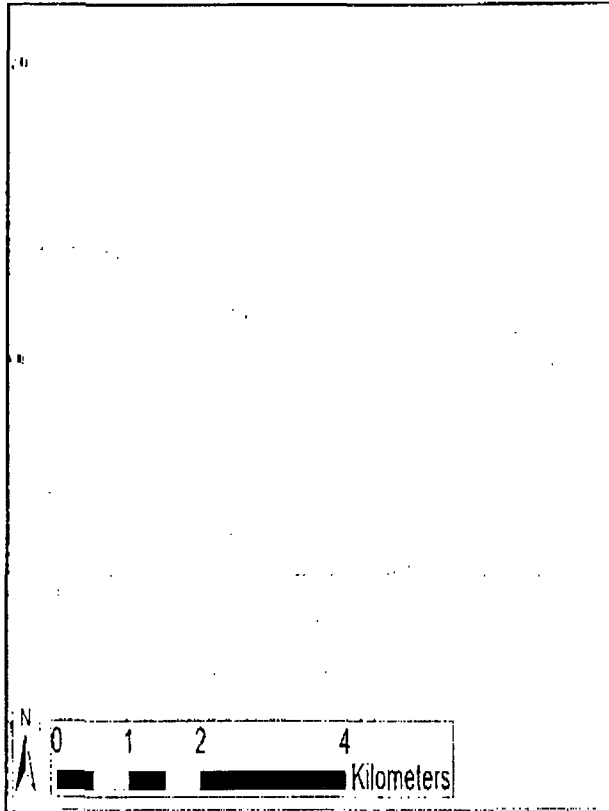
GFS Forecast valid @ 0300Z 18MAR2011 From 1800Z 15MAR2011 Run



ALLEXTEFF(Rate)	
RTH Radiation Field	
18-Mar-11 09:00:00Z	
	REM/hr
100 nrem/hr	1.0E-07
10 nrem/hr	1.0E-08
1 nrem/hr	1.0E-09

FACTS
 Fukushima Daiichi
 37.42139° N / 141.0325° E
 0900Z 16MAR2011
 Type: Nuclear Facility Accident
 Weather: 40 km GFS
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

Total Activity	
Isotope Air Concentration	
18-Mar-11 09:00:00Z	
	CI/m3
100 pCi/m3	1.0E-10
10 pCi/m3	1.0E-11
1 pCi/m3	1.0E-12
100 fCi/m3	1.0E-13
10 fCi/m3	1.0E-14



For Official Use Only

Possible Release -- Situational Details Unknown

Fukushima Daiichi

Most Likely Release Scenario



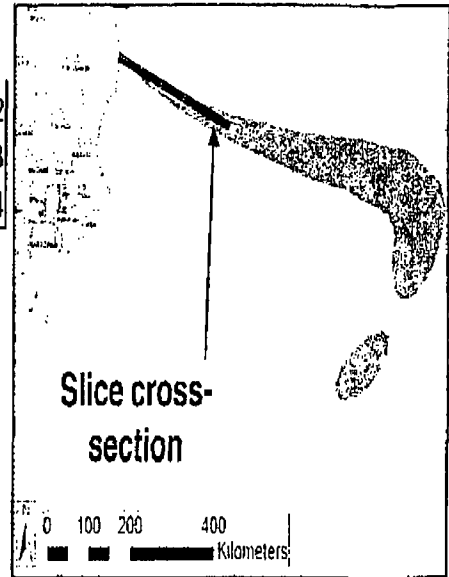
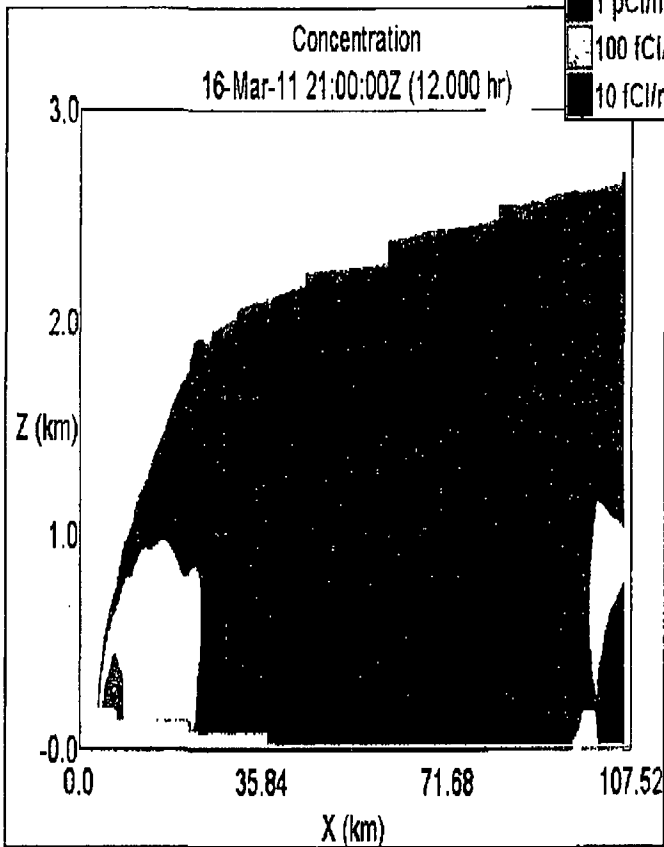
Vertical Slice @ 2100Z 16 March

Total Activity

Isotope Air Concentration

16-Mar-11 21:00:00Z

1 pCi/m3	1.0E-12
100 fCi/m3	1.0E-13
10 fCi/m3	1.0E-14



**Assumes
continuous
venting**

FACTS
 Fukushima Daiichi
 37.42139° N/ 141.0325° E
 0900Z 16MAR2011
 Type: Nuclear Facility Accident
 Weather: 40 km GFS
 Model: HPAC 5.0 SP1
 Static Population Estimates:
 LandScan 2009

Note: The plume will change shape and structure as a function of time – slices at other times were similar or smaller. Higher concentrations were generally at or below 1 km elevation, lower concentrations up to approx 2.8 km.



Backup: Radiation Unit Conversions

- Activity
 - 1 Curie (Ci) = 3.7×10^{10} Becquerels (Bq) = 3.7×10^{10} disintegrations/sec
 - Activity is a measure of atomic disintegrations per second.
 - Exponentially decays with age and is relative to specific radio-nuclide and age.
- Exposure or Dose Rate
 - 1 Gray (Gy) = 100 centi-Gray (cGy)
 - 1 centi-Gray (cGy) = 1 radiation absorbed dose unit (rad)
 - Dose is a measure of the energy deposited into a given mass.
 - Exposure when integrated over a time combined with an estimate of human tissue damage yields dose. Radiation detectors usually display instantaneous dose rate (e.g., cGy/hr, rad/hr).
- Dose Equivalent
 - 1 Sievert (Sv) = 100 centi-Sievert (cSv)
 - 1 centi-Sievert (cSv) = 1 Roentgen Equivalent to Man (REM)
 - An equivalent measurement or estimation of possible damage from ionizing radiation to human tissue. Dose Equivalent varies with type of human tissue exposed, ingestion, shielding, time, radiation type and energy.
- Exposure
 - 1 roentgen (R) = 2.58×10^{-4} Coulombs (C) per kg (in air)
 - Used to measure x and gamma ray radiation. 1 R ~ 1 rad ~ 1 rem for x and gamma.

For Official Use Only

Possible Release – Situational Details Unknown

Backup: Radiation Exposure Reference



<u>Exposure</u>	<u>cGy / Rad / REM / cSv</u>	<u>Reference</u>
Cross Country Civilian Flight (cosmic radiation)	0.004	
Medical X-Ray (Chest)	0.01	Mettler FA, et al: Effective Doses in Radiology and Diagnostic Nuclear Medicine, 2008
Mammogram	0.4	Mettler FA, et al: Effective Doses in Radiology and Diagnostic Nuclear Medicine, 2008
CT (Chest, Abdomen, and Pelvis)	1.8	Mettler FA, et al: Effective Doses in Radiology and Diagnostic Nuclear Medicine, 2008
Chernobyl Evacuation Zone	10	
Hiroshima Survivor Inside Structure	78	
Nagasaki Survivor Inside Structure	156	
Average Background Annual Exposure in U.S. (Total)	0.62	NCRP No. 160 (2006)

<u>U.S. Civilian Standards</u>	<u>cGy / Rad / REM / cSv</u>	
Maximum Annual Public Exposure	0.1	(10 CFR 20.1301)
Maximum Radiation Worker Annual Dose	5	(10 CFR 20.1201)
General Emergency	1	(NUREG-0654/FEMA REP 1)
Protective Actions (shelter or evacuate)	1.0-5.0	(EPA 400-R-92-001, 1992)
Evacuation required	5	(EPA 400-R-92-001, 1992)
1st Responder Dose Protecting valuable property 1	10	(EPA 400-R-92-001, 1992)
1st Responder Dose Lifesaving or protection of large populations 1	25	(EPA 400-R-92-001, 1992)
Maximum 1st Responder Dose	25	(EPA 400-R-92-001, 1992)

<u>Military OEG*</u>	<u>cGy / Rad / REM / cSv</u>	
Wartime high-priority missions, to include life-saving	125	NATO STANAG-2473, 3 May 2000; USAFRRI, SP 03-1, April 2003
Operations other than war based on mission priorities and risk analysis	75	NATO STANAG-2473, 3 May 2000; USAFRRI, SP 03-1, April 2003

Note: Sieverts=Grays and Rad=REM for beta and gamma radiation as the Quality Factor is one.

*FEMA: Planning Guidance for Protection and Recovery Following Radiological Dispersal Device (RDD) and Improvised Nuclear Device (IND) Incidents

2/1-1

- ✓ Can connect trip cost home w/ other coming from work
- Even w/ 1/2 hr / Semester

① - 2-2-16

- 30- 1/2 hr / 1/2 hr
- Cost / 1/2 hr
- 30- 1/2 hr → Sunday
- LT Indiana → 30- 1/2 hr
- only 1/2 hr
- LT Connecticut → 30- 1/2 hr
- LT 1/2 hr / 1/2 hr → 1/2 hr
- ✓ Just cost 1/2 hr → 30- 1/2 hr
- 30- 1/2 hr → 30- 1/2 hr
- 30- 1/2 hr
- 30- 1/2 hr → 30- 1/2 hr
- 30- 1/2 hr → 30- 1/2 hr

② 2-2-16 (See in notes)

→ 30- 1/2 hr → 30- 1/2 hr

EP Nos 2

PI Prof
Assessment

Smart Sample

forward to ERIC

(b)(5)

forward findings

OP is search

Intro to why necessary

IP that its true to

3 examples on how to document

1902

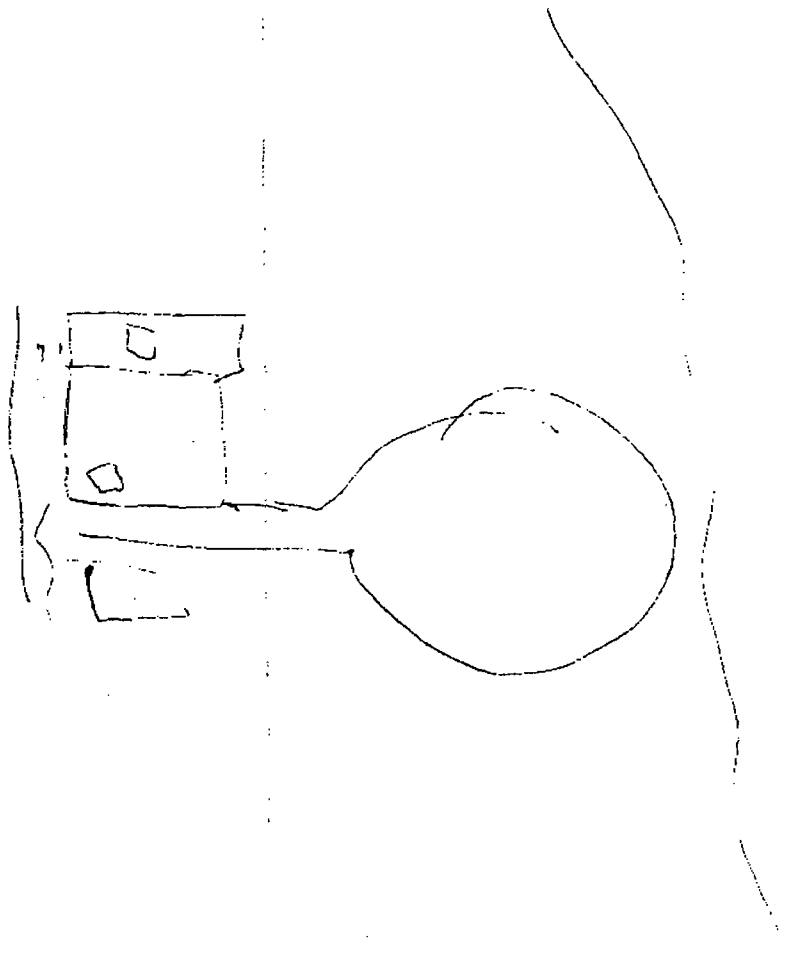
NEI 9901 class 5-

(b)(5)

Regional band EP Inspect

March bill
2003

Perry
Bridford





SE 95



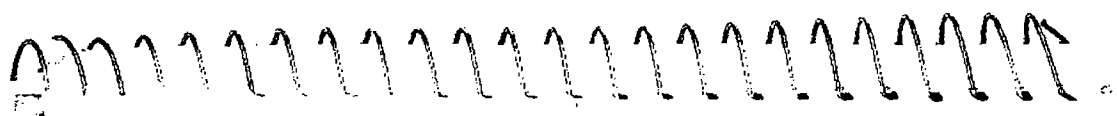
Google Draw - Click, Click, Draw = Distance

MAY 03 2005
-- 12:00



BR May 2005

What they were told
they were to



1. Weather

2. Climate

3. Temperature

4. Humidity

5. Wind

6. Clouds

7. Pressure

8. Seasons

9. Weather Systems

10. Global Climate Change

11. Local Climate

12. Microclimate

One-Time Completed

73.22 (a), (f)	- 594
73.22 (b)	- 307
73.23 (a), (f)	- 211
73.23 (b)	- 492

Protective

Mark
... ..

... ..

... ..

...

...

...

...

...

...

...

...



2.5

8.25

10.75

[Faint, illegible handwritten notes]

[Faint, illegible handwritten notes]

MT 204

RECORD

7530-00-222-3525
FEDERAL SUPPLY SERVICE
-GPO-

RADIATION

DOSE		AMOUNT	
rem	sievert	curie	becquerel
0.1 mrem	1 μ Sv	1 pCi	37 mBq
1 mrem	10 μ Sv	27 pCi	1 Bq
10 mrem	100 μ Sv (0.1 mSv)	1 nCi	37 Bq
100 mrem	1 mSv	27 nCi	1 kBq
500 mrem	5 mSv	1 μ Ci	37 kBq
1 rem	10 mSv	27 μ Ci	1 MBq
5 rem	50 mSv	1 mCi	37 MBq
10 rem	100 mSv	27 mCi	1 GBq
25 rem	250 mSv	1 Ci	37 GBq
50 rem	500 mSv	27 Ci	1 TBq
100 rem	1 Sv	1 kCi	37 TBq
ABSORBED ENERGY		27 kCi	1 PBq
100 rad = 1 Gy (gray)		1 MCI	37 PBq

SI UNITS PREFIXES:

E	exa	10 ¹⁸	M	mega	10 ⁶	μ	micro	10 ⁻⁶
P	peta	10 ¹⁵	k	kilo	10 ³	n	nano	10 ⁻⁹
T	tera	10 ¹²	c	centi	10 ⁻²	p	pico	10 ⁻¹²
G	giga	10 ⁹	m	milli	10 ⁻³			

JAPAN
EVENT
STARTS

NT PAAD LOG

MARCH 11, 11

11:00
11:00 AM

DOE BRIDGE CALL, w NARAC
- JOHN MASTRANO - NARAC

John (NARAC) - PLANNING MEETING, NOT YET INITIATED
• NARAC HAS GOOD MGT ANALYSIS AND
CAN PROVIDE (ALL ACTUAL)

PLANT INFORMATION - SEE PRESS RELEASE #1 TELCO

605 - NARAC, CNN REPORTS A RELEASE IN PROGRESS
• NO CONFIRMATIONS

CONTACT INFORMATION: Dave Blumstein Nuclear Incident Team
Bob Gerald
Dan Blumstein (DOE) COC - 202-586-8100
NARAC (202) 422, 9100 Brenda
NARAC/DOE BRIDGE (202) 245 2099
PIN (b)(6)

SET UP FOR 645 p BRIDGE CALL TO DISCUSS
RUNNING RASCH SOURCE TERMS FOR NARAC
IMAAE RONS.

645p - DIABLO CANYON TERMINATION NOUE
- ST OF CA TERMINATES TSUNAMI WARNING AND
DOWNGRAD TO ADVISORY

Rick Lantz - Nuclear Reactors

(b)(5)

(b)(6)

(b)(6)

750 - Cite w/ NARAC - DOE

... WORST CASE INTEREST ON ...
... CONTRACTING ...

750 -

(b)(6)

(NARAC)

[Redacted block containing (b)(5)]

? How low would be the contract values ...

- Unit 2 ...

- Unit 1, ? CANNOT CONFIRM UNITING

[Redacted block containing (b)(5)]

750 - NARAC will provide US However not
information, will email to HOO

850 - Working source term scenarios for
release to NARAC. INSIDE OF WORST CASE
CORE DAMAGE SCENARIO, PROPOSING) CURRENT
STATUS (UNIFIED Reactor w/ NO Core/CAD Damage
& Normal RCS inventory) 2) 10% GAP Release
VIA Stack 3) 10% GAP Release UNFILTERED
(Current)

350-500

1020p

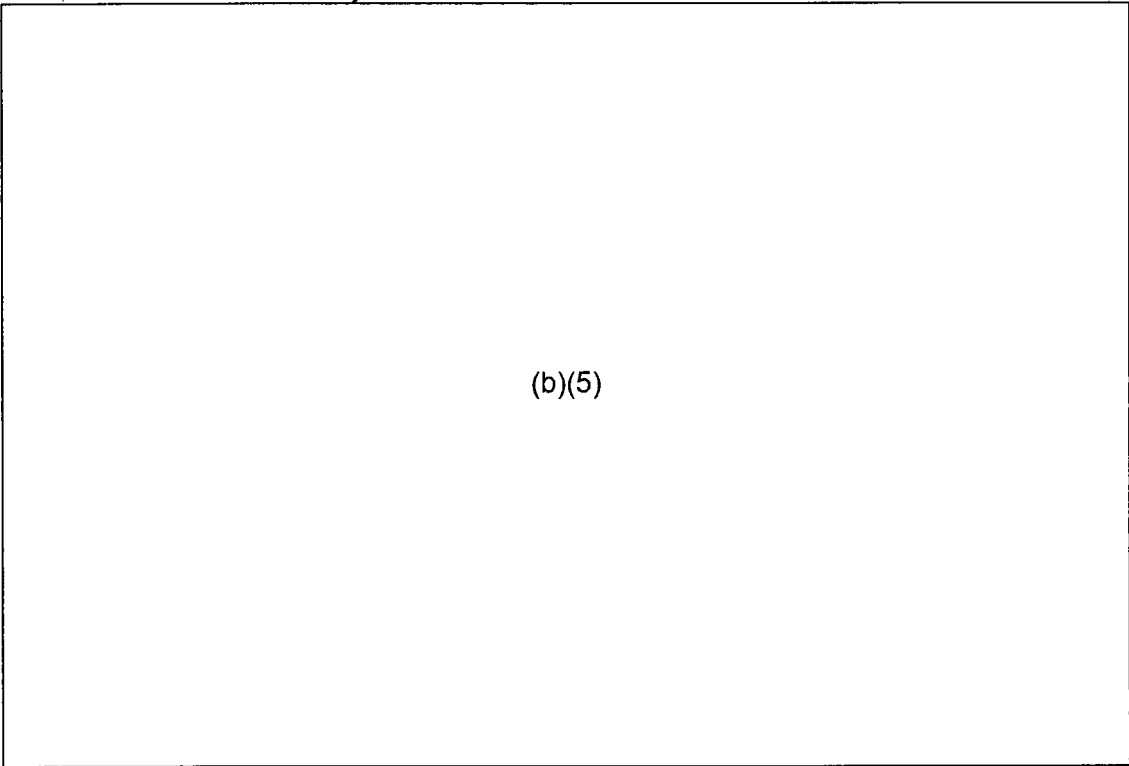
1030p

NARAC IN AGREEMENT.

950 - [REDACTED] (SOFT CREDITED INFORMATION) ON WEBSITE.
T.O.E. 46 (202) 576, 7100 / WATCH OFFICE
"PATCH TO NIT (NUCLEAR INCIDENT TEAM)"
→ NIT RECEIVED'S CALL WITHIN WE SOUND NARAC
RASCAL RUNS.

1030p - REVIEW OF IAEA EVENT SCALE W/ RST.
OBT ASSESSMENT WAS LVL 3 BASED ON
DEFENSE IN DEPTH. LESS THAN LVL 2 FOR
RADIOLOGICAL CONDITIONS OR PUBLIC CONSEQUENCES.

1030p



(b)(5)

(b)(6)

- 2006

CONFERENCE CALL 4pm, JAPAN ESTIMATED 12:50

- DOD HISTORICAL DATA ASSISTANCE

[Redacted Box] (b)(5)

OFFSIDE DOD LIMIT INFORMATION
- Also Repetitions sensitivity.

TURNOVER - DAVE ^{WILLIAMS} ~~PERKINS~~ FOR DATA SUMMARY 3:00

SITUS

Run #1 Sent to NARAC

Run #2 or 3 to be sent following SITUS

4 variations of Run #1, NARAC

Run #4 will follow

AFSN
1:30

1230a - MIKE CASE (RET), CHARLES ROBERTS
TO MODEL THIS ACCOUNT VS TIME.
(ESTD TO JAPAN = 1)

1340a - Call to NARAC, GRANDA QUANCE
TAKES A WHILE TO RUN (45 min)
USE LTR TIME, NO NEED TO GET
LOCAL (JAPAN) TIME SO THAT DTS/NET
IS SYNCED w/ MET difference w/
R+SCH

- ? WHAT TIME IS THE MEANING BEING?

Pm - DIRECT LINE 31) 516, 5184

1250A - Dave Young, November For The Bulletin

- RE ESTABLISH BENCH @ 1 AM.
- STATE DEPT (USIA) ALSO ASK - GIVE US INFORMATION FROM JAPAN

BUSINESS AND TRADING ATTORNEYS DO (MATH) BENCH, DETERMINE TO GIVE N424C CASE # + FIRST (ATTORNEYS / LAWYERS).

AEN

- 1:30 IRSN - they want to model, don't have BUR
- they want to talk w/us
- concern - only facts
what are the needs

~~10% core damage, elevated or filtered release~~
~~10% core~~

- 10% core damage Filtered / elevated
ground level / unfiltered
- TMI comparison

Brenda questions
so many nuclides - reduce them

(b)(5)

03

(b)(5)

03

Current met
- winds offshore
Brenda sending

a

031

RxN-

Rx1-

03

1:45

04

- no info units 2+3
- 2/3 core coverage for Buck met
- seems well recovered

Joe Cirincione

PMT 2 -

0312) Sent scenario to NARAC
10% core melt, contain intact

(b)(6)

0314) Blast @ RI @ 1700 Dave Young
Rx destroyed - Japanese News
DOE Tokyo sent email saying only
3 rx bldgs when there were 4
CNN also reporting heard a blast

0340) ET call w/ IAEA

0345) Dave Bowman & Dave Young w/ ET

0400) NARAC report back

- Field measurement data ?
- Any other protective measures & how far out
- Rain - sea breeze effect

(b)(5)

Conf call 5:00

- Where field measurements - distance & azimuth
- Status of dry well & rx vessel

Modeling for scenario w/ zero containment

0530)

ET Q

- what if fuel pool became involved
- what if all other units were impacted

CA Brief @ 730

- Conducted several 'what-if' scenarios
- Shared scenarios with NARAC
- Coordinated w/ NARAC + DOE all night
- no definitive info
- complete chronology

Scenarios

- normal coolant condition

- 10% GAP

- 10% fuel failure ⇒ NARAC good comparison

- 40% fuel failure

- total failure

- Spoke w/ IRSN (France) to compare notes ^{nobody has info}
- dose assessment files posted on web eOC

To do or consider

- Need field measurement data to refine models
- Need info on protective measures
- (Brett put together a list of questions)
- Consider if multiple plants are impacted
- Consider if fuel pool became involved
- Overlay a RASCAL plot on Google Earth

0720

Dave Young

PM speech. Email to sum it up.
Walls rx bldg blew, rx vessel in fact
Caused H leak from water embedding b/w
Cont. vessel & bldg wall.

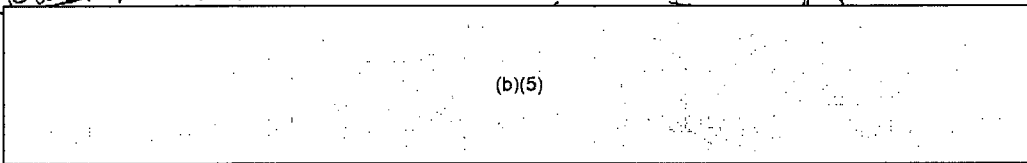
No status of core.

Using borated sea water to cool

News Report - CNN

Expanded evacuation to 10 miles
(Japanese news source - 20 km)

7:50 am.
Brenda from NARAC



5:00 am

CNN

more than

5,000 people evacuated

Radiation container intact

Japan to hand out Iodine pills

- May have been a collapse of building & not an explosion

10:00 am met data & current forecast
Philip Vogt, John Nastrom
will get us into in ~ 1/2 hr.

official said radiation + pressure going
down

(b)(5)

10:30 am Mark Rindinger @ DOE NIT - they
have no scheduled calls as of now.
They will give us "heads up" if
they schedule anything.

(b)(5)

(b)(5)

Winds light from SW - from
NARAC - Lawrence Livermore (Phil Vogt)
sent an e-mail w/ met data - e-mail
w/ more data from Phil Vogt

Ed Tupin (EPA)

(b)(6)

is available to come to HOC
this weekend if necessary.

11:00 am
CNN - Japan Nuclear Safety Agency:
"not as bad as TMI"

12:00 am
FOX News - approx. 40K people evacuated

12:15 PM - Received NOAA update. Long term
forecasts that winds will continue from west
to east for next few days and will not
approach Continental US. *Bill*

~1300 Recd JAEA - RSMC Obninsk plume model
data - very similar to NOAA Report
for long term forecast. *Bill*

1:23 AMK world news - 13 EDGs - none
are working ^{at site}

~10 km Evacuation around Fukushima
Power Site #2 ; 20 km Evacuation
around Fukushima Power Site #1

~1015 microsieverts/hr around unit #1

2:00 pm HHS ^{req} requested NRC's Plume
Modeling & any other GIS modeling
products. We responded that we
cannot provide that information.

After rounded to CPA Question from NY Times
on dose rates. Miss G. G. F. Publisher
Dose rates increased from 60 rads to 100 rads
rate dose increase were minor amount of
short duration and no dose consequences.

Clarify to CPA, NY Times record same - proposed [unclear]
[unclear]

2:30pm

Chris Smith - NIT DOE

- Does release function - take any credit for Reactor Building Containment
- Given little information on the site,

- Winds continue out to sea
- we will be verifying met. data again at 4:00pm
- Interacting NARAC DOE HQ - Nuclear Incident Team
- Plume modeling show plume out to sea
- Various core melt scenarios - latest - 40% core melt contained intact

3:30pm

- Bill Perchett CA briefing

◦ 2 NRC staff on their way to Japan

◦ FEMA back into normal mode

◦ preparing to have IAEA as the POC

◦ New Cs & I's should have a domestic focus

Next call 11:30pm; Next call 7:30am

4:30 pm Call received from Tony
Olises - He & a team are headed
to Fukushima & inquired whether
he & his team would need KI -
We responded that they should take
advice from Japanese Govt (who has
been dispersing KI)

4:53 pm Gary Miller - FAA - received call -
no radi-active cloud - Will
not see a plume - They do
not need to re-rout flights -
They will not have to de-contaminate
planes.

5:13 pm Received update from NARTIC
(LMAC) on met. data for next
five hours. Winds from west-
southwest @ 3-5 mph, visibility
class changed from III to II, in
3 hrs.

1725 - Update from RSMC - China has advised that
contamination is expected to be limited to
the release point area.

5:30 Bill Borchardt received update from TEPCO. Unit 2 off R/C, going to depressurize once they get approval from regulators. Reactor level steady. Unit 1: injecting seawater & boric acid into reactor core. Unit 3: shutdown using HPCI. No reactor coolant leakage. Unit 4, 5, 6 already shutdown.

6:20 pm Received met info from Melbourne Australia Bureau of Meteorology - provides similar plant modeling to Beijing China, Russia, & NOAA.

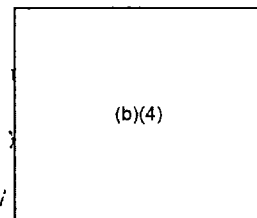
8:35p - Call w/ DOE on PAWT STATUS

PAWT:

- Units 4-6 SHUT DOWN (TEPCO Press Release)
- UNIT 2 - NO R/C,
- UNIT 3 - NO RES LEAKAGE, START UNLOADING, NO CAPABILITY FOR SITUATION

INSTRUMENTS

UNIT GE MARK I
UNIT 2-5 GE MARK I
UNIT 6 GE MARK II



2330

12

ET - EXHAUST - 27

NEARBY NPPs (RAC + 2nd)

- 36.7 m SW

- 72.3 m SW

(INTERFERING XPA SW OTHERS - NHK MEDIA)

PLANT OPER (30)

- SW - 36.7 m SW

PLANT OPER (30)

- SW - 72.3 m SW

12

PLANT OPER (30)

- SW - 36.7 m SW

PLANT OPER (30)

- SW - 72.3 m SW

PLANT OPER (30)

PLANT OPER (30)

PLANT OPER (30)

1805 p - SW - 3m/s (NHAC) Corrosion

3

PLANT OPER (30)

PLANT OPER (30)

1250 am - Example STATUS Briefing Target Seems Acceptable
TO Chairman. * TARGET A 4 am UPDATE TO
PREPARE FOR 7 am Chairman Brief.

PAs FOR Americans IN JAPAN, CONTINUE TO FOLLOW
JAPANESE Recommendations.

Plan FOR OPS CARTER WINNING → POSSIBLE Detonation
@ NOON ^{Sunday} ~~Monday~~? BUT →

1220 → Chairman

- STILL WANTING A PUBLIC STATEMENTS TO ^{US} CITIZ.
IN JAPAN.
- WE WILL BE GETTING A WHITE HOUSE Release
TO CONJURE ON.
- BUT ALSO AN NRC Release ON WHAT IS
GOING ON.

Plant UPDATE

U.S. - LOST COOLING INJECTION, UNCOVERED TO 1.7 m BELOW
TOAF, BEING INTERFERING SEA WATER (AT ABOUT
8-9 pm EST) (LYONS - FROM KOWDO - ^{JAPAN} NSS4).

645A - IMAAC MOOR RONS OF INUSTION P... 6

ROUTE

(b)(5)

BONG Q...

647A

(b)(5)

(b)(5)

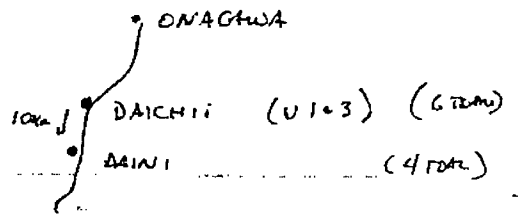
MR RICE LEWIS - CONTACT

(b)(6)

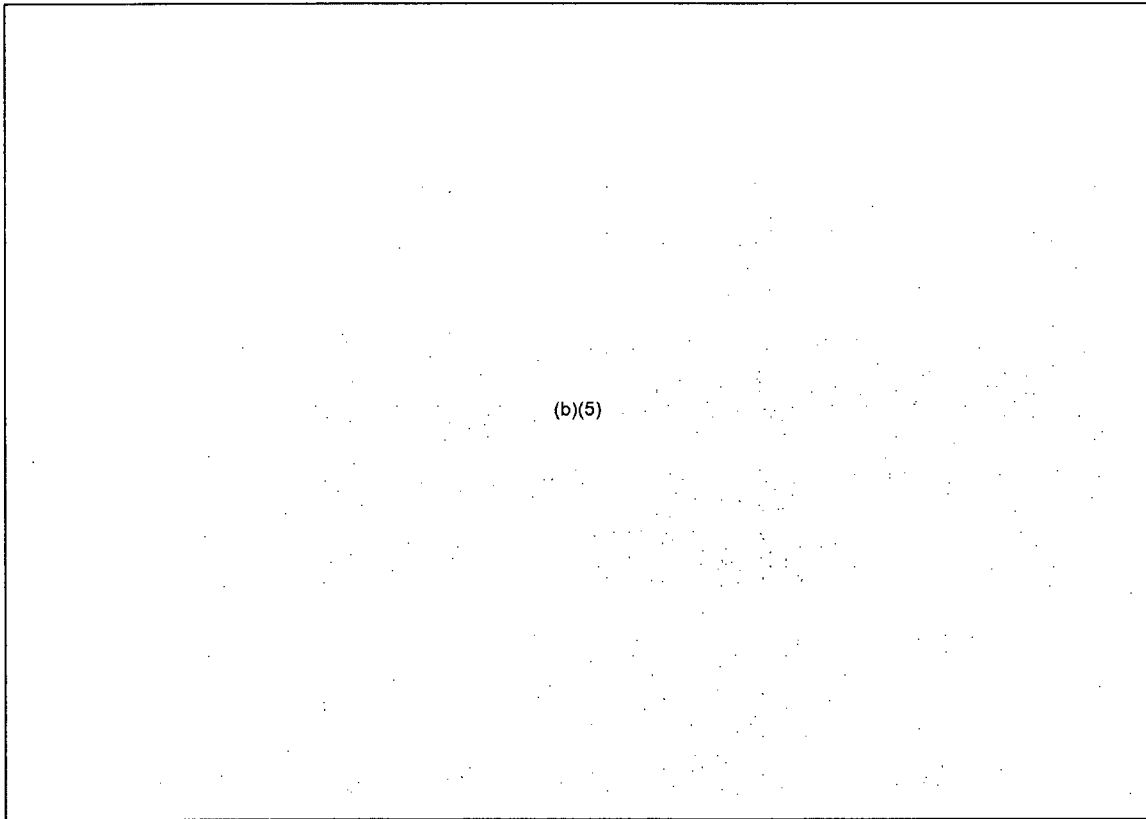
(b)(5)

Request that we work back through diplomatic channels to contact the Japanese Navy.

- Name of SAP?



RICE LOWTZ - NAW



(b)(5)

• Updates on my preliminary analysis from
 NARAC ~ 9:00 AM. Units 1-3

Action:

Check Brian Stinson's SUN
 volume to get CHOROWSKY
 information.

Sam

3/12/08

Today

Wanda's Q&A

- ~~get~~ develop Q&As - camera right news
- upcoming hearings ~~for Wanda~~
Fred. Upton to do hearing Wed 10:00
press releases
- hardened court @ USA - Mark Is (message)
- draft press release already done

EU's

- Back calculate from camera to get JMW's km
- Use current met
- Event path thru suppression pool

(b)(5)

Peter

Steve Mark chris Bob
Luke Britinger, Smith Gerald
Nate Russo DOE / NE Diachi
- They heard R3 might be Max Field
+ would a source term

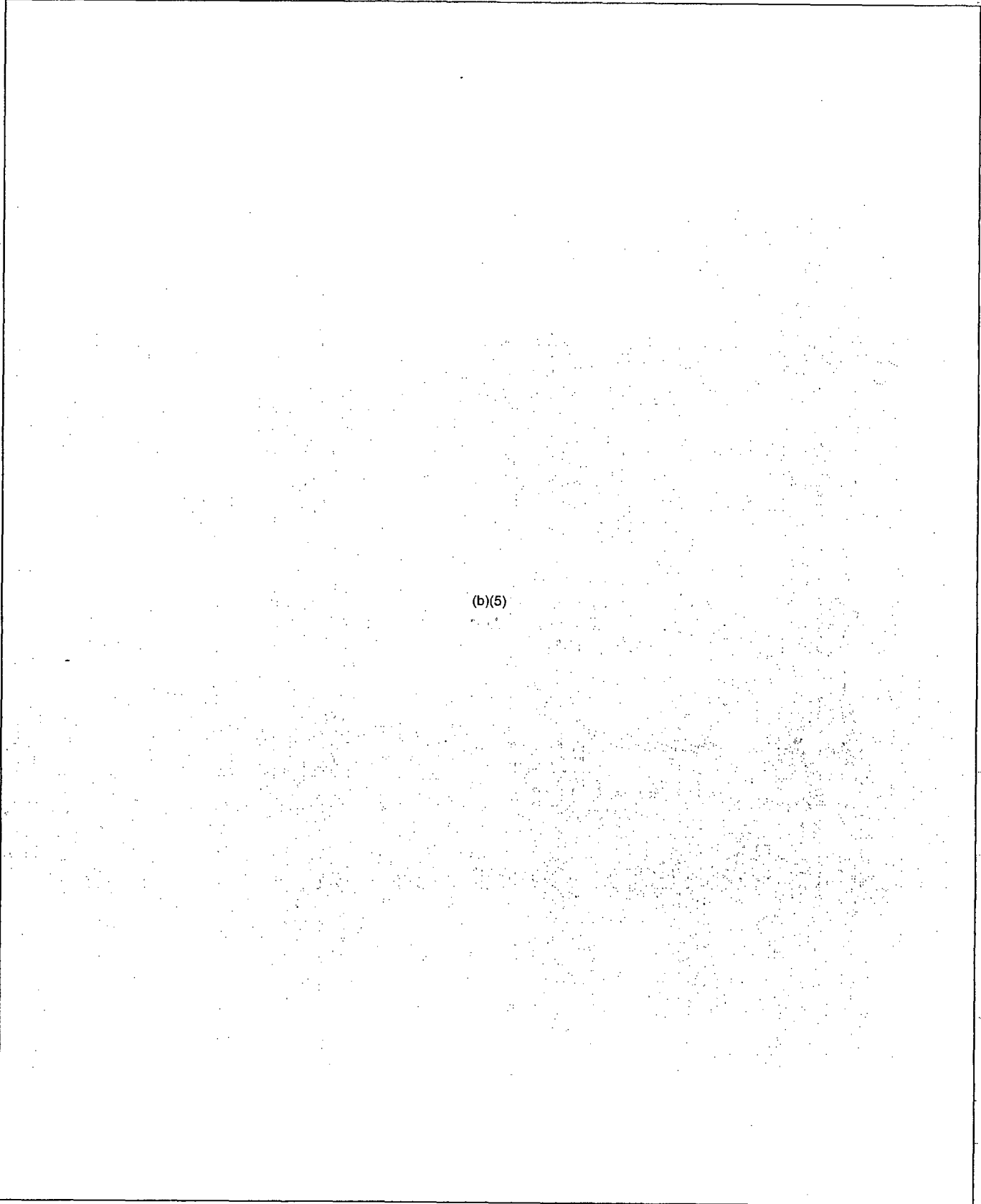
1
- Need email saying NRC doesn't think
Max would a source term
- Dave Borzoma

(b)(5)

(b)(5)

Rick Lentz
Naval Command

(b)(6)



(b)(5)

12

(b)(5)

(b)(5)

re 1015 Briefed Chairman

(b)(5)

M
N

Unit 1 Drachin - below ~~1000~~ TAF

1:00 Chairman mtg

• Can confirm VE 133, 135 KRS based on T/2
54d 9th 10yr

• Need updated met

~~Calculating~~
• Using

(b)(5)

M
D

• Requested GIS + data assessor
• Waiting for new met data

(b)(5)

M
C

• Looking @ Unit 1 + 3 - determine potential
doses @ site boundary
• Exceed PAFS for Unit 1-3
• RR loading higher than what we expect w/ design
• 100 lb lead rods - vert
• Looking back & looking forward

JANUS - regulatory

METI - Japanese govt agency

Meti

(b)(5)

(b)(5)

(b)(5)

1/2

(b)(5)

(b)(5)

LI A-03

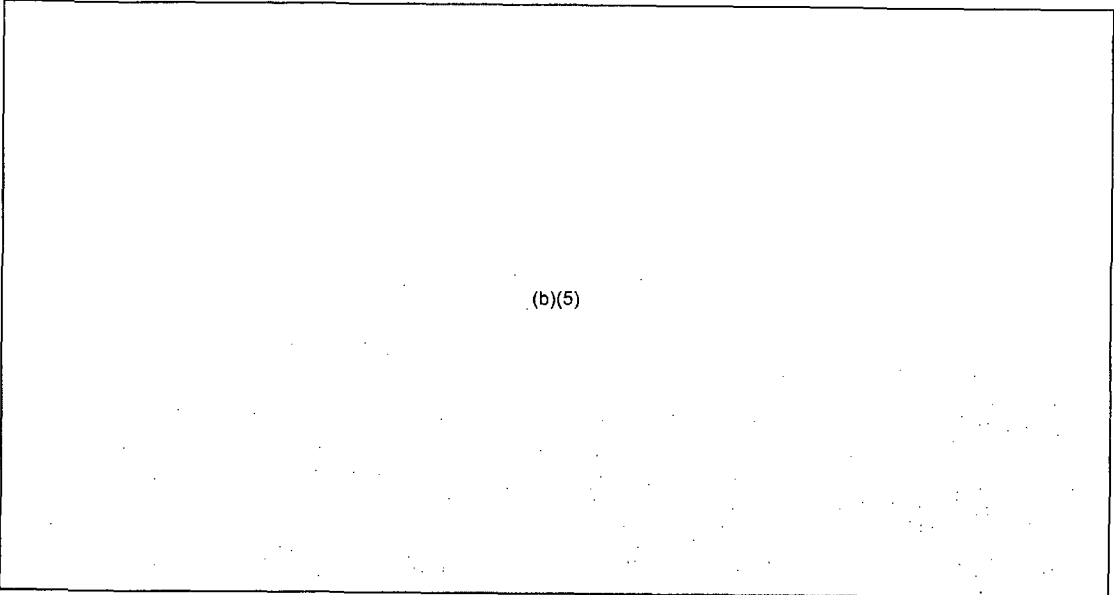
(b)(5)
jca2nd@jso.med.go.jp

(b)(5)

301-816-5151 (f-r)

PM12, HOC@NRC.gov

PM102, HOC@NRC.gov - dose assessors



(b)(5)

DOE Seve aoki
IMAZ.

(b)(5)

What is the US assessment?

- Press release w/ accurate info. Assurance to Americans in Japan - protective actions in Japan.

(b)(5)

- What do
Continuity Statement on post measures

Ken Chery

(b)(6)

look
Mar
Jan
Mex

Determine how we came to similar to
Mexico.
Share weather files.

3/13 Com Asst Brief 3:30 pm

Met

~~Unit 3~~

No

Unit 1 Seawater injection / High DC power - normal level

Unit 2 REIC running - Plant OK

Q+

Unit 3 - HPCI run and then tripped - A attempt to
inject sea water - core partially / equipment
damage. Containment intact. Success of
injects report unclear - no level indicator

Gen
e

Unit 4-6 previously 4/D

Fu

[Redacted] (b)(5)

3/

[Redacted] (b)(5)

Local

NRC Press Release recently - will get into local
on U.S. Ambassador comments

Talking Point for regional State House office ?

Jim Trapp sent to Japan - meeting - 4 hrs
Tom Uiso in transit

books for Today

Maintain Awareness of event to prepare
for Commission Congressional Hearing on Wednesday

Next TA briefing 11:30

State Dept Briefing @ 2:30

Met with

May please for news story to avoid

Q+A

Ambassador wants to be departed about statement
@ Tokyo

(b)(5)

(b)(5)

124

126

cell

(b)(6)

Yang Li
(if any data)

News items should be summarized and reported
to group to share w/ Japanese but

(b)(5)

19: 20

(b)(5),(b)(6)

1240

(b)(5)

1200 mms

(b)(5)

UNIT 3 - INCREASE IN DOSE RATE FROM 15 mSv TO 20 mSv.
(NHK MEDIA - RESULT OF U3 EXPLOSION)

Need: Reach out to RES for a comparison
of Chernobyl Release to these
graphic needed.

ET Brief 1:30 am

• Breach in By-Downs

• NOTICE IN TOKAI

• UNITS 1 & 3 CONTINUOUSLY MONITORING - VIBRATION MAY HELP

QUALIFY POSSIBLE PROBS IN THE REACTOR

• MET CONSISTENTLY FROM WEST, WIND SHIFT
MAY OCCUR TOMORROW EVENING.

(b)(5)

• CNN Report Fukushima — 1481/HR (.1 ne/hr)
• ? upwind, 5km from site.

• RASCAL runs

• ESTIMATES w/ & w/o PARTICIPATION TO
ESTIMATES AND BORNE EXPOSURE.

UNIT 2 — NO INFO ON HOW MAINTAINING CONDITIONS
WITHOUT RCIC. — OPS ON STATION SAFETY, WHICH
LOSSES FROM HEATUP.

LT = NRC ROLE FOR NUC INCIDENT RESPONSE, OR
ROBOTS FROM JAPAN.

• NO SUPPORT ROBOTIC

• NRC — 6 RIA FOR ASSISTANCE,
1ST IS INCIDENT RESPONSE

→ NRC ROLE, NEWS TO US.

• DOE SIT REP REPORT IDENTIFICATIONS NOT
VERY WELL WORDS OR ACCURATE.

• USAID WANTING TO KNOW WHO IS BRIDGING WHO

• UK WANTS CALL w/ US BEFORE 10 AM EDT TO
SHARE INFO.

• LT WORKING ON CHARTERS BRIDGING SHOOT

— 7 AM MEETING

0210 - Report from Bill Burt (NITOPS) ^{Doc} _{Coaching}
lost to all 3 units @ DIACHII.

0215 - CNN Radio WZS @ ONAGAWA "DECLINED"

0300 - 600 People Remains from Zokoro ENAC.

0315 - Call w/ UK @ 830 am. Want Dose Export
to be in our call.

0450 - Call to Doc NIT

* - Possibly New Routes - need Air Base
monitoring - Department

- Not sure Japanese, maybe still

Department initiated for monitoring

around B.S.S. @ NARZ N.M.P.

(b)(5)

(b)(5)

Down wind, and both feet at the view of

0630 - Any USIS, NISA office monitoring
I'll go to HUCS.

31

08
08
08

200

Venture all 3
Twice do dummy vent

Issues now:
Spent fuel pool

- No h/c since cooling
- Wind shift - 9AM direction

(b)(5)

- runs don't include venting

08

Weather

6:15

RASCAL

Q+As from Packer - done

RST has lead for assistance

8:30 - Clinton mtg in UK

Comparison of all plumes w/ Chernobyl

- no venting, if venting our est is low
- 10% core damage with uniform 45°

(b)(5)

- Japanese helicopters cc 737

3/14

- 0805 - Left message w/ RES to call Ops Ctr. + email
- 0820 - Email to Trapp/lessee to make connection
- 0930 - UK team briefing

~~Met w/ stability class~~

Reviewed many scenarios

Run w/ actual data as it comes in & can then
look @ prot. actions
did w/ IT Security

0855 - Called DEINIT to make contact
~~with~~

Rick Maurer - NIT Technical guy for
day shifts

0845 - Mike case confirmed RES would
get update

3/14

1030

UK Call

Danachi

Unit 1

- Core damaged - Cs¹³⁷ detected when
roof blew
- 1450 below TAP
- seawater injection lost
- 1^o contain intact
- 2^o contain damaged
- SFP - as long as water in pool + evap
slow enough, 4th day (tomorrow) until
they have problems.
- IAEA says water back on for units 1 + 3,
no confirm unit 2

Unit 3

- Core damage
- seawater inj. lost
- 2^o contain failed
- 1^o contain OK

Unit 2

- don't know status of core
- UK - said perhaps uncovered core

1042 - FT Att -

(b)(5)

- NRC - looking for more of what can happen w/ r/c cores - Need written summary of sequence of events - RST
 - Work w/ Tripp that we agree on what equip would be helpful - B5b
 - positive displacement pumps (who operates this equip - special expertise)
 - air compressors
 - Air N
 - DC/AC power supplies
 - what else
 - Dose ass around release (NRC lead)
 - look around clock + met conditions Ding
 - names of 6 people - Follow up w/ Eric (RST)
 - 1 communicator - risk comm.
- ~~not~~
- Aerial monitoring from NV - launched to Japan
 - 100K americans in Japan

Domestic one voice / one message

- Public communications Key msg.
- EPA ready w/ monitoring equip
- Comm. w/ States - working w/ RSLOs - make it more obvious to intragency

Q+A

(b)(6)

USAID

(b)(5)

- equip list
- list of people doubled

(b)(5)

- more info than Q+A + talking points

John w/ Prime Minister @ EOC

We are doing - 1030 am
 Design leak, 40% loss - all 3 units send to NARA
 & copy naval mx
 NARA is doing 100% loss

1100 call w/ DOE HQ NIT/NARA

(b)(6)

code

(b)(6)

- using Xe-133, Cs-137, I-131
 50u/s 5u/s .5u/s
- Design leak rate, different release durations
- 40% loss

(b)(6)

PMWERDS

Anticipate
40% is worst case - might be less severe
based on what we have

& P&IS. Give sense of dates. Go to 30km

: Bullets.

nrcdomain/PMT 12

Questions for Jim/Tony

- AAZ
- Venting times? Length of time venting
 - related to explosions and/or venting of 1st contain.
 - filtered pathway?

UAZ

Turnover

- Expecting NARAC run mid afternoon. Brief ET once we digest results
- Keep in sync with RST on their 'what if' scenarios
- This shift received no new dose info from Ginn & Trapp
- Receiving good met data
- Continue keep staffing of PMT
- RES (C. Davis Lewis) is working on? about our scenarios vs. Chernobyl

✓ Plain language update send to executive support team

- Fire check brief
- Web ECC TASK - Sally Bellings

(b)(6)

3:00 call

(b)(6)

~~XXXXXXXXXX~~

Yong GIS Analyst

(b)(6)

(cell)

(b)(6)

5:00 EDT call of NARAC/CAT
next call 20:00 EDT

(b)(6) #

no new info
NARAC working on calc.

Naval Reactors info from George Washington carrier
docked at Yokosuka Naval Base

Rick Lentz Dir. Rad Controls
George Deweyport (Relief)

(b)(6)

1800 EST $\rightarrow 2.4 \times 10^{-8} \mu\text{Ci/ml}$ gross particulate
isotopes consistent with measured at Reagan
 \rightarrow water sample from barge \rightarrow I-131, Cs-137
 \rightarrow air measurement inside carrier $3.0 \times 10^{-9} \mu\text{Ci/ml}$
1904 EST \rightarrow ground deposition = 450 pCi

Call from Tony Wiser - 1946 EDT
Yokosuka Staff Tokyo will send email to Liaison
with report of measured radioactivity
in μBq range.

email from Tony rec'd 1959 EDT, passes through
information from Richard O'Malley NARAC at Yokosuka
confirms information from Naval Reactors contact.

info:

3/15/11 at ~0700

airborne rad. barge = 60000cpm (~~1.5~~ 1.5×10^{-8} $\mu\text{Ci}/\text{ml}$)

USS Geo Wash. = 7×10^{-9} $\mu\text{Ci}/\text{ml}$

USS Geo Wash. = 450 μCi / direct probe

estimated doses over 12-hr period

20 mrem TEDE

120 mrem CDE - thyroid

(b)(5)

2031 EDT

Brenda L. Hanz @ NARAC to backcalculate from
USS Geo Washington data - couple hours.

location of USS Geo Washington

$35^{\circ} 17.1' \text{ N}$

$139^{\circ} 40.4' \text{ E}$

(b)(6)

John Halvorsen, Naval Reactors ²¹⁰⁰

(b)(5)

used dispersion modeling to apply to Tokosuka

(b)(5)

2001 EDT front gate from Naval Rx call
5247 uSv/hr

820 mR/hr @ front gate

Paul Holland, Exelon call (b)(6)
done assessment assistance for ET
provided Naval Rx information.
He will do what calculations he can.

called back at 2313 EDT

TEDE 7 mrem ^{validated} calculated from
thy 233 mrem Naval Rx basis
will email using FBK-11 5 12

call w/ DOE NIT
doe assessor

3/14/11 2350 EDT

will have comparison call later with DOE assessor

Matthew Sharp State Dept Japan Task
Force

Linda Region 4

3/15/11 0010 EDT

Confirmed

US site boundary closes for Crack Cast
arrival planning ✓

Jeff Bolczek US^{NSA} rep at USAID
DOE NEST group differences

3/15/11 0024 EDT

0630 (M215)

UPDATE STATUS FROM TONY UNSES :

U4 - SFP STATUS

• H₂ EXPLOSION IN R₂ BUILDING

• LOWER SFP LEVEL ~~SUSPECTED~~ REPORTED

→ FIRE OCCURRED, BUT WAS FROM AN OIL FIRE
FROM A PUMP IN THE R₂ BUILDING

• TO R/NE RECORDS BETWEEN JUNE 3+4, AMERICANS
TO LOWER WATER LEVEL IN U4 SFP.

- SITE PERSONNEL ARE EVALUATING PUTTING WATER INTO SFPs, BUT HAVE NOT ~~YET~~ DONE ANY WATER INJECTIONS INTO ANY SFPs.
- NO CONFIRMED INFORMATION ON SFP HEAD LEVELS

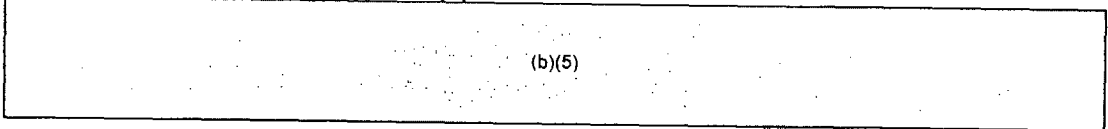
SITE BOUNDARY DOSE RATES:

9 AM RATING OF 11,000 ~~(μ or μ)~~ Sv SPIKE
 TRANSIENT DOWN TO 600 μ Sv. (1100 - 600 μ Sv/hr)

PUMP UNITS ARE ONLY ABOUT 10 MIN. DISTANCE, PER TONY.

UNIT 2 - TONY REPORTS THAT LICENSURE IS MEASURING PRESSURE IN VESSEL AND DRYWELL. (THIS WOULD APPEAR TO INDICATE THAT VESSEL IS ~~IN~~ INTACT.)

7:00 am. March 15, 2011



- IXCIE sent over 32-man ^{emergency} team from NTK world 5:31 am

- 100 milligram ^{air} and reactor 3 = 40rem

NTK world

- 10 minutes last evening, all fuel rods were ~~exposed~~ completely. Then 1/2 exposed until this morning. Explosions near suppression pool

10X the performance level for 3 years

lll

people living w/in 20 to 30 km radius
ordered to stay indoors

Our modeling assumptions for spent
fuel pool fire for unit 4:

- 1) (b)(5)
- 2) 104 days offloaded (180 bundles removed)
- 3) 4-5 days no cooling
- 4) All Cs & I-131 lost in 24 hours

~~from~~ ^{from} ~~from~~ from air Tuesday

11:30 AM
1:36 PM
4:45 PM
~~1:30 PM~~

Morning
3:00 pm
5:00 pm

SFP temp 84°C Unit 4
2Xs normal temp

10:00 am March 15, 2011

DF NIT - Japan officials accepted
assistance from DFAMS + 3 CNIT

Being in progress:

- Units Unit 2 100% ~~core~~ Core melt
- Units 1 & 3 40% core melt
- Scale: Fukushima to Tokyo

Wind: from NE turning from E

Week NARRAC running model out to West Coast which includes deposition.

(b)(5)

(b)(5)

- Naval reactors have more supplies at region - sending additional supplies to their region - so they have what they need?
- 30+ person ^{air} ^{measuring} ^{system} ^{personnel} team working in Japan

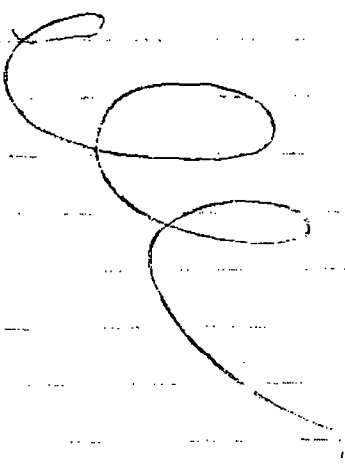
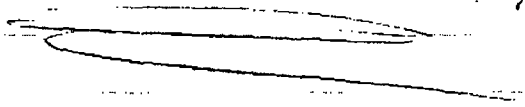
- Dan Blumenthal taking lead in field from DOE - landing at noon

(b)(5)

Next call 17:00 EST

(b)(5)

Hot wash - Rotate Supplies
Ink Pens!!!



Joanna Turk

NIT
NARAC
Sandia

Info from Tony DISES

Air lifting water in to STP for
UNIT 4

~~11:00~~ 11:00 am 2nd request of LARRY (General
Bruce Watson) called Dr. Paul Paine
of Fed EX/UPS

(b)(6)

- 1) all atmospheric release from Fukushima
Site are below 3000 m (10^4 kg^2) from NOAA data
- 2) No ^{30km} ~~is~~ some over plant area.

No reason to ~~live~~ ^{live} plants or concerns
about plant exposure at high altitude.

Question: ~~Butler~~ ^{Butler} ~~to~~ ^{to} ~~ask~~ ^{asked} a # of questions - referred her to
liaison team.

2:00 pm Conference Call

- Remote Sensing Lab Nelles LV
- Los Alamos
- Sandia
- NARAC

- Is met data on-site lost?
- DOE teams arrived, filling out custom forms, & monitoring plans at 3:00 am.

Next call 7:00 pm ET

2:30 pm Request from:
Lt David Sims
Navy CPTC

(b)(6)

for met data & dose assessment data

3/1

3:20 am - left MSG w/ Hazel Pedersen - one pager

(b)(5)

One Pager - developed down @ USAID

- Dose monitoring program - how to apply
- DOE HPS
- When they become rad workers
- Use EPA

~~1. 1. 1.~~

Rad safety officer research

Call the Ops Ctr.

When

• Ben talks handling our file
 if other feds want help they can
 call Ops Ctr

- What advice to members of public
- If other feds want advice they write
 their RSO

• MDP 131

K. Guidance

NO
ACT
MOM
4

Who haski

- what we do for NRC staff
 - do sum, ki
- Other feds - AD
 - left to each agency to determine
 - call ops
- any citizens
 - Japanese

dave.webb@dhs.gov

UACI

DOE worker guidelines

1. Update Status Sheet
 - what is highest rad level we have?

DOE call 1900 EDT

- Spike in airborne levels 6.5×10^{-3} uCi/m³ on GW P/S Yokosuka Harbor
- ↑ airborne @ 1700 → now (decrease now)
- ~~2~~ teams on the ground? 1st shift on Conflict Mgmt + AUS (air) + 1 team of 2 → embassy rest of teams to outfit military aircraft today (by noon in Jpn)

2200 PDT - next call

1100 AM

Jeff @ USAID
Anti-stoppers

Bill @ NIT

2/15/1

(b)(5)

Explosion in Unit 2 or 4 @ 1500
Japan time - EPIC press release

2 - 1000 of concern

Rosa DeLauro - Congress in CT ^{3rd} district
sum in her district makes ~~auto~~
air monitors.
She said they

www.inbrackon.org

(b)(6)

(b)(5)

12 min

U4 - 108 days (most recent period)

RST - this ASKED GC FOR SFP INVENTORY IN
EACH UNIT.

NO OK CALL TO RST.

UFL

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

(b)(5)
(b)(5)
(b)(5)
(b)(5)

Based on input from INPO, GEH, EPRI, Naval Reactors (with Bettis and KAPL), and DOE/NE

(b)(5)

UNIT ONE

(b)(5)

(b)(5)

STATUS:

Core Status: Damaged, fuel partially or fully exposed (JAIF, NISA, TEPCO) the volume of sea water injected to cool the core has left enough salt to fill the lower plenum to the core plate (GEH, INPO, Bettis, KAPL) Vessel temperatures 230C at bottom drain, 240C at FW nozzle (b)(6) 0430 3/24) RPV, DW and torus pressure increasing as a result of increased flow (b)(6) 0430 3/24).

Core Cooling: Seawater injection, injecting through feedwater 119 l/min, or 300l/min, or 7gal/min (JAIF, NISA, TEPCO) Recirculation pump seals have likely failed. (GEH)

Primary Containment: Not damaged, 58 psia (TEPCO is considering venting on 3/24)

Secondary Containment: Severely damaged (hydrogen explosion)

Spent Fuel Pool: Fuel covered, no seawater injected (b)(4),(b)(5) (JAIF, NISA, TEPCO)

Rad levels: DW 4780 R/hr, Torus 3490 R/hr (source instruments unknown), Outside plant less than 6R/hr (TEPCO 9pm 3/20/11)

Other: Electric power available, equipment testing in progress (JAIF, NISA, TEPCO)

(b)(5)

ASSESSMENT:

Damaged fuel that may have slumped to the bottom of the core and fuel in the lower region of the core is likely encased in salt and core flow is severely restricted and likely blocked. The core spray nozzles are likely salted up restricting core spray flow. Injecting seawater through the feedwater system is cooling the vessel but limited if any flow past the fuel. GE believes that water flow, if not blocked, should be filling the annulus region of the vessel to 2/3 core height.

(b)(4),(b)(5) There is likely no water level inside the core barrel. Natural circulation believed impeded by core damage. It is difficult to determine how much cooling is getting to the fuel. Vessel temperature readings are likely metal temperature which lags actual conditions.

The fuel pool is slowly heating and has not reached saturation. Overhead photos (on ~3/19) show entire fuel floor covered by grey-brown debris of building roof.

The primary containment is not damaged.

RECOMMENDATIONS:

(b)(4),(b)(5)

- o Attempt to inert with Nitrogen prior to venting and especially before utilizing containment spray
 - Steam/condensing could jeopardize inert environment
 - Hydrogen gas production more prevalent in salt water than in fresh water

(b)(4),(b)(5)

(b)(4),(b)(5) Containment spray should be secured before 2 lbs. to prevent opening vacuum breakers

(b)(4),(b)(5)

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

- o Borate water if possible. (With salt in vessels, consider effect of acidic conditions in vessel when deciding how much boron to add.)
- Ensure SFP level maintained as full as possible.

- o [Redacted]

(b)(4),(b)(5)

- o When flooding containment, consider the implications of water weight on seismic capability of containment

[Redacted]

(b)(4),(b)(5)

- CRD injection is desired for cooling material on bottom of vessel.

[Redacted]

(b)(4),(b)(5)

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UNIT TWO

STATUS:

Core Status:

(b)(5)

Core Cooling:

Seawater injection through RHR, bottom head temperature 105C, feed water nozzle temperature 105C (JAIF, NISA, TEPCO) Recirculation pump seals have likely failed. (b)(6)

Primary

Damage suspected (JAIF, NISA, TEPCO)

Containment:

Secondary

Damaged (JAIF, NISA, TEPCO), hole in refuel floor siding (visual)

Containment:

Spent Fuel

Fuel covered, seawater injected on March 20. fuel pool temperature 51C (JAIF, NISA, TEPCO)

Pool:

Rad Levels:

Drywell 4590 R/hr; Torus 193 R/hr (source instruments unknown)

Other:

External AC power has reached the unit, checking integrity of equipment before energizing.

ASSESSMENT:

Damaged fuel may have slumped to the bottom of the core and fuel in the lower region of the core is likely encased in salt and core flow is most likely severely restricted and likely blocked. The core spray nozzles are likely salted up restricting core spray flow (if they were used for saltwater injection). Injecting seawater through the recirculation system is cooling the vessel, but with limited, if any, flow past the fuel (b)(4), (b)(5)

(b)(4), (b)(5)

(b)(4), (b)(5) Natural circulation believed impeded by core damage. It is difficult to determine how much cooling is getting to the fuel. Vessel temperature readings are likely metal temperature which lags actual conditions.

Low level release path: fuel damaged, reactor coolant system potentially breached at recirculation pump seals, primary containment damaged resulting in low level release. There may be some scrubbing of the release if the release path is through the torus and water level is maintained in the torus.

Fuel pool is heating up but is adequately cooled.

RECOMMENDATIONS:

(b)(4), (b)(5)

- o Attempt to inert with Nitrogen prior to venting and especially before utilizing containment spray
 - Steam/condensing could jeopardize inert environment
 - Hydrogen gas production more prevalent in salt water than in fresh water

(b)(4), (b)(5)

- o (b)(4), (b)(5) Containment spray should be secured before 2 lbs. to prevent opening vacuum breakers

(b)(4), (b)(5)

- o Borate water if possible. (With salt in vessels, consider effect of acidic conditions in vessel when deciding how much boron to add.)

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

- Ensure SFP level maintained as full as possible

o

(b)(4),(b)(5)

o When flooding containment, consider the implications of water weight on seismic capability of containment

(b)(4),(b)(5)

- CRD injection is desired for cooling material on bottom of vessel.

(b)(4),(b)(5)

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

UNIT THREE

STATUS:

Core Status	[REDACTED] (b)(5)
Core Cooling	Seawater injection through RHR, bottom head temperature 185C, feed water nozzle temperature 81C (JAIF, NISA, TEPCO) Recirculation pump seals have likely failed. [REDACTED] (b)(6)
Primary Containment	Damage suspected (JAIF, NISA, TEPCO)
Secondary Containment	Damaged (JAIF, NISA, TEPCO)
Spent Fuel Pool	Low water level, spraying with sea water (JAIF, NISA, TEPCO)
Rad Levels:	DW 6000 R/hr, torus 158 R/hr (source instruments unknown)
Other:	External AC power has reached the unit, checking integrity of equipment before energizing.

ASSESSMENT:

Damaged fuel may have slumped to the bottom of the core and fuel in the lower region of the core is likely encased in salt and core flow is most likely severely restricted and likely blocked. The core spray nozzles are likely salted up restricting core spray flow (if they were used for saltwater injection). [REDACTED] (b)(4),(b)(5)

water flow, if not blocked, should be filling the annulus region of the vessel to 2/3 core height. There is likely no water level inside the core barrel. While core flow capability may be affected due to continued salt build up, RPV water level indication is suspect due to environment. Natural circulation believed impeded by core damage. It is difficult to determine how much cooling is getting to the fuel. Vessel temperature readings are likely metal temperature which lags actual conditions.

Low level release path: fuel damaged, reactor coolant system potentially breached at Recirculation pump seals, primary containment damaged resulting in low level release. There may be some scrubbing of the release if the release path is through the torus and water level is maintained in the torus.

Fuel pool is heating up but is adequately cooled, and fuel may have been ejected from the pool (based on information from TEPCo of neutron sources found up to 1 mile from the units, and very high dose rate material that had to be bulldozed over between Units 3 and 4. It is also possible the material could have come from Unit 3)..

RECOMMENDATIONS:

- [REDACTED] (b)(4),(b)(5)
- o Attempt to inert with Nitrogen prior to venting and especially before utilizing containment spray
 - Steam/condensing could jeopardize inert environment
 - Hydrogen gas production more prevalent in salt water than in fresh water
- o [REDACTED] (b)(4),(b)(5)
- o [REDACTED] (b)(4),(b)(5) Containment spray should be secured before 2 lbs. to prevent opening vacuum breakers.
- [REDACTED] (b)(4),(b)(5)

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

- o Borate water if possible. (With salt in vessels, consider effect of acidic conditions in vessel when deciding how much boron to add.)
- Ensure SFP level maintained as full as possible

- o [Redacted]

(b)(4),(b)(5)

- o when flooding containment, consider the implications of water weight on seismic capability of containment

- [Redacted]

(b)(4),(b)(5)

- CRD injection is desired for cooling material on bottom of vessel.

- [Redacted]

(b)(4),(b)(5)

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

UNIT FOUR

STATUS:

Core Status: Offloaded 105 days at time at accident (JAIF, NISA, TEPCO)

Core Cooling: Not necessary (JAIF, NISA, TEPCO)

Primary: Not applicable (JAIF, NISA, TEPCO)

Containment

Secondary: Severely damaged, hydrogen explosion. (JAIF, NISA, TEPCO)

Containment:

Spent Fuel Pool: Low water level, spraying with sea water, hydrogen from the fuel pool exploded, fuel pool is cool heating up very slowly (JAIF, NISA, TEPCO)

Temperature back up to 100 C (NISA) (b)(4),(b)(5)
3/24

Rad Levels:

Other: External AC power has reached the unit, checking electrical integrity of equipment before energizing. (JAIF, NISA, TEPCO)

ASSESSMENT:

Given the amount of decay heat in the fuel in the pool, it is likely that in the days immediately following the accident, the fuel was partially uncovered. The lack of cooling resulted in zirc water reaction and a release of hydrogen. The hydrogen exploded and damaged secondary containment. The zirc water reaction could have continued, resulting in a major source term release.

Fuel may have been ejected from the pool (based on information from TEPCO of neutron sources found up to 1 mile from the units, and very high dose rate material that had to be bulldozed over between Units 3 and 4. It is also possible the material could have come from Unit 3).

RECOMMENDATIONS:

- (b)(4),(b)(5)
-

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

UNIT FIVE

STATUS:

Core Status:	In vessel (JAIF, NISA, TEPCO)
Core Cooling:	Functional (JAIF, NISA, TEPCO)
Primary Containment:	Functional (JAIF, NISA, TEPCO)
Secondary Containment:	Vent hole drilled in rooftop to avoid hydrogen build up (JAIF, NISA, TEPCO)
Spent Fuel Pool:	Fuel pool cooling not functioning (JAIF, NISA, TEPCO)
Other:	External AC power supplying the unit, Unit 6 (?) diesel generators available. Fuel Pool Cooling lost when pump failed (JAIF, NISA, TEPCO)

ASSESSMENT:

Unit five is relatively stable

RECOMMENDATIONS:

(b)(5)

Monitor

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

UNIT SIX

STATUS:

Core Status:	In vessel (JAIF, NISA, TEPCO)
Core Cooling:	Functional (JAIF, NISA, TEPCO)
Primary Containment:	Functional (JAIF, NISA, TEPCO)
Secondary Containment:	Vent hole drilled in rooftop to avoid hydrogen build up (JAIF, NISA, TEPCO)
Spent Fuel Pool:	Fuel pool cooling functioning (JAIF, NISA, TEPCO)
Other:	External AC power supplying the unit, diesel generators available. Fuel Pool Cooling lost when pump failed (JAIF, NISA, TEPCO)

ASSESSMENT:

Unit Six is relatively stable

RECOMMENDATIONS:

- Monitor

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RST Assessment of Fukushima Daiichi Units, 1500 March 24, 2011

ABBREVIATIONS:

GEH – General Electric Hitachi
INPO – Institute of Nuclear Power Operations
JAIF – Japan Atomic Industrial Forum
NISA - Nuclear and Industrial Safety Agency
TEPCO – Tokyo Electric Power Company

From: PMT02 Hoc
Sent: Tuesday, March 15, 2011 10:02 PM
To: PMT02 Hoc; narak@llnl.gov; nitops@nnsa.doe.gov
Cc: cmht@nnsa.doe.gov; Brandon, Lou
Subject: NRC RASCAL estimations
Attachments: Case Summary & Source Term Unit 2 Core Melt.doc; Unit 2 core melt 03-15-11 2145 source term.csv

--- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN ---

This is a MONITORING OPERATION FOR THE JAPAN EARTHQUAKE TSUNAMI AFTERMATH.

Attached are two files for the Unit 2 core melt source term (.CSV and Case Summary files), which were requested by Kevin Foster.

In addition to this email, you should have received an email recently for updated Unit 4 spent fuel pool.

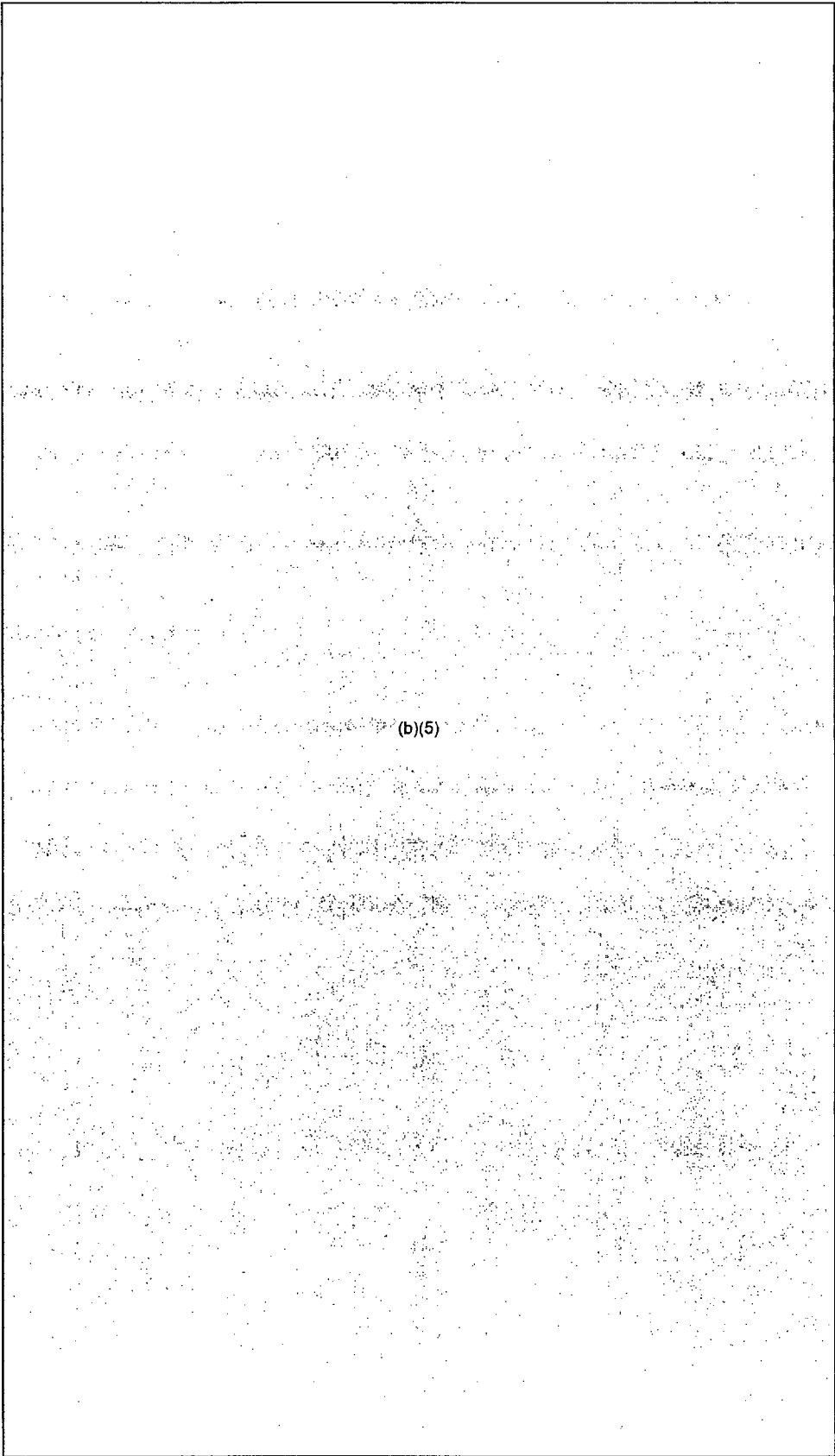
NRC Protective Measures Team
301-816-5419

Please reply to this email to acknowledge receipt.

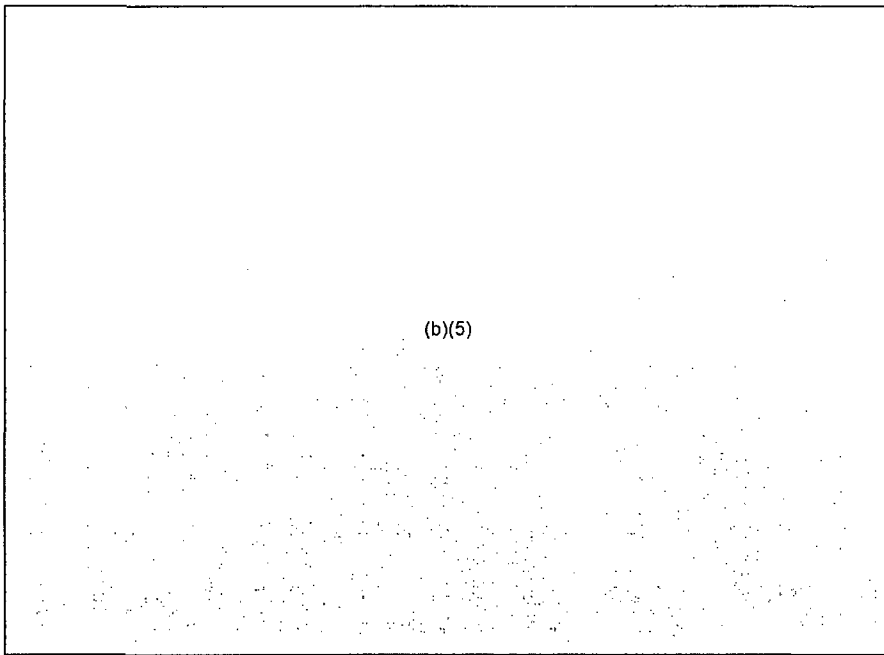
This information should not be released at this time.

NO PARTICIPATION OR RESPONSE BY CMHT IS EXPECTED

--- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN



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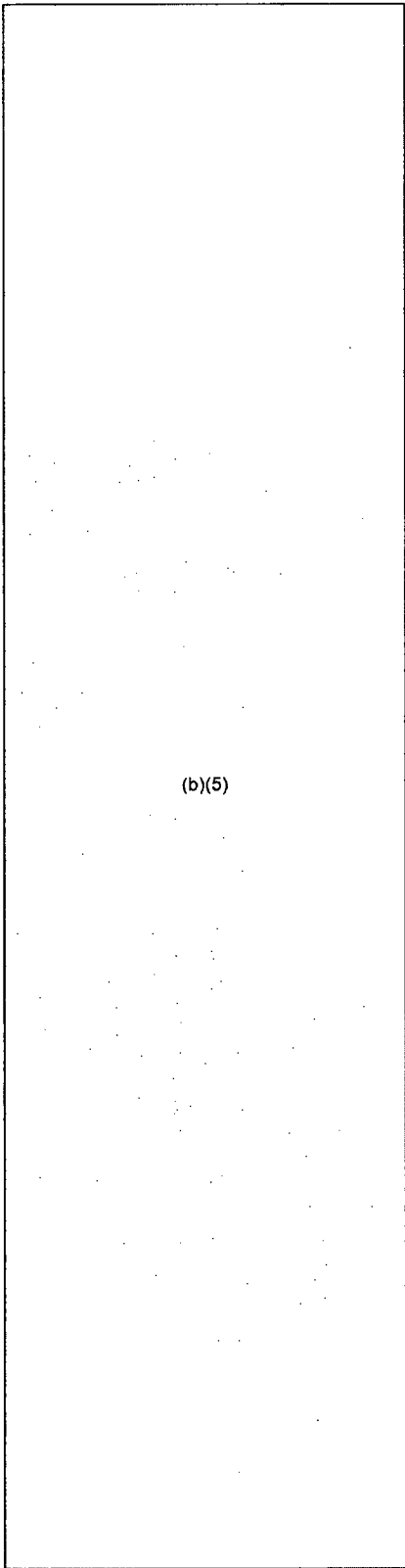
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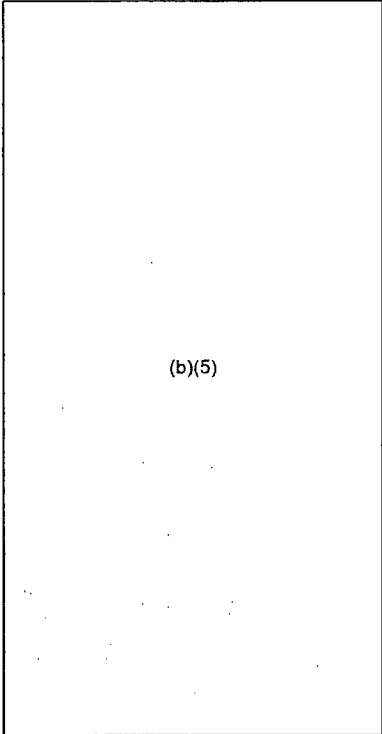
(b)(5)

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(b)(5)



(b)(5)

From: PMT02 Hoc
Sent: Wednesday, March 16, 2011 1:55 AM
To: narak@llnl.gov; nitops@nnsa.doe.gov
Cc: Brandon, Lou
Subject: NRC Rascal Estimations
Attachments: Fukushima unit 4 - SF pool complete meld down - Case Summary.pdf; Fukushima Unit 4 estimate for 50 miles - TEDE - Puff - 03162011 0437UTC withLegend.pdf; Unit 4 spent fuel data.csv

--- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN ---

This is a MONITORING OPERATION FOR THE JAPAN EARTHQUAKE TSUNAMI AFTERMATH.

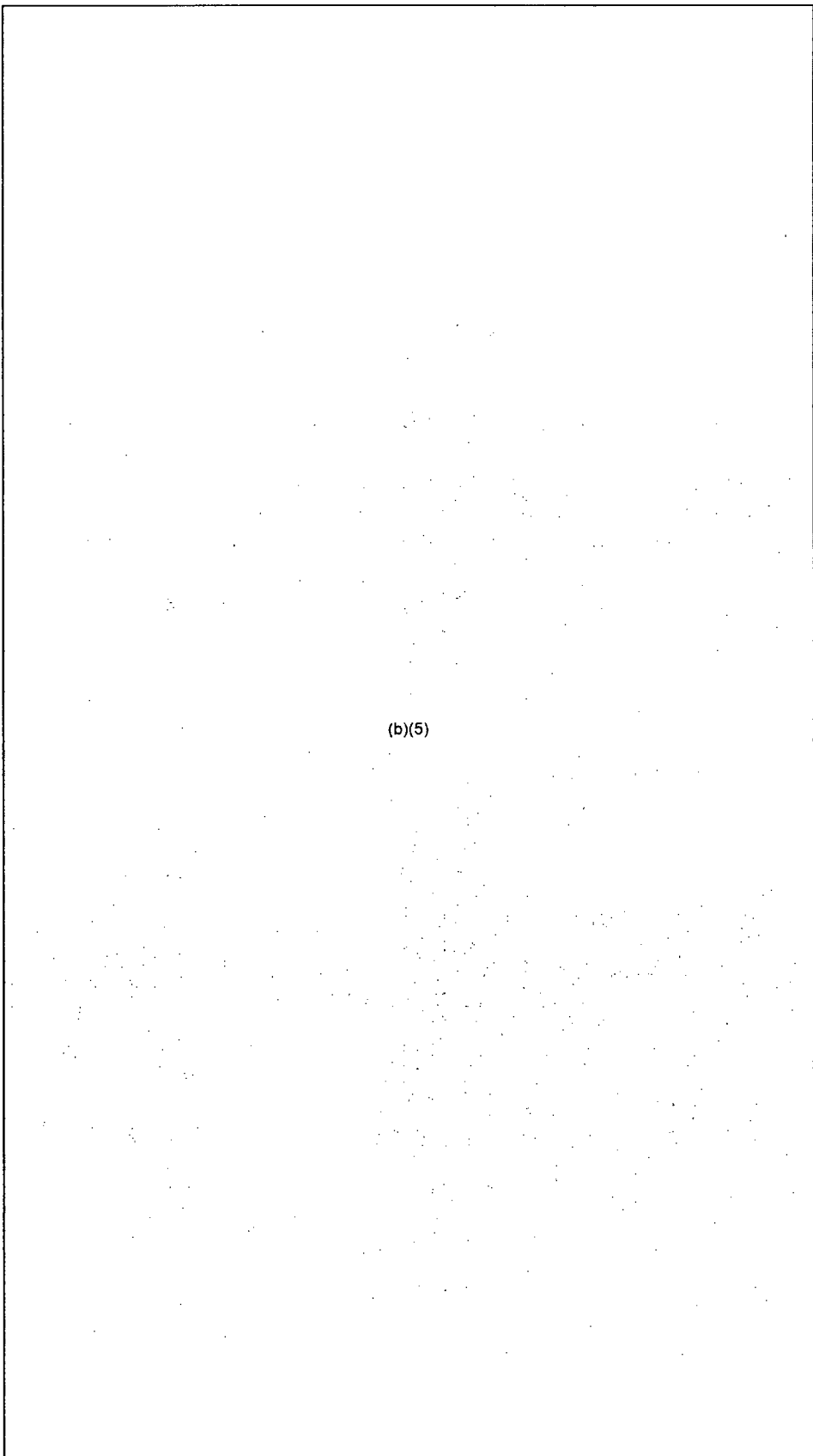
This is a simulated run to characterize 100% melt down of spent fuel pool for unit 4. While this looks like a reactor core damage run, we "creatively" modified the model to simulate damage to the unit 4 spent fuel pool. Unit 2 data was used to simulate the unit 4 spent fuel pool scenario instead of creating another run.

This is not to be distributed until coordinated with the NRC, if at all.

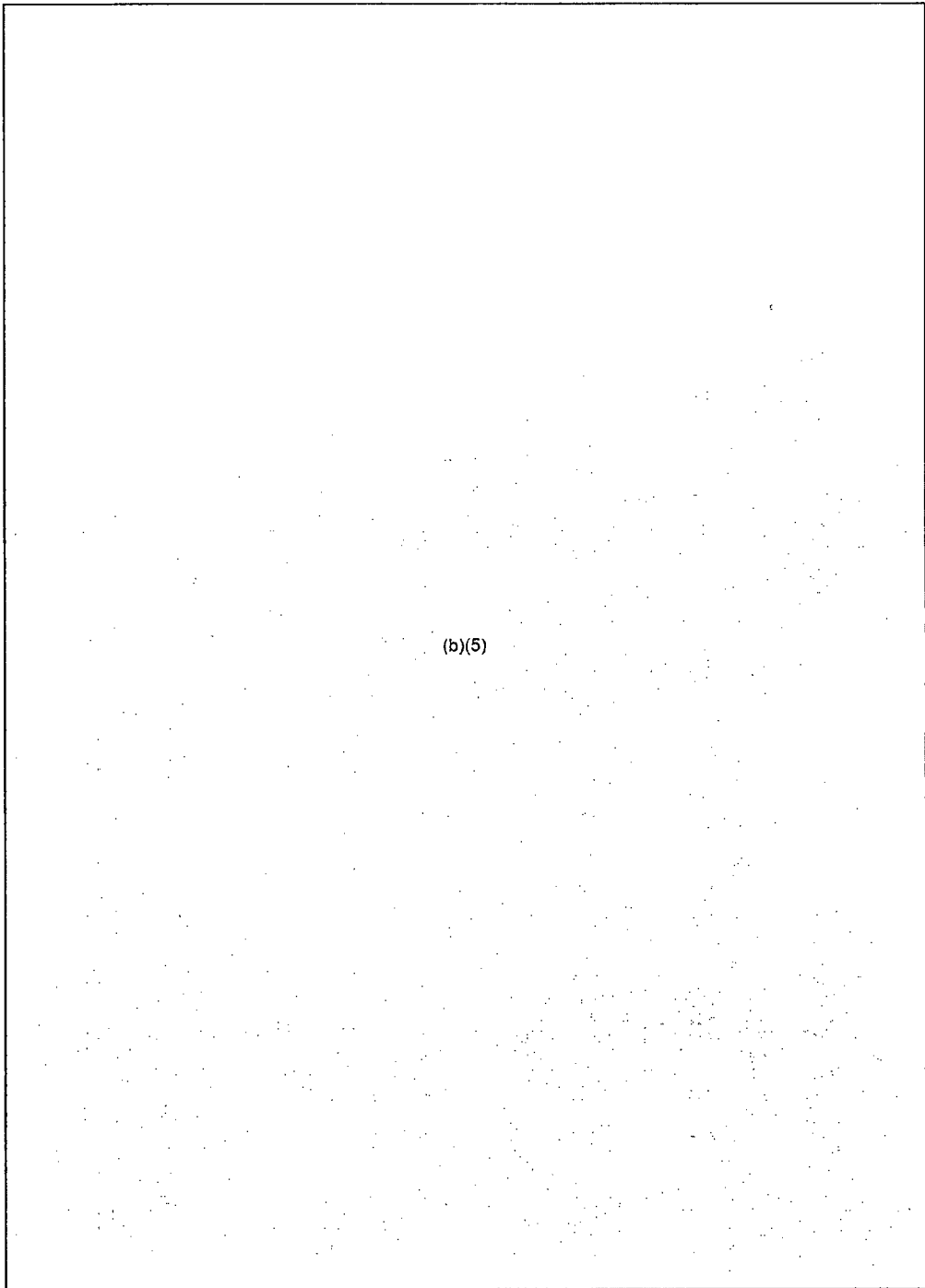
PMT Dose Analyst (PMT02)
NRC Operation Center

THIS IS A NOT DRILL --- THIS IS NOT A DRILL --- THIS IS NOT A DRILL

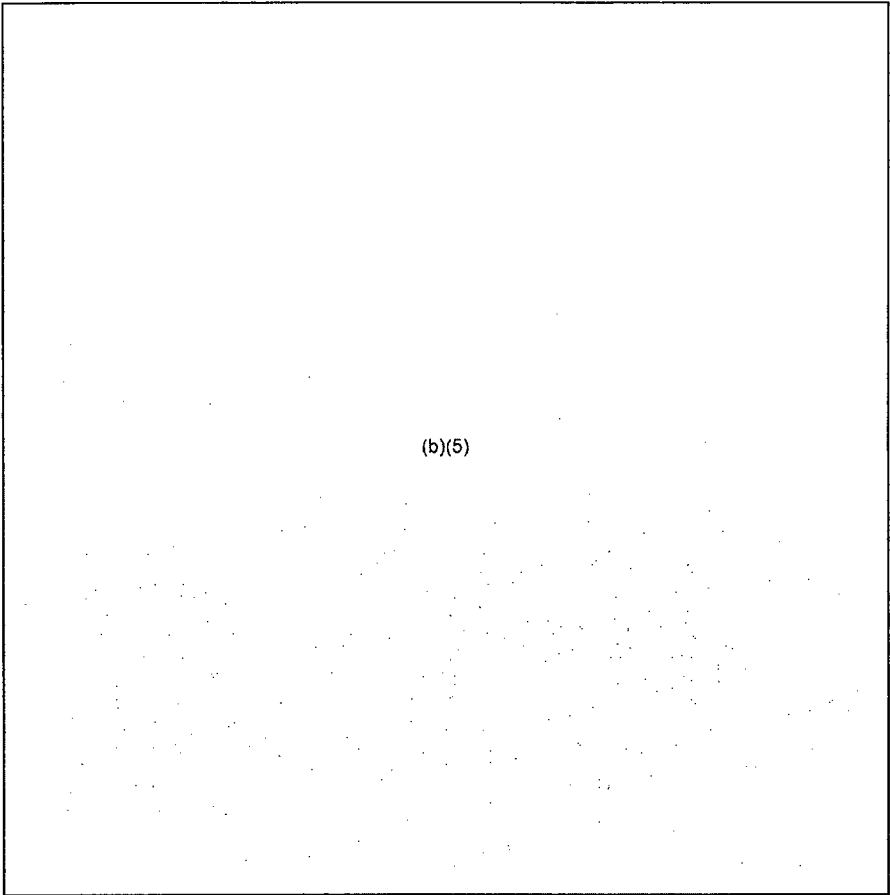
All pages

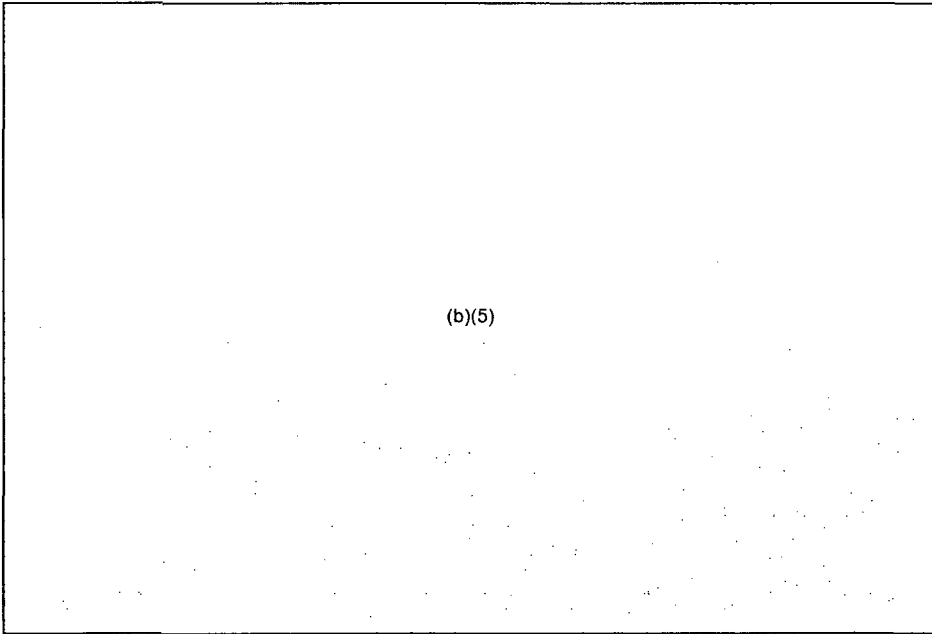


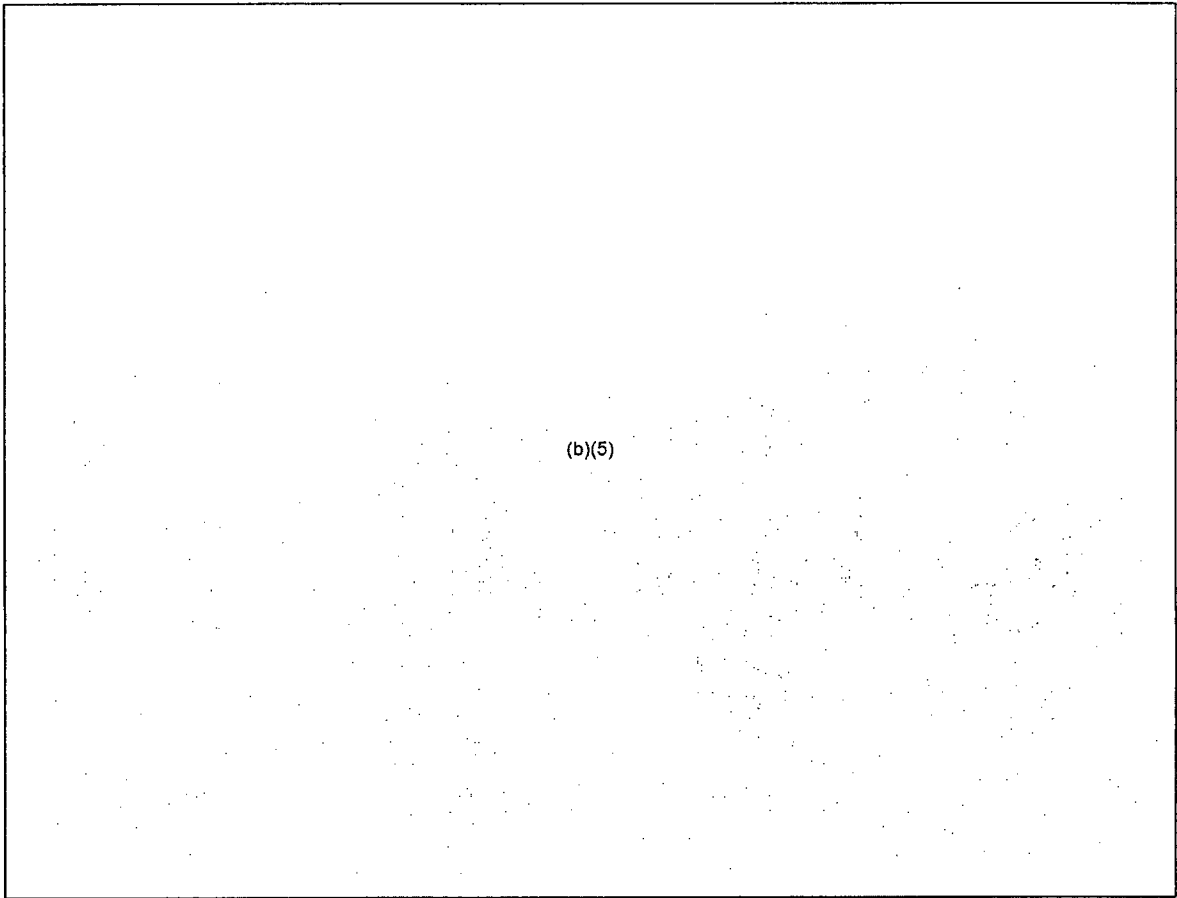
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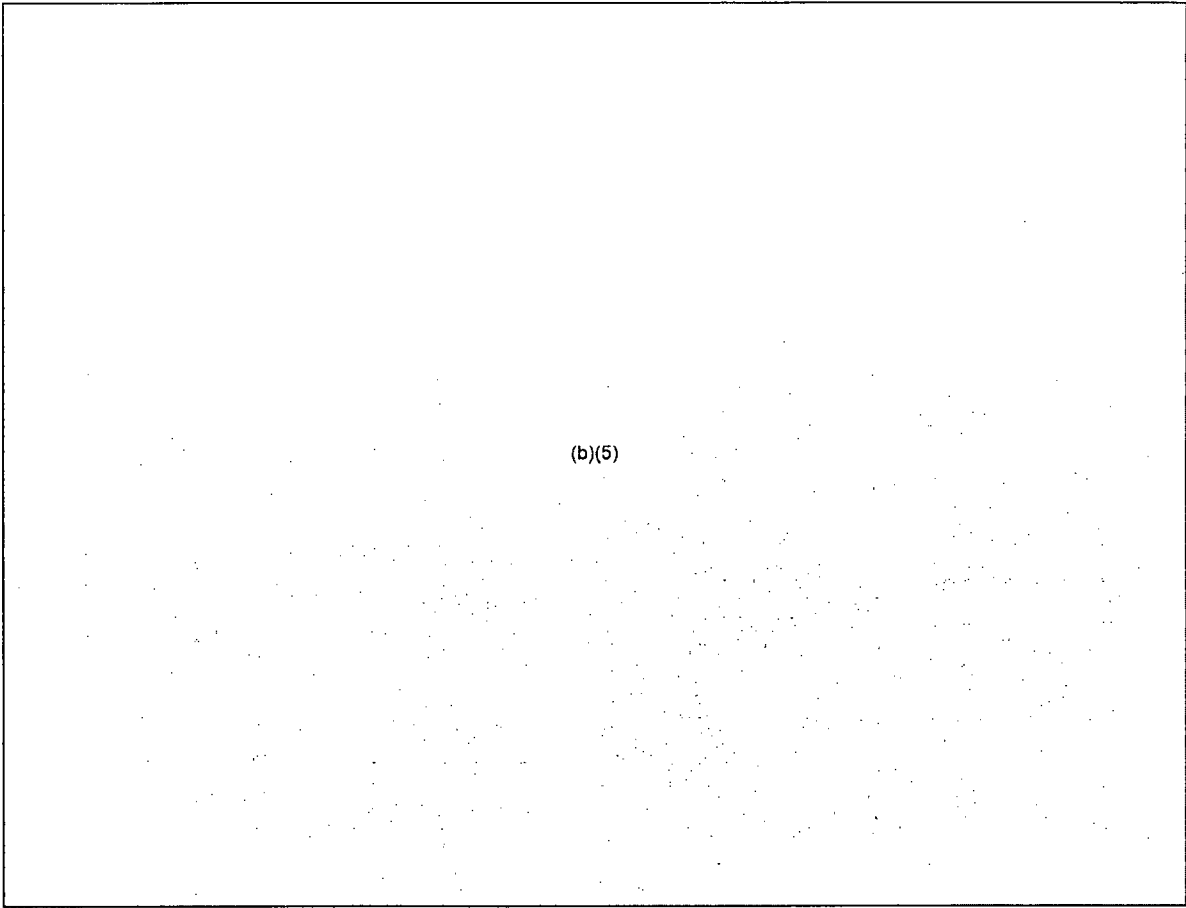


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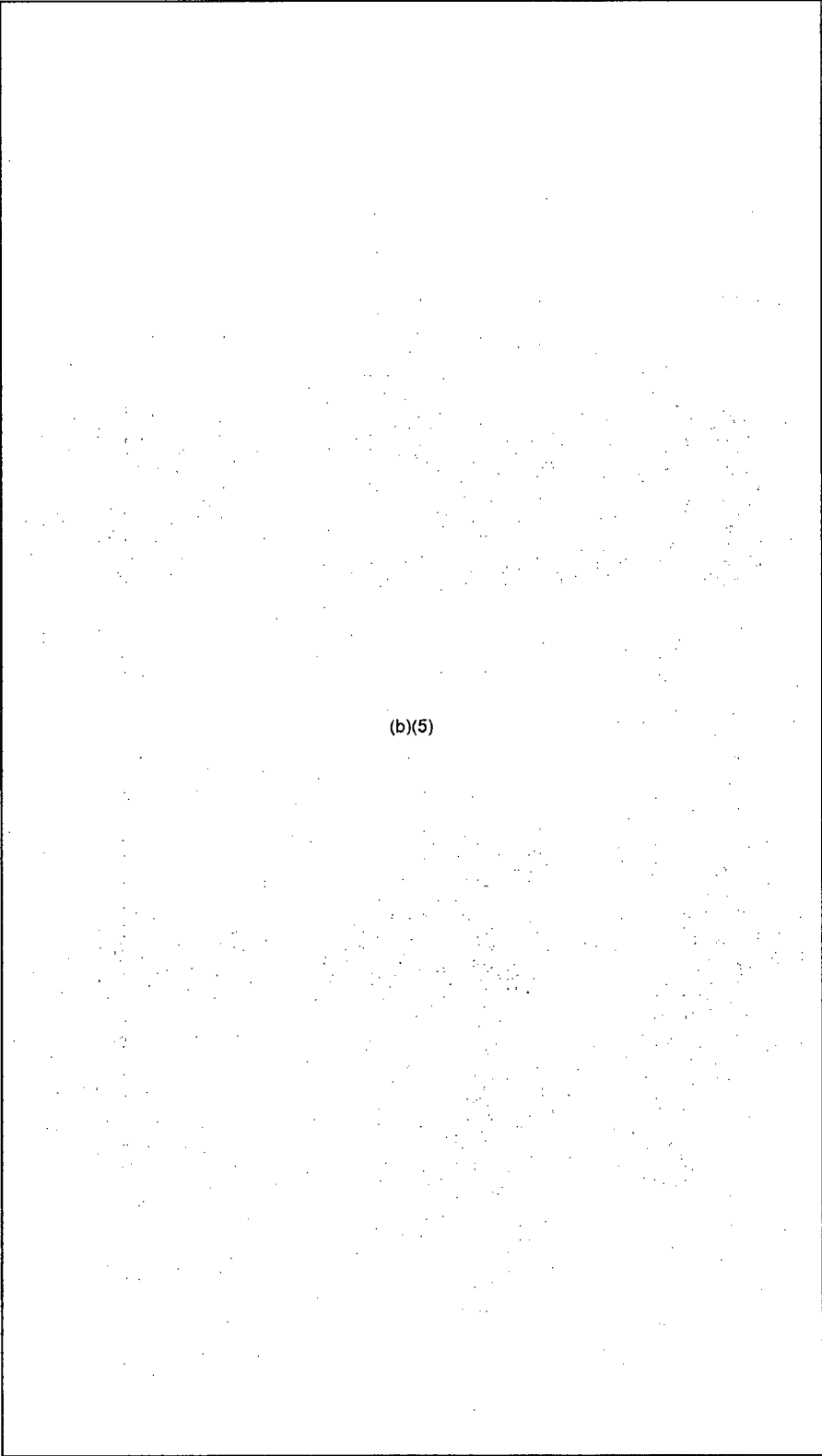
(b)(5)

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From: PMT02 Hoc
Sent: Tuesday, March 15, 2011 1:21 PM
To: PMT02 Hoc; narac@llnl.gov; nitops@nnsa.doe.gov
Cc: cmht@nnsa.doe.gov; Brandon, Lou
Subject: RE: NRC RASCAL estimations
Attachments: RASCAL Source Term for Fukushima 4 fuel pool (3-15-11).csv

--- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN ---

This is a MONITORING OPERATION FOR THE JAPAN EARTHQUAKE TSUNAMI AFTERMATH.

Attached is the subject file, with revised unit 4 spent fuel inventory. The total released activity estimate is based on 7 batches total with the last batch at 105 day old, for a 24 hours continuous release.

301-816-5419 (NRC Protective Measures Team)

Please reply to this email to acknowledge receipt.

This information should not be released at this time.

NO PARTICIPATION OR RESPONSE BY CMHT IS EXPECTED

--- THIS IS A MONITORING OPERATION FOR THE FUKUSHIMA REACTOR IN JAPAN

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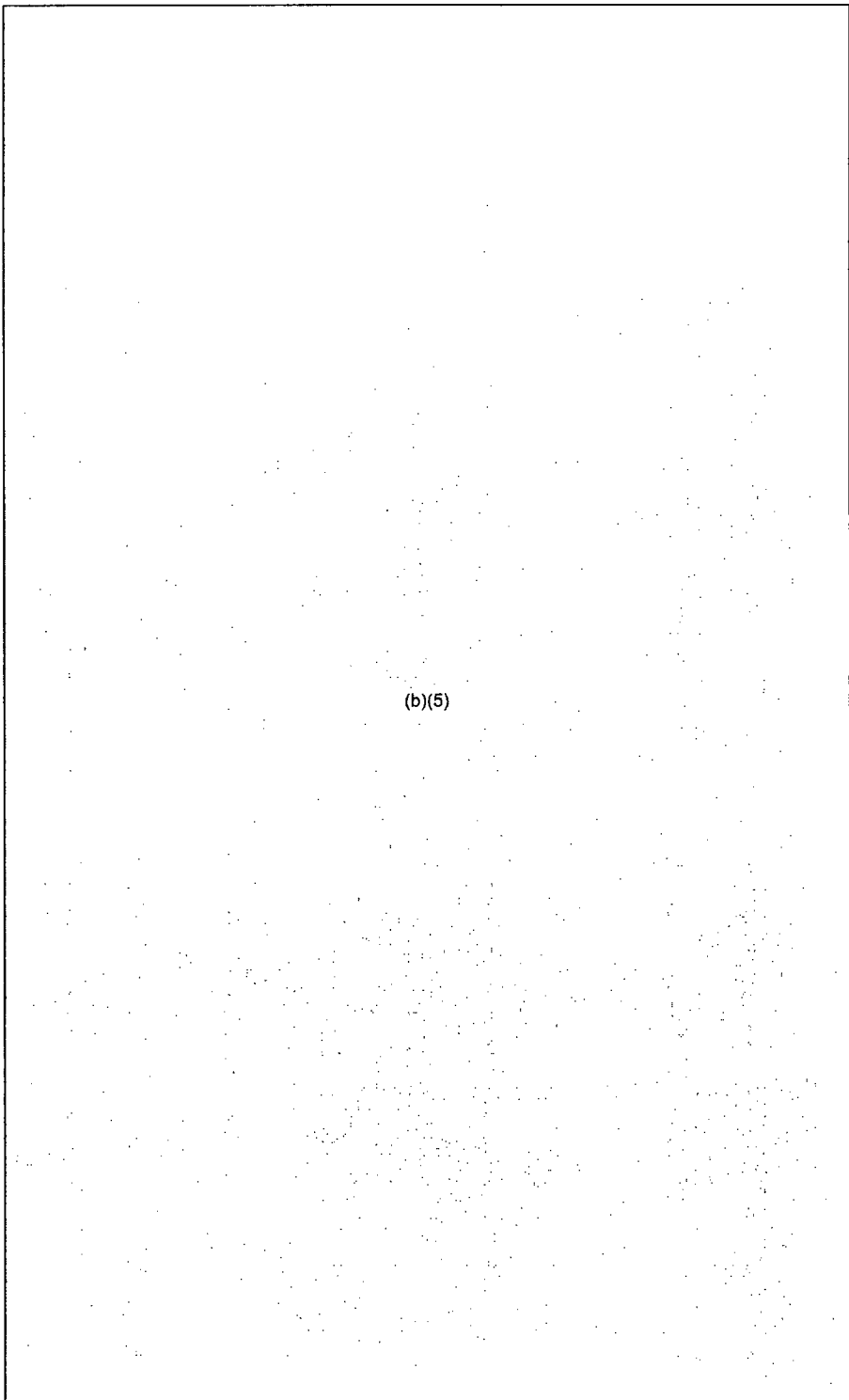
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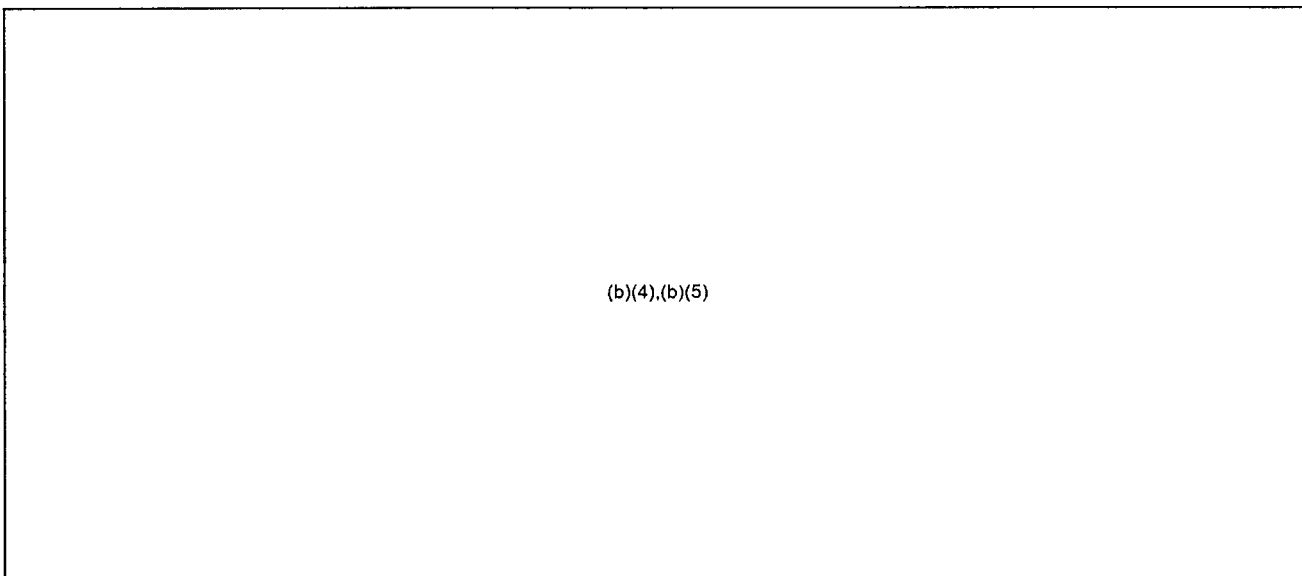
(b)(5)



From: Mazaika, Michael
Sent: Tuesday, March 15, 2011 12:54 PM
To: PMT01 Hoc
Cc: Galletta, Thomas; Quinlan, Kevin; Harvey, Brad; Brown, David; Schaaf, Robert; Brandon, Lou
Subject: Questions Re Model-Predicted Met Data

Folks:

Had some thoughts overnight regarding the Met data being used as input to RASCAL. As I recall, it is being driven by forecast model output. You may have already gotten answers to these questions, but just to be sure:



More to come regarding requests to obtain actual historical onsite Met data and offsite data from the Japan Meteorological Agency.

I spoke with Dave Brown twice this morning. He advised me of the current staffing plan for this week and indicated that it was not necessary to report to the office today. I will be available by phone (b)(6) or e-mail. Tom, this and my follow-up e-mail were the reason for my call around 11 AM; no need to return the call unless you want to discuss further.

Thanks,

Mike

From: Andrews, Tom
Sent: Tuesday, March 15, 2011 5:22 PM
To: Cortez, Ruben
Cc: Walker, Rae; George Athey; Brandon, Lou; Alferink, Beth; Howell, Linda
Subject: RE: Rascal 4 question

Appears to be a naming issue in RASCAL. I have reported it to Lou Brandon and George Athey.

Tom Andrews
Senior Emergency Response Coordinator
USNRC - Region IV
612 East Lamar, Suite 400
Arlington, TX 76011

Office: 817.860.8233
Facsimile: 817.860.8228
Cellular:

(b)(6)

Tom Andrews - Incident Response Rule #24
Very few things scare people more than the lack of information.

From: Cortez, Ruben [mailto:Ruben.Cortez@dshs.state.tx.us]
Sent: Tuesday, March 15, 2011 1:16 PM
To: Andrews, Tom
Cc: Walker, Rae; George Athey; Brandon, Lou
Subject: Rascal 4 question

(b)(4),(b)(5)

Ruben Cortez
Inspection Unit MC 1986
Texas Department of State Health Services
PO BOX 149347
Austin, TX 78714-9347
Voice: 512/834-6770 x2004 Fax: 512/834-6622
ruben.cortez@dshs.state.tx.us

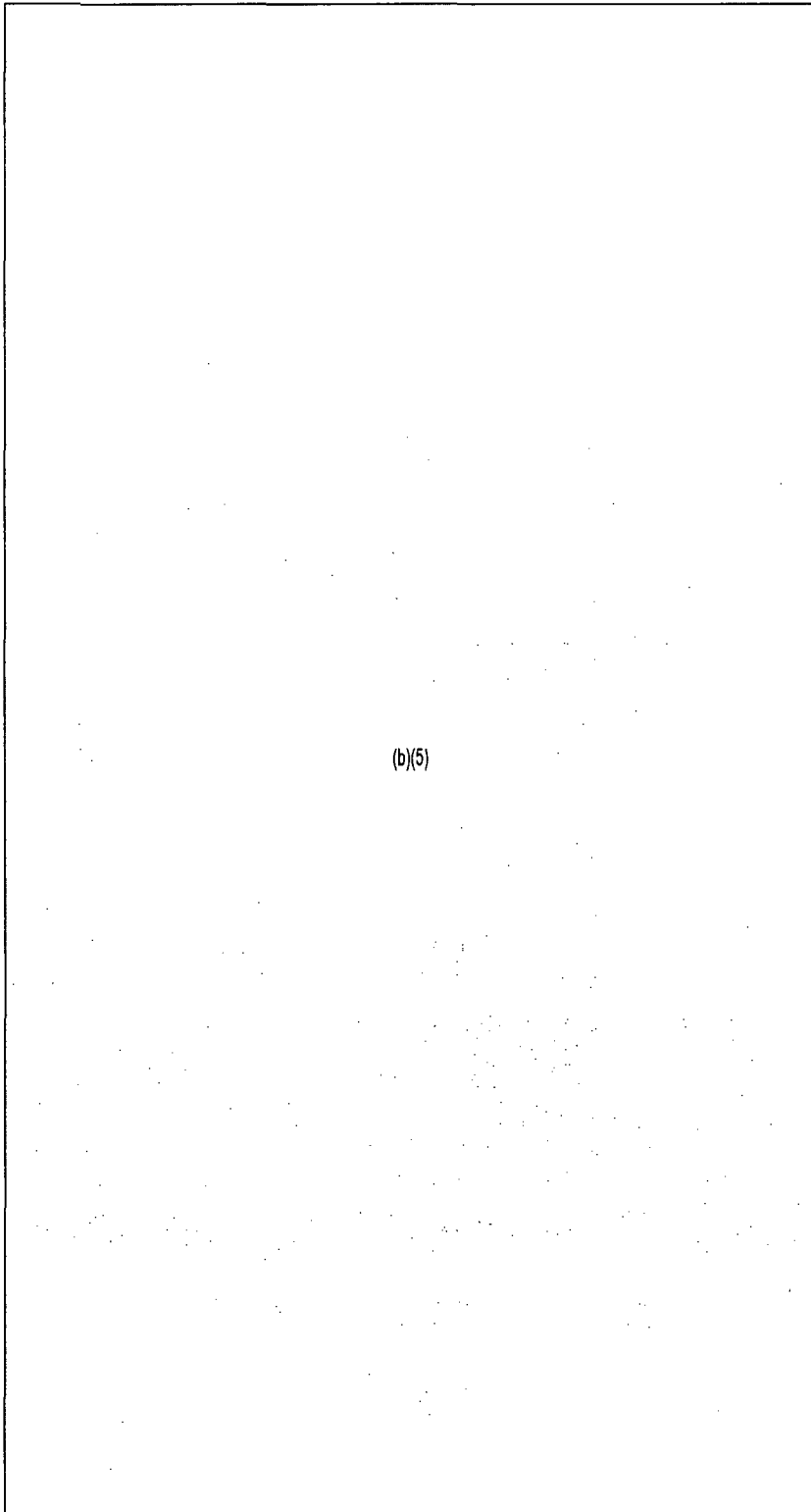
<http://vortex.plymouth.edu/statlog-u.html>

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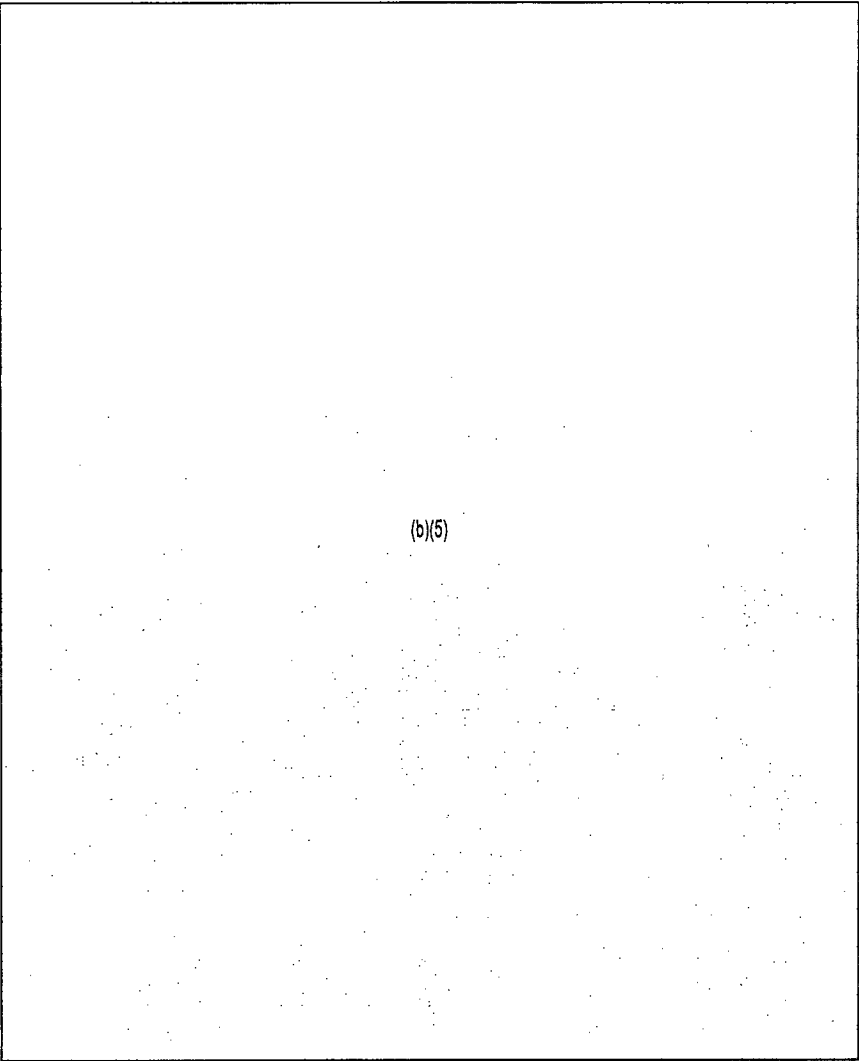
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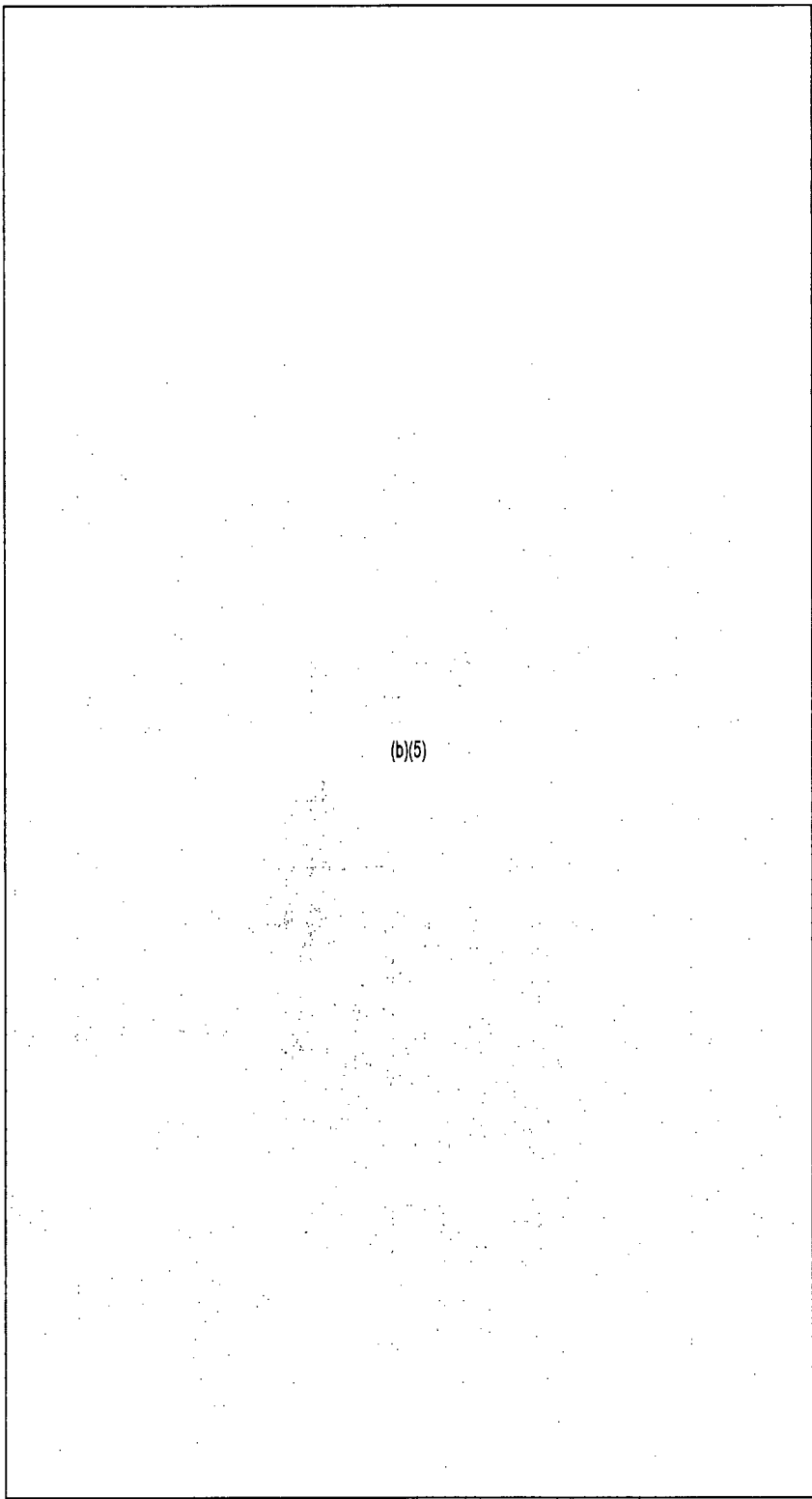
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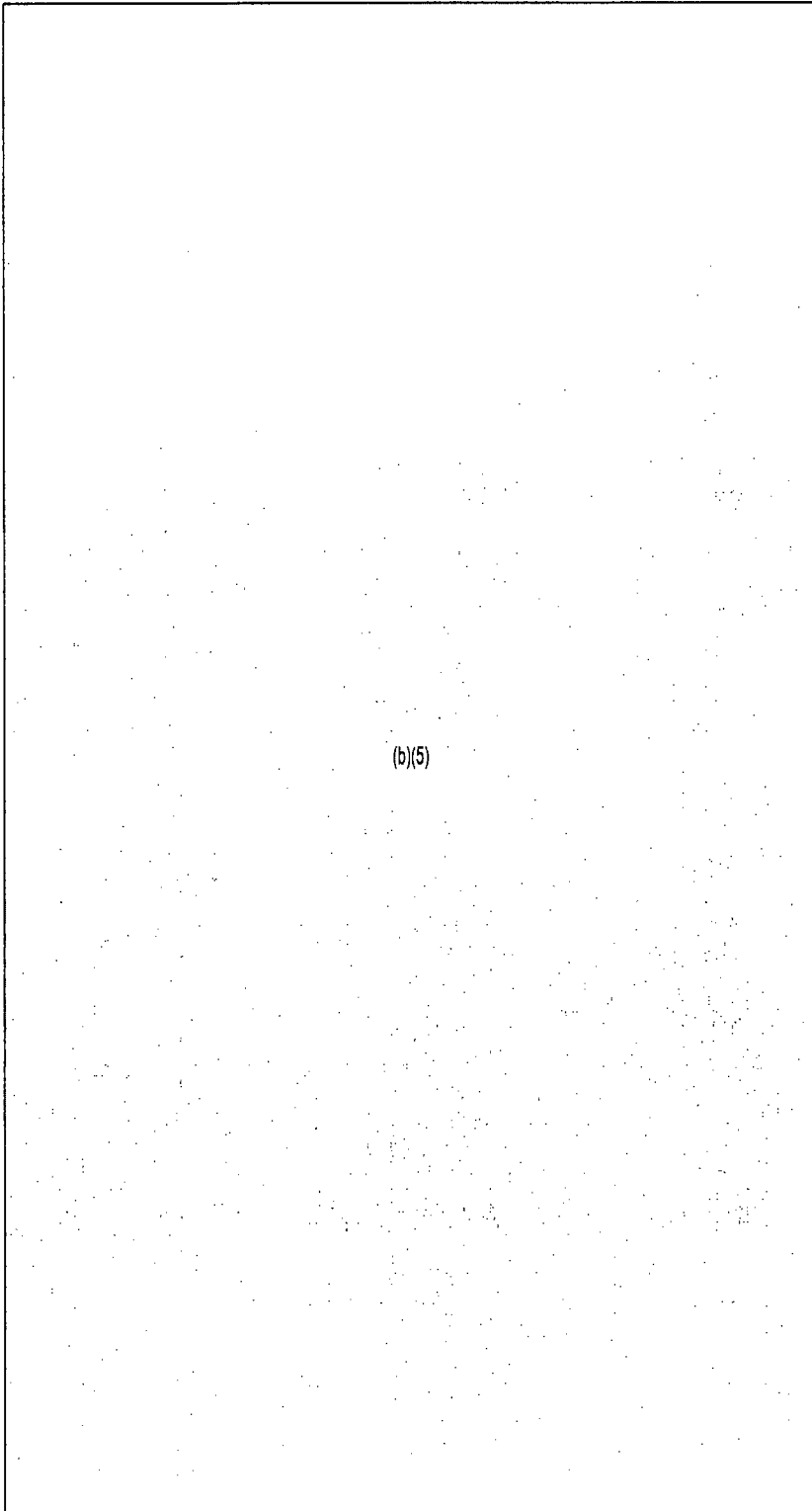


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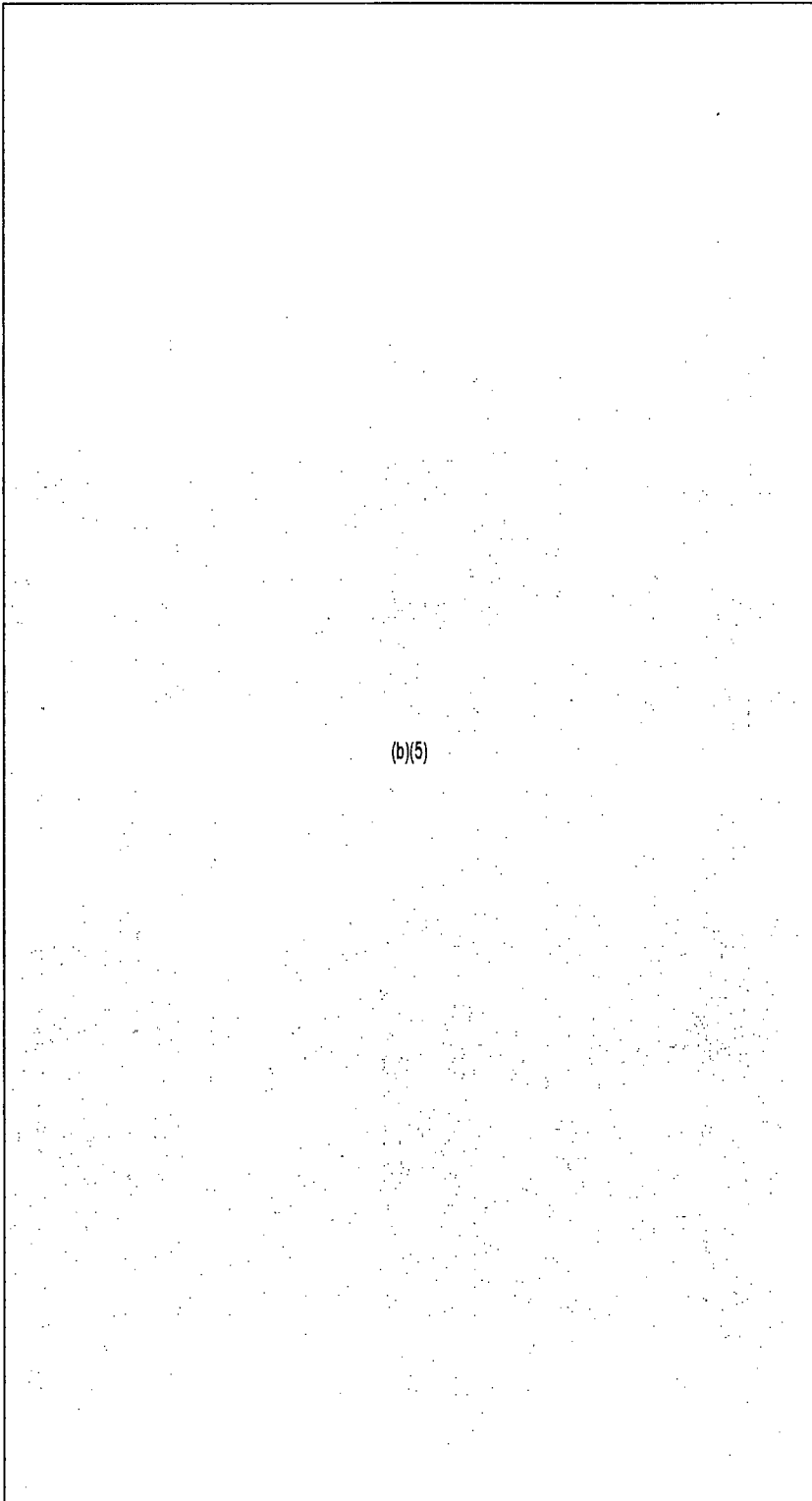
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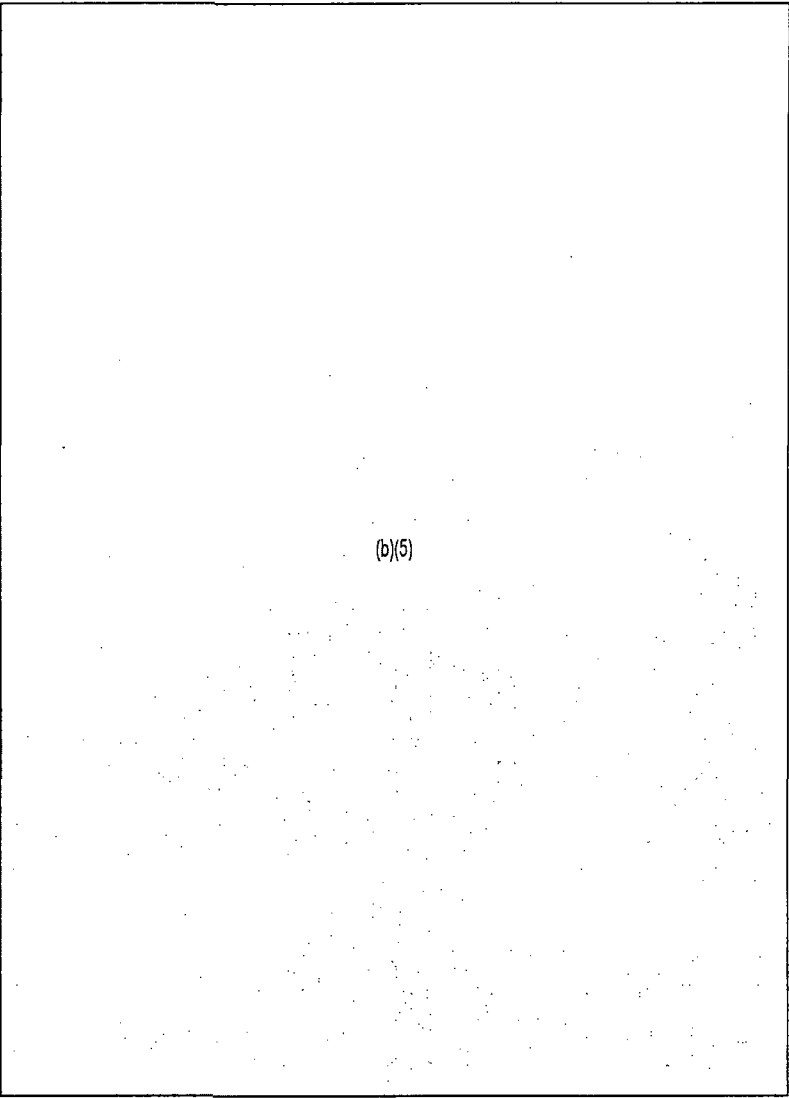
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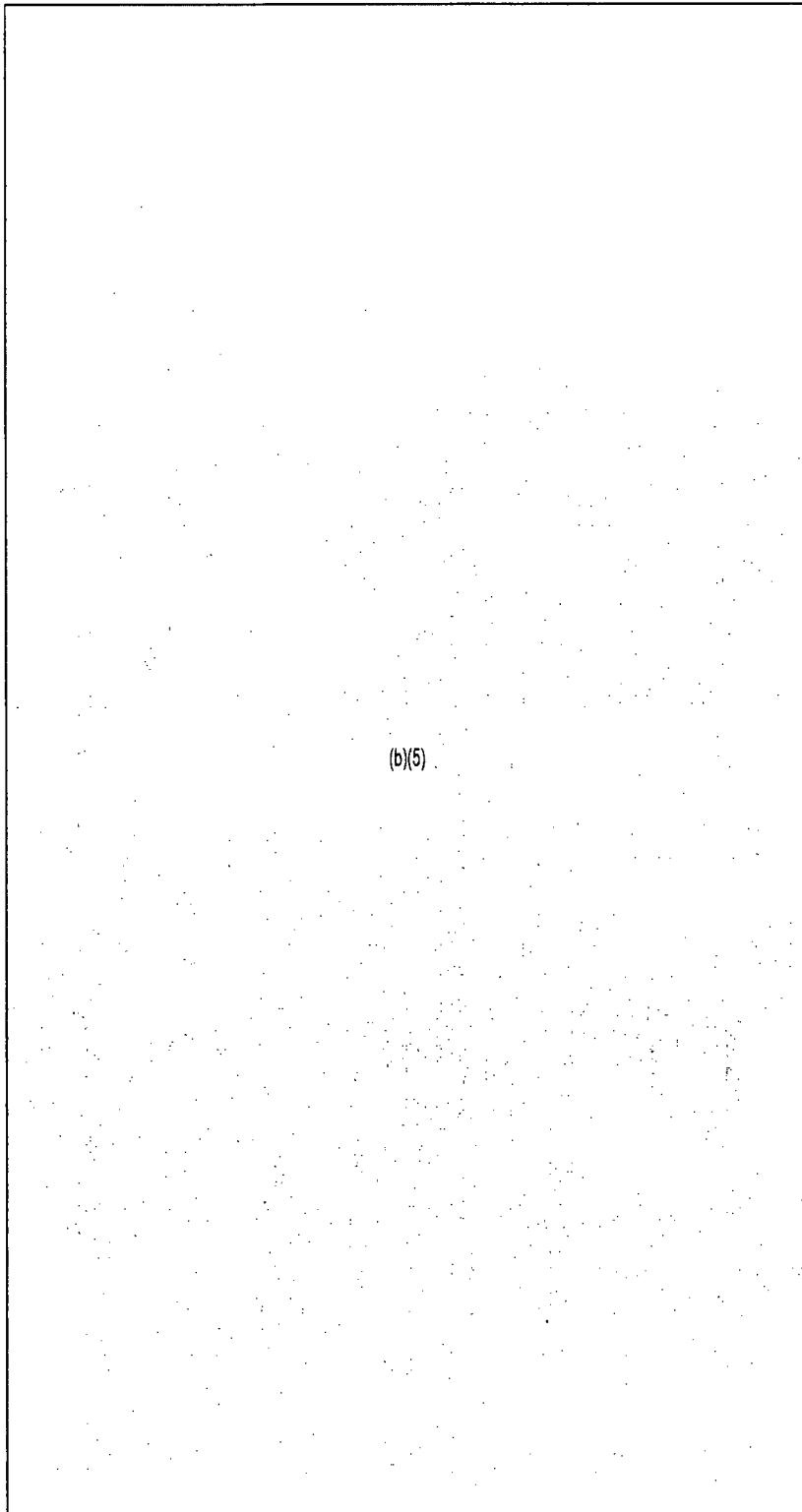
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Attachment Bryan fire.STD(3945 bytes) cannot be converted to PDF format.

Approved Draft

Return to
Brian M. DeMat



NRC NEWS

U.S. NUCLEAR REGULATORY COMMISSION

Office of Public Affairs Telephone: 301/415-8200
Washington, D.C. 20555-0001

E-mail: opa.resource@nrc.gov Site: www.nrc.gov

Blog: <http://public-blog.nrc-gateway.gov>

No. 11-049

March 15, 2011

NRC PROVIDES PROTECTIVE ACTION RECOMMENDATIONS TO STATE DEPARTMENT

Based on the Nuclear Regulatory Commission's analysis of all the data currently available, the NRC has provided information to the Department of State that indicates it is prudent to evacuate American citizens in Japan to a distance of up to 50 miles from the damaged Fukushima reactors.

Under the guidelines for public safety that would be used in the United States under similar circumstances, the NRC would recommend that residents within 50 miles of the affected site evacuate. Among other things, in the United States protective actions recommendations are implemented when projected doses could exceed 1-5 rem.

A rem is a measure of radiation dose. The average American is exposed to approximately 620 millirems, or 0.62 rem, of radiation each year from natural and manmade sources.

In making protective action recommendations, the NRC takes into account a variety of factors that include weather, wind direction and speed, and the status of the problem at the reactors.

Attached are the results of two sets of computer calculations used to support the NRC assessment.

###

News releases are available through a free *listserv* subscription at the following Web address: <http://www.nrc.gov/public-involve/listserv.html>. The NRC homepage at www.nrc.gov also offers a SUBSCRIBE link. E-mail notifications are sent to subscribers when news releases are posted to NRC's website.

Summary Report

Case description: Fukushima Unit 2 mid night release 15MAR
 Run date/time: 2011/03/15 02:51

Maximum Dose Values (rem) - Close-In

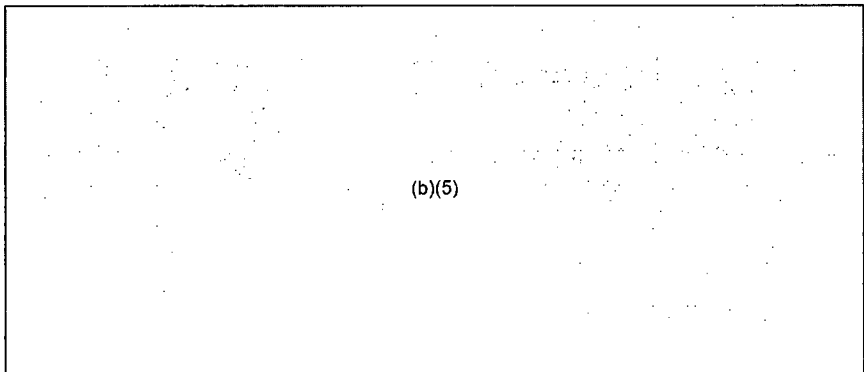
Dist from release miles (kilometers)	0.5 (0.8)	1 (1.61)	1.5 (2.41)	2 (3.22)	3 (4.83)	5 (8.05)	7 (11.27)	10 (16.09)
Total EDE	<u>5.4E+03</u>	<u>2.0E+03</u>	<u>1.2E+03</u>	<u>8.2E+02</u>	<u>4.8E+02</u>	<u>2.3E+02</u>	<u>1.6E+02</u>	<u>9.5E+01</u>
Thyroid CDE	<u>2.8E+04</u>	<u>1.1E+04</u>	<u>6.2E+03</u>	<u>4.3E+03</u>	<u>2.5E+03</u>	<u>1.3E+03</u>	<u>8.4E+02</u>	<u>5.1E+02</u>
Inhalation CEDE	<u>3.7E+03</u>	<u>1.4E+03</u>	<u>8.0E+02</u>	<u>5.6E+02</u>	<u>3.3E+02</u>	<u>1.7E+02</u>	<u>1.1E+02</u>	<u>6.7E+01</u>
Cloudshine	<u>1.9E+01</u>	<u>9.3E+00</u>	<u>5.8E+00</u>	<u>4.1E+00</u>	<u>2.5E+00</u>	<u>1.4E+00</u>	<u>9.7E-01</u>	<u>6.2E-01</u>
4-day Groundshine	<u>1.7E+03</u>	<u>6.5E+02</u>	<u>3.8E+02</u>	<u>2.6E+02</u>	<u>1.5E+02</u>	<u>7.3E+01</u>	<u>4.6E+01</u>	<u>2.8E+01</u>
Inter Phase 1st Yr	<u>2.4E+04</u>	<u>9.3E+03</u>	<u>5.4E+03</u>	<u>3.8E+03</u>	<u>2.2E+03</u>	<u>1.0E+03</u>	<u>6.6E+02</u>	<u>3.9E+02</u>
Inter Phase 2nd Yr	<u>1.1E+04</u>	<u>4.4E+03</u>	<u>2.6E+03</u>	<u>1.8E+03</u>	<u>1.0E+03</u>	<u>4.9E+02</u>	<u>3.1E+02</u>	<u>1.8E+02</u>

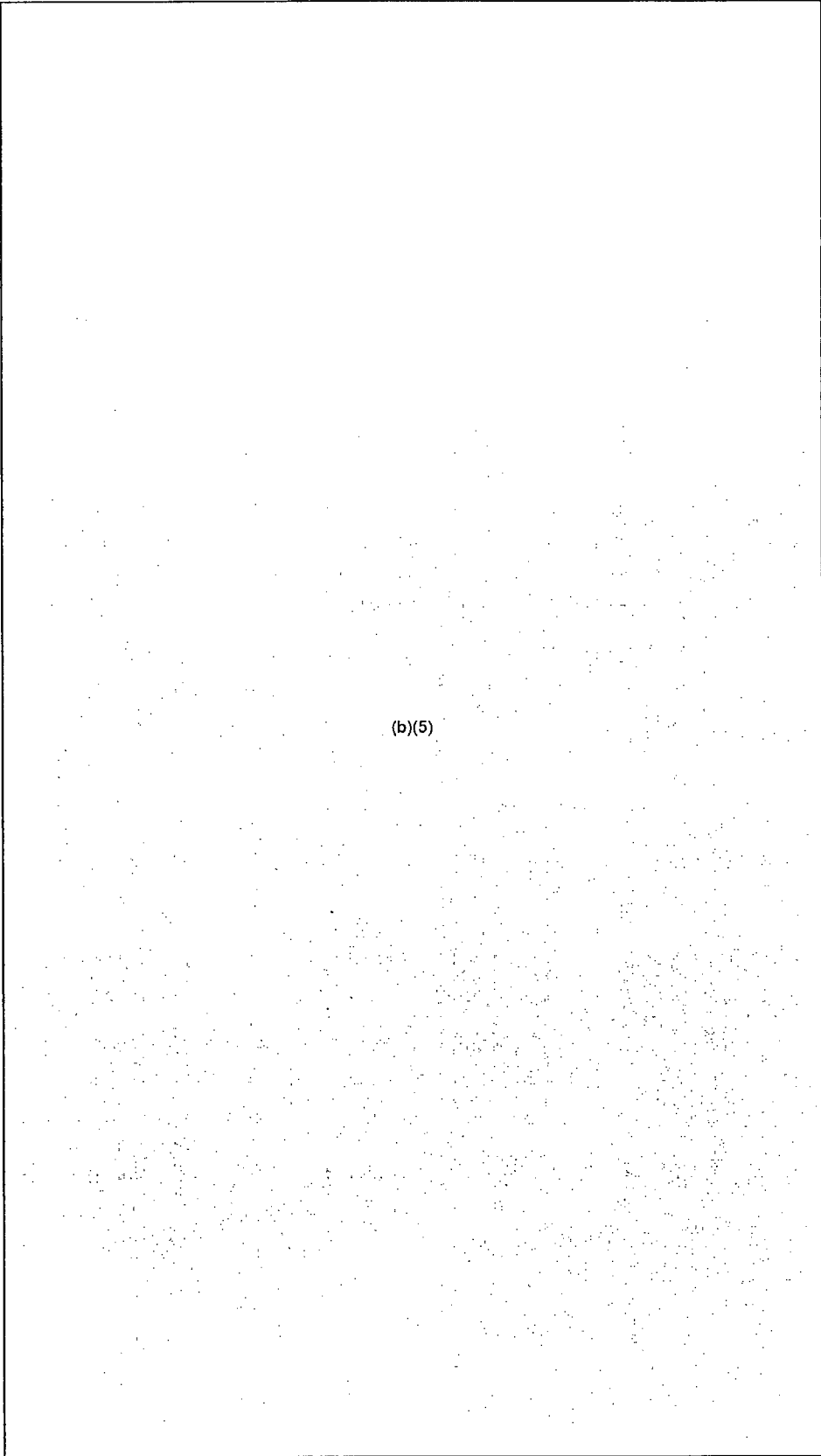
- Notes:
- Doses exceeding PAGs are underlined
 - Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
 - Intermediate-Phase EPA PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
 - *** indicates values less than 1 mrem
 - To view all values - use Detailed Results | Numeric Table
 - Total EDE = Inhalation CEDE + Cloudshine + 4-Day Groundshine

Maximum Dose Values (rem) - To 50 mi

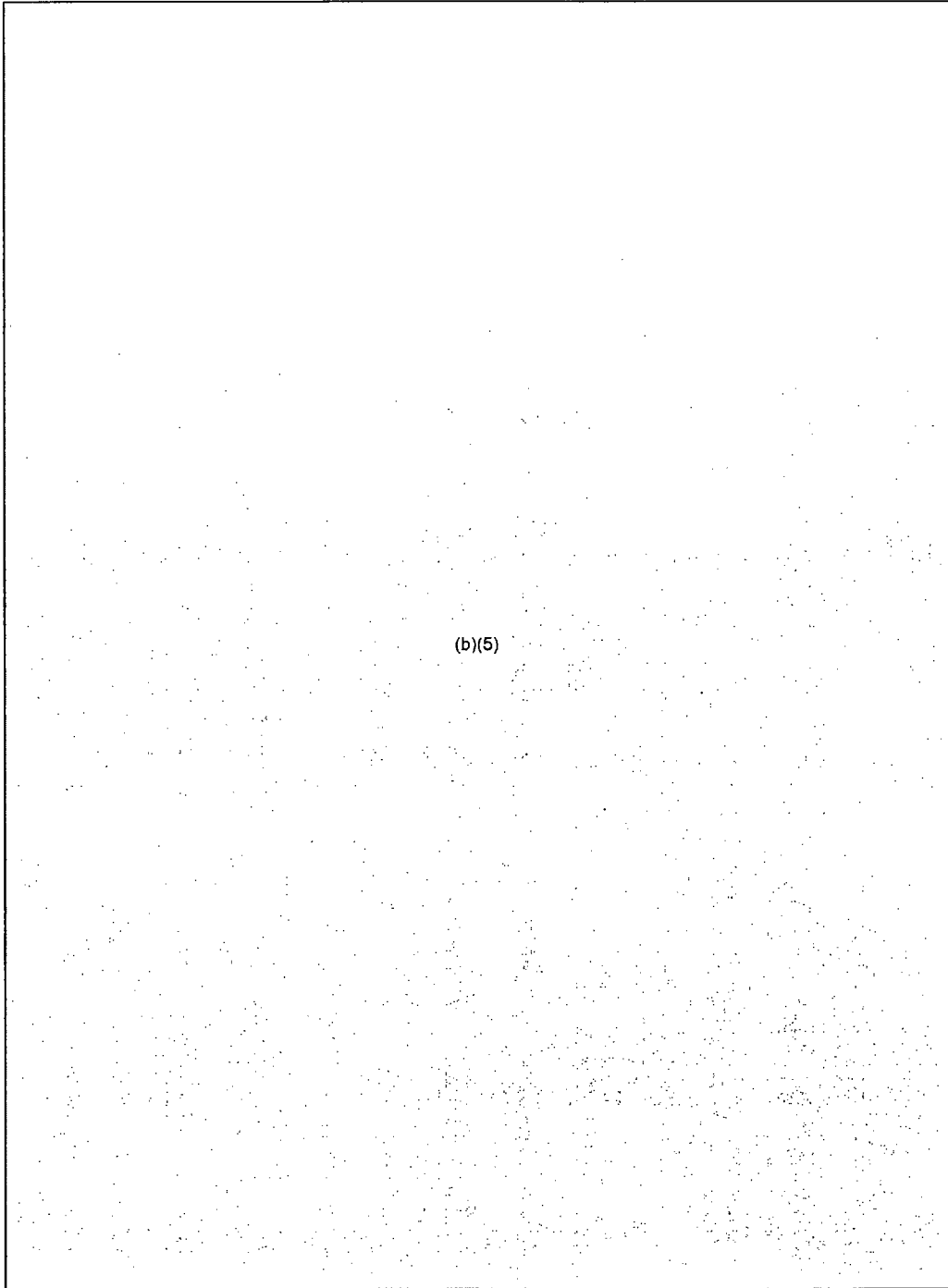
Dist from release miles (kilometers)	15 (24.1)	20 (32.2)	30 (48.3)	40 (64.4)	50 (80.5)
Total EDE	<u>8.6E+01</u>	<u>6.3E+01</u>	<u>3.7E+01</u>	<u>1.8E+01</u>	<u>8.1E+00</u>
Thyroid CDE	<u>3.3E+02</u>	<u>2.7E+02</u>	<u>1.3E+02</u>	<u>5.9E+01</u>	<u>2.5E+01</u>
Inhalation CEDE	<u>3.9E+01</u>	<u>3.1E+01</u>	<u>1.3E+01</u>	<u>4.4E+00</u>	<u>1.3E+00</u>
Cloudshine	<u>4.5E-01</u>	<u>3.8E-01</u>	<u>1.7E-01</u>	<u>7.4E-02</u>	<u>2.9E-02</u>
4-day Groundshine	<u>4.7E+01</u>	<u>3.2E+01</u>	<u>2.4E+01</u>	<u>1.3E+01</u>	<u>6.7E+00</u>
Inter Phase 1st Yr	<u>7.1E+02</u>	<u>4.7E+02</u>	<u>3.8E+02</u>	<u>2.2E+02</u>	<u>1.3E+02</u>
Inter Phase 2nd Yr	<u>3.4E+02</u>	<u>2.3E+02</u>	<u>1.8E+02</u>	<u>1.1E+02</u>	<u>6.9E+01</u>

- Notes:
- Doses exceeding PAGs are underlined.
 - Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
 - Intermediate-Phase PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
 - *** indicates values less than 1 mrem
 - To view all values - use Detailed Results | Numeric Table
 - Total EDE = CEDE Inhalation + Cloudshine + 4-Day Groundshine
 - Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine





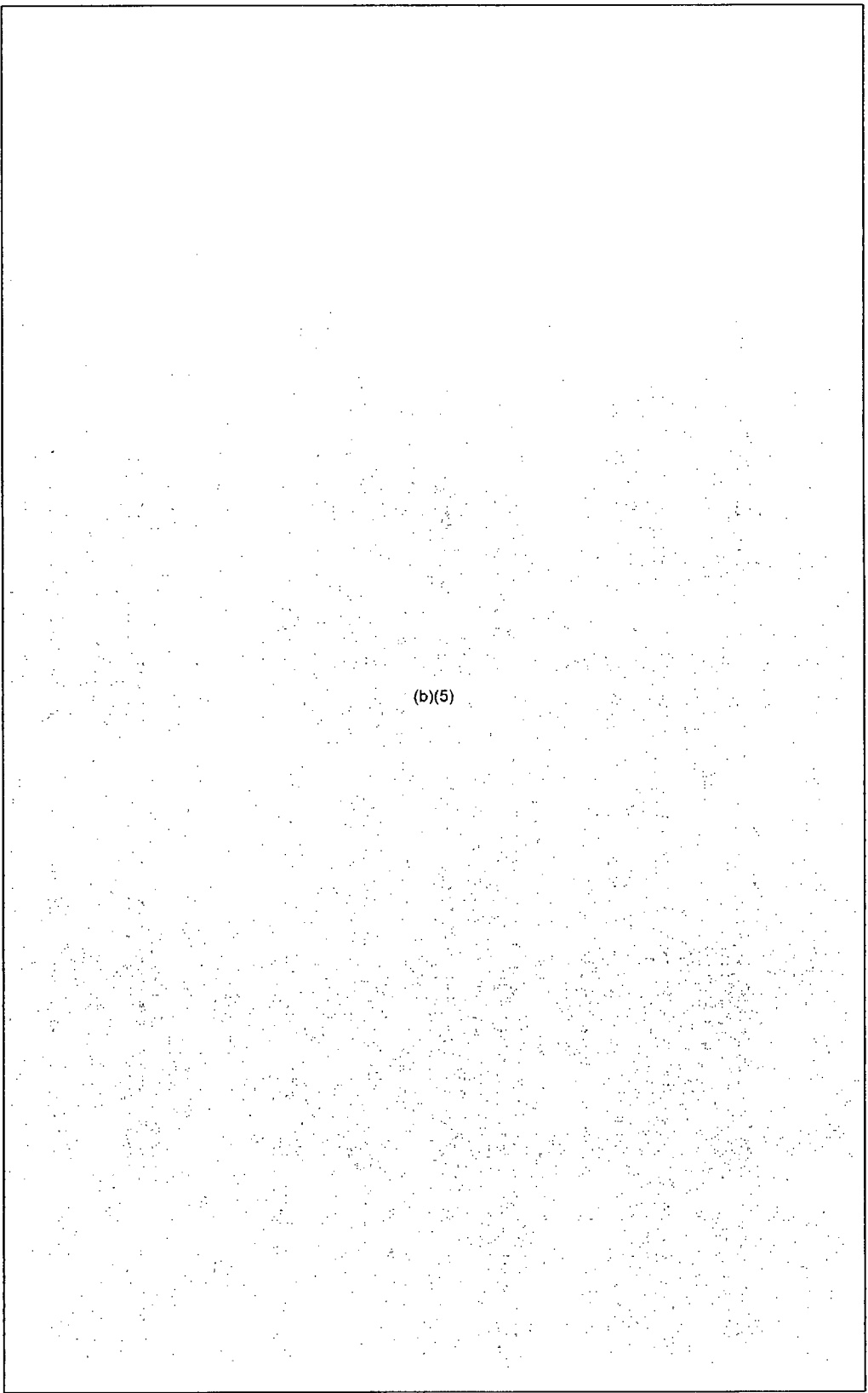
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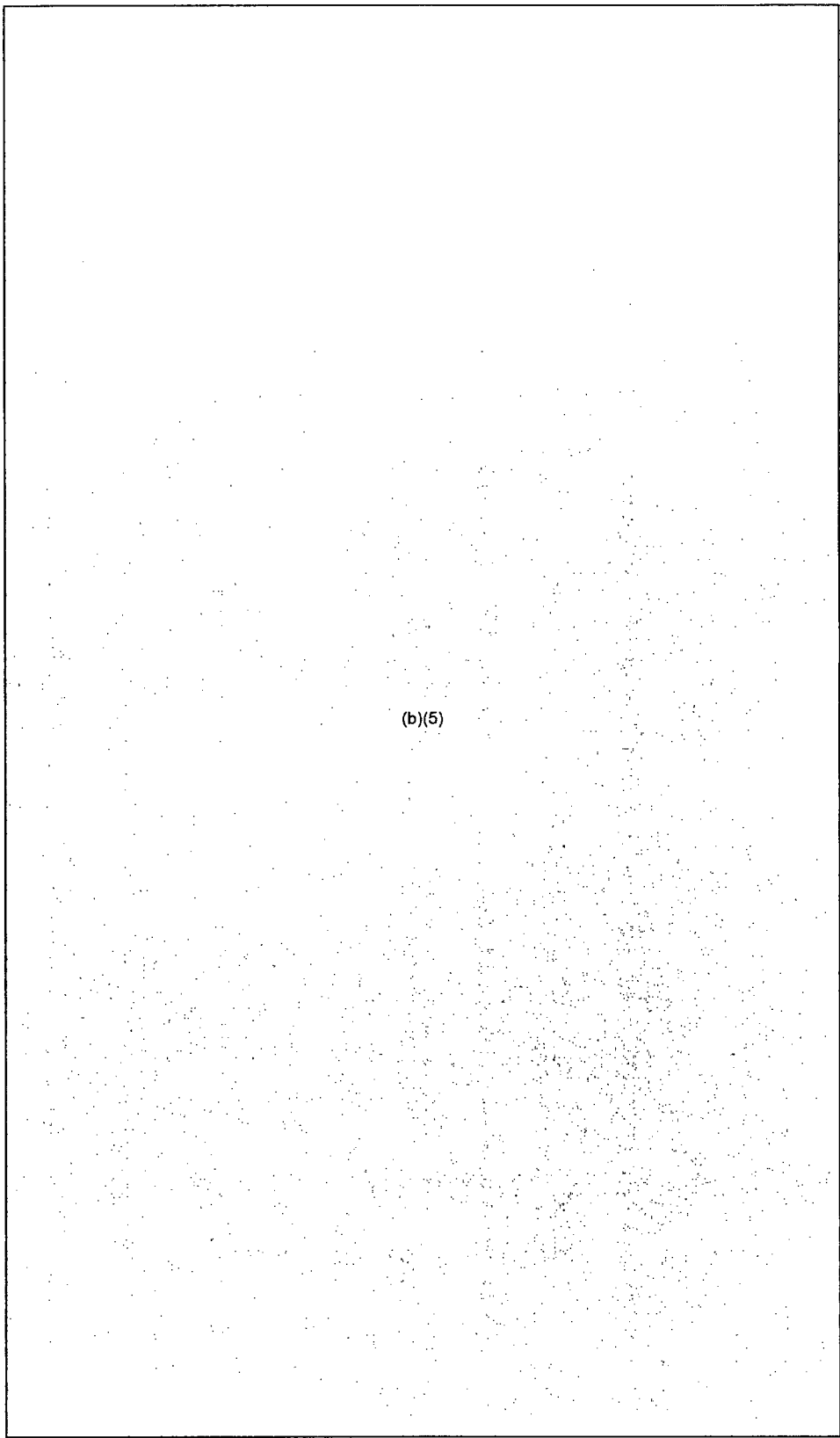
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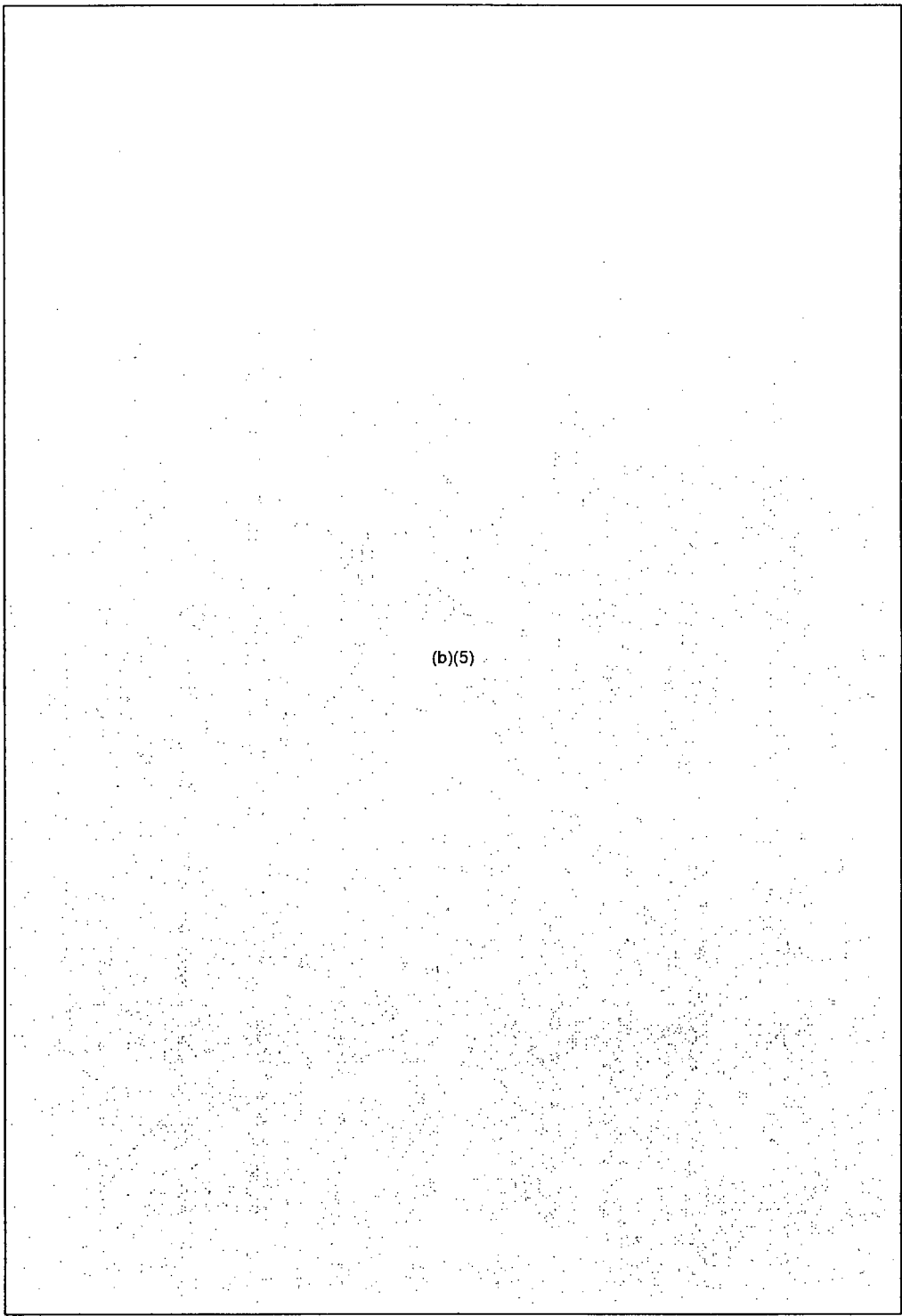
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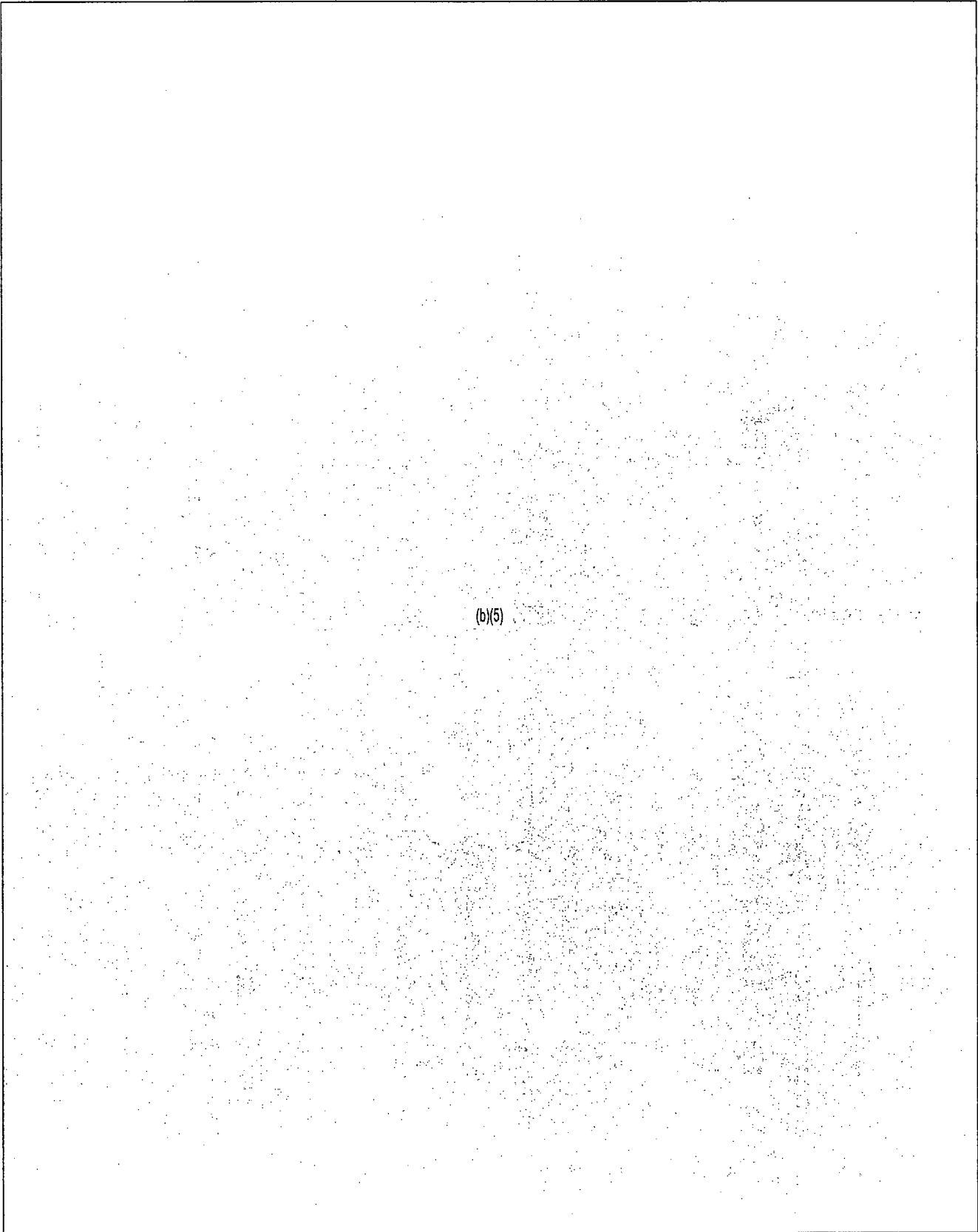
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**Discussion of the MARCH 16, 2011 PRESS RELEASE DOSE ASSESSMENT
ASSUMPTIONS**

There are two dose assessments attached to the March 16th press release. Both assessments are worst case hypothetical, computer model analyses of consequences for releases from the Fukushima site. The first assessment assumed a Unit 2 reactor 100% core melt as an unfiltered release from a totally failed containment and actual meteorological conditions during early morning hours of the date indicated. The low dispersion characteristics included low wind speeds, relatively stable air, and light precipitation.

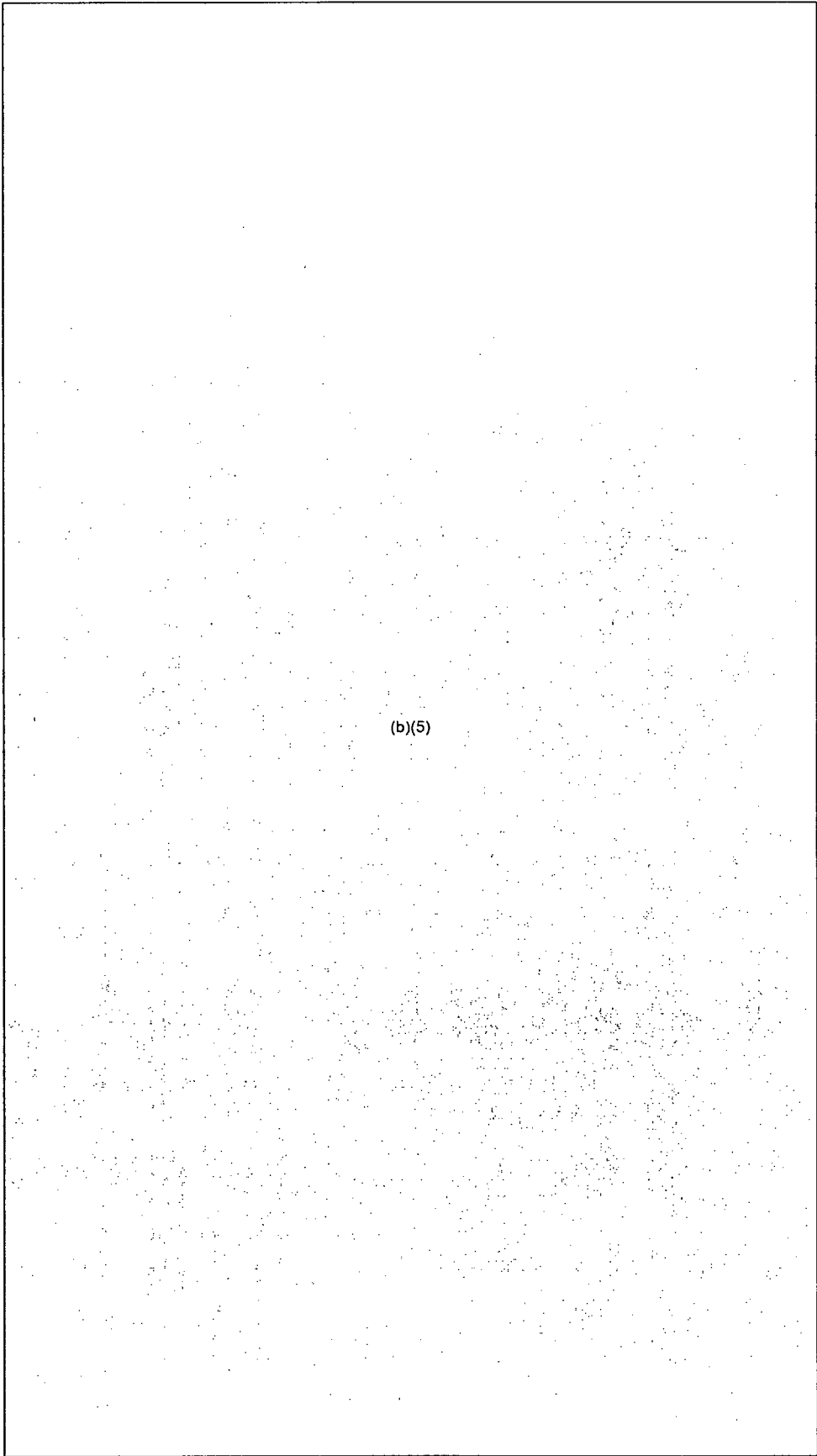
The second assessment represented multiple unit failures: 1) Unit 2 with 33% reactor core damage; 2) Unit 3 spent fuel pool with 50% damage (with 180 bundles of spent fuel discharged 105 days ago) ; and 3) Unit 4 spent fuel pool with 100% damage (with 550 bundles of spent fuel discharged 30 days ago) . To account for the combined inventories of the three units, the staff adjusted the reactor power level, fuel burnup and number of assemblies in the calculation. The meteorological conditions for the second assessment also assumed actual conditions, but no precipitation, greater wind speeds, and less stable atmospheric conditions, result in greater atmospheric dispersion. In addition, the source term included two additional days of decay before release. For the multi-unit assessment, the increased decay time before release and the greater atmospheric dispersion significantly reduced the resultant dose estimate.

Although the dose projections for the first assessment are somewhat higher than the second assessment, the differences in the modeling assumptions did not affect the overall conclusion that protective action guides would be exceeded beyond fifty miles. Both assessments are highly speculative, given the lack of actual (representative) site data and assumed no mitigation of the current situation at the time of the press release.

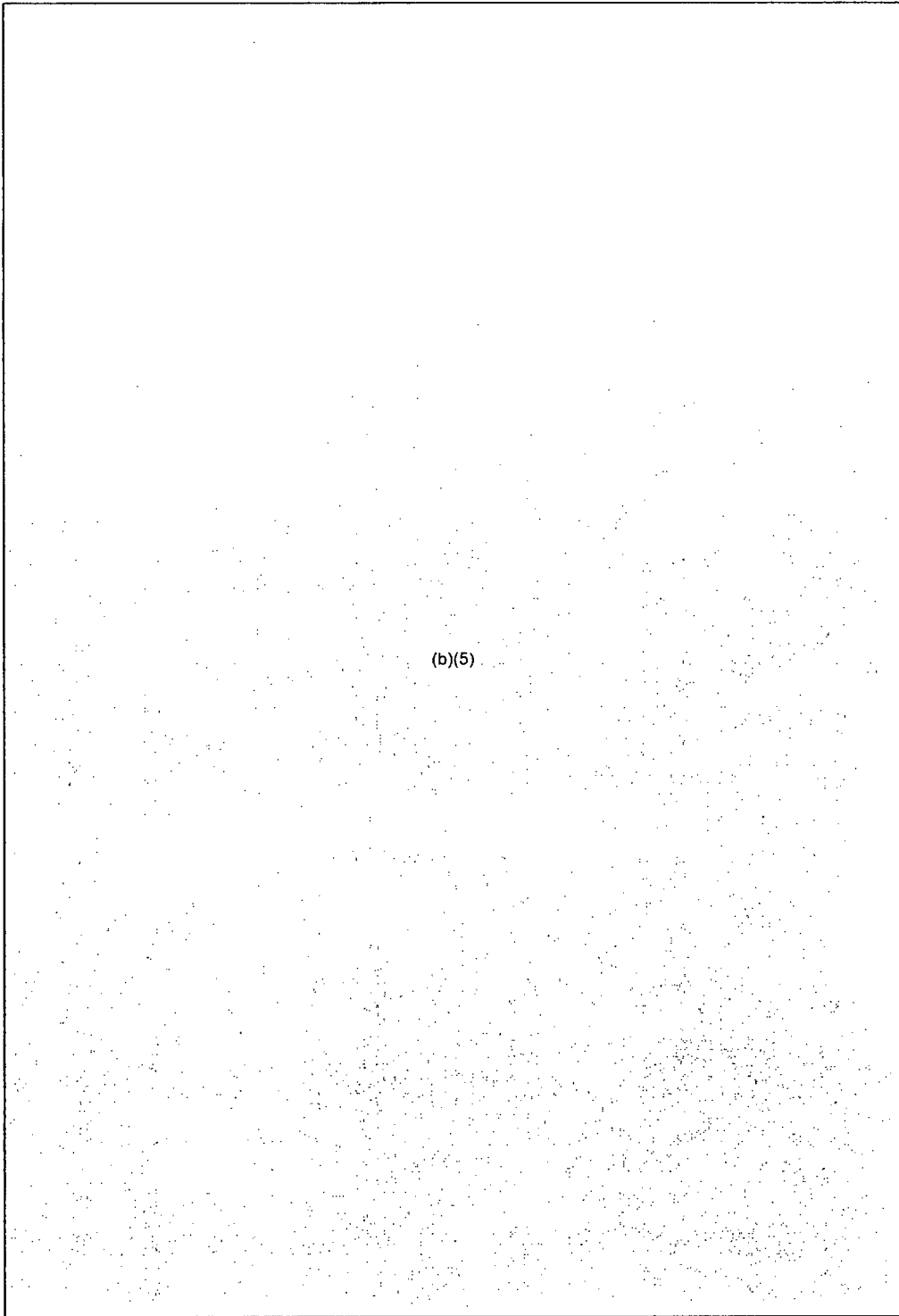
Although there is postulated reactor core damage in Unit 1 and Unit 3, the primary containment structure is reported to be intact.

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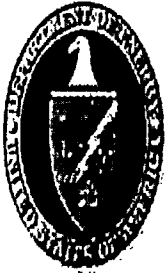
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Japan Earthquake Response

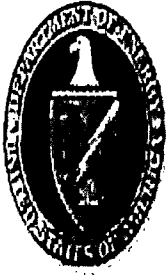
April 6, 2011 // 0600 EDT





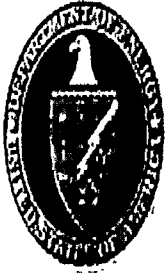
**This information is for limited
distribution to those with a
NEED TO KNOW
and should not be forwarded outside
your agency or organization without
prior clearance from U.S. DOE**

**Contact: DOE/NNSA Nuclear Incident
Team: NITOPS@nnsa.doe.gov**



Current Status

- ◇ Radiation levels continue to fall at Fukushima Daiichi complex
- ◇ Reactors 1-4 and spent fuel pools generally stable and continue to receive fresh water injections (see text SITREP for detailed info)
- ◇ Two 70 foot Putzmeister concrete pumps expected to arrive in Tokyo by end of week
- ◇ TEPCO reports that crack in concrete shaft near Reactor 2 was sealed using silica-based polymer and no longer leaking radioactive water into Pacific.
- ◇ Water Storage and Disposal:
 - ◇ TEPCO continues to discharge lower-level radioactive waste water into the ocean
 - ◇ Planning continues to ship 5 Savannah River Site storage tanks and high activity trailer



DOE/NNSA Emergency Response

◆ **Command, Control, Coordination:**

- **Nuclear Incident Team (NIT):** Coordinating overall emergency response
- **Policy Working Group (PWG):** Coordinating overall policy
- **Senior Energy Official:** Primary Manager of deployed field teams
- **Liaisons:** DART, USPACOM, USAID, NRC

◆ **Modeling**

- **National Atmospheric Release Advisory Center (NARAC):** conducting predictive radioactive atmospheric dispersion modeling

◆ **Monitoring and Sampling**

- **Consequence Management Response Team (CMRT):** Conducting ground monitoring, air sampling and initial results analysis
- **Aerial Measuring System (AMS):** Conducts aerial detection for mapping radiological ground material deposits
- Currently 3 platforms: 1 Fixed, 2 Rotary

◆ **Assessment**

- **Consequence Management Home Team (CMHT):** Scientific assessment of data updated daily from ground measurements and AMS flights

◆ **Medical Consultation**

- **Radiation Emergency Assistance Center/Training Site (REAC/TS):** Providing medical advice about radiological exposure

Deployed* (31)

Yokota AB

- (1) SEO
- (1) SEO Staff
- (18) CMRT
- (7) AMS

US Embassy Tokyo

- (3) DART LNO

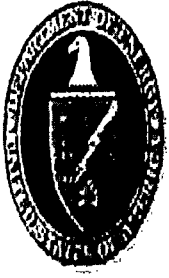
USPACOM HQ

- (1) LNO

Upcoming personnel changes:

Several personnel enroute to/from Japan 3-6 April.

**The number deployed does not currently reflect DOE/NNSA personnel assisting in nuclear energy (NE) aspects of the response.*



Significant Events: Past 24 Hrs.

International Engagement:

- ◇ Briefed Ambassador Roos, Admiral Walsh, Assistant Secretary Lyons and separately MOD delegation on DOE CM and AMS capabilities
- ◇ Coordinated with and seeking approval from MEXT and MOFA on unattended Early Warning System deployment locations
- ◇ Bilateral aerial monitoring operations began today with MEXT and AMS calibration flight
- ◇ Coordinated with MAFF on identification of soil sample shipment logistics
- ◆ 2 High Purity Germanium (HPGe) arrived in Japan to loan to GOJ

Nuclear Incident Team:

- ◆ Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, DIA, NCMI, and WH
- ◆ Continued coordination of rotation for deployed personnel



Significant Events: Past 24 Hrs.

Operations:

- ◆ Modeling
 - NARAC: Continued work on products normalizing NARAC models to measurements taken in the field. Preliminary assessment of time correlated deposition and further assessment of dose rate measurements correlated to actual weather patterns
- ◆ Field Monitoring and Assessment
 - AMS UH-1: Flew from the Fukushima Daiichi plant south to the 30 km line along the coast
 - AMS C-12: Did not fly today
 - No ground monitoring teams today due to personnel turnover
 - Continued monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokuska Naval Base
- ◆ Medical Consult
 - Nothing substantial to report



Data Inputs

♦ Monitoring

- 262* hours total flying time for Aerial Measuring System (AMS) fixed and rotary-wings
- Approximately 100,000 total field measurements taken by DOE, DoD, and GOJ fixed stations and deployed teams

♦ Sampling

- 240 total air samples taken at US facilities throughout Japan undergoing lab analysis in US
- 1 US soil sample at LLNL for lab analysis

<u>Organizations Providing Data</u>	
•	Consequence Management Response Team
•	CMRT
•	AMS
•	AFRAT
•	External US
•	Japan Emergency Command Center, US Embassy, Tokyo
•	USAF, BSC Commander
•	USAF, WC-135 Constant Phoenix
•	Futenma Marine Corps Air Station
•	Nuclear Regulatory Commission
•	Naval Reactors
•	Japan
•	Ministry of Foreign Affairs (MOFA)
•	Nuclear Safety Technology Center (NUSTEC)
•	Tokyo Electric Power Company (TEPCO)
•	Ministry of Agriculture, Forestry and Fisheries (MAFF)
•	Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
•	Ministry of Health, Welfare and Labor
•	Nuclear and Industrial Safety Agency (NISA)
•	Nuclear Safety Commission

*Effective 5 April 2011 flight hours have been re-calculated to reflect total time on mission to include fuel stops



Guide to Interpretation

US EPA Derived Response Levels (DRLs) for Evacuation and Relocation

■ Early Phase DRL

If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated by red.

□ First Year DRL

If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated by orange.

Fifty Year DRL

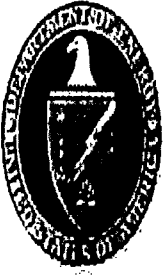
If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area falls within the second year DRL.

Second Year DRL

If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated by yellow.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years).



Guide to Interpretation

Areas at Risk for Agricultural Contamination

Aerial measurements can indicate areas where agricultural monitoring and sampling should occur, although they cannot directly determine the amount of contamination of agricultural products grown in these areas.

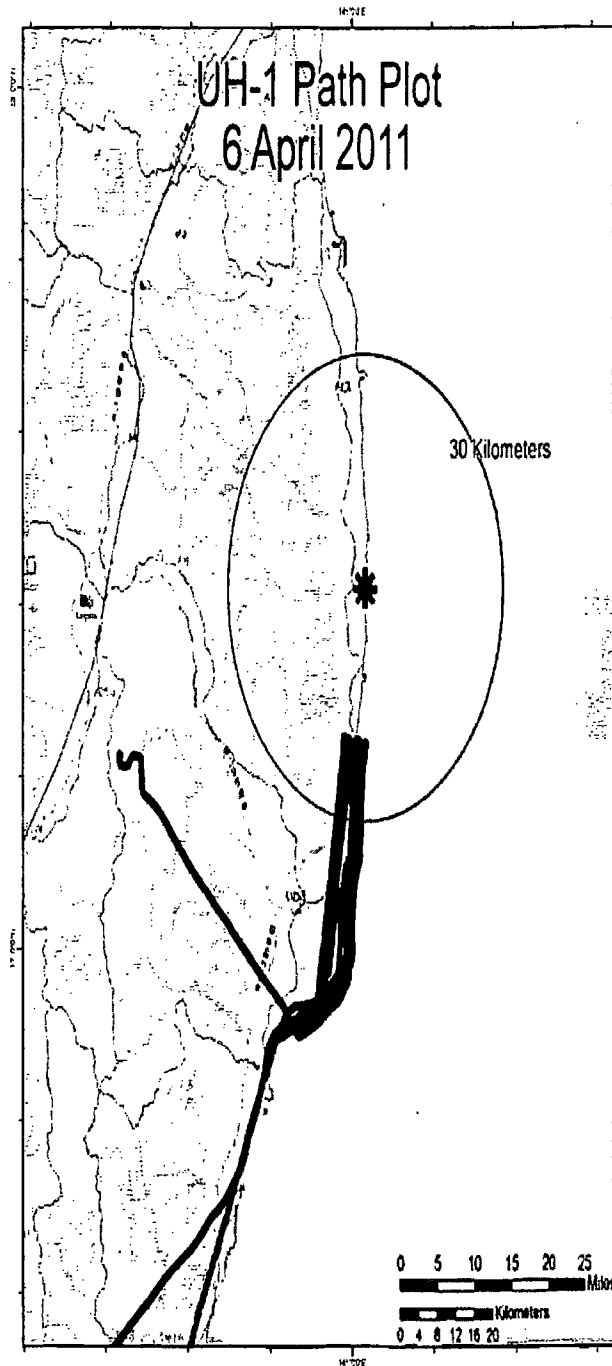
AMS monitoring results in areas beyond 25 miles from the Fukushima Daiichi reactors show areas where dose rates are many times higher than historical background.

The measured external dose rates in these areas are not high enough to warrant evacuation or relocation of the population, however, lower levels of radioactive contamination in agricultural products provide more of a risk because the radioactive material can be ingested into the body. Agricultural monitoring in these areas may be warranted.

- ◆ Areas 10 to 100 times historical background are indicated by green.
- ◇ Areas 2 to 10 times historical background are indicated by light blue.
- ◆ Areas at or near historical background are indicated by dark blue.



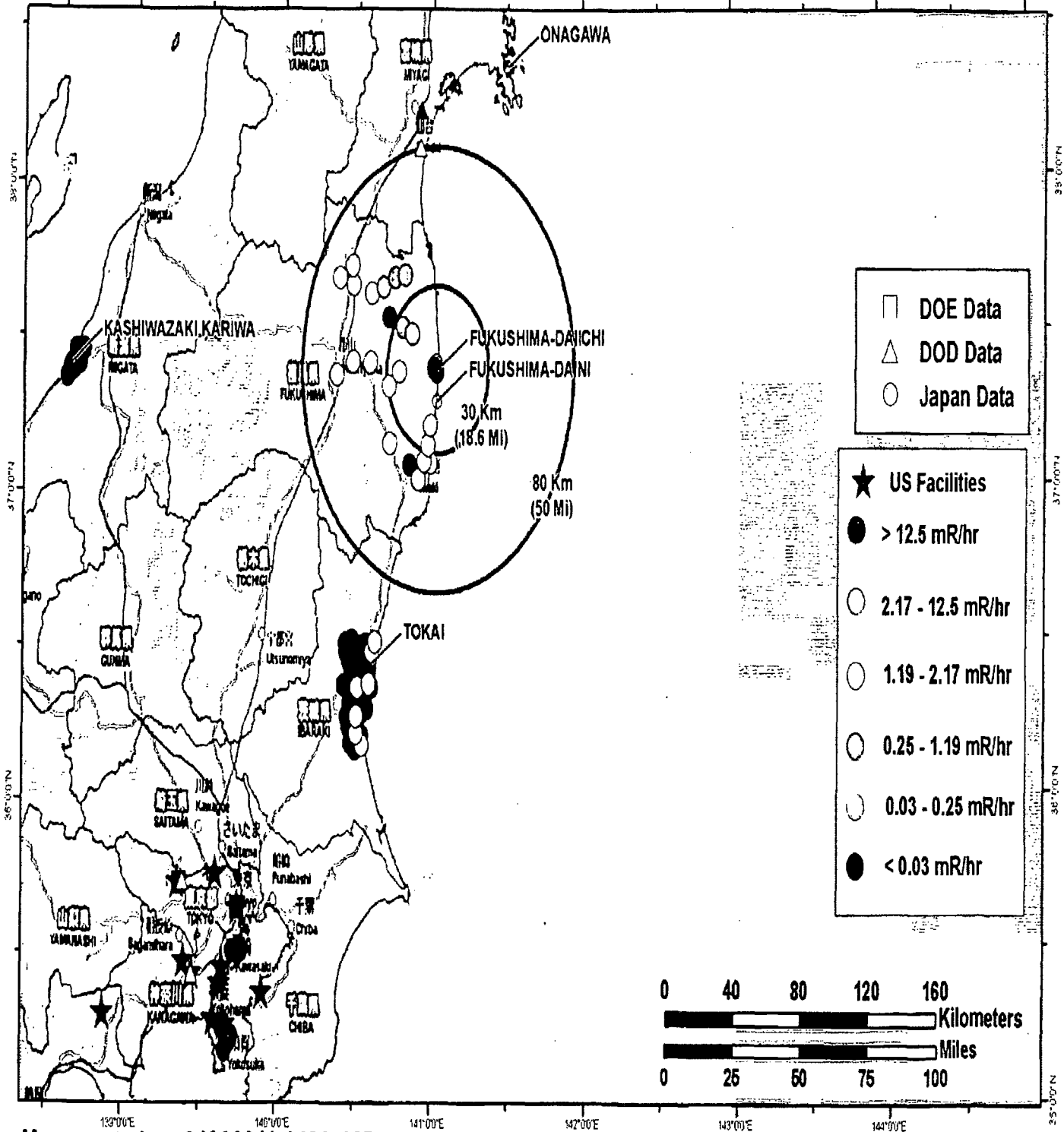
Flight Path





Field Monitoring Results April 5 13:00 to April 6 13:00 JST

FUKUSHIMA DAICHI JAPAN



Map created on 04062011 1400 JST
Name: NIT 24hrsMonitoringResults 05Apr2011 1300

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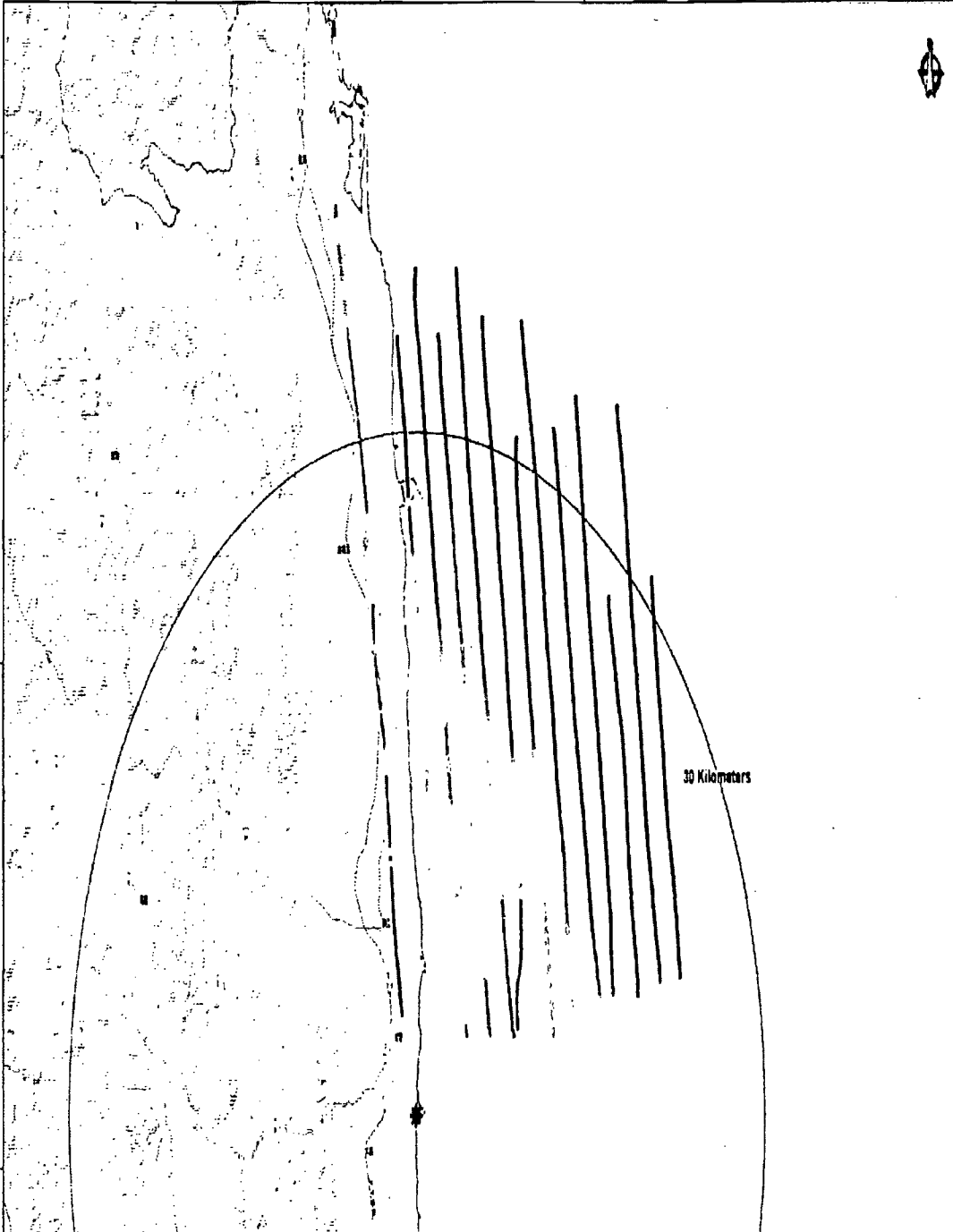
Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100



Aerial Monitoring Results

C-12 Survey Date - 05 April 2011

FUKUSHIMA DAIICHI
JAPAN



Detector Response

Ratio to Nominal Background

- 0.93 - 2.50
- 2.50 - 4.50
- 4.50 - 5.00
- 5.00 - 8.00
- 8.00 - 25.00
- 25.00 - 50.00

Technical Considerations and Notes:
 This product represents gross response from all radionuclides. The nominal background level for C-12 surveys was taken from data at 5000 feet above ground level. This is due to a combination of factors, including the altitude of the aircraft and the detector response to the terrain. The data product is the count rate for the survey area.

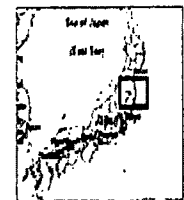
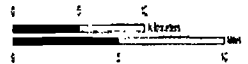
Not For Public Distribution

Right Information:
 C-12 Survey Area at 5000 Feet Above Ground Level, Survey 140 Area
 Survey Flight Data from AEC-101

This map was produced by the Geographic Information Systems department at NNSA's Remote Sensing Laboratory (RSL) at Nellis AFB, Las Vegas, Nevada. HSP Grid 2010, ESH World Street Map, and CHRT databases were used for map generation.

RSL map identification number is
 C12_A011 and

1:125,000



Map created on 4/06/2011 02:00:00 PM JST
 Check for revision in 12 hours

UNCLASSIFIED

Nuclear Incident Team DOE NT
 Contact (202) 686 - 8100

UNCLASSIFIED



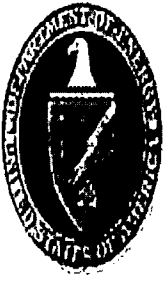
Forecasted Weather April 6-7, 2011

04/06/2011 20:00:00 JST

04/07/2011 00:00:00 JST

04/07/2011 17:00:00 JST





Planned Operations: Next 24 Hrs

◆ Aerial Monitoring

- AMS UH-1: Continue flying from Fukushima Daiichi plant south to 30 km line along the coast.
- AMS C-12: Fly west of Fukushima Daiichi plant between 40-60 km. Flight plan coordinated with MEXT.
- Future flights will be coordinated with MEXT. All areas inside 80 km from plant will be surveyed from 6-12 April. AMS will fly inside the 60 km line; MEXT will fly outside the 60 km line

◆ Ground Monitoring

- Complete beta/gamma exposure rate surveys. Radio nuclide evaluations are to include in-situ measurement assessment of gamma isotopes.
- Continue monitoring activities at the US Embassy Japan and Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokosuka Naval Base.
- Continuing work to implement the Early Warning Array utilizing Infields and SMC.

Severe Accidents and the Melcor Code

Background

The risk to the public from nuclear power generation arises if an accident progresses to the point at which fuel degradation occurs, and large quantities of radioactive materials are released into the environment. The NRC has invested heavily in the investigation of severe reactor accidents and has developed computer codes for the analysis of severe accident phenomena and progression. Expertise on severe accident phenomenological behavior and a quantitative predictive capability for simulating the response of nuclear power systems to severe accidents are essential to the NRC's mission. The role of such expertise and analytical capability is potentially wide ranging in the regulatory environment, which includes the transition to a more risk-informed regulatory framework and to the study of vulnerabilities of nuclear power plants. MELCOR represents the current state of the art in severe accident analysis, which has developed through NRC and international research performed since the accident at Three Mile Island in 1979.

Objective

The objective of this research is to maintain NRC staff expertise on severe accident phenomenological behavior and a computer code for analysis of nuclear power plants' response to severe accidents.

Approach

The MELCOR code is a fully integrated, engineering-level computer code whose primary purpose is to model the progression of postulated accidents in light-water reactors (LWRs), as well as in nonreactor systems (e.g., spent fuel pool (SFP) and dry cask). MELCOR is a modular code consisting of three general types of packages: (1) basic physical phenomena (i.e., hydrodynamics—control volume and flowpaths, heat and mass transfer to structures, gas combustion, aerosol and vapor physics), (2) reactor-specific phenomena (i.e., decay heat generation, core degradation and relocation, ex-vessel phenomena, engineering safety systems), and (3) support functions (i.e., thermodynamics, equations of state, material properties, data-handling utilities, equation solvers). These packages model the major systems of a nuclear power plant and their associated interactions (see Figures 3.2. and 3.3). MELCOR 1.8.6 (Fortran 77) was released in September 2005; the code modernization effort resulted in the release of MELCOR 2.0 (Fortran 95) in September 2006. The latest version (MELCOR 2.1) was released in September 2008.

Current activities will include development and implementation of new and improved models to predict the severe accident behavior of advanced non-LWR reactor designs.

Severe accident competency is needed to evaluate new generic severe accident issues and to address risk-informed regulatory initiatives and operating reactor issues associated with plant changes, as in the case of steam generator tube integrity. Licensees will continue to pursue plant modifications that require assessment of incremental risk impacts that will necessitate analysis of phenomena related to severe accidents.

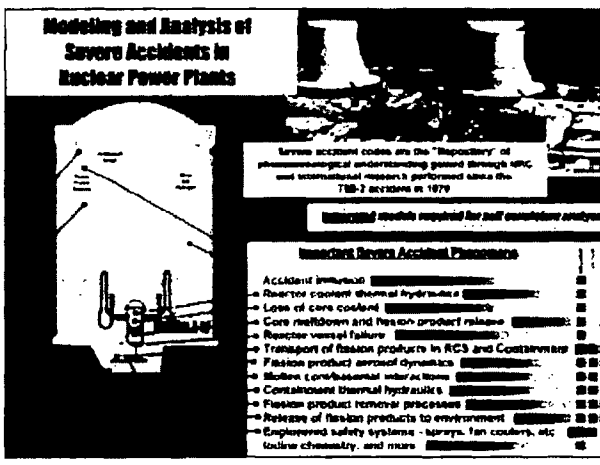


Figure 3.2 MELCOR modeling capabilities

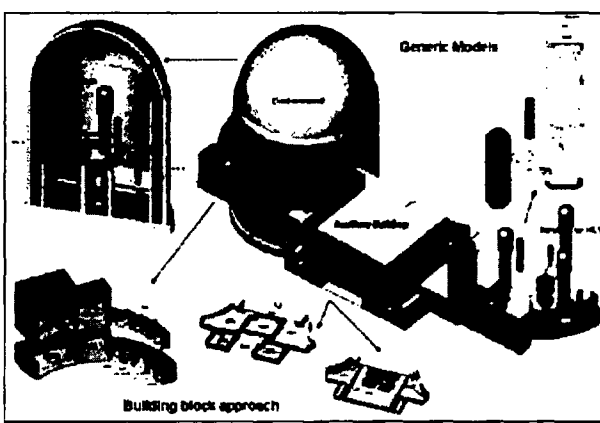


Figure 3.3 MELCOR plant modeling approach

Applications

The improved understanding of phenomenological behavior and modeling in severe accidents and their implementation in MELCOR directly impacted the analytical methods and criteria adopted for design-basis accidents (e.g., source term research and the revised source term). The development of best-estimate severe accident models in the future is expected to improve the licensing evaluation models. The development of best-estimate

models reveals, quantitatively, margins in existing models. Activities associated with the development, assessment, and applications of MELCOR include the following:

- safety analysis and risk decisionmaking
 - revision of the NRC's alternative source term (NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," issued February 1995) for high-burnup fuel and mixed-oxide (MOX) fuel
 - new reactor certification (Advanced Passive 1000 Megawatt (AP1000), Economic Simplified Boiling-Water Reactor (ESBWR), U.S. Evolutionary Power Reactor (EPR), U.S. Advanced Pressurized-Water Reactor (U.S. APWR), Advanced Boiling-Water Reactor (ABWR))
- experimental analyses and code validation activities
- nuclear power plant beyond-design-basis accidents
- aerosol transport and deposition in steam generators during bypass accidents
- risk of steam generator tube rupture induced by a severe accident
- effects of air ingress on fission product release
- vulnerabilities of SFP to accidents
- state-of-the-art consequence analysis

National laboratories, universities (e.g., Texas A&M), and international organizations (e.g., Paul Scherrer Institute in Switzerland) are involved in the MELCOR code development effort.

A Symbolic Nuclear Analysis Package (SNAP) plug-in has been developed for MELCOR, and the integration of MELCOR and SNAP provides a more user friendly system for input deck preparation and accident simulation. The accident simulation models for new reactor designs, including the EPR (see Figures 3.4 and 3.6), ABWR (see Figure 3.5), U.S. APWR, AP1000, and ESBWR, are

under development. The models run in severe accident and design-basis accident modes (containment peak pressure and source term). The models provide a convenient display system for the user to define an accident sequence by introducing system malfunctions (e.g., loss-of-coolant accident (LOCA)) and controls (e.g., emergency core cooling system (ECCS)) to mitigate the consequences of the accident. In addition, the user can visually see the progression of an accident (e.g., core heatup and degradation) as the calculation is progressing. The following figures illustrate examples of the simulation models for the EPR and ABWR, including core degradation and available system interfaces.

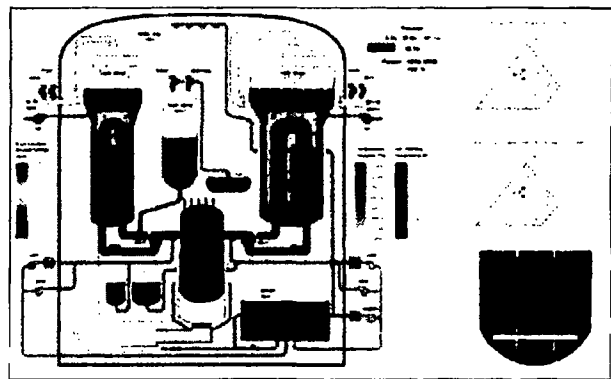


Figure 3.4 EPR simulation model

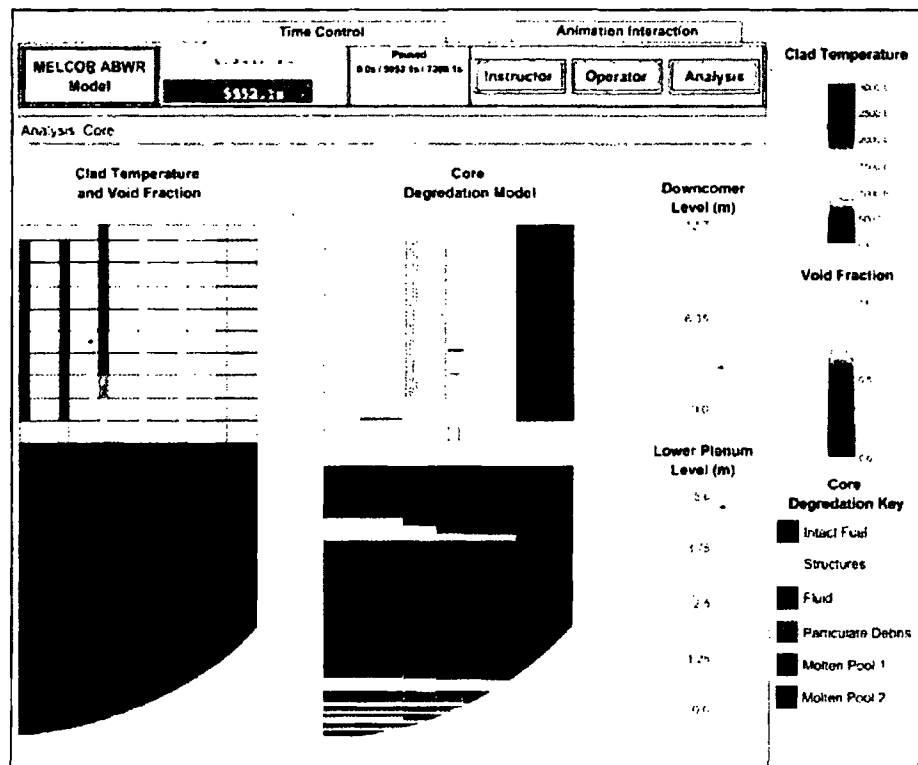


Figure 3.5 ABWR core heatup and degradation

Malfunctions			
LOCAe			
Inactive	Surge the heat heat hot leg	Intermediate	Or at time = 1.0E10 seconds
Inactive	Cold leg break	Intermediate	Or at time = 1.0E10 seconds
Inactive	Hot leg break	Intermediate	Or at time = 1.0E10 seconds
Inactive	Manufacturing system LOCA	Intermediate	Or at time = 1.0E10 seconds
Inactive	SMCL loop R-3TR	Intermediate	Or at time = 1.0E10 seconds
ECCS failures			
Inactive	SMCL loop MED head by pump unavailability	Intermediate	Or at time = 1.0E10 seconds
Inactive	SMCL loop LOW head by pump unavailability	Intermediate	Or at time = 1.0E10 seconds
Controls			
ECCS			
0.00e+00 hp	SMCL loop MED head injection flow demand	1.0 hrs. of rated	
0.00e+00 hp	SMCL loop LOW head injection flow demand	1.0 hrs. of rated	
Primary Depressurization System			
Inactive	Manual actuation of PDS Valve #1	Intermediate	Or at time = 1.0E10 sec
Inactive	Manual actuation of PDS Valve #2	Intermediate	Or at time = 1.0E10 sec

Figure 3.6 EPR user interface model

International Collaborations

The following examples of international collaborations resulted in MELCOR improvements:

- NRC Cooperative Severe Accident Research Program (CSARP)
- MELCOR Code Assessment Program (MCAP)
- Phébus-Fission Products (Phébus FP), VERCORS (a French test program), and follow-on program (Phébus-Source Term Separate Effects Test Project (STSET)), French Institute for Radiological Protection and Nuclear Safety (IRSN): This project investigates fission product releases and degradation of uranium dioxide (UO₂) fuel (including burnup greater than 40 gigawatt day per metric ton) and MOX fuel under severe accident conditions, and the effects of air ingress on core degradation and fission product release. Results are used to validate the NUREG-1465 source term and MELCOR code.
- German QUENCH experiment program to investigate overheated fuel.
- ARTIST, Paul Scherrer Institute (Switzerland): This project investigates experimentally the potential mitigation of radioactive material releases through the secondary side of a steam generator. Results from this research would allow the NRC to decide whether improved source term bypass models are needed.
- Molten Core Concrete Interaction Program, Organization for Economic Cooperation and Development (OECD) and Argonne National Laboratory (U.S.): This project consists

of separate effects experiments to further address the ex-vessel debris coolability issue. The results will be used to develop coolability models.

- Behavior of Iodine Project (BIP), Nuclear Energy Agency, Committee on the Safety of Nuclear Installations (France): Experimental investigations of iodine behavior in containment during conditions following a severe accident for computer code model development and validation. BIP addresses the uncertainties related to iodine behavior (especially with respect to iodine interactions with paints). Together with complementary testing at Atomic Energy of Canada Ltd. (AECL) and IRSN, this project advances and quantifies the state of the art on modeling of iodine behavior in the containment. Adequate modeling of iodine behavior is crucial in determining the need for pH control in containment sump. The proposed research will complement the ongoing IRSN projects of France Phébus-FP and follow-on program, Phébus STSET.

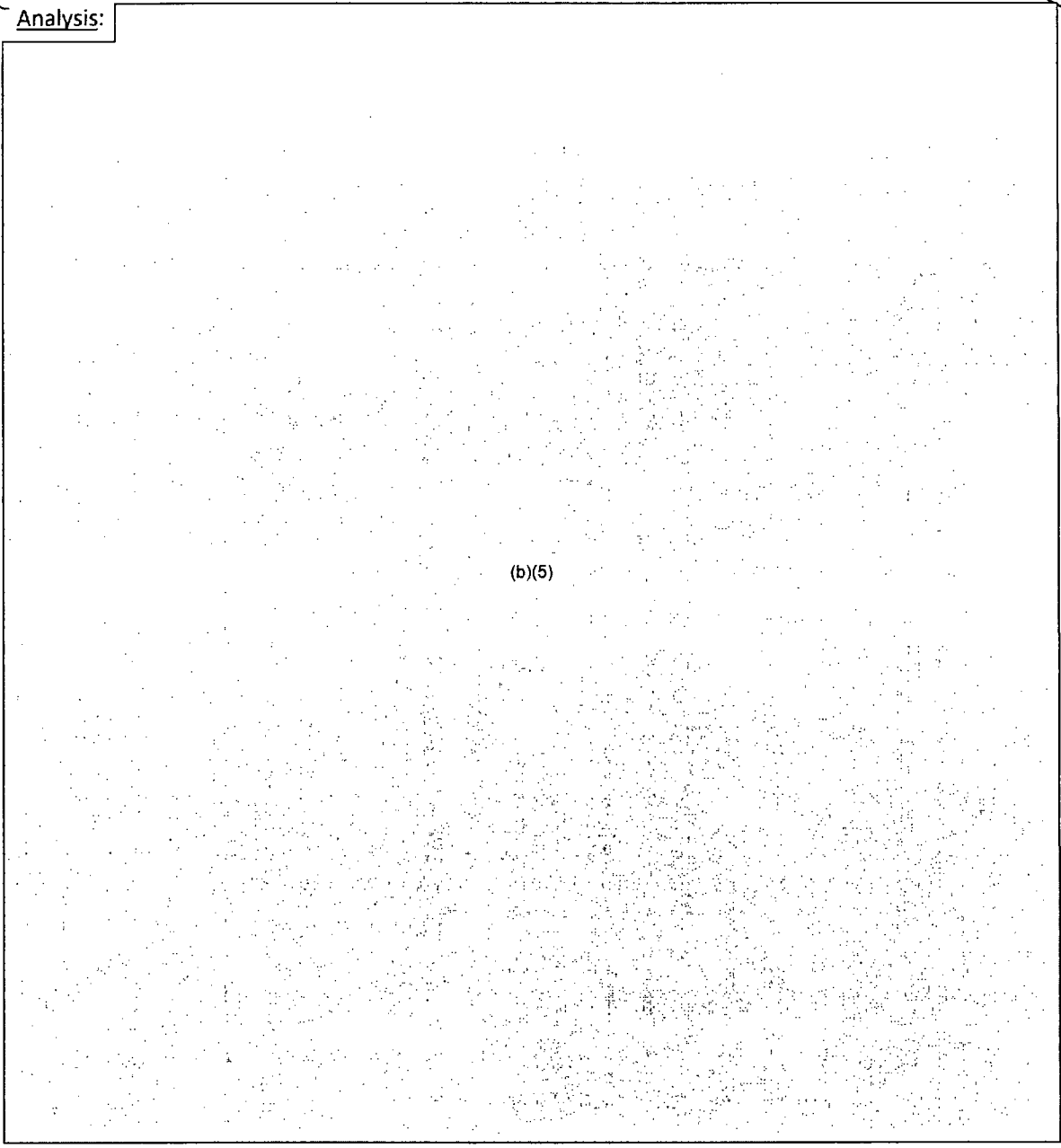
For More Information

Contact Hossein Esmaili, RES/DSA at 301-251-7554 or Hossein.Esmaili@nrc.gov

Response TO VINCE HOUGHTON
APR 11

BLUF: The Japanese provisional limit for water of 300 Bq/l of I-131 is not protective for children over one year of age and less than 18 years of age because the thyroid dose assumed by drinking water at the limit for even a limited period of time (less than 60 days) produces a thyroid dose in excess of the PAG when combined with the other pathways of exposure (air and food) likely to exist at the time when such a limit is reached.

Analysis:



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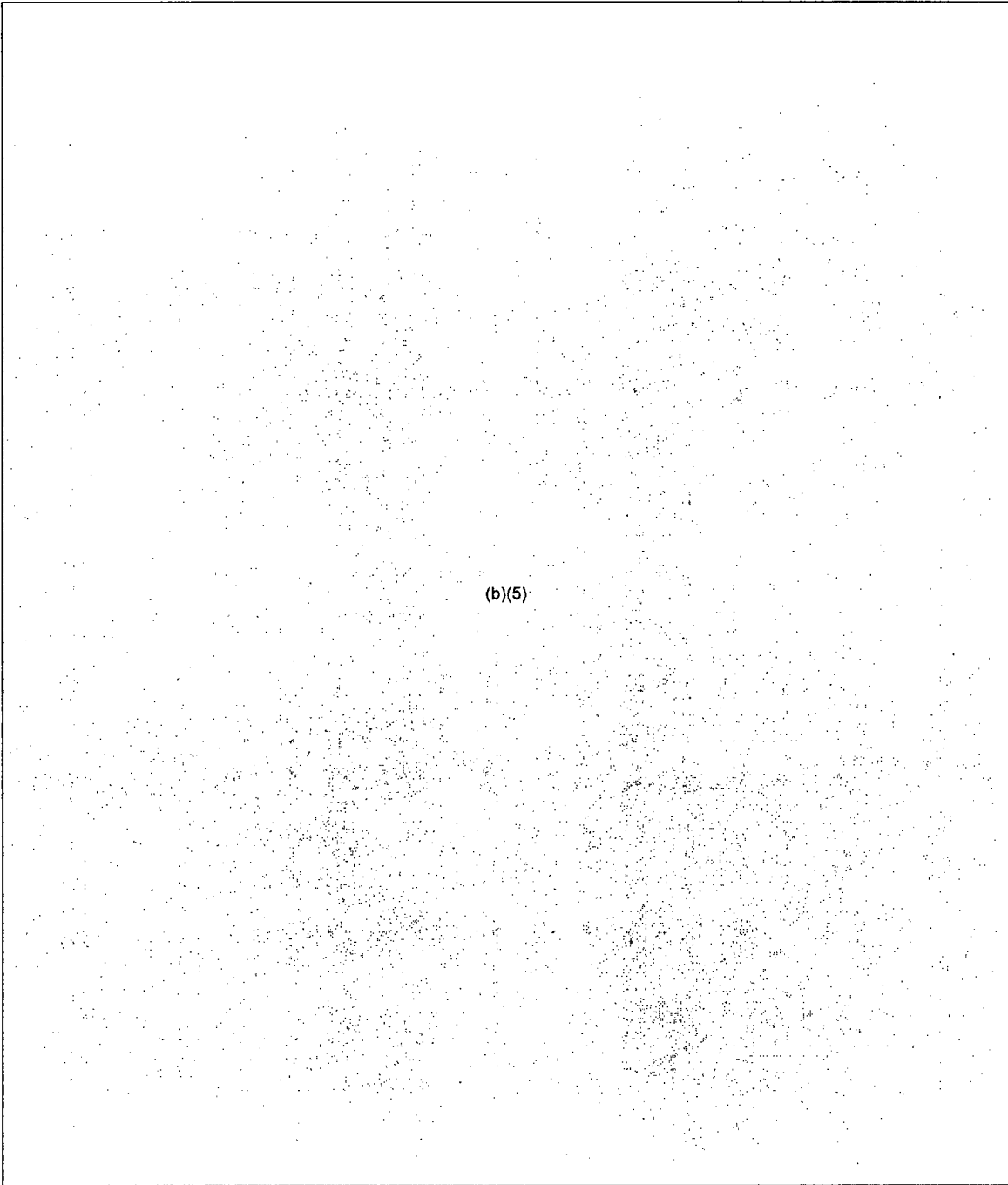
Official Use Only

The assessments and recommendations are based on the best available technical information. It is acknowledged that the information is subject to change and refinement.

Reactor Safety Team Assessment of the Fukushima Daiichi Unit 4 Spent Fuel Pool

Purpose: To review the April 19, 2011 Japan Nuclear Energy Safety Organization's (JNES's) assessment of the Fukushima Daiichi Unit 4 Spent Fuel Pool

Stakeholder: Japan Site Team

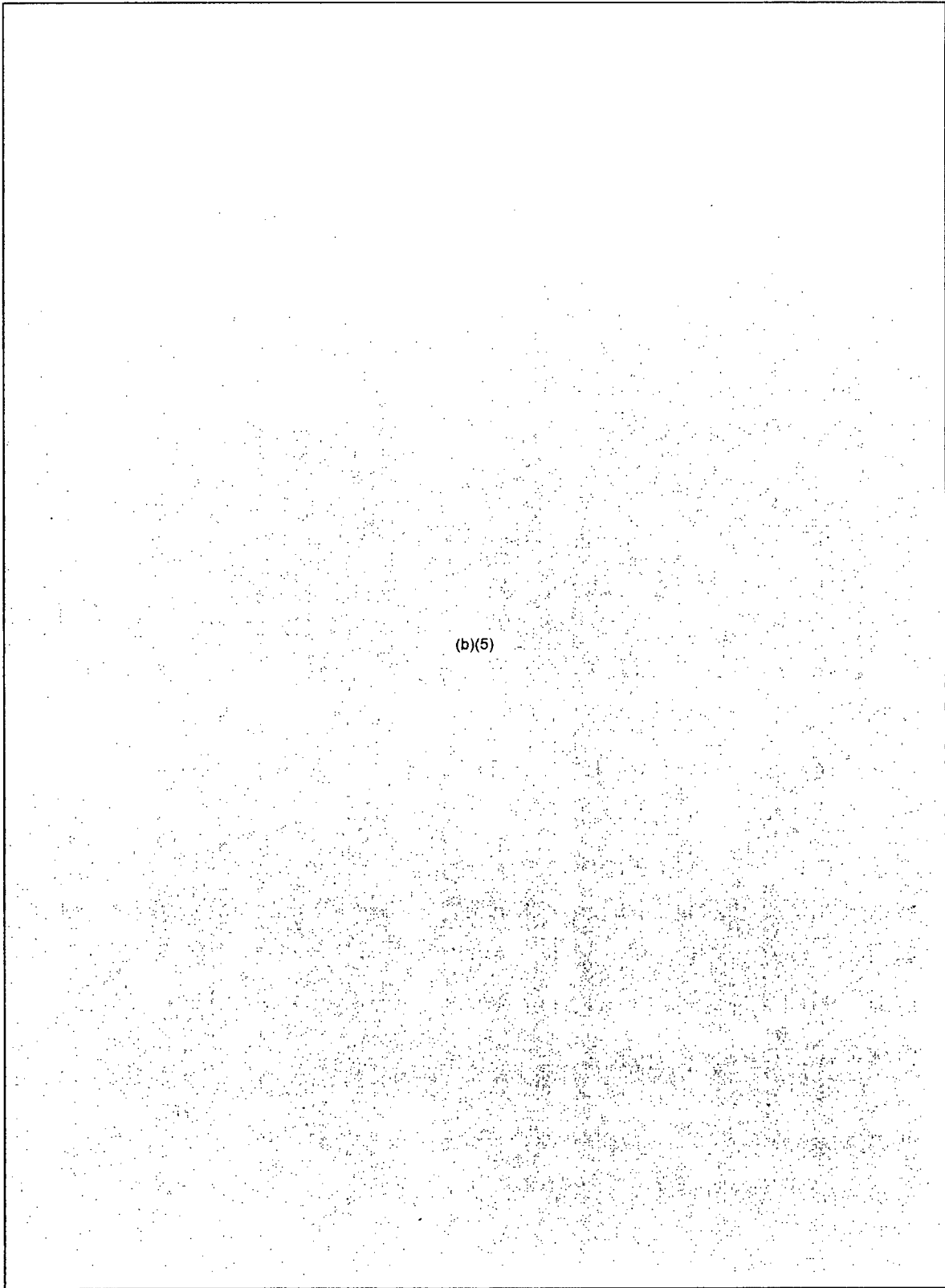


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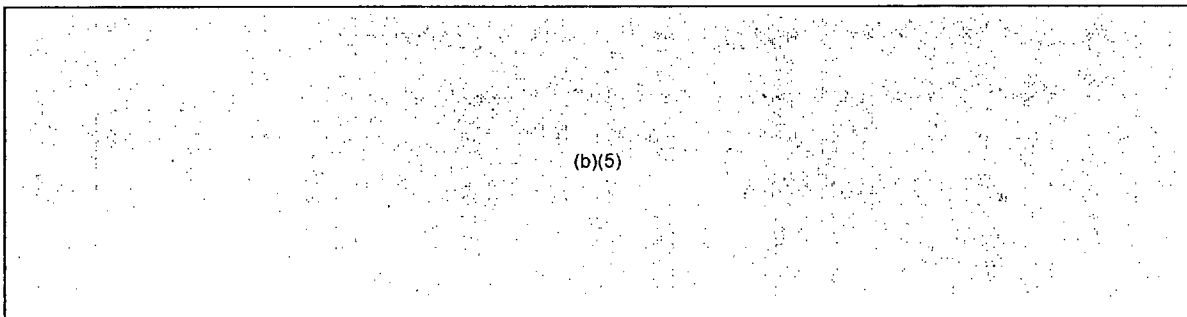
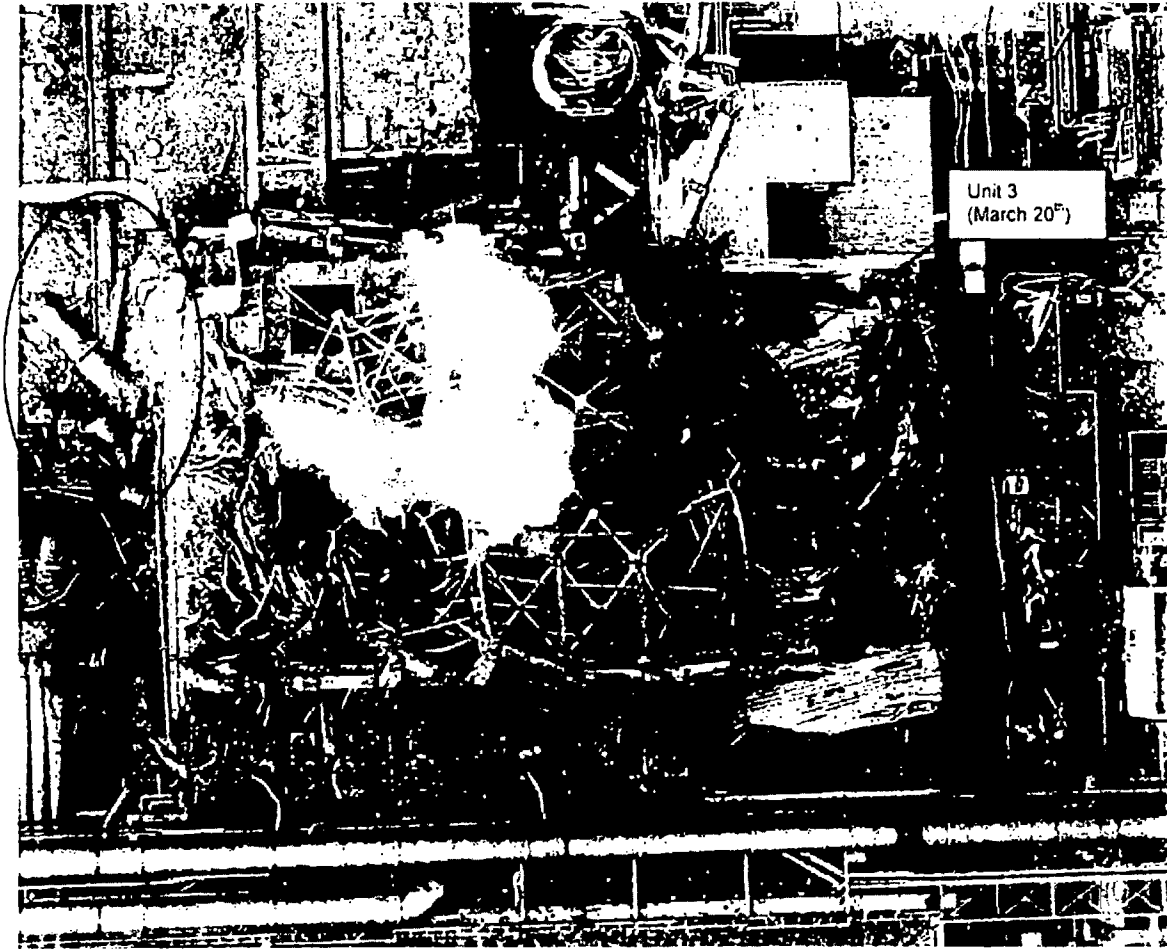
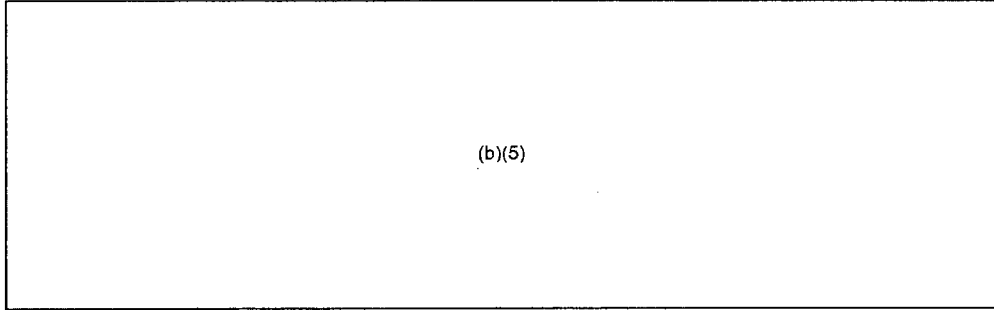
The assessments and recommendations are based on the best available technical information. It is acknowledged that the information is subject to change and refinement.



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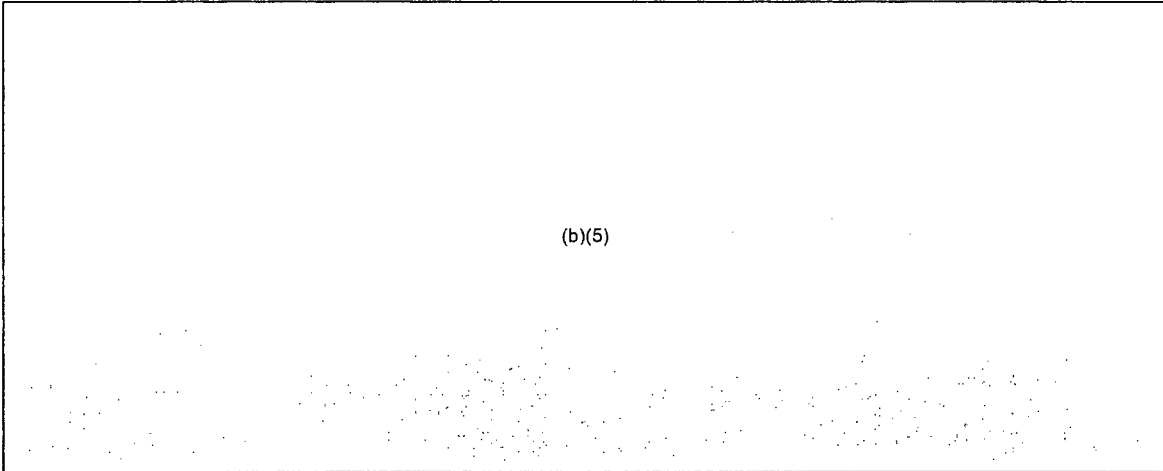
Official Use Only

The assessments and recommendations are based on the best available technical information. It is acknowledged that the information is subject to change and refinement.



Official Use Only

The assessments and recommendations are based on the best available technical information. It is acknowledged that the information is subject to change and refinement.



Special Hazards of Acetylene

Acetylene is the most common gas used for fueling cutting torches in both general industry and the mining industry. When mixed with pure oxygen in a cutting torch assembly, an acetylene flame can theoretically reach over 5700°F. Users of this type of equipment are generally familiar with the fire hazards associated hot flames and the production of hot slag. However, many users may not be aware of the unique characteristics of acetylene itself that create special hazards compared to other fuel gases.

Chemical Composition: An acetylene molecule is composed of two carbon atoms and two hydrogen atoms. The two carbon atoms are held together by what is known as a triple carbon bond. This bond is useful in that it stores substantial energy that can be released as heat during combustion. However, the triple carbon bond is unstable, making acetylene gas very sensitive to conditions such as excess pressure, excess temperature, static electricity, or mechanical shock.

Storage: Because of acetylene's unstable nature, it must be stored under special conditions. This is accomplished by dissolving the acetylene in liquid acetone. The liquid acetone is then stored in the acetylene cylinder, which in turn, is filled with a porous (sponge-like) cementitious material.

- NEVER ATTEMPT TO STORE OR INJECT ACETYLENE GAS INTO ANY TYPE OF VESSEL, TANK, OR ENCLOSURE. IMPROPERLY STORED ACETYLENE GAS IS UNSTABLE.
- ACETYLENE GAS REGULATORS SHOULD NOT EXCEED A SETTING OF 15 P.S.I.G.
- FLAME ARRESTORS AND CHECK VALVES SHOULD BE INSTALLED AT BOTH THE TORCH BASE HOSE CONNECTIONS AND AT THE REGULATOR HOSE CONNECTIONS.
- ACETYLENE CYLINDERS SHOULD BE PROPERLY SECURED AT ALL TIMES. MOVEMENT OF CYLINDERS SHOULD BE DONE WITH CARE. CYLINDERS SHOULD BE PROTECTED FROM FLAME OR HEAT.

When exposed to excess temperature, pressure, or mechanical shock, pure or less than pure acetylene gas can undergo a violent, explosive decomposition reaction. Additionally, if this reaction, or an ignition of acetylene occurs within the torch base or supply hose, it can propagate back into the storage cylinder causing it to explode violently.

Flammable range: Acetylene has a very wide range of flammability. The lower flammable limit (LFL) is typically listed as 2.5% and the upper flammable limit (UFL) is listed as 81%. Although acetylene will not undergo combustion at concentrations above the UFL, it can undergo an explosive decomposition reaction, even at concentrations of 100%.

- NEVER USE ACETYLENE OR ITS EQUIPMENT IN ANY WAY NOT CONSISTANT WITH RECOGNIZED GOOD PRACTICE.
- ALWAYS MAINTAIN ACETYLENE CUTTING EQUIPMENT IN PROPER WORKING CONDITION TO PREVENT INADVERTANT LEAKAGE OF ACETYLENE OR OXYGEN INTO THE SURROUNDING WORK ENVIRONMENT.
- WHILE STORAGE IN A HORIZONTAL POSITION DOES NOT MAKE THE ACETYLENE LESS STABLE OR SAFE, IT DOES INCREASE THE LIKELIHOOD OF SOLVENT LOSS, WHICH WILL RESULT IN A LOWER FLAME QUALITY WHEN THE CYLINDER IS USED. THEREFORE IT IS ALWAYS PREFERABLE TO STORE AN ACETYLENE CYLINDER IN AN UPRIGHT POSITION.

Acetylene gas is ignitable over a wide range of concentrations.

Ease of ignition: Acetylene is a very easy gas to ignite. In fact, the energy from a static spark capable of igniting acetylene is lower than for any other fuel gas except hydrogen. The ignition energy of acetylene in air is approximately seventeen times lower than that of methane. The static charge developed by walking across a carpet floor on a dry day can be 1700 times greater than that needed to ignite acetylene. When mixed with pure oxygen, the ignition energy of acetylene is almost 100 times lower than it is in air.

- NEVER DISCHARGE UNBURNED ACETYLENE GAS FROM A TORCH EXCEPT FOR THE NORMAL PROCESS OF LIGHTING THE TORCH.
- NEVER DISCHARGE UNBURNED ACETYLENE GAS FROM A TORCH INTO ANY TYPE OF CONTAINER OR VESSEL.

When unburned acetylene gas is discharged from a torch, static electricity can be generated at the torch tip. If the tip comes in contact with a ground path, a static spark capable of igniting the acetylene can occur.

Rate of combustion reaction: Because of its simple chemical make up and sensitive triple bond, acetylene burns at a very fast rate. This very fast burning rate can accelerate the rate at which pressure is generated in an explosion beyond what would occur for other fuels. This, in turn, can make acetylene explosions more violent than for other fuels.

- NEVER DISCHARGE UNBURNED ACETYLENE GAS INTO ANY TYPE OF CONTAINER, VESSEL, ENCLOSURE, OR PIPE (SUCH AS A "POTATO GUN") WITH THE INTENT OF IGNITING THE GAS TO "DEMONSTRATE" THE HAZARDS OF ACETYLENE, OR TO PROPEL AN OBJECT FROM AN ENCLOSURE OR TUBE.

Because of the very fast reaction rate of burning acetylene, it is not generally possible to design an enclosure to safely vent the explosive pressures. Furthermore, because of the ease of ignition of acetylene, premature ignition is very possible.

ACETYLENE DATA

General Information [1]

CAS No. 74-86-2

DOT/UN No. 1001

Normal state: colorless gas with garlic-like odor.

Chemical formula C₂H₂ or H C C H

Molecular weight: 26.04

Vapor density: 0.9

Classification Data [2]

NFPA Hazard Label (health-fire-reactivity): 0-4-3

Note: reactivity rating can be reduced to 2 when acetylene is properly stored dissolved in acetone in approved cylinders.

NOTE: It is prohibited by federal law (USDOT) to transport acetylene except when dissolved in acetone in approved cylinders.

NFPA classification: Class 1A flammable liquid

Boiling point: 119°F

Flammable limits in air [1]

Lower limit (LFL) 2.5%

Upper limit (UEL) 82%

WARNING Even at concentrations above 82%, all the way up to 100%, acetylene is still a significant hazard because it can explosively decompose even at these high concentrations. [3]

Ignition Data [3]

Minimum ignition energy in air: 17 microjoules

Minimum ignition energy in O₂: 0.2 microjoules

Autoignition temperature in air: 581°F

Autoignition temperature in O₂: 565°F

Chemistry [4]

Stoichiometric concentration in air: 7.73%

Peak explosion pressure ratio (deflagration) in stoichiometric air concentration: 9.7

Constant pressure, adiabatic flame temperature (Stoichiometric in air): 4108°F

Stoichiometric concentration in O₂: 28.6%

Peak explosion pressure ratio (deflagration) in stoichiometric O₂ concentration: 17

Constant pressure, adiabatic flame temperature (Stoichiometric in O₂): 5556°F

Explosion Data [5]

Measured peak explosion pressure: 10.6 atmospheres.

Measured peak rate of pressure rise: 1415 bar-meters per second

Fundamental burning velocity in air [6]

157 centimeters per second

Heats of Combustion and Formation [3]

Gross heat of combustion: 1299.6 kilojoules per gram-mole

Net Heat of combustion: 1255.5 kilojoules per gram-mole

Heat of formation: 226.7 kilojoules per gram-mole

DATA SOURCES

[1] Lewis, Richard J., Sr., *Sax's Dangerous Properties of Industrial Materials, Eighth Edition*, Van Nostrand Reinhold, New York, NY

[2] NFPA 325M - 1994, *Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids*. The National Fire Protection Association, Quincy MA

[3] Babrauskas, Vytenis, *Ignition Handbook*, Fire Science Publishers/Society of Fire Protection Engineers, Issaquah WA

[4] Mine Safety and Health Administration, Technical Support, Triadelphia WV, internal calculation.

[5] NFPA 68- 2002, *Guide for Venting of Deflagrations*, The National Fire Protection Association, Quincy MA

[6] Kuchta, Joseph M., *Investigation of Fire and Explosion Accidents in the Chemical, Mining, and Fuel-Related Industries A Manual*, U.S. Bureau of Mines, Bulletin 680.

ADDITIONAL READINGS

Fire Protection Handbook, 19th Edition, Arthur E. Cote, Editor-in-Chief, National Fire Protection Association, Quincy MA

NFPA 51-2002, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*, National Fire Protection Association, Quincy MA

NFPA 51B - 1999, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, National Fire Protection Association, Quincy MA

NFPA 326 - 1999, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*, National Fire Protection Association, Quincy MA

U.S. Department of Labor, Mine Safety and Health Administration, Code of Federal Regulations, Title 30, *Mineral Resources*. U.S. Government Printing Office, Washington DC

U.S. Department of Transportation, Code of Federal Regulations, Title 49, *Transportation*, U.S. Government Printing Office, Washington DC

Pre-decisional
April 6, 2011

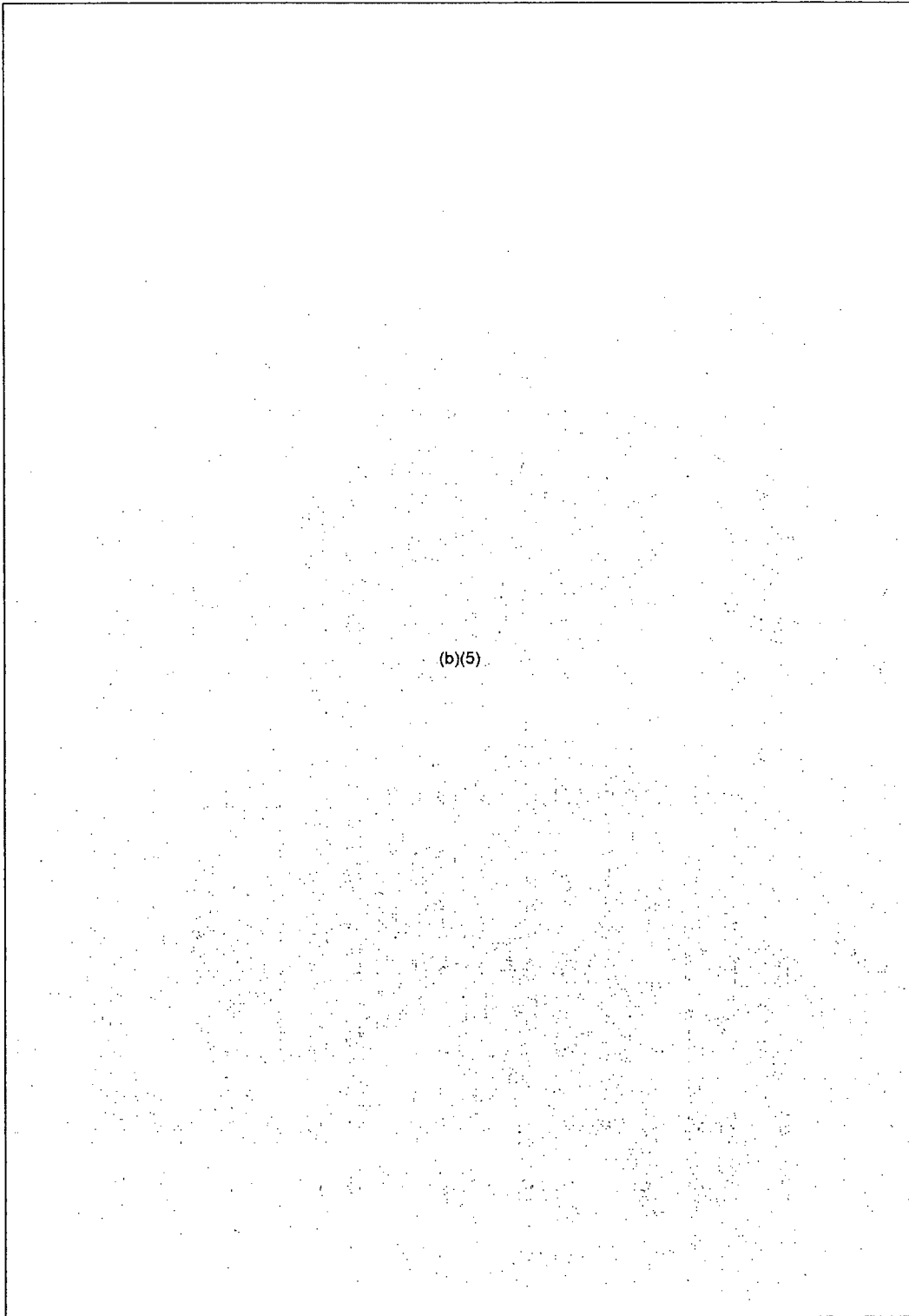
**Japan Accident Response
National Laboratory Analysis Record**



NE Review/Date: 4/6/11

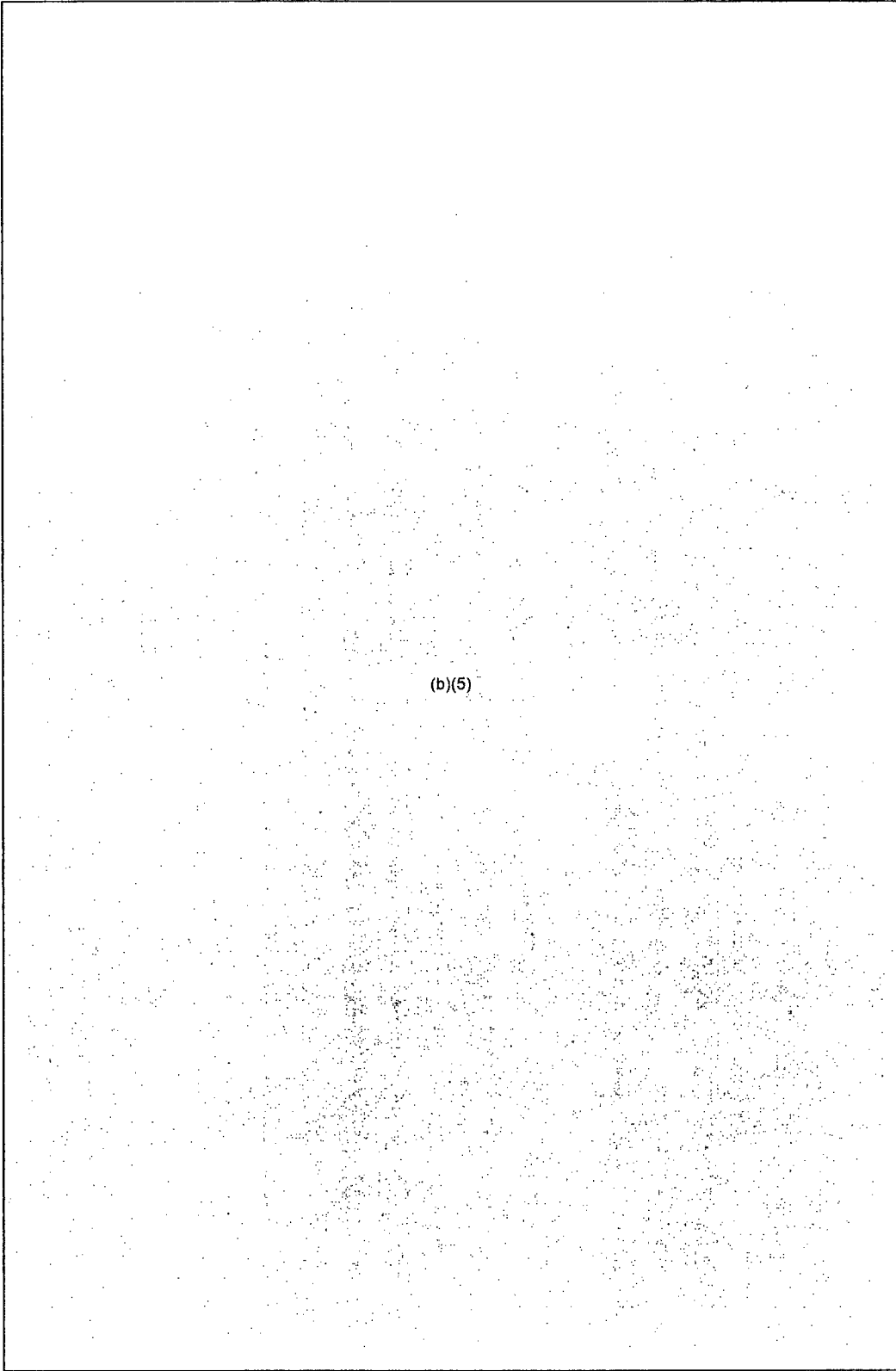
RALPH WAY
X6825

Pre-decisional
April 6, 2011



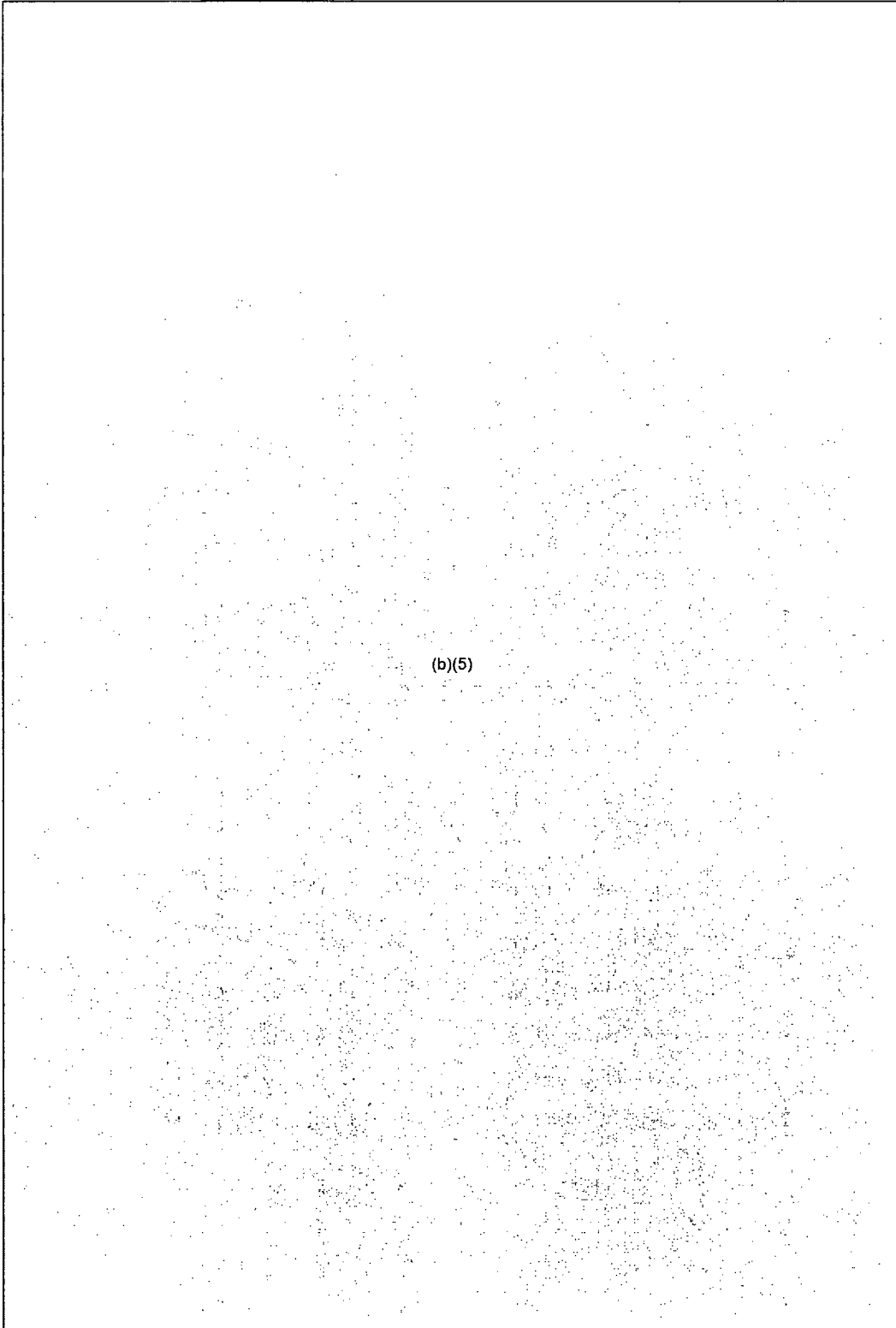
(b)(5)

Pre-decisional
April 6, 2011



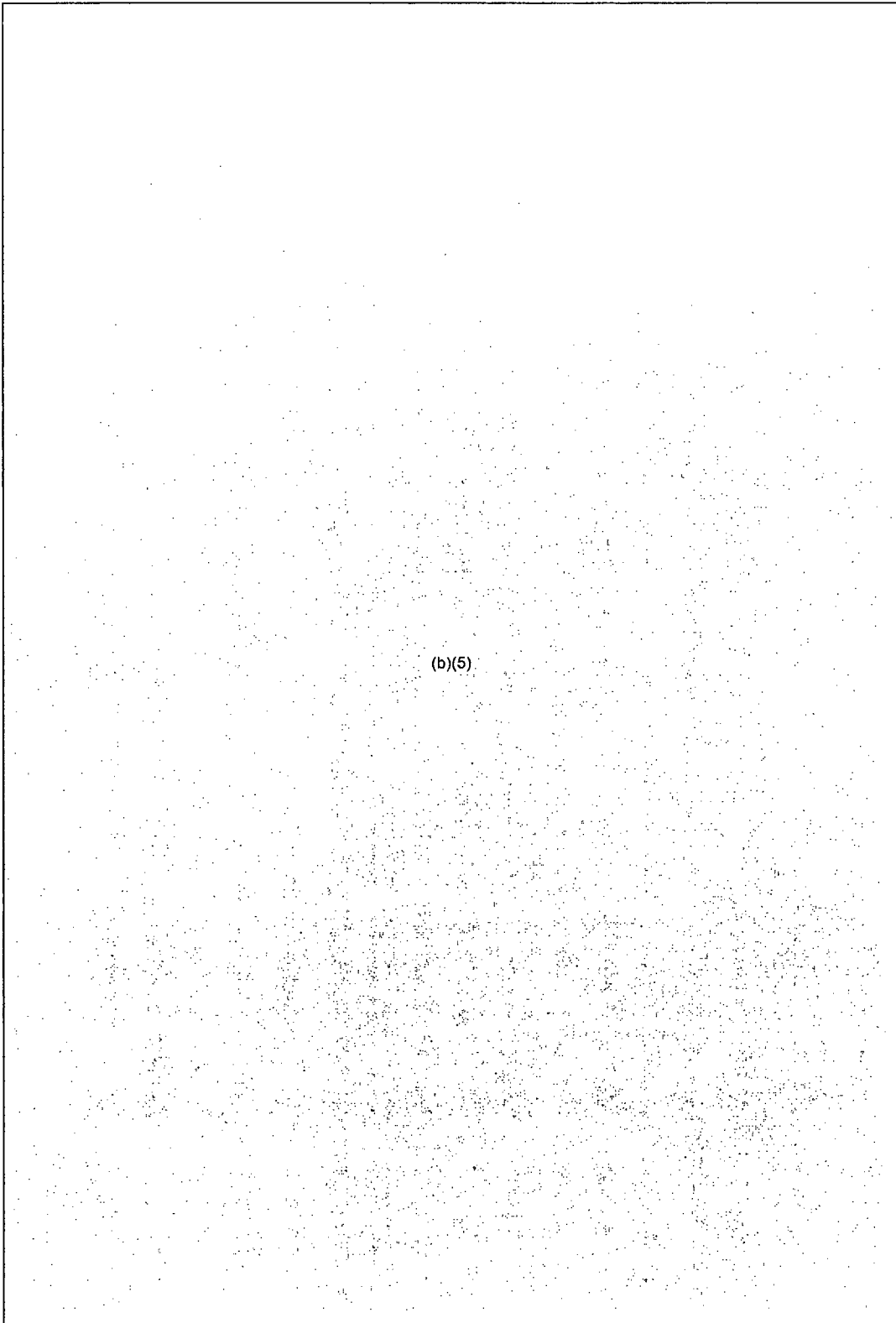
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Pre-decisional
April 6, 2011



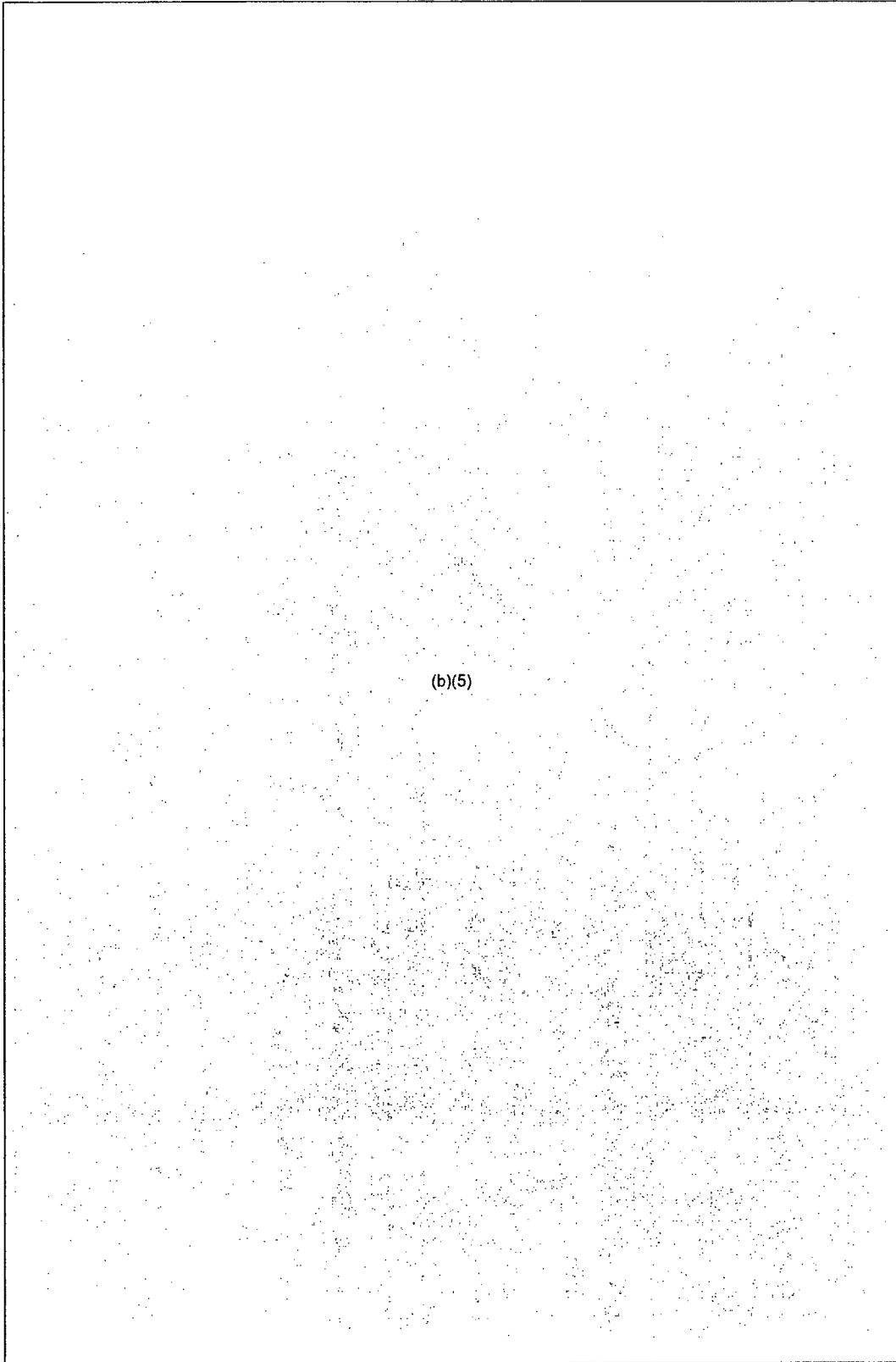
(b)(5)

Pre-decisional
April 6, 2011



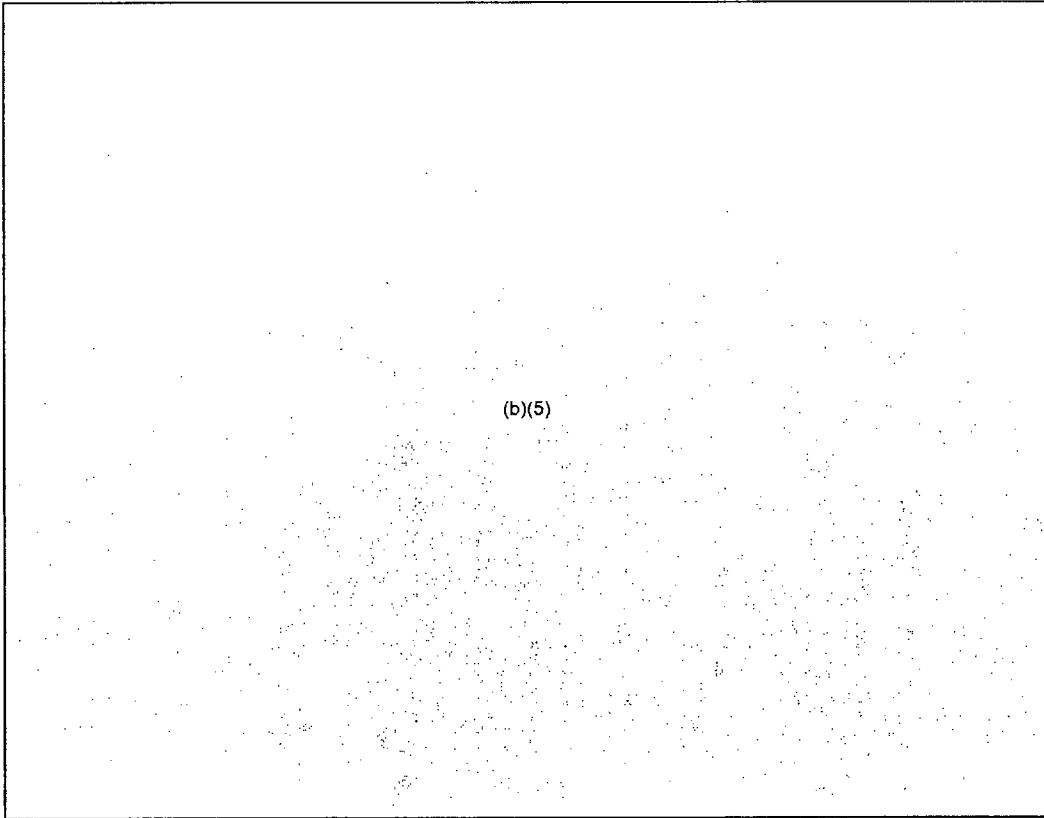
(b)(5)

Pre-decisional
April 6, 2011



(b)(5)

Pre-decisional
April 6, 2011



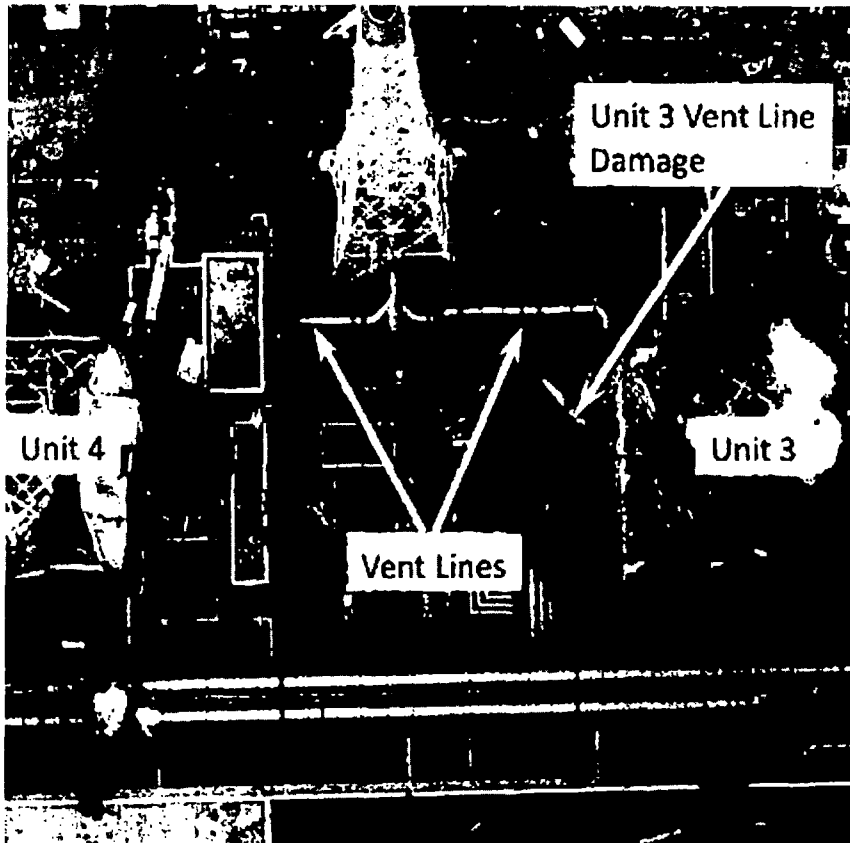


Figure 2. Unit 3 and Unit 4 buildings and associated vent lines connecting the buildings to the stack.

Task Tracker

Japan Earthquake and Tsunami Daiichi

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New Entry

Closed Entries

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All Tasks

Site Tasks

Search

Priority	Originator Date/Time Requested	Description/Response	Assigned To Date/Time	Time Due/ Completed	Requestor	Status	Edit
	Record #: <u>5219</u> RST BWR Systems and Ops Analyst <i>Michael Brown</i> 05/06/2011 11:43:42	(b)(5) Response:	NRC Office NRR	05/11/2011 11:43:42	Rudy Bernhardt	2: Assigned	Edit
Request Attachment:				05/05/2011 11:43:42	Response Attachment:		
	Record #: <u>5204</u> RST Accident Seq Analyst <i>mathew panicker</i> 05/04/2011 13:23:32	Desc: The attached document on Fukushima plant instrumentation needs to be reviewed by experts on I and C before it is distributed to the consortium team. . The document is attached. Also there is a question from DOE regarding the method of measurement of water level and water temperature of spent fuel pool at the plant. Only the document is attached Response:	NRC Office NRR	05/05/2011 19:23:00		2: Assigned	Edit
Request Attachment:				05/04/2011 13:23:32	Response Attachment:		
	Record #: <u>5027</u> RST BWR Systems and Ops Analyst <i>Michael Brown</i> 04/27/2011 14:12:08	Desc: Japan Site Team requested that guidance be provided to NISA on Organization Changes following Post Accident Response. For example, after 9/11, the NRC made significant organizational changes. Other examples would be actions taken after Davis-Besse, Y2K and TMI (TMI Information may be dated) What changes were made? What worked well? What didn't work well? Dave recommended that as documents are located (e.g. IMC 0350) that these documents be provided to the Japan Site Team and NISA ASAP. The goal is that in ~ 2 weeks a document can be provided to NISA with our recommendations. Update 05.02.11: This task was assigned to Allan Howe of DORL. Response: NSIR/NRR and Roy Zimmerman may be familiar with this Issue. Update 05.02.11: This task was assigned to Allan Howe of DORL. Update 5/5/11 - John Stang x1345 has been assigned to work on it. Left him a message, asking for a status update - MB	RST (All) NSIR	05/12/2011 14:12:08	Dave Skeen/ Chuck Casto	2: Assigned	Edit
Request Attachment:				04/27/2011 14:12:08	Response Attachment:		
	Record #: <u>5010</u> RST Accident Seq	Desc: 175,000 gallons/day are pumped out of the Unit 2 turbine building which appears not to affect the water level in the turbine building. Similar issues exist in Units 1 and 3. Evaluate the mass balance for the water in and out of the plant to improve our understanding of the sources of the water.	RST (All)				

<p>Request Attachment:</p>	<p>Analyst <i>andrzej drozd</i></p> <p>The desired result is a clearer picture of how much of the water being pumped into each reactor building may be escaping, and what amount of groundwater, if any, is entering the buildings. Include in the water mass balance consideration of updated estimates of the decay heat level for each Unit.</p> <p>Response: Update 06.02.11 (RST02): Email sent to Steve Garchow seeking confirmation that information already provided is sufficient.</p> <p>04/27/2011 04:23:10</p>	<p>NRR</p> <p>04/27/2011 04:23:10</p> <p>Response Attachment:</p>	<p>Andrzej Drozd</p> <p>2: Assigned</p> <p>04/29/2011 14:41:32</p> <p>Edit</p>
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<p>Request Attachment:</p>	<p>Record #: <u>5196</u> EST Coordinator <i>Rebecca Stone</i></p> <p>Desc: Desc: Japan RST requests HQ to evaluate the information in the attachments regarding TEPCO's plan to reinforce the Unit 4 SFP. We are particularly interested in any structural concerns that HQ may identify.</p> <p>NOTE: First attachment is here; Response: Received response from NRR - attached document.</p> <p>05/04/2011 03:22:54</p> <p>Send response to Japan Team - awaiting response prior to closing Ready to close</p>	<p>NRC Office</p> <p>NRR</p> <p>05/11/2011 16:00:00</p> <p>06/04/2011 03:22:54</p> <p>Response Attachment:</p>	<p>Japan RST</p> <p>Edit</p>
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<p>Request Attachment:</p>	<p>Record #: <u>5068</u> RST Severe Accident Analyst <i>Donnie Harrison</i></p> <p>Desc: NRR to perform simplified risk assessment of affected spent fuel pools (similar to Draft Risk Assessment of the affected reactors performed by Jeff Mittman of the Japan Team) and provide key insights from that assessment to Japan Team</p> <p>Update 04/29/11 - NRR to continue this assessment, will forward to Jeff Mittman by Monday Morning Japan Time (Sunday Night EDT).</p> <p>Response: Update 05.02.11 RST02: We will verify with the Japan Team on 05.03 call that they have information they need. Will define whether this tracker will be closed out or not.</p> <p>Japan Site-Team indicated that Jeff Mittman will discuss the SFP risk assessment with NRR staff upon return to HQ.</p> <p>Update 06.02.11 RST 02 1432hrs: Package has been sent to the Site Team by NRC Ops Center yesterday (see attached zip file password: rst01rst01).</p> <p>Update 5/6/11 - sent email to Mike Cheok, D. Harrison, J. Mittman, J. Circle and S. Meng asking for a status update.</p> <p>04/28/2011 13:24:43</p>	<p>RST (All)</p> <p>NRR</p> <p>04/28/2011 13:24:43</p> <p>Response Attachment:</p>	<p>Chuck Casto</p> <p>Edit</p>
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<p>Request Attachment:</p>	<p>Record #: <u>5065</u> RST BWR Systems and Ops Analyst <i>Michael Brown</i></p> <p>Desc: Call Damian Peco (DOE) at 301-903-7283 on Monday 5/2/11 during dayshift to discuss setting up a routine phone call between DOE, NRC (HQ) and Chuck Casto to coordinate actions between DOE and NRC.</p> <p>Update: Please keep Skip Young in the loop as he will be the POC for interfacing on this coordination. (per email from Brian Wittick 4/29/11)</p> <p>Response: A one-time call is scheduled for 09:30 am between DOE and Chuck Casto to discuss responsibilities. This is not the routine call that is being set up for later.</p> <p>04/28/2011 10:16:27</p> <p>Dave Skeen has the lead to work this item with Damian.</p>	<p>NRC Office</p> <p>NRR</p> <p>04/28/2011 10:16:27</p> <p>Response Attachment:</p>	<p>Damian Peco</p> <p>Edit</p>
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<p>Request Attachment:</p>	<p>Record #: <u>5026</u> RST BWR Systems and Ops Analyst <i>Michael Brown</i></p> <p>Desc: NRR to review Draft Risk Assessment performed by Jeff Mittman of the Japan Team as an independent check prior to providing information to Japan</p> <p>Update 04/29/2011 - Please consider Tasker 5017 responses in review/assessment, which includes information related to remaining energy in vessel that could affect this tasker assessment.</p>	<p>RST (All)</p> <p>NRR</p>	<p>Mike Brown</p> <p>Edit</p>
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04/27/2011 13:57:33

Response: Set up call for NRR reviewers to discuss comments with Jeff Mitman prior to providing information to Japan.

04/29/2011 13:57:33

Update 5/5/11 - sent email to Mike Cheok, D. Harrison, J. Mlttman, J. Circle and S. Meng asking for a status update.

Request Attachment:

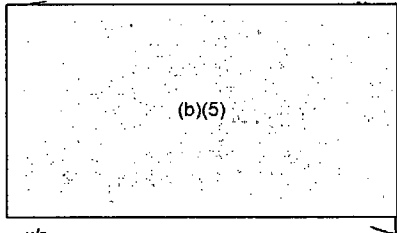
Response Attachment:

Desc: *****Will be assigned upon completion of review of Roadmap by NRR, estimated week of April 25*****

Reactor TA is requesting a "follow-up discussion at an appropriate time" regarding the TEPCO Roadmap to Restoration.

Text of request follows:

From: Franovich, Mike
Sent: Sunday, April 17, 2011 11:19 AM
To: OST01 HOC
Cc: Hoc, PMT12; RST01 Hoc; LIA08 Hoc; Tracy, Glenn; Zimmerman, Roy; Castleman, Patrick; Orders, William; Hipschman, Thomas; Snodderly, Michael
Subject: RE: TEPCO "Roadmap towards Restoration"



Record #: 4835
LT Coordinator
Russell Chazell

2 Medium

(Select)
ET Director

Commissioner Ostendorff's Office

Edit

v/r

Mike Franovich
Technical Assistant for Reactors
Office of Commissioner Ostendorff
301-416-1784

From: OST01 HOC
Sent: Sunday, April 17, 2011 5:37 AM
To: Castleman, Patrick; Orders, William; Franovich, Mike; Hipschman, Thomas; Snodderly, Michael
Cc: Hoc, PMT12; RST01 Hoc; LIA08 Hoc; Tracy, Glenn; Zimmerman, Roy
Subject: TEPCO "Roadmap towards Restoration"

On April 17, TEPCO presented the attached Roadmap to Restoration, and METI provided a subsequent statement. DOS has requested NRC's thoughts on the plan through brief, high-level bullets to be used by the SoS upon her return to the US. The HOC Team and Japan Team are drafting points at this time. Requested by noon, Sunday 4/17 to DOS Embassy.

04/17/2011 11:45:52

Response:

04/17/2011 11:45:52

Request Attachment:

Response Attachment:

Desc: RES/DSA to provide realistic scenarios for energetic dispersion of high quantities of radioactive material that would result in mobile plumes. Related to closed task number 3491 (See attachment)

Record #: 3995
EST Actions Officer
Melissa Ralph

2 Medium

EST Executive Support Team (All)

RES has been tasked. This action can be closed on confirmation of an EDO tracking number for this assignment.

RES

F. Brown

Edit

Day shift on 4/11 should check on the status of this assignment.

04/03/2011 22:39:55

Response:

04/03/2011 22:39:55

Request Attachment:

Response Attachment:

Desc: REVISED: Gather and provide information related to the failure of gauges at TMI to provide to the Site Team. OLD

Record #: 4691
PMTR Prot Actions
Assistant Dir
Sandra Wastler

VERSION: Requested the status of the gauges in units 1,2,3, and SFPs regarding water level, pressure, etc. How reliable is it and how are you getting the data?

RST (All)
NRR

(b)(5),(b)(6)

Response: Discussed the status of instrumentation with the Japan Team during the 0300 call on 4/14/2011. The Japan Team has agreed to draft up an answer and the RST will provide the final response to Mr. Holahan.

2 Medium

Vince
Holahan, NRC
at PACOM

Edit

04/13/2011 19:37:20

Japan Team 03:00am 4/22 call, INPO will evaluate harsh effects on water level instrumentation.
4/28/11 INPO 0400 Call: INPO not tracking this as an action. Input was provided to TEPCO regarding EQ instrumentation concerns but not aware if info was forwarded to PACOM.
4/28/11 Request modified to provide info to Site Team from TMI experience.
4/29 OLD VERSION RESPONSE EPRI document and status of instrumentation provided to Holahan around 0500 EDT. NUREG from Site Team still pending. New documents from DOE attached

Update - 5/5/11 - sent email to Vince Holahan along with all the TMI documents in the M:\RST\Japanese Earthquake & Tsunami Response\RST Assessment of Fukushima Daiichi\TMI Instrumentation Documentation directory and asked him if it was ok to close the Task.

04/13/2011
19:37:20

Request
Attachment:

Response
Attachment:

Record #: 4937
EST Coordinator
Emily Larson

(b)(5)

LT (All)
LT Coordinator

Glenn Tracy

Edit

04/20/2011 17:14:47

04/20/2011
17:14:47

Request
Attachment:

Response
Attachment:

Record #: 4406
EST Actions Officer
Amy Roundtree

Desc: NRR should take the lead on this item and work with the regions to see if the attachment is possible.

ET (All)

See attachment for more information regarding request.

Request is for NRC to facilitate detection measurements at 4 NRC sites.

Response: Email was sent from the ET (Roy Zimmerman) to NRR. Waiting on NRR response as to whether or not they will accept the task.

NNSA

Edit

04/08/2011 18:35:28

Note: Task 4518 and 4406 are identical tasks.

04/08/2011
18:35:28

Per Eric Leeds email on 4/9 at 10:27AM: "NRR will coordinate with the regions to make it happen. We're all over it."

Request
Attachment:

Response
Attachment:

Task Tracker

Print PDF

Japan Earthquake and Tsunami (Master View)

New Entry

Closed Entries

Team Tasks

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All Tasks

Site Tasks

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Priority	Originator Date/Time Requested	Description/Response	Assigned To Date/Time	Time Due/ Completed	Requestor	Status	Edit
	Record #: <u>5238</u> EST Coordinator Dennis Andrukat	(b)(5)	NRC Office NSIA	05/06/2011 07:18:00	(b)(6)		Edit
	05/05/2011 18:24:19	Response: NOTE: Kathy Brock has asked this to be assigned (5/5/11). See attached email. UPDATE: PMT asked to assign this to NSIR/DPR (5/5/11).	05/05/2011 18:24:19				
	Request Attachment:		Response Attachment:				
	Record #: <u>5204</u> RST Accident Seq Analyst mathew panicker	Desc: The attached document on Fukushima plant instrumentation needs to be reviewed by experts on I and C before it is distributed to the consortium team. . The document is attached. Also there is a question from DOE regarding the method of measurement of water level and water temperature of spent fuel pool at the plant. Only the document is attached	NRC Office NRR			2: Assigned	Edit
	05/04/2011 13:23:32	Response: Comments on the document on plant instrumentation	05/04/2011 13:23:32	05/06/2011 14:57:30			
	Request Attachment:		Response Attachment:				
	Record #: <u>5196</u> EST Coordinator Rebecca Stone	Desc: Desc: Japan RST requests HQ to evaluate the information in the attachments regarding TEPCO's plan to reinforce the Unit 4 SFP. We are particularly interested in any structural concerns that HQ may identify.	NRC Office NRR	05/11/2011 16:00:00	Japan RST		
	05/04/2011 03:22:54	NOTE: First attachment is here; Response: Received response from NRR - attached document. Send response to Japan Team - awaiting response prior to closing Ready to close	05/04/2011 03:22:54				
	Request Attachment:		Response Attachment:				
		Desc: NRR to perform simplified risk assessment of affected spent fuel pools (similar to Draft Risk Assessment of the					

5/5/11 2300

Some part
of this is
view in STB
report per
REQ 11
1

Record #: 5068
 RST Severe Accident Analyst
 Donnie Harrison

affected reactors performed by Jeff Mittman of the Japan Team) and provide key insights from that assessment to Japan Team

RST (All)
 NRR

Update 04/29/11 - NRR to continue this assessment, will forward to Jeff Mittman by Monday Morning Japan Time (Sunday Night EDT).

Response: Update 05.02.11 RST02: We will verify with the Japan Team on 05.03 call that they have information they need. Will define whether this tracker will be closed out or not.

Japan Site Team indicated that Jeff Mitman will discuss the SFP risk assessment with NRR staff upon return to HQ.

04/28/2011 13:24:43

04/28/2011 13:24:43

Update 05.02.11 RST 02 1432hrs: Package has been sent to the Site Team by NRC Ops Center yesterday (see attached zip file psword: rst01rst01).

Update 5/5/11 - sent email to Mike Cheok, D. Harrison, J. Mittman, J. Circle and S. Meng asking for a status update.

Request Attachment:

Response Attachment:

Chuck Casto

Edit

Record #: 5065
 RST BWR Systems and Ops Analyst
 Michael Brown

Desc: Call Damian Peco (DOE) at 301-903-7283 on Monday 5/2/11 during dayshift to discuss setting up a routine phone call between DOE, NRC (HQ) and Chuck Casto to coordinate actions between DOE and NRC.

NRC Office
 NRR

Update: Please keep Skip Young in the loop as he will be the POC for interfacing on this coordination. (per email from Brian Wittick 4/29/11)

Response: A one-time call is scheduled for 09:30 am between DOE and Chuck Casto to discuss responsibilities. This is not the routine call that is being set up for later.

04/28/2011 10:16:27

04/28/2011 10:16:27

Dave Skeen has the lead to work this item with Damlan.

Request Attachment:

Response Attachment:

Damian Peco

Edit

Record #: 5026
 RST BWR Systems and Ops Analyst
 Michael Brown

Desc: NRR to review Draft Risk Assessment performed by Jeff Mittman of the Japan Team as an independent check prior to providing information to Japan

RST (All)
 NRR

Update 04/29/2011 - Please consider Tasker 5017 responses in review/assessment, which includes information related to remaining energy in vessel that could affect this tasker assesment.

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04/27/2011 13:57:33

04/29/2011 13:57:33

Update 5/5/11 - sent email to Mike Cheok, D. Harrison, J. Mittman, J. Circle and S. Meng asking for a status update.

Request Attachment:

Response Attachment:

Mike Brown

Edit

Desc: *****Will be assigned upon completion of review of Roadmap by NRR, estimated week of April 25*****

Reactor TA is requesting a "follow-up discussion at an appropriate time" regarding the TEPCO Roadmap to Restoration.

Text of request follows:

From: Franovich, Mike
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 To: OST01 HOC
 Cc: Hoc, PMT12; RST01 Hoc; LIA08 Hoc; Tracy, Glenn; Zimmerman, Roy; Castleman, Patrick; Orders, William; Hipschman, Thomas; Snodderly, Michael
 Subject: RE: TEPCO "Roadmap towards Restoration"

(b)(5)

EZ 493 of 810

2 Medium

Record #: 4835
LT Coordinator
Russell Chazell

(b)(5)

(Select)
ET Director

Commissioner
Ostendorff's
Office

Edit

v/r

Mike Franovich
Technical Assistant for Reactors
Office of Commissioner Ostendorff
301-445-1784

From: OST01 HOC
Sent: Sunday, April 17, 2011 5:37 AM
To: Castleman, Patrick; Orders, William;
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Cc: Hoc, PMT12; RST01 Hoc; LIA08 Hoc;
Tracy, Glenn; Zimmerman, Roy
Subject: TEPCO "Roadmap towards
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high-level bullets to be used by the SoS
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and Japan Team are drafting points at this
time. Requested by noon, Sunday 4/17 to
DOS Embassy.

04/17/2011 11:45:52

Response:

04/17/2011
11:45:52

Request
Attachment:

Response
Attachment:

2 Medium

Record #: 3995
EST Actions Officer
Melissa Ralph

Desc: RES/DSA to provide realistic scenarios
for energetic dispersion of high quantities of
radioactive material that would result in
mobile plumes. Related to closed task
number 3491 (See attachment)

EST Executive
Support Team
(All)
RES

F. Brown

Edit

RES has been tasked. This action can be
closed on confirmation of an EDO tracking
number for this assignment.

Day shift on 4/11 should check on the status
of this assignment.

04/03/2011 22:39:55

Response:

04/03/2011
22:39:55

Request
Attachment:

Response
Attachment:

2 Medium

Record #: 4691
PMTR Prot Actions
Assistant Dir
Sandra Westler

Desc: REVISED: Gather and provide
information related to the failure of gauges
at TMI to provide to the Site Team. OLD
VERSION: Requested the status of the
gauges in units 1,2,3, and SFPs regarding
water level, pressure, etc. How reliable is it
and how are you getting the data?

RST (All)
NRR

Vince
Holahan, NRC
at PACOM

Edit

(b)(5),(b)(6)

Response: Discussed the status of
instrumentation with the Japan Team during
the 0300 call on 4/14/2011. The Japan Team
has agreed to draft up an answer and the
RST will provide the final response to Mr.
Holahan.

Japan Team 03:00am 4/22 call, INPO will
evaluate harsh effects on water level
instrumentation.

4/28/11 INPO 0400 Call: INPO not tracking
this as an action. Input was provided to
TEPCO regarding EQ instrumentation
concerns but not aware if info was
forwarded to PACOM.

04/13/2011 19:37:20

4/28/11 Request modified to provide info to
Site Team from TMI experience.
4/29 OLD VERSION RESPONSE EPRI
document and status of instrumentation
provided to Holahan around 0500 EDT.
NUREG from Site Team still pending.
New documents from DOE attached

04/13/2011
19:37:20

Update - 5/5/11 - sent email to Vince Holahan along with all the TMI documents in the M:\RST\Japanese Earthquake & Tsunami Response\RT Assessment of Fukushima Daiichi\TMI Instrumentation Documentation directory and asked him if it was ok to close the Task.

Request Attachment:

Response Attachment:

Record #: 4937
EST Coordinator
Emily Larson

LT (All)
LT Coordinator

(b)(5)

Glenn Tracy

Edit

04/20/2011 17:14:47

04/20/2011
17:14:47

Request Attachment:

Response Attachment:

Record #: 4406
EST Actions Officer
Amy Roundtree

ET (All)

Desc: NRR should take the lead on this item and work with the regions to see if the attachment is possible.

See attachment for more information regarding request.

Request is for NRC to facilitate detection measurements at 4 NRC sites.

Response: Email was sent from the ET (Roy Zimmerman) to NRR. Waiting on NRR response as to whether or not they will accept the task.

NNSA

Edit

04/08/2011 18:35:28

04/08/2011
18:35:28

Note: Task 4518 and 4406 are identical tasks.

Per Eric Leeds email on 4/9 at 10:27AM:
"NRR will coordinate with the regions to make it happen. We're all over it."

Request Attachment:

Response Attachment:

Japan Earthquake/Tsunami Internal Information

SEARCH

HOME

View All Site Content

Lists

Japanese Event Task Tracking (JETT) Process

1 2 3 4 5 6 7 8 9 10 11 12

Japan Earthquake/Tsunami Internal Information

Japanese Event Task Tracking (JETT) Process

New Actions Settings

View: Open Items

Documents

Ticket Number	Assigned to	Due Date	Status	TAC Number
5238 ^{NEW}	NSIR	5/6/2011 5:00 PM	Open	ZG0062
5196 ^{NEW}	NRR	5/11/2011 4:00 PM	Open	ZG0062
5186	NRR	5/4/2011 10:30 AM	Open	ZG0062
5146	RES	5/4/2011 5:00 PM	Open	ZG0062
5142	NRR	5/3/2011 3:00 PM	Open	ZG0062
5095	NSIR	4/29/2011 4:00 PM	Open	ZG0062
5075	NSIR	5/4/2011 4:00 PM	Open	ZG0062

Japan One Pager

NRC Status Updates

DOE SitReps

Press Releases (IAEA)

Travel Advisory

Photos / Video

HOC Watchbill

Congressional Notes

External Fact Sheets

External Guidance

Foreign Modeling

Fukushima Update

International Information

Japan Maps

Refer to NSIR

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994

Re-run of 3/16/11 run @ 12:24pm

found in press release. Ignore run date / time on this copy

Summary Report

Case description: Fukushima U2, U3 and U4 SFP approximate site release
Run date/time: 2011/03/17 08:48

Maximum Dose Values (rem) - Close-In

Table with columns for distance (0.5 to 10 miles) and rows for various dose metrics like Total EDE, Thyroid CDE, Inhalation CEDE, etc.

Notes:

- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase EPA PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = Inhalation CEDE + Cloudshine + 4-Day Groundshine

Maximum Dose Values (rem) - To 50 mi

Table with columns for distance (15 to 50 miles) and rows for various dose metrics like Total EDE, Thyroid CDE, Inhalation CEDE, etc.

Notes:

- Doses exceeding PAGs are underlined.
- Early-Phase PAGs: TEDE - 1 rem, Thyroid (iodine) CDE - 5 rem
- Intermediate-Phase PAGs: 1st year - 2 rem, 2nd year - 0.5 rem
- *** indicates values less than 1 mrem
- To view all values - use Detailed Results | Numeric Table
- Total EDE = CEDE Inhalation + Cloudshine + 4-Day Groundshine
- Total Acute Bone = Bone Inhalation + Cloudshine + Period Groundshine

Handwritten notes: V00177, 1/16/11, 2011/03/17, 12:24pm, 994

Case Summary

Event Type: Nuclear Power Plant
Location: Name: Fukushima U4, City, county, state: <undefined>, <undefined>, <undefined>, Lat / Long / Elev: 37.4214° N, 141.0325° E, 0 m, UTC Offset: 9 hours, Population: not available

Reactor Parameters

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Summary Report

Reactor power: 3760 MWt
 Average fuel burn-up: 30000 MWD / MTU
 Containment type: BWR Mark I
 Containment volume: 2.50E+05 ft³
 Design pressure: 60 lb/in²
 Design leak rate: 0.54 %/d
 Coolant mass: 1.25E+05 kg
 Assemblies in core: 917

Source Term

Type: Time Core Is Uncovered
 Shutdown: 2011/03/11 14:46
 Core uncovered: 2011/03/16 19:50
 Core recovered: No

Release Pathway

Type: BWR - Release Through Dry Well
 via direct, unfiltered pathway
 Description: Fukushima - U2, U3 and U4 SFP release approximation
 Release height: 10. m

Release events

2011/03/16 19:50 Leak rate (% vol) Total failure
 2011/03/16 19:50 Sprays Off

Meteorology

Type: Actual Observations
 Dataset name: Fukushima 2011-03-16 0935
 Dataset desc: Obs/fcsts for Fukushima Unit 1

**Summary of data
 at release point:**

	Type	Dir deg	Speed m/s	Stab class	Precip	Temp °C
2011/03/12 14:00	Obs	265	1.0	B	?	
2011/03/12 15:00	Obs	265	1.0	B	?	
2011/03/12 16:00	Obs	277	1.3	B	?	
2011/03/12 17:00	Obs	260	2.4	B	?	
2011/03/12 18:00	Obs	241	1.4	E	?	
2011/03/12 19:00	Obs	236	2.1	E	?	
2011/03/12 20:00	Obs	239	2.1	E	?	
2011/03/12 21:00	Obs	229	3.8	E	?	
2011/03/12 22:00	Obs	224	5.1	E	?	
2011/03/12 23:00	Obs	226	3.9	E	?	
2011/03/13 00:00	Obs	228	4.1	E	?	
2011/03/13 01:00	Obs	235	2.6	E	?	
2011/03/13 02:00	Obs	233	3.9	E	?	
2011/03/13 03:00	Obs	225	1.8	E	?	
2011/03/13 04:00	Obs	225	1.3	E	?	
2011/03/13 05:00	Obs	225	2.2	E	?	
2011/03/13 06:00	Obs	225	2.2	E	?	
2011/03/13 07:00	Obs	248	2.7	E	?	
2011/03/13 08:00	Obs	248	2.7	E	?	
2011/03/13 09:00	Obs	270	3.1	E	?	
2011/03/13 12:00	Obs	271	7.4	D	?	
2011/03/13 13:00	Obs	276	6.2	D	?	
2011/03/13 14:00	Obs	312	2.8	B	?	
2011/03/14 18:00	Obs	258	4.8	unk	?	
2011/03/14 19:00	Obs	268	5.0	unk	?	

Refer to NSIR

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Summary Report

2011/03/14 20:00	Obs	330	2.2	unk	?
2011/03/14 21:00	Fcst	337	4.6	unk	?
2011/03/14 22:00	Fcst	323	7.2	unk	?
2011/03/14 23:00	Fcst	305	6.6	unk	?
2011/03/15 00:00	Fcst	015	8.6	unk	?
2011/03/15 02:00	Fcst	002	7.5	unk	?
2011/03/15 03:00	Fcst	347	5.2	E	None
2011/03/15 04:00	Fcst	332	5.6	E	None
2011/03/15 05:00	Fcst	332	4.0	E	None
2011/03/15 06:00	Fcst	344	3.5	E	Lgt rain
2011/03/15 07:00	Fcst	026	3.8	E	Lgt rain
2011/03/15 08:00	Fcst	044	4.4	E	Lgt rain
2011/03/15 09:00	Fcst	020	4.2	E	Lgt rain
2011/03/15 10:00	Fcst	010	3.4	E	None
2011/03/15 11:00	Fcst	030	3.5	D	Lgt rain
2011/03/15 12:00	Fcst	027	3.0	D	Lgt rain
2011/03/15 13:00	Fcst	037	3.4	D	Lgt rain
2011/03/15 14:00	Fcst	053	3.7	B	None
2011/03/15 15:00	Fcst	058	3.7	B	None
2011/03/15 16:00	Fcst	067	3.2	C	Lgt rain
2011/03/15 17:00	Fcst	081	3.9	C	Lgt rain
2011/03/15 18:00	Fcst	089	4.7	B	None
2011/03/15 19:00	Fcst	085	4.4	B	None
2011/03/15 20:00	Fcst	083	4.4	B	Lgt rain
2011/03/15 21:00	Fcst	074	4.6	C	Lgt rain
2011/03/15 22:00	Fcst	054	5.0	D	Lgt rain
2011/03/15 23:00	Fcst	029	5.6	D	Rain
2011/03/16 00:00	Fcst	011	5.1	D	Lgt rain
2011/03/16 01:00	Fcst	346	4.3	C	Lgt rain
2011/03/16 02:00	Fcst	350	5.3	D	Lgt rain
2011/03/16 03:00	Fcst	323	5.6	D	Lgt rain
2011/03/16 04:00	Fcst	316	5.4	D	None
2011/03/16 05:00	Fcst	298	4.8	D	None
2011/03/16 06:00	Fcst	314	5.6	D	None
2011/03/16 07:00	Fcst	312	4.7	D	None
2011/03/16 08:00	Fcst	331	4.9	D	None
2011/03/16 09:00	Fcst	299	4.2	D	None
2011/03/16 10:00	Fcst	312	5.4	C	None
2011/03/16 11:00	Fcst	309	7.5	C	None
2011/03/16 12:00	Fcst	304	7.2	C	None
2011/03/16 13:00	Fcst	314	8.8	C	None
2011/03/16 14:00	Fcst	325	10.4	C	None
2011/03/16 15:00	Fcst	324	12.3	C	None
2011/03/16 16:00	Fcst	304	14.7	D	None
2011/03/16 17:00	Fcst	299	14.2	D	None
2011/03/16 18:00	Fcst	297	11.3	D	None
2011/03/16 19:00	Fcst	316	9.8	D	None
2011/03/16 20:00	Fcst	309	9.4	D	None
2011/03/16 21:00	Fcst	294	9.5	D	None
2011/03/16 22:00	Fcst	299	7.6	D	None
2011/03/16 23:00	Fcst	300	9.7	D	None
2011/03/17 00:00	Fcst	294	5.0	D	None
2011/03/17 01:00	Fcst	286	7.0	D	None
2011/03/17 02:00	Fcst	287	6.6	D	None
2011/03/17 03:00	Fcst	293	6.5	D	None
2011/03/17 04:00	Fcst	300	6.3	D	None
2011/03/17 05:00	Fcst	311	5.9	D	None
2011/03/17 06:00	Fcst	295	7.4	D	None

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Summary Report

2011/03/17 07:00	Fcst	303	8.4	C	None
2011/03/17 08:00	Fcst	333	4.8	C	None
2011/03/17 09:00	Fcst	321	5.9	C	None
2011/03/17 10:00	Fcst	307	5.0	C	None
2011/03/17 11:00	Fcst	292	8.4	C	None
2011/03/17 12:00	Fcst	315	9.3	C	None
2011/03/17 13:00	Fcst	299	11.1	C	None
2011/03/17 14:00	Fcst	292	11.8	C	None
2011/03/17 15:00	Fcst	286	10.7	C	None
2011/03/17 16:00	Fcst	298	9.3	D	None
2011/03/17 17:00	Fcst	286	8.5	D	None
2011/03/17 18:00	Fcst	285	10.6	D	None
2011/03/17 19:00	Fcst	288	11.1	D	None
2011/03/17 20:00	Fcst	301	11.3	D	None
2011/03/17 21:00	Fcst	311	10.1	D	None
2011/03/17 22:00	Fcst	307	8.4	D	None
2011/03/17 23:00	Fcst	303	8.7	D	None
2011/03/18 00:00	Fcst	311	7.1	D	None
2011/03/18 01:00	Fcst	316	3.4	D	None
2011/03/18 02:00	Fcst	310	6.0	D	None
2011/03/18 03:00	Fcst	319	7.4	D	None
2011/03/18 04:00	Fcst	316	6.3	D	None
2011/03/18 05:00	Fcst	307	4.9	D	None
2011/03/18 06:00	Fcst	311	4.4	D	None
2011/03/18 07:00	Fcst	326	5.1	C	None
2011/03/18 08:00	Fcst	343	5.4	C	None
2011/03/18 09:00	Fcst	344	6.1	C	None

Dataset options:

Est. missing stability using: Wind speed, time of day, etc.
Adjust stability for consistency: No
Modify winds for topography: Yes

Calculations

Case description:

Fukushima U2, U3 and U4 SFP approximate site release

End of calculations:

2011/03/17 10:50

Distance of calculation:

Start of release to atmosphere + 15 h

Close-in distances:

Close-in + to 50 miles

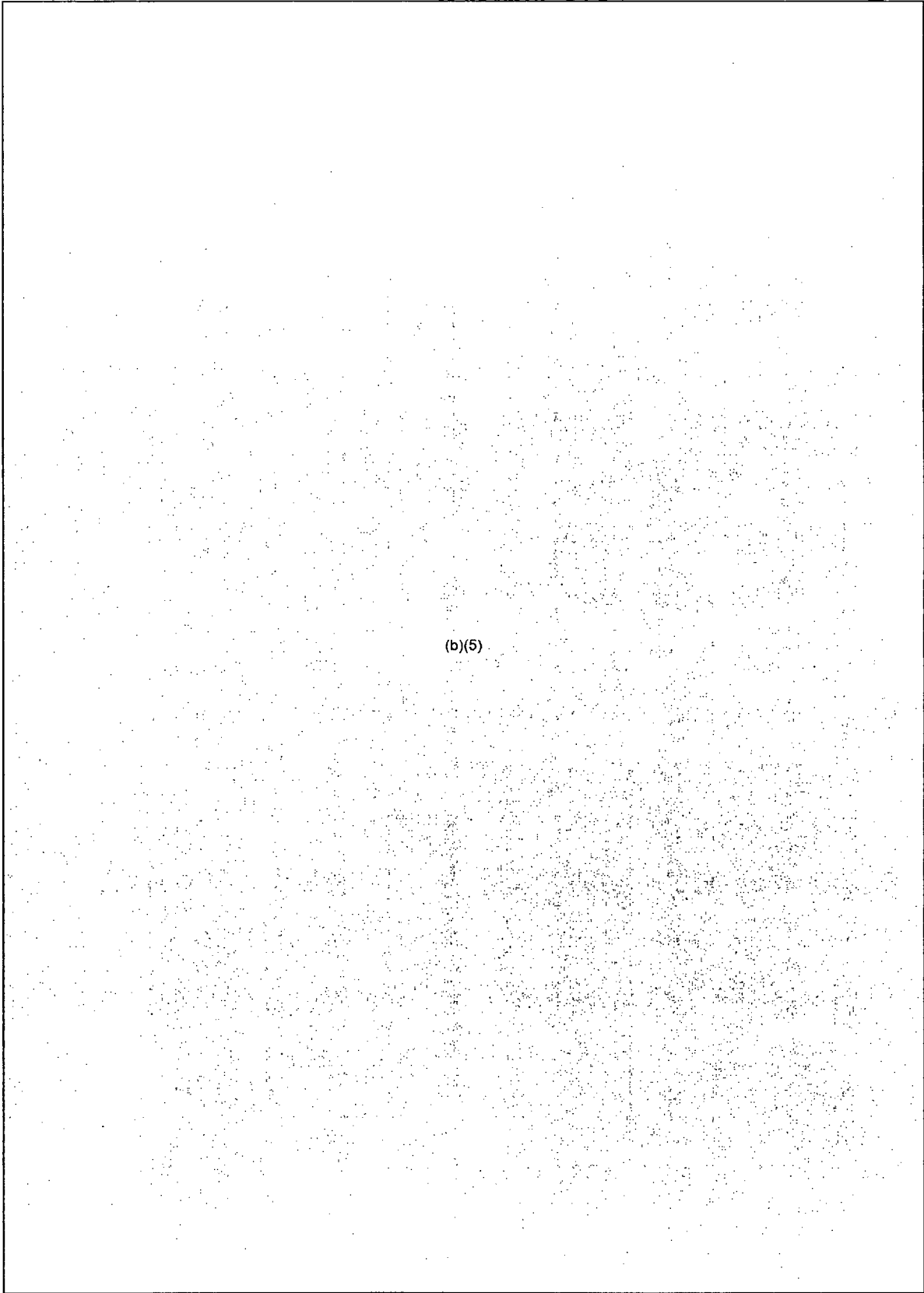
0.5, 1.0, 1.5, 2.0, 3.0, 5.0, 7.0, 10.0 miles

(b)(5)

Refer to NSIR

995

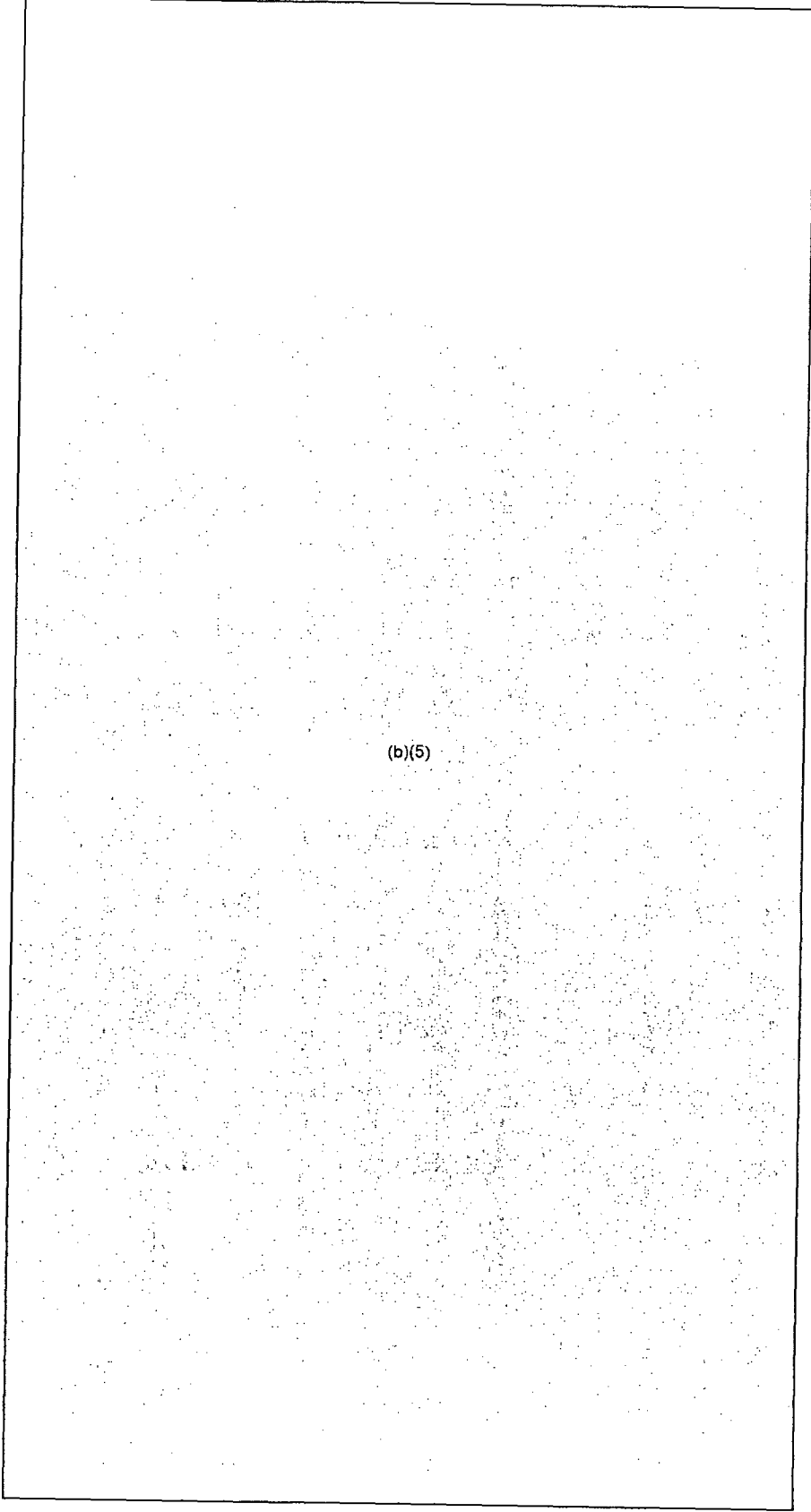
NOTE: RASCAL run to justify
expansion to 50 mile EPZ



(b)(5)

Refer to NSIR

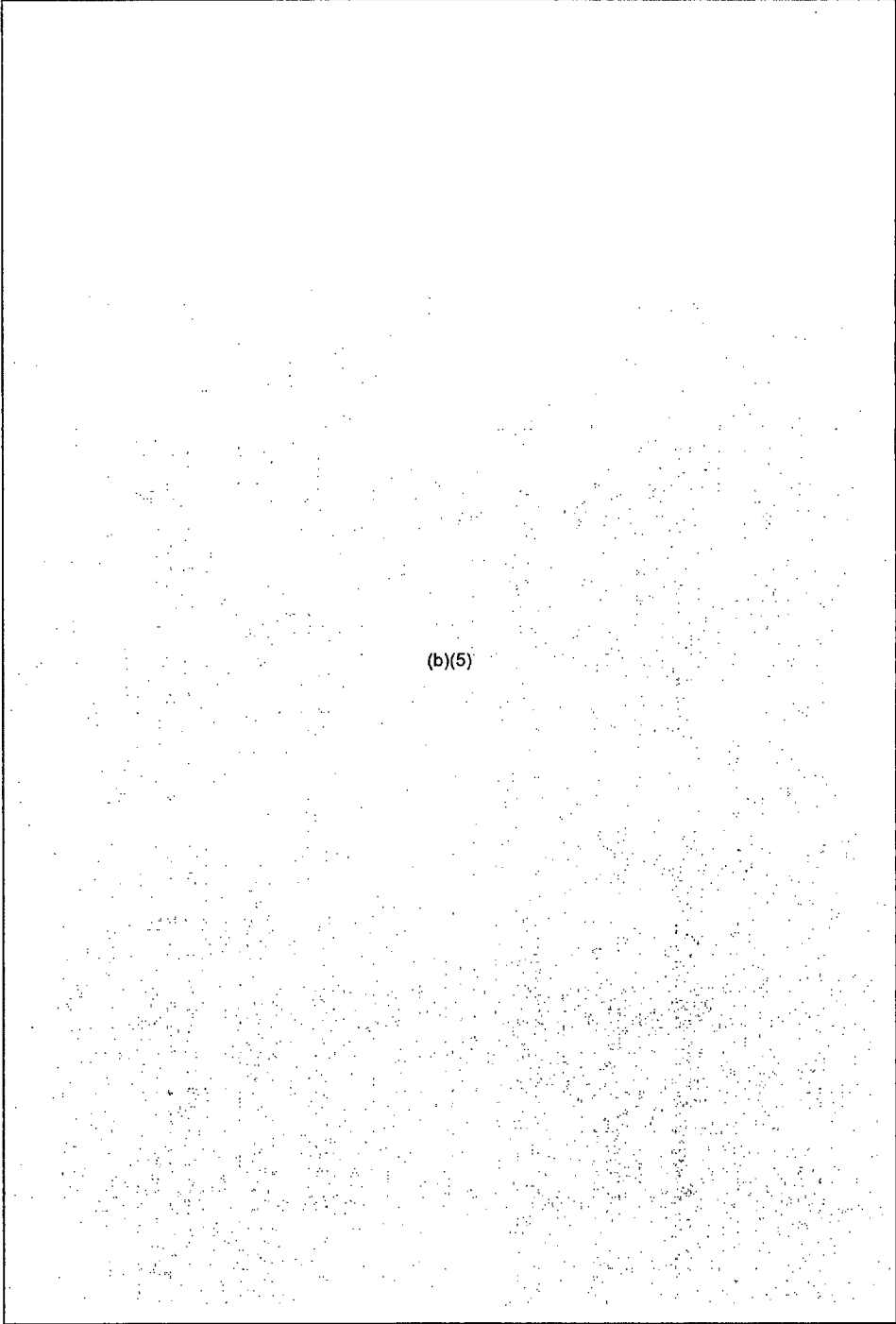
NOT FOR PUBLIC DISCLOSURE



(b)(5)

Refer to NSIR

NOTICE FOR PUBLIC DISCLOSURE



(b)(5)

(b)(5)

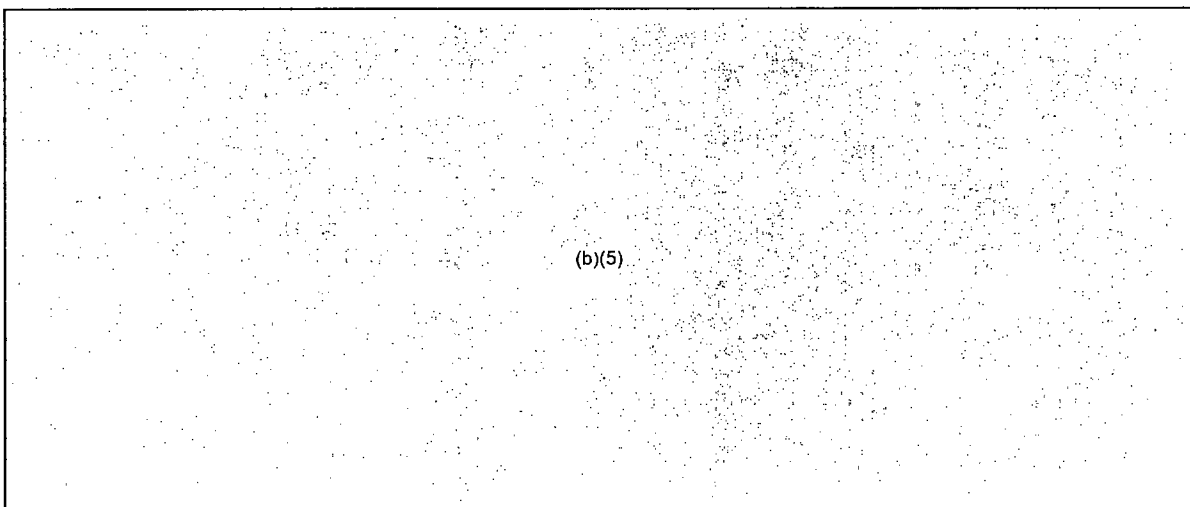
NARAC Plume Model Dose Projections
Tokyo Impact SuperCore Analysis With Modified Unit 4 Spent Fuel Pool Release
for CMHT Top 20 List of Radionuclides
Hypothetical Case
Issue Date: 12:30 UTC March 29, 2011

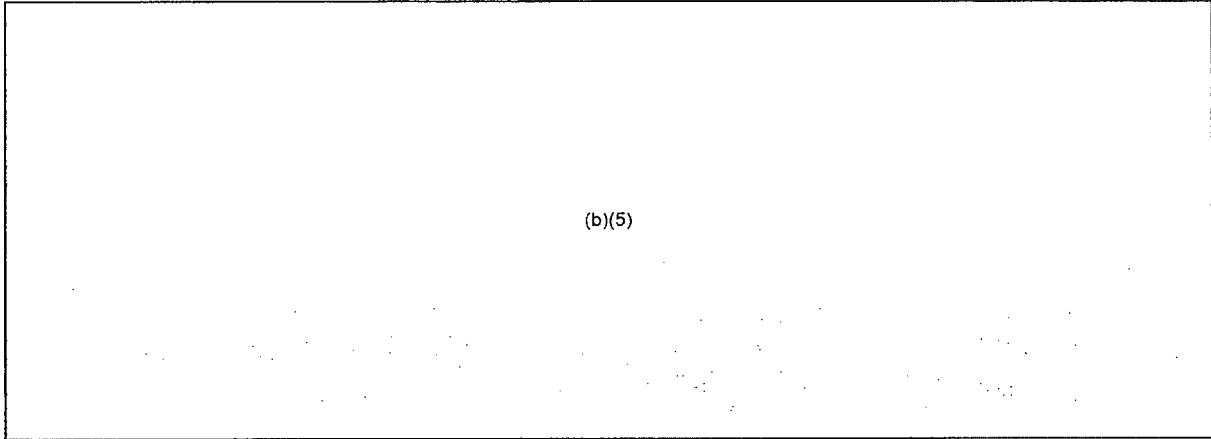
Summary

The objective of these calculations is to develop estimates of the potential doses that may occur due to hypothetical releases from the Fukushima Dai-ichi Nuclear Power Plant (NPP). The US EPA/FDA Protective Action Guides levels of concerns are listed below for comparison.

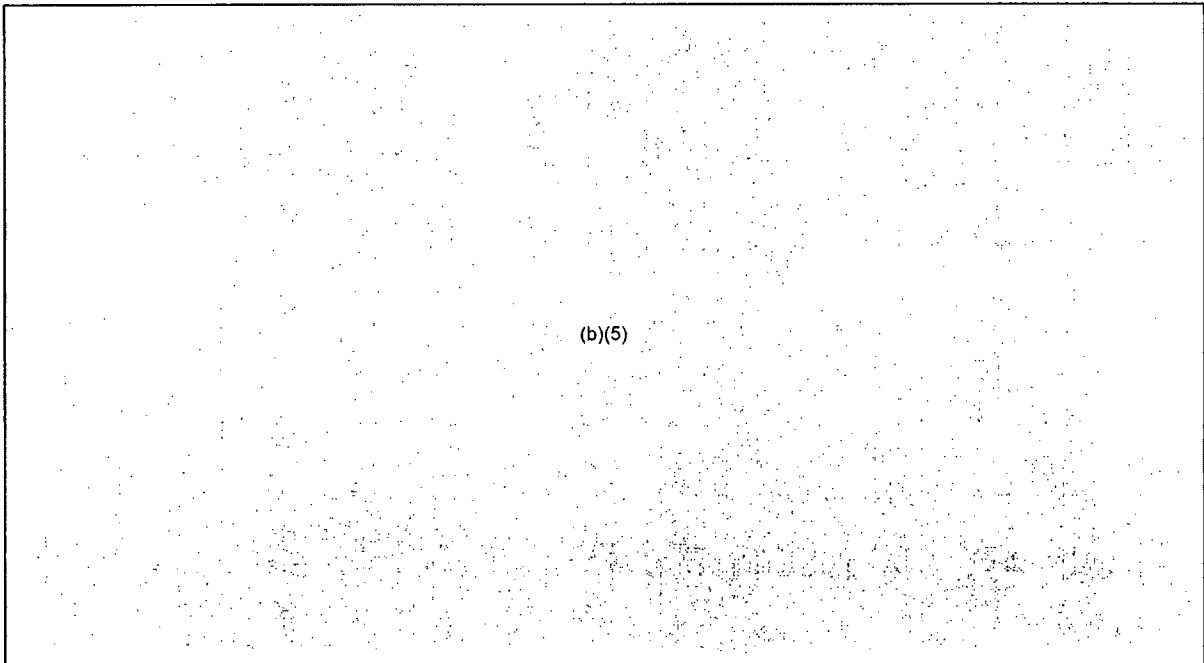
	US EPA/FDA Protective Action Guideline	US EPA/FDA Recommended Actions to Consider
Total Effective Dose	Greater than 1-5 rem	Evacuation or sheltering
Radioiodine Dose to Child Thyroid	Greater than 5 rem	Administration of Potassium Iodide (KI)
Radioiodine Dose to Adult Thyroid	Greater than 10 rem	Administration of Potassium Iodide (KI)
Avoidable Groundshine and Resuspension Dose – 1 st Year	Greater than 2 rem	Relocation
Avoidable Groundshine and Resuspension Dose – 2 nd Year	Greater than 0.5 rem	Relocation

Source Term Summary

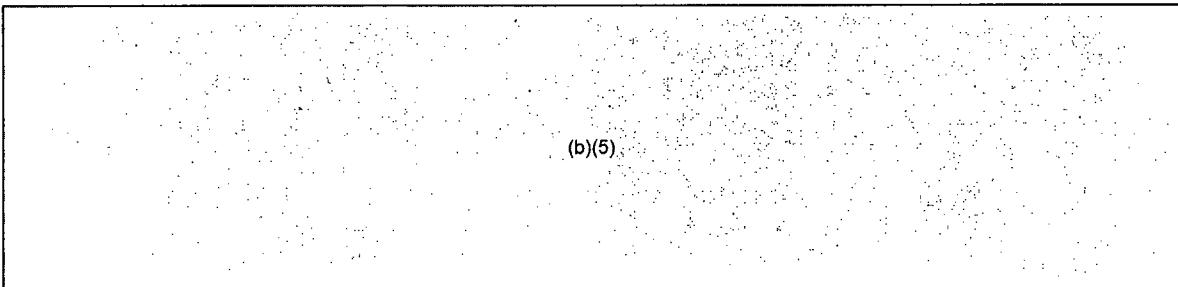




NARAC Modeling Assumptions



NARAC Model Results:



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(b)(5)

Appendix 1: Original NRC Supercore Source Term (Provided by NRC)

Issue Date: 1830 UTC March 18, 2011

Objective

The objective of this appendix is to provide additional detail on the NRC provided "Supercore" source term.

NRC Source Summary

The NRC "Supercore" source term was calculated using the RASCAL code and includes estimated release rates for specific nuclides for the following source terms:

1. Unit 2: 25% of the total fuel was released to the atmosphere (33% of the total fuel was assumed to melt)

Fuel Damage: 33% of total inventory melted (NRC based this estimate on reactor status information provided from the plant)

Release Fraction: 25% of the total inventory released to the atmosphere (NRC based this estimate on Subject Matter Expertise on estimated deposition within the unit along the predicted release path)

Reactor Parameters

Reactor power: 2350 MWt

Average fuel burn-up: 30000 MWD / MTU

Source Term

Shutdown: 2011/03/11 14:46

Core uncovered: 2011/03/15 06:00

Core recovered: 2011/03/15 07:00

Assumes reactor vessel leaking into the primary containment (dry well) and total failure of primary containment and secondary containment (reactor building). This is a possible, but conservative estimate and the scenario is based on limited plant data.

2. Unit 3: 50% of the total spent fuel was released to the atmosphere

Description:

- 1/3 of core (1 batch) is 105 days old
- 2/3 of core (2 batches) are 1 to 2 years old (the aged fuel contributes a very small fraction to the amount of radioactivity released over the near term and resultant dose to the environment)

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- 50% of total inventory damaged (NRC based this estimate on info from Japan that 50% of total inventory was exposed to the atmosphere because of reduced water level). Given the above assumptions, it is realistic to assume that 100% of the volatile exposed material is rapidly released to the atmosphere.

Reactor power: 2350 MW(t)
Avg spent fuel burn-up: 50000 MWD / MTU
Assemblies in core: 548
Shutdown for newest batch: 2010/12/01
Length Time out of reactor core: approximately 105 days
Fuel uncovered: 2011/03/14 11:00
Fuel recovered: No
Number of Batches in pool: 3 Batches (1 Batch Fresh, 2 Batches Old)
Fuel Damage: 50% (no containment)

3. Unit 4: 100% of the total spent fuel was released to the atmosphere

Description:

- This pool has both new and old batches (which are specified below separately as Unit 4a and Unit 4b, respectively)
- 100% of total inventory damaged (NRC based this estimate on info from Japan that 100% of total inventory was exposed to the atmosphere because of loss of water). Given the above assumptions, it is realistic to assume that 100% of the volatile exposed material is rapidly released to the atmosphere.

Reactor power: 2350 MW(t)
Avg spent fuel burn-up: 50000 MWD / MTU
Assemblies in core: 548
NRC Unit 4a – New Fuel
Length Time out of reactor core: approximately 30 days
Fuel Damage: 100% (no containment)
Type: Pool Storage - Uncovered Fuel
Shutdown for newest batch: 2011/02/11
Batches in pool 3
Fuel uncovered: 2011/03/16 15:00
Fuel recovered: No

Description:

- 1 core (3 batch) is 30 days old
- 100% of total inventory damaged

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NRC Unit 4b – Old Fuel

Length Time out of reactor core: approximately 1 to 2 years

Fuel Damage: 100% (no containment)

Type: Pool Storage - Uncovered Fuel

Shutdown for newest batch: 2009/08/10

Batches in pool 4

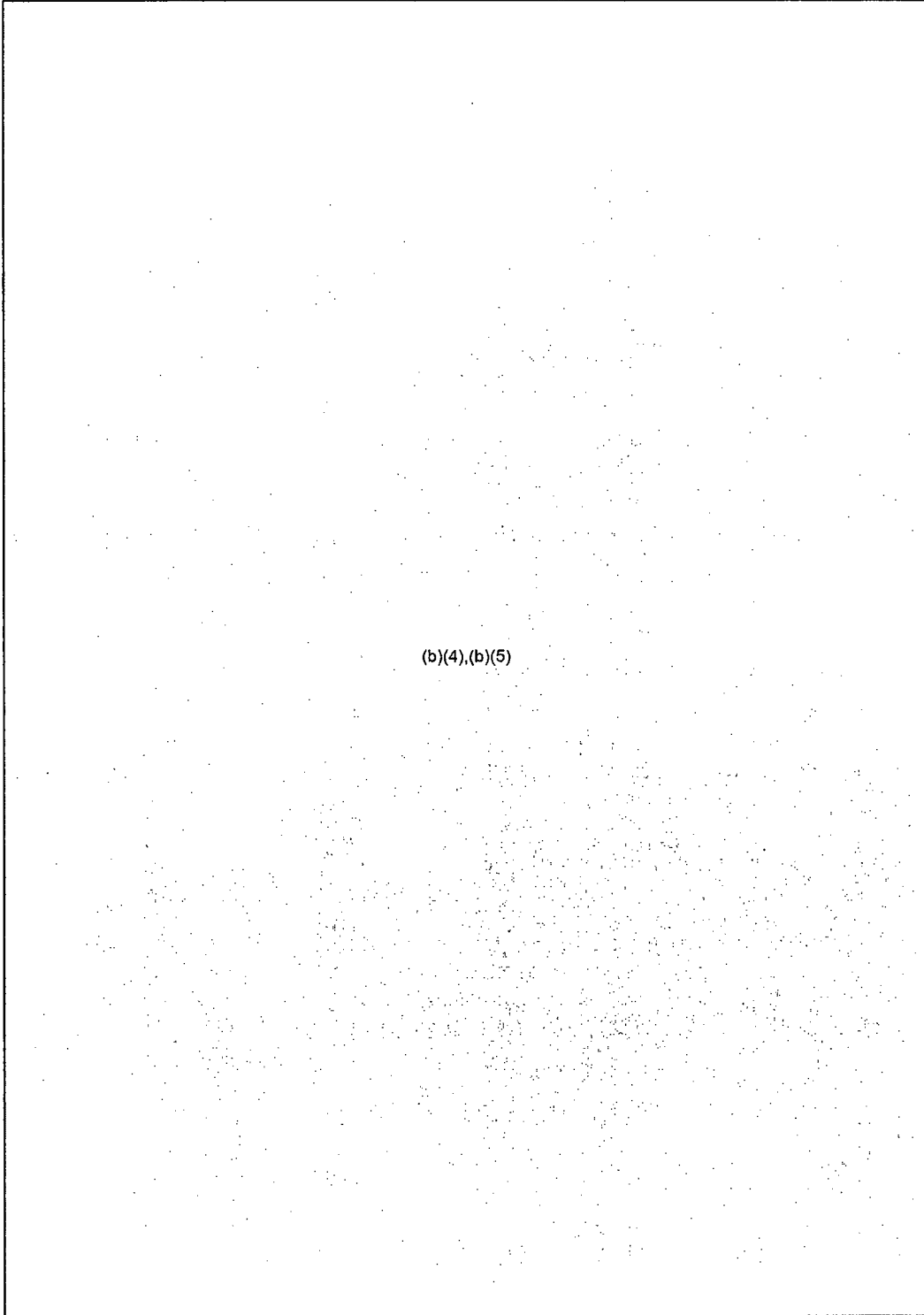
Fuel uncovered: 2011/03/16 15:00

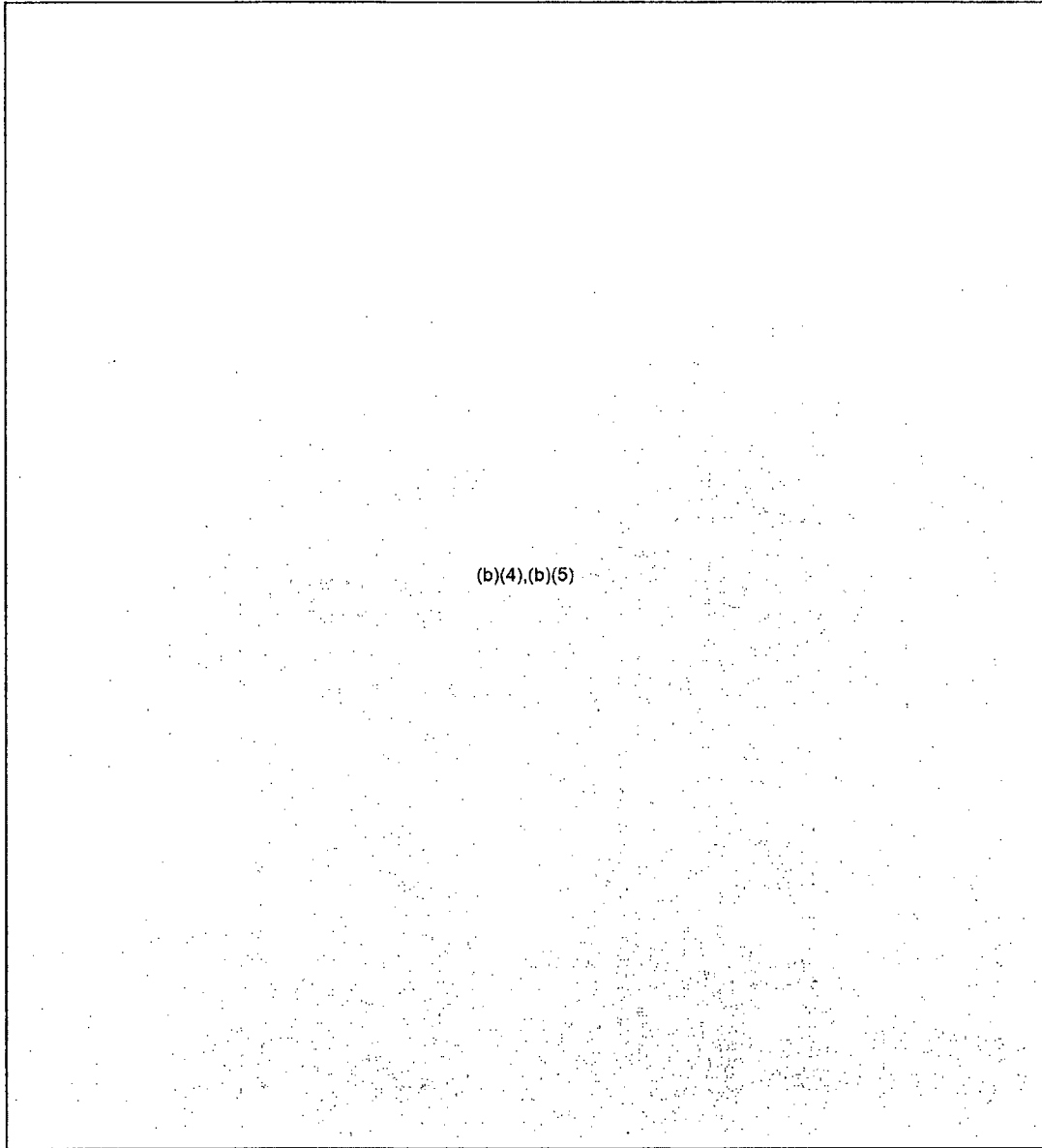
Fuel recovered: No

Description:

- 1+1/3 core (4 batch) is 1 to 2 years old
- 100% of total inventory damaged

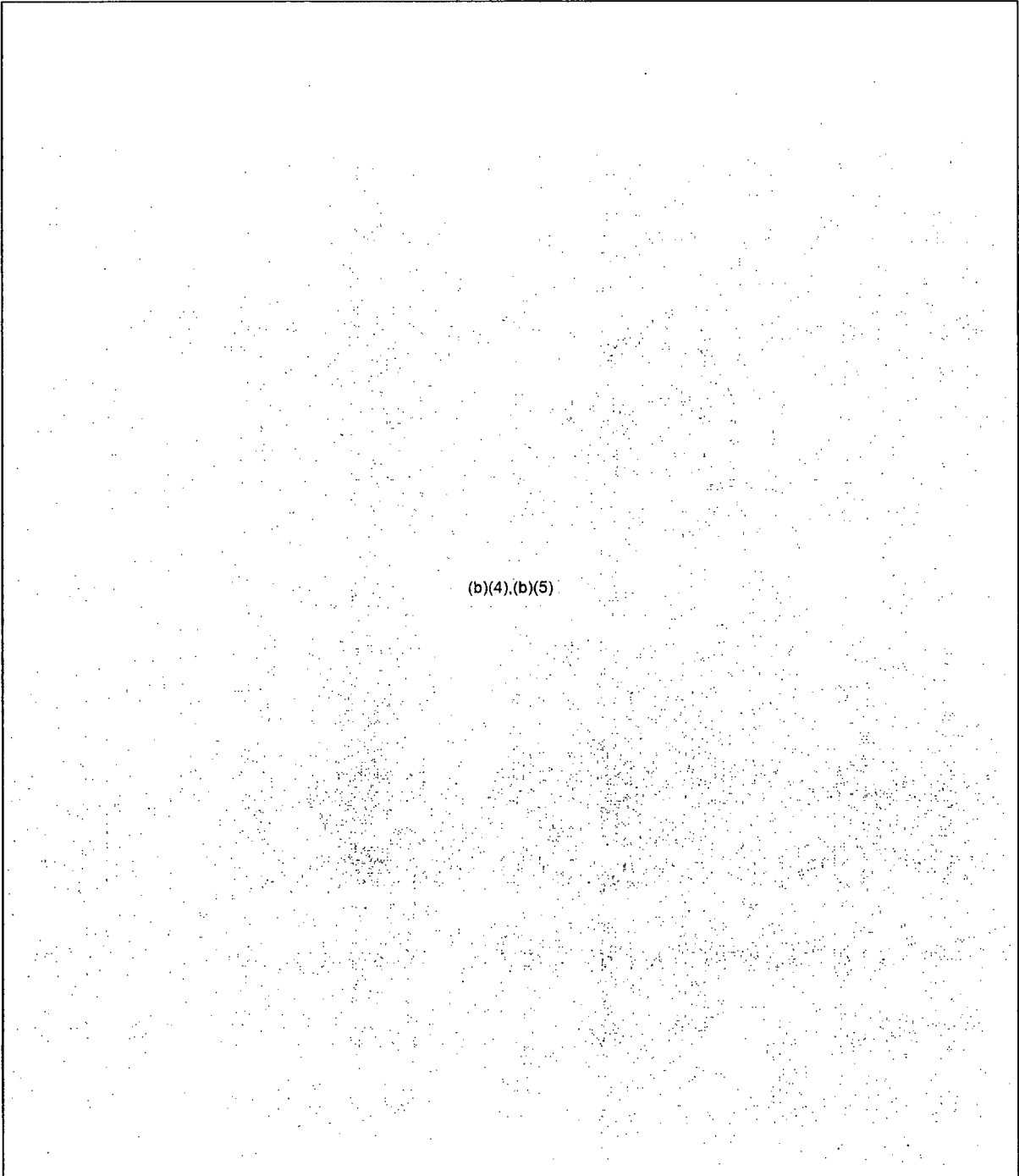
Isotope Mix and Release Quantity





(b)(4),(b)(5)

**Appendix 2. Modified SuperCore Source Term and CMHT Top 20 Radionuclide List
for Dose Calculation**



(b)(4),(b)(5)

**NARAC Plume Model Dose Projections for the
Updated NRC Plausible Realistic Scenario Based on Japan Reactor Information
Hypothetical Reactor Release**

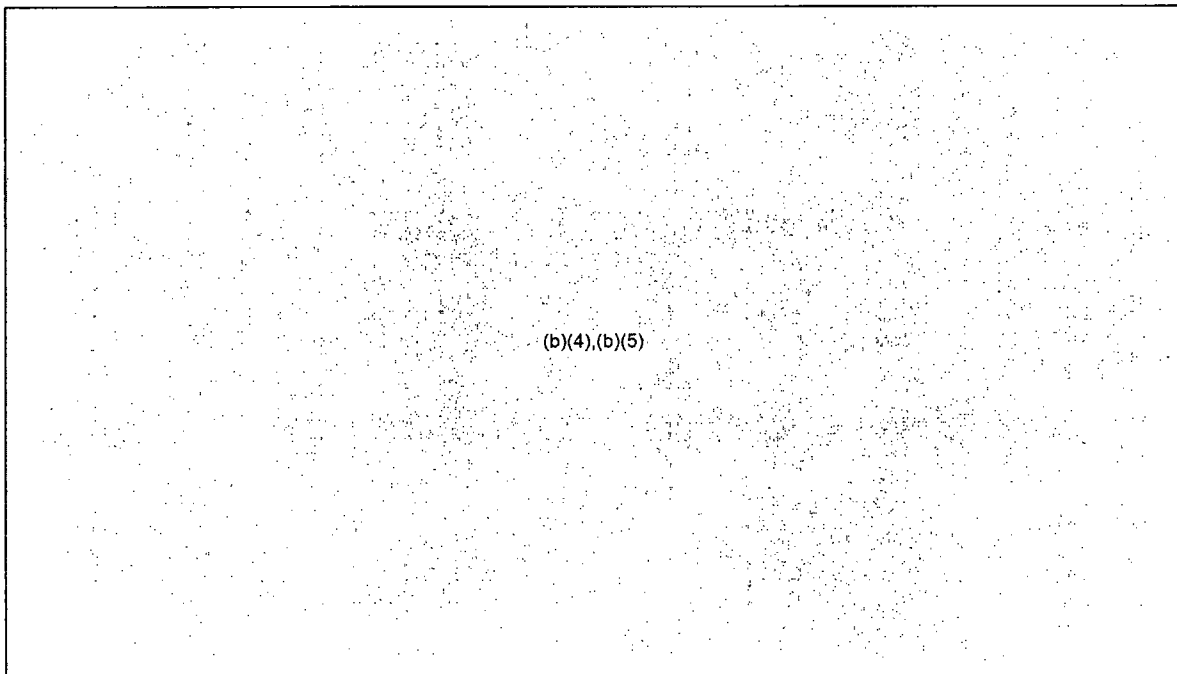
Issue Date: 1450 UTC March 25, 2011

Summary

The objective of the attached NARAC (National Atmospheric Release Advisory Center) calculations is to develop estimates of the potential radiological dose that may be received in Japan based on the NRC's updated "Plausible Realistic Scenario" for the Fukushima Dai-ichi Nuclear Power Plant (NPP). The levels of concern are listed below based on the US EPA/FDA Protective Action Guides.

	US EPA/FDA Protective Action Guide Values	US EPA/FDA Protective Actions Guides to Consider
Total Effective Dose	Greater than 1-5 rem	Evacuation or sheltering
Radioiodine Dose to <i>Child</i> Thyroid	Greater than 5 rem	Administration of Potassium Iodide (KI)
Radioiodine Dose to <i>Adult</i> Thyroid	Greater than 10 rem	Administration of Potassium Iodide (KI)

Source Term Summary



(b)(4),(b)(5)

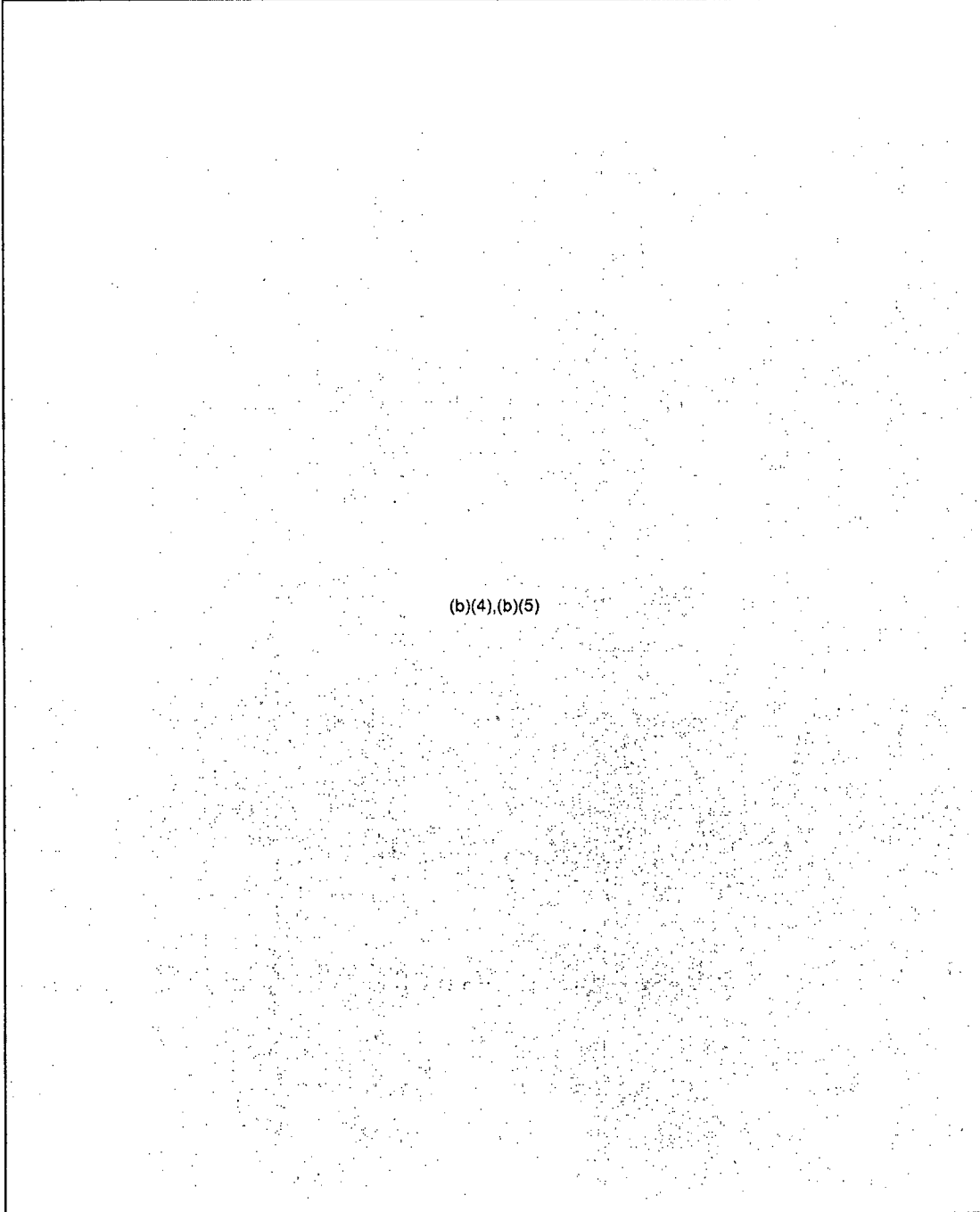
NARAC Modeling Assumptions

(b)(4),(b)(5)

NARAC Model Results

(b)(4),(b)(5)

Appendix 1. List of Radionuclides Used in NARAC Simulations



(b)(4),(b)(5)

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From: Kelly, John E (NE)
To: DL-NITSolutions
Subject: FW: Reactor Safety Team Assessment 2000 EDT 3-24-2011
Date: Friday, March 25, 2011 1:50:24 PM
Attachments: 03-24-11 2000 RST Assessment Document.docx

Integrated DOE-NRC-INPO report to Japan

From: Versluis, Rob
Sent: Thursday, March 24, 2011 10:28 PM
To: DL-NERT-All
Subject: Fw: Reactor Safety Team Assessment 2000 EDT 3-24-2011

Fyi

Rob Versluis +1-301-903-1890(o) (b)(6)

From: RST01 Hoc <RST01.Hoc@nrc.gov>
To: RST01 Hoc <RST01.Hoc@nrc.gov>; RST02 Hoc <RST02.Hoc@nrc.gov>; mossdj@inpo.org <mossdj@inpo.org>; Casto, Chuck <Chuck.Casto@nrc.gov>; Nakanishi, Tony <Tony.Nakanishi@nrc.gov>; Monninger, John <John.Monninger@nrc.gov>; Devercelly, Richard <Richard.Devercelly@nrc.gov>; Foster, Jack <Jack.Foster@nrc.gov>; Trapp, James <James.Trapp@nrc.gov>
Cc: RST03 Hoc <RST03.Hoc@nrc.gov>; INPOERCAssistance <INPOERCAssistance@inpo.org>; Ruland, William <William.Ruland@nrc.gov>; Versluis, Rob
Sent: Thu Mar 24 22:25:22 2011
Subject: Reactor Safety Team Assessment 2000 EDT 3-24-2011

All,

The reactor safety team has compiled its assessment report of conditions and recommendations at the damaged Fukushima Daiichi reactor plants.

Shortly after our completion of the attached report, the RST received a new update from JAIF with a time-date stamp of 2200 JDT 3/24/2011 (0900 EDT 3/24/2011), that indicates changes in their view of containment integrity in units One and Three, indicating the containment vessel integrity status as "Not Damaged". This information has not been factored into the assessment report, and the RST will be moving forward to review and evaluate this latest status report.

We request that our INPO addressee please forward this assessment to the EPRI staff who are involved in this event response activity.

If you have any comments or questions on this report, please contact the

Reactor Safety Team at RST01.Hoc@nrc.gov.

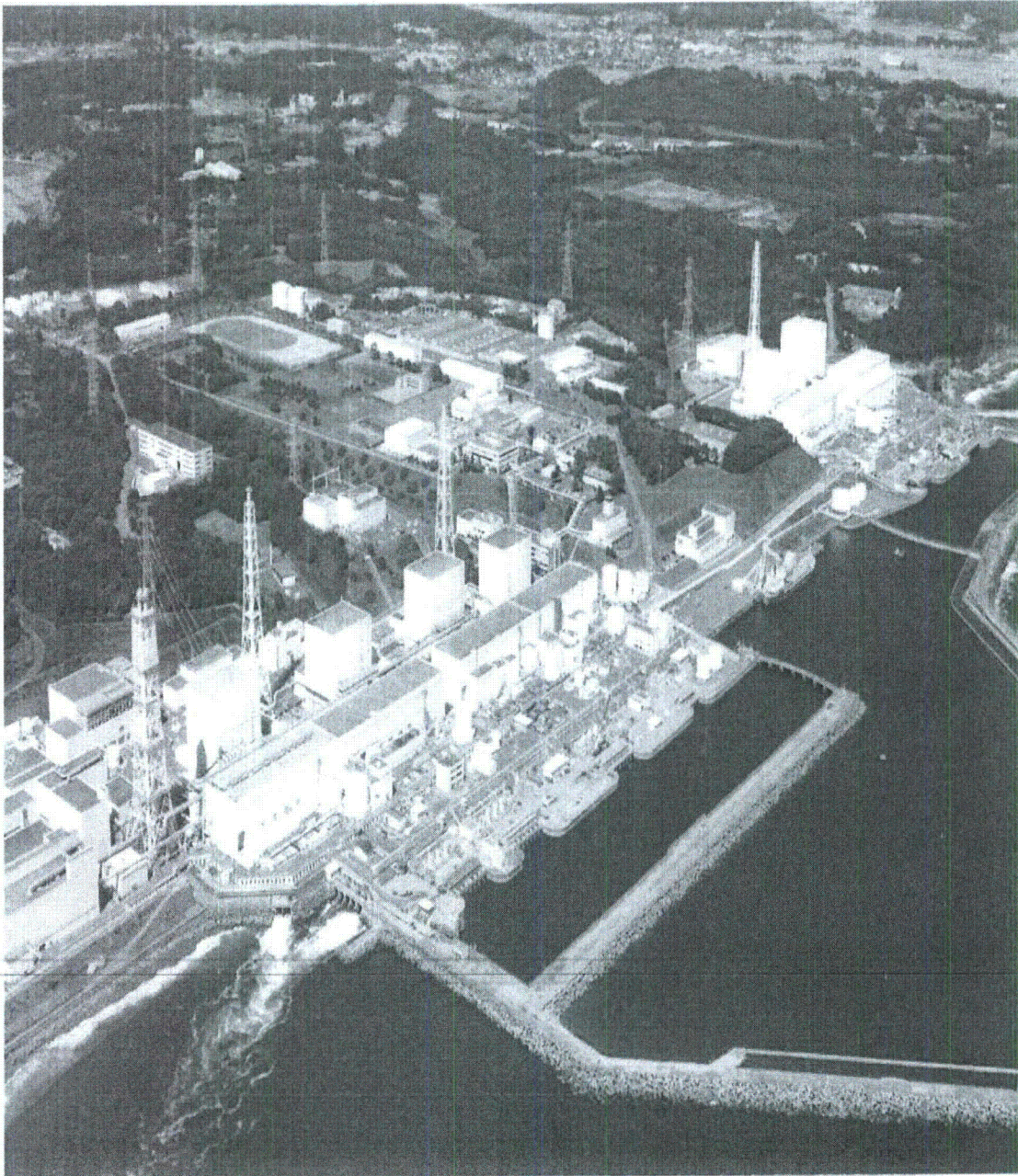
John Thorp

RST Chronologist Evening Shift, 3/24/2011



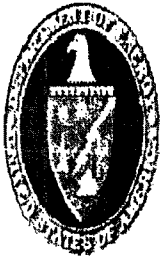
Japan Earthquake Response

April 5, 2011 // 1800EDT



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1



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**Contact: DOE/NNSA Nuclear Incident
Team: NITOPS@nnsa.doe.gov**

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Current Status

- ◆ No major changes in airborne radiation levels at the Fukushima Daiichi Power Plant
- ◆ Status of reactors 1-4 (water/pressure levels, status of water pumps, and electrical connectivity) provided in accompanying text SITREP
- ◆ The Japanese national government is now encouraging evacuation for local residents within the 20-30 km radius of the site boundary. This is a slight change from the previous voluntary evacuation with shelter in place for the 20-30 km zone.
- ◆ On a trial basis, synthetic resin was sprayed to prevent the spread of radioactive dust near the common spent fuel pool.
- ◆ TEPCO continues to address issues with water in trenches outside turbine buildings of Units 1, 2 and 3
 - A 20 cm crack was found in a pit connected to the Unit 2 turbine building and is leaking radioactive water into the ocean. TEPCO currently attempting to infuse liquid glass to seal the leak. A test using a dye agent showed the possibility that the radioactive water is leaking from a cracked pipe, and then seeping through gravel into the concrete pit.
 - TEPCO constructing a water treatment facility to reduce activity in water discharged to the sea and considering using a large floating platform to store up to 10,000 tons of radioactive water.
- ◆ Large Putzmeister concrete pump being flown to JPN
- ◆ Water Storage and Disposal
 - At 1900 JST of April 4, TEPCO began discharging to the sea the low radioactive waste water stored in the Central Radioactive Waste Disposal Facility and the low level radioactive subsurface water stored in the sub drain pits. By noon Tuesday, an estimated 3,430 tons of low level radioactive water was discharged into the Pacific Ocean.
 - GOJ requested on behalf of TEPCO 5 Savanna River Site storage tanks and high activity trailer
 - GOJ requested Russia to send ship "Suzuran" used to decommission nuclear submarines to treat and store radioactive water

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DOE/NNSA Emergency Response

◆ Command, Control, Coordination:

- **Nuclear Incident Team (NIT):** Coordinating overall emergency response
- **Policy Working Group (PWG):** Coordinating overall policy
- **Senior Energy Official:** Primary Manager of deployed field teams
- **Liaisons:** DART, USPACOM, USAID, NRC

◆ Modeling

- **National Atmospheric Release Advisory Center (NARAC):** conducting predictive radioactive atmospheric dispersion modeling

◆ Monitoring and Sampling

- **Consequence Management Response Team (CMRT):** Conducting ground monitoring, air sampling and initial results analysis
- **Aerial Measuring System (AMS):** Conducts aerial detection for mapping radiological ground material deposits
- Currently 3 platforms: 1 Fixed, 2 Rotary

◆ Assessment

- **Consequence Management Home Team (CMHT):** Scientific assessment of data updated daily from ground measurements and AMS flights

◆ Medical Consultation

- **Radiation Emergency Assistance Center/Training Site (REAC/TS):** Providing medical advice about radiological exposure

Deployed* (39)

Yokota AB

- (2) SEO
- (1) SEO Staff
- (24) CMRT
- (7) AMS

US Embassy Tokyo

- (4) DART LNO

USPACOM HQ

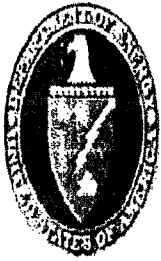
- (1) LNO

Upcoming personnel changes:

Several personnel enroute to/from Japan 3-6 April.

**The number deployed does not currently reflect DOE/NNSA personnel assisting in nuclear energy (NE) aspects of the response.*

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Significant Events: Past 24 Hrs.

International Engagement:

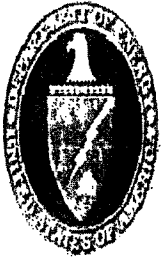
- ◆ US Embassy met with MOFA and MEXT to request approval for placing early warning sensors at specific locations
- ◆ 2 High Purity Germanium (HPGe) detectors being shipped to GOJ to support sample analysis
- ◆ Japan shipping more than 90 soil samples (on Friday) to Savannah River Site for lab analysis
- ◆ MG Bansho, JSDF received briefing and tour from CMRT

Nuclear Incident Team:

- ◆ Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, DIA, NCMI, and WH
- ◆ Continued coordination of rotation for deployed personnel

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Significant Events: Past 24 Hrs.

Operations:

- ◆ Modeling
 - NARAC: Continued work on products normalizing NARAC models to measurements taken in the field. Preliminary assessment of time correlated deposition and further assessment of dose rate measurements correlated to actual weather patterns
- ◆ Field Monitoring and Assessment
 - AMS UH-1 (1): Survey along eastern flanks of mountains on west side of Tohuka Expressway north to Koriyama to north side of Fukushima
 - AMS UH-1 (2): No mission today
 - AMS C-12: Survey N and NE of Fukushima Daiichi plant near shoreline primarily over water
 - Ground teams: Completed beta/gamma exposure rate surveys. Radionuclide evaluations are to include in-situ measurement assessment of gamma isotopes. Continued monitoring activities at US Embassy Japan and Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokosuka Naval Base
- ◆ Medical Consult
 - Nothing substantial to report

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EZ 526 of 810



Data Inputs

♦ Monitoring

- 232 hours total flying time for Aerial Measuring System (AMS) fixed and rotary-wings
- Approximately 100,000 total field measurements taken by DOE, DoD, and GOJ fixed stations and deployed teams

♦ Sampling

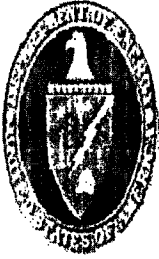
- 240 total air samples taken at US facilities throughout Japan undergoing lab analysis in US
- 1 US soil sample at LLNL for lab analysis

Organizations Providing Data

- ♦ Consequence Management Response Team
 - CMRT
 - AMS
 - AFRAT
- ♦ External US
 - Japan Emergency Command Center, US Embassy, Tokyo
 - USAF, BSC Commander
 - USAF, WC-135 Constant Phoenix
 - Futenma Marine Corps Air Station
 - Nuclear Regulatory Commission
 - Naval Reactors
- ♦ Japan
 - Ministry of Foreign Affairs (MOFA)
 - Nuclear Safety Technology Center (NUSTEC)
 - Tokyo Electric Power Company (TEPCO)
 - Ministry of Agriculture, Forestry and Fisheries (MAFF)
 - Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
 - Ministry of Health, Welfare and Labor
 - Nuclear and Industrial Safety Agency (NISA)
 - Nuclear Safety Commission

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Guide to Interpretation

US EPA Derived Response Levels (DRLs) for Evacuation and Relocation

■ Early Phase DRL

If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated by red.

First Year DRL

If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated by orange.

Fifty Year DRL

If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area falls within the second year DRL.

Second Year DRL

If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated by yellow.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years).

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Guide to Interpretation

Areas at Risk for Agricultural Contamination

Aerial measurements can indicate areas where agricultural monitoring and sampling should occur, although they cannot directly determine the amount of contamination of agricultural products grown in these areas.

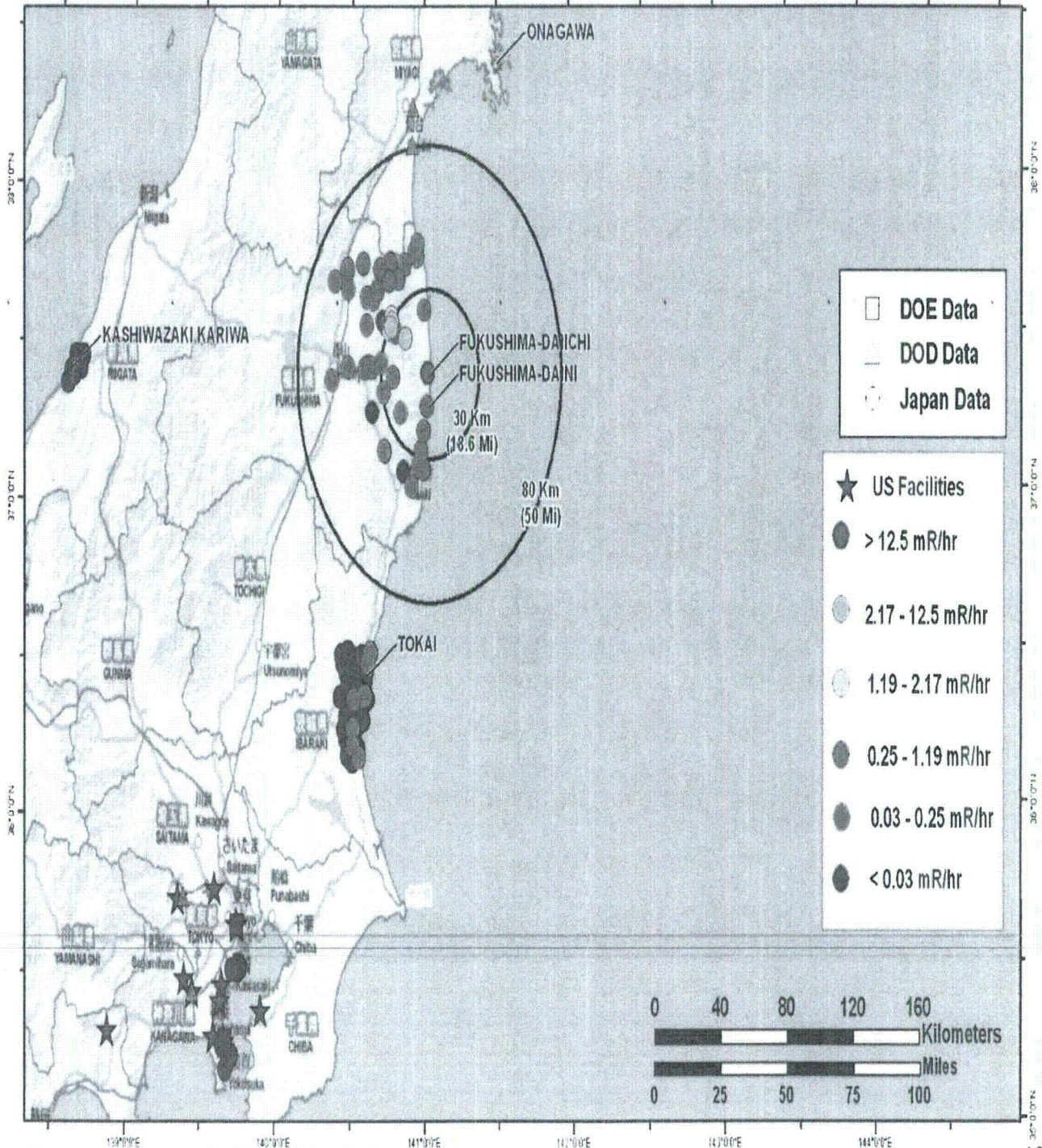
AMS monitoring results in areas beyond 25 miles from the Fukushima Daiichi reactors show areas where dose rates are many times higher than historical background.

The measured external dose rates in these areas are not high enough to warrant evacuation or relocation of the population, however, lower levels of radioactive contamination in agricultural products provide more of a risk because the radioactive material can be ingested into the body. Agricultural monitoring in these areas may be warranted.

◆ Areas 10 to 100 times historical background are indicated by green.

◆ Areas 2 to 10 times historical background are indicated by light blue.

◆ Areas at or near historical background are indicated by dark blue.

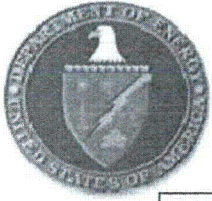


Map created on 04062011 0350 JST

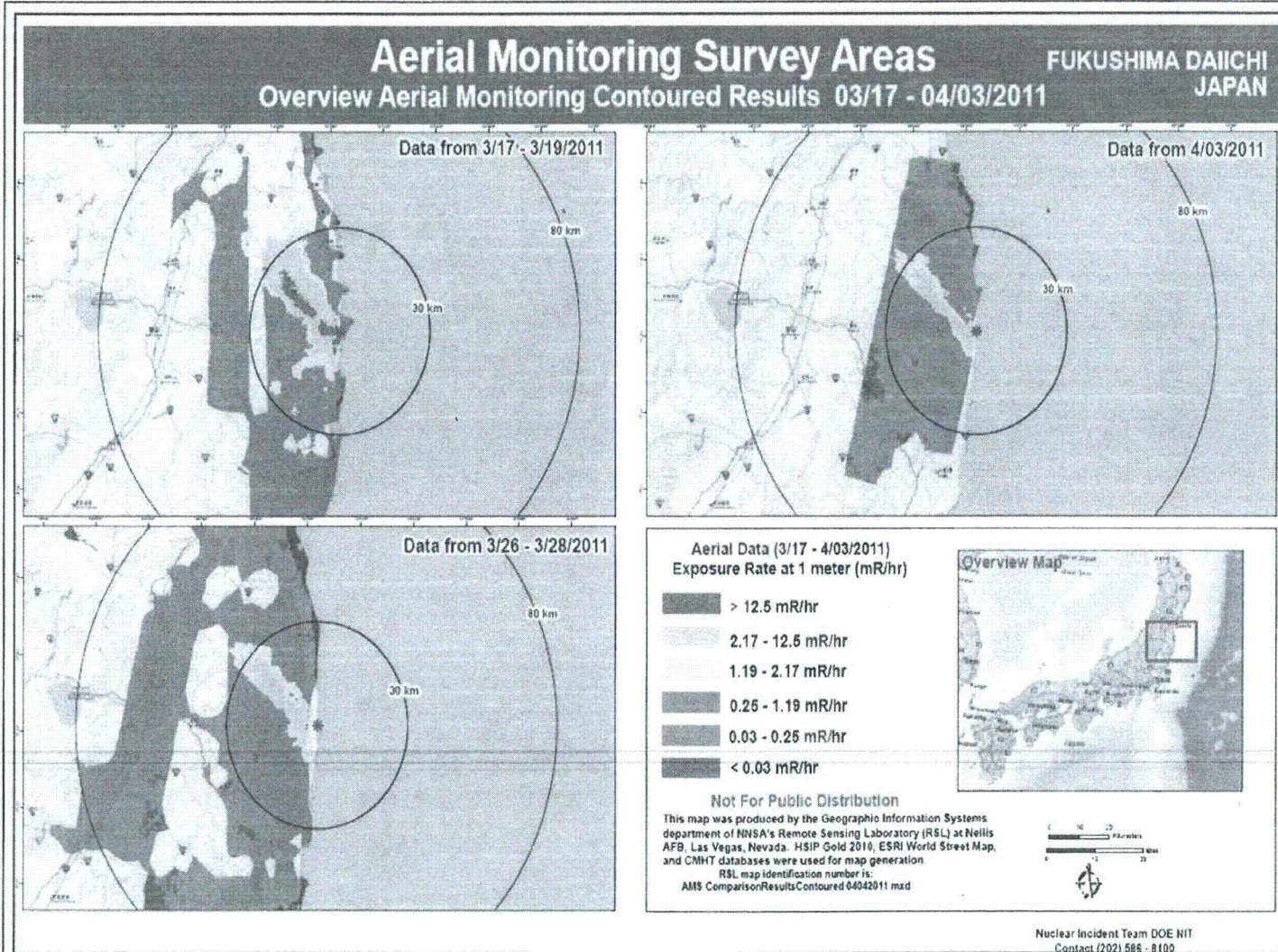
Name: NIT 24hrsMonitoringResults 05Apr2011 0100

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Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100



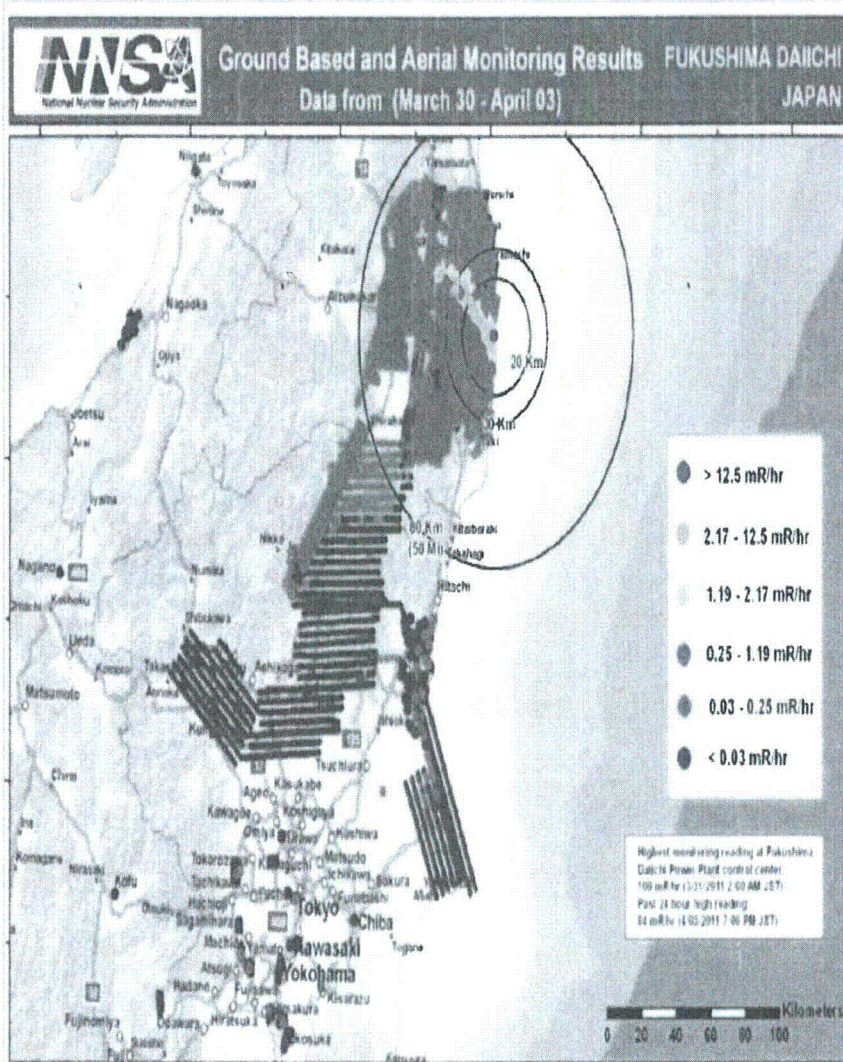
Time Series Analysis



EZ 531 of 810



DOE/NNSA Monitoring



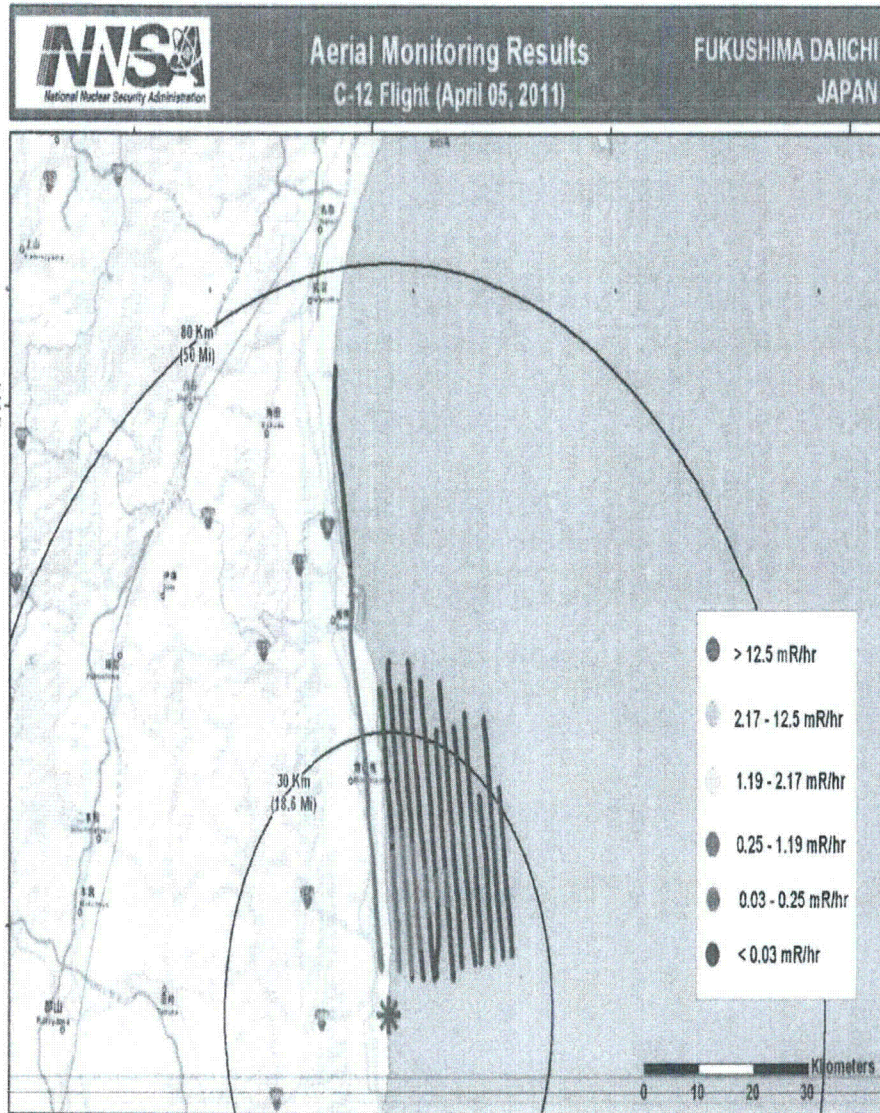
Assessment:

- ♦ Rapid decay of deposited radiological material indicates Radioiodine is the most significant component of dose;
- ♦ Radiation levels consistently below actionable levels for evacuation or relocation outside of 25 miles; and levels continue to decrease
- ♦ No measurable deposition of radiological material since March 19th;
- ♦ US bases and facilities all measure dose rates below $32\mu\text{R/hr}$ – a level with no known health risks;
- ♦ Agricultural monitoring and possible intervention will be required for several hundred square kilometers surrounding the site;
 - Soil and water samples are the only definitive method to determine agricultural countermeasures
 - Ground monitoring can give better fidelity to identify areas that require agricultural sampling

This product is an aggregate of data collected from March 30 – April 3, 2011. Monitoring results are derived from aerial measuring platforms and validated where possible by ground survey teams.



First Over Water Flight



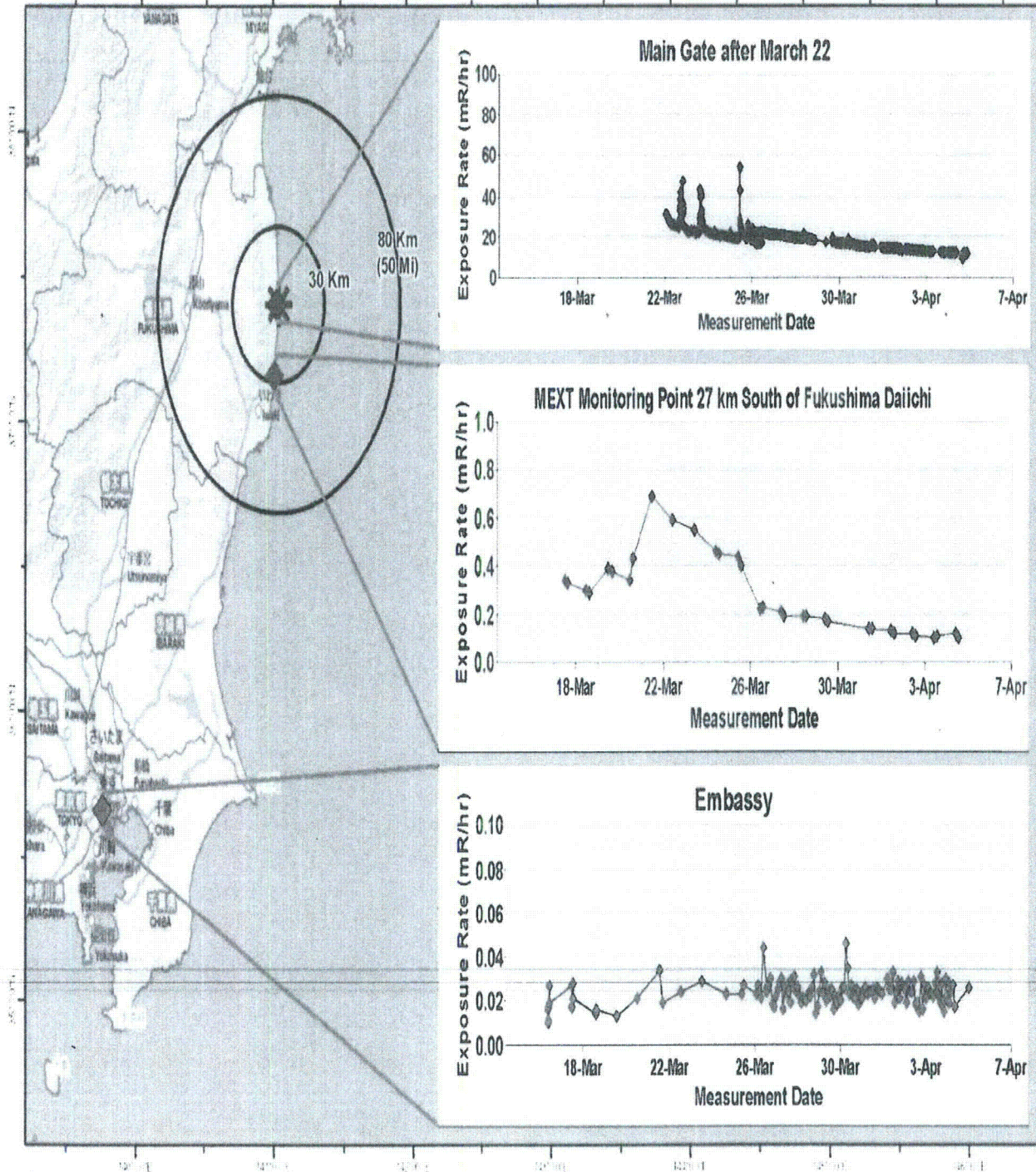
Assessment:

- ◆ Preliminary DOE measurements indicate a release of radiological material extending 20 kilometers North of the Fukushima plant and greater than 10 kilometers out to sea;
- ◆ Aerial measurements are normally corrected to show contamination on a solid surface; for measurements over water the analysis is more complex since the material is distributed throughout the water column;
- ◆ This aerial survey only reflects radiological material near (or above) the surface and provides a qualitative measure of the contamination;
- ◆ DOE measurements April 5th indicate areas where further measurements and water sampling is advisable;
- ◆ Analyzing water samples is the most direct way of measuring the amount of radiological material in the water:
- ◆ The Government of Japan is currently sampling water in multiple locations around the plant
- ◆ These data will be provided to the government of Japan to assist in their monitoring efforts



Exposure Rate Trends From Fukushima South to the U.S. Embassy

FUKUSHIMA DAIICHI
JAPAN



Map created on 04052011 2300 JST
Name: CMHT Mon Trend 05Apr2011 Simplified

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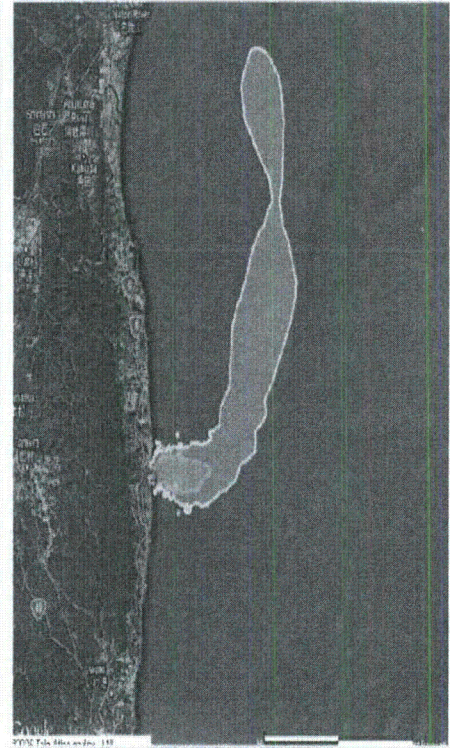
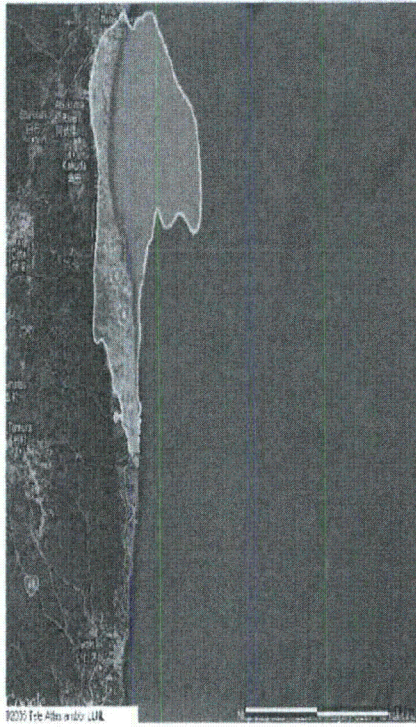
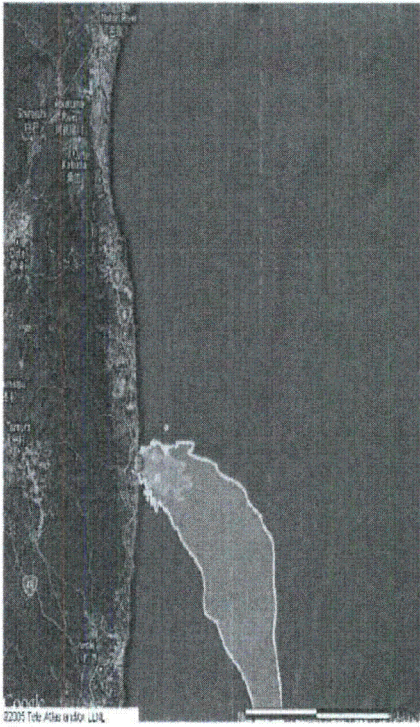


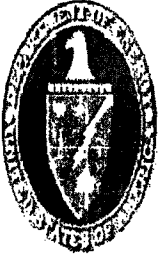
Forecasted Weather April 6-7, 2011

04/06/2011 07:00:00 JST

04/06/2011 18:00:00 JST

04/07/2011 00:00:00 JST





Planned Operations: Next 24 Hrs

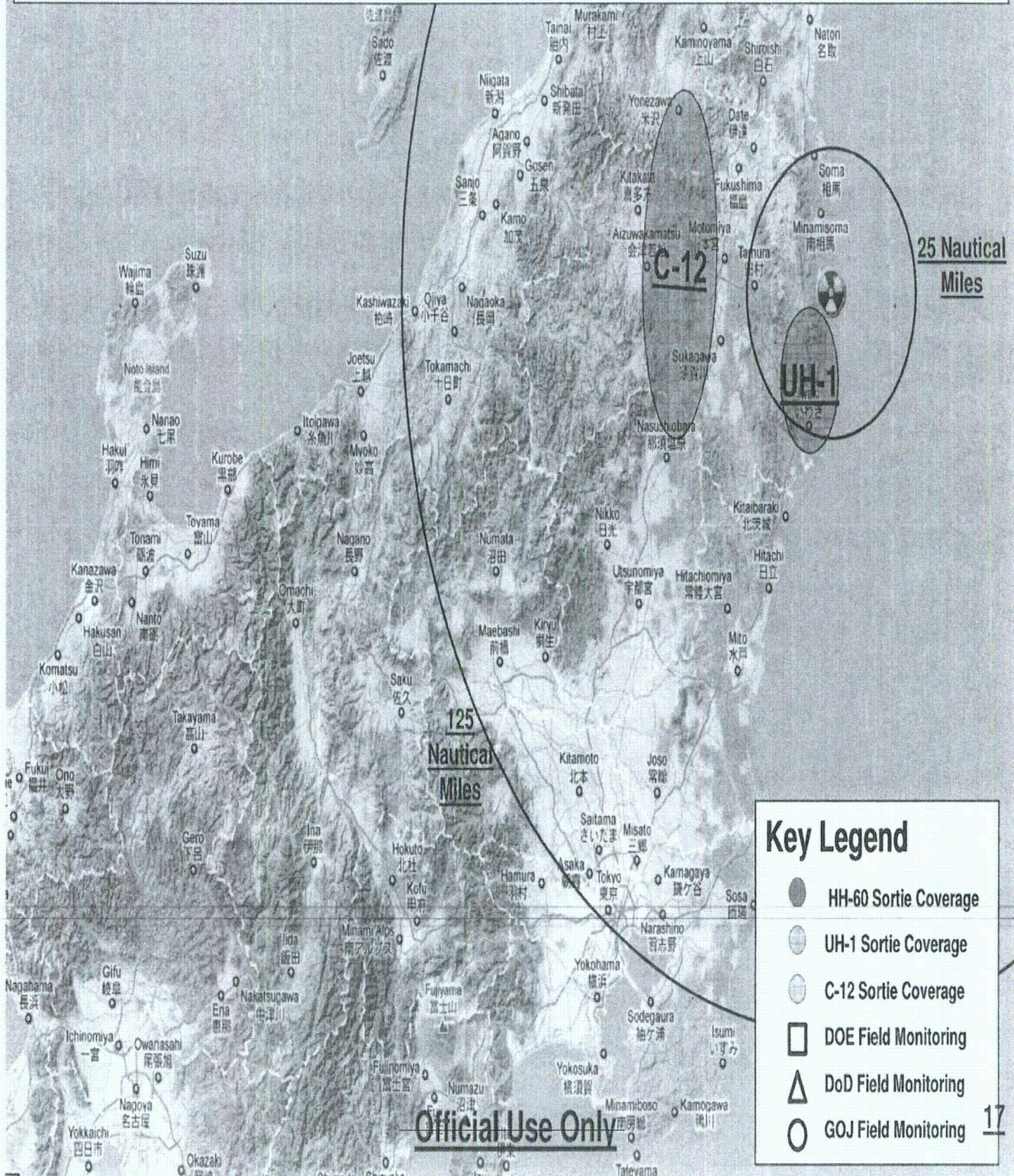
- ◆ Aerial Monitoring
 - AMS UH-1: Fly from Fukushima Daiichi plant south to 30 km line along coast
 - AMS C-12: Fly west of Fukushima Daiichi plant between 40-60 km
 - Flights are being coordinated with GOJ MEXT
 - All areas inside of 80 km from plant will be surveyed in period 6-12 April
 - AMS will fly inside 60 km line; MEXT will fly outside 60 km line
- ◆ Ground Monitoring
 - Complete beta/gamma exposure rate surveys. Radionuclide evaluations are to include in-situ measurement assessment of gamma isotopes.
 - Continue monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, Yokota AB, and Yokosuka Naval Base
 - Continuing work to implement the Early Warning Array
- ◆ Ambassador Roos visiting Yokota and will meet with CMRT

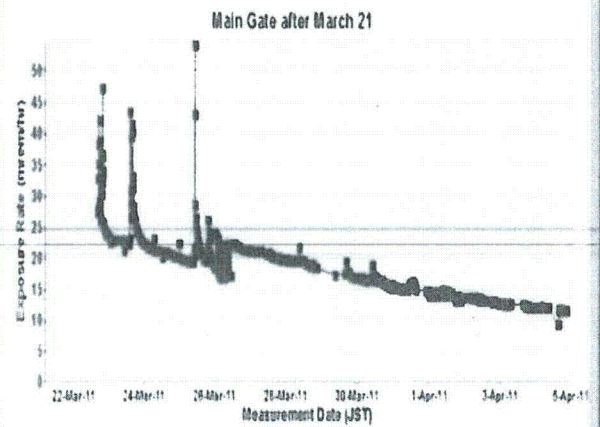
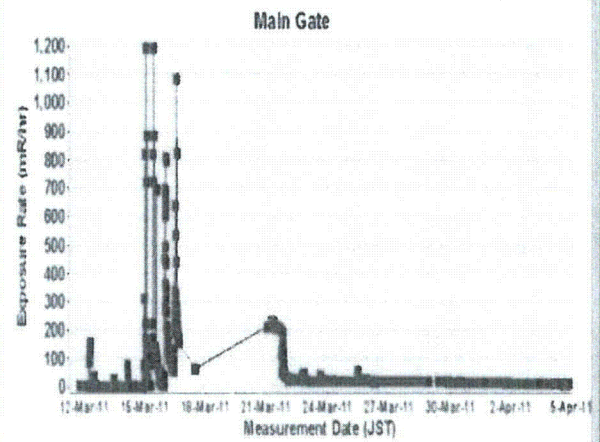
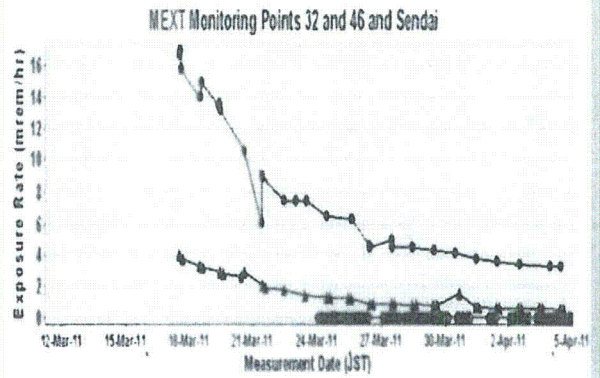
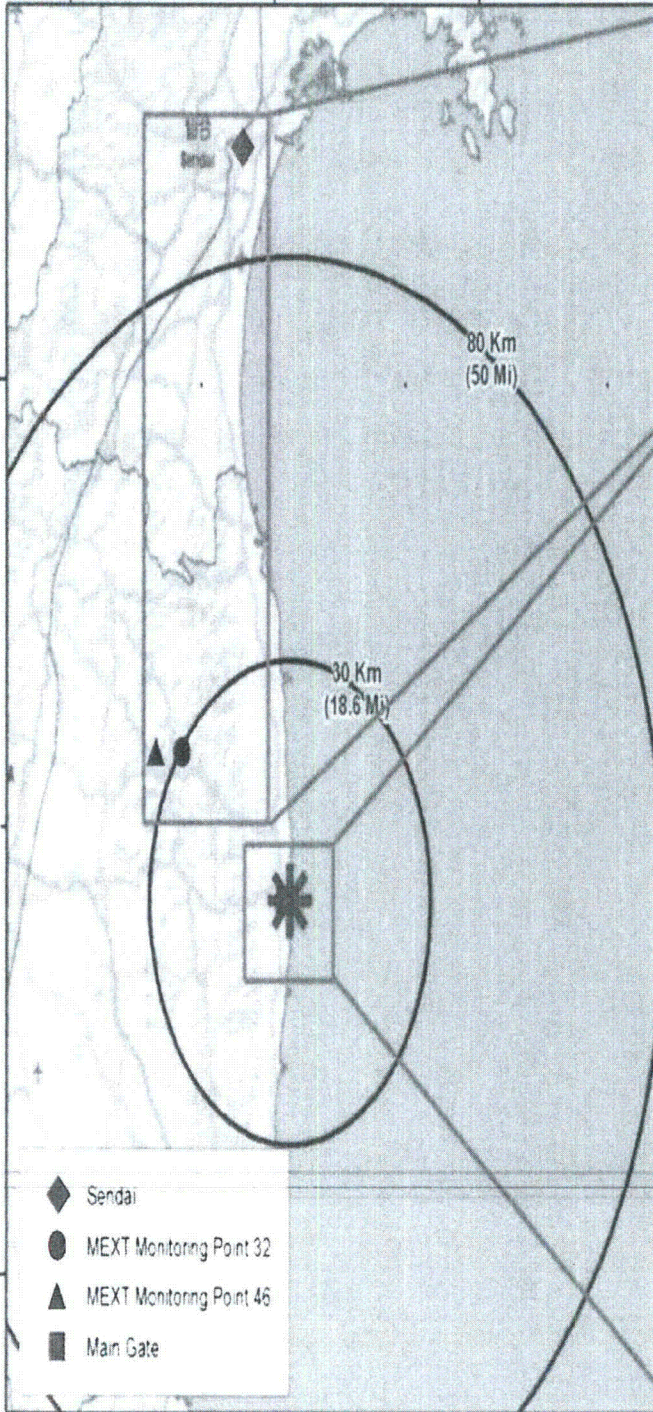
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Planned Aerial/Field Monitoring Operations

April 6, 2011 Operational Period

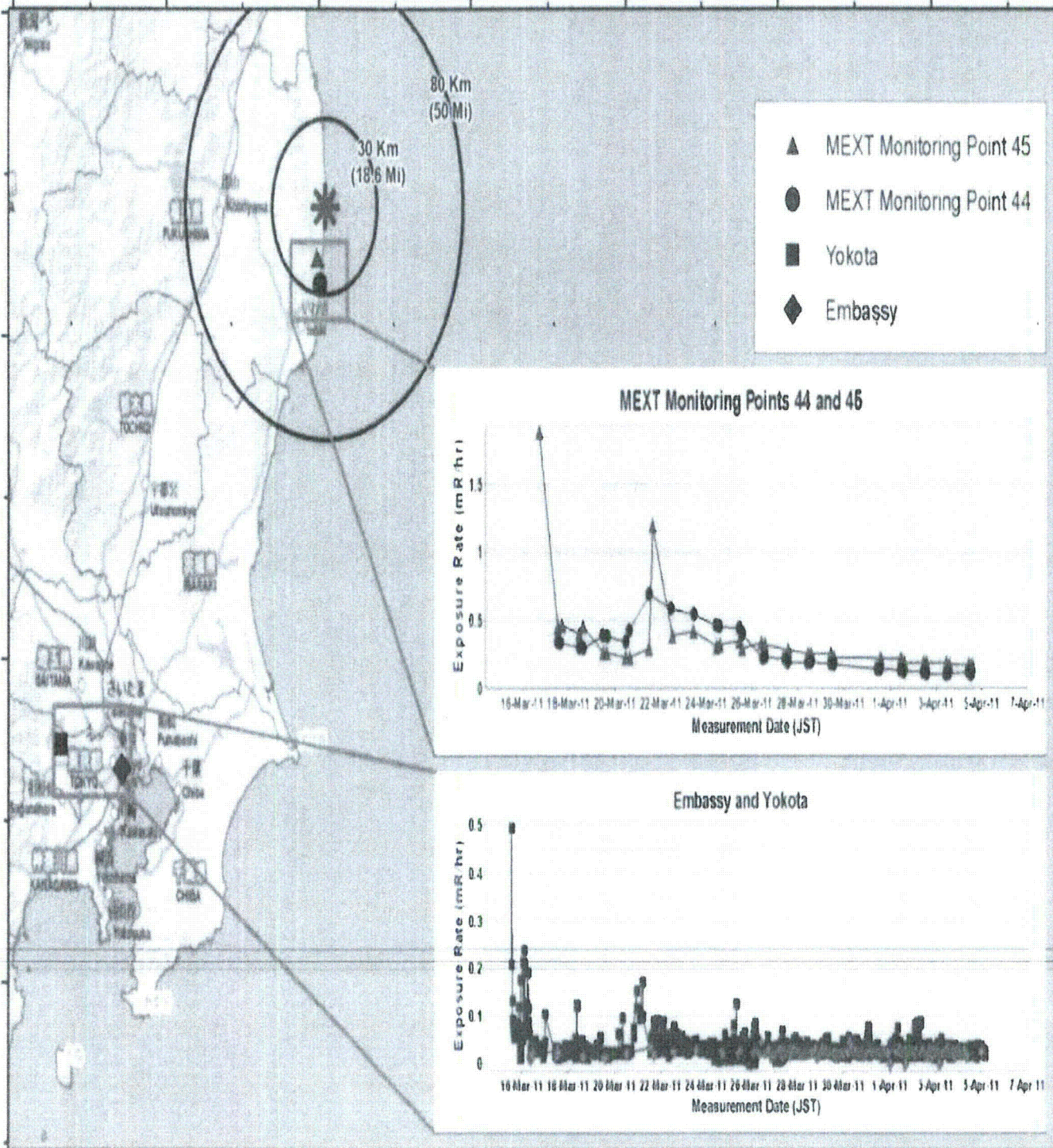




Map created on 04042011 1930 JST
Name: NIT MonTrend 04Apr2011 wPAGs North

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Map created on 04052011 2000 JST
Name: NIT MonTrend 04Apr2011 w/PAGs South

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Aerial and Ground Monitoring Data Assessment

- ◆ An assessment of measurements gathered through 4 April continues to show:
 - Radiation levels consistently below actionable levels for evacuation or relocation outside of 25 miles
 - Radiological material has not deposited in significant quantities since 19 March

- ◆ An assessment of measurements gathered at US military installations in the Tokyo area through 4 April shows:
 - Radiation levels far below actionable levels for evacuation or relocation
 - All aerial measurements at US facilities were less than 32 $\mu\text{R/hr}$ - a level that poses no known health risk

- Monitoring of these locations will continue although no increases in deposited radiation are anticipated

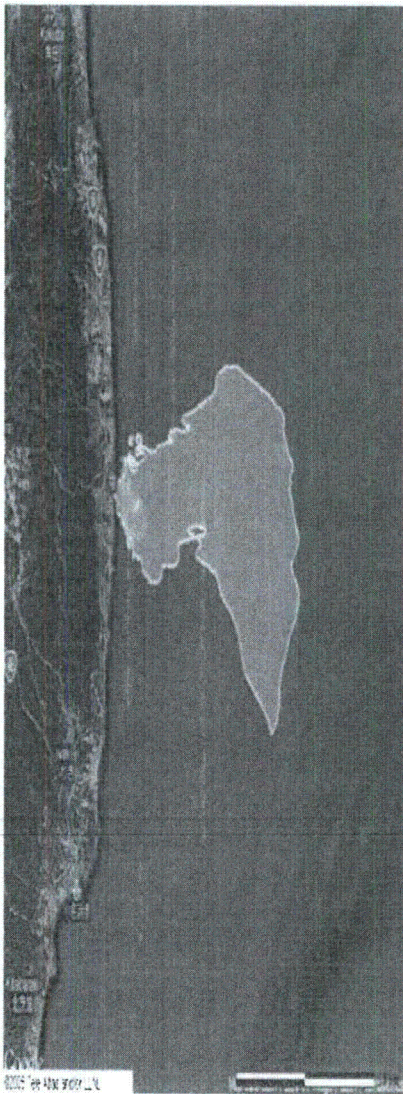
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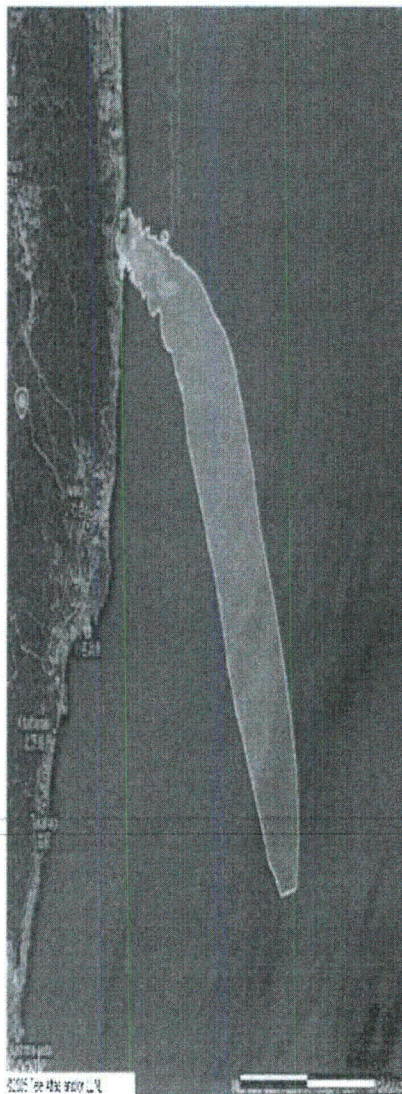
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Forecasted Weather April 5-6, 2011

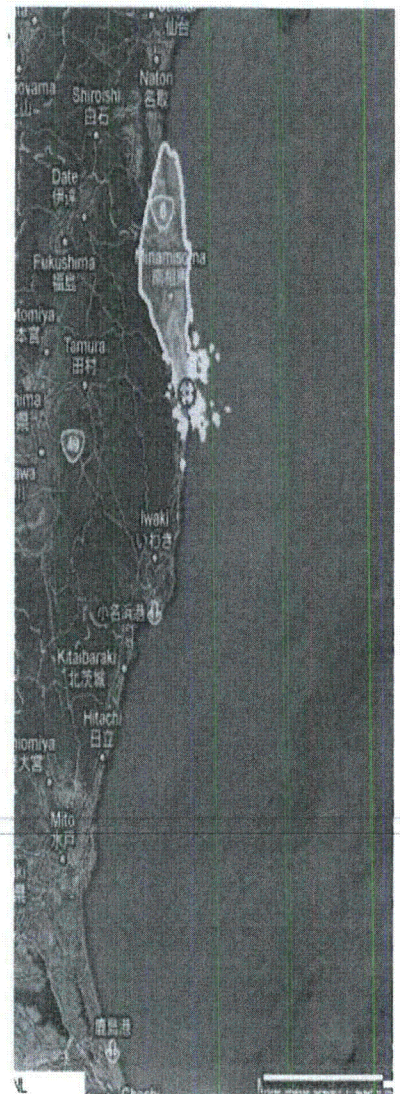
04/05/2011 20:00:00 JST



04/06/2011 08:00:00 JST



04/06/2011 18:00:00 JST



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Planned Operations: Next 24 Hrs

◆ Aerial Monitoring

- AMS UH-1: Fly from Fukushima Daiichi plant south to 30 km line along coast
- AMS C-12: Fly west of Fukushima Daiichi plant between 40-60 km
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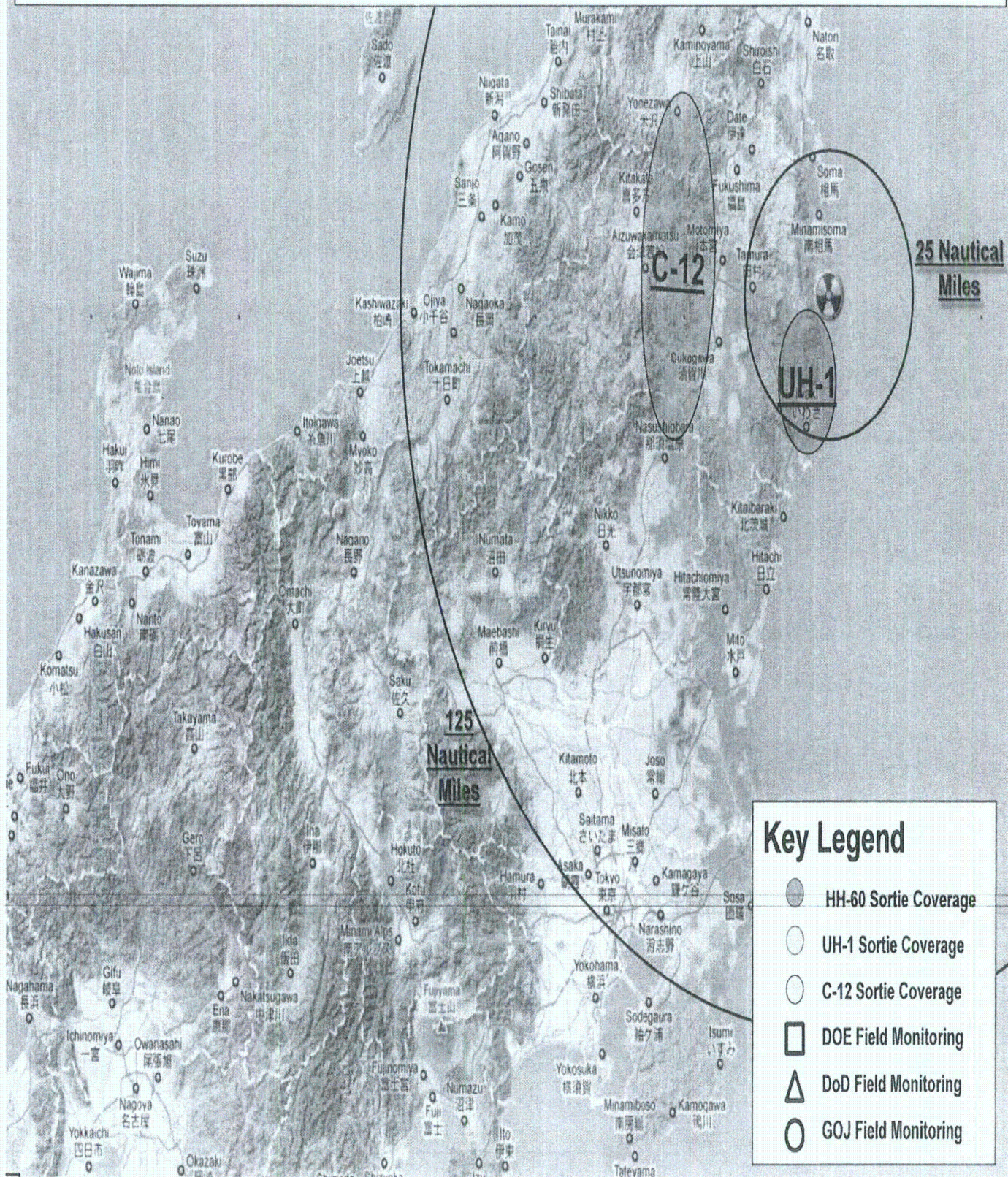
◆ Ground Monitoring

- Complete beta/gamma exposure rate surveys. Radio nuclide evaluations are to include in-situ measurement assessment of gamma isotopes.
- Continue monitoring activities at the US Embassy Japan and the Embassy Resident Towers in Tokyo, CMOC TOC at Yokota AB, and Yokuska Naval Base.
- ~~Continuing work to implement the Early Warning Array utilizing Infields and SMC.~~

- Ambassador Roos visiting Yokota and will meet with CMRT

Planned Aerial/Field Monitoring Operations

April 6, 2011 Operational Period

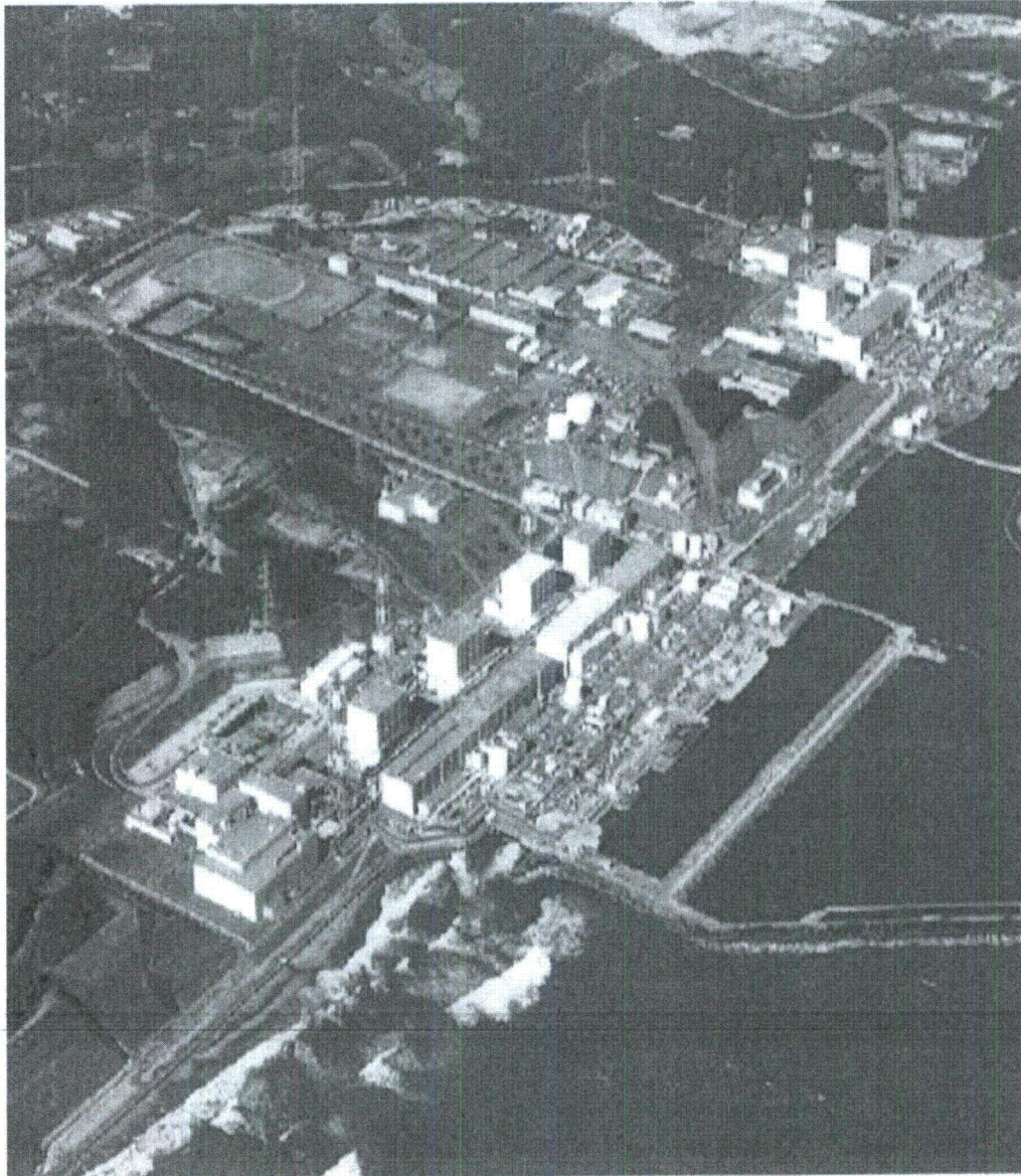




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Japan Earthquake Response

April 3, 2011 // 0600 EDT



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Team: NITOPS@nnsa.doe.gov**

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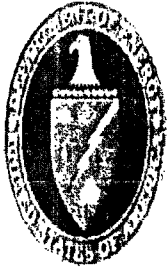


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Current Status

- ◆ No major changes in airborne radiation levels at the Fukushima Daiichi Power Plant
- ◆ Additional power plant status in accompanying text SITREP
 - Unit 1: Reactor water level stable, core damage est. 70%. Freshwater injection continues. Electrical power line connected. Pumping freshwater in spent fuel pool.
 - Unit 2: Reactor water level stable, core damage est. 33%. Spent fuel pool has been filled and fresh water injection has been reestablished after a brief suspension.
 - Unit 3: Reactor water level stable, core damage est. 33%. Freshwater injection continues; trucks pumping water into spent fuel pools.
 - Unit 4: Spraying continues periodically for the spent fuel pool. Power restored. Trucks pumping water into spent fuel pool.
- ◆ Synthetic resin sprayed near reactor to fix contamination
- ◆ TEPCO continues to address issues with water in the trenches outside the turbine buildings of Units 1, 2 and 3
 - A 20 cm crack has been found in a pit connected to the Unit 2 turbine building and is leaking radioactive water into the ocean. Rad levels in the pit exceed 1000 mSv/hr. TEPCO is having difficulty patching the crack with concrete and an additional attempt will be made using a polymeric material with additional concrete on April 4.
 - TEPCO constructing a water treatment facility to reduce activity in water discharged to the sea and considering using a large floating platform to store up to 10,000 tons of radioactive water.
- ◆ The Japanese national government is now encouraging evacuation for local residents within the 20-30 km radius of the site boundary. This is a slight change from the previous voluntary evacuation with shelter in place for the 20-30 km zone.

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DOE/NNSA Response

◆ Command, Control, Coordination:

- **Nuclear Incident Team (NIT):** Coordinating overall emergency response
- **Policy Working Group (PWG):** Coordinating overall policy
- **Senior Energy Official:** Primary Manager of deployed field teams
- **Liaisons:** DART, USPACOM, USAID, NRC

◆ Modeling

- **National Atmospheric Release Advisory Center (NARAC):** conducting predictive radioactive atmospheric dispersion modeling

◆ Monitoring and Sampling

- **Consequence Management Response Team (CMRT):** Conducting ground monitoring, air sampling and initial results analysis
- **Aerial Measuring System (AMS):** Conducts aerial detection for mapping radiological ground material deposits
- Currently 3 platforms: 1 Fixed, 2 Rotary

◆ Assessment

- **Consequence Management Home Team (CMHT):** Scientific assessment of data updated daily from ground measurements and AMS flights

◆ Medical Consultation

- **Radiation Emergency Assistance Center/Training Site (REAC/TS):** Providing medical advice about radiological exposure

Deployed (44)

Yokota AB

- (2) SEO
- (1) SEO Staff
- (25) CMRT
- (9) AMS

US Embassy Tokyo

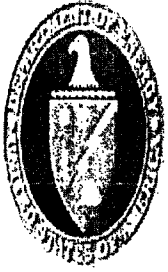
- (5) DART LNO
- (1) Nuclear Energy Representative

USPACOM HQ

- (1) LNO

Upcoming personnel changes:

Several personnel enroute to/from Japan 2-4 April.



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Mission Summary

Type	Last 24 Hours	Total
AMS Flight Hours	Aircraft still in flight	196
Field Measurements	19,492	102,237
Air Samples	120 paper filters 120 charcoal filters	120 paper filters 120 charcoal filters
Soil Samples	1	1

Field measurements are a combination of DOE, DoD, and GOJ data including automated downloads from several remotely monitored stations. Figures accurate as of 0600 EDT 3 APR 11.

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Significant Events: Past 24 Hrs.

International Engagement:

- GOJ Prime Minister's Office requested the Early Warning Line proposal come from a civilian ministry, vice MOD; DOE will try to coordinate with MEXT
- ♦ General Oriki visit to USFJ
- ♦ Coordinated further on GOJ ministries' requested support for sample analysis of food, soil, and water. Support will require sensitive detectors (High Purity Germanium), support equipment, and training

Nuclear Incident Team:

- ♦ Provided ground monitoring and aerial measuring data spreadsheets to CDC, FDA, HHS, USDA, EPA, NRC, DHS, NR, and WH
- ♦ Coordinated rotation for deployed personnel



Significant Events: Past 24 Hrs.

Operations:

◆ Modeling

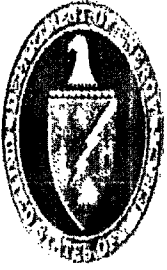
- NARAC: Continued work on products normalizing NARAC models to measurements taken in the field. Preliminary assessment of time correlated deposition and further assessment of dose rate measurements correlated to actual weather patterns

◆ Field Monitoring and Assessment

- AMS UH-1 and HH-60: Flew over US Military installations in and around the Tokyo area to provide information for USFJ to issue protective action guidance for dependents.
- AMS C-12: Flew in the valley from the south near Shirasaka to the mountains on the west side, north to Shiroy, and east to the ocean.
- 2 ground teams conducted surveys of military installations in the Tokyo area in support of the aerial mapping
- 1 ground team took ground measurements on Yokota AB

◆ Medical Consult

- Nothing substantial to report



Data Providers

◆ Japan

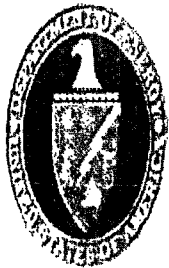
- Ministry of Foreign Affairs (MOFA)
- Nuclear Safety Technology Center (NUSTEC)
- Tokyo Electric Power Company (TEPCO)
- Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Ministry of Education, Culture, Sports, Science, and Technology (MEXT)
- Ministry of Health, Welfare and Labor
- Nuclear and Industrial Safety Agency (NISA)
- Nuclear Safety Commission

◆ Consequence Management Response Team

- CMRT/CMOC
- AMS
- AFRAT

◆ External US

- Japan Emergency Command Center, US Embassy, Tokyo
- USAF, BSC Commander
- USAF, WC-135 Constant Phoenix
- Futenma Marine Corps Air Station
- Nuclear Regulatory Commission
- Naval Reactors



Guide to Interpretation

US EPA Derived Response Levels (DRLs) for Evacuation and Relocation

■ Early Phase DRL

If a person is in danger of receiving an external radiation dose of 1 Rem over 4 days, the EPA recommends evacuation until radiation levels decrease. This area is indicated by red.

○ First Year DRL

If a person is in danger of receiving an external radiation dose greater than 2 Rem during the first year, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over a full year. This area is indicated by orange.

Fifty Year DRL

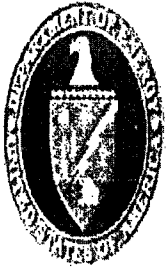
If a person is in danger of receiving an external radiation dose greater than 5 Rem over 50 years, the EPA recommends relocation until radiation levels decrease. This is not an urgent action because the dose is received over fifty years. This area falls within the second year DRL.

Second Year DRL

If a person is in danger of receiving an external radiation dose of greater than 0.5 Rem in the second year (or any subsequent year), the EPA recommends relocation until radiation levels decrease. This area is indicated by yellow.

These calculations account for multiple variables. For instance, radiation is most intense in the first days following its release therefore dose reduction may be met by evacuating early in the response.

Protective actions are frequently expressed in dose rates. The dose rate is an indicator that residents would accumulate the threshold dose if they stayed in the area the entire time expressed (e.g. 1 year, 2 years, 50 years).



Guide to Interpretation

Areas at Risk for Agricultural Contamination

Aerial measurements can indicate areas where agricultural monitoring and sampling should occur, although they cannot directly determine the amount of contamination of agricultural products grown in these areas.

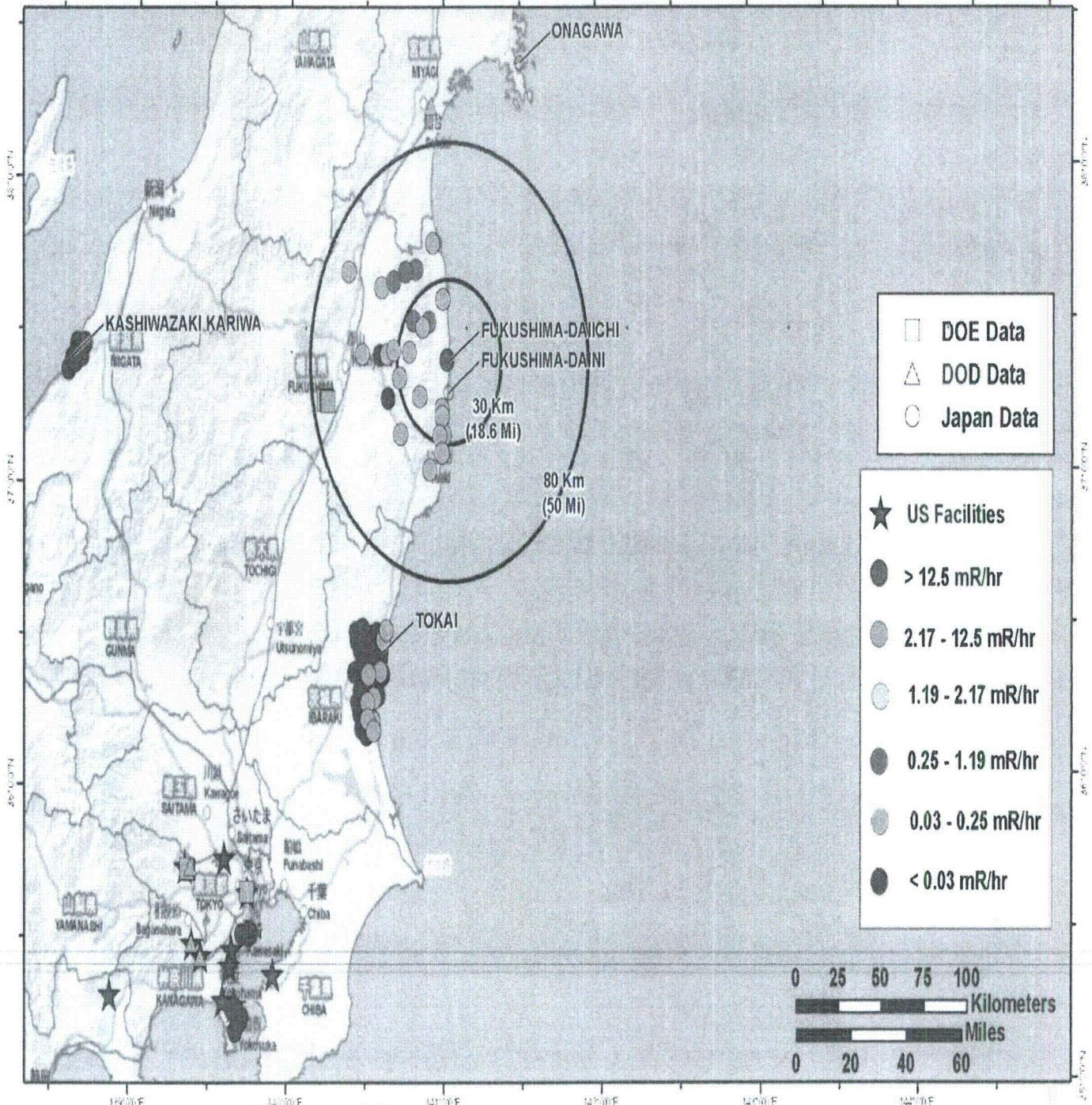
AMS monitoring results in areas beyond 25 miles from the Fukushima Daiichi reactors show areas where dose rates are many times higher than historical background.

The measured external dose rates in these areas are not high enough to warrant evacuation or relocation of the population, however, lower levels of radioactive contamination in agricultural products provide more of a risk because the radioactive material can be ingested into the body. Agricultural monitoring in these areas may be warranted.

◆ Areas 10 to 100 times historical background are indicated by green.

◆ Areas 2 to 10 times historical background are indicated by light blue.

◆ Areas at or near historical background are indicated by dark blue.



Map created on 04032011 1430 JST
Name: NIT 24hrsMonitoringResults 02Apr2011 1300

UNCLASSIFIED

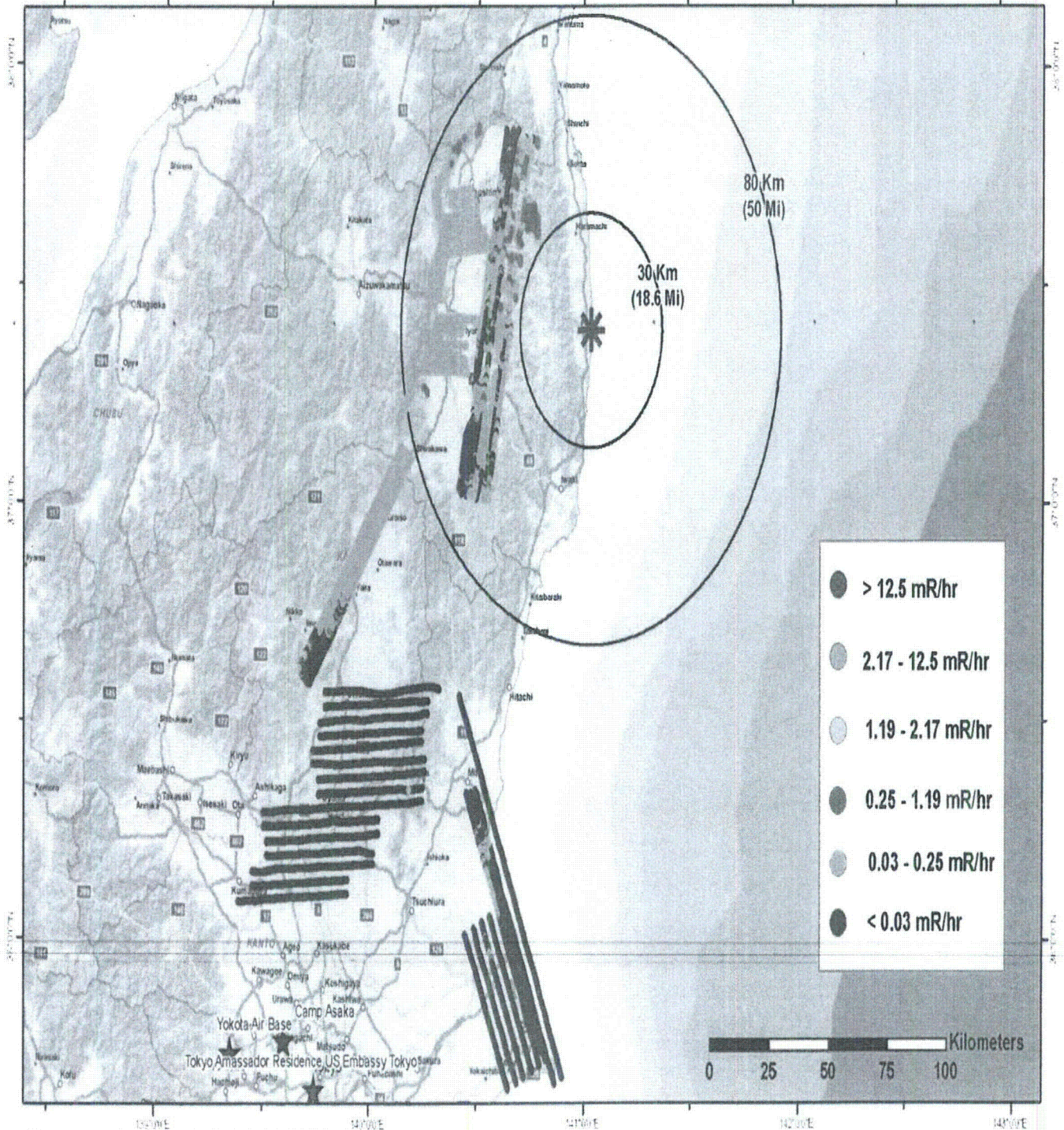
Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100

Official Use Only



Aerial Monitoring Results Combined Flights (April 01 and April 02, 2011)

FUKUSHIMA DAIICHI JAPAN

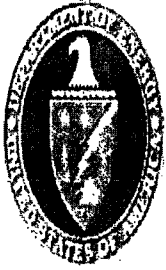


Map created on 04032011 0530 JST
Name: NIT Combined Flight Results 01-02Apr2011

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Aerial and Ground Monitoring Data Assessment

Assessment:

- ◆ An assessment of measurements gathered through 02 April continue to show:
 - Radiation levels consistently below actionable levels for evacuation or relocation outside of 25 miles
 - Radiological material has not deposited in significant quantities in the areas measured since 19 March

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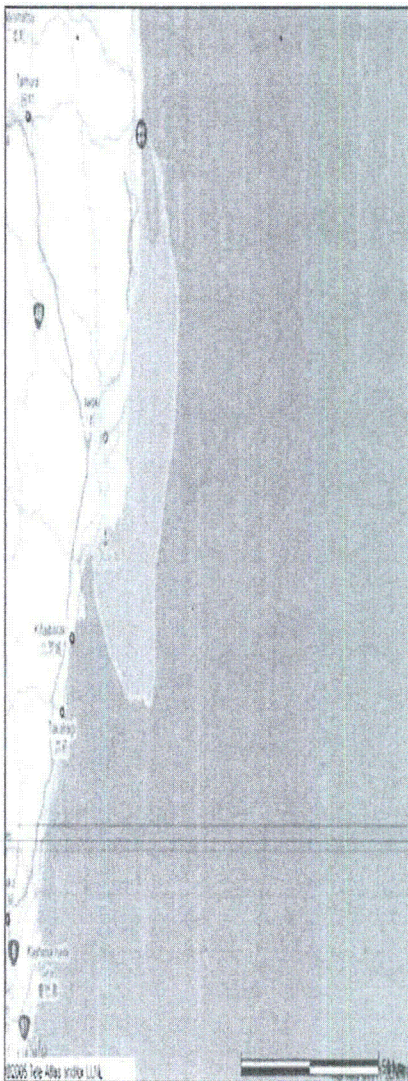


Official Use Only

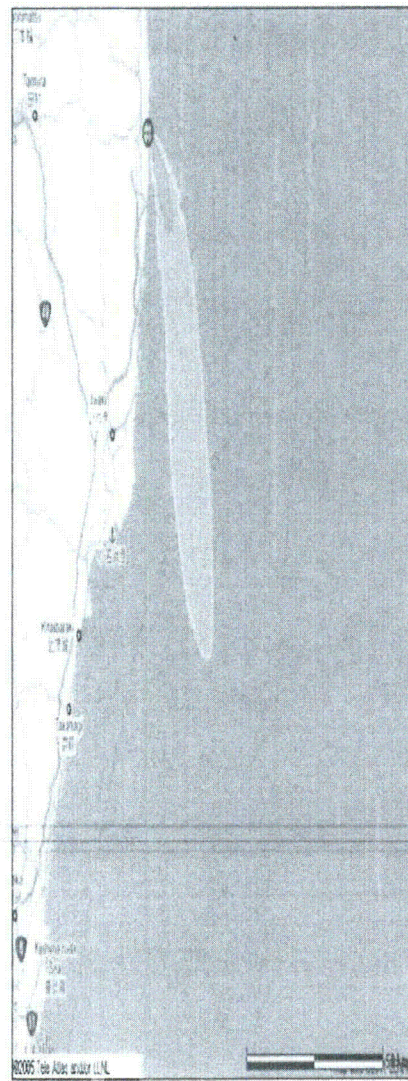
Forecasted Weather

April 4, 2011

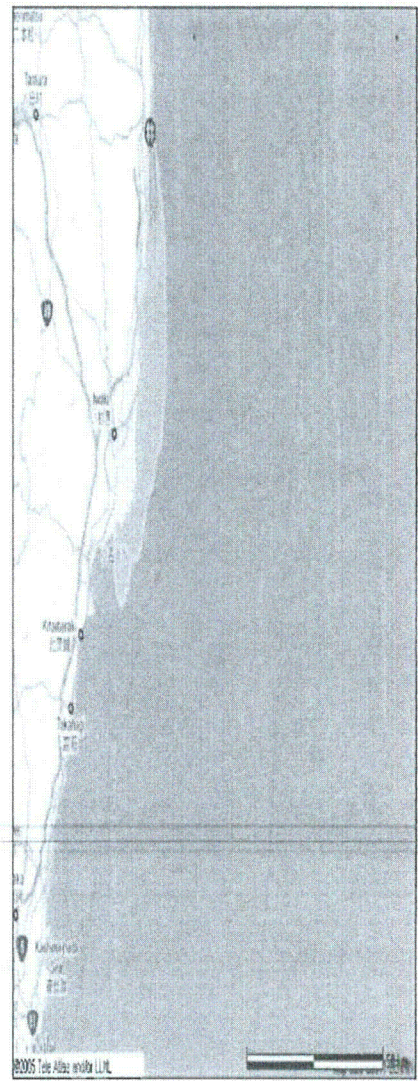
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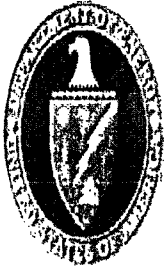
04/04/2011 07:00:00 JST



04/04/2011 16:00:00 JST



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Planned Operations: Next 24 Hrs

- ◆ Aerial Monitoring
 - AMS UH-1: Aircraft not available tomorrow per USAF
 - AMS HH-60: TBD
 - AMS C-12: Continue to fly in the valley from the south near Shirasaka to the mountains on the west side, north to Shiroy east to the ocean.

- ◆ Ground Monitoring
 - Specific assignments TBD
 - Complete beta/gamma exposure rate surveys. Radio nuclide evaluations are to include in-situ measurement assessment of gamma isotopes.

- Continue joint Monitoring and Assessment planning with DoD (US AFRAT)
- Meeting (4 April) with MEXT on technical cooperation for monitoring and sampling

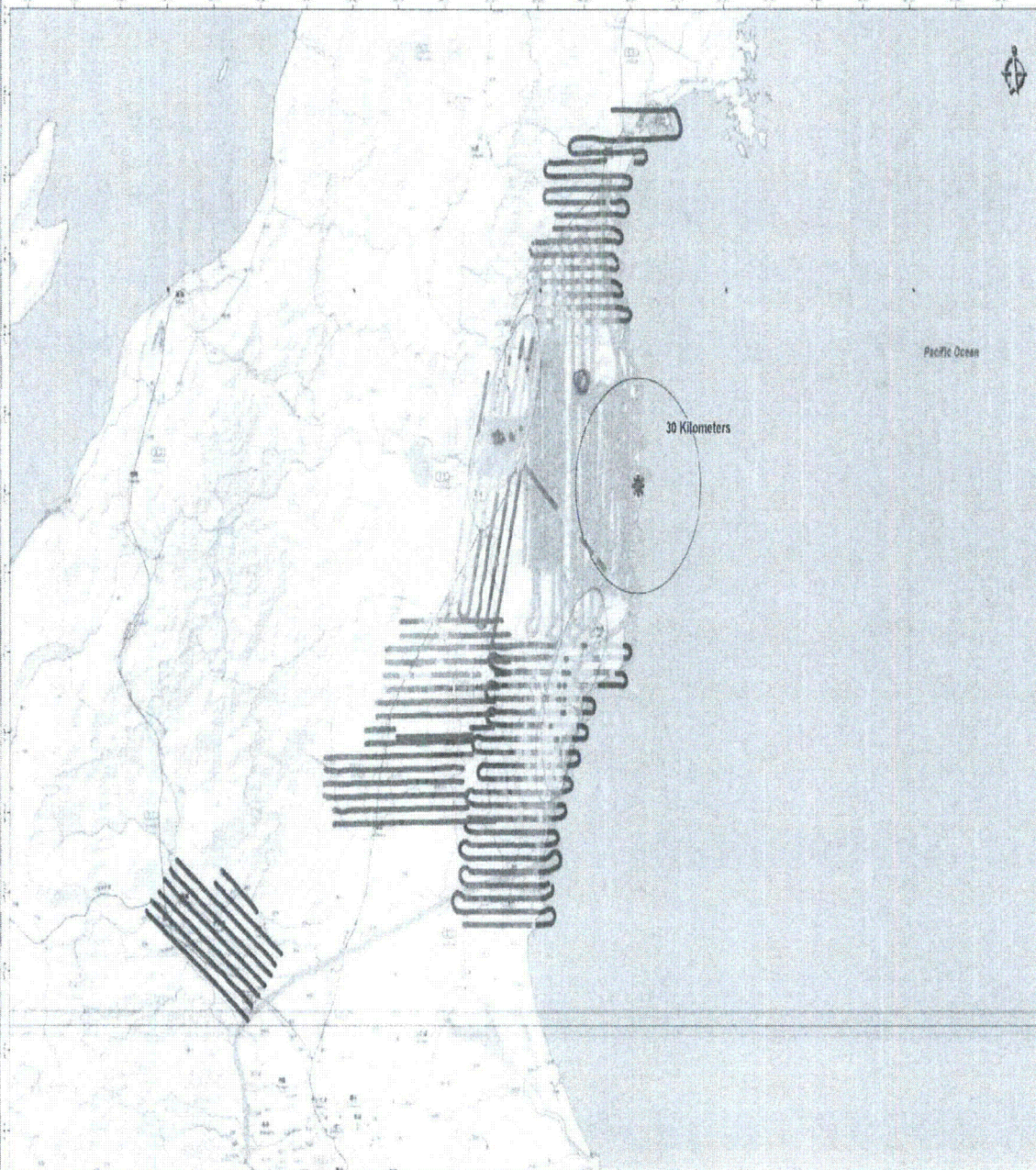
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Aerial Monitoring Results

C-12 & UH-1 Survey Dates: 28-30 March 2011

FUKUSHIMA DAIICHI
JAPAN



* Fukushima Daiichi
Aerial Data- 6 Flights
Exposure Rate at 1 meter ($\mu\text{R/hr}$)

- < 582
- < 500
- < 300
- < 200
- < 150
- < 100
- < 60
- < 30
- < 10

- The colors represent a significantly lower exposure rate than on previous maps.
- The range of exposure rates are based on limitations of aircraft system sensitivity not based on specific regulatory limits.

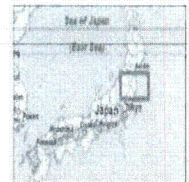
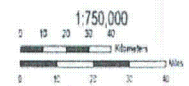
Technical Considerations and Notes:

- This product is a conservative estimate based upon the assumption that all material is deposited along the ground. This assumption may overestimate the ground level exposure rate by an order of magnitude.
- An attempt has been made to remove the effect of radiation sources not of terrestrial nature. However, significant material remains suspended in the air and continues to be emitted from the NPP. This product does not correct for this effect in a spatially dependent manner.
- Caution should be used when correlating aerial measurements to ground based measurements and activities at specific locations.
- A restriction has been added for deviations in height above ground level based on altitude and the local topography.

~~Not For Public Distribution~~

Flight Information:
C-12 Nominal Altitude at 2000 ft Above Ground Level, Speed 140 knots
UH-1 Nominal Altitude at 500 ft Above Ground Level, Speed 70 knots
This map was produced by the Geographic Information Systems department of NNSA's Remote Sensing Laboratory (RSL) at Nellis AFB, Las Vegas, Nevada. HSP Gold 2010, ESRI World Street Map, and CRHT databases were used for map generation.

RSL map identification number is:
C12AgriculturalImpact@PathPlot_2011.mxd



Map created on 3/30/2011 08:35:50 PM JST
Check for revision in 12 hours

Nuclear Incident Team DOE NIT
Contact (202) 586 - 8100